Contents

FIGURES .................................................................................................................. V
TABLES ................................................................................................................... V
BOXES .................................................................................................................... VI
IMAGES .................................................................................................................. VI
IMAGE GROUPS ...................................................................................................... VII
ACRONYMS AND ABBREVIATIONS ..................................................................... VII
ACKNOWLEDGEMENTS ......................................................................................... VIII
HOW TO USE THE ST. EUSTATIUS MARINE PARK MANAGEMENT PLAN ........ IX
SUMMARY .............................................................................................................. X
IMPLEMENTATION AND REVISIONS ................................................................. XIII
INTRODUCTION ................................................................................................... XIV
STENAPA and the Parks of St Eustatius ................................................................ xiv
Purpose of the Management Plan ......................................................................... xv
Adaptive management and timeframes ................................................................... xv

PART 1: ST. EUSTATIUS BACKGROUND INFORMATION ........................................ 16
LOCATION ............................................................................................................. 17
HISTORY AND CULTURE ...................................................................................... 19
History .................................................................................................................... 19
Culture ................................................................................................................... 21
Population ............................................................................................................ 23
POLITICS AND ECONOMICS ............................................................................. 25
Politics .................................................................................................................. 25
Economy ............................................................................................................... 25
Economic development ......................................................................................... 27
CLIMATE ............................................................................................................... 31
GEOLOGY AND GEOMORPHOLOGY ................................................................. 35
OCEANOGRAPHY ................................................................................................ 38
TERRESTRIAL FLORA AND FAUNA ................................................................. 40
Flora ....................................................................................................................... 40
Fauna ...................................................................................................................... 41
MARINE HABITATS, FLORA AND FAUNA .......................................................... 43
Open Water ............................................................................................................ 44
Seabed – Seagrass ................................................................................................. 46
Seabed – Sand and Algae ...................................................................................... 48
Seabed - Coral reefs ............................................................................................... 49
Intertidal -Beaches ................................................................................................ 56
Intertidal - Rocky shores ....................................................................................... 61
SPECIAL INTEREST SPECIES ............................................................................. 63
HUMAN USE OF THE MARINE ENVIRONMENT ............................................... 64
Tourism and recreation ......................................................................................... 64
Fisheries ............................................................................................................... 65
Artificial reefs ...................................................................................................... 66
Shipping/ industry ................................................................................................. 67
REFERENCES ......................................................................................................... 69

PART 2: MANAGEMENT ENVIRONMENT ............................................................... 70
INTRODUCTION .................................................................................................... 71
ST. EUSTATIUS MARINE PARK ........................................................................... 72
Activities of the Marine Park ................................................................................ 72
STATEMENT OF SIGNIFICANCE AND VALUES .............................................. 76
Statement of significance ...................................................................................... 76
A summary of values associated with St. Eustatius Marine Park ......................... 77
VISION, MISSION AND GOALS .......................................................................... 79
VISION ................................................................................................................... 79
MISSION ............................................................................................................... 79
GOALS .................................................................................................................. 79
ZONING ................................................................................................................ 81
Zone location ........................................................................................................ 81
Table 11 A summary of the information sources available to St Eustatius Marine Park
Table 8 Summary of the staff involved with St Eustatius Marine Park
Table 7 Institutional provisions for St Eustatius Marine Park
Table 6 General marine ecosystem values
Table 5 IUCN Red List Species found within St Eustatius Marine Park
Table 4 Hurricanes and tropical storms to affect St. Eustatius since 1960.
Table 3 IUCN Red List Species found with and adjacent to St Eustatius Marine Park
Table 2 Hurricanes and tropical storms to affect St. Eustatius
Table 1 Fish prices per target species on St. Eustatius

Figures
Figure 1 St. Eustatius and the other Dutch Caribbean islands
Figure 2 The main features of St. Eustatius
Figure 3 Copper engraving of St. Eustatius
Figure 4 Statia’s Flag
Figure 5 Population density of the Dutch Caribbean Islands
Figure 6 Population growth
Figure 7 Emigration and immigration
Figure 8 The population of St Eustatius since 2000
Figure 9 Population pyramid for St Eustatius from 1995
Figure 10 Population pyramid 2005
Figure 11 Contribution to the GDP of St Eustatius by the Government and Private enterprises.
Figure 12 % change in GDP 1996-2003
Figure 13 Contribution of different sectors to the economy on St Eustatius
Figure 14 Visitor numbers to St Eustatius 2004 – 2006
Figure 15 Average Precipitation and Temperatures
Figure 16 Wind rose
Figure 17 The Antilles Current
Figure 18 The Caribbean current
Figure 19 The distribution of key marine habitats around St Eustatius
Figure 20 Seagrass succession diagram
Figure 21 Number of divers registering with St Eustatius Marine Park
Figure 22 Map of St Eustatius Marine Park including buoys
Figure 23 The location of the reserves in St Eustatius Marine Park
Figure 24 Anchorage zones for Bunker vessels with draft up to 15m
Figure 25 Mini guides published for STENAPA
Figure 26 Main sources of grant funding for STENAPA in 2006
Figure 27 Division of Fees income for STENAPA
Figure 28 Questionnaire responses 1: Most important aspects of the Marine Park
Figure 29 Questionnaire responses 2: Activities in the Marine Park
Figure 30 Questionnaire responses 3: Issues for the Marine Park
Figure 31 Questionnaire responses 4: Use of Marine Park Facilities
Figure 32 Top 15 issues identified through the management success project
Figure 33 Hierarchy of issues raised by the stakeholder consultations for St Eustatius Marine Park

Tables
Table 11 A summary of the information sources available to St Eustatius Marine Park
Table 12 STENAPA finances for 2006........................................................................................................101
Table 13 Current and proposed fees systems for users of the STENAPA Protected Area’s. .................102
Table 14 Stakeholders of St Eustatius Marine Park. ............................................................................103
Table 15 Stakeholder consultation methods. .........................................................................................104
Table 16 Grading of management success issues .............................................................................114
Table 17 Grading of threats recognised by St Eustatius Marine Park stakeholders. ......................115
Table 18 A hierarchical list of the threats and issues facing St Eustatius Marine Park. ..........................116

Boxes
Box 1 Definitions of key terms used in section 2 .............................................................................71
Box 2 Questions asked in the stakeholder questionnaire. ...............................................................109
Box 3 Historical issues with fisheries. ...............................................................................................112
Box 4 Key issues/threats facing St Eustatius Marine Park. ..............................................................120

Images
Image 1 The cannons at Fort de Windt with St Kitts in the background, ........................................20
Image 2 The placard commemorating the 225th anniversary of the first salute .............................20
Image 3 Roaming goats are herded for personal consumption. .........................................................27
Image 4 Statia Terminals NV Oil storage facility ............................................................................28
Image 5 Statia Terminals main pier ................................................................................................28
Image 6 Lobster and Image 7 Conch, the most frequently targeted species in St. Eustatius. ..........29
Image 8 The Quill ................................................................................................................................31
Image 9 An oblique aerial photograph of St Eustatius ....................................................................35
Image 10 The inside of the Quill crater with steep cliffs and lush vegetation ...................................35
Image 11 White Wall viewed from the sea .........................................................................................36
Image 12 White Wall from land ........................................................................................................36
Image 13, Image 14 Eroding cliffs at Kay Bay showing distinct layers of rock ...............................37
Image 15 Contrasting coastlines of the high energy windward shore .............................................39
Image 16 Low energy on the leeward shore .....................................................................................39
Image 17 Thick forest around The Quill .........................................................................................40
Image 18 Dolphin fish ......................................................................................................................44
Image 19 Spotted Eagle Ray ............................................................................................................44
Image 20 Flying Gurnard ..................................................................................................................47
Image 21 Turtles on Seagrass ...........................................................................................................47
Image 22 French Grunts ....................................................................................................................49
Image 23 Spur and Groove Reef / Lava fingers ................................................................................52
Image 24 Boulder is an example of patch reef on the West Coast ..................................................53
Image 25 Barracuda Reef – gently sloping basalt .........................................................................53
Image 26 Black coral (Antipathes sp) .............................................................................................54
Image 27 The beach at Lynch Bay ......................................................................................................56
Image 28 Zeelandia Beach looking towards The Quill ......................................................................56
Image 29, Image 30 Photographs illustrating the changes in the beach shape at Oranje Bay. .........59
Image 31 The Breakwater structure at the harbour .........................................................................59
Image 32 The beach in Oranje Bay on 19th February 2005 .............................................................60
Image 33 Turtle nesting beaches of St Eustatius ............................................................................60
Image 34 Corre Corre Rocky Shore on the Windward coast of St. Eustatius .................................61
Image 35 Rocky shore developed as a landing area for Statia Terminals N.V. ................................62
Image 36 Natural Rocky Shore to the south of Oranjebaai ..........................................................62
Image 37 Hawksbill Turtle ................................................................. 63
Image 38 The endangered Lesser Antillean Iguana ......................................................... 63
Image 39 Tourists during the final stages of a dive ......................................................... 64
Image 40 A diver at Mushroom Gardens dive site ......................................................... 64
Image 41 A ranger and a fisherman remove an Eagle Ray from a net ................................. 65
Image 42 Fishing traps are used frequently within St Eustatius Marine Park .................. 65
Image 43 Thriving Coral Reef of St Eustatius Marine Park ........................................... 76
Image 44 Reserve marker buoy, Image 45 Anchor damage to the reef reduces biodiversity. 81
Image 46 Ranger Radio Spanner in uniform .................................................................... 85
Image 47 Sea Turtle Programme Co-ordinator Arturo Herrerain uniform ......................... 85
Image 48 Guidelines published at the Airport .................................................................. 92
Image 49 Zeelandia Beach Signage ................................................................................. 92
Image 50 Image 51, Two species of grouper .................................................................. 117

Image Groups
Image Group 1 Colours of St. Eustatius annual Carnival ............................................. 21
Image Group 2 Hurricane tracks ................................................................................... 34
Image Group 3 Terrestrial Plants .................................................................................. 40
Image Group 4 Terrestrial Invertebrates ..................................................................... 41
Image Group 5 Terrestrial Vertebrates ........................................................................ 42
Image Group 6 Sandy habitat animals ........................................................................ 48
Image Group 7 Reef Animals ....................................................................................... 51
Image Group 8 Bleached coral ..................................................................................... 54
Image Group 9 Reefball structures .............................................................................. 57
Image Group 10 Reef Degredation ............................................................................... 58
Image Group 11 Artificial Reefs .................................................................................. 66
Image Group 12 Statia Terminals ................................................................................ 68
Image Group 13 Activities of St Eustatius Marine Park .............................................. 74
Image Group 14 STENAPA’s new offices .................................................................... 75
Image Group 15 Physical Resources ........................................................................... 98

Acronyms and Abbreviations

AGGRA Atlantic and Gulf Rapid Reef Assessment (Caribbean wide study of coral reef health)
CITES Convention on International Trade in Endangered Species of Wild Fauna and Flora
DCNA Dutch Caribbean Nature Alliance
IUCN World Conservation Union (formerly International Union for the Conservation of Nature and Natural Resources)
MARPOL International Convention for the Prevention of Pollution from Ships
MINA Central Government Department of Nature and the Environment
MP Marine Park
MPA Marine Protected Area
PA Protected Area
SPAW Specially Protected Areas and Wildlife – Annex of the Cartagena Convention
STENAPA St. Eustatius National Parks Foundation
UNEP United Nations Environment Programme
WCPA World Commission on Protected Areas
WWF World Wide Fund for Nature
## Acknowledgements

This plan could not have been completed without the cooperation and enthusiastic support of a number of individuals and organisations. This includes the stakeholders of St. Eustatius Marine Park who attended the meetings during 2007 or contributed directly to the management plan;

<table>
<thead>
<tr>
<th>Group</th>
<th>Individuals</th>
</tr>
</thead>
<tbody>
<tr>
<td>NGO groups</td>
<td>Gay Soetekouw, President St Eustatius Historical Foundation</td>
</tr>
<tr>
<td></td>
<td>Grant Gillmore, Island Archaeologist, SECAR</td>
</tr>
<tr>
<td></td>
<td>Jo Gillmore, Archaeologist, Consultant to the historical foundation</td>
</tr>
<tr>
<td></td>
<td>Karen Eckert, WIDECAST</td>
</tr>
<tr>
<td>Town fishermen</td>
<td></td>
</tr>
<tr>
<td>Staff</td>
<td>The Staff and Board of STENAPA</td>
</tr>
<tr>
<td>Harbour</td>
<td>Mervin Gittens, Harbour Master</td>
</tr>
<tr>
<td></td>
<td>Austin van Heyningen, Assisstant Harbour Master</td>
</tr>
<tr>
<td></td>
<td>Andre Gittens, Security Department</td>
</tr>
<tr>
<td></td>
<td>Gilberto Maduro, Operations Department</td>
</tr>
<tr>
<td>Law Enforcement</td>
<td>Inspector Harold Look, Chief Inspector of Police, St Eustatius</td>
</tr>
<tr>
<td>Industry/business</td>
<td>Koos Sneek, Director, St Eustatius Business Association (STeba)</td>
</tr>
<tr>
<td></td>
<td>Henk Soetekouw, Chief Pilot, Statia Oil Terminal</td>
</tr>
<tr>
<td>Dive and snorkel operators</td>
<td></td>
</tr>
<tr>
<td>Tourism</td>
<td>Alida Francis, Director</td>
</tr>
<tr>
<td></td>
<td>Roland Lopes</td>
</tr>
<tr>
<td></td>
<td>Jerry A-Kum, Product development and research manager</td>
</tr>
<tr>
<td>Government Departments</td>
<td></td>
</tr>
<tr>
<td>Schools of St Eustatius</td>
<td></td>
</tr>
<tr>
<td>Community</td>
<td>Community members of St Eustatius who took part in the stakeholder input.</td>
</tr>
<tr>
<td>Researchers / interns</td>
<td>Liz Hartel</td>
</tr>
</tbody>
</table>

Other individuals we would like to thank are Brenda S and R. Duncan Kirkby, Kalli De Meyer and Todd Barber for the use of their photographic material. As well as the peer reviewers:

Floyd Homer  
WCPA Regional Vice Chair for Caribbean  
President, The Trust for Sustainable Livelihoods

Anne Walton  
WCPA Member, Management Plan Review Coordinator/ MPA Management Capacity Building Coordinator, NOAA National Marine Sanctuary Program
How to use the St. Eustatius Marine Park Management Plan

The St. Eustatius Marine Park Management plan has been designed to be a dynamic document, accessible via hard copy, electronic copy and relevant websites. It should be kept up to date with additional material to allow adaptive management as situations and issues change and management actions succeed. The plan has 4 parts:

Part 1: St. Eustatius Background Information.

The physical, social and political environment that St. Eustatius Marine Park works within greatly influences the operations of the protected area. Those using the management plan may not be aware of the stage upon which St. Eustatius Marine Park operates and can refer to this section for background information. Technical terms are explained in the text and names of plants and animals are given as the common name in English, followed by local and scientific names where appropriate.

*Part 1 provides valuable background and contextual information. It can be used as a stand alone introduction to the island and MPA and has been written with a range of audiences in mind.*

Part 2: Management environment.

This is the first part of the working document which states the significance, mission and goals of St. Eustatius Marine Park. Resources available to St. Eustatius Marine Park are described, including the legal instruments, institutional arrangements, human and physical resources. The main issues facing St. Eustatius Marine Park are detailed and described before being summarised.

*Part 2 will be of interest to those wishing to develop a more in depth understanding of the operational management and issues facing the MPA.*


In part 3 the actions that St. Eustatius Marine Park need to take to work towards the mission and goals are clarified. Day to day activities of the MPA staff are outlined, and actions are recommended to tackle the management issues and external issues identified in Part 2 that St. Eustatius Marine Park faces.

*Part 3 is of concern to those with an interest in the current activities of St. Eustatius Marine Park and the rational behind actions being taken.*

Part 4: Additions and Developments.

The final part of the plan is intended to act as a place marker for updates, where management actions have led to outcomes that can be described or there has been a change in the tools available to the MPA. This section needs to be kept up to date so that staff can work from the proposed actions and work schedule, and so any interested party can pick up the whole plan and have a thorough understanding of St. Eustatius Marine Park from the context through to the most recent management actions.

*Part 4 is to be used by the management body to keep the management plan up to date; its contents are unlikely to be available until the plan has been formally updated.*
The St. Eustatius Marine Park was created in 1996 and extends around the entire island from the high water line to 30m depth contour. St. Eustatius lies in the North Eastern Caribbean (17º 49'N, 62º 98'W) within the Lesser Antilles island group. The island is volcanic, and ancient weathered volcanic cones dominate the landscape including The Quill (600m) in the South and Boven (289m) in the North West. St. Eustatius is part of the Kingdom of the Netherlands and is regarded by the European Union as an overseas territory. The marine park falls entirely within the territorial waters and jurisdiction of St. Eustatius and is protected by the Marine Environment Ordinance which was passed in 1996. For issues related to international treaties, threatened and endangered species, migratory species and marine pollution the Central Government Department of Nature and the Environment (MINA) also has jurisdiction.

The St. Eustatius Marine Park covers an area of 27.5 km² and protects a variety of habitats, including pristine coral reefs (drop off walls, volcanic ‘fingers’ and ‘bombs’, spur and groove systems), 18th century shipwrecks and modern-day artificial reefs to promote fishing and dive tourism (including a 100m cable-laying ship). Within the Park are two actively-managed Reserves in which no fishing or anchoring is permitted to conserve marine biodiversity, protect fish stocks and promote sustainable tourism. In addition to regular mooring maintenance (dive, snorkel and yacht sites), patrols and research, the Marine Park works closely with three local dive centres to ensure that diving practices minimise impact on the reef. Statia’s marine environment is a home, migratory stop over or breeding site for 4 IUCN Red List Species, 10 CITES Appendix I species and 98 Appendix II species.

The Marine Park is managed by a local non governmental, not for profit foundation (‘stichting’) called St Eustatius National Parks Foundation (STENAPA) incorporated in the Netherlands Antilles on 21st November 1988 and first registered with the St Maarten Chamber of Commerce and Industry on the 28th August 1995 (registration #80371). STENAPA has a co-management structure with stakeholders, conservationists and other interested parties on the board. The management of the marine park is carried out by the Parks Manager and the park rangers. Two office administrators also work on the marine park administration and organisation and an education and outreach officer is shared with the nearby Dutch Caribbean islands of Saba and St Maarten.

The mission of the marine park is to manage and conserve natural, cultural and historical marine resources of St. Eustatius for sustainable use with continued stakeholder participation, for the benefit of current and future generations.

This is the second management plan for the St. Eustatius Marine Park. The first management plan was written in 1997 by The CARMABI Foundation and Marine and Coastal Resource Management Saba with financial support from the KNAP fund. The rapid development of the Marine Park and the successes in management have highlighted the need for a strategic document to consolidate management decision making and to define the mission, goals and objectives of the park.
Management planning and a clear strategy for management is a prerequisite if the park is going to begin monitoring its own effectiveness.

Extensive stakeholder consultation identified key external and management issues which need to be addressed within the timeframe of this management plan:

<table>
<thead>
<tr>
<th>External Issues</th>
<th>Management Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Artisanal fishing</td>
<td>Sustainable financing</td>
</tr>
<tr>
<td>Bleaching</td>
<td>Stakeholder ownership</td>
</tr>
<tr>
<td>Commercial shipping</td>
<td>Presence and enforcement</td>
</tr>
<tr>
<td>Development</td>
<td></td>
</tr>
<tr>
<td>Diving / snorkelling</td>
<td></td>
</tr>
</tbody>
</table>

This document has been prepared in close consultation with STENAPA, their management and staff and a considerable number of stakeholders and stakeholder group representatives. The plan specifies management goals and strategies for the St. Eustatius Marine Park related to the park’s mission and goals. It also identifies the major existing and potential threats and issues facing the park from ecological, social and cultural perspectives. It is designed to provide a framework for developing transparent adaptive management processes.

**Strategic Summary**

The following table summarises the Goals of the Marine Park, the main issues and how the proposed actions address the goals and issues.

<table>
<thead>
<tr>
<th>Goals</th>
<th>Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Manage St. Eustatius’ marine environment successfully as a regionally and globally significant protected area, within an effective legislative framework and with commitment from stakeholders.</td>
<td>Artisanal fishing</td>
</tr>
<tr>
<td>2) Conserve, through practical conservation and active management; a) the natural values of the marine park, including threatened, rare and endangered species, habitats, water quality, biological diversity, ecosystem processes and aesthetic values. b) the cultural and historical marine resources of St Eustatius.</td>
<td></td>
</tr>
<tr>
<td>3) Ensure the promotion of the marine environment as a traditionally and contemporarily valuable, sustainable, multiple use resource whilst establishing rules, guidelines, permits and enforcing legislation for different users.</td>
<td></td>
</tr>
<tr>
<td>4) Ensure the involvement of the local community and stakeholders, to cultivate a sense of ownership, improved information base and support for the zoning, regulations and management practices of St. Eustatius Marine Park.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>Addressed Goals</th>
<th>1</th>
<th>2a</th>
<th>2b</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address conflict between fishermen and other users</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaluate commercial shipping impacts</td>
<td>✓ ✓ ✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Promote sustainable development on St Eustatius</td>
<td>✓ ✓ ✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ensure diving and snorkelling activities are sustainable and safe</td>
<td>✓ ✓ ✓ ✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monitor and evaluate coral bleaching</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design and implement a comprehensive zoning plan</td>
<td>✓ ✓ ✓ ✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Establish sustainable financing mechanisms</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increase sense of ownership amongst key stakeholders</td>
<td>✓ ✓ ✓ ✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enhance presence and enforcement</td>
<td>✓ ✓ ✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Peer Reviews**

We are very grateful to the following for spending considerable amounts of time reviewing the final draft of the St. Eustatius Marine Park Management Plan and providing detailed feedback. The feedback received can be seen in Appendix 12, and is summarised below. The points raised have been taken into account where possible or will be considered during the review of this plan.

### Floyd Homer

**WCPA Regional Vice Chair for Caribbean**  
**President, The Trust for Sustainable Livelihoods**

**Summary**

The Management Plan is well written with an easy to follow style and lots of relevant background and explanatory information. The range of management issues are clearly identified and the priority actions are unambiguous.

**Key points**

1. Further stakeholder analysis required
2. Key management issues:
   - Misunderstanding of rights (roles and responsibilities) of various users of the MPA.
   - Limited ability of MPA staff to enforce regulations or management prescriptions.
   - Insufficient staffing and resources to patrol and manage the MPA.
   - Poor communication between Board and the Staff, and between staff and other stakeholders.
3. The questionnaire results indicate a lack of use of the marine park facilities by the Community and the Schools. This may be significant.
4. Different methods of engaging with stakeholders should possibly be explored
5. Where possible the implementation of priority action points should be outlined.

### Anne Walton

**WCPA Member, Management Plan Review Coordinator/ MPA Management Capacity Building Coordinator, NOAA National Marine Sanctuary Program**

**Summary**

Overall, this is an excellent management plan, well organised and clearly articulated.

**Key points**

1. Consider including a socioeconomic profile in the future
2. Identify target resources for special protection measures.
3. Consider interpretive enforcement as a tool to complement law enforcement.
4. What seems to be missing is management effectiveness indicators, corresponding monitoring programmes and an adaptive management framework.
Implementation and revisions

The master copy of this document is the property of the manager of St Eustatius Marine Park

Use

This management plan should be used as an outreach tool and to guide management decisions in the coming 3-5 year period. The actions recommended in the plan should form the starting point for developing clear, measurable objectives for each issue that currently faces the marine park. A framework for this is provided in this part of the plan, as suggested by expert review.

Distribution

The document is available as a whole document and in sections (for ease of uploading to the STENAPA website). The document is also available in Microsoft WORD and PDF formats. The St Eustatius Marine Park Management Plan should be accessible via; the website, hard copy, electronic copy (CD, DVD for large files or direct transfer with other media).

Additions and developments

When anything changes that is included in the management plan, the change should be added to the additions and developments section of the Master Plan. To save time and enable easy updates, this should be done as frequently as possible.

- **Methods:** Save any additions onto hard drive and burn them onto CD as needed, or add hard copies to the back of the plan (Part 4) where pockets, zip pockets and CD storage is available.
- **Include:** New work plans and annual schedules, Budget, New research, Projects, Staff CV’s when new members recruited, Legislation passed, useful photographs any other relevant information

If any sheets are lost from the management plan, print them out and replace them.

Updates

The life span of this management plan is 3-5 years depending on the changes experienced by STENAPA and the marine park over time. Updates to Part 3 should be made (or at least added to part 4) once a year. The plan should be reviewed in detail with stakeholder input at the earliest in mid 2010, but no later than mid 2012. The recommended update framework is provided in the introduction to the management plan.

Appendices

Full appendices for the management plan are available on disk at the back of this manual. The appendices should also be uploaded to the STENAPA website to enable stakeholders and interested parties to access the main information relating to St Eustatius Marine Park.
Introduction

STENAPA and the Parks of St Eustatius

STENAPA is the only organisation on St Eustatius with a mandate for environmental protection. STENAPA is legally mandated by the Island Government to manage all the island’s protected areas (the Statia Marine Park, the Quill/Boven National Park as well as a young Botanical Garden) on the 21km² island of St Eustatius.

STENAPA is a non governmental, not for profit foundation (‘stichting’), the foundation was set up in 1988 and operational from that date. Due to a funding requirement that it registered with Chamber of Commerce in 1995. The mission of STENAPA is; ‘The acquisition, preservation, protection and administration of parcels of land/water on St Eustatius, worthy of preservation, due to:

• Scenic beauty and/or the presence of flora and fauna important in scientific or cultural respects or valuable from a geological or historical point of view;
• Its purpose to serve for the well-being, the education and the recreation of the St Eustatius population as well as that of visitors, all this with due observance of the primary requirement of preservation.’

The foundation aims to achieve its mission through:

• Purchase or acquisition of individual areas of land/water and the buildings possibly constructed thereon;
• Administration, development and protection of these areas to do full justice to the preservation of nature, and scientific and cultural values and to the well-being of visitors;
• Making these areas accessible to persons and institutions, who wish to visit to perform scientific studies, or for educational or recreational purposes;
• Execution or stimulation of scientific research on these areas, for the benefit of science itself and the benefit of preservation of the natural and cultural values of these areas.

The marine park encompasses the waters surrounding St. Eustatius down to the 60m depth contour. Within the Marine Park, there are two marine reserves (the Northern and Southern Reserves). No fishing or anchoring is allowed in these areas in order to protect the coral reefs. The majority of the coral reef area around Statia is contained within the Reserves. Throughout both reserves, dive moorings are maintained to prevent people from anchoring, while still allowing them the opportunity to enjoy diving on the reefs. The Reserves were set up to conserve marine biodiversity, restore dwindling fish stocks, promote sustainable tourism, and safeguard the marine ecosystem.

There is currently no management of the catchments on St. Eustatius that drain into the marine environment. Integrated catchment and coastal management is essential for the future well being of St. Eustatius’ natural resources since activities on land directly affect the water around St. Eustatius.

STENAPA staff include the parks manager, two office administrators, 4 national park rangers and a Sea Turtle Programme Coordinator supported by an 9 member Board. The Manager started to manage STENAPA at a time of financial uncertainty, and was forced to close the park doors in October 2003 when grant funding came to an end. STENAPA was able to fundraise substantially and work closely with the Island Government to re-open shortly after. Since 2003, the main drive has been for STENAPA to gain long-term financial security, to professionalize with a centralised work place and well-trained staff, and enhance public awareness through media and stakeholder meetings.

STENAPA manages and implements a variety of projects as well as Public Awareness and Education programmes in addition to carrying out the core management activities required to operate the protected areas of St Eustatius and the Botanical Gardens. Typically the projects have a fixed timeframe and are often funded by outside agencies. Projects can be research-orientated, designed to influence policy or to develop public awareness about environmental issues. Current projects include: a sea turtle satellite tracking project, fish population surveys and artificial reef projects. Terrestrial projects being managed by STENAPA include invasive flora and fauna management and an anti-plastics campaign.
**Purpose of the Management Plan**

This document will clearly define the goals and objectives of the Marine Park, and state the management objectives and strategies which will allow the Marine Parks successes to be highlighted and its management effectiveness to be assessed. It will also assist both staff and Board by providing a solid framework for reference, decision making and planning. The management plan will also ensure continuity of management effort and allow stakeholders and other interest groups to understand and participate in the planning process. According to IUCN management plans are an essential step towards ensuring the proper management of protected areas.

The terms of reference for a management plan were agreed in December 2006. Background information collection and preparation for stakeholder consultations started in January 2007.

**Adaptive management and timeframes**

The St. Eustatius Marine Park management plan provides a framework for the formulation of performance agreements for the marine park manager and staff, which will aid the ongoing evaluation of management successes. For this management plan to serve the needs of St. Eustatius Marine Park, it is vital that it is periodically reviewed and updated. Stakeholders are also keen to see a review process adopted.

It is recommended that Part 1 of this plan is updated every 3 years, and parts 2 and 3 of this plan are reviewed together on an annual basis. Necessary updates should then be added in section 4. Stakeholder input to the running of the St. Eustatius Marine Park will be an ongoing process. It is recommended that formal stakeholder input regarding the effectiveness of the management plan is carried out every 3 years, in conjunction with the revision of Part one.

The main working document of the management plan will be assembled in a handbook type folder with the extensive appendices included on a CD-ROM. This will kept and updated by the manager of the marine park, with other copies being made available through the website and on request.

The recommendations above for reviewing and revising the Management Plan should be seen as guidelines. After the management planning and review process has been consolidated, revisions may become less frequent and/or more specific.

<table>
<thead>
<tr>
<th>SECTION</th>
<th>TIME PERIOD</th>
<th>PEOPLE INVOLVED</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,2,3,4</td>
<td>Every 3-4 years</td>
<td>Staff, Board and Stakeholders</td>
</tr>
<tr>
<td>2</td>
<td>Once a year additions put into section 4</td>
<td>Staff and Board</td>
</tr>
<tr>
<td>3</td>
<td>Once a year additions put into section 4</td>
<td>Staff and Board</td>
</tr>
<tr>
<td>4</td>
<td>Additions made continually</td>
<td>Staff and Board when necessary</td>
</tr>
</tbody>
</table>
PART 1: ST. EUSTATIUS BACKGROUND INFORMATION.
**Location**

St. Eustatius is situated in the North Eastern Caribbean (63° N, 18° W) within the Lesser Antilles island group along with U.S. Virgin Islands, British Virgin Islands, Anguilla, St.-Barthélemy, Saba (Netherlands.), St. Martin (Netherlands/France.), St. Kitts and Nevis, Barbuda, Antigua, Redonda, Montserrat, Guadeloupe, La Désirade, Les Saintes, Marie-Galante, Dominica, Martinique, St. Lucia, Barbados, St. Vincent, Grenadines, Grenada and Trinidad and Tobago.

![Figure 1 St. Eustatius and the other Dutch Caribbean islands](image)

It is one of the five islands that make up the Netherlands Antilles: St. Maarten, St. Eustatius and Saba (Windward Islands) and Bonaire and Curaçao (Leeward Islands). The Windward Islands are part of the Lesser Antillean Island Arc, which stretches from Puerto Rico in the North to the coastline of Venezuela in the South (see Figure 1). The Windward Islands lie within eye sight of one another, St. Eustatius is 63 km from St. Maarten and 28km from Saba. St. Eustatius is 4km wide and 8km long and has an area of 21 km².

St. Eustatius, also known widely as ‘Statia’ s a relatively young island having emerged from the sea through volcanic activity. The island lies at the north end of a continuous submarine bank that also contains the islands of St. Kitts and Nevis, this is known as the St Kitts Bank which gets no deeper than 180m. The Quill dominates the landscape in the South East of the island and is separated from the mountainous North West by the Kultuurvlakte – the central plane where the majority of the population live. Overlooking the Caribbean on the western edge of the plain, Oranjestad (Orange City) is the capital, consisting of both an Upper and Lower town. The airport is located on the central, flat part of the island close to the settled area known as Golden Rock. The oil transhipment facility is located in the North West, located between the Terrestrial Protected Area to the north, which includes Boven, the highest of the older Northern volcanoes, and Signal Hill to the South.

The Miriam C. Schmidt Botanical Garden is located in the South East of the island, in the shadow of Mazinga, the highest point of the island at 600m. The Marine Park Offices are located on Gallows Bay on the West Coast, which occasionally has a beach, depending on predominant wave direction and water movements. The other main beach, Zeelandia is located on the East Coast.

The ruined Fort de Windt in the South of the Island has been protected since 1981, and can be reached by passing White Wall, a ridge of Limestone (ancient coral reef) emerging from the side of the Quill which is visible from nearby Islands (see Figure 2).
**Figure 2** The main features of St. Eustatius

(photograph source: [http://eol.jsc.nasa.gov](http://eol.jsc.nasa.gov))
History and Culture

History
Text adapted from (St et al., 2006)

St. Eustatius has a rich and diverse history, thanks to the fact that it is surrounded by islands which have been colonised by a number of different settlers through history. Prehistoric groups migrated north from South America (around the Orinoco River basin in Venezuela), through the Antilles. There were three phases of prehistoric human settlement on Statia. The first group were part of the archaic culture and date to around 500BC. They lived in small settlements (about 10-15 people) on the Windward side of the island, near Corre Corre Bay. These settlers subsisted on marine resources, fruit and seeds. The archaeological evidence of this period of inhabitation includes shell, flaked and ground stone tools and some undecorated ceramics.

The second group, the Saladoid people inhabited Statia between 300-700AD. In 1923 the Golden Rock Site on the centre of the island was discovered, which dates to the 5th century AD. Here 25-40 people would have lived in thatched roved huts whilst cultivating some crops such as manioc. The last phase of prehistoric people on Statia were on the island from 1000-1400 AD. Statia was deserted when Europeans visited the island in the early 17th century, the reasons for this are unknown but may have been related to an extended drought.

Statia was ‘discovered’ in 1493 by Christopher Columbus. Through the following years, the island changed hands at least 22 times. St. Eustatius was initially settled by the Dutch in 1636 and disputed with the English during the 1660’s and 1670’s up until 1679, when the Dutch established control. From 1636-1700 Dutch merchants on Statia attempted to grow tobacco, however this turned out to be unsuccessful and the value of Statia as a strategically placed port was eventually. Curaçao, St. Eustatius and St. Maarten became neutral trading hubs for enslaved Africans, finished products from Europe and raw materials from the Americas.

In the mid-18th century St. Eustatius took over from Curaçao as the main trading port for slaves. The free trading approach adopted by the island and attracted traders from near-by islands and from the shipping routes that passed by (Figure 3). The location of Statia's port on the leeward side of the island meant that it was well protected from storms and up to 200 large merchant vessels could anchor in Oranje Bay at one time.

![Figure 3](source www.secar.org)

The population on Statia is estimated to have been as high as 20,000 during the 1770-1780’s – compared to 3500 today. This included merchants that lived in Oranjestad, planters that lived out in the country, slaves who worked on the plantations and in the warehouses, and the transient population of sailors. In 1778, 3182 ships arrived in Statia making St. Eustatius one of the busiest ports in the world.
Statia's economy was based upon the slave trade and the (legal and illegal) trade of sugar, raw materials and finished products. The slave trade peaked in the 1770's, declining by the 1790's and in 1821 the slave trade was abolished by the Dutch. The abolition of slavery along with the decline in the sugar and munitions industries saw trade on Statia decline. Statia was taken by the French and the English between 1801 and 1816. The heavy taxes and regulations enforced by these countries saw the end of any trading on Statia. The island has remained in Dutch hands from 1816 to the present day.

Image 1  The cannons at Fort de Windt with St Kitts in the background,

Image 2  The placard commemorating the 225th anniversary of the first salute

(source: Kalli De Meyer)
The sovereignty of the United States was first recognised by a foreign power – Statia/The Netherlands - when on November 16, 1776 a salute was fired from Fort Oranje in reply to a salute by the brigantine (a type of ship) named Andrew Doria, which was flying the flag of the newly formed United States of America (Image 2).

Since 1954, Statia has been a municipality of the Netherlands Antilles along with Bonaire, Curacao, Saba and Sint Maarten. A 2004 commission of the governments of the Netherlands Antilles suggested revising a statute that would dissolve the Netherlands Antilles. Statia adopted a new flag on Statia Day that year, but in 2005 voted to remain part of the Netherlands Antilles. As a result of constitutional reform discussions that have taken place since this vote, the Netherlands Antilles will be dissolved in 2008. Bonaire, Saba and St Eustatius will have a similar status to Dutch municipalities, including the right to vote in elections, from 25 November 2008.

**Culture**

The majority of Statia’s population are Methodist and Seventh Day Adventists with a Protestant and Roman Catholic minority. Dutch customs are still important throughout the Netherlands Antilles, but US influences are becoming dominant on St Eustatius.

Dutch is the official language, but English is taught in schools and spoken widely. Spanish is also spoken by some residents. Statia’s premier cultural event is its annual Summer Festival (Image group Image Group 1), which is the main event of the year and takes place for ten days starting late July until early August. It is very similar to other Caribbean carnivals with a Pyjama Jump-up in the early morning and Festival Queen and Calypso Competitions culminating in the burning of King Stupid.

![Image Group 1 Colours of St. Eustatius annual Carnival.](Source: STENAPA)

The education system is modelled on the Dutch structure. Teaching is mainly carried out in Dutch although English, French and Spanish are also taught in the secondary education system. St. Eustatius has its own flag (Figure 4). The flag is divided in four five-sided blue squares, each bordered in red. In the centre of the white diamond centre is the silhouette of Statia in green. The golden star in the centre of the flag represents unity, keeping the people of Statia together.
Figure 4 Statia’s Flag
Population

In 2005, 2584 people were registered as permanent residents on St Eustatius. In 2004 the population density was 123 persons per km², comparable to Saba but far less densely populated than neighbouring St Maarten (Figure 5).

![Figure 5 Population density of the Dutch Caribbean Islands (CBS, 2005)]

The total population of St Eustatius has increased gradually from 1995 to 2005 from 1982 individuals to 2584 (Figure 6). Between 1998 and 2004 there were only 2 years when the numbers of people moving away from St Eustatius exceeded the number of people moving to the island, 1999 and 2001. Throughout these years there was a net gain in population through emigration and immigration (Figure 7).

![Figure 6 Population growth (Left)]

![Figure 7 Emigration and immigration (Right)]

Data from St Eustatius Tourist Development Foundation (2007) and (CBS, 2005)

The population figures presented in Figure 6 do not accurately represent the number of persons staying on St Eustatius at any one time. Since the year 2000, St Eustatius has seen up to 30,000 visitors coming to the island, up to 20,000 of whom are non Antillian Nationals (see Figure 8). This places extra pressure on the natural resources and infrastructure of the island.
Figure 8 The population of St Eustatius since 2000
(CBS, 2005)

The population structure from 1995 to 2005 has changed significantly as shown in Figure 9 and Figure 10. The population pyramid for 2005 shows many more people living on the island over the age of 20 – this is shown by the swelling of the graph. The birth rate (number of youngsters on the island under 10) has not changed significantly. When these facts are considered alongside the increase in the population as shown in Figure 6, it can be presumed that from the mid-1990’s to 2005, people in the economically active age ranges (from 20-60) moved back to St Eustatius. The main reason for this is likely to be an increase in employment opportunities on the island from tourism and industry. This is reflected by the population pyramid from 1995 which shows that the young economically active residents, from the ages of 18-30 were few in number. The reasons for this initial loss in population are likely to be related to young individuals moving abroad to work and study. This also occurs in 2005, although it appears more of the population return to St Eustatius having spent time abroad.

Figure 9 Population pyramid for St Eustatius from 1995 (left)

Figure 10 and 2005 (right)
(CBS, 2001)
Politics and Economics

Politics
The form of government in the Netherlands Antilles is a Parliamentary Democracy. The Governor General, who is the representative of the Queen of the Netherlands, is nominated by the Federal Government and is appointed by the Crown.

As Chief Administrator, the Governor General exercises executive power over external affairs and is assisted by an advisory council. Executive power in internal affairs is vested in the Prime Minister and his 8-member cabinet. The 22 member Parliament of the Netherlands Antilles is a unicameral legislative body. Members are elected to a 4-year term.

On the Island level the Kingdom is represented by a Lieutenant Governor who is also the local Chief Administrator and Chief of Police. Executive power is vested in an Executive Council consisting of two commissioners who must have the support of the majority of the five-seat Island Council (the island’s law-making body). St. Eustatius governs its internal affairs, excluding finance, police, telecommunications, education and health. A key element of the government’s mandate is to promote tourism and investment in a number of sustainable activities.

Economy
The island’s official currency is the Antillean guilder, but the American dollar is extensively used. The exchange rate between the two currencies is fixed. One American dollar can be converted in 1.78 Antillean guilders. The monetary system of the island is regulated by the Central Bank of the Netherlands Antilles.

Figure 11 (left) Contribution to the GDP of St Eustatius by the Government and Private enterprises.

Figure 12 % change in GDP 1996-2003 (Right)

(CBS, 2001).

The Gross Domestic Product of St Eustatius has increased year by year since 1996 (Figure 11). In 2003 St Eustatius’ GDP was 115 million Nafls (CBS, 2005). The rate of increase in GDP has varied.
dramatically, from 20% increase in 96-97 to as little as a 1% increase in 01-02 (Figure 12). This reflects the dependency of the economy on tourism when world affairs are likely to have affected travel and possibly industry in 01-02.

The main sectors of employment on St Eustatius are trade, restaurants, hotels and other services which in 2001 employed 69% of the workforce (CBS, 2001). The main industrial employer is Statia Terminals N.V. – Now owned by Nustar Energy. Tourism related employment includes taxis, hotels, restaurants and sales of goods including souvenirs (Figure 13).
Economic development

Farming

During the 17th Century, St Eustatius mainly produced sugar cane but during the 19th century this expanded to include a number of different crops including Manioc within 40 plantations. In the 20th century, plantation agriculture declined whilst sisal continued to be cultivated and exported until 1928. After establishment of oil-industries on Curaçao and Aruba many economically active (working) men moved away.

There was a small agricultural revival and cattle were introduced at the end of the 1970’s. This highlighted one of the main problems with agriculture on St Eustatius, the fact that the land was not evenly distributed amongst the population. In 1983 about 50% of the land was owned by a very small number of families (Rojer, 1997).

Recent and current agricultural practices on St Eustatius are limited to animal husbandry, where free roaming cattle, goats and sheep are herded for personal consumption.

Image 3 Roaming goats are herded for personal consumption.
(source: RJ Van Oosten)
Industry

The main industrial activity on St. Eustatius takes place at the oil transhipment facility located immediately south of the northern marine reserve on the West coast and which has been in operation since 1982 (Image 4, Image 5). Known as Statia Terminals NV, the venture expanded in 1993. The storage facility can be hired and is mainly used for oil being transported from the Middle East to the USA. It operates 50 storage tanks with a capacity of approximately 11 million barrels (1.75 million m$^3$). The terminal has a jetty which serves two smaller tankers at a time and other berths include three floating barges, a floating hose station, floating dock and single point mooring for super tankers (at a depth of 65 meters (212 ft), making it one of the deepest installations in the world). The terminal has a product flow rate of up to 90,000 barrels (14,300 cubic meters) per hour to or from a ship (www.cbi.com).

Over 10% of the population of St. Eustatius work for/with Statia Terminals. 120 people are employed by Statia Terminals NV, with a further 350 being employed by contractors associated with the terminal. The most recent figures available for the fourth quarter 1999 reported that Statia Terminals International N.V. an operating cash flow, of $7.8 million$^1$.

Fisheries

There are about 25 fishermen on St. Eustatius. Considering the small size of the island’s economy this is a significant sector of employment. The income that is generated by the fisheries sector is invested back into the St. Eustatius economy, since all the fishermen are locals. Taxes and income are generated from sales of fuel, two stroke oil, fishing gear, spare parts and engines. Such associated economic activities are also significant contributors to the island economy. The Spiny Lobster (Panulirus argus, Image 6) fishery is without doubt the most important fishery on the island. The total lobster catch for 2003 is estimated to be 4 tons, which represents a gross value of 100,000 NAF (approximately US$56,000) (Dilrosun, 2004).

<table>
<thead>
<tr>
<th>Target Species</th>
<th>Price per kilo (NAF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spiny Lobster (Panulirus argus)</td>
<td>25</td>
</tr>
<tr>
<td>Conch (Strombus gigas)</td>
<td>20</td>
</tr>
<tr>
<td>Wahoo (Acanthocybium solandri)</td>
<td>16</td>
</tr>
<tr>
<td>Tuna</td>
<td>16</td>
</tr>
<tr>
<td>Red Snapper species</td>
<td>16</td>
</tr>
<tr>
<td>Dolphin fish (Coryphaena hippurus)</td>
<td>16</td>
</tr>
<tr>
<td>Pot fish</td>
<td>10</td>
</tr>
</tbody>
</table>

Table 1 Fish prices per target species on St. Eustatius (Dilrosun, 2004)

$^1$ Before interest expense, income taxes, depreciation and amortization.
Tourism

From 1965 the government made improvements to the island infrastructure that included the construction of the airport in 1971, which encouraged more visitors to come to the island. In 1983 STENAPA, in cooperation with the St Eustatius Historical Foundation, created 12 nature trails. Visitors to St Eustatius usually take part in diving and hiking activities whilst using spare time to visit the locations of historical importance.

The contribution of tourism to the economy of St Eustatius is unknown. Since the year 2000 the number of divers and yachts visiting the marine park have approximately doubled. This provides income for many of the services on St Eustatius, including hotels, restaurants and shops. In 2006 1052 divers registered with STENAPA and 835 yachts visited the island. July and December are consistently the most popular times for visitors to come to the island as shown in Figure 14.

Image 6 Lobster and Image 7 Conch, the most frequently targeted species in St. Eustatius.

(source: Brenda S. and R. Duncan Kirkby)
Figure 14 Visitor numbers to St Eustatius 2004 – 2006 (A-Kum, 2006)
Climate

The climate of St. Eustatius is tropical - the average temperature in the coldest month lies above 18ºC. An average of 1073 mm of rain falls per year (1881-1980, Oranjestad) (De Palm, 1985), although the rainfall is not spread evenly through the year. No clear wet or dry season can be identified, although yearly averages show the majority of rain falling between July and December while January to July tend to have less rainfall (see Figure 15). All climate data is presented in Appendix 7.

![Graph showing average precipitation and temperature for Franklin D Roosevelt Airport, St Eustatius, 1971-2002 (CBS, 2005).](image)

(Lazell, 1972) calls St. Eustatius and Saba ‘Snag-islands’, referring to the fact that they have one high peak that ‘snags’ clouds as they pass causing rain on the higher land (Image 8). Because of its height, The Quill (600 m) has an average rainfall of 1500-2000 mm. The lowlands tend to be very dry, rain gauges at 25 and 40m elevation on St Eustatius catch considerably less rain than those at higher elevations. This limited rainfall has led to a dependency on groundwater as a water source for those who inhabit the island.

![Image 8](image)

On the low lying areas, there is very little variation in temperature during the year, with December to March being the cooler months at around 25ºC on average, and April to November being the warmer months on average with temperatures between 27ºC and 28ºC. The coldest temperatures recorded are around 18ºC, the hottest temperatures are around 33ºC. At higher elevations,
temperatures are lower, which along with increased rainfall gives a very different environment to the low lands.

The wind rose below shows (Figure 16) average wind speeds and direction from 2005. St Eustatius is located in the Northeast Trade Wind zone. 33% of the wind comes from the east, and 67% from north-east, with average wind speeds of 6/7 metres per second. St Eustatius, Saba and St Maarten along with the neighbouring islands are situated in the Atlantic hurricane zone. On average one tropical storm or hurricane passes at a distance of less than 200 km each year. Once every 4 or 5 years hurricane conditions occur on St Eustatius (Table 2, Image Group 2).

Figure 16 Wind rose showing 2005 wind speed (Metres per second) and direction averages data for St Eustatius (data: (Aruba, 2006), graphic: D.R.MacRae)

In September 1995 St. Eustatius was hit by hurricane Luis, a scale-4 hurricane, followed only 10 days later by hurricane Marilyn. In 1996 hurricane Bertha passed by. In 1998 hurricane Georges caused significant damage and in 1999, the island was hit by hurricanes Jose and Lenny causing mudslides, floods and considerable beach erosion.

<table>
<thead>
<tr>
<th>DATE</th>
<th>WIND SPEED MPH</th>
<th>CATEGORY</th>
<th>CPOA</th>
<th>NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 Sep 1960</td>
<td>150</td>
<td>h4</td>
<td>43</td>
<td>DONNA</td>
</tr>
<tr>
<td>17 Jul 1979</td>
<td>46</td>
<td>ts</td>
<td>43</td>
<td>CLAUDETTE</td>
</tr>
<tr>
<td>3 Sep 1979</td>
<td>58</td>
<td>ts</td>
<td>24</td>
<td>FREDERIC</td>
</tr>
<tr>
<td>17 Sep 1989</td>
<td>144</td>
<td>h4</td>
<td>48</td>
<td>HUGO</td>
</tr>
<tr>
<td>28 Aug 1995</td>
<td>63</td>
<td>ts</td>
<td>67</td>
<td>IRIS</td>
</tr>
<tr>
<td>5 Sep 1995</td>
<td>132</td>
<td>h4</td>
<td>51</td>
<td>LUIS</td>
</tr>
<tr>
<td>15 Sep 1995</td>
<td>92</td>
<td>h1</td>
<td>57</td>
<td>MARILYN</td>
</tr>
<tr>
<td>8 Jul 1996</td>
<td>81</td>
<td>h1</td>
<td>24</td>
<td>BERTHA</td>
</tr>
<tr>
<td>21 Sep 1998</td>
<td>115</td>
<td>h3</td>
<td>14</td>
<td>GEORGES</td>
</tr>
<tr>
<td>20 Oct 1999</td>
<td>92</td>
<td>h1</td>
<td>15</td>
<td>JOSE</td>
</tr>
<tr>
<td>18 Nov 1999</td>
<td>144</td>
<td>h4</td>
<td>29</td>
<td>LENNY</td>
</tr>
<tr>
<td>22 Aug 2000</td>
<td>75</td>
<td>h1</td>
<td>29</td>
<td>DEBBY</td>
</tr>
<tr>
<td>15 Sep 2004</td>
<td>63</td>
<td>ts</td>
<td>62</td>
<td>JEANNE</td>
</tr>
</tbody>
</table>

(source: http://stormcarib.com. Categories: ts= Tropical storm, h1= minimal, h2= moderate, h3= extensive, h4= extreme, h5= catastrophic. CPOA = Closest Point of Approach (miles). For further details on the hurricanes, refer to Appendix 2).

Table 2 Hurricanes and tropical storms to affect St. Eustatius since 1960.

(source: www.stormcarib.com)
Geology and Geomorphology

The island of St. Eustatius lies at the north end of a continuous submarine bank, no deeper than 180m, that also contains the islands of St. Kitts and Nevis. The Lesser Antilles are located on an area where the plates that make up the earth’s crust meet. This is known as a zone of subduction where the Atlantic Plate slowly slides under the Caribbean Plate. The island has an area of 21 sq. km and the landscape of the island is dominated by two volcanic areas. At the northern end the extinct volcanic hills rise to 289 m and were once a separate island surrounded by sea cliffs (Roobol & Smith, 2004). Two and a half kilometres to the southeast the relatively youthful Quill volcano, with an 800 m diameter open crater, rises to 600 m (Image 9, Image 10). A third volcanic structure is exposed at the White Wall-Sugar Loaf tilted limestone feature, which forms the southern shoreline of the Quill.

![Image 9](source: N. Esteban)

![Image 10](source: RJ Van Oosten)

The first volcanic activity around the north western complex is thought to have taken place around 1 million years ago (Westermann, 1957). Bergje or Little Mountain is the main remnant from the central crater of an old volcano (Westermann, 1961). Boven and Gilboa Hill are made of ancient, solidified streams of lava. The horseshoe shaped ridge known as Panga, between Fort Royale and Signal Hill, is what remains of the base of the volcano. Several parts of the northern hills are made from by-products of volcanic activity such as agglomerates, lava and ash. The original volcano in the north could have been more than 600 meters high. Erosion has been acting since the last volcanic activity in the area to smooth and level out the features that remain.

The whole south eastern part of the island is taken up by The Quill, unique in the area as a mountain because of its even, typical volcano form. The Quill is a perfect example of an ash-volcano. The last eruption of the Quill was prehistoric and occurred before settlement of the island.
by Salidoid Indians probably 1550 years before present (Roobol & Smith, 2004). The unique form took shape during the final acts of the last period of volcanic activity when there was no lava-flow, but molten rock was exploding out of the volcano by gasses under high pressure. The entire top, crater, slopes and the base of The Quill are covered with loose material. The largest blocks are lying on the edge and on the bottom of the crater. Lower on the slopes the material gets finer and The Kultuurlakte is covered for the greater part by volcanic ashes, which make rich and fertile agricultural land. Six recently drilled water wells in the sides of the Quill have revealed heated groundwater, measuring up to 70 degrees Celsius, suggesting that the Quill is dormant.

![Image 11](White Wall viewed from the sea (left))

![Image 12](and the land (Right) (source: STENAPA))

On the south side of The Quill there are two areas of sedimentary rock which recline against the slope of the volcano: The White Wall (270 m, Image 11, Image 12) and The Sugar Loaf (73 m) are made from limestone, which is ancient coral reef, and some volcanic material (Ippel, 2000). The limestone was originally formed at the bottom of a prehistoric shallow sea. The slabs which lie at an angle of 40°, were forced upwards during a volcanically active phase and were turned over into their present positions by a plug of lava (now hardened). White Wall and Sugar Loaf are thought to be between 70.000 to 21.000 years old (Westermann, 1961).
Beaches on Statia have black sand which is made up from titanium and iron weathered from the volcanic rocks (Ippel, 2000). White sandy sections on Zeelandia beach are derived from sandstone between the two hilly sections north and south of the island. The steep slopes and tropical rainfall on the higher elevations mean that rates of erosion from run-off are very fast. Where vegetation is removed, soils are quickly washed away and into the surrounding sea. As well as physical erosion and gullyimg caused by rainfall, the limestone rocks of St Eustatius are eroded by chemicals in the rain, which leaves the limestone sharp and spiky in areas where it is exposed.

The cliffs along the beach of Zeelandia Bay and Turtle Beach are cut into the flank deposits of the Quill, and show stratification after multiple volcanic eruptions. The lowest and oldest layers are dated back to about 25,000 years ago, the upper and youngest layer back to about 7,500 years ago. In each successive volcanic event, a mixed magma eruption deposited a new layer with heavy basaltic andesite tuffs on the bottom, pumice flow in the middle and the finer grained air fall ashes on top (see Image 13, Image 14). Basic monitoring of cliff erosion by STENAPA between 2004 and 2006 (whereby stakes are placed at the base of cliffs early each year, and distance from cliff is measured at the end of the year) show that cliff erosion is significant and up to 2.0 meters in one year. The weathering of these cliffs results in major landslides with pieces of rock of over 1 meter high deposited at the base of cliffs.

A detailed geological map of St Eustatius can be found in Appendix 9, along with a report on the Volcanology of St. Eustatius and Saba.
**Oceanography**

St. Eustatius lies at the north end of a continuous submarine bank, no deeper than 180m, that also contains the islands of St. Kitts and Nevis. St Eustatius and the neighbouring islands are affected by The Antilles Current and possibly the Caribbean current. The Antilles Current was named in 1876, and flows northward east of the Antilles joining the Florida Current past the outer Bahamas. Its waters are concentrated into a strong northward Jet about 80-100 km wide centred at 400 m depth (Lee *et al.*, 1996). Mooring studies have indicated that the Antilles has mean transport speeds of 3.2 Sv² northwards in the upper 800m of water (see Figure 17).

![Figure 17](source: http://oceancurrents.rsmas.miami.edu/)

Figure 17 The Antilles Current transports tropical waters from the North Equatorial Current north-westward. It is a significant source of warm water for the Gulf Stream system.

The narrowly spaced chain of islands, banks, and sills of the Antilles Islands Arc, including St Eustatius and the neighbouring islands, separate the Caribbean from the Atlantic Ocean and act as a sieve for the inflow of Atlantic water to the Caribbean Basin. Water flows into the Caribbean Sea through the narrow passages between the islands and continues westward as the Caribbean Current, the main surface circulation in the Caribbean Sea (Figure 18).

![Figure 18](source: http://oceancurrents.rsmas.miami.edu/)

Figure 18 The Caribbean current is formed by waters flowing though the Antilles Island chain from the Atlantic into the Caribbean sea.

The monthly average sea surface temperature ranges from 25°C in January-March to 29°C in August-November. Visibility ranges from 15m to 30+m. There are usually two high tides and two

---

2 The sverdrup, named after the oceanographers Harald and Otto Sverdrup, is an unit of measure of volume transport. It is used almost exclusively in oceanography, to measure the transport of ocean currents. It is equivalent to 106 m³/s
low tides every day in St Eustatius, with about six hours between high tide and low tide. The average tidal range is around 45cm.

Waves, known as ground swell are produced by low pressure weather systems at sea. The majority of these form in the Western Atlantic and send waves towards St Eustatius through winter months. As a result of swell, large waves may be seen breaking on the east coast on calm, sunny days in winter. During each winter season, there may be from five to ten swell events, each lasting from one to eight days. Research has also shown that intense winter swell activity often runs in cycles, several active years being followed by several less active years (Deane et al., 1973). The height of swell waves on a usually calm leeward coast may vary between 1 m and 3 m (3–10 ft), although occasionally they may be as high as 5 m (16 ft). Hurricanes, which develop from areas of very low pressure, produce very high energy sea conditions, where very large groundswells are driven by high winds. The impact of the ground swell waves is reduced by neighbouring islands which act as a barrier against wave energy.

Waves produced by the wind are generally highest from June to July and from December to March when the wind speeds are highest. The dominant easterly wind drives waves towards the east or windward coast where average wave height is more than 1 m (3 ft). On the leeward coasts, average wave height is usually less than 0.3 m (1 ft) (see contrasting coastlines Image 15, Image 16). Wave energy is concentrated at headlands and spread out in bays. This is a result of wave refraction, a process which results in the wave fronts being ‘bent’ as they approach the shore (Bacon, 1978).

During swell wave conditions, windward coasts can experience considerable erosion. Erosion may be due to one or more factors, for example: a particularly severe winter swell, a recent hurricane, the death of an adjacent coral reef or interference in the supply of sand. For more information, read the text on beaches and sand dunes in the habitats section of this Part of the St Eustatius Marine Park Management Plan.
Terrestrial Flora and Fauna

Flora

There are 482 known wild plant-species of St. Eustatius, 448 seed-plants and 34 ferns and related species. Among the plants there is one island-endemic species: the recently rediscovered Statia Morning Glory (*Ipomoea sphenophylla*) which is considered to be the rarest plant in the Kingdom of the Netherlands (Image Group 3). Five plant-species have a limited geographical distribution including only a few islands, and 3.7% of the species are endemic to the Lesser Antilles and the Virgin Islands. The ‘Lower Plants’ are represented by 40 leaf mosses and 20 liverworts. A biological inventory can be seen in Appendix 1.

There are a series of plant communities on The Quill, varying from thorny bushes on the lower slopes to evergreen seasonal forest in the crater and elfin forest on the highest parts of the crater’s rim. The evergreen seasonal forest is very similar to ‘tropical rainforest’ and is rich in species. The elfin forest is an unusual type of forest, which develops only under specific conditions. The dry evergreen forest on the rim of the crater, the mountain shrubbery on the east slope and the semi-evergreen seasonal forest on the northwest slope are relatively undisturbed. These forest formations cover a relatively small area, which makes them vulnerable to human and natural disturbances. This is especially true for the elfin forest. Semi-evergreen forest has become rare regionally as a result of...
human activity. The vegetation of St Eustatius has been seriously disturbed in the past by agriculture and cattle breeding, however, at present these activities are very limited.

Fauna

81 species of invertebrate have been accounted for on St Eustatius such as Land Hermit Crabs, Spiders, Scorpions and a number of Butterflies and other Insects (Image Group 4).

**Image Group 4** Land Hermit Crabs (*Coenobita clypeatus*), Scorpion (*Centruroides barbudensis*) and Monarch Butterflies (*Danaus plexippus*) on St Eustatius (source: STENAPA).

The largest group of vertebrates on St Eustatius is birds, represented by 26 local and nesting species such as the American Kestrel (*Falco tinnunculus*)\(^3\) (Image Group 5). In addition 28 migrating species are present every year on a temporary basis. Low hunting pressure and absence of the Mongoose are favourable circumstances responsible for the abundance of birds on Statia. There are 13 species of amphibians and reptiles on Statia and 5 species of Bats – the only mammals to naturally inhabit the island. There are no island endemics among the vertebrates. The Red-bellied Racer (*Alsophis rufiventris*) can only be found on St. Eustatius and Saba and is considered an endangered species because of its limited range (Image Group 5). Several vertebrates are endemic to the Lesser Antilles and the Virgin Islands, either at the species level or the subspecies level, including:

- the ground-lizard (*Ameiva erythrocephala*),
- two tree-lizards (*Anolis bimaculatus bimaculatus, Anolis wattsi schwartzi*),
- two geckos (*Sphaerodactylus sputator* and *S. sabanus*),
- a bat sub-species (*Ardops nichollsi montserratensis*)
- Antillean Iguana (*Iguana delicatissima*) – rare due to hunting (Image Group 5)

In the past, the main threats to the Terrestrial Flora and Fauna on St Eustatius were agriculture and cattle-breeding. Present day threats include destruction of habitat through industrial development and unregulated tourism development, pollution and roaming cattle. Since 1997 regulations have been in place to protect terrestrial areas of St Eustatius as well as individual species, such as the Statia Morning Glory, orchids and the Antillean Iguana.

---

\(^3\) Known locally as Killy Killy
Image Group 5 Fauna found on St Eustatius: Red Bellied Racer Alsophis rufiventris, Juvenile Antillian Iguana (*Iguana delicatissima*), American Kestrel (*Falco tinnunculus*) (source: STENAPA).
**Marine habitats, flora and fauna**

The marine habitats represented within the Marine Park can be categorized as follows:

- **Open water:** supporting planktonic and pelagic sea creatures including fish and migratory species such as whales, dolphin and turtles
- **Sea bed (benthos):** supporting coral reefs, sea grass beds and including surface dwelling animals and plants and infauna (burrowing creatures like molluscs and crustacean), invertebrates, reef and bottom living fish.
- **Intertidal:** formed at the interchange between land and sea including, rocky shores, sandy beach and dune areas

There is, of course, regular exchange of water, energy and materials between each of these habitats. Organisms also move freely between the different environments for feeding and reproduction. As the waters around St Eustatius are relatively shallow, without much exchange between coastal and deep water currents, corals and other organisms on reefs are exposed to any terrestrial influences. This includes freshwater runoff, sediments, nutrients and any form of pollution, which all stress and eventually kill marine organisms.

Throughout 2007 STENAPA worked on the production of a marine habitat map using a digital satellite image and field work to identify the different habitat types. The work is expected to be completed in 2008. A draft of the habitat map can be seen in Figure 19. The methods used for the survey can be seen in Appendix 1.

![Figure 19](image.png)

*Figure 19* The distribution of key marine habitats around St Eustatius. (source: STENAPA)

The areas of blue on the map next to the shore and within other areas of shading represent unclassified areas, the main blue area beyond the boundary of the Marine Park will not be classified.
Open Water
The marine park is confined to the waters from the shoreline out to the 30m (100’) depth contour. The water is warm with constant salinity and is low in naturally occurring nutrients. The marine flora and fauna in the open waters around St Eustatius, beyond the depth limits of the marine park but within the islands territorial waters, are not very well known.

The surrounding waters are full of phytoplankton (microscopic plants) which form the basis of the complex marine food web, supporting not only the island’s coral reefs and associated animals but also zooplankton (microscopic animals) which are often the juvenile stages of species found in other habitats. There are no known studies of the plankton communities around St Eustatius.

The open water supports pelagic fish populations, most of which are highly migratory such as Tuna (Thunnus sp.), Dolphin (Dorado / Coryphaena hippurus see Image 18) and Wahoo (Acanthocybium solandri) as well as Marlin (Makaira sp.) and swordfish (Xiphias gladius). In general, these fish are found passing within the territorial waters of St Eustatius, on occasion they can be found within the marine park itself.

Image 18 Dolphin fish (Coryphaena hippurus) (source: http://marinebio.org/species.asp?id=147)– a pelagic species that visits the waters off St. Eustatius.

Image 19 Spotted Eagle Ray (source: Brenda S. and R. Duncan Kirkby)

All four Caribbean species of turtle can be found in Statia’s open water: confirmed sightings of Hawksbills (Eretmochelys imbricate), Green Turtles (Chelonia mydas) and Leatherbacks (Dermochelys coriacea), and an unconfirmed sighting of Loggerhead (Caretta caretta). A number of Cetaceans are regular visitors both to the reefs and the waters around St Eustatius, including; Baleen Whale Species (Balaenoptera sp.), Pilot Whales (Globicephala macrorhynchus), Dwarf Sperm Whales (Kogia simus), Humpback Whales (Megaptera novaeangliae), Gervais’s Beaked Whales (Mesoplodon europaeus), Killer Whales (Orcinus orca), Melon-Headed Whales (Peponocephala electra), Sperm Whales (Physeter macrocephalus), Pantropical Spotted Dolphins (Stenella attenuata), Striped Dolphin (Stenella coerulealba), Spinner Dolphins (Stenella longirostris), Bottlenose Dolphins (Tursiops truncates), Cuvier’s Beaked Whales (Ziphius cavirostris). Manta Rays (Manta birostris) and Eagle Rays (Aetobatus narinari) (Image 19) also visit the Marine Park from Deeper waters.

There are a number of birds that live almost exclusively in the open ocean environment, using St Eustatius as a breeding ground or migratory stop over. These include Frigate Birds (Fregata magnificens), Red Billed Tropicbirds (Phaethon aethereus), Brown Pelicans (Pelecanus occidentalis) and Audubon’s Shearwater (Puffinus lherminieri) (see Appendix 1 for more details on water birds of St Eustatius).

Location
Although not strictly part of the marine park, the waters around St Eustatius from the shore line to the 12 mile zone (the boundary of internationally recognised territorial waters) do constitute the territorial waters of the island. There is currently no organisation charged with the management of the territorial waters beyond the 30m depth contour and legislation should be drafted to regulate activities within this zone.
Pelagic zone
With the exception of the seabed, everything in blue water beyond the 30m depth contour, which marks the seaward extent of the St Eustatius Marine Park, can be considered the pelagic zone. The pelagic environment is commonly thought of as being made up of number of different ecological zones; most importantly, the epipelagic, mesopelagic and the bathypelagic;

- Epipelagic: The epipelagic zone stretches from the surface down to 200 meters. This is where most plants and animals (flora and fauna) live due to the abundance of light and nutrients. Pelagic fish species found in this part of the sea around St. Eustatius include small bait fish such as Herring (Clupea harengus) – a major food source for marine mammals, and larger, predatory fish such as the tuna, Wahoo (Acanthocybium solandri), Dolphin (Dorado - Coryphanaena hippurus) and Rainbow Runner (Elagatis bipinnulata) all of which are commercially important species.

- Mesopelagic: The water from 200-1,000 meters is classified as the mesopelagic zone, a twilight zone where some light filters through but does not reach a level of brightness necessary for photosynthesis to occur. Beyond the mesopelagic is the bathypelagic zone, however there are no waters deeper than 1000m within the Territorial waters of St. Eustatius.

Sea bottom
Soft-bottom habitats dominate much of the sea floor beyond the epipelagic (light) zone. The sediments are usually comprised of a mixture of biologically fixed silica and calcium carbonate, as well as clays, silts, and sand sediments. Varieties of mobile and stationary animals live on and within these sediments. Around St Eustatius, these are likely to include mobile echinoderms such as brittlestars and sea cucumbers, crustaceans such as crabs, amphipods, and shrimps, molluscs such as snails and octopods, and a variety of worms such as polychaetes and nematodes. There are also many sessile (fixed) polychaetes, clams, sponges and other invertebrates. These mobile and sessile animals typically range in size from megafauna (>1 cm), to the smallest microbes. Microbes such as bacteria play an important role in breaking down organic material.

Condition
There is little known about the deep water environments around St Eustatius which are beyond the reach of SCUBA divers. However pelagic and deeper water habitats need to be considered in protected area management as they influence the ecology of other marine environments and are sure to be home to many as yet undiscovered life forms. The little available evidence indicates that water quality is generally good within open water environments. There have not been reports of ‘die offs’ of marine animals or birds or plants which could be attributed to poor water quality or pollution and Statia’s waters produce very little ciguatera. Ballast waters are not known to have caused any problems to date.

Overfishing of Statia’s territorial waters may be a potential problem. In this context it is also important to note that in addition to pelagic fish, globally endangered sea turtles, sea birds and dolphins are threatened by illegal fishing activities.

Recovery of depleted stocks of groupers depends on known spawning aggregation sites being permanently closed to fishing and the development of effective marine protected areas that cover the known depth range of all species; effectively from the shoreline to 400 m (Munro & Blok, 2003).

Value
Research voyages in the Florida Keys which have explored deep water environments have recorded considerable numbers of new invertebrate and fish species. There is every reason to believe that the same would be true of the deep water benthic environment around Statia. Healthy and abundant migratory pelagic fish stocks of Tuna, Dolphin and Wahoo are critical to support Statia’s small scale local fishing industry. Globally endangered cetaceans and sea turtles regularly migrate through Statia’s waters.
Seabed – Seagrass

The two most important ecosystems found on the seabed within the marine park are sea grass beds and coral reefs. Both are highly productive, fragile and valuable marine resources.

**Introduction**
Seagrasses are flowering plants that live underwater. Like land plants, seagrasses produce oxygen. The depth at which seagrasses are found is limited by water clarity which determines the amount of light reaching the plant. Seagrass beds form in shallow coastal lagoon areas.

Seagrass ecosystems are considered to be amongst the most productive in the world; an average growth rate of seagrass leaves is about 5mm per day, with entire stands of seagrass being turned over every 16 weeks with 3-4 crops annually (Edwards, 2000). In addition to this, the blades of seagrasses provide a huge surface area for settlement of epiphytes (plants that live on the surface of another organism such as calcareous green algae, crustose coralline red algae, cyanobacteria, diatoms and epifauna (animals that live on the surface of another organism such as sponges, hydroids, bryozoans, foraminiferans). For a square metre of seabed, a dense seagrass stand may have 20m² of leaf area for other organisms to settle on. The productivity of the epiphytes can be twice that of the seagrasses themselves.

The seagrass stands in around St. Eustatius are dominated by Turtle grass (*Thalassia testudinum*) together with Manatee grass (*Syringodium filiforme*) and banks of calcareous alga (*Halimeda* sp). Through a succession of growth (see Figure 20), seagrasses can turn vast areas of unconsolidated sediments into highly productive plant dominated, structured habitat with a diversity of microhabitats.

**Figure 20** Seagrass succession diagram (Edwards, 2000)

Significant invertebrates in the seagrasses of St. Eustatius include Queen Conch (*Strombus gigas*), Cushion Stars (*Oreaster reticulata*), Sea Cucumber (*Holothuria mexicana*), Sea Urchins (*Tripneustes venricosus, Lytechinus variegates, Meoma ventricosa*).

**Location**
Sea grass beds are found all around the island, from approximately 10m and deeper until about 35m. The distribution of the seagrass beds can be seen in the habitat map presented in Figure 19.
**Condition**

Sea grass beds have not been studied in St. Eustatius. Island residents and fishermen have reported significant decline in the sea beds in the past 10-15 years due to several factors: hurricanes, anchorage by tankers and disturbance in sea water dynamics.

- In the late 1990s, there were five major hurricanes that impacted the marine environment on five consecutive years leading to disturbance of sea beds and the heavily dependent conch population.
- Since the early 1980s, tankers have anchored in the waters of Oranje Bay (particularly from 18-35m depth) whilst waiting to bunker at Statia Terminals. A study by the Marine Park to investigate impacts from tankers has shown extensive damage on the sea bed with vast ‘rubble’ zones and large ‘anchor scars’ through sea grass beds.
- In the 1990s, the extension of the breakwater to the city pier, and the new 24” pipeline on the sea bed from the Terminal SPM to shore have altered the predominant wave action and in-shore currents and related dynamics and interaction with sediment, affecting erosion and deposit of sand and consequently sea grass beds.

![Image 20](Image 20) Some species such as the Flying Gurnard (*Dactylopterus volitans*) have reduced in number following the destruction of seagrass (source: Brenda S. and R. Duncan Kirkby)

**Value**

The seagrass beds of St. Eustatius provide a biological filter system for the near shore waters. The seagrasses also prevent terrestrial sediments from reaching the reef where they would smother and kill coral reef organisms. The seagrass beds also provide a nursery and habitat for numerous commercially and recreationally valued marine animals such as Conch and juvenile fish. Internationally endangered species such as turtles also depend on the well being of the seagrass for their survival (Image 21).

![Image 21](Image 21) Turtles on Seagrass in St Eustatius Marine Park (source: Brenda S. and R. Duncan Kirkby)
Seabed – Sand and Algae

Introduction
Little is known about the sandy habitats between the shores of St. Eustatius and the coral reefs. The habitat is understood to be home to various species of animals and plants including crustaceans, sea stars, shrimp, nudibranch, worms and fish (Image Group 6). Marine plants also exist in some areas including species of seagrass and algae.

Image Group 6 Top Left: Garden eels (*Heteroconger hassi*) inhabit sandy areas where algae and other marine plants grow (source: STENAPA). Yellow Tail Goatfish (*Mulloidichthys martinicus*) forage for food, Feather duster worms (*Sabella sp.*) reach out from sandy habitats and filter passing water (source: D.R.MacRae)
Seabed - Coral reefs

Introduction

There are a variety of reef types on St. Eustatius, from shallow sloping reefs to patch reefs through volcanic boulders of various sizes to spur and groove type reefs with sandy channels divided by lava fingers. Each of these offer a hard substrate for coral and other animals to settle on, which in turn attracts fish and an abundance of other invertebrates.

The waters surrounding St. Eustatius are teeming with life. The coral reefs are home to many fish species including Fairy baslets (*Gramma loreto*), Angel fish (*Holocanthus* sp. and many others) Groupers, Triggerfish, Scorpion fish, Moray eels (e.g. *Gymnothorax moringa*), Wrasse and Chromis, Parrot fish and roaming shoals of Blue Tangs (*Acanthurus coeruleus*). In sandy areas Garden eels (*Heteroconger halis*), Peacock Flounder (*Bothus lunatus*), Stingrays (*Dasyatis Americana*) and Flying Gurnard (*Dactylopterus volitans*) can all be seen. Near to the reefs in the blue water, Crevalle Jacks (*Caranx hippos*), Bar jack (*Caranx ruber*), Shoals of Barracuda (*Sphyraena* sp.) shoals of up to 200 Horse-eye jacks (*Caranx latus*) and Wahoo (*Acanthocybium solandri*) meander looking to feed off the smaller reef fish.

In deeper areas, the coral communities are dominated by plate corals (*Agaricia sp.*), soft corals such as Seafans, Seaplumes, gorgonians and Black coral (*Antipathes* sp.) at depths in excess of 20m, particularly at the drop off.

Aside from corals and fish, many other creatures inhabit the reef and other underwater habitats. These include a variety of sponges such as Giant Barrel Sponges (*Xestospongia muta*), Stove-pipe sponges (*Aplysina archeri*), Azure Vase Sponges (*Callyspongia plicifera*), Ball Sponges (*Cinachyra* sp.) and Elephant Ear Sponges (*Agelas clathrodes*). Countless other invertebrates inhabits the reefs such as Conch, Brittle stars, Magnificent Sea Urchin (*Astropyga magnifica*), Zooanthids, Crinoids, Brittle stars, Cork Screw Anemones (*Bartholomea annulata*), Giant anemones (*Condylactis gigantea*), Spiny Lobsters (*Panulirus argus*), Pederson shrimp, Arrow Crab (*Stenorhynchus seticornis*), Decorator Crabs (*Microphrys bicomuta*) and nudibranchs such as the Lettuce Sea Slug (*Tridachia crispate*).

A number of different reef species can be seen in Image Group 7.

A number of different plant species live on the reef and sandy habitats, the most common being Encrusting fan-leaf algae (*Lobophora variegata*), and *Dictyota* sp. Other species found include calcareous algae (with calcium in their structure) such as Pink Coralline algae and Leaf Algae (*Halimeda* sp.). Mats of Red Algae grow in some areas. Seaweeds such as Sargassum and Green Feather Algae (*Caulerpa sertulanoideae*) provide habitat and food for other animals.
In addition to all of the animals and plants usually seen around the reefs and other marine habitats, some less frequently spotted species exist. 4 turtle species use the waters as a foraging and breeding ground; Hawksbills (*Eretmochelys imbricate*), Green Turtles (*Chelonia mydas*), Leatherbacks (*Dermochelys coriacea*) and an unconfirmed sighting of a Loggerhead (*Caretta caretta*) in 2003. Spotted Eagle Rays (*Aetobatus narinari*) are often seen by divers and snorkellers, along with 2 species of shark; Caribbean Reef Sharks (*Carcharhinus perezi*) and Nurse Sharks (*Ginglymostoma cirratum*). Seahorses (*Hippocampus sp.*) can also be seen clinging to gorgonians with their tails.

In addition to supporting a wealth of marine organisms, the coral reefs of St. Eustatius help to support the Island's economy which relies to a great extent on tourism dollars. The reefs are the basis of the fishing activity that takes place on the island and the structure of the reef protects coastal developments from waves and storm surges. Corals and algae also produce the materials that make up the beaches on St. Eustatius.

**Location**

**Lava fingers**

Within the Southern Marine Reserve the seabed slopes steeply towards the drop off which goes down to depths in excess of 100 metres. The reef slope here is divided by a spur and groove system with coral fingers divided by sandy channels (Image 23). The 'rock fingers' are hardened, ancient lava flows from the Quill volcano. The walls, overhangs, ledges and tops of the fingers are encrusted with corals and other organisms which thrive in deeper waters such as Plate Corals, Sea Fans and Black Corals.
Image 23 Spur and Groove Reef / Lava fingers (source: Dos Winkel)
Patch reef
Around the Southern, Western and Northern Marine Park areas, volcanic activity has produced patch reefs, where coral reef organisms have settled on volcanic boulders (Image 24) and blocs that have been blown out from the Quill many years ago.

Image 24 Boulder is an example of patch reef on the West Coast (source: Brenda S. and R. Duncan Kirkby)

Other basaltic formations
The basaltic rock of the Northern and Southern ends of St Eustatius slopes into the sea at a relatively shallow angle, forming large ridges, flat areas and ledges (Image 25). Reef organisms have settled on these areas creating a varied and diverse habitat.

Image 25 Barracuda Reef – gently sloping basalt (source: Brenda S. and R. Duncan Kirkby)

Condition
Reef health is generally excellent and a 2002 AGGRA survey of 30 Caribbean sites found the reef to be in good health with diverse fish population and no signs of pollution. There is very little mechanical damage to coral reefs due to two factors, first that reefs are fairly deep and beyond the depth that vessels (propellers/hulls) would damage corals, second that all non-resident divers must dive with a dive guide from a local dive centre. There is significant sedimentation in the Marine Park due to erosion of cliffs and hillsides during heavy rainfall (a ‘plume’ is often visible around the island after heavy rainstorms) but not much sediment is observed on corals due to the fact that it is dispersed by the time it reaches most of the coral reef (depths of >10m). The major source of land based pollution is from the Smith’s Gut Landfill Site near Zeelandia Beach, which poses a large problem on the Atlantic coast. Very few plastics or other waste are observed on the sea bed and on dive sites on the Caribbean side.

In 2005 there was a major coral bleaching event. Coral bleaching is the loss of colour from corals under stressful environmental conditions (Image Group 8). While any stress can cause corals to
bleach, high water temperature has been the major cause of coral bleaching events in recent
decades. Coral bleaching leads to the death of corals and the demise of the coral reef ecosystem. Two sites in the Southern Marine Reserve of the Marine Park (Barracuda Reef at 23m depth and Mushroom Garden at 16m depth) are monitored on an annual basis using the REEFCHECK protocol, starting in June 2005. Comparison of the pre-bleaching event and post-bleaching event data shows that the impact of the 2005 bleaching event is very significant, particularly on the shallower site with estimated coral loss of 78.6% cover at Mushroom Gardens – formerly a favourite dive site (more information on bleaching can be found in Appendix 1).

<table>
<thead>
<tr>
<th>Barracuda Reef</th>
<th>Mushroom Garden</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total percentage of hard and soft corals lost between 2005 and 2006 as 34.8%.</td>
<td>Total Percentage of hard and soft corals lost between 2005 and 2006 as 78.6%</td>
</tr>
</tbody>
</table>

Filter-feeders such as the ascidian *Trididemnum solidum* have few natural predators and are capable of overgrowing corals, threatening reefs throughout much of the Caribbean. *Trididemnum solidum* is sometimes spotted on reefs around St Eustatius but it is not considered invasive.

**Image Group 8** Bleached Pillar coral (*Dendrogyra cylindrica*) (source: STENAPA), Bleached Mustard Hill Coral (*Montastrea annularis*) (source: STENAPA)

Corals are often removed by visitors and taken home as souvenirs. Black Coral (see Image 26) is used to make jewellery and is threatened globally.

**Image 26** Black coral (*Antipathes sp*) commercially threatened and listed in CITES⁴ Appendix II (source: Brenda S. and R. Duncan Kirkby)

---
⁴ Convention on International Trade in Endangered Species of Wild Fauna and Flora
**Value**

As a tourist destination, St Eustatius Marine Park has considerable value. In the 2007 willingness to pay study carried out by STENAPA staff, 89% of divers visiting the marine park rated the diving experience as good or excellent— a level of experience 72% of divers were willing to pay for. Aside from direct fees earning income, services provided by hoteliers, restaurant owners and other businesses on St. Eustatius contribute significantly to the economy of St. Eustatius. 70% (CBS, 2001) of islanders are employed in service industry and trade which includes a considerable amount of tourism. The reefs of St. Eustatius along with the seagrass beds provide a home, nursery and breeding ground for most of the species caught in the small fishery on the island, including Lobster and conch.

The marine habitats of St. Eustatius have different species zonation within them and play a wider role in the well-being of the coast by providing a range of ecological services. In a number of ways, coral reefs produce calcium carbonate which eventually becomes limestone rock or the sand that ends up on beaches. Reefs also protect the coastline from storm damage by reducing wave energy and slowing/diverting water currents. Reefs also recycle nutrients and organic matter.
Intertidal -Beaches

Introduction

Beaches are formed by waves, currents and tidal action, with waves generally being the predominant force. Within the surf zone, deep water waves begin to interact with the seabed. This results in changes in the direction and height of the incoming waves, which tend to align themselves in a direction parallel to the shoreline. Depending on the actual direction from which these waves approach, sand or other material may be transported along the shore or in an onshore/offshore direction, or a combination of both. Most of the beach sand on Statia’s beaches is black sand made up of volcanic minerals (Image 27). Sources of sand to the beach include the erosion of the cliffs, with sand transport along the islands shorelines.

![Image 27 The beach at Lynch Bay (source: STENAPA)](image)

Sand dunes form when sand is carried by the wind from the beach towards the land. Dunes are highly dynamic coastal features, and especially when they are not anchored by vegetation, they may undergo rapid changes over short time periods. They can move inland as a result of onshore winds and are eroded by wave action and high water associated with severe storms. The vegetation cover represents the difference between a mobile pile of sand and a stabilized dune (C.E.P., 1998). Generally, native dune grasses, trailing vines and small perennials are the most hardy species and are found on the seaward face of the dunes. Shrubs and trees are more abundant in the back-dune zone. Sand dune environments are limited to a small area on St Eustatius near Zeelandia Beach where some dune type plants can be found.

Location

The beaches on St Eustatius are sensitive to changes in the maritime conditions in the coastal waters of the island. Zeelandia beach (Image 28) in the Eastern side of the island is a steeply sloping sandy beach with strong currents and considerable wave action. The only beach on the East Coast forms in Oranje Bay when sea conditions and currents allow the build up of sand.

![Image 28 Zeelandia Beach looking towards The Quill (source R.J. Van Oosten)](image)
**Condition**

During summer months, there is often beach loss due to hurricanes. Over the last 10 years, hurricanes Georges in 1998 and Lenny in 2000 had significant impacts on the beaches of Statia. STENAPA are supporting a government project to install REEFBALLS (Image Group 9) in Oranje Bay in an attempt to construct underwater breakwaters in front of the hotel zone to protect the beach from erosion. The technical report for this project can be seen in Appendix 1.

![Image Group 9 Reefball structures to be used for beach building (source: www.reefbeck.com)](image)

**Zeelandia beach**

There has been concern over the rate of cliff erosion on Zeelandia beach for a number of years. Erosion continued on Zeelandia Beach throughout 2006, when STENAPA recorded four major cliff falls and four minor cliff falls. Sand mining compounds the erosion problem at the northern end of Zeelandia Beach. Despite being an illegal activity, sand mining (Image Group 10) continues in the most accessible areas of the beach in the gully and on the beach. In addition to the illegal sand mining, the Executive Council of the Island Government agreed to a temporary one-year policy of sand mining to curb the sand shortage used for construction. The islands main waste disposal site, in a natural drainage channel at Smiths Gut encroaches onto Zeelandia beach.
Image Group 10 From top, clockwise: open waste disposal site emptying onto Zeelandia Beach (source: D.R.MacRae) Flooding caused by sand mining at Zeelandia beach (source: STENAPA).
Oranje Bay Beach
The beach in Gallows bay, changes form frequently (see Image 29, Image 30), from a substantial area of sandy beach which supports recreational activities and acts as a habitat for a number of species to an area with no beach and a rocky shoreline.

Image 29, Image 30 Photographs illustrating the changes in the beach shape at Oranje Bay.
(source: St Eustatius Historical Foundation and D.R. MacRae)

The oil terminal pier and armoured shoreline (see Image 35) to the north could prevent longshore sediment transport in to Gallows Bay from the north. The breakwater structure at the harbor to the south (Image 31) could also prevent longshore sediment transport in to Gallows Bay from the south. Originally the harbor structure was an open pier, which could allow sediment transport through, whereas the rubble breakwater that was constructed to take its place forms a barrier to long shore sediment transport. Reports and local knowledge indicate that when waves come from the north (particularly during winter months) the beach builds up, whereas when waves come from the south the beach tends to erode5 (further information can be seen in Appendix 1)

Image 31 The Breakwater structure at the harbour (source: STENAPA)

5 This means that the harbor breakwater may not impact on the beach as much as the Oil Terminal structures.
Ten beach clean-ups were conducted on Zeelandia Beach during 2006, collecting a total of 16 truck loads full of rubbish including a partial radiator, a water heater, a large rope, fishing nets, an oil barrel, a plastic barrel, four large batteries and several car batteries.

**Value**

The value of Statia’s beaches and adjacent areas lies not only in the money which can be made from selling the sand for construction but also in tourism dollars. Tourists demand various physical attributes of the tropical destinations they visit and sandy beaches are definitely one of the features in high demand. The local community also makes extensive use of the sandy areas for bathing and other recreational activities. This is especially the case when waves and currents produce a beach in Oranje Bay from time to time (Image 32).

![Image 32 The beach in Oranje Bay on 19th February 2005 (source: STENAPA)](Image)

The beaches also support fragile but important flora which binds the sand, prevents erosion and speeds further sand accumulation. Zeelandia Beach (see Image 33) in particular is a very important nesting site for 3 species of turtles; Green turtles (*Chelonia mydas*) Hawksbill turtles (*Eretmochelys imbricata*) and occasional Leatherback (*Dermochelys coriacea*) nests.

![Image 33 Turtle nesting beaches of St Eustatius (source: STENAPA)](Image)
**Intertidal - Rocky shores**

**Introduction**

Rocky shores form the transition between terrestrial and marine environments, and are thus exposed to very different physical conditions. In the course of a day, rocky shores are covered with seawater at high tide and exposed directly to the air at low tide. With high tides and storm surges, the rocky shores become covered, at low tides, rock pools form.

Most rocky shores are the remains of ancient coral reefs filled in by pieces of calcareous algae and the skeletons of microscopic amoebas, the foraminiferans, all cemented together by intense pressures over time. The resulting limestone is highly soluble. It dissolves readily as the warm seas create agitation against it, as the pure rainwater runs down its sides, as the boring sponges and sea urchins grind holes into it. The result is a pitted, gouged surface, weathered grey and so eroded that it is often hard to stand on, with channels, gullies, and pools that swell with water at each surge of the sea.

Various forms of algae dominate the intertidal area, since other organisms find it difficult to cope with extreme heat, desiccation and ultraviolet ray stress. Species of snails graze on algae contributing to bioerosion of the limestone. Barnacles are conspicuous by their absence. Mussels are often absent or below the low water mark. Intertidal communities in the Caribbean are restricted to a relatively small area because of the small tides (a maximum tidal range of around 45cm).

**Location**

Rocky shores are located around the island, but in particular where the steeper slopes of the Boven sub sector and the Quill meet the sea at the North and the South of the Island.

![Image 34 Corre Corre Rocky Shore on the Windward coast of St. Eustatius (source STENAPA)](source)
**Condition**
The rocky shores on St. Eustatius are intact since they are difficult to build on and situated on land that is difficult to access. Some extensive modification of the rocky shore has taken place near the oil transhipment facility in the North East of the Island (Image 35, Image 36) where the cliff was dynamited to make way for the platform for oil terminal tanks.

![Image 35](image-link) Top - Rocky shore developed as a landing area for Statia Terminals N.V.,

**Value**
The rocky shores provide essential protection from the sea by acting as a barrier from the pounding waves. Little is known about the many different plants and animals which inhabit the rock pools, and their importance within the wider environment.
**Special interest species**

**Endangered Species**

St Eustatius Marine Park and its adjacent coastline is a home, migratory stop over or breeding site for 14 IUCN Red List species, 10 CITES Appendix I species and 98 Appendix II species (Table 3). Whales are often heard during January-April as they migrate past, Humpback Whales in particular can be seen breeching from the Southern tip of the island.

<table>
<thead>
<tr>
<th>Species</th>
<th>Red List Status</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Lagenodelphis hosei</em></td>
<td>FRASER’S DOLPHIN</td>
</tr>
<tr>
<td><em>Megaptera novaeangliae</em></td>
<td>HUMBACK WHALE</td>
</tr>
<tr>
<td><em>Lutjanus analis</em></td>
<td>MUTTON SNAPPER</td>
</tr>
<tr>
<td><em>Lutjanus cyanopterus</em></td>
<td>CUBERGA SNAPPER</td>
</tr>
<tr>
<td><em>Mycteroperca venenosa</em></td>
<td>YELLOWFIN GROOPER</td>
</tr>
<tr>
<td><em>Carcharhinus leucas</em></td>
<td>BULL SHARK</td>
</tr>
<tr>
<td><em>Galeocerdo cuvier</em></td>
<td>TIGER SHARK</td>
</tr>
<tr>
<td><em>Manta birostris</em></td>
<td>MANTA RAY</td>
</tr>
<tr>
<td><em>Sphyrna mokarran</em></td>
<td>GREAT HAMMERHEAD</td>
</tr>
<tr>
<td><em>Chelonia mydas</em></td>
<td>GREEN TURTLE</td>
</tr>
<tr>
<td><em>Dermochelys coriacea</em></td>
<td>LEATHERBACK</td>
</tr>
<tr>
<td><em>Eretmochelys imbricata</em></td>
<td>HAWKSBILL TURTLE</td>
</tr>
<tr>
<td><em>Iguana delicatissima</em></td>
<td>LESSER ANTILLEAN IGUANA</td>
</tr>
</tbody>
</table>

Table 3 IUCN Red List Species found within St Eustatius Marine Park.

For more information visit [http://www.iucnredlist.org/](http://www.iucnredlist.org/)

**Image 37** 3 species of turtle frequent St Eustatius Marine Park’s waters including the Hawksbill Turtle (*Eretmochelys imbricata*). The status of turtles around St. Eustatius can be seen in the annual Turtle Report in Appendix 1.

**Image 38** The endangered Lesser Antillean Iguana (*Iguana delicatissima*) uses beaches for foraging where it plays a role in seed dispersal (source: RJ Van Oosten)
**Human use of the Marine Environment**

Humans use the marine environment on St. Eustatius for 3 main purposes; recreation, fishing and industry. The Marine Park and coastal environment is managed by St Eustatius National Parks Foundation (STENAPA) incorporated in the Netherlands Antilles on 21st November 1988. STENAPA is the only organisation on St Eustatius with a mandate for environmental protection and is legally mandated by the Island Government to manage all the island’s protected areas.

**Tourism and recreation**

The main reasons why people visit St Eustatius is for the diving (Image 39, Image 40) and natural environment. The number of divers visiting the Protected Area is gradually increasing from one year to the next. During 2006, the number of divers registered with Statia Marine Park increased by 20% from 2005. Figure 21 shows that the number of divers has steadily increased since the slump in tourism in 2001/2, and is consistently reaching record levels. The proportion of divers purchasing an annual pass (66%) increased between 2005 and 2006.

![St Eustatius Registered Divers](chart)

**Figure 21** Number of divers registering with St Eustatius Marine Park (data from STENAPA)

The large majority of divers in 2006 originated from the USA, followed by Holland, Switzerland, France, Netherlands Antilles and UK. A larger proportion of divers came from the USA than previous years, and many of these were yacht visitors, live aboard customers or passengers on the four mast cruise ship, ‘Polynesia’.

![Tourists during the final stages of a dive](image39)

**Image 39** Tourists during the final stages of a dive

![A diver at Mushroom Gardens dive site](image40)

**Image 40** A diver at Mushroom Gardens dive site (source: Brenda S. and R. Duncan Kirkby)

An analysis of dive location statistics in the Marine Park shows that there are clearly favourite dive sites (details of all of the dive sites can be found in Appendix 8). It is clear that the most popular dive site is the artificial reef sunk in 2003, the Charles Brown, followed by the Southern Reserve site, Hangover, historical wreck site, Double Wreck (also popular as it is close to shore and a good night dive site) and the STENAPA reef (popular as it’s close to shore, a good night dive site and
Divers often see turtles. Dive sites that have a permanent mooring and were infrequently visited are Drop Off, Valley of the Sponges, Five Fingers (1) and Crooks Castle, as well as snorkel sites, Twelve Guns and Inner Jenkins Bay.

The number of registered yachts anchoring or mooring in St. Eustatius Marine Park has decreased by approximately 6% over recent years. Awareness about payment of yacht fees to the Marine Park has been enhanced with the new mini-guide though rangers continue to experience problems with yacht fee collection. It is felt that yacht tourism is an important market as many yacht visitors dive, hike, use local taxis, services and restaurants or return as overnight guests to Statia at a later stage. The majority of yacht captains come from USA, followed by UK, Holland, ‘other European countries’, Canada and France. In addition to individual and charter yachts, groups of yachts have come from educational programmes such as Broadreach and Seamester during June-July and have also carried out community projects for STENAPA. A ferry from St. Kitts also brings tourists and shoppers every other Sunday, arriving in St. Eustatius at 10am departing at 4pm.

**Fisheries**

The St. Eustatius fishermen primarily fish on the narrow shelf surrounding the island. In 1996 STENAPA was granted effective control over the island shelf from the high water mark to the 30 meter (100 ft) depth contour. In addition fishing is restricted to hand line fishing within the Marine Reserves. Fishermen are restricted to catching a maximum of 20 queen conch (*Strombus gigas*) per year in the marine park area. Some recreational hand lining and trolling is carried out at the weekends. Local fishermen only are allowed to trawl a line with hook through the reserve on return from fishing trips. Bycatch is thought to be minimal (Image 41).

There are about 25 fishermen on the island of St. Eustatius. Considering the small scale island economy this is a significant social economical factor that can not be overseen by the local Island Government. The money that is generated by the fishery sector, directly and indirectly, is invested back into the St. Eustatius economy, since all the fishermen are locals. In addition indirect taxes are generated from fuel, two stroke oil, fishing gear, spare parts and engines. The aggregated value of the fishery sector is also an important factor to the island economy. The spiny lobster (*Panulirus argus*) fishery is without doubt the most important fishery on the island, where chicken wire and bamboo traps are used (Image 42). The total lobster catch for 2003 is estimated to be approximately 4 tons, which represents a gross value of 100,000 NAF ($55,000).

In Gallows Bay St. Eustatius there is one facility for lifting the fishing vessels out of the water for maintenance or emergencies. Unfortunately the facility has never worked optimally and is currently out of order, because there is no money or no effort being undertaken to buy the necessary cables and mechanical winch. There is no pier in the harbour where the fishermen can tie their boat and subsequently most of the boats are moored outside of the harbour in open, un-protected water. The fish market located in Gallows Bay is quite good and would almost meet EU standards, would it not be for the fact that most of the infrastructure in the market is dysfunctional. (Dilrosun, 2004).

**Image 41** A ranger (in blue) and a fisherman remove an Eagle Ray from a net (left), **Image 42** Fishing traps are used frequently within St Eustatius Marine Park (source: STENAPA).
Artificial reefs

In 1997 an artificial reef named STENAPA Reef was created by sinking of some old barges and tugboat. This reef was primarily created for fishermen when the Marine Park was established which limited fishing areas. The site soon attracted divers as it is often visited by turtles, and so a Marine Park mooring for a dive site (red buoy for larger boats) is now maintained at the site.

In 2002, the Government of St. Eustatius in the Netherlands Antilles acquired its newest "reef", the Charles L. Brown (Image Group 11). The Charles Brown is a 100-metre long (320 ft) vessel previously used by US company AT&T for cable laying. It was originally constructed by a Napolese ship builder in Italy in 1954, and has travelled internationally for cable laying operations. The Charles Brown Committee was set up by the government to oversee the preparation and sinking of the ship. The Committee is comprised of the three island dive centres (Dive Statia, Goldenrock and Scubaqua), Statia Marine Park and the Tourism Office. The boat was prepared for sinking (cleaned, oils and fuel removed, hazardous waste removed) and it was sunk on Friday 25th July 2003 in 81 minutes. STENAPA dive centres and the fire department played an important part in the scuttling of the vessel. Statia Terminals removed all the fuel and oil from the ship and provided its tug boats to tow the Charles Brown to its final resting place. The project was also sponsored by Budget Marine in St Maarten. The ship lies in 31 meters of water just outside of the Southern Marine Reserve.

In February 2004 local fisherman requested that STENAPA create an artificial reef designated solely for fishing, and not as a dive site. It was agreed at that meeting to locate the new reef at a depth of 75 feet, west of the Southern Marine Reserve. Following some equipment delays, the reef was finally completed in February 2006 with the sinking of a pipe, concrete mix barrel and the tug boat "Miss Cathy" (Image Group 11). STENAPA was assisted by Statia Terminal throughout the project. Following a "settling-in" period of six months a survey was conducted to assess the fish population at the new reef. Both diversity and density of fish had increased when compared to the results of the survey conducted prior to the creation of the reef. The new species were observed in large numbers, in particular shoals of Bar Jack, Blue Tang, Striped Grunts and Horse-eye Jacks. As had been agreed upon in 2004 this site is only used for fishing; there is no dive mooring attached, and the site is marked for fishermen by a small brown buoy.

Image Group 11 The Charles Brown (Top 2 photographs), Miss Cathy (Bottom 2 photographs) (source: top right and bottom right, Golden Rock Divers, others, STENAPA)
Shipping/ industry

The principal commercial maritime activity in St. Eustatius occurs in and around Statia Terminals NV (Image Group 12) which is located immediately south of the northern marine reserve and has been in operation since 1982. The terminal is a for-hire bulk liquid terminal engaged in third party storage and handling, particularly as a trans-shipment point for oil being transported from the Middle East to the USA. It currently operates 50 storage tanks with a capacity of approximately 11 million barrels (1.75 million m$^3$), after a crude oil expansion project in 1993. The terminal has a jetty which serves two smaller tankers at a time and other berths include three floating barges, a floating hose station, floating dock and single point mooring (SPM) for larger tankers including very large crude carriers. The restricted zone established for the single point mooring overlaps the boundaries for the northern reserve. There are three designated anchorage zones which are for bunker vessels with drafts up to 15m (50ft). The zones are situated in Oranje Baai between the City Pier and the Statia Terminal Jetty. The zones are located in water of 24m to 40m. Two of the zones fall entirely within the marine park while half of the remaining zone lies inside of the marine park. The Terminal also uses the area west of these designated zones for anchoring vessels.

There are current plans for further expansion of the Terminal.
Image Group 12 Clockwise from top, an oblique aerial view of Statia Terminals looking South East, looking North East, Mooring buoys at Statia Terminals, shoreline protection at Statia Terminals (source: STENAPA)
References


PART 2: MANAGEMENT ENVIRONMENT.
Introduction

Understanding the goals and objectives of a protected area and the range of direct and indirect threats are essential elements of any management plan. STENAPA chose to adopt an adaptive management framework for its management planning of the St. Eustatius Marine Park. Adaptive management provides a logical approach to management planning which is highly prioritised and threat orientated. The stepwise implementation of this plan coupled with the continued participation in the DCNA Management Success Project will provide the framework for actions and feedback, allowing effective actions to be identified.

The key elements of the adaptive management framework are:

1. Identifying and describing the significance and condition of natural values within the marine park
2. Identifying and describing the threats and issues facing the natural values
3. Assessing which threats pose the greatest risk to the natural values
4. Developing and prioritizing management objectives
5. Developing and implementing management actions to address threats
6. Measuring the success of those management actions
7. Adapting management approaches based on the outcome of measured actions.

Information on the significance of the ecosystems, habitats and species found within the St Eustatius Marine Park as well as their general condition has been presented in Part 1. This is summarized and highlighted in the statement of significance and values. Part 2 goes on to identify the threats and issues facing the marine park. Together with the Park’s goals and objectives this information is used to build a framework for management. This approach is based firmly on the IUCN management cycle which seeks to ensure that there is continuous learning by reassessing and re-evaluating the success of management actions, programmes and initiatives.

The Dutch Caribbean Nature Alliance, of which STENAPA is a member, is in the process of developing a uniform tool to measure management success of the terrestrial and marine parks on each of the six islands of the Dutch Caribbean. This newly developed St Eustatius Marine Park management plan is an important component of the management success project. Setting clear goals and objectives for the marine park makes it possible to begin evaluating management effectiveness and management success and assisting park managers to become ever more effective in their management planning and implementation.

Box 1 Definitions of key terms used in section 2.

**Values:** the importance of a Protected Area in terms of a range of variables, including: biological, ecological, wilderness, economic, social characteristics as well as scientific, international or national significance. The intrinsic natural values of the marine park include:

- Rich diversity of marine life and habitats (biodiversity)
- Ecological processes such as reproduction and foraging
- Unique marine life including species with limited distribution and endemic species
- Internationally and/or locally threatened and vulnerable marine life
- Geomorphological significant features

**Issue:** A situation or concern which requires a resolution at some stage. Some issues, if not addressed, could develop into a threat.

**Threat:** A threat is a biological, chemical or physical process or entity which has the immediate potential to harm the natural values of the park. A threat can be an entity such as a marine organism which becomes a pest, or a process such as an increase in sedimentation which damages habitat.

**Impact:** An impact is the effect that a threat has on the natural assets of the park. For example increased sedimentation may impact on a seagrass bed by causing reduced visibility so that the sea grass is no longer able to photosynthesise (grow) optimally causing a reduction in the amount of seagrass.
**St. Eustatius Marine Park**

St Eustatius National Parks Foundation (STENAPA) has a permanent Board of Directors, which oversees Foundation activities within the Marine Park, National Parks and Botanical Garden. STENAPA is the only organisation on St Eustatius with a mandate for environmental protection. The foundation is non-profit, relying on fee-generated income, grants and government subsidies.

St Eustatius Marine Park was established in 1996 with the objective of conserving and managing the marine resources for the benefit and enjoyment of the people and future generations. The park surrounds the island and extends from the high water mark to a depth of 30 metres (100 ft). The total area of the park is 27.5 km². Within the Marine Park, there are two actively managed reserves where anchoring and fishing are not permitted in order to protect pristine coral reef (Figure 22).

**Marine Park Reserves**

Within the Marine Park, there are two marine reserves (the Northern and Southern Reserves). No fishing or anchoring is allowed in these areas in order to protect the coral reefs. The majority of the coral reef area around Statia is contained within the Reserves. Throughout both Reserves, dive moorings are maintained to prevent people from anchoring, while still allowing them the opportunity to enjoy the unique experience of diving on a reef. The Reserves were set up to conserve marine biodiversity, restore fish stocks, promote sustainable tourism, and safeguard the marine ecosystem.

---

Figure 22 Map of St Eustatius Marine Park including buoys.

---

6 other than line and hook trolling by local fishermen on the way back from fishing grounds.
Activities of the Marine Park

Core activities in the Marine Park continue as provided by the Marine Environment Ordinance (1996) and as set out in the Marine Park management plan (1997 – available from STENAPA). Ongoing activities (Image Group 13) unique to the Marine Park include:

- Installation and maintenance of 42 dive, snorkel, and yacht moorings.
- Education and raising awareness about the importance of marine conservation.
- Research and monitoring including: Reef Check - Fishery Assessments - Coral Watch (to monitor bleaching) - Turtle Conservation and Monitoring (see Annual Report in Appendix 1) - Tanker Impacts - Recreational Use
- Patrolling and enforcement of park laws and regulations.
- Working closely with local dive operators and live-aboards.
- Diving and fishery enhancement through creation of artificial reefs.
- Advisory role to government for coastal development, tourism, and pollution.

Further details of the ongoing activities and historical activities of the marine park can be seen in the annual reports in Appendix 1.
Activities of St Eustatius Marine Park include (clockwise from top left) turtle research and monitoring, snorkel club outings, beach clean ups and patrols (source: STENAPA).

Construction of the new visitors centre took place during the first seven months of 2006 and completely transformed the operational base for the National Parks: the Island Government approved an extension of the property on Gallows Bay to enable expansion of the existing building into a Visitors Centre with two administration offices, as well as construction of a Public Bathroom building and a separate Equipment and Workshop building. The property now has two entrances with a dedicated Visitor Entrance (see Image Group 14).
View of visitor centre from road

Entrance gate to visitor centre

Visitor centre displays – incomplete

Souvenir sale section, internet access

Visitor entrance to reception

Reception through to meeting room

Rangers’ office

Management office

Image Group 14 STENAPA's new offices
Statement of Significance and Values

A **statement of significance** explains the protected area’s importance. The statement of significance expands upon the identification of values by adding unique qualifiers and placing the marine park within a regional, national and international context.

**Key features or values** are the features or values that must be protected and preserved to maintain the significance of the marine park. They may not be limited to those within the protected area boundary, and have all been recognised during the stakeholder consultations of January 2006.

The purpose of this section is to explain why the St Eustatius Marine Park is important, describing the values associated with the park, explaining why it was designated and what its benefits to society are.

Frequently the initial reasons for creating a protected area are subjective or poorly understood and badly communicated. Unless protected area values are understood, there is a risk that management actions, either deliberately or inadvertently, will adversely affect not only the natural resources but also the social and economic situation, especially that of residents. It is therefore critical that the significance and value of the marine park are clearly understood and are reflected in the park’s goals and objectives. This will ensure that everyone is ‘on the same page’ when it comes to how the marine park is to be managed and will avoid use being made of the park which is incompatible with its future conservation. As more emphasis is placed on including a range of stakeholders in the planning process, it is important to have a mechanism through which the values they hold for the area can be identified and described.

**Statement of significance**

The marine environment of St. Eustatius supports 27.5 km² of biologically diverse coral reef, seagrass, sandy seabed and open ocean communities. The Marine Park is one of the top 5 sites in the Caribbean to see healthy coral and fish populations. The St Eustatius Marine Park was established in 1996 to manage these marine resources for the benefit and enjoyment of the people and future generations. The 2 reserves have 43% hard coral cover and the Protected Area is a home, migratory stop over or breeding site for 14 IUCN Red List species, 10 CITES Appendix I species and 98 Appendix II species. St Eustatius Marine Park attracts around 500 yacht visitors and 2500 diving/snorkelling visitors per year contributing to income for the 70% of the islands population employed in restaurants, hotels and other services7.

---

**Image 43** Thriving Coral Reef of St Eustatius Marine Park (source: STENAPA).

---

A summary of values associated with St. Eustatius Marine Park.

**Recreation**
- Yachting industry
- Diving and snorkelling
- Beaches and related activities
- Walking tours along beaches and waterfront
- Charles Brown Wreck

**Cultural**
- Traditional fishing methods used, such as traps
- Traditional fishing sites
- Education for sciences, art etc
- Aesthetic values - Views of Saba, St Kitts
- ‘Beach life’ and activities

**Industry**
- Shipping – to and from the storage facilities at Statia Terminals
- Tourism – which is the mainstay of St Eustatius’s economy which is dependent on the well being of the marine resource

**Institution**
- STENAPA is valuable as a conservation body
- Networking capabilities
- Centre for outreach and education
- Coordinator of research and monitoring
- Government and stakeholder facilitator.
- Responsible use of the MP – sharing between users.
- Well sustained and patrolled Protected Area.
- Preservation
- Representative of Statia

**Natural features**
- Geology: White wall, Spur and Groove Reef (Lava fingers), Basaltic Ridges other volcanic landscapes
- Biodiversity of the reef and seagrass other marine environments and the associated wildlife

**Environment**
- Habitat that is home to many species including endangered, rare and endemic plants and animals.
- Variety of marine ecosystems
- Breeding grounds especially those for birds.
- Fish spawning areas on shallow reefs and on seagrass beds
- Migratory stop over for birds and sea turtles
- Shoreline protection, especially from the coral reefs and seagrass beds

**Fisheries**
- Income for some residents, fishery resources in near-shore waters have been depleted.
- 2 artificial reefs both sunk for fisheries in 2005 (STENAPA reef) and 1997 Miss Cathy respectively – should move boxes to fisheries?

**Historical / Archaeological sites**
- The historic Bay Front Ruins
- Double Wreck - sank approximately 300 years ago. Consisting mostly of ballast stones fused together in the shape of the ship with old pottery shards, pieces of hand blown bottles and an old anchor.
- Blue Bead hole,
- Anchor reef,
- Kay Bay Canons.
- Artefacts at Crooks Castle
- Old ballast deposits in the Bay
- Underwater wall within Oranje Bay
- Water front buildings and ruins

**General**
- Terrestrial scenery
- Underwater seascapes
- Inherent value knowing the sea/water is ‘healthy
- Community resource for recreation
- All businesses in Statia directly relates to the sea.
- Scientific resource especially sharks, whales, lobster, conch, turtles and diverse coral species.
Other Values

Ecological services

Sediment traps. St Eustatius Marine Park’s seagrass beds are a critical component of the island’s ecology and play a vital role in trapping and containing storm water and associated sediments.

Foraging grounds. The seagrass and reefs vitally important foraging grounds for juvenile green and hawksbill turtles which can be found cropping on manatee and turtle grass and on soft corals and sponges.

Nesting grounds. The sandy beaches around St Eustatius Marine Park are important turtle nesting grounds.

Spawning grounds. Fish spawning can be found at a number of locations around St Eustatius Marine Park, which are important sites for ensuring the well-being of fish populations into the future.

Nursery grounds. The seagrass beds are important role as nursery grounds for many species of marine fish and for the globally threatened Queen conch.

Coral reefs and Seagrasses

Coral reefs and seagrass beds are all considered globally endangered ecosystems. The latest figures indicate that 70% of the world’s coral reefs could be lost in our lifetime and seagrasses have been destroyed globally through mostly due to dredging, aquaculture and land conversion. Table 4 outlines some of the more general values† associated with these key ecosystems on St Eustatius Marine Park.

<table>
<thead>
<tr>
<th>Coral Reefs</th>
<th>Seagrasses</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Habitat for many animals and plants</td>
<td>• Provide habitat and food for many animals and species</td>
</tr>
<tr>
<td>• Tourism</td>
<td>• Tourism</td>
</tr>
<tr>
<td>• Recreation – diving and other watersports</td>
<td>• Provide shelter for juveniles of many commercial fish species</td>
</tr>
<tr>
<td>• Fisheries</td>
<td>• Consolidate sediments and reduce wave energy</td>
</tr>
<tr>
<td>• Shoreline protection through reduction of wave energy</td>
<td>• Traditional uses e.g. weaving, roof thatch, compost,</td>
</tr>
<tr>
<td>• Production of coral sand</td>
<td></td>
</tr>
</tbody>
</table>

Table 4 General marine ecosystem values

Endangered species

St Eustatius Marine Park and it’s adjacent coastline is a home, migratory stop over or breeding site for 14 IUCN Red List species, 10 CITES Appendix I species and 98 Appendix II species (Table 5). Whales are often heard during January-April as they migrate past, Humpback Whales in particular can be seen breeching from the Southern tip of the island.

<table>
<thead>
<tr>
<th>Species</th>
<th>Red List Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lagenodelphis hosei</td>
<td>FRASER’S DOLPHIN</td>
</tr>
<tr>
<td>Megaptera novaeangliae</td>
<td>HUMBACK WHALE</td>
</tr>
<tr>
<td>Lutjanus analis</td>
<td>MUTTON SNAPPER</td>
</tr>
<tr>
<td>Lutjanus cyanopterus</td>
<td>CUBERA SNAPPER</td>
</tr>
<tr>
<td>Mycteroperca venenosa</td>
<td>YELLOWFIN GROPER</td>
</tr>
<tr>
<td>Carcharhinus leucas</td>
<td>BULL SHARK</td>
</tr>
<tr>
<td>Galeocerdo cuvier</td>
<td>TIGER SHARK</td>
</tr>
<tr>
<td>Manta birostris</td>
<td>MANTA RAY</td>
</tr>
<tr>
<td>Sphyra mokarran</td>
<td>GREAT HAMMERHEAD</td>
</tr>
<tr>
<td>Chelonia mydas</td>
<td>GREEN TURTLE</td>
</tr>
<tr>
<td>Dermochelys coriacea</td>
<td>LEATHERBACK</td>
</tr>
<tr>
<td>Eretmochelys imbricata</td>
<td>HAWKSBILL TURTLE</td>
</tr>
<tr>
<td>Iguana delicatissima</td>
<td>LESSER ANTILLEAN IGUANA</td>
</tr>
</tbody>
</table>

Table 5 IUCN Red List Species found with and adjacent to St Eustatius Marine Park
### Vision, Mission and Goals

#### Vision

A thriving actively managed and sustainably used marine environment around St. Eustatius.

#### Mission

To manage and conserve natural, cultural and historical marine resources of St. Eustatius for sustainable use with continued stakeholder participation, for the benefit of current and future generations.

#### Goals

1. Dynamically manage St. Eustatius’ marine environment successfully as a nationally, regionally and globally significant protected area, within an effective legislative framework and with commitment from stakeholders.

   St. Eustatius Marine Park faces constant challenges in setting realistic objectives that take into account all of the present and future uses. By trying to achieve a balance between use and protection, St. Eustatius can build on its successes to become regional and global flagship for the effectiveness of protected areas.

2. Conserve, through practical conservation and active management;
   - the natural values of the marine park, including threatened, rare and endangered species, habitats, water quality, biological diversity, ecosystem processes and aesthetic values.
   - the cultural and historical marine resources of St Eustatius.

   2a) By conserving and managing all aspects of St Eustatius’ marine environment the Marine Park will safeguard the vital life-support processes of the sea including:
   - photosynthesis,
   - maintenance of food chains,
   - movement of nutrients,
   - degradation of pollutants
   - conservation of biological diversity
   - productivity

   This provides an essential foundation for sustainable, nature-based tourism.

   2b) To be of greatest benefit St Eustatius Marine Park must address the full spectrum of human values. This will ensure that STENAPA does not attach too much importance to the scientific and technical aspects of managing the natural environment, at the expense of the human, cultural, and spiritual aspects.

---
8 These goals are not written in any order of priority, for further information on the goals of Marine Protected Areas, visit [www.iucn.org/themes/wcpa/pubs/guidelines.htm](http://www.iucn.org/themes/wcpa/pubs/guidelines.htm), and look at the Guidelines for Marine Protected Areas.
3) Ensure the promotion of the marine environment as a traditionally and contemporarily valuable, sustainable, multiple use resource whilst establishing rules, guidelines, permits and enforcing legislation for different users.

It is essential that St. Eustatius Marine Park ensures that protection lasts and values are not undermined by cumulative degradation. Lasting protection can be achieved in partnership with wise use involving the accommodation of a broad spectrum of human activities compatible with the primary goal of conservation. This can be done by applying key management and enforcement tools.

4) Ensure the involvement of the local community and stakeholders, to cultivate a sense of partnership, improved information base and support for the zoning, regulations and management practices of St. Eustatius Marine Park.

By involving stakeholders five key benefits arise, each of which will help in the pursuit of St Eustatius Marine Parks’ objectives:

- Increased sense of ‘ownership’.
- Greater support for the protection of the area.
- Greater public involvement in decision-making
- Formation of links between planning for conservation and planning for development.
- Provision of a mechanism for communication
Zoning

Zone location
The St Eustatius Marine Park surrounds the entire island from the high water mark to a depth of 30 metres. Due to the shape of the sea floor this extends the furthest in the South West (Figure 23). There are two designated reserves, marked by large yellow buoys (Image 44), one in the North and one in the South. The goals of the reserves are to conserve marine biodiversity (Image 45), protect fish stocks and promote sustainable tourism.

![Diagram of St Eustatius Marine Park with Northern and Southern Reserves]().

**Figure 23** The location of the reserves in St Eustatius Marine Park.

The Northern Marine Reserve is located at 17° 30’.5 N along the high waterline to the northern point, to the north to the 30 meter depth limit, to the west and south along the 30 meter depth limit until these lines pass the coordinate 17° 30’.5 N and back to Jenkins Bay. The Southern Marine Reserve is located at 17° 28’.5 N along the high waterline to the point of White Wall, south out to sea for half a nautical mile, to the west following the 30 meter depth limit to the crossing with the 17° 27’.7 N coordinate, to the north 17° 28’.5 N and back to Gallows Bay. Anchoring is not permitted within the Reserves. Fishing is not permitted within the reserves with the exception of trolling with a line and a hook by local fishermen on return from fishing trips. Within the marine park all relevant legislation, rules and guidelines apply as described in the Marine Environment Ordinance.

![Image of reserve marker buoy]().

**Image 44** Reserve marker buoy, **Image 45** Anchor damage to the reef reduces biodiversity.
**Other zones**

Due to the heavy boat traffic using Statia Terminals NV, anchoring zones have been designated for bunker vessels with drafts up to 15m (50ft). The zones are situated in Oranje Baai between the City Pier and the Statia Terminal Jetty. The zones are located in water of 24m to 40m. Two of the zones fall entirely within the marine park (zones B and C in Figure 24) while half of Zone A lies beyond the depth boundaries of the marine park. Tankers also use the area west of these designated zones for anchoring vessels.

![Anchorage zones for Bunker vessels with draft up to 15m.](image)

*Figure 24* Anchorage zones for Bunker vessels with draft up to 15m.
**Governance**

The Marine Park is managed by a local non governmental, not for profit foundation ("stichting")-called St Eustatius National Parks Foundation (STENAPA) incorporated in the Netherlands Antilles on 21st November 1988. The mission, mandate and goals of STENAPA are:

**STENAPA Mission**

Acquisition, preservation, protection and administration of parcels of land/water on St Eustatius, worthy of preservation, due to:

- Scenic beauty and/or the presence of flora and fauna important in scientific or cultural respects or valuable from a geological or historical point of view;
- Its purpose to serve for the well-being, the education and the recreation of the St Eustatius population as well as that of visitors, all this with due observance of the primary requirement of preservation.

**STENAPA Mandate**

STENAPA is the only organisation on St Eustatius with a mandate for environmental protection. STENAPA is legally mandated by the Island Government to manage all the island’s protected areas (the Statia Marine Park, the Quill/Boven National Park as well as a young Botanical Garden) on the 21km² island of St Eustatius. Collectively, the protected areas account for 33km² - more than the total land area of St Eustatius.

**STENAPA Goals**

- Purchase or acquisition of individual areas of land/water and the buildings possibly constructed thereon;
- Administration, development and protection of these areas to do full justice to the preservation of nature, and scientific and cultural values and to the well-being of visitors;
- Making these areas accessible to persons and institutions, who wish to visit to perform scientific studies, or for educational or recreational purposes;
- Execution or stimulation of scientific research on these areas, for the benefit of science itself and the benefit of preservation of the natural and cultural values of these areas.
Two new members joined the board in May – one represents Statia PRIDE Foundation Pamela Berkel and the other represents the government – working on the government beautification committee Ruth Pandt. One former member had to resign (as Secretary) in January as she became an office administrator based in the STENAPA offices.

<table>
<thead>
<tr>
<th>Position</th>
<th>Member</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>President</td>
<td>Irving Brown</td>
<td>Irving left his native island of St Eustatius at the tender age of 12 to study at Lower and Middle Technical School (Aruba) and then continued to the University of Netherlands Antilles to complete a BS in Mechanical Engineering (Curacao). After completing his studies, Irving returned to St Eustatius in 1992 and started working for Statia Terminal nV in January 1993 as an Engineer Trainee, working his way up to become Assistant Maintenance Manager in 2005.</td>
</tr>
<tr>
<td>Vice President</td>
<td>Ronald Coutar</td>
<td>Ronald joined the Board of STENAPA as Vice President in 1998, and became President in 1999. Ronald held the office of President until new Statutes were introduced in 2005 with elections every two years so that officers could remain in the same position for maximum four years, and was then elected Vice President.</td>
</tr>
<tr>
<td>Secretary</td>
<td>Vacant since January 2007</td>
<td>Jana moved from the USA to work in St Eustatius in 1987. Due to her interest in environmental issues, and in assisting STENAPA in particular, Jana became an Ordinary Board Member in May 2000 and was elected Treasurer in March 2001.</td>
</tr>
<tr>
<td>Treasurer</td>
<td>Jana Mason</td>
<td>Ira applied to become a Board Member due to his interest in environmental issues in Statia, and his wide experience working as a horticulturist for 32 years at the Brooklyn Botanic Garden in New York. Ira first came to St Eustatius in 1986 and is a founding member and President of the Statia Morning Glory Foundation – established in 2001 to protect endemic species of flora and fauna on St Eustatius. Ira has been an Ordinary Member since March 2002.</td>
</tr>
<tr>
<td>Ordinary Member</td>
<td>Ira Walker</td>
<td>Daniel applied to become a Board Member due to his concern for the preservation of the natural environment of St Eustatius. He was one of the first citizens of Statia to join STENAPA as a member. He is also a founding member, Vice President and Secretary of the Statia Morning Glory Botanical Foundation, established to protect endemic species of flora and fauna on St Eustatius.</td>
</tr>
<tr>
<td>Ordinary Member</td>
<td>Daniel Eaton</td>
<td>Kay joined the Board of STENAPA in 1998 due to interest in the public becoming more involved with environmental conservation on St Eustatius. Kay saw that the island was still undeveloped, and was concerned that it would develop in an uncontrolled fashion, and wanted to help influence the direction of development.</td>
</tr>
<tr>
<td>Ordinary Member</td>
<td>Kay Boyd</td>
<td>Ingrid Walther represents the dive centre currently on rotation for Board representation, and has represented the dive industry on the Board since January 2007. Born in Switzerland in 1968, Ingrid has a Diploma in Hospitality and Tourism Management with a specialisation in tourist marketing.</td>
</tr>
<tr>
<td>Ordinary Member</td>
<td>Pamela Berkel</td>
<td>Fishermen Representative</td>
</tr>
</tbody>
</table>
Institutional arrangements

Table 6 indicates which institutional arrangements are in place for the St Eustatius Marine Park. Where possible further details have been included in the appendices.

<table>
<thead>
<tr>
<th>Statutes</th>
<th>✓</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily board</td>
<td>✓</td>
</tr>
<tr>
<td>Staff work book</td>
<td>✓</td>
</tr>
<tr>
<td>Job descriptions for staff</td>
<td>✓</td>
</tr>
<tr>
<td>Uniforms for staff</td>
<td>✓  See Photo’s Image 46 Image 47</td>
</tr>
<tr>
<td>Staff id badges</td>
<td>✓</td>
</tr>
<tr>
<td>Staff evaluations</td>
<td>✓</td>
</tr>
<tr>
<td>Committees</td>
<td>✓  2 committees – see below</td>
</tr>
<tr>
<td>Annual report</td>
<td>✓  See Appendix 1</td>
</tr>
<tr>
<td>Annual audit</td>
<td>✓  Financial reporting carried out annually</td>
</tr>
</tbody>
</table>

**Table 6** Institutional provisions for St Eustatius Marine Park

*Image 46* Ranger Nadio Spanner in uniform (left)

*Image 47* Sea Turtle Programme Co-ordinator Arturo Herrerain uniform

**Committees**

**Executive Committee**

With the exception of the board members who are already nominated in function, the Board elects four Board officers (President, Vice President, Treasurer, Secretary) from its ordinary members every two years. The last elections for the executive committee took place in October 2005. The Executive Committee is charged with the following:

- Taking urgent decisions;
- Overseeing the affairs of STENAPA between meetings; and
- Ensuring that the decisions of the Board are implemented and that the affairs of STENAPA are conducted in a proper manner at all times

The Executive Committee consists of the following officers:

- President Irving Brown
- Vice President Ronald Courtar
- Secretary (vacant since January 2007)
- Treasurer Jana Mason
St. Eustatius Marine Environment Ordinance

AB1996, No. 03

THE ISLAND COUNCIL OF SINT EUSTATIUS:

Considering:
That it is desirable to establish regulations concerning the management of the marine environment of the Island Territory of St. Eustatius for the protection of the nature as well as regulations for commercial, educative, recreational and research activities;

Has decided:
To decree the Island Ordinance Marine Environment.

SECTION I: GENERAL PROVISIONS

ARTICLE 1
This ordinance defines the terms below as follows:
(a) Underwater Park: also known as the marine park, the sea floor and the overlying waters around and adjacent to the island St. Eustatius, from the high water tidemark to the 30m depth contour,
(b) Coral: live organisms or the calcified casings (skeletons) of those organisms,
(c) Statian: a person who was born on St. Eustatius or born from Statian parents
(d) Diver: A person who, outfitted with scuba equipment, enters the water with definite intentions to be under water, is in the water, exits the water after being in the water for a short time.
(e) Dive Sport: the activity as a diver, recreational as well as commercial;
(f) Dive Site: the place of position where diving is practiced, where it is started and where it is finished;
(g) Spear Fishing: the hunting or killing of marine animals using spears, harpoons and spear guns, either mechanically or pneumatically powered, and including spear guns which would fall under the law on firearms.
(h) Dragnet Fishing: dragging of fish lines behind a boat with intentions to catch fish in open water
(i) SCUBA (Self-Contained Underwater Breathing Apparatus): underwater equipment that allows the user by means of compressed air in bottles to remain submerged for a prolonged period of time
(j) Hookah: underwater equipment which allows the user to remain submerged for a prolonged period of time by means of surface air supply
(i) Conch: shell creatures/snails that live in the ocean and belong to the species Strombus gigas
(j) Turtles: marine reptiles of the species in the broadest sense of the term that live in the sea.
(k) Fill Station: location where bottles for diving are filled

ARTICLE 2
1. There is an underwater park St. Eustatius which is commonly referred to as Statia Marine Park.
2. Within the Marine Park there are reserves that cover:
   (a) From Gallows Bay, 17 28’.5 coordinate along the high waterline to the point of white wall, south outward in the sea for ½ nautical mile, to the west following the 30 meters depth limit of ½ nautical mile outward in the sea, measured from the coastline to the crossing with the 17 27’.7 coordinate, to the north 17 28’.5 coordinate and back to Gallows Bay,
(b) Jenkins Bay, 17 30'.5 coordinate along the high water line to its most northern point of the island, to the north to the 30 meter depth limit, to the west and south along the 30 meter depth limit until these lines pass the coordinate 17 30'.5 and back to Jenkins Bay,

(c) The parts of the underwater park as designated by General Island Resolution. Such designations can also be for a limited period of time.

SECTION II: INSTRUCTIONS PROTECTION UNDERWATER FAUNA AND FLORA

ARTICLE 3
It is prohibited to commit acts that conflict with this Ordinance and damage the interests of the nature and environment within the underwater park of the Island Territory St. Eustatius as defined in Section I General Provisions.

ARTICLE 4
Spear fishing is not allowed if use is made of scuba or Hookah equipment.

ARTICLE 5
It is forbidden to fish in the marine park using poison, poisoned bait and/or other materials as well as chemicals and explosives.

ARTICLE 6
In divergence to the provisions of Articles 3 and 4, the catching of sea turtles within the marine park is only allowed in accordance with the following instructions:

(a) it is forbidden to catch more than two sea turtles per person per year,
(b) it is forbidden to catch female sea turtles from April 1st up to and including November 30th,
(c) persons who have caught sea turtles must report every catch to the manager of the Statia Marine Park before killing it,
(d) it is forbidden to disturb sea turtles’ nests, steal eggs or have sea turtle eggs in one’s possession

ARTICLE 7
The collection of sea snails (conch) in the marine park is only allowed in accordance with the following provisions:

(a) it is forbidden to catch sea snails using scuba or Hookah equipment,
(b) it is forbidden to catch sea snails smaller than 19 cm (7,5 inches) or sea snails which do not have a well developed lip,
(c) it is prohibited to take more than 20 conch per person per year,
(d) the collecting of conch is only for private use and consumption,
(e) deleted,
(f) persons who collect conch must report their catch at once to the manager of the Statia Marine Park.

ARTICLE 8
The Executive Committee can – upon advice from the manager of the Statia Marine Park – by means of a General Island Resolution establish additional regulations for catching or collecting of animals and plants in the marine park regarding minimum size of the animals and plants, the amount, changing the fishing season and the expansion or limitation of the regulations allowing the catching of fish.

ARTICLE 9
1. It is forbidden to commit acts within the Statia Marine Park that damage or can damage the underwater environment.
2. It is forbidden to commit acts intentionally that can destroy the underwater environment of the marine park.
3. It is forbidden to collect coral, or other bottom-dwelling invertebrate animals or plants that live on the sea floor or to pick, break-off or kill them.
ARTICLE 10
1. It is forbidden to anchor on the sea bottom in the Statia Marine Park.
2. The first paragraph does not apply if the safety of the boat and/or its crew is in danger.
3. The first paragraph does not apply within the indicated anchoring zones in the Statia Marine Park. These zones are established by the manager and are marked as such.

ARTICLE 11
1. It is forbidden to intentionally damage or destroy mooring buoys that are placed in the Statia Marine Park by or on behalf of the Executive Committee of St. Eustatius or to remove the buoys without written permission from or on behalf of the Executive Committee.
2. It is forbidden to place mooring buoys in the Statia Marine Park without written permission from or on behalf of the Executive Committee.
3. The Executive Committee will establish regulations by means of a General Island Resolution regarding the use of mooring buoys.

ARTICLE 12
It is prohibited to discharge any substance in or flowing out into the Statia Marine Park with the exception of fish, fish parts, chumming material, cooling effluent and effluent of marine sanitation devices of vessels.

ARTICLE 13
Changes and amendments to the coastal area that can influence the underwater environment of the Statia Marine Park must be established ahead of time by means of an Environment Impact Assessment.

SECTION III: VISITOR’S FEE, PERMITS AND FEES

ARTICLE 14
1. Conditions can be attached to permits granted on the basis of this Ordinance in the interest of protecting the marine environment, to ensure compliance with this Ordinance and in the interests of the safety of visitors to the park.
2. A fee is charged for the permit; the amount thereof is established by General Island Resolution.
3. A written request must be submitted to the Executive Committee for a permit or an exemption as meant in this Ordinance, accompanied by relevant documentation.
4. The Executive Committee can establish further regulations regarding the accompanying documentation.
5. A permit or exemption granted on the basis of this Ordinance is only valid if it is in writing.

ARTICLE 15
1. Visitors to the Statia Marine Park must obtain an entry ticket for the underwater park from the manager of the Statia Marine Park. A visitor’s fee of ANG 17,50 is charged for the entry ticket to the underwater park to those who are going to scuba dive or snorkel.
2. The visitor’s fee is a fixed amount per person per year. The amount thereof can be changed by a General Island Resolution, which can also fix another amount to be charged for groups as described in the Resolution.
3. A General Island Resolution can establish visitor’s fees for other users of the underwater park.
4. The proceeds of the visitor’s fee is only spent on the upkeep of the underwater park St. Eustatius. This also includes maintenance, upholding the law, providing information and research.
5. The management body provides the Executive Committee before April 1st with an accounting of the proceeds form the previous year.

ARTICLE 16
Visitors to the Marine Park are charged a visitor’s fee of ANF 3,60 (USD 2.00) per scuba diver per dive or ANG 3,60 (USD 2.00) per visitor that comes to St. Eustatius to snorkel in the Marine Park.
ARTICLE 17
1. The person that transports people to a location within the Statia Marine Park in exchange for payment must have a written permit granted by or on behalf of the Executive Committee.
2. Conditions can be attached to the permit.
3. The provision of paragraph one of this Article does not apply if it concerns passing through the area of the Statia Marine Park.

ARTICLE 18
1. The owner and/or operator of a boat that anchors in the designated anchor zones within the Statia Marine Park or makes use of the mooring buoys that are installed there must pay an anchor fee.
2. Permission to anchor must be gotten from the manager of the Statia Marine Park.
3. The anchor fee entitles to use anchors in the designated zones in the Marine Park or to use that mooring buoys for a maximum of one week.
4. The St. Eustatius General Port Fee Ordinance does not apply to the anchor zones within the Statia Marine Park and the mooring buoys installed.
5. Establishing and changing the amount of the anchor fee within the Statia Marine Park takes place by means of a General Island Resolution.

ARTICLE 19
1. It is forbidden to have a fill station in use or to possess a compressor used to fill diving bottles without a permit from the Executive Committee.
2. The prohibition in paragraph one does not apply to those on visiting boats in as far as the filling of bottles is done for their own use and serves no commercial purpose.

ARTICLE 20
1. Those that conduct commercial diving activities within the underwater park must have written permission from the Executive Committee to do so.
2. The Executive Committee can establish further regulations regarding such a permit in a General Island Resolution.

SECTION IV: CONCLUDING AND CRIMINAL PROVISIONS

ARTICLE 21
1. The Executive Committee can grant an exemption from the provisions of this Ordinance on request for scientific research and educational purposes.
2. The Executive Committee can in certain cases and on request grant an exemption from the provision of Article 9, paragraph three of this Ordinance for commercial purposes.
3. Conditions can be attached to exemptions.
4. Before granting an exemption the Executive Committee will seek the advice of an expert.

ARTICLE 22
Users of the Statia Marine Park must strictly follow the instructions of the manager of the underwater peak and/or his co-workers.

ARTICLE 23
1. A General Island Resolution arranges for the management of the Statia Marine Park by a non-governmental legal entity.
2. The manager of the legal entity that is in charge of managing the Statia Marine Park is obliged to not commit any acts that conflict with the provisions of this Ordinance.
3. Violation by the manager of provisions by or pursuant to this Island Ordinance will be punishable with imprisonment for a maximum of one month.

ARTICLE 24
Violation of the provisions in or pursuant to this Ordinance is punishable with imprisonment for a maximum of one month or a monetary fine for a maximum of ANG 5,000.

ARTICLE 25
Criminal acts in this Ordinance are deemed to be misdemeanours.
ARTICLE 26
Besides the persons indicated in the Criminal Code, the persons responsible for tracking and tracing the criminal acts in this Ordinance are:
(a) the persons responsible for the management of the Marine Park,
(b) other persons so indicated in a General Island Resolution.

ARTICLE 27
Objects acquired by violating any of the prohibitions of this Ordinance, or objects used in committing the violation, may be seized and can be confiscated by a Court of Law.

ARTICLE 28
This Ordinance comes into effect on the day following the day it is proclaimed.

ARTICLE 29
It can be cited as: "St. Eustatius Marine Environment Ordinance".

Established in the public meeting of the Island Council of the Island Territory of St. Eustatius March 25th, 1996

The Island Secretary, The Lieutenant-Governor,
D.C. Berkel JD E.R. Locadia

This Island Ordinance was proclaimed by me on March 28, 1996.

The Lieutenant-Governor,
E.R. Locadia
Announced (Publication Board): March 28th, 1996
Announcement in GIB: April 9th, 1996
Date of Commencement: March 29th, 1996

This version of the MEO is revised according to the GOVERNOR OF THE NETHERLANDS ANTILLES and is transcribed from its original Dutch language.

Treaties implemented by the National (Netherlands Antilles) Nature Conservation Ordinance such as CITES, SPAW protocol of the Cartagena Convention, Bonn Convention on migratory species, Inter-American sea turtle convention, Biodiversity convention and the Ramsar convention overrule regulations stipulated within this island ordinance. Therefore, Article 6 of this MEO, is null and void, as all species of Sea Turtle and their nesting areas are protected.
Other relevant legislative and policy tools

A range of relevant legislation and policy tools exist on St. Eustatius, from international treaties and conventions through National legislation to Island legislation. The DCNA has produced a booklet to bring all the existing legislation concerning the use and conservation of the marine environment for the windward Netherlands Antilles islands. The booklet is designed to be used by wardens, rangers and managers to help with the enforcement of legislation relating to the marine environmental. This will be made available through www.DCNA.nature.org. Full copies of the tools listed below can be found in Appendix 2.

Island legislation and policies

C1 - Statia Lobster Ordinance - AB1966, No. 01
C2 - Statia Hindrance Ordinance - AB1993, No. 09
C3 - Statia Marine Environment Ordinance - AB1996, No. 03
C4 - Statia Marine Environment Resolution - AB1996, No. 04
C5 - Statia Marine Environment Ordinance Explanatory Memo - AB1996, No. 05
C6 - Statia Flora and Fauna Ordinance - AB1997, No. 06
C7 - Statia Flora and Fauna Resolution - AB1997, No. 07
C8 - Statia Flora and Fauna Explanatory Memo
C9 - Statia Marine Environment Ordinance - AB1996, No. 06
C10 - Statia Marine Environment Ordinance Governor’s Resolution - No. 2544

National legislation

A1 - National Fisheries Ordinance - Ao1991, No. 74
A2 - National Fisheries Resolution - Ao1992-108
A3 - National Prevention of Pollution from Ships Ordinance - Ao1993, No. 108
A4 - National Civil Liability Oil Tankers Ordinance - Ao1998, no. 169
A5 - National Oil Pollution Compensation Ordinance -Ao1998-170
A6 - National Nature Conservation Ordinance - Ao2001, No. 41

International Treaties and Conventions

CITES Convention Of International Trade In Endangered Species
Cartagena The Convention For The Protection And Development Of The Marine Environment Of The Wider Caribbean Region
IAC Inter American Convention For The Protection And Conservation Of Sea Turtles
CBD Convention On Biological Diversity
CMS/Bonn Convention On The Conservation Of Migratory Species Of Wild Animals
Ramsar Ramsar Convention On Wetlands
MarPol International Convention For The Prevention Of Pollution From Ships

Table 7 International treaties and conventions relevant to St Eustatius Marine Park.

Permits

Permits are required for watersports operations, tour operator and tourism guides. Permits are obtained by submitting a signed and dated permit application and form alongside a copy of a current business license from the island government. Copies of permitting documents can be seen in Appendix 3. Boats operating in the Marine Park must be registered with the Harbour Office.
Guidelines

St Eustatius Marine Park guidelines for a range of activities are published in mini guides (Figure 25), on signboards (Image 48, Image 49) and on the STENAPA Website (the signboard at the harbour can be seen in Appendix 4). The mini-guides are sold as souvenirs, included in purchase of dive and yacht fees, and are available from the STENAPA headquarters, so are not presented in full in this plan. Laminated dive briefings about the Marine Park in English, Dutch and French are distributed to all dive centres who are requested to display them clearly for divers to read.

Diving in St Eustatius Marine Park  Miriam Schmidt Botanical Garden
Yachting in St Eustatius Marine Park  Nature on Statia

The Quill National Park

Figure 25 Mini guides published for STENAPA

Image 48 Guidelines published at the Airport (left)
Image 49 Zeelandia Beach Signage (right)

Diving

The following guidelines exist for the users of St. Eustatius Marine Park who intend to SCUBA dive:

1. Diving within the Marine Park is allowed only through local dive operators. There are three dive operators on the island:
   • Dive Statia
   • Scubaqua
   • Golden Rock
   Additionally, there are permit arrangements allowed by the Executive Council of the Island Government with a weekly liveaboard vessel, Caribbean Explorer, for a Marine Park Ranger/Intern to supervise dives and ensure that their dives keep to Marine Park regulations.
2. Each diver must purchase a dive tag (sold through the dive operator);
   • annual diving pass= $15
   • single dive pass= $3
   • *All fees go towards operational and maintenance costs of the Marine Park.
3. Avoid wearing gloves and touching or collecting marine life, including shells.
4. When diving near coral, be aware of trailing equipment and your fins. The slightest touch can damage or kill sensitive coral.
5. Do not feed fish. It changes their natural behaviour and diet.
6. Leave historical artefacts undisturbed to allow future divers to enjoy them.
7. Report any turtle and cetacean sightings to the National Parks Office.
8. Never touch, disturb, or harass a turtle or any other encountered marine life.
9. Do not disturb any of the fish traps outside of the reserves.

Snorkellers must adhere to the same guidelines as SCUBA divers, other than points 1 and 2. If snorkellers wish to use a boat mooring each individual must pay the $3 single or $15 year pass fee.

**Yachting**

The following guidelines exist for those yachting within St. Eustatius Marine Park:

- The Park Rangers collect mooring/anchorage fees daily and can advise on available facilities (water, laundry, shopping, fuel, ice, and weather forecasts).
- For Customs and Immigration, yachts are advised to proceed to the Harbour Office (open Monday-Friday: 0800 – 1600, weekends: 0800 – 1100) for paperwork and registration.
- The Parks Office is open Monday-Thursday: 0800 – 1700, and Friday: 0800 – 1600.
- The Marine Park can be contacted on VHF 17/16 and the Harbour Office on VHF 14.
- Waste disposal bins are available at the City Pier.
- The international law (MARPOL) prohibits the discharge of any type of solid or liquid waste, including food, into the sea within 3 miles of land.
- Vessels with onboard holding tanks are encouraged to use them and to dispose of waste periodically offshore.

**Mooring**

Visiting yachts are only allowed to moor on the yellow Marine Park moorings provided in Oranjestad Bay. To moor your boat:

- Approach the floating pick-up line of the mooring by heading into the wind or current at a very slow speed. Shift engine into neutral before reaching the mooring.
- Pick up the eye of the pick-up line with you boat hook.
- Thread your bowline through the eye-splice of the pick-up line twice, or thimble once, to prevent chafing. Do not tie off eye at the boat stern.
- Bring your line back to the boat and cleat it off on the same side. DO NOT put the pick-up line eye over your boat cleat.
- When leaving the mooring, back away with the wind after casting off the pick-up line.
* Rafting with other boats is not permitted while occupying Marine Park moorings. During heavy seas, it is recommended to use an anchor as additional support.

**Anchoring**

If moorings are not available or their use is inappropriate, please use these guidelines to anchor:

- Shift engine into neutral and slowly head into the wind or current and be sure crew, anchor, and anchor line are ready.
- When selecting an anchorage, observe the bottom. Make sure your anchor line is 5 times the water depth. Do not drop your anchor on coral reefs or seagrass beds. Most of Oranje Bay has a sandy bottom.
- Once an anchorage is determined, lower the anchor over the side; never throw the anchor.
- Slowly play out the anchor line to avoid the line from dropping into a pile on the bottom.
- Allow time for the anchor to catch hold. Let the current or wind drift the boat back. Once the anchor is set, fasten the anchor line to the bow cleat.
- Reverse the boat slowly, creating a steady strain on the anchor line to ensure the anchor is holding. If the anchor is moving, pull it up and try again.
- Check for dragging by noticing vibrations on the anchor line, or by visible jerks on the line.
- Do not anchor within 30 m (100 ft) of any mooring or regulatory buoy. If in doubt where to anchor, call the Marine Park on VHF 17/16.
Human Resources

Staff
Seven staff members work on St Eustatius Marine Park, only one park ranger works full time on the MPA while the other staff members spend some time on terrestrial issues. The staff members are outlined on the next page. As well as the core staff members, St Eustatius Marine Park depends on the efforts of interns and volunteers;

Intern Programme
STENAPA continues to arrange for volunteers to come as Marine Park, National Park and Botanical Garden Interns. It is expected that these volunteers have relevant qualifications or experience in these fields, and that they coordinate activities for the Working Abroad volunteers, particularly in the National Park (trail maintenance, sign building, species monitoring, etc), Botanical Garden (planting, maintenance, garden development, etc) and Marine Park (turtle monitoring, mooring cleaning, etc). Additional activities for interns include participation in monthly school presentations, collection of fees from tourists, and ensuring maintenance of general use areas (bathroom, kitchen, etc) at the Botanical Garden. Interns usually stay for a period of six months. A bed is provided in a shared bedroom at the Botanical Garden, a shared truck is available for use out of office hours, and costs for energy and bottled water at the Botanical Garden are covered. Since 2006, there is a standard payment of a small monthly stipend payment of $75. This stipend is charged to the Working Abroad account due to the interns’ important role in volunteer coordination. The intern positions are advertised on the STENAPA web site and on www.idealist.org (a web site offering conservation opportunities worldwide). The majority of interns apply after viewing this site or after coming to Statia as a Working Abroad volunteer. Interns play an extremely valuable role in the organisation and coordination of project activities, and staff would not be able to coordinate the Working Abroad volunteer programme without the assistance from interns.

Information for volunteers can be found in Appendix 10.

Working Abroad Volunteer Programme
Working Abroad, a French/UK based volunteer organisation has supported the Statia Conservation Project since early 2003. Groups of up to eight volunteers visit for a period of two months to work on the Marine Park, the Quill National Park and the Botanical Garden. A contribution of $1267 is received from each volunteer to cover the costs of camping at the Botanical Garden, use of a new truck and for project costs. During 2006, a total of 32 volunteers assisted STENAPA and helped on a large number of activities. This programme continues to develop with improvements to address comments and criticisms from former volunteers; and provides a major boost to the activities in all three sectors, Marine Park, National Parks and Botanical Garden. Development in the Botanical Gardens and nightly monitoring patrols for the turtle conservation programme would not have been possible without the assistance from Working Abroad volunteers.

Statia Terminals NV volunteers
Statia Terminal staff carry out voluntary community service as part of a commitment by the owners, Nustar Energy to the local community. The Marine Department staff, in particular, assist the Marine Park with activities beyond the capacity of the Marine Park, such as installation of a heavy dead-weight anchor for a dive site mooring or yacht mooring, donation and sinking of items for an artificial reef for fishermen, and assistance with sinking of the Charles Brown wreck. The Marine Park requests assistance in writing from the Manager of Statia Terminal.
<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>MPA/TPA Time split</th>
<th>Years of service</th>
<th>Academic qualification</th>
<th>Dive qualification</th>
<th>Special police powers</th>
<th>VHF radio operator maintenance</th>
<th>Vehicle / boat maintenance</th>
<th>First aid</th>
<th>Conflict resolution</th>
<th>Captains license</th>
<th>IT Training</th>
<th>Media and communication</th>
<th>Species specific training</th>
<th>Monitoring</th>
<th>General areas of work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nicole Esteban</td>
<td>Manager</td>
<td>60/40</td>
<td>4</td>
<td>MSc</td>
<td>Divemaster</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Oversees all programmes, financial and project reports, project management, volunteer management, research / monitoring coordination.</td>
</tr>
<tr>
<td>Walter Blair</td>
<td>MPA Chief ranger</td>
<td>100/0</td>
<td>4</td>
<td>None</td>
<td>Rescue diver</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Mooring maintenance, yacht/dive fee collection, boat/vehicle maintenance, assists research, assists snorkel club</td>
</tr>
<tr>
<td>Nadio Spanner</td>
<td>MPA Ranger</td>
<td>80/20</td>
<td>2</td>
<td>BVO</td>
<td>Rescue diver</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Mooring maintenance, yacht/dive fee collection, boat/vehicle maintenance, assists research, assists snorkel club</td>
</tr>
<tr>
<td>Violet Busby</td>
<td>Administrator</td>
<td>50/50</td>
<td>2</td>
<td>Diploma</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Provides information to visitors, cash box management, accounting entry and reporting, office supplies, office management.</td>
</tr>
<tr>
<td>Jessica Berkel</td>
<td>Administrator</td>
<td>50/50</td>
<td>&lt;1</td>
<td>Diploma</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Former board secretary on a permanent transfer from the government. Provides information to visitors, cash box management, accounting entry and reporting, office supplies, office management.</td>
</tr>
<tr>
<td>Dominique Vissenburg</td>
<td>Education officer</td>
<td>60/40</td>
<td>2</td>
<td>BSc</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Establishing and running education programmes within schools and communities</td>
</tr>
<tr>
<td>Arturo Herrera</td>
<td>Sea Turtle Programme Co-ordinator</td>
<td>90/10</td>
<td>1</td>
<td>MSc</td>
<td>Rescue</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Schedules and trains volunteers on turtle programme, leads patrols, arranges turtle programme research, arranges volunteer schedule, organises turtle-related educational activities. Coordinates all research.</td>
</tr>
</tbody>
</table>

**Table 8** Summary of the staff involved with St Eustatius Marine Park
### Physical Resources

<table>
<thead>
<tr>
<th>Resource</th>
<th>#</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Office(s)</strong></td>
<td>2</td>
<td>constructed July 2006</td>
</tr>
<tr>
<td><strong>Meeting room</strong></td>
<td>1</td>
<td>constructed July 2006 – 1 Marine Park</td>
</tr>
<tr>
<td><strong>Workshop</strong></td>
<td>2</td>
<td>constructed July 2006 – 1 Marine Park</td>
</tr>
<tr>
<td><strong>Visitor centre</strong></td>
<td>1</td>
<td>constructed July 2006 (shared with meeting room)</td>
</tr>
<tr>
<td><strong>Public Toilets</strong></td>
<td>4</td>
<td>3 constructed July 2006 at Visitor centre, 1 constructed 1998 at the Botanical Garden.</td>
</tr>
<tr>
<td><strong>Accommodation</strong></td>
<td>1</td>
<td>Two bedroom “open” cottage constructed 1998 at the Botanical Gardens.</td>
</tr>
<tr>
<td><strong>4x4 trucks</strong></td>
<td>4</td>
<td>3 Mazda B2900 pickups. 2004 models, all hunter green in colour. All in working condition. Mitsubishi, 2001 model. Same colour, same condition.</td>
</tr>
<tr>
<td><strong>Patrol boat</strong></td>
<td></td>
<td>Eduardono flat bottom Fibre glass boat, white with blue stripe and black paint at the water line. Boat was purchased in 2001, in need of replacement (major cracks along hull) and carries two Yamaha 85 outboard engines</td>
</tr>
<tr>
<td><strong>Dinghy</strong></td>
<td>1</td>
<td>Rigid inflatable with 1 Tohatsu 30HP engine purchased 2005</td>
</tr>
<tr>
<td><strong>Fax Machine</strong></td>
<td>1</td>
<td>Lexmark 9350 All in One centre, purchased July 2007</td>
</tr>
<tr>
<td><strong>Telephone</strong></td>
<td>2</td>
<td>Brand = Uniden. Purchased in 2006 handheld, portable</td>
</tr>
<tr>
<td><strong>VHF radio</strong></td>
<td>1</td>
<td>Portable. Purchased in 2006 and in good condition</td>
</tr>
<tr>
<td><strong>Base station</strong></td>
<td>1</td>
<td>Brand = RayMarine purchased in 2004.</td>
</tr>
<tr>
<td><strong>Moorings</strong></td>
<td>27</td>
<td>Dive moorings (6 red 18” and 21 white 18” blue stripe)</td>
</tr>
<tr>
<td><strong>Buoy</strong></td>
<td>3</td>
<td>Snorkel (white 18” blue stripe)</td>
</tr>
<tr>
<td><strong>Buoy</strong></td>
<td>4</td>
<td>Yacht (yellow 18”) (6 others removed due to conflict/fisherfolk)</td>
</tr>
<tr>
<td><strong>Signboards</strong></td>
<td>4</td>
<td>4 large full colour fibreglass signs (office, harbour, airport, Zeelandia)</td>
</tr>
<tr>
<td><strong>Computers</strong></td>
<td>8</td>
<td>Generic computers, good working condition.</td>
</tr>
<tr>
<td><strong>Laptop computers</strong></td>
<td>2</td>
<td>IBM Think pad. Purchased in 2004, in good condition, colour black.</td>
</tr>
<tr>
<td><strong>Camera</strong></td>
<td>1</td>
<td>Sony Cybershot camera with underwater case. In good working condition. Sony Handycam video camera with mini cassette and underwater housing</td>
</tr>
<tr>
<td><strong>Projector</strong></td>
<td>1</td>
<td>1 Canon LV-7105U. Purchased in 2003, colour grey, in good working order.</td>
</tr>
<tr>
<td><strong>Screen</strong></td>
<td>1</td>
<td>Roll down screen in visitor centre, purchased 2007</td>
</tr>
<tr>
<td><strong>Internet</strong></td>
<td>1</td>
<td>DSL since 2006</td>
</tr>
<tr>
<td><strong>BC</strong></td>
<td>6</td>
<td></td>
</tr>
<tr>
<td><strong>Regulators</strong></td>
<td>6</td>
<td></td>
</tr>
<tr>
<td><strong>Weights (sets)</strong></td>
<td>6</td>
<td>About 100kg in various sizes</td>
</tr>
<tr>
<td><strong>Wetsuits</strong></td>
<td>6</td>
<td></td>
</tr>
<tr>
<td><strong>Weighs (sets)</strong></td>
<td>6</td>
<td>About 100kg in various sizes</td>
</tr>
<tr>
<td><strong>Wetsuits</strong></td>
<td>6</td>
<td></td>
</tr>
<tr>
<td><strong>UW Scooter</strong></td>
<td>2</td>
<td>Torpedoes purchased in 2002</td>
</tr>
<tr>
<td><strong>Masks</strong></td>
<td>50</td>
<td>15 Wahoo JR black silicone, purchased June 2007, 15 Magnum 2 black silicone, purchased June 2007, 20 Clear silicone, purchased 2005</td>
</tr>
<tr>
<td><strong>Fins</strong></td>
<td>50</td>
<td>Pairs (all for snorkel club)</td>
</tr>
<tr>
<td><strong>Snorkels</strong></td>
<td>50</td>
<td>Brand = “Fiji” black P.V.C mouth with yellow tube</td>
</tr>
<tr>
<td><strong>Field Glasses</strong></td>
<td>3</td>
<td>1 Gambit LS7x50 multi coated optics (black with green), 1 Gambit 7x50F filed 6.6° 1000m (black), 1 Seachoice - offshore model 7x50 325’ at 1000 yards (safety yellow)</td>
</tr>
<tr>
<td><strong>GPS</strong></td>
<td>3</td>
<td>1 Garmin brand Etrex 12 channel GPS, colour yellow, 1 Garmin brand Geko 101, colour black and yellow, 1 Garmin GPS76, colour black</td>
</tr>
<tr>
<td><strong>Maintenance Equipment</strong></td>
<td>0</td>
<td>For the Marine Park generally no maintenance equipment except perhaps wire brushes for line cleaning, some paint and adhesive letters for buoy and boat markings with varnish to protect. Currently 5 reels of Poly-Dac rope purchased in January, colours: yellow, white with blue used for replacing mooring lines, pick-up lines and buoys.</td>
</tr>
<tr>
<td><strong>Drill Mooring Eq.</strong></td>
<td>1</td>
<td>Hydraulic power unit purchased in 2005. Brand new – co-owned with Nature Foundation St Maarten with drilling equipment for manta rays. 20 manta rays and chain</td>
</tr>
<tr>
<td><strong>First Aid kit:</strong></td>
<td>3</td>
<td>Basic “A” first Aid kits</td>
</tr>
</tbody>
</table>

| **Table 9** Physical resources of St Eustatius Marine Park. |

Images of some of St Eustatius Marine Park’s physical resources can be seen on the next page.
**Image Group 15** From top left, STENAPA 4*4, Patrol boat, public bathroom building, Ranger cleaning a mooring line (source: Dos Winkel), Workshop bench and storage, Work pavilion with workshop (source: STENAPA)
Mooring programme details

The table below details the current status of the dive sites and moorings maintained by St Eustatius Marine Park. The site number corresponds with the numbers on the Dive site map presented earlier in this Part of the management plan. Where no mooring is maintained, it is due to position of the dive site in a shipping channel or lack of frequency of visitation to the dive site (#5, 9, 28).

<table>
<thead>
<tr>
<th>Type</th>
<th>Area</th>
<th>Site No.</th>
<th>Name</th>
<th>N o</th>
<th>N'</th>
<th>W o</th>
<th>W'</th>
<th>Depth m</th>
<th>Line m</th>
<th>Buoy Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dive</td>
<td>South</td>
<td></td>
<td>Drop Off East</td>
<td>17</td>
<td>27.671</td>
<td>62</td>
<td>58.449</td>
<td>21</td>
<td>27</td>
<td>White</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Drop Off West</td>
<td>17</td>
<td>27.676</td>
<td>62</td>
<td>58.527</td>
<td>29</td>
<td>37</td>
<td>White</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Grand Canyon</td>
<td>17</td>
<td>27.694</td>
<td>62</td>
<td>58.662</td>
<td>26</td>
<td>33</td>
<td>White</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Cliffs / Down South</td>
<td>17</td>
<td>27.729</td>
<td>62</td>
<td>58.767</td>
<td>20</td>
<td>26</td>
<td>White</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Coral Gardens</td>
<td>17</td>
<td>27.67</td>
<td>62</td>
<td>58.82</td>
<td>30</td>
<td>38</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mushroom Gardens</td>
<td>17</td>
<td>27.759</td>
<td>62</td>
<td>58.657</td>
<td>16</td>
<td>20</td>
<td>White</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The Humps</td>
<td>17</td>
<td>27.809</td>
<td>62</td>
<td>58.68</td>
<td>13</td>
<td>16</td>
<td>Red</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Valley of Sponges</td>
<td>17</td>
<td>27.835</td>
<td>62</td>
<td>58.938</td>
<td>13</td>
<td>16</td>
<td>White</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Five Fingers North</td>
<td>17</td>
<td>28.86</td>
<td>62</td>
<td>58.98</td>
<td>14</td>
<td>18</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Five Fingers South</td>
<td>17</td>
<td>27.898</td>
<td>62</td>
<td>58.996</td>
<td>16</td>
<td>20</td>
<td>White</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The Ledges</td>
<td>17</td>
<td>27.793</td>
<td>62</td>
<td>59.069</td>
<td>19</td>
<td>23</td>
<td>Red</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Anchor Reef</td>
<td>17</td>
<td>27.738</td>
<td>62</td>
<td>59.118</td>
<td>23</td>
<td>28</td>
<td>White</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The Blocks</td>
<td>17</td>
<td>27.84</td>
<td>62</td>
<td>59.105</td>
<td>17</td>
<td>21</td>
<td>White</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Hangover</td>
<td>17</td>
<td>27.871</td>
<td>62</td>
<td>59.147</td>
<td>17</td>
<td>21</td>
<td>White</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Anchor Point South</td>
<td>17</td>
<td>27.825</td>
<td>62</td>
<td>59.2</td>
<td>18</td>
<td>22</td>
<td>White</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Anchor Point West</td>
<td>17</td>
<td>27.802</td>
<td>62</td>
<td>59.212</td>
<td>18</td>
<td>22</td>
<td>Red</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Anchor Point North</td>
<td>17</td>
<td>27.84</td>
<td>62</td>
<td>59.25</td>
<td>19</td>
<td>23</td>
<td>White</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Twin Peaks</td>
<td>17</td>
<td>27.974</td>
<td>62</td>
<td>59.472</td>
<td>22</td>
<td>27</td>
<td>White</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Barracuda Reef West</td>
<td>17</td>
<td>28.006</td>
<td>62</td>
<td>59.455</td>
<td>23</td>
<td>28</td>
<td>White</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Nursing Station</td>
<td>17</td>
<td>28.088</td>
<td>62</td>
<td>59.495</td>
<td>19</td>
<td>23</td>
<td>White</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Blair’s Reef</td>
<td>17</td>
<td>28.227</td>
<td>62</td>
<td>59.493</td>
<td>19</td>
<td>23</td>
<td>White</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Crook’s Castle</td>
<td>17</td>
<td>28.315</td>
<td>62</td>
<td>59.254</td>
<td>11</td>
<td>14</td>
<td>White</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Triple Wreck</td>
<td>17</td>
<td>28.75</td>
<td>62</td>
<td>59.66</td>
<td>17</td>
<td>21</td>
<td>White</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Double Wreck</td>
<td>17</td>
<td>28.792</td>
<td>62</td>
<td>59.641</td>
<td>20</td>
<td>26</td>
<td>Red</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Stingray City</td>
<td>17</td>
<td>28.742</td>
<td>62</td>
<td>59.557</td>
<td>15</td>
<td>19</td>
<td>White</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>STENAPA Reef</td>
<td>17</td>
<td>29.055</td>
<td>62</td>
<td>59.83</td>
<td>17</td>
<td>22</td>
<td>White</td>
</tr>
<tr>
<td></td>
<td>North</td>
<td>25A</td>
<td>Chien Tong</td>
<td>17</td>
<td>29.011</td>
<td>62</td>
<td>59.875</td>
<td>17</td>
<td>22</td>
<td>Harbour buoy</td>
</tr>
<tr>
<td></td>
<td>General area</td>
<td></td>
<td>Doobie’s Crack</td>
<td>17</td>
<td>30.609</td>
<td>63</td>
<td>0.517</td>
<td>29</td>
<td>37</td>
<td>White</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Outer Jenkins Bay</td>
<td>17</td>
<td>30.812</td>
<td>63</td>
<td>0.114</td>
<td>12</td>
<td>15</td>
<td>White</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Twin Sisters</td>
<td>17</td>
<td>31.013</td>
<td>63</td>
<td>0.21</td>
<td>18</td>
<td>22</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>North</td>
<td>29</td>
<td>Gibraltar/North Point</td>
<td>17</td>
<td>31.509</td>
<td>63</td>
<td>0.004</td>
<td>18</td>
<td>22</td>
<td>White</td>
</tr>
<tr>
<td></td>
<td>Outside MP</td>
<td>30 north</td>
<td>The Charles L Brown</td>
<td>17</td>
<td>27.864</td>
<td>62</td>
<td>59.648</td>
<td>31</td>
<td>23</td>
<td>White</td>
</tr>
<tr>
<td>Outside MP</td>
<td>North</td>
<td>30 south</td>
<td>The Charles L Brown</td>
<td>17</td>
<td>27.84</td>
<td>62</td>
<td>59.598</td>
<td>31</td>
<td>23</td>
<td>White</td>
</tr>
<tr>
<td></td>
<td>North</td>
<td>31</td>
<td>Blue Bead Hole</td>
<td>17</td>
<td>28.658</td>
<td>62</td>
<td>59.504</td>
<td>31</td>
<td></td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>General area</td>
<td>32</td>
<td>Aquarium</td>
<td>17</td>
<td>30.362</td>
<td>63</td>
<td>0.376</td>
<td>31</td>
<td></td>
<td>None</td>
</tr>
<tr>
<td>Marker</td>
<td>Reserve</td>
<td>1</td>
<td>On Shore</td>
<td>17</td>
<td>28.5</td>
<td>62</td>
<td>59.18</td>
<td>0</td>
<td></td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5E</td>
<td>Existing</td>
<td>17</td>
<td>27.4</td>
<td>62</td>
<td>57.45</td>
<td>30</td>
<td></td>
<td>Large Yellow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5W</td>
<td>Existing</td>
<td>17</td>
<td>27.844</td>
<td>62</td>
<td>59.555</td>
<td>19</td>
<td></td>
<td>Large yellow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5N</td>
<td>Existing</td>
<td>17</td>
<td>28.5</td>
<td>62</td>
<td>59.555</td>
<td>19</td>
<td></td>
<td>Large yellow</td>
</tr>
<tr>
<td>Snorkel</td>
<td>South</td>
<td>A</td>
<td>Blind Shoal</td>
<td>17</td>
<td>27.877</td>
<td>62</td>
<td>58.645</td>
<td>6</td>
<td></td>
<td>White</td>
</tr>
<tr>
<td></td>
<td>North</td>
<td>C</td>
<td>Inner Jenkins Bay</td>
<td>17</td>
<td>30.746</td>
<td>63</td>
<td>0.057</td>
<td>6</td>
<td></td>
<td>White</td>
</tr>
<tr>
<td></td>
<td>South</td>
<td>B</td>
<td>Twelve Guns</td>
<td>17</td>
<td>28.211</td>
<td>62</td>
<td>58.972</td>
<td>6</td>
<td></td>
<td>White</td>
</tr>
<tr>
<td>Artificial reef</td>
<td>General area</td>
<td></td>
<td>Artificial reef for</td>
<td>17</td>
<td>28.409</td>
<td>62</td>
<td>59.731</td>
<td>24</td>
<td>27</td>
<td>Brown</td>
</tr>
</tbody>
</table>

| White       | For vessels <30 tonnes |
| Large Yellow| Reserve boundary marker |
| Red         | Dive site for all vessels 30-50 tonnes |

Table 10 Mooring details of St Eustatius Marine Park
Available information
Each of the factors listed below have been identified by Kenchington, R. A. (1990). (Managing Marine Environments, Taylor and Francis, New York.) as important background information for the running of any PA. A good source of information is considered to be recent, comprehensive and easily accessible.

<table>
<thead>
<tr>
<th>Access to information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geological maps                                                 †</td>
</tr>
<tr>
<td>Maps of currents                                                -</td>
</tr>
<tr>
<td>Bathymetric charts                                              †</td>
</tr>
<tr>
<td>Tide tables                                                     -</td>
</tr>
<tr>
<td>Baseline habitat maps                                           -</td>
</tr>
<tr>
<td>Community descriptions                                          †</td>
</tr>
<tr>
<td>Species lists                                                   †</td>
</tr>
<tr>
<td>Status of commercially important species                        ✓</td>
</tr>
<tr>
<td>Status of endangered, threatened and endemic species            ✓</td>
</tr>
<tr>
<td>Aerial photographs                                              ✓</td>
</tr>
<tr>
<td>Hydrological survey                                             -</td>
</tr>
<tr>
<td>Land use plans                                                  -</td>
</tr>
<tr>
<td>Topographical maps                                              ✓</td>
</tr>
<tr>
<td>Economic valuation                                              -</td>
</tr>
<tr>
<td>Cultural valuation                                              -</td>
</tr>
<tr>
<td>Traditional usage                                               -</td>
</tr>
<tr>
<td>Current use and usage levels                                    ✓</td>
</tr>
<tr>
<td>Socio-economic survey                                           -</td>
</tr>
<tr>
<td>Other                                                           -</td>
</tr>
</tbody>
</table>

✓ = Good source, † = available but insufficient, - = not available

Table 11 A summary of the information sources available to St Eustatius Marine Park
Finance

STENAPA and therefore St Eustatius Marine Park relies on income from fees, grant funding and government subsidies. The main expenditures for STENAPA are wages and operational costs. Due to the management structure of STENAPA it is impractical to divide the marine and terrestrial Protected Area’s finances. The following figures and text illustrate the finances for the whole of the STENAPA organisation which includes St Eustatius Marine Park, The Quill and Boven and the Botanical Gardens. These other areas employ 2 more staff and represent a considerable drain on STENAPA’s human, physical and financial resources. Further financial figures can be seen in Appendix 1 – STENAPA’s annual Report.

<table>
<thead>
<tr>
<th>Income</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grants</td>
<td>$280,022.00</td>
</tr>
<tr>
<td>Subsidy - Island Government</td>
<td>$67,416.00</td>
</tr>
<tr>
<td>Sales and other fees</td>
<td>$35,416.00</td>
</tr>
<tr>
<td>Donations and contributions</td>
<td>$964.00</td>
</tr>
<tr>
<td>Other income</td>
<td>$11,764.00</td>
</tr>
<tr>
<td><strong>Total Income</strong></td>
<td><strong>$395,582.00</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Expenditure</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personnel</td>
<td>$183,886.00</td>
</tr>
<tr>
<td>Operating</td>
<td>$106,582.00</td>
</tr>
<tr>
<td>General and administrative</td>
<td>$49,873.00</td>
</tr>
<tr>
<td>Depreciation</td>
<td>$34,378.00</td>
</tr>
<tr>
<td><strong>Total operating expenses</strong></td>
<td><strong>$374,719.00</strong></td>
</tr>
</tbody>
</table>

| Operating income        | $20,863.00 |
| Surplus for the year    | $20,863.00 |

**Table 12** STENAPA finances for 2006

Grants

Seven major funders contributed to the projects of STENAPA. Figure 26 highlights the key grant funding sources and their relative contributions there were several sources of grant funding for STENAPA in 2006:

- Turtle Conservation programme
- Operational costs
- Professionalisation of STENAPA
- Reef check - bleaching monitoring
- NFWF - Statia Marine Park improvement
- Goat and Corallita control
- Water truck, signs and tool shed
- Phase 1 Garden Completion
- Education on SSS Islands

Figure 26 Main sources of grant funding for STENAPA in 2006
Government subsidies
The government of St Eustatius subsidises STENAPA on a yearly basis which accounts for approximately \( \frac{1}{4} \) of STENAPA’s income.

Sales and other fees
Annual dive fees and Dive Live aboard fees account for most of the income from fees (copies of the current passes can be seen in Appendix 3) (Figure 27)

![Figure 27 Division of Fees income for STENAPA.](image)

STENAPA Fees
The St. Eustatius National Parks is currently faced with a lack of financing which threatens their sustainability as an organization. The Economic Tourism survey/study has been carried out and is presented in Appendix 1 because organizational financing will run dry in early 2007. Ultimately if this happens STENAPA will be faced to close their doors once more (operations closed in October 2003 for three weeks when finances were drained until the Executive Council agreed on a monthly subsidy). The objective of this study is to justify whether or not St. Eustatius National Parks Office can rightfully increase Marine/National Park user fees for tourists. Through the suggested increase in user fees by tourists STENAPA may potentially sustain their operations via the collecting of larger fees (Table 13). The Executive Council has indicated the proposed fee increase can go ahead from 1st January 2008.

<table>
<thead>
<tr>
<th>Protected area</th>
<th>Fee type</th>
<th>Fee amount</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Existing</td>
<td>Proposed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>St Eustatius Marine Park</td>
<td>Dive- Single</td>
<td>$3</td>
<td>$4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dive- Annual</td>
<td>$15</td>
<td>$20</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yacht- Nightly</td>
<td>$10</td>
<td>$10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yacht- Weekly</td>
<td>$30</td>
<td>$30</td>
<td></td>
</tr>
<tr>
<td>Quill/Boven National Park</td>
<td>Hiking- Annual</td>
<td>$3</td>
<td>$6</td>
<td></td>
</tr>
<tr>
<td>Combined Park fee</td>
<td>Multi pass (Diving/Hiking)</td>
<td>-</td>
<td>$25</td>
<td></td>
</tr>
</tbody>
</table>

Table 13 Current and proposed fees systems for users of the STENAPA Protected Area’s.

Other income
Donations and other contributions account for a small percentage of STENAPA’s income. Other sources of income include Truck rental, rent and fines.
**Stakeholders**

Involving local communities (and other stakeholders) to regular, effective participation is essential for successful MPA management. It is particularly important in the management of marine environment to work very closely with those using the marine resource directly and those using adjacent water and terrestrial environments. This is because these areas are intrinsically linked by natural flows and processes.

An important step in establishing effective stakeholder relationships is to identify the stakeholders and their roles within the marine environment. Table 14 summarises the stakeholder groups of St Eustatius Marine Park.

<table>
<thead>
<tr>
<th>STAKEHOLDER (s)</th>
<th>DETAIL / ROLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>NGOs</td>
<td>Statia PRIDE, Historical Foundation (coastal and underwater artefacts), SECAR (archaeologists)</td>
</tr>
<tr>
<td>Tourism/Watersports</td>
<td>3 dive centres, 1 visiting live-aboard boat (Caribbean Explorer), Polynesia cruise ship</td>
</tr>
<tr>
<td>Industry</td>
<td>Statia Terminal (oil terminal), Terminal pilots</td>
</tr>
<tr>
<td>Harbour</td>
<td>Harbour master and staff</td>
</tr>
<tr>
<td>Fishermen</td>
<td>Renaldo Redan - spokesperson for fishermen, 18 fishermen</td>
</tr>
<tr>
<td>Law enforcement</td>
<td>Public Prosecutor, Chief Police Inspector</td>
</tr>
<tr>
<td>Public departments</td>
<td>Public Works Director, LVV (agriculture, fish, livestock)</td>
</tr>
<tr>
<td></td>
<td>Director, Tourism Department Director, Harbour Master</td>
</tr>
<tr>
<td>Tourists</td>
<td>divers, yachts, Polynesia cruise ship</td>
</tr>
<tr>
<td>Community</td>
<td>Local users, school children</td>
</tr>
<tr>
<td>Media</td>
<td>Radio station (Mr Rivers - President), Lynn Kennedy, Althea Merkman (Herald reporters)</td>
</tr>
<tr>
<td>Government</td>
<td>Island Council (Governor and 2 commissioners and 2 other political party reps and senator)</td>
</tr>
<tr>
<td>Staff</td>
<td>2 office administrators, 2 rangers, 1 turtle coordinator, 1 manager</td>
</tr>
<tr>
<td>Board</td>
<td>9 members incl. 1 diving centre, 1 government representative, 1 NGO representative</td>
</tr>
<tr>
<td>Partners</td>
<td>DCNA, WIDECAST, Working Abroad volunteer programme</td>
</tr>
<tr>
<td>Researchers/scientists</td>
<td>International researchers and scientists. Interns and volunteers who have worked in St Eustatius Marine Park.</td>
</tr>
</tbody>
</table>

**Table 14** Stakeholders of St Eustatius Marine Park.
Stakeholder Input

Introduction
Stakeholders of St. Eustatius Marine Park were consulted with extensively through the first 7 months of 2007 to obtain feedback on various aspects of the Management Plan. The consultations were carried out using meetings and questionnaires (Table 15). Input was also received via individual communications and list servers.

<table>
<thead>
<tr>
<th>Group</th>
<th>Meeting</th>
<th>Questionnaire</th>
<th>Individual communications</th>
</tr>
</thead>
<tbody>
<tr>
<td>NGOs</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tourism/Watersports</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industry</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harbour</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fishermen</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Law enforcement</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public departments</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Government</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tourists</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Community</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Media</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staff</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Board</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partners</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Researchers/scientists</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>

Table 15 Stakeholder consultation methods.

The planning documents, positioning documents and detailed minutes from the meetings can be seen in Appendix 5, along with copies and the results of the questionnaires.
Meeting Feedback

The following pages summarise the main threads of input from the stakeholder meetings held in the first half of 2007. Feedback from stakeholder meetings relating to the marine park Vision, Mission, Goals, the Management Plan structure, and values of the Marine Park have been incorporated into the text. Full meeting minutes can be found in Appendix 5. Each of the comments below involved either extensive discussion or occurred in more than one meeting.

Uses

The main uses of the MPA by stakeholders were listed as follows:

- Diving
- Fishing
- Snorkelling
- Recreation
- Boating
- Harbour – used as a transit point for control and mooring
- Anchoring for bunkering vessels – coordinated through the oil terminal
- Science

Zonation

Comments on the current zones of the MPA:

- Zoning in Oranjestad Bay needs to be reviewed for a recreational area – the area from the terminal to the pier is heavily used and zoning needs to be reviewed. Suggestions for priority areas and gradation of zones – not just reserves and multiple use zones.
- Need to consolidate and summarise current zones and use for outreach. Signage throughout Oranjestad Bay about zones – possibly include swim zones, no wake zones, areas open to jet skis.
- Other zones suggested: Bathing area, Artificial reef zone, fishermen only areas – perhaps the Southern Marine Reserve, Anchoring zone for tankers – possibly only north of the Terminal Pier
- Tanker anchoring area needs to be reviewed, some scope for change at the northern boundary of the southern reserve
- Different zones for fishermen perhaps with seasonal fishing, areas could also be rotated
- Near shore zoning for fishing traps and yacht corridors, can be a problem at night – need to allow for manoeuvring and access.

Issues

Stakeholders see the main historical, Current, Management and future issues to be:

Historical issues

- Between fishermen and terminal.
- Between fishermen and dive operators.
- Between fishermen and MP regarding setting of zones and reserves.

Current Issues

Development

- Run off from increased development.
- Erosion – natural erosion and heavy rains cutting into the cliffs.

Historical concerns

- Removal of artefacts from the St Eustatius Marine Park by locals and visitors, mainly divers.
- Preservation of the Bay Front ruins.

Diving

- Conflicting interests at some dive sites – fishing and diving, where traps are placed too close to the moorings.
- Live aboards not to have priority over dive companies for using Red Moorings.
- Safety – issues between divers and fishermen, divers at night with no lights, fishermen fishing with no flag.

Fisheries

- Conflict between fisherfolk and other users at Charles Brown and Double Wreck.
• Kittitians fishing illegally in Statian waters.
• Fishermen’s pots being removed by anchors from tankers.
• Divers destroying traps.

**Shipping**
• Health of marine life near the terminal.
• Bilge pumping and ballast dumping in the MP.
• Tug boats and movement of boat traffic.

**Other uses**
• Jet skis and spear guns – uncertainty of regulations, noisy, smelly, dangerous (suggestions to establish swim lines during busy periods).

**Management Issues**

**Governance**
• Some misunderstanding of the ‘rights’ of various users of the MPA.
• Enforcement not seen as part of St Eustatius Marine Park’s mandate – lack of confidence in rangers training, skills and equipment for enforcement.
• Questions regarding jurisdiction and responsibility between Government, Statia Terminal, Harbour Office, STENAPA.
• Review and update the employee handbook, the volunteer handbook.
• Some conflict with the harbour legislation
• Police place emphasis on MP to enforce.
• Enforcement of tanker zones.

**Resources**
• More staff to conduct research and increase ranger presence.
• Review requested of pay scales in the light of responsibility, experience and number of hours.
• Personal use of MP equipment by staff at weekends e.g. boats is a concern.
• Interns are an essential part of the human resource.
• General maintenance person required familiar with carpentry and motors.
• More personnel to carry out enforcement duties, specific roles recommended: dive traffic, yachts, recreational use, fisheries and ecosystem management, commercial use of the MP, ‘cultural’ management.
• Brain drain of time spent on interns and volunteers before they leave the island – possibly spend time on locals.
• PR officer required.
• More rangers for patrols.

**Finance**
• General constraints financially.
• Increase in fees has not seemingly had a direct increase in the amount of work done.
• Confusion over harbour office and MP collecting fees – why both?
• Dive tag distribution, collection and statistical information too cumbersome for dive operators to carry out. Dive shops to feel too involved with selling the tags, monitoring the monies and keeping it separate from their own businesses, keeping records – additional paperwork and use of employee time – suggestion for clients to purchase their tags from the MP.
• Suggestions to expand the fees system to the harbour office to collect fees from visiting yachts, need to clarify roles between the harbour office and STENAPA.

**Monitoring**
• Diver activity on the Caribbean Explorer needs to be regularly monitored by an official MP member of staff with experience in diving and the MEO, not an intern as frequently observed.

**Communication**
• VHF radio communication with Harbour to be improved.
• Lack of commitment from Executive Council.
• Prove the worth of the reserves and communicate to stakeholders.
• Management, staff, board, volunteers, and interns; concerns over communication between all groups.

**Future issues**
• Concern over the cooperation between the terminal and St Eustatius Marine Park.
• Need for more resources, especially tools and boats.
• Provision of access to water and electricity hook-ups for yachts.
• There are plans to expand the harbour with a port development which will impact yacht and recreation (provision of 40-50 yacht berths). This will also affect the shoreline with the
development of a groin half way between the Blue Pier and the Golden Era hotel. This will provide more favourable berthing for pleasure craft with calmer waters. It is likely to effect the marine environment with more activities and pollution although the economy should benefit. The Marine Park will still collect yacht environmental fees from yachts using the berths.

• Involvement of the European Union and constitutional change – police forces are likely to be combined on St. Eustatius, St. Maarten and Saba, could be the case for the MP’s.

**Marine Park Management Activities**

Stakeholders made the following observations concerning the management activities of St Eustatius Marine Park:

**Patrols**
- Not enough time spent patrolling- most boat activity seems to be for collecting dive fees and research – suggestion of weekend staff, Patrols need more visibility
- Infractions occurring between 4-7am and after 5pm – mostly spear, conch and lobster fishing.
- Night patrols required and more day patrols, including shore patrols
- Lack of patrols on Atlantic side

**Training**
- Staff generally seem well informed about the MP.
- Advanced first aid and life saving should be carried out and updated regularly.
- Emergency management training – for health/first aid and also environmental emergencies (need clarification of the role of the Harbour Office).
- Customer service and communication skills training to increase ‘business’ efficiency.
- Staff training on the rules, regulations and laws relating to the MP.
- Staff request cross-training and less specialist approach.
- 4 wheel drive training for volunteers and interns (need to treat vehicles with respect to reduce maintenance).
- Staff, volunteers and interns – training in use of tools – machetes, chainsaws and boat handling.
- Police training for all rangers.
- Participation and exchanges with other MPA’s.
- Training for use of dive computer and camera.
- Training for community involvement and public awareness.
- Share knowledge and experience with other National Parks.
- Training in the history of the MP.
- All staff to do tourism training in customer service and professionalism, then apply to the MP.
- Training on enforcement procedures for current staff.
- Rescue training.
- Training in how to approach larger vessels and unknown vessels.
- MEO training to be given to police officers and fishermen.
- Underwater cultural management, staff and volunteers trained how to recognise cultural sites and artefacts, training possibly provided by SEHF, SECAR, and possibly NAAM in Curaçao.

**Resources**
- New headquarters are very well received, drinks facilities are an important aspect. Suggestions for a guided tour of the new facilities for businesses and the local community.

**Outreach**
- Direct outreach to the locals to educate the public about preserving St Eustatius Marine Park need to increase sense of ownership
- Suggestions to use the MPA headquarters for regular meetings with the main stakeholders for education, information, sharing information and concerns
- Disagreement over the visibility of the MPA within the community
- Questions over the effectiveness of outreach programmes
- Joint ventures with local businesses suggested.
- Little knowledge on what research is being carried out besides turtle monitoring
- Need to increase communication, collaboration and cooperation between the MP, dive shops, harbour office, terminal, government, tourism.
• Develop tourism and use unique aspects of Statia to market the island along side the tourism board, increase guided tours, participation in surveys, awareness and promotion of environmental concerns positive aspects of what STENAPA is doing.
• Shared results of surveys, newsletters available though dive shops and hotels
• Outreach into ‘magazines’ for free advertising
• Professional marketing required
• Possibilities of visitors taking part in turtle patrols.
• Increase communication between STENAPA and the harbour office and Statia Terminal
• Have a presence at the harbour, signboard etc
• Distribute maps and brochures around the island
• Third level of involvement for Statia youth – advanced junior rangers etc

Monitoring
• Focus seems to be on turtles – suggestions for monitoring marine ‘health’ near to the oil terminal and the effects of run-off.
• Fish surveys suggested to prove effects of MPA.
• Turtle monitoring sheets too detailed, anyway of simplifying sampling method?
• Fish numbers, diversity and distribution study required, including rare varieties.
• Monitor the effectiveness of outreach
• Fish catch surveys – possibly involve the fishermen
• Ballast discharge monitoring
• Monitor discharges from restaurants – sharks possibly being attracted inshore.
• Water quality monitoring as a whole

Maintenance
• Line cleaning by staff seems to be an opportunity for staff/interns to take a leisurely dive.
• Cleaning and maintenance of washing and toilet facilities more often.
• Increase frequency of cleaning and repairing lines – suggest regular maintenance schedule
• Suggestions for a protocol for using, cleaning, returning equipment.
• Plan a maintenance schedule for the snorkel/scuba and vehicles.
• Yacht mooring balls need replacing.
• Maintenance person to carry out main maintenance tasks – vehicle repairs could be carried out by an auto shop.
• Tiles on toilet/wash room floors too slippery – suggestions to add grip tape or runners of some sort.

Equipment
• MP should have their own compressor, shops are filling many tanks for pleasure dives as opposed to maintenance or research dives.
• Concerns over the limited number of yacht moorings
• Tools many private tools are used for construction and repair.
• Specific tools for MP and TPA.
• Lockers that lock
• Bigger more sturdy boat for patrols, especially on the Atlantic (East) side of the Island
• Dive tanks and integrated weights
• Book and resource storage space, especially in the rangers office
• New masks, snorkels and fins for the snorkel club
• Emergency first aid kits available at the visitor centre
• Suggestions for an inventory of office supplies with a re-ordering procedure in place
• Boat should have improved labelling, a distinctive colour and a large flag
• Structured storage method for computer files so files can be shared more easily.
• Replace shower heads
• Mirrors to doors of changing rooms

Further Discussion and Comments
Comment made that it might be possible to diversify and increase income for fishermen by putting together a ½ or full day fishing package for visitors, to include fishing (boat, fuel, wage), tags/fees, fishing, collaboration with a restaurant to cook the fish.
Questionnaire input

A total of 164 questionnaires were completed by the community, schools, visitors (hotel, family and cruise ship). Four key questions (Box 2) were asked and answers were provided in a structured format. Copies of the questionnaires can be seen in Appendix 5.

1. Which is the most important part of Marine Park for you?
2. Which activities do you take part in?
3. Which of the following do you see as the most important challenge facing the Marine Park?
4. Which of the following do you see often or make use of?

Box 2 Questions asked in the stakeholder questionnaire.

The results were analysed in detail to evaluate the responses of each stakeholder group. Actual data for the responses are in the spreadsheet presented in Appendix 5, along with additional comments and comments added to the ‘Other’ alternative on the questionnaires.

Key Outcomes

1. What is the most important part of the Marine Park for you?

Recreational activities are the most important part of the marine park to most respondents. The Natural environment is also a very important aspect of the MPA especially to tourists and those visiting families and friends. Cruise visitors also highlighted the importance of the fact that there are no shops or ‘pushy’ vendors along the beachfront.

Figure 28 Questionnaire responses 1: Most important aspects of the Marine Park

Total number of respondents = 164
2. Which activities do you take part in?

Most respondents used the marine park for swimming, and relaxing on the beach, diving was the third most popular activity with most visitors taking part. The community extensively uses the marine environment for swimming, snorkelling and the beaches for BBQ’s and social events. Other activities that stakeholders took part in included walking along the bay and beaches, schoonering, hiking along the shoreline and boogie boarding.

![Figure 29 Questionnaire responses 2: Activities in the Marine Park.](image)

Total number of respondents = 164

3. Which of the following do you see as the most important challenge facing the Marine Park?

The community (including schools), and visitors to hotels see poaching as the greatest threat to the marine park. Visitors and schools see development and change of land use as an issue, and all groups apart from cruise visitors see pollution as an issue of concern.

![Figure 30 Questionnaire responses 3: Issues for the Marine Park](image)

Total number of respondents = 164
4. Did you see or make use of marine park maps, brochures, presentations, staff or buildings?

Most people asked have made use of the marine park centre, staff and/or mini-guides. Within the additional comments people appreciated that the STENAPA staff were friendly and helpful and that the centre has a shop for souvenirs and drinks. Notably the Community and the Schools responses signify a lack of use of the marine park facilities.

![Figure 31](image)

Figure 31 Questionnaire responses 4: Use of Marine Park Facilities
Total number of respondents = 164
Issues
St Eustatius Marine Park has faced a range of historical issues, some of which continue to pressure management and the natural resources of the Protected Area. The marine park is currently challenged with constraints on management and external issues that can be human-induced or natural, and may originate from within the protected area or from beyond its boundaries. Management and external issues are often manifested in the form of social or economic demands upon the protected area.

As part of effective planning, expected future issues are accounted for at the end of this section.

Historical issues
The main historical issues for St Eustatius Marine Park have been related to the fisheries on the island and the other uses of the marine park. Divers have had conflicts with fishermen in the past about use of moorings and trap disruption. The other main issues of loss of fishing grounds and destruction by tankers were outlined by Dilrosun (2004) (Box 3).

Inventory of the Fishery sector of St Eustatius, pp. 14. Department of Agriculture, Animal Husbandry and Fisheries, Island Territory of CURAÇAO. (Appendix 1)

The St. Eustatius fishermen find that the best fishing grounds were designated to be marine reserves, and after several quite severe incidents that took place over the years between them and STENAPA fishers have become distrustful of the local Island Government's actions and STENAPA. In addition it is the fishermen's experience that catches have gone down significantly since STENAPA took over management of the park area. An other factor that has even worsened the situation is that tankers, coming and going to the St. Eustatius oil terminal, are anchoring in the marine park area (within the 30 meter depth contour), and are destroying the fishing grounds with their anchor and anchor chain, and cutting away the traps. The fishermen find that the habitat destruction by the oil tankers is much more severe than their "relatively small" violations of the marine park ordinance. Since the management of the marine park and thus the fishing grounds is a STENAPA matter, a critical success factor for sustainable management of the park area, and consequently the fishing grounds, has been to improve the communication and cooperation between STENAPA, the fishermen and local island Government.

Box 3 Historical issues with fisheries.

Current Management issues
Sustainable financing
A lack of sustainable financing continues to be a threat to the operations of STENAPA. Financing not only restricts the physical resources available to the staff and stakeholders, but it also reduces the number of staff and increases the dependency on volunteers and interns to carry out essential maintenance and patrolling work.

Stakeholder ownership
2 of the key stakeholder groups for St Eustatius Marine Park - the fishermen and Statia Terminals show little interest in the activities of St Eustatius Marine Park, although extensive efforts have been made to involve them in the past. The local community also have shown little regard for the marine park in the past.

Presence and enforcement
Due to a lack of staff and an inadequate boat, patrols and enforcement are seen as inadequate by a number of stakeholders. Staff feel an inadequate knowledge of the Marine Environment Ordinance and inadequately trained to deal with infractions and approach vessels. Interns are often relied up on to carry out rangers’ tasks which is seen as unacceptable by dive operators, other stakeholders.

NOTE: This is a short summary of the key management issues raised. The full range of management issues discussed by stakeholders is presented earlier in this section under the heading Stakeholders – Meeting Feedback.
Current 'external' issues

External issues are those that arise beyond the operations of St Eustatius Marine Park, and are a source of threat to the marine resources of St Eustatius Marine Park.

St Eustatius Marine Park has been through a threat identification process for the Dutch Caribbean Nature Alliance Management Success Project (2007, for full details see Appendix 11). Issues were also a key topic during stakeholder consultation for the management plan. From these processes, two sets of issue analyses can be carried out before summarising the key current issues and threats facing the marine park.

Global issues and natural disasters

Global Warming

Globally, coral reefs, seagrass beds and mangroves are being degraded by global warming, pollution and coastal development. Reefs are particularly sensitive to climate change because they bleach easily if there are changes to sea surface temperatures (SSTs).

Corals get their colour from tiny single-cell plants - zooxanthellae - which provide for the reef-building creatures, the polyps. If there is an increase in SST for a prolonged period, the zooxanthellae are driven away, the coral loses its colour, the polyps lose their food and the reef is weakened. The reefs then become more vulnerable to other threats, such as: overfishing; pollution; creatures that eat them; sedimentation from storm surges and snorkellers; and coastal developments.

To mitigate the damage to coral weakened by warming waters the recent IUCN reports have called for the adoption of a range of measures, such as:

- improved reef monitoring
- use of marine protection areas
- transplanting healthy coral to degraded reefs
- use of coastal and fishing management schemes

Mangroves provide shelter for spawning fish, they also provide a source of income and food for millions of people, delivering about $30bn (£16bn) worth of benefits in goods and services globally. Although mangroves are well suited for harsh conditions, rising sea levels and deforestation threatens to undermine some of the plants' long-term survival. The IUCN and TNC, highlight 10 strategies that could help protect the forests, including:

- identify and protect areas naturally positioned to survive climate change
- manage human demands on the forests
- establish green belts and buffer zones to allow mangrove migration
- restore degraded areas that have displayed resilience to climate shifts

Natural Disasters

St. Eustatius faces threats from annual hurricane damage. Hurricanes damage coral reefs and add to runoff into the ocean through increased rainfall. In a healthy marine environment, coral reefs and mangroves are known to protect the coastline from hurricane swell by reducing wave energy. Healthy reefs and mangroves are also capable of regenerating after a hurricane event. The regeneration of coral reefs and mangroves is prevented when water is polluted by terrestrial sediments, chemicals, and sewage from direct input and runoff. This continues to be a significant threat to St. Eustatius’ marine environment.

Other natural events that may have an impact on St. Eustatius’ marine environment include volcanoes. Such events are very difficult to manage for, since they tend to be on a catastrophic scale. However, the ability for the environment to recover from volcanic activity, including ash fall is still directly related to the amount of other impacts effecting the marine environment.
NOTE: Global issues and natural disasters have been excluded from the threat analysis carried out below. It is generally agreed that the best practice for taking into account global issues and natural disasters within environmental management is to monitor and protect so if there are any events, the environment will be ‘healthy’ and more likely to be able to recover. Bleaching has been included since it has a very significant impact and required direct action, even though it is thought to be a consequence of global warming.

**External issues identified by the DCNA Management Success Project**

The DCNA Management Success Project used the WWF method of ranking issues and threats. The manager of the marine park was presented a list of issues facing the marine park and asked to give them a number relating to the extent, impact and permanence of the threat presented by that particular issue. Numbers were allocated from 1-4, 1 being low extent, impact or permanence and 4 representing a high extent, impact or permanence. These figures were analysed and resulted in a number for the degree of threat to St Eustatius Marine Park that each issue represented, as presented in Figure 32. Further details of the methodology can be found in Appendix 6.

![Figure 32](image-url)

To make use of these figures they have been given a grade, from 1-5, where 1 is a severe threat to the St Eustatius Marine Park resources and values through to 5 which is considered no threat, although the issue may become a threat in the future. This further analysis is shown in Table 16. The only severe threat identified through the method is Bleaching, with sedimentation and commercial shipping constituting low threats. These results need to be considered in partnership with the results from the stakeholder consultations, as presented over the following pages.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Score</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bleaching</td>
<td>36</td>
<td>1</td>
</tr>
<tr>
<td>Sedimentation</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>Commercial shipping</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>Anchor damage</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Pollution: Terrestrial run off</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Artisanal fishing</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Sport Fishing</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Recreational fishing</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Commercial fishing</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Diving / snorkeling</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Pollution</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Cruise boats</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Boating</td>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>

**Table 16** Grading of management success issues.
External issues identified through stakeholder consultation

Stakeholders raised a number of key issues during the consultations of 2007. The main issues raised have been analysed by counting the number of times they were discussed or recognised during the stakeholder meetings and questionnaire surveys (Figure 33). The analysis can be seen in Appendix 6, and the stakeholder minutes can be seen in Appendix 5.

These results have also been given a grade from 1-5 where 1 is a severe threat to the St Eustatius Marine Park resources and values through to 5 which is considered no threat, although the issue may become a threat in the future. This allows comparison and summary with the Management Success Threat analysis. Table 17 gives the final grades for the issues recognised by the stakeholder input.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Number of groups recognising the issue</th>
<th>Total</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development</td>
<td></td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Artisanal fishing</td>
<td></td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Poaching</td>
<td></td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Commercial shipping</td>
<td></td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Diving/snorkeling</td>
<td></td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Pollution</td>
<td></td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Anchor damage</td>
<td></td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Terrestrial run-off</td>
<td></td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Sedimentation</td>
<td></td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Collection of artifacts</td>
<td></td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Bleaching</td>
<td></td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Sport fishing</td>
<td></td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Recreational fishing</td>
<td></td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Commercial fishing</td>
<td></td>
<td>0</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 17 Grading of threats recognised by St Eustatius Marine Park stakeholders.

The severe threats identified by stakeholders are development, artisanal fishing and poaching. Other high threats are commercial fishing, diving/snorkelling and pollution. These threats are outlined in the next section.
Analysis
To analyse the threat analysis from the management success work and the stakeholder consultations of 2007, the issues considered significant have been graded, totalled and ranked into orders of priority. A rank of 1-2 indicates a threat with a high priority through to a rank of 7-8 which indicates a threat with a low priority. Table 18 below summarises the outputs from the issue analysis.

<table>
<thead>
<tr>
<th>Management Success Score</th>
<th>Stakeholder Input Score</th>
<th>Total</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Artisanal fishing</td>
<td>5</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Bleaching</td>
<td>1</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Commercial shipping</td>
<td>4</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Development</td>
<td>5</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Diving/snorkeling</td>
<td>5</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>Poaching</td>
<td>5</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>Pollution</td>
<td>5</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>Anchor damage</td>
<td>5</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>Sedimentation</td>
<td>4</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Terrestrial run-off</td>
<td>5</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>Collection of artifacts</td>
<td>5</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Commercial fishing</td>
<td>5</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Recreational fishing</td>
<td>5</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Sport fishing</td>
<td>5</td>
<td>5</td>
<td>10</td>
</tr>
</tbody>
</table>

Table 18 A hierarchical list of the threats and issues facing St Eustatius Marine Park as identified by the DCNA Management Success Project and Stakeholder consultations.
**Details of the main current external issues identified**

The main threats identified are described below. Many of the threats identified that face St Eustatius Marine Park are linked. For example, commercial shipping, anchoring and pollution, where the shipping on St. Eustatius may be causing damage through anchoring outside of allocated zones and ballast and other pollutants may be released while the ships are anchored. Such linkages will be taken into account in management planning though a strategic summary of the proposed actions which will highlight the links between the actions and which issues they are dealing with.

**Artisanal Fishing**

Fishing by local people is seen as a threat to the St Eustatius Marine Park by a number of groups. The threat arises from a reduction in the recreational value of the MP since divers and other users such as yachts are often in conflict with the fisherfolk. Conflict arises from the placement of fishing pots, use of moorings, diver safety and divers tampering with pots to release trapped animals. There is considered to be no significant threat to the fishery resource as it is at the moment because:

- fish stocks are considered to be very low due to historical fishing pressure.
- the Marine Park has been having a positive impact on the fish numbers and diversity

**Bleaching**

Coral bleaching is the loss of colour from corals under stressful environmental conditions, this is usually caused by high sea temperatures or pollution. The corals of St. Eustatius bleach periodically which results in the loss of corals on the reef and their associated values for biodiversity and ecosystem services.

**Commercial shipping**

Commercial shipping is considered to be a threat to St Eustatius Marine Park for a number of reasons. Ships are thought to be causing significant damage through anchoring, 70% of which takes place within the Marine Park (around 800 ships per year). Ballast is frequently put into the waters around St Eustatius Marine Park and bilge pumping also adds to the amount of pollutants entering the waters around the Statia Terminal. Some stakeholders have observed tankers releasing sewage into the waters around St Eustatius, sewage is a cocktail of chemicals which are very harmful to coral reefs as well as humans. Finally, the value of the MPA as a fishery is threatened by commercial shipping through ships destroying traps whilst anchored.

**Development**

Development of land for housing and other building requirements often leads to increased run off and sedimentation of the reefs. This is due to the clearing of vegetation. Development is seen as a threat to the scenic value of the waterfront and the historical value of the archaeological sites on the beachfront of Oranje Bay.
**Diving/snorkelling**
Some areas are considered to be overused by divers. The effect of divers on coral reefs is not clear although divers often damage corals by knocking into them. Divers also threaten the fishery resource through conflict with fishermen over the use of buoys and interfering with traps.

**Poaching**
The community and hotel visitors saw poaching as a significant threat to the MPA. Taking fish illegally occurs from within the reserves and also fisherfolk from the neighbouring Island of St Kitts illegally fish in the waters of St Eustatius.

**Pollution**
Tankers dumping sewage and ballast, and bilge pumping (see commercial shipping). Sewage contains a cocktail of substances which are harmful to the marine environment and humans. Likewise the practice of bilge pumping (emptying water from parts of a ship) puts harmful wastes such as oil into the water if it is done incorrectly. Ballast for oil tankers is often water which is used to weigh down ships that do not have any cargo. This water is often taken up elsewhere in the world before a journey to St. Eustatius. It therefore contains not only pollutants, but it can also contain species of plants and animals not found in local waters which then become invasive.

**Anchor damage**
Poor anchoring practices damage the marine environment through heavy anchors hitting and being dragged through marine habitats such as coral reefs and seagrass bed. Anchor chains also wipe out habitats around anchor points as the boat moves around on the surface, dragging the chain in circles.

**Sedimentation**
The removal of old slave walls and deforestation have led to increased storm water runoff and therefore increased erosion and sediment reaching the marine environment. Sediment in the marine environment smothers many organisms, it often contains pollutants such as hydrocarbons (oils) and it also make the water cloudy, which does not look good for recreational use and also stops light from reaching organisms on the seabed.

**Terrestrial run-off**
During heavy rainfall, water runs off the land directly into the marine park. This is especially the case after sustained heavy rain when the ground is soaked and during rain after a dry period when the ground is hard and does not soak up rainfall easily. Terrestrial run-off contains sediment (see sedimentation), litter and pollutants all of which affect the values of St Eustatius Marine Park. Run off from the waste disposal site at Smiths Gut (a natural channel) is responsible for considerable pollution on Zeelandia Beach.

**Collection of artefacts**
Many artefacts continue to be removed by visitors to St. Eustatius, this includes historical artefacts which are taken from the sea bed by divers, for example, blue jewellery type beads found at certain dive sites. Such activity directly effects the historical value of the St Eustatius Marine Park.

**Commercial fishing**
There is very limited commercial fishing on St. Eustatius, although fishermen from near-by St Kitts fish illegally in the Marine Park – this threat is covered under poaching.

**Recreational fishing, sport fishing**
Spearfishing takes place from time to time in St Eustatius Marine Park. Spearfishing, especially with SCUBA equipment effectively targets a small number of prize species. The numbers of these species is greatly reduced. This problem is made worse by the fact that people aim for the larger fish which are generally capable of producing more eggs.
**Future issues**

**Harbour development**
There are plans to expand the harbour with a port development to provide 40-50 yacht berths. This is expected to: improve safety by providing shelter for the yachts, attract more yachts to St. Eustatius and increase the income from yacht visitors. The shoreline will be affected from the harbour along to the groin half way between the Blue Pier and the Golden Era hotel. A busier shoreline will also have some impact on St Eustatius Marine Park from user conflict to pollution.

There are also plans to expand the oil storage facility at Statia Terminals, which will increase the amount of boat traffic visiting St. Eustatius.

**Lower Town development**
Stakeholder meetings brought up the issue of the development of the shoreline (a 40 room hotel was mentioned) and the archaeological site on the beach front at Oranje Bay. This area is connected directly to the St Eustatius Marine Park and any developments are likely to have some impact through run-off and other forms of pollution such as sewage.

**St Kitts support of Whaling.**
The neighbouring islands of St Kitts and Nevis support whaling and recently hosted the 58th Annual International Whaling Commission meeting. Conflict may arise from any whaling activity that takes place on or over the boundaries of St. Eustatius territorial waters, although the whaling activity is unlikely to take place within the marine park itself.

**Constitution**
Constitutional changes are likely to affect finances, legislation and cultural aspects of St Eustatius Marine Park.
Summary of issues
The main issues facing St Eustatius Marine Park have been identified through extensive stakeholder input and management opinion through the Management Success Project. The top 5 external issues only are listed in (Box 4), since these have been identified as those pressures that are most threatening the values of St Eustatius Marine Park. The other issues mentioned in previous sections are important but considering the scale of the impact, continued commitment to best practice as well as cross over from the actions to be proposed, their significance is reduced within the framework of this management plan.

<table>
<thead>
<tr>
<th>External Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Artisanal fishing</td>
</tr>
<tr>
<td>Bleaching</td>
</tr>
<tr>
<td>Commercial shipping</td>
</tr>
<tr>
<td>Development</td>
</tr>
<tr>
<td>Diving / snorkelling</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Management Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainable financing</td>
</tr>
<tr>
<td>Stakeholder ownership</td>
</tr>
<tr>
<td>Presence and enforcement</td>
</tr>
</tbody>
</table>

Box 4 Key issues/threats facing St Eustatius Marine Park.

It is essential that an effective management strategy for these issues and threats is established and actioned. By choosing an effective course of action to deal with any one of the issues in Box 4, value will be added by outcomes that will have a knock on effect and go some way to tackle other issues that have been identified. An example of this would be to establish sustainable financing to secure further human resources who in turn can increase presence, enforcement and the capacity to deal with external issues.

Alternatively, St Eustatius Marine Park can identify essential projects which deal with multiple issues, an example of this might be a programme which addresses issues with the fisherfolk of the island, which in turn addresses conflict between the fisherfolk and commercial shipping

The recognition of the current key issues facing St Eustatius Marine Park is an essential step to the production of effective actions to deal with them. It is also important however to bear in mind threats to St Eustatius Marine Park which are likely to arise in the future, including further development of the shoreline, policies of neighbouring islands and any legislation from changes in constitution.
PART 3: MANAGEMENT PLAN.
Key Issues and Actions

External Issues

Manage conflict between fishermen and other users

Historical overfishing prior to the establishment of the Marine Park has led to a decline in St. Eustatius’ fish stocks within the St Eustatius Marine Park. The target species on St. Eustatius are Lobster, Conch, Grouper and other non-migratory species that have slow reproductive cycles and their stocks will take time to recover. Recent proof that the MPA has had a significant effect on restoring fish stocks highlights the need for continued co-operation with the fisherfolk of the island. Fishermen on the island are concerned about the loss of their fish pots, loss of fishing areas, conflict with divers around mooring sites and water safety.

**ACTIONS**

**Design and implement a comprehensive zoning plan**

A zoning plan may prevent traps being ruined by shipping by establishing clear movement corridors which will also improve navigation safety at night. The zoning planning process should also consider designating the Eastern, Atlantic part of the Southern Reserve to the fishermen. For more zoning provisions, see the Zoning plan action point below.

**Reduce fish trap loss**

Provide a stock of pop-up traps for fishermen to try, map the location of any traps that are deployed using a GPS, provide dive centres with marker buoys to attach to any ghost traps loose in St Eustatius Marine Park.

**Rules and guidelines**

Establish and publicise rules and guidelines for placing fish pots near to dive buoys and an underwater code of conduct for divers.

**Fishing co-operative**

Continue to pursue the establishment of a fishermen’s co-operative on St. Eustatius. This will give the local fishermen a collective voice and a more significant role on STENAPA’s board of directors. This will also help to maintain communication between STENAPA, Harbour Office, Statia Terminals, Government and the fishermen.

**Develop monitoring programme that uses fishermen**

Involve fishermen in monitoring programmes, and feed back results. Possible parameters to include are time of catch, location, size of individuals, health of catch, and species in the catch.

**Alternative livelihoods**

Investigate and consult on establishing alternative livelihoods for fishermen including the possibility of fishing packages for tourists which could include ½ day fishing, tags, fees and collaboration with a restaurant to cook the fish.

---

9 A meeting was held on 18th June 2007 to try and tackle the main conflicts between the fishermen and the dive centres, the outcomes are included in this action point. Notes from this meeting can be seen in Appendix 5.
Evaluate commercial shipping impacts

Statia Terminals NV employs over 10% of the islands workforce and therefore plays a major role in the economy of St. Eustatius. Stakeholders of St Eustatius Marine Park identified three main threats coming from shipping traffic: pollution (ballast, bilge pumping and sewage), anchor damage and destruction of fishing apparatus.

**Actions**

**Monitor boat traffic**
Establish a Vessel Monitoring System that has a round the clock, daily monitoring to closely observe and verify that tankers anchor within designated zones (see report in Appendix 1).

**Monitor pollution**
Identify and set up a protocol to monitor the main pollutants from the terminal and the vessels using the terminal. Publicise the results and recommend action points.

**Monitor impacts of anchoring**
Set up a repeatable monitoring protocol for assessing anchor damage, include fixed photo quadrats and assess recovery rates where possible. This should also include monitoring the nature of shipping traffic, the number and size of vessels and the frequency of vessel visits.

**Design and implement a comprehensive zoning plan**
Establish/enforce definite zones for anchoring and movement of shipping traffic (see zoning plan action point). This will prevent infractions by vessels by anchoring in the reserves and improve safety for fisherfolk whilst reducing damage to traps.

Promote sustainable development on St. Eustatius

The development of the harbour, shoreline and archaeological sites as well as the further development of Statia Terminals NV threatens the value of St Eustatius Marine Park through habitat destruction, pollution and ongoing disturbance. Sustainable and carefully planned development can achieve a number of goals and maintain the values of the marine environment.

**Actions**

**Raise awareness**
Identify the key stakeholders involved with development programmes on the island. Target them with outreach materials highlighting the importance of the environment for St Eustatius.

**Adopt best practice for building**
Develop best practice construction guidelines and an incentive programme. Market, publish and maintain the profile of the guidelines.
Ensure diving and snorkelling activities are sustainable and safe

Tourist activities including diving and snorkelling provide a livelihood for a large part of St. Eustatius’ population. Visitors also take away memories and act as an informal marketing tool for the island. Divers identified safety issues with fishermen approaching moorings too close and divers have also used the buoys at night with no lights, creating a safety hazard. Divers also disrupt fishing traps.

Actions

Outreach
Publish clear, comprehensive rules and guidelines about diving and snorkelling in St Eustatius Marine Park. Include information on fees (amounts and use). Explore possibilities for visiting divers to participate in monitoring and conservation activities Possible participation in surveys.

Underwater archaeology
Train staff and volunteers how to recognise cultural sites and artefacts. Training can possibly be provided by SEHF, SECAR, and NAAM in Curaçao.

Diving safety
Establish definitive rules for diving in St Eustatius Marine Park including the use of night diving lights and the availability of first aid kits and first aid personnel.

Mooring maintenance
Ensure that a mooring maintenance protocol is devised and respected. Explain the details of the mooring programme to stakeholders including personnel responsibilities, maintenance tasks and the timing of the mooring work. Devise a clear feedback mechanism for stakeholders to report damaged or missing moorings. Provide a method of updating the status of the moorings for stakeholders.

Zoning plan
Carefully consider diving and snorkelling activity in zoning. Aspects of planning should include safety at night, use of moorings, scientist only reserves, swim zones and the issue of tugs and other traffic passing over popular dive sites.

Monitor and evaluate coral bleaching

Coral bleaching directly threatens the reefs that surround St. Eustatius. Another major bleaching event will have a major impact on the values of St Eustatius Marine Park. Although there is very little active management can do to address bleaching, monitoring can provide long term information on bleaching around St. Eustatius and collaboration with neighbouring islands can go some way to improving understanding and strategies to ‘deal’ with the threat.

Actions

Continue to monitor bleaching
Continue to use Coral Watch on a quarterly basis and 1-2 weekly basis during bleaching events. Adapt methods where appropriate.

Co-ordinate with other islands
Communicate methods with Saba, St Maarten, other DCNA islands, St Kitts and Nevis and other islands in the region. Establish results on the STENAPA website for information sharing.

Outreach and awareness
Train any new staff in Coral Watch and the use of an underwater camera to document bleaching events. Distribute leaflets to dive operators and divers to alert them of the nature and characteristics of coral bleaching. Include bleaching in a reports database.
Design and implement a comprehensive zoning plan

A clear plan for zoning is required to tackle a number of issues raised by stakeholders. This includes conflict between fishermen, divers, commercial shipping and yacht’s people. A number of zones were suggested by stakeholders; a recreational area in Oranjestad Bay to include swim lines, no wake zones, areas open to jet ski’s (dependent on STENAPA’s policy on jet ski’s), a zone for artificial reefs, anchoring zone for tankers, zones for fishing with rotation between areas, yacht and boat manoeuvring areas near shore. Some of their suggestions already exist, which highlights the need for a clarification and re-consideration of current zoning in St Eustatius Marine Park.

**Actions**

**Initial information gathering and preparation**
Define the goals of the zoning plan, the zones’ location and the objectives of the zones. Clearly justify decisions made at each stage. Document the developments and prepare a presentation for stakeholders. Consult with other DCNA islands about zoning plan preparation.

**Stakeholder consultation**
Consult with stakeholders to define their needs, using meetings and other stakeholder consultation methods. Solicit commitment from stakeholders to review current zonation.

**Draft plan preparation**
Prepare a draft zoning plan including descriptions, justifications, details of the stakeholder input, accurate maps, including the habitat map currently being prepared.

**Review of draft**
Facilitate the review of the draft plan by all stakeholders to develop ownership. Include options for review via the STENAPA website and through oral presentations with clear maps and other visuals including imagery.

**Finalisation**
Finalise the zoning plan with clear objectives for implementation within a specified time frame. Submit the plan to relevant authorities. Adopt the zoning plan. Publish the zoning plan map to the STENAPA website, and in a leaflet with relevant rules and guidelines. Monitor the effects of the zoning plan and the responses of the stakeholders.
Management Issues

Establish sustainable financing mechanisms

Reliance on government subsidies and grant funding for income makes STENAPA and the St Eustatius Marine Park dependent on unsustainable finance, at any time these sources of income could cease. The current dive fees along with the yacht fees do not cover the operational costs of St Eustatius Marine Park. The willingness of stakeholders to pay extra for dive fees and protected area entrance fees has already been investigated and has shown that visitors are willing to pay more than the current fee. Even if the fee increases are implemented successfully, St Eustatius Marine Park will continue to face a significant challenge raising funds from fees because of the relatively small amount of tourists visiting the island.

**Actions**

Review of fees collection system.
Review the methods of fee collection to:
• avoid duplication of the yacht fee collection process at the harbour and at the marine park office.
• simplify tag distribution, money collection, statistical information gathering.
• include advances in the current fees systems to increase the amount charged for diver fees in line with the options presented in the willingness to pay study of 2006 (below – full details in Appendix 1)

<table>
<thead>
<tr>
<th>Protected area</th>
<th>Fee type</th>
<th>Fee amount</th>
<th>Existing</th>
<th>Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>St Eustatius Marine Park</td>
<td>Dive- Single</td>
<td>$3</td>
<td>$4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dive- Annual</td>
<td>$15</td>
<td>$20</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yacht- Nightly</td>
<td>$10</td>
<td>$10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yacht- Weekly</td>
<td>$30</td>
<td>$30</td>
<td></td>
</tr>
<tr>
<td>Quill/Boven National Park</td>
<td>Hiking- Annual</td>
<td>$3</td>
<td>$6</td>
<td></td>
</tr>
<tr>
<td>Combined Park fee</td>
<td>Multi pass (Diving/Hiking)</td>
<td>-</td>
<td>$25</td>
<td></td>
</tr>
</tbody>
</table>

Stakeholder input
Consult with stakeholders about the pricing system and about the logistics of collecting fees. Consider options including joint fee collection, stakeholders collecting fees, STENAPA collecting fees and the possibility of stakeholders earning from selling passes. Explore possibilities of the Harbour Office coordinating with STENAPA to add signage to the main pier about the fees.

Joint marketing of the island
Coordinate with local government and other island organisations to establish a marketing plan for the Islands tourism concentrating on the values of the environment. A successful marketing strategy should result in increased visitation, and therefore increased revenue.

Monitor progress
Consult regularly with stakeholders to monitor the feedback about the revised fees system.

Explore possibilities for finance
Consider the following options for increasing the variety of sources of income; collection of fees from tankers, environmental levy at the airport, collection boxes, increased souvenir sales (e.g. sale of T-shirts to visiting live-aboards), refreshment sales. Continue liaison with the DCNA to establish the trust fund to cover operational costs.
Increase sense of ownership amongst key stakeholders

A number of key stakeholders had very little regard for St Eustatius Marine Park or the marine environment; this includes schools, the local community and the operators of Statia Terminals NV. The main misunderstandings came from a lack of knowledge relating to the value of the marine park, the work of the marine park and the laws, rules and guidelines relating to the marine park.

**Actions**

**Open day at STENAPA headquarters**
BBQ’s and a guided tour of the new headquarters advertised with radio, flyers, radio spots and ads in the paper, objectives to talk about St Eustatius Marine Park, share information, raffle. Have on a regular basis for people to look forward to and take part in. Address why St Eustatius Marine Park is important for stakeholders and target with outreach.

**Targeted outreach**
Target groups with specific outreach (a proposal for a communication strategy is present on the following page). Possibilities include for outreach:
- Recognition of individuals: Junior rangers, fishermen etc with an award or a stay at a hotel
- Open snorkelling days
- Distribute results of monitoring and research, especially recommendations and summaries.
- Coordinate with other organisations to promote St. Eustatius as an outstanding tourism destination, a centre for ‘eco-tourism’.
- Produce and distribute a visual booklet with laws, rules, and guidelines.
- Distribute information in the newsletter through sympathetically locally preferred news outlets.
- Use pictures, stickers, posters and other forms of visual outreach, e.g. Documentary and videos about St Eustatius Marine Park for a variety of audiences e.g. St Maarten Airport and St Eustatius airport
- Involve locals with turtle work e.g. brochure, turtle tour, patrol participation.

**Staff training:**
Develop staff and board communication expertise and knowledge, areas of education could include
- Contextual training in the history of the marine park, to include a time line of the development of St Eustatius Marine Park
- Tourism training in customer service and professionalism applied to St Eustatius Marine Park.
- Training in community involvement and public awareness.
- The know your island test that is taken by taxi drivers

**Recognition**
Pursue national, regional and international recognition. Write to the island council and request national recognition.
Communication strategy for the main stakeholders of St Eustatius Marine Park.

<table>
<thead>
<tr>
<th>GROUP</th>
<th>DETAIL</th>
<th>OBJECTIVES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NGOs</strong></td>
<td>Statia PRIDE, Historical Foundation (coastal and underwater artefacts), SECAR (archaeologists)</td>
<td>Promote conservation management activities and build relationships with other similar initiatives.</td>
</tr>
<tr>
<td><strong>Tourism/Watersports</strong></td>
<td>3 dive centres, 1 visiting live-aboard boat (Caribbean explorer), Polynesia cruise ship.</td>
<td>Establish St Eustatius Marine Park as a premier dive and watersports destination in the Caribbean and the role of conservation. Emphasis the need for practical hands on conservation effort on the part of the users to protect the reefs and their role.</td>
</tr>
<tr>
<td><strong>Industry and local businesses</strong></td>
<td>Statia Terminal (oil terminal), Terminal pilots</td>
<td>Value of the marine park, education about the marine environment and fund raising.</td>
</tr>
<tr>
<td><strong>Harbour</strong></td>
<td>Harbour master and staff</td>
<td>Coordination of enforcement, fees collection, surveillance, Issue identification input.</td>
</tr>
<tr>
<td><strong>Fishermen</strong></td>
<td>Renaaldo Redan - spokesperson for 18 fishermen.</td>
<td>Education about the marine environment, involvement with environmental initiatives, meetings with other stakeholders.</td>
</tr>
<tr>
<td><strong>Law enforcement</strong></td>
<td>Public Prosecutor, Chief Police Inspector</td>
<td>Coordinating efforts in Law enforcement and the development of legislation.</td>
</tr>
<tr>
<td><strong>Public departments</strong></td>
<td>Public Works Director, LVV (agriculture, fish, livestock) Director, Tourism Department Director, Harbour Master</td>
<td>Developing practical solutions to conservation and management issues.</td>
</tr>
<tr>
<td><strong>Tourists</strong></td>
<td>Divers, yachts, Polynesia cruise ship</td>
<td>Importance of marine conservation and visitor role in conservation management.</td>
</tr>
<tr>
<td><strong>Community</strong></td>
<td>Local users, school children</td>
<td>Stimulate interest in St Eustatius Marine Park, educate about conservation management and build support for management decisions.</td>
</tr>
<tr>
<td><strong>Media</strong></td>
<td>Radio station (Mr Rivers - President), Lynn Kennedy, Althea Merkman (Herald reporters)</td>
<td>Communication of MPA objectives, management strategies, communication methods.</td>
</tr>
<tr>
<td><strong>Government</strong></td>
<td>Island Council (Governor and 2 commissioners and 2 other political party reps and senator)</td>
<td>Developing practical solutions to conservation and management issues.</td>
</tr>
<tr>
<td><strong>Staff and board</strong></td>
<td>2 office administrators, 2 rangers, 1 turtle coordinator, 1 manager. 9 board members.</td>
<td>Management strategies, involvement with key decisions, strategic planning.</td>
</tr>
<tr>
<td><strong>Partners</strong></td>
<td>DCNA, WIDECAST, Working Abroad volunteer programme</td>
<td>Muster continued interest through involvement and active feedback.</td>
</tr>
<tr>
<td><strong>Researchers and scientists</strong></td>
<td>Regional and International</td>
<td>Stimulate relevant management orientated research into issues of interest to St Eustatius Marine Park, including science and Protected Area Management.</td>
</tr>
<tr>
<td><strong>Funders</strong></td>
<td>Current/future funders, AMFO, foundations, individuals</td>
<td>Build donor confidence in St Eustatius Marine Park and donor cultivation.</td>
</tr>
</tbody>
</table>
Enhance presence and enforcement

Stakeholders identified considerable confusion over the responsibilities for enforcement, and concern over the apparent lack of the presence of St Eustatius Marine Park staff on patrol. The main issue is a lack of qualified staff to perform patrols whilst carrying out the other tasks associated with the operations and development of St Eustatius Marine Park. Efficient patrols and consistent enforcement will improve the success of St Eustatius Marine Park.

**Actions**

**Collaboration**
Work with the Government, Harbour Office and Police to establish clear enforcement procedures and publicise the outcome. Explore possibilities for sharing patrols with the harbour staff using their vessel, particularly on the Atlantic side of the Island. Publicise what patrols are for, not when they are taking place or the powers that rangers have. Continue to seek funding from funders and partners for extra ranger positions for enforcement.

**Training**
Staff do not feel qualified to take on some aspects of enforcement. Stakeholders, including staff members identified the following areas where staff training will help with enforcement directly or indirectly:
- Staff training on the rules, regulations and laws relating to St Eustatius Marine Park. A translation of THE Marine Environment Ordinance into laymen’s terms with a list of the most frequent infractions and the legislation which is most relevant e.g. for fisheries; spear, lobster and conch fishing.
- Emergency management training – for environmental emergencies.
- Training on enforcement procedures for current staff and police training for all rangers.
- Staff training in how to approach larger vessels and unknown vessels.
- Training about the Marine Environment Ordinance for police officers and fishermen.

**Adapt patrols**
The current patrolling protocol should be made more effective and visible. More than the current 2 patrols a week needed, night and day patrols, island wide as well as shore based.
Stakeholder identified the following actions for improving presence through patrols:
- Increase patrols on the Atlantic Coast by pursuing funding for a more substantial patrol boat, and finance for the increased fuel costs.
- Work with the harbour and police to establish land patrols to survey the coast.
- Increase the number of patrols and the amount of time taken on patrols.
- Adapt the roles of rangers to include more patrols, and less time on line cleaning.
- Establish night patrols and lighting on buoys to facilitate enforcement at night.
- Advanced first aid and life saving training should be carried out and updated regularly.

**Surveillance**
Establish clear surveillance and information gathering protocols for observing who is using the St Eustatius Marine Park and how they are using it.

---

10 Anne Walton (peer reviewer) recommended the consideration of ‘interpretive enforcement’ as an action point to complement law enforcement and as a good way of engaging stakeholders. This should be considered as part of the ongoing outreach programme for STENAPA.
**Suggested framework for developing objectives on a yearly basis to carry out the actions identified**

**Action (all content below for example only)**

Design and implement a comprehensive zoning plan with stakeholder input

**Objective**

To accurately locate zones needed in the MPA, justify those zones with stakeholder input, implement the zoning plan, create and publish a map of the zones and a guide leaflet with the map and rules and regulations that apply and to establish a monitoring programme for the zones.

<table>
<thead>
<tr>
<th>Activities</th>
<th>Output (objectively verifiable)</th>
<th>Agency/Personnel*</th>
<th>Budget*</th>
<th>Week number</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Planning</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project planning</td>
<td>Project plan with detailed goals, outputs, roles, budget</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Information gathering</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Definition</td>
<td>Listed goals of zoning.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Objective setting</td>
<td>List of objectives for possible zones.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summarise current status</td>
<td>Single document or map Defining current zones and the rules and regulations applicable.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summarise current stakeholder positions</td>
<td>List of stakeholder views from the Marine Park management plan stakeholder consultations.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Stakeholder Consultation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Define groups</td>
<td>List of groups to be consulted</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Define methods</td>
<td>Document of consultation methods.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arrange meetings</td>
<td>Meetings carried out, minutes taken, attendee list</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Facilitate alternate input</td>
<td>Questionnaire input, interview minutes.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Draft plan preparation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Write draft plan</td>
<td>Draft plan including descriptions, justifications, details of the stakeholder input and accurate maps.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Review of draft</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distribute draft plan for review to stakeholders</td>
<td>List of feedback expected and/or leading questions. Copies of plans distributed to local stakeholders, feedback received in note form.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distribute draft plan for review to management peers</td>
<td>List of feedback expected and/or leading questions. Copies of plans distributed to 2/3 international experts in Protected Area management, feedback received in note form.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revise draft</td>
<td>Final Zoning Plan with revisions included</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Finalisation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Implementation</td>
<td>Time frame for adopting the zoning plan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Submit plan</td>
<td>Plan submission to relevant authorities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adopt zoning plan</td>
<td>Marker buoys where necessary, staff and stakeholder orientation meetings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Publish plan</td>
<td>Maps, leaflets (design time and output)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monitor</td>
<td>Biological monitoring data, stakeholder feedback comments documented.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Agency/personnel and budget requirements to be decided on site by management.*