St Maarten Proposed Land Parks Management Plan 2009
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Acronyms and abbreviations

CITES Convention on International Trade in Endangered Species of Wild Fauna and Flora
DCNA Dutch Caribbean Nature Alliance
EPIC Environmental Protection in the Caribbean
EWE Emilio Wilson Estate
IUCN World Conservation Union (formerly International Union for the Conservation of Nature and Natural Resources)
MINA Central Government Department of Nature and the Environment
TPA Terrestrial Protected Area
MPA Marine Protected Area
PA Protected Area; “A clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values” (IUCN, World Commission on Protected Areas 2008).
SPAW Specially Protected Areas and Wildlife – Annex of the Cartagena Convention
UNEP United Nations Environment Programme
VROM The Ministry of Spatial Planning, Housing and The Environment
WCPA World Commission on Protected Areas
WWF World Wide Fund for Nature
SXMLP St. Maarten Land Parks
About the Authors

**Beverly Mae Nisbeth, MSc., Manager, Nature Foundation St. Maarten**

After a ten-year healthcare career in the Dutch Antilles and the Netherlands, Beverly Mae attained her BA in Biology and then her MSc in Environmental Science at Pace University’s Dyson College of Arts and Science in New York. On returning to St. Maarten in 2006 she accepted the job as the Manager of Nature Foundation St. Maarten.

Beverly Mae directs the daily operations geared towards managing the St. Maarten Marine Park. Her projects include establishing a sea turtle nesting beach volunteer programme and placing information signage on nesting beaches. Other important work includes writing bi-monthly nature and environment articles for the children’s newspaper.

Beverly Mae is a Dutch Caribbean Nature Alliance (DCNA) Board representative for Nature Foundation St. Maarten.

Beverly Mae has critically reviewed and contributed to St. Maarten Land Parks as well as the St. Maarten Marine Park Management Plan.

**Duncan MacRae, Director, Coastal Zone Management (UK)**

Duncan has spent 15 years working around the globe in coastal management and environmental consultancy. Duncan has a Masters degree in Tropical Coastal Management and a BSc (Hons) in Physical Geography. He is also a Fellow of The Royal Geographical Society and a member of the IUCN World Commission on Protected Areas. Since graduating his work has included research and practical management in Madagascar, Southern Thailand, Vietnam, Indonesia and the Middle East relating to protected areas and coastal development.

Duncan was assistant marine park manager for the Bonaire National Marine Park in 2001/2002 where he worked in Environmental Impact Assessment, wastewater management and research into the effects of diving tourism on coastal ecology. Since January 2005 Duncan has been working extensively with the Dutch Caribbean Nature Alliance (DCNA) to develop a tool to evaluate the success of the ten protected areas within the Dutch Caribbean. In conjunction with this he has written Management Plans for the Bonaire National Marine Park, St. Maarten Marine Park, St Eustatius Marine Park.

Duncan authored the proposed St. Maarten Land Parks Proposed Management Plan and coordinated its development through the DCNA Management Planning Process.

**Jan Blok, Staatsbosbeheer.**

Jan graduated from the University of Forestry and Rural development Larensteijin, Velp (The Netherlands) and has been employed since 1981 by Staatsbosbeheer (National Forest Service in The Netherlands) as a policy employee specialising in recreation within natural and forest areas. (The National Forest Service is a public organisation that manages more than 230,000ha of woodlands and natural sites).

Jan was born and grew up on Curaçao. As a student in 1977 he wrote the first management plan for the Washington-Slagbaai National Park on Bonaire and was responsible for the execution of this plan 2 years later. In 2000 he was asked to write the management plans for the terrestrial national parks on St. Eustatius and Saba. On behalf of the National Forest Service, since 2004, he has been a member of the DCNA Partners, a group of specialists from several Dutch nature organizations that support, and advise the DCNA whilst working with other groups in The Netherlands. In 2007, he returned to St. Eustatius, Saba and St. Maarten to contribute to the 2008 management plans for the terrestrial parks on Saba, St. Eustatius and St. Maarten.

Jan carried out initial field work and wrote preliminary notes.
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 who attended the meetings during 2008 or contributed directly to the management plan;

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<tr>
<th>Group</th>
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<tr>
<td>Government</td>
<td>Jay Haviser, Hendrik-Jan van Ieperen, Neville York, Loekie Morales</td>
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<td>Tourism</td>
<td>Edward Dest, Augusto E. Priest, Valya Pantophlet</td>
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Other individuals we would like to thank are;

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**Adam Brown** (EPIC) for his contributions about Birds to the initial draft.

**Carol Gracie** and other members of the New York Botanical Garden inventory team that worked on photographic the plants of Saba, many of which are found on St. Maarten.

**Kalli De Meyer** for various photographs of St. Maarten and the other DCNA islands

**Various** website authors and contributors who don’t mind their material being used for non-profit reasons as mentioned in the text.

**Stepane Bouju**, a member of the IUCN World Commission on Protected Areas for volunteering to carry out a review of the plan.
Peer Review

Peer review is an essential step in developing a robust management plan within an effective management planning process. The DCNA management planning process has been used to develop the St. Maarten Proposed Land Parks Management Plan. This has been reviewed several times by members of the IUCN World Commission on Protected Areas (WCPA). 2 reviewers were chosen from the IUCN WCPA to review this management plan on the basis of their experience and expertise. The feedback received has been incorporated into the document and is included in Appendix 6. Some aspects of the feedback will be taken into account through the implementation of the plan, and the remaining points will be included when this plan comes to review.

**Dan Paleczny**

Dan has 30 years of professional experience in working with protected areas, and is a member of the IUCN World Commission on Protected Areas and the IUCN Commission on Ecosystem Management. Dan is currently the Senior Policy and Planning Coordinator for Ontario Parks, Canada. Since 2003 he has been working on research to evaluate protected area assessment and reporting mechanisms throughout the world with particular consideration of how they support decision making and achieve the principles of the ecosystem approach. This research includes a focus on integrating planning and effectiveness evaluations.

Dan has also worked in many other roles including:
- Project Director, UNDP and International Co-Manager, IUCN for Wadi El-Rayen Protected Area & Valley of the Whales World Heritage Site, Egypt

**Summary**

I have examined the provisional plan in detail and hereby offer my review. Before proceeding, I would like to congratulate the writing team and the board for inviting external review and input. Opening up your work to wider international scrutiny is forward-looking; this demonstrates your intent to achieve high standards and transparency. This surely bodes well for the reputation of the Nature Foundation.

Overall, there is much about the provisional plan that I like. For example, the thoroughness of the document shows that considerable thought and effort has been invested in researching and writing. The background information section presents an interesting and concise overview of St. Maarten and its natural and culture heritage. It will serve you well as a reference volume that will be useful for an array of educational endeavours. The description of key values establishes the foundation for the subsequent two chapters on the management environment and plan, which are also comprehensive. The key issues that you have described appear to be shared among stakeholders, as noted in the summary of meetings, and they are used as the basis for the stated actions. Consideration is given to follow-up evaluation as a means to assess effectiveness. These are the key elements of a sound plan and strategy for safeguarding the Island’s heritage for social, economic and ecological purposes. I offer technical comments to support your efforts. Among these, the plan should be sure to address the key conservation priorities and threats that afflict St. Maarten’s natural heritage.

I have described the technical aspects of my review under the four requested categories. As you have requested a critique, I have aimed to offer a thorough and detailed response; however, I offer these with the intention of contributing in a constructive and positive manner. They are intended to build upon the already good basis that you have. With this in mind, I offer suggestions pertaining to the overall structure of the document (parts and sections), the ordering and relevance of information within sections, potential gaps in treatment, and grammatical considerations.
Robert Llewellyn-Smith.

Robert’s career, for the past 15 years, has been in biodiversity conservation and natural resource management. He has worked for a range of organizations including Government bodies and International NGO’s in Africa, the Middle East, Eastern Europe and UK.

Work has involved ecological surveys, wildlife management, planning and management of protected areas, ecotourism, training conservation rangers, environmental impact assessment and agroforestry. He is currently working as a protected areas consultant for a Government Environmental Authority in the United Arab Emirates.

Robert is qualified to Masters level in Ecology and Natural Resource Management with a first degree in Physical Geography. He is an active member of the IUCN World Commission on Protected Areas.

Summary

The Provisional Plan for Terrestrial Protected Areas on St. Maarten is intended firstly as a proposal to establish the St. Maarten Lands Park, and secondly as a guidance document for developing the Parks once they are under management of Nature Foundation St. Maarten. It meets these intentions well, providing an informative and generally cohesive guide to developing the Parks, amidst a set of challenging surrounding circumstances.

The Plan communicates effectively the values of the proposed protected areas and the proposed actions for their management. The presentation, style and content of the Plan should ensure that it is well received and understood by its users.

The Plan could be tighter in places, and I have made various observations, queries and recommendations to assist with this.

In line with its overall guidance purpose, the Plan does not commit to detail that might outdate. It allows room for any future sub-plans e.g. zoning plans, and other updates in Part 4, keeping it a dynamic working document for those using it.
Nature Foundation St. Maarten (NAFSXM) was established in January 1997 with the objective of enhancing the environment through effective management, education, awareness and protection of natural resources. In agreement with stakeholders when the Foundation was established, the mandate of Nature Foundation St. Maarten included being responsible for the operation of marine and terrestrial Protected Areas on the island. Nature Foundation St. Maarten has a permanent Board of Directors, which oversees Foundation activities. NAFSXM is based in Cole Bay and is mandated with the responsibility of operating the St. Maarten Marine Park.

The Foundation is a non-governmental/non-profit organisation operating on grants and government subsidies with a staff currently consisting of a manager, an administrative clerk, and a marine park ranger, supported by a 7 member Board. In the past, concerns for nature were overlooked but NAFSXM has worked very hard for the last several years and has seen a greater awareness developing on the part of the population, demonstrating that the community cares about conservation efforts. The mainstay of St. Maarten’s economy is tourism which depends on clean beaches and healthy waters, reinforcing the need to protect the environment.

The main thrust of NAFSXM recently has been to establish a Marine Park and get it legally recognised with a Marine Park Ordinance. The Dutch World Wildlife Fund financially supported the initial phase of setting up the Marine Park. Further funding was received from Stichting DOEN and IUCN with some government subsidies covering the gap in between. The proposed Marine Park surrounds St. Maarten’s entire Dutch side from Oyster Pond in the East to Cupecoy Beach in the west, stretching from the average high water line to a depth of 60m (200ft). To ensure the effective use of the near-shore waters, zones have been planned in detail and incorporated into the Marine Park Ordinance. A large fishing area accommodates local fishermen and separate sites are designated for SCUBA diving, anchoring and shipping traffic.

St. Maarten is the last island in the Netherlands Antilles to establish a Marine Protected Area. Laws have been written and incorporated into the draft Marine Park Ordinance for the protection of beaches, coral reefs, turtles, mangroves, seagrasses, and other protected species that are indigenous to these areas. The French side of the island has a Marine Park (Réserve Naturelle Marine) which was founded in 1998, located on the Eastern side of the Island; it encompasses the islands of Pinel and Tintamarre.
About The St. Maarten Proposed Land Parks
Management Plan

Purpose
NAFSXM would like to secure a long term management agreement to protect the environment of the entire Dutch side of the island. The proposed St. Maarten Land Parks will offer protection to the island’s indigenous terrestrial flora and fauna while allowing sustainable recreation. There is currently no management of the catchments on St. Maarten that drain into the marine environment. Integrated catchment and coastal management is essential for the future well-being of St. Maarten’s natural resources since activities on land directly affect the water around St. Maarten.

This document clearly defines the Vision, Mission and Goals of the St. Maarten Land Parks, identifies the main values and issues and states the key management strategies required to manage the proposed areas. This provides a framework to develop clear objectives for the manager and staff, which will aid the evaluation of management successes. For this management plan to serve the needs of St. Maarten Land Parks, it is vital that it is periodically reviewed and updated. The plan provides detailed background information about the status of the human and physical landscapes of St Maarten. This acts as a contextual reference for any users, a tool for lobbying stakeholders and as a resource for education.

As the St. Maarten Land Parks become realised this plan should form the basis of detailed action plans for each of the proposed Land Parks

Process
This plan is intended to 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 (as illustrated below).

The DCNA Management planning process.
The stages in Blue indicate the consultative parts of the process, Orange represents the formal development of the management plan and those in Purple to the right provide the necessary feedback for adaptive management. The process of management planning is an essential prerequisite for evaluating the effectiveness of management. The planning process described above feeds directly into the DCNA Management Success Project with the actions and objectives.

The final Terms of Reference for the St. Maarten Land Parks management plan was signed off on September 2007 by Beverly Mae Nisbeth, Manager of Nature Foundation St Maarten, Kalli De Meyer, Executive Director of DCNA, and Duncan MacRae, Director of Coastal Zone Management (UK). This document has been prepared by the authors for Nature Foundation St Maarten.

Background information collection and preparation for stakeholder consultations started in September 2007. Field information and stakeholder positioning meetings were held in December 2007. Formal stakeholder input into the management plan was conducted during April 2008, with meetings held over a one-week period.

**Structure**

The St. Maarten Land Parks 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: Background Information.**

The physical, social and political environment that Nature Foundation St. Maarten works within will greatly influence the operations of the protected area. Those using the management plan may not be aware of the stage upon which St. Maarten Land Parks might operate 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 information. It can be used as a stand alone introduction to the island and PA 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. Maarten Land Parks. Resources available to Nature Foundation St. Maarten are described, including the legal instruments, institutional arrangements and human and physical resources. The main issues facing St. Maarten Land Parks 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 likely to face the PA.*

**Part 3: Proposed Management Plan.**

In Part 3 the strategies that Nature Foundation St. Maarten and partners need to take to work towards the mission and goals are clarified. It has been labelled a Proposed Plan since the areas are not currently under any management.

*Part 3 is of concern to those with an interest in the current activities of Nature Foundation St. Maarten and St. Maarten Land Parks 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 PA. 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 the proposed St. Maarten Land Parks 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.*
Summary

Three areas have been identified as having special conservation value on St. Maarten, for the management planning process they have been given the collective name of ‘St. Maarten Land Parks’.

The Emilio Wilson Estate is located on the western side of the road that runs through Cul de Sac valley to St. Peter covering about 90ha from the road to the top of Sentry. The Estate covers land that had sugar plantations, including 9ha of land leased to the Emilio Wilson Estate Historical & Cultural Park Foundation and 80+ha of land to the summit of Sentry Hill.

Geneve/Back Bay is on the east coast of St. Maarten and is circled by hills running from Guana Bay Point in the north to Back bay in the south. The area covers approximately 100ha and has a number of different owners. It is one of the few places on St. Maarten where no construction has taken place and is home to a number of possible historical sites and geological formations.

The Hill Tops covers the hillside areas of Cole Bay Hill, Sentry Hill, St. Peters Hill, Concordia Hill, Marigot Hill, Waymouth Hill and Williams Hill. These areas are in excess of the 200m height contour which has had some restrictions on building in the past.

None of the terrestrial environments of St. Maarten are protected, including biologically diverse rainforest, drought resistant habitats and lagoons. St. Maarten Terrestrial Parks will offer excellent hiking with views of the island and neighbouring Saba, St Eustatius, St Barths, Anguilla, St. Kitts and Nevis. The mission of St. Maarten Land Parks is to manage, conserve and restore St.
Maarten’s natural, cultural and historical resources for education, preservation and sustainable use with continued stakeholder participation, for the benefit of current and future generations.

The proposed Protected Areas will help conserve and restore St. Maarten’s natural, cultural and historical resources for the benefit of current and future generations. St. Maarten and its habitats are a home, migratory stop over or breeding site for 10 IUCN Red List species, 9 CITES Appendix I species and 89 Appendix II species including the 2 endemic plants, the endemic Anguilla Bank Bush Anole (Anolis wattsi Pogus) and many other plants and animal species with limited distribution. St. Maarten Terrestrial Parks could attract visitors and contribute to income for many people on the island employed in restaurants, hotels and other services.

This is the first management plan for St. Maarten Land Parks. It is intended initially as a proposal to establish the St. Maarten Land Parks and secondly as a guidance document for developing the Parks once they are under the management of Nature Foundation St. Maarten and for the EWE, partner organisations. The lack of terrestrial parks and the severity of the threats facing the remaining terrestrial environments have highlighted the need for a strategic document to consolidate the management approach and define the goals and aims of the proposed St. Maarten Land Parks.

Management planning and a clear strategy for management is a prerequisite if Nature Foundation St. Maarten is going to begin monitoring its own effectiveness. 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.

Extensive stakeholder consultation identified the main external and management issues facing the St. Maarten Land Parks through their initial establishment;

<table>
<thead>
<tr>
<th>Management Issues</th>
<th>External Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Resources.</strong></td>
<td><strong>Development.</strong></td>
</tr>
<tr>
<td>- Staff/finance</td>
<td>- Construction of Link 7</td>
</tr>
<tr>
<td>- Information sources</td>
<td><strong>Erosion.</strong></td>
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<tr>
<td><strong>Governance.</strong></td>
<td><strong>Invasive species.</strong></td>
</tr>
<tr>
<td>- Legislation</td>
<td></td>
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<tr>
<td>- Ownership</td>
<td></td>
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<tr>
<td>- Institutional Organisation</td>
<td></td>
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<tr>
<td><strong>Working with constituents.</strong></td>
<td></td>
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<tr>
<td>- Government</td>
<td></td>
</tr>
<tr>
<td>- Community</td>
<td></td>
</tr>
</tbody>
</table>

This document has been prepared in close consultation with Nature Foundation St. Maarten, their management, staff and a considerable number of stakeholders and stakeholder group representatives.

**Strategic Summary**

The table below is a product of the management planning process and extensive stakeholder input. It summarises the interaction between the Goals, Issues and Strategies of Nature Foundation St. Maarten regarding St. Maarten Land Parks.
Figure 2: The main physical features of St. Maarten (source: adapted from Google Earth)
1. Background information.
1.1. Location

St. Maarten is situated in the North Eastern Caribbean (18° N, 63° W) within the Lesser Antilles island group along with Saba and St Eustatius. 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. Maarten is 63 km from St. Eustatius and 48km from Saba. St. Maarten is the largest of the three Windward Islands and has an area of about 95.8 km².

![Figure 1: St. Maarten’s location within the Caribbean](image)

St. Martin/St. Maarten is the smallest island in the world to be shared by two sovereign governments - the Dutch and French. Since 1648 the island has been divided in two, with, Sint Maarten, the smaller Southern side making up part of the Netherlands Antilles (41.4 km²), and Saint-Martin, the larger Northern side being a French Overseas Territory (54.3 km²).

The island is situated on a submarine plateau called the Anguilla bank with a maximum depth of 36m, which it shares with the islands of Anguilla and St. Barthélemy. St. Martin/St Maarten has an irregular shape, having many bays and lagoons along its coast. Several uninhabited small islands surround St. Martin/St Maarten. Tintamarre, also called Flat Island, Ile Pinel, Little Key and Green Key at the eastern side of the main island as well as Great Key in Simpson Bay Lagoon belong to French St. Martin (Figure 2). Pelican Key, also called Guana Key, Molly Beday, Cow and Calf and Hen and Chickens at the eastern side of the main island as well as Little Key in Simpson Bay Lagoon belong to the Netherlands Antilles (Dutch) side of St. Martin/St Maarten.

Coral reefs, seagrass beds, mangrove and salt pond habitats are apparent around the coastline of St. Maarten. The coral reefs have spur and groove formations (coral ridges divided by sand channels) and boulders at the dive sites ‘The Maze’ and ‘Hen and Chicks’ are encrusted with numerous species of corals, sponges and anemones. Seagrasses are found mainly along the southern and south western shores, although they are on the brink of total destruction due to damage caused by conch fisherfolk and coastal development. Mangroves can be found around Simpson Bay Lagoon, and around the salt ponds, which provide a perfect habitat for roosting, nesting and migrating birds as well as a wealth of other species. The salt ponds provide important foraging areas for many birds and the brackish and sometimes hypersaline conditions give rise to a unique wildlife community that includes several fish species, snails and insects.

The highest points and the geologically oldest parts of the island are in the centre, including Fort Hill (220m), Cole Bay Hill (215m), Sentry Hill (344m), Saint Peter’s Hill (317m), Flagstaff (386m), Pic Paradis (400m) and Naked Boy Hill (300m). Flagstaff is the highest hill on the Dutch side. Founded in 1763, Philipsburg, the capital of Dutch St. Maarten, fills a narrow stretch of land between Great Bay and the Great Salt Pond. With its numerous shops, restaurants, cafes and casinos the waterfront forms the focal point of tourist activities and has become a popular stop for cruise ships.
1.2. **History and Culture**

The information in this section has been adapted from the book; “A short History of Sint Maarten” (2004) available from the Sint Maarten Museum. A detailed report about the archaeology of the Emilio Wilson Estate can be found in Appendix 2 (Haviser, J. 2006).

### 1.2.1. **History**

There is a possibility that the South American Stone Age people, known as the Ciboneys, lived on St. Maarten 4000 BC. The island was covered with lush vegetation and had many varieties of birds, crocodiles and large rodents.

**Pre-History 4000 BC-1490 AD**

Upon arrival of the first humans in the Caribbean, the islands were covered with lush vegetation and many varieties of bats, birds, sea mammals, iguanas, giant land tortoises and large rodents. There are but a few rare archaeological sites which indicate inhabitation in the Caribbean Islands by “Lithic Age” peoples prior to 4000 BC.

From about 4000 BC to about 500 BC, peoples of the “Archaic Age” level of technological development migrated onto the islands from South-/Central- and North America. These Archaic Age people were semi-nomadic hunter-gatherer-fishing folk, using simple stone and shell and probably wooden tools, who did not know agriculture nor the manufacture of ceramic vessels. Neither the ethnic associations nor the language of these peoples are known. On St. Martin, the Norman Estate site on the French side is the only site of this time period discovered, and it dates to about 2000 BC.

Beginning around 500 BC, populations of people began to migrate from South America into the Caribbean region, introducing the “Ceramic Age”. These were far more developed societies than the Archaic peoples, farming manioc and other crops, using large sea-faring canoes, showing knowledge of ceramics, and producing stone and shell tool. These initial Ceramic Age communities also had complex social, economic and religious systems.

On St. Martin/St. Maarten, the oldest Ceramic Age artefacts are the remains of these first migrations from about 500 BC, often referred to as ‘Saladoid’ people. The name that was given to these people is derived from the place where archaeologists first identified them, the Saladero site in the Orinoco basin in Venezuela.

According to archaeologists, it is doubtful whether there was ever a large-scale prehistoric Carib migration into the Northern Lesser Antilles. There is also no proof, that when the first Europeans passed by St. Martin/St. Maarten in the 1490’s, Amerindians were still living on the island. (Dr. Jay Haviser - communication to NAFSX 2006).

**1490’s– 1650’s**

During his 1492 – 1494 voyage, Christopher Columbus ‘discovered’ the Caribbean islands; possibly sighting St. Maarten on November 11, 1493. The island was named after St. Martin, the bishop of Tours. Some evidence indicates that the island Columbus saw was Nevis, with later confusion leading to the naming of St Martin. Throughout the fifteenth century, other Caribbean islands were occupied by various European nations like the Spanish, English and French, whilst St. Maarten was not considered to be of any importance.

In 1624 the first Dutchman set foot on the island and found it uninhabited. Over the following years the Dutch explored the island in greater depth. They noticed the salt ponds, which were of great importance since salt was used for the preservation of food. In 1631 a small group of Dutchmen claimed the island for the ‘West-Indische Companie’ (West India Company). Simultaneously, a group of Frenchman settled in the area now known as the French Quarter.

In 1632 the Dutch built Fort Amsterdam and continued their colonization, the harvesting of salt being one of the main reasons for the settlement. Anguilla was also occupied and a small fort was built there as well. In 1633, the Spanish recaptured both islands and used the materials of the Anguillian fort to reinforce Fort Amsterdam. They also built a second fort on Pointe Blanche, now known as ‘the Old Spanish Fort’. Under the command of Peter Stuyvesant, director of the West India
Company, the Dutch attempted to recapture St. Maarten in 1644 with some 800 soldiers. In spite of various attacks and an effort to starve the Spaniards, the Dutch could not force the Spanish to surrender. The Spanish did not leave St. Maarten until 1648.

The Dutch and French immediately moved back to the island and on March 23, 1648, the famous partition agreement was signed on Mont des Accords (Concordia). The colonists introduced various commercial crops, such as tobacco, indigo, coffee, cotton and sugarcane. Trade began to expand, the island prospered.

**1650’s – 1850’s**

The island changed hands frequently between France, England and Holland. Pirates and looters caused much damage, and agriculture and salt production were not as successful as before. The number of people on the island fluctuated sharply. In 1667 John Simpson was commander of the Dutch Part; Simpson Bay may be named after him.

Through the early 1700’s, the British periodically drove out the French, but the Dutch remained in control. The Dutch Governor John Philips, brought order after the chaotic preceding years. He revived the production of salt and persuaded the landowners to plant more coffee, sugarcane and cotton for a greater economic yield. He made land available to investors. The English came in large numbers, bringing their English-speaking slaves with them. With the English influence, the Dutch language and culture faded into the background. Fort Amsterdam was strengthened and the main village moved from Cul-de-Sac to its present location and named Philipsburg in honour of the governor.

The second half of the eighteenth century brought prosperity, with a peak around 1790, when the island had 92 estates with sugarcane as the main crop (Image 1). Time and again the English tried to take over, and by 1817 the island had changed hands 16 times. In that year the French and Dutch established lasting control. In 1766 Fort St. Louis was constructed in Marigot. In 1772 mention was made of a severe hurricane, and in 1819 a major hurricane destroyed almost everything on the island, including all historical records. Simpson Bay village became isolated from the rest of the island. The plantation industry declined due in part to the prohibition of the slave trade.

From 1820 to 1848, a number of important buildings were constructed; the Reformed Church, the Pasanggrahan (Government Lodging House) and the Methodist Church. There was a revival of the salt industry from 1735 in which the entire population participated. In 1845 the colony of Curaçao...
was divided into the three Windward Islands (St. Maarten, Saba and St. Eustatius) and the three Leeward Islands (Curaçao, Aruba and Bonaire).

The abolition of slavery on French St. Martin took place in 1848. A number of slaves on the Dutch side, moved to the French side where they acquired the status of free foreigners. (One route, the ‘freedom path’ can still be found at the border, between the Dutch and the French Quarter.) To prevent unrest, Dutch plantation owners requested that the Dutch Government abolish slavery in the Dutch colonies. It was not until 1863 that slavery was officially abolished. Eventually, many estate owners left the island and ex-slaves were able to obtain land on or around the former estates.

**1860’s to the present day**

Through the late 1800’s and early 1900’s industry on St. Maarten declined; the production of sugar stopped in 1875, cotton in 1932 and salt in the 1940s (Image 2). People returned to subsistence agriculture and fishing. Many men, with or without family members, emigrated to Aruba and Curaçao to work in the oil refineries. Others left for seasonal work (sugarcane cutting) in the Dominican Republic or went to the US.

In the Second World War, Holland was occupied by Germany and France took control over the island for 10 days. The French side was under Vichy control, and was blockaded by Allied forces. In 1943 the Juliana Airport was opened on the Dutch side.

In 1948 the frontier monument was erected, celebrating 300 years of peaceful coexistence. In 1951 the Netherlands Antilles signed the ‘statuut’ to become autonomous, and were reorganised into Curaçao, Aruba, Bonaire and the Windward Islands, each with its own territorial government.

The first major hotel (Little Bay) was constructed in 1955. In 1959 the first local radio station began broadcasting. In 1960 a major hurricane (Donna) hit the island. In the Lowlands the first luxury villas were built in the 60’s. In 1966 Philipsburg was extended by filling in part of the nearby Salt Pond. Numbers of tourists grew along with developments in air transport. The economy expanded...
rapidly. Many St. Maarteners returned home. Employment levels were high and the boom in tourism attracted people from other islands as well as different parts of the world. The population grew rapidly, escalating from around 7,000 in 1970 to more than 30,000 in 1995 on the Dutch side alone.

1.2.2. CULTURE
The cultural diversity of St. Maarten springs from its historical role as a crossroads for visitors to the New World. Dutch, French and British traders brought European traditions, while Afro-Caribbean people brought the language and culture of West Africa. Today the range of influences is reflected in the number of languages spoken. Dutch is the official language, but English is taught in schools and spoken everywhere, while other common languages are Spanish and Papiamento, the dialect of the Netherlands Antilles. St. Maarten’s premier cultural event is its annual Carnival (Image Group 1), which includes parades, calypso competitions, reggae shows, and an endless array of stands serving traditional island food.

Image Group 1: Colours of St. Maarten’s annual Carnival. (source: www.st-maarten.com)

The island culture has its roots largely in African, French and Dutch influences, though scores of more recent immigrants have added their own elements to this multicultural society. The tourist boom of the past few decades has resulted in such an influx of job-seekers from elsewhere in the Caribbean that only about 20% of all residents were born on the island. Education is compulsory, and approximately 99 percent of the children attend school. The government spends about a third of its budget on education, which is modelled on the Dutch system. Apart from local faculties, teachers are recruited from Holland and the Caribbean islands. There are technical and vocational schools, teacher’s colleges and two other further education establishments: the University of St. Maarten and the American University of the Caribbean.

St. Maarten has its own flag (Figure 3). The design shows red, white and blue panels and the island’s crest. This coat of arms depicts the national bird; the Brown Pelican, national flower: Orange Sage (Latana camara), the Court House and the border monument.

Figure 3: St. Maarten’s Flag.
1.3. Population

In 2005 approximately 35,000 people were considered permanent residents of St. Maarten (and approximately 30,000 in St Martin). St. Maarten is by far the most densely populated of all the Dutch Caribbean Islands with just over 1000 per km$^2$ on the Dutch side (See Figure 4).

![Figure 4: Population density of the Dutch Caribbean Islands (source: CBS, 2005).](image)

On average, approximately 1000 people more move to the island as move away, this adds to the growth figures for the resident population (see Figure 5). 2003 saw a significant rise in the numbers of people moving to and from St. Maarten, and for the first time there was a net loss of people (around 250 more left the island than moved to the island).

![Figure 5: Movements by the permanent population to and from St. Maarten (source: CBS, 2005).](image)

There has been a significant shift in the structure of the population of St. Maarten over the years from 1995 to 2004 as shown in Figure 6. There is an increasing loss of young, economically active residents from the age of 15 years to 20 years, who leave to study or work abroad. All figures for the population of St. Maarten have been taken from [www.cbs.an](http://www.cbs.an) and are presented in Appendix 1.
The resident population are far outnumbered by visitors to the island. Figure 7 shows the expected growth of the population and the expected growth of stay over visitors from 2005 to 2015. There are three main tourist groups that visit St. Maarten; stay over tourists, cruise boat tourists and yacht tourists. Stay over visitors alone increase the population of St. Maarten by 7 times over the year, although tourists do not usually stay for more than 2 weeks. The number of stay over tourists is expected to increase by between 50% (low estimate, 354000 persons) and 80% (high estimate, 432000 persons) between 2005 and 2015. If the resident population continues to grow at its current rate (16.5%) 2015 will see around 47500 persons permanently on Island (TourMap, 2005).

The number of cruise visitors is also expected to increase from 2005 to 2015 from just under 1.4 million to nearly 2 million visiting the whole of the island. Marine base tourists such as Yacht visitors are also likely to increase in number. These increases in the temporary and permanent populations on St. Maarten will place increasing pressure on the islands environment and infrastructure.

The majority of the population are Protestant, though there are Catholic and Jewish minorities.
1.4. Politics and Economics

1.4.1. Politics

The form of government in the Netherlands Antilles is a Parliamentary Democracy. The Governor, 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 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 uni-chambered 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. Executive power is vested in an Executive Committee consisting of five commissioners who must have the support of the majority of the eleven-seat Island Council (the island’s law-making body).

1.4.2. 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 1.82 Antillean guilders. The monetary system of the island is regulated by the Central Bank of the Netherlands Antilles.

The economy of St. Maarten is based almost entirely on tourism. It is estimated that 85% of all employment, and a significant contribution to the GDP, are related directly and indirectly to tourism (see Figure 8 and Figure 9). St. Maarten has one of the highest per-capita incomes in the Caribbean. Its tourism product offers visitors one of the most diverse and exciting vacation experiences in the Caribbean. In addition to tourism, the other major forms of economic activity are financial services and trade with the neighbouring islands. St. Maarten’s GDP for 2004 was 1,023.4 million NAFs, an increase of 12.5% from 2003, illustrating the rapid growth, mostly in tourism that is taking place.

![Figure 8: The contribution of tourism related activities to St. Maarten’s GDP (source: CBS, 2005).](image)

St. Maarten produces very few consumable goods. The government is looking into ways of diversifying the economy, particularly with industry that would support the main economic activity and not damage the tourism product. Government is currently involved in preparing zoning plans, which will reserve an area for light industry/manufacturing and an area for heavy industry. Once this is in place efforts would be made to attract industries.
1.4.3. **ECONOMIC DEVELOPMENT**

**Farming**

At the end of the 18th century there were 92 plantations on the island growing sugarcane, some cotton, as well as indigo (De Palm, 1985). The sugarcane and cotton industries went into decline through the late nineteenth and early twentieth centuries, leaving agriculture as the main ‘economic’ activity along with salt production. Salt extraction took place in the Great Salt Pond up until 1939, with a network of dykes and drainage canals that were built to prevent fresh rainwater from entering into the saltpans.

Agriculture remained the most important economic activity until around 1960. The main agricultural activities taking place were pastoral, including the rearing of cows and sheep. During the rainy season the cattle grazed on higher pastures while in the dry season on the pastures in the valleys. Lobster, some cattle and agricultural products were exported to Curacao. After 1960, many of the working men of the island moved away to Santo Domingo to work in sugar fields as well as to Aruba and Curacao to find work in the oil industry reducing the agricultural activity to a subsistence level.

Many areas in the valleys, which have historically been used for agriculture, have recently been released for housing construction. As a result of old zoning legislation, the hills above 80 meters were not built on (EcoVision/AID Environment, 1996) until the late 1990’s. More recently, construction projects have been encroaching on the remaining mountain forest (Image Group 2).
Image Group 2: Hillsides of St. Maarten facing pressure from development (source: NAFSX)


**Industry**

The only mining activities were open cast excavations that are still visible on the landscape. The main mining products were material for land reclamation in the bays and lagoons and fill to cover household garbage in the Great Salt Pond. The main excavation at Fort Hill has not been used since the 1960’s when the southern part of the Great Salt Pond was filled in. The mine producing construction material at Hope Estate was closed in 1994 (EcoVision/AID Environment, 1996). The government restricted land reclamation and its associated mining activities by individuals in 1991, however the fill to cover waste continues to be excavated in several places.

**Tourism**

The success of tourism on St. Maarten through the 1960’s attracted many people from the other islands looking to join the well-employed labour force. Gains to be made from the tourism industry has attracted many people, which has led to the islands population exploding from 5,000 inhabitants in the 1960s to 44,500 inhabitants today (just the Dutch part of the island) (CBS, 2005). The construction industry boomed to supply housing for the residents and hotels/condos etc for tourists (Image 3). The fertile valleys of Cul de Sac and Cole Bay have seen considerable building development. One study carried out in 2003 found that St. Maarten is one of the most developed islands for tourism in the world (Mc Elroy, 2003).

![Image 3: Coastal development at Cupecoy / Mullet Beach (source: NAFSXM)](source: NAFSXM)

In the 1980’s, many of the islands accessible slopes were built on. This required roads to be carved out of the hillside, many of which lie unpaved thus contributing tremendously to the erosion and sedimentation of the marine environment. The lowlands and Billy Folly on the Dutch side almost completely been transformed to accommodate the booming tourism industry and residential development (Rojer, 1997). More recently the coastline at Pelican, Guana Bay and Dawn Beach has also been developed for tourism and expensive residential houses
1.5. Climate /Oceanography

The climate of St. Maarten is humid tropical; the average rainfall is 1008 mm per year (Figure 10). The average yearly temperature is 26.8 °C (CBS, 2005). Yearly variations in rainfall can be considerable, for example, in 1992 there was 1273 mm of rain, yet in 1994 there was 658 mm. The majority of the rain falls in August – November, though on a monthly basis clear wet or dry seasons are difficult to distinguish. July 2005 saw the highest monthly rainfall with 211.6 mm; August 24th 2005 saw the greatest daily maximum with 80.4 mm falling in 24 hours. The majority of the rainfall on St. Maarten is caused by convection (the air heating up and rising – thus causing rainfall), although the hilly areas in the centre of the island receive more rainfall suggesting they are high enough to cause orographic rainfall (air forced up by the height of the land causing rainfall).

There is very little variation in temperature over the year, with December to March being the cooler months at around 25°C on average, and April to November being the warmer months on average with temperatures between 27°C and 29°C. The coldest temperatures recorded are around 18°C; the hottest temperatures are around 33°C. The precipitation/temperature graph below shows the average rainfall and temperatures from 1970 to 2005.

![Figure 10: Average Precipitation and Temperatures for Princess Juliana International Airport St. Maarten, 1971 – 2002 (CBS, 2005).](image)

The wind rose below (Figure 11) shows average wind speeds and direction from 1971-2001. St. Maarten is located in the Northeast Trade Wind zone. 78% of the wind comes from the east, and 22% from east-south-east, with average wind speeds of 6/7 metres per second. The Wind is a significant, reliable natural resource on St. Maarten.

![Figure 11: Wind rose showing 1971-2002 wind speed averages data for Princess Juliana Airport St. Maarten (source: CBS, 2005).](image)
St. Maarten is located in the Atlantic hurricane zone (Image Group 3) and on average one tropical storm or hurricane passes at a distance of less than 200 km each year. Once every 4 or 5 years St. Maarten is hit by a hurricane (see Table 1).


Table 1: Hurricanes and tropical storms to affect St. Maarten since 1960. (source: www.stormcarib.com)

<table>
<thead>
<tr>
<th>DATE</th>
<th>WIND SPEED MPH</th>
<th>CATEGORY</th>
<th>CPOA</th>
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</tr>
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<td>5 Sep 1960</td>
<td>138</td>
<td>h4</td>
<td>13</td>
<td>DONNA</td>
</tr>
<tr>
<td>26 Aug 1966</td>
<td>92</td>
<td>h1</td>
<td>42</td>
<td>FAITH</td>
</tr>
<tr>
<td>17 Jul 1979</td>
<td>46</td>
<td>ts</td>
<td>5</td>
<td>CLAUDETTE</td>
</tr>
<tr>
<td>3 Sep 1979</td>
<td>58</td>
<td>ts</td>
<td>13</td>
<td>FREDERIC</td>
</tr>
<tr>
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<td>40</td>
<td>ts</td>
<td>20</td>
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<td>69</td>
<td>ts</td>
<td>50</td>
<td>KLAUS</td>
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<tr>
<td>5 Sep 1995</td>
<td>132</td>
<td>h4</td>
<td>24</td>
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<td>2</td>
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<td>75</td>
<td>h1</td>
<td>5</td>
<td>DEBBY</td>
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</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 1).

In September 1995 St. Maarten was severely damaged by Luis, a category 4 hurricane, followed only 10 days later by Marilyn. In 1996 Hurricane Bertha passed by. In 1998 Hurricane Georges damaged many properties and in 1999, the island was hit by Hurricanes Jose and Lenny causing mudslides, floods and considerable beach erosion.
St. Martin/St. Maarten is located on an undersea plateau, known as the Anguilla Bank, where depths do not exceed 36m. This is shared with St. Barthélemy and Anguilla. St. Martin/St. Maarten and the neighbouring islands are affected by The Antilles 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 (Lee et al., 1996).

Mooring studies have indicated that the Antilles has mean transport speeds of 3.2 Sv\(^1\) northwards in the upper 800m of water (see Figure 12). In addition there is deeper flow from the Deep Western Boundary Undercurrent below 800 m carrying 33 ± 10.9 Sv southwards. The influence of this deep flow results in a large, mean southward transport for the entire water column.

![Figure 12](source: http://oceancurrents.rsmas.miami.edu/)

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 low tides every day in St. Martin/St. Maarten, with about six hours between high tide and low tide. The average tidal range is around 45cm.

St. Martin/St. Maarten lies within the Northeast Trade Wind zone, which causes wind swell for much of the year. Waves produced by the wind are generally highest from June to July and from December to March when the wind speeds are highest. Wave direction varies according to the time of year. Waves approach from a predominantly easterly direction. For this reason, the waves are highest on the east or windward coasts 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). 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).

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. Martin/St. Maarten through winter months. A result of swell, large waves may be seen breaking on the coast even 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

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\(^1\) 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
pressure, produce very high energy sea conditions, where very large groundswells are driven by high winds.

*Image Group 4:* Contrasting coastlines of the high energy windward shore at Back Bay and low energy coastline at Great Bay on the leeward shore (source: NAFSXMF)

During swell wave conditions, leeward coasts, in particular, experience considerable erosion (Image Group 4). Sand is moved offshore and trees and walls are undermined, leaving their roots or foundations exposed. Swell waves may also cause changes in the shape of a beach by moving sand from one end to the other. Beaches tend to erode during the winter months and build up (or accrete) during the summer months. If the amount of winter erosion exceeds summer accretion, there is overall erosion with the land behind the beach being eroded as the beach retreats inland. The rate of retreat is called the erosion rate. Overall 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. Conversely, if accretion exceeds erosion, the beach gets wider over time and deposition features, such as cuspate forelands, tombolos, spits and bars develop.
1.6. **Geology and Geomorphology**

St. Martin/St. Maarten forms part of the non-volcanic arc of the Lesser Antilles. The oldest layers of rock date back approximately 50 million years (Westermann, 1957). These older rocks are sedimentary – and made of marine deposits that were once on the ocean floor. More recently these layers were folded by tectonic forces, then pushed above the water surface (Image Group 5).

![Image Group 5: Layered sedimentary Rock on the shores of St. Maarten (source: NAFSXM)](image)

These oldest layers, “The Pointe Blanche Formation” form two parallel chains of hills which include; Fort Hill (220 m), Cole Bay Hill (215 m), Sentry Hill (344 m), Saint Peters Hill (317 m), Flagstaff (386 m), Mount Paradise (400 m) en Naked Boy Hill (300 m). The hilly parts of the island were formed in the Oligocene Period (34 to 23 million years before present).

In the Miocene Period (23 to 5.3 million years before present), the “Pointe Blanche Formation” was submerged by the sea, during a period of local subsidence of the earth crust. This allowed calcium and other marine deposits to accumulate, which now form the Terres Basses or Lowlands on the western part of the island. A second period of tectonic activity brought the area above sea level. Throughout the Pleistocene Era (1.8 million to 12,000 years before present) there was an ice age which locked up much of the earth’s water on land. The area, which incorporated Sint Maarten and the nearby islands of Anguilla and St. Barthélemy, remained above sea level as one large land mass. During the coldest periods of the ice age in the Pleistocene Era, the sea level was 36 m lower than at present.

At the end of the Pleistocene glaciation, ice melted and the sea level rose. The large, single island flooded and only the highest parts remained above sea level – forming the islands of St. Martin/St. Maarten, Anguilla and St. Barthélemy as they are known today. The Simpson Bay Lagoon, Great Salt
Pond, Great Bay and other bays and lagoons are drowned valleys. The plateau the neighbouring islands sit on has a maximum depth of 36 m and is known as the Anguilla Bank.

More recent igneous rock formations include those in the Colombier Valley, Cul-de-Sac and Belle Plaine. The Williams Hill (264 m) is formed from dark coloured dolerite, which is a type of magma. The youngest rock formations, the coral reefs, are formed in the ocean and lie around 5 to 6 m above the sea level and can be found mainly on the Eastern part of the island.

A number of geomorphological landforms exist on St. Maarten - including sand bars, and spits which are formed by water movement and sand deposition around the bays and coastline. Soils on the hill slopes are not very well developed due to the comparatively high rainfall and associated high rates of erosion. In the valleys, on the less porous rock, soils are generally well developed where they have not been removed for building foundations and other infrastructure development.
1.7. Marine Environment

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

- Open water: supporting planktonic and pelagic sea creatures including fish and migratory species such as 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 mangroves, rocky shores, sandy beach and dune areas

There is, of course, regular exchange between the land and each of these habitats. These is also constant exchange between each habitat for feeding and reproduction and continuous movement of water and animals between the deep waters surrounding St. Maarten, the coral reefs, seagrass and mangrove areas (see Image Group 6 and Figure 13). As the waters around St. Maarten 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.

The mangrove, seagrass and coral reef habitats of St. Maarten 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. The mangrove forested areas of the coast have 4 distinct ‘zones’ where the plants are different. These change as conditions become more saline towards the sea:
**Image Group 6:** Red Mangrove (*Rhizophora Mangle*), Flying Gurnard (*Dactylopterus volitans*) over seagrass, Pillar Coral (*Dendrogyra cylindrica*) on a reef (source NAFSXM).
1.8. **Terrestrial Habitats, Flora and Fauna**

The types of vegetation that characterize St. Maarten have evolved due to the islands terrain, distinct climate and years of human activity. St. Maarten has varied topography with large hills forming three main ridges in the centre and east, aligned in a north-south direction. Only the Lowlands in the west are flat. The coastline includes bays, lagoons, steep rocky coasts, and sandy beaches. Old plantations removed the natural habitat and today, the high population density and expanding tourism industry of St. Maarten continues to threaten terrestrial environments (Image Group 7). As a consequence, St. Maarten’s vegetation is almost entirely secondary or degraded.

The Nature Conservancy has produced a vegetation map of St. Maarten which can be used to assist the description of the habitats of the Island (Image 4). The majority of the areas on the Dutch side of St. Maarten that have not been developed consist of secondary vegetation, originating from either seasonal or dry evergreen vegetation communities. On a few of the slopes in the centre of the island, dense secondary woodland vegetation is growing, preventing erosion. These two main vegetation types make up the largest habitat type represented by the light green area on Vegetation Map. Few patches of original Evergreen Seasonal Forest remain on the highest hilltops, making this special habitat vulnerable if further development is allowed to continue in the hills. An initial species list for St. Maarten is presented in Appendix 2.

**Image Group 7**: The development of Simpson Bay Lagoon from the 1970s into the 21st century has marginalised the natural environment (source: A. Caballero).
Image 4: Vegetation Map of St. Maarten (source: The Nature Conservancy)
**Figure 13:** Schematic diagram of a typical tropical coastal seascape. The majority of the coast of St. Maarten has been developed to some extent and does not have seagrass or mangrove. The large arrows at the bottom symbolise gradients created by the buffering of the influences of the land and the ocean on the seascape (Diagram © D.R. MacRae).
1.8.1. **EVERGREEN SEASONAL FOREST**

**Introduction**
Evergreen Seasonal Forest only exists on the hill range of St. Maarten that runs from Sentry Hill to St. Peter Hill (>200 meters). These vegetation communities are adapted to cope with periodical drought. Stands of original plant communities can only be found on top of the main peaks (Image Group 8).

**Image Group 8:** Semi-Evergreen Seasonal Forest (source: Jan Blok)

Stoffers (1956) first classified this type of forest as a semi-Evergreen Seasonal Forest with both deciduous trees forming the canopy, and evergreen trees forming the under storey (Figure 14). This habitat type is home to some of the largest trees on the St. Maarten which have thick trunks and live for many years. In 1960 Stoffers listed several trees being present in large numbers which do not exist elsewhere on the St. Maarten, including Gum Trees (*Bursera simaruba*), Locust Trees (*Hymenaea courbaril*), Redwoods (*Inga laurina*) and the White Frangepane (*Plumeria alba*).

**Figure 14:** The names given to the different layers of vegetation in a forest (Diagram by D.R. MacRae).

Most trees in this habitat have umbrella-shaped crowns (Stoffers, 1956), a shape adopted by trees that live in shade. At higher elevations, long stemmed woody vines known collectively as ‘Lianas’ are more abundant than other areas. Lianas root to the ground level and use other trees for vertical support to climb up to the canopy to get access to well-lit areas of the forest. Ground vegetation is scarce most probably due to the higher levels of shade created by the surrounding canopy. Epiphytes, mosses and lichen that grow on trees are rather scarce.
On St. Peter Hill, Howard (1991) reported a well-developed epiphytic growth of large specimens of Bromeliad. Bromeliads are known for attracting wildlife due to the large pool of water that often gets trapped within their crowns. There is also a lush growth of vines and lianas at St. Peter Hill. *Polypodium phyllitides*, a tropical fern also known as ‘Bird Nest Fern’ was also found to be thriving. Different species of Radiator Plant (*Peperomia sp.*) are also common, often found growing on rotten wood. *Peperomia sp.* generally have thick, stout stems and fleshy leaves sometimes grown for their ornamental foliage.

Orchids are also present in abundance, mainly from two genuses *Epidendrum* and *Oncidium*. *Epidenrum sp.*, commonly known as the Star or Crucifix Orchid, are epiphytes which grow mainly on trees in Evergreen Seasonal Forest and are often fragrant with colourful flowering life stages. *Oncidium Sp.*, sometimes known as Spray Orchids, also grow mainly on other vegetation and the flowers come in shades of yellow, red, white and pink, the petals being ruffled on the edges. Orchids can are also found on other hilltops on St. Maarten, including Cay Hill, Cole Bay Hill and Vineyard Hill (Rojer, 1997).

**Condition**

The Evergreen Seasonal Forest remains in relatively good condition as the relief, terrain and elevation of the hilltops and ridges prevent humans from accessing the area where it is established. The majority of this habitat still contains original forest which is in good condition. However, the lowland Evergreen Seasonal Forest on the hilltops of St. Maarten is highly vulnerable because of the small area they occupy and continued pressure from development (Image 5).

![Image 5: Forest clearance on the lower slopes of the Cole Bay side of the Sentry Hill Range with Simpson Bay Lagoon in the foreground (source: D.R. MacRae)](image)

**Value**

The Evergreen Seasonal Forest is highly valuable as it is some of the last original forest remaining on St. Maarten and fulfils various functions for the island which makes the forests indispensable. The original evergreen forests give the island exceptional landscape qualities which attract tourists to the Island (TourMap, 2005). Several species, including orchids, bromeliads and ferns are restricted to this habitat. This habitat is also highly valuable to scientists and managers involved in research and conservation management of terrestrial environments. Preservation of the St. Maarten hilltops with their well structured plant communities will benefit the populations of several dove species. The elevated, vegetated hilltops are important as they prevent erosion of the hillside from heavy rainfall. The roots of the vegetation bind the soil together preventing erosion and landslides so often seen in other tropical islands where deforestation has taken place.

The proposed Hill Tops Protected Area would protect an area of this Evergreen Seasonal Forest and its associated ecological values and functions.
1.8.2. **Drought / Mixed Evergreen Deciduous Thorn Woodland**

*Introduction*

These woodlands are a mix of secondary vegetation originating from either seasonal or dry evergreen vegetation communities that are the dominant habitat on St. Maarten. The habitat ranges from the mixed woodlands on the slopes of the hills down to the more degraded thorny wood and shrubland nearer the coastal margins as shown in the light green area of the Vegetation Map (Image 4). The vegetation within this habitat is varied and complex and therefore for this purpose Rojer (1997) divided the habitat description into different groups described below. All these habitats are found within the main Nature Conservancy habitat classification ‘Drought Deciduous Thorn Woodlands and Mixed Evergreen Thorn Woodland’.

*Secondary Seasonal communities*

**Deciduous Seasonal Forest**

On the hills where original vegetation has been disturbed, secondary or degraded vegetation exists. Secondary seasonal communities derived from woodland only occurs at higher elevations in the hill range around the Cul de Sac valley where there is higher rainfall. This habitat is dominated by woody plants especially thorny shrubs (Image 6). Only a few large trees grow here, such as Lobloolly (*Pisonia fragrans*), Wild Misple (*Morisonia americana*), Locust Tree (*Hymenaea courbaril*), Tamarind (*Tamarindus indica*), White Cedar (*Tabebuia pallida*) and *Ficus urbaniana*. Most of the trees are shrub-like and the ground is often covered with a layer of cacti of the genus *Opuntia*.

*Thorny Woodlands*

Further degradation of the deciduous seasonal forests has lead to the development of Thorny Woodlands further down the slopes. These areas now dominate large areas of St. Maarten where old plantations destroyed the deciduous forest. Soils are generally dry, rocky and thin with an indistinct or patchy litter layer. Poor soil quality, continued development and fires, prevent these Thorny Woodlands from naturally developing into forests.

Thorny Woodlands have a lower canopy than the forests, and plants with thorns are abundant. The vegetation is dense and often difficult to walk through. Because of the lack of moisture, epiphytes, bryophytes, and ferns are mostly absent. Few insects and birds live in the Thorny Woodlands.

The lower hills and the uncultivated parts of the valleys are covered with Thorny Woodland. The Casha (*Acacia sp.*) dominates the habitat which is indispearsed with Black Cherry (*Randia aculeata*) and the thornless West Indian Cherry (*Malpighia emarginata*). In several places Mimosa (*Leucaena leucocephala*) is dominant. *Opuntia* cacti form the undergrowth in places. Stoffers (1956) considers the thorny vegetation between Belvédère and Oyster Pond to be derived from dry evergreen...
formations. In the past there may have been more lush vegetation in the valleys. Veenema (1955) mentions that a permanent creek used to run through the valley of Cul de Sac.

Croton thickets grow on the east side of Great Bay, at Point Blanche, Fort Amsterdam and Burgeux Bay. The Croton thicket is dominated by Yellow Balsam (Croton flavens) on St. Maarten. Species of the genus Lantana, several cacti of the genus Opuntia and Melocactus compete for resources. Above the shrub layer scattered trees emerge such as the Casha (Acacia spec.) and White Frangepane (Plumeria alba).

Woodland derived from dry evergreen forest
On the eastern hill range the strong trade winds have prevented the growth of any seasonal forest and a dry evergreen forest adapted to the conditions has developed. The dominant species have hard leathery leaves and grown into shrub like trees and high bushes. The dominant species is Black Willow (Capparis indica), other abundant species are: Yellow Sage (Lantana camara), the National flower of St. Maarten, Crab wood (Pithecellobium unguis-cati), Centepee plant (Comocladia dodonaea), West Indian Cherry (Malpighia emarginata) and Banso (Samyda dodecandra). Many cacti also grow in the Eastern hills, all cacti are on the CITES list of plants protected against international trade. One cacti of St. Maarten, the Woolly Nipple Cactus (Mammillaria nivosa) is attractive and would apppeal to collectors/buyers if propagated for legal export trade. The species is locally abundant in two areas.

Condition
Although Drought Deciduous and Mixed Evergreen Deciduous Thorn Woodland is threatened by various pressures, the secondary and degraded vegetation communities of the interior still occupy large areas and dominate the vegetation of St. Maarten. These plant communities, particularly those on the hills in the middle and eastern part of St. Maarten, could develop into natural habitats. However, in many areas urbanisation has crept up to higher elevations resulting in the continued degradation and erosion of the slopes. Frequently, former woodland has been degraded to bush and shrubland after repeated cutting and removal of trees for human use to clear land (Image 7).

Image 7: Development on the slopes of Billy Folly and associated woodland damage
(source: D.R. MacRae, 2007).

Value
This wide-spread secondary habitat is of significant value to the people of St. Maarten. While it may not be in its original condition, the roots of the current vegetation are essential to bind the slopes and prevent run off and erosion.
Many animals are supported by the trees and plants in the woodlands and forests. Birds and insects depend on the flowering and fruiting of trees and plants which provide valuable food. Large insects are common on stems and branches and which provide micro-habitats for these tiny animals.

In the Geneve Bay area this habitat has very high biological value (Image 8) and is home to many cacti. All cacti are on the CITES list of plants protected against international trade.

![Geneve Bay area (source: Jan Blok)](image)

The proposed Hill Tops, Emilio Wilson Estate and Geneve Bay Protected Areas would protect part of the Drought Deciduous and Mixed Evergreen Deciduous Thorn Woodland. The proposed Geneve Bay Protected area would protect important and diverse cacti species.

### 1.8.3. **Succulent Evergreen Shrubland**

**Introduction**

In the Lowlands some areas on the west and a small strip on the east are covered in succulent evergreen shrubland. Shrubs with small and shiny hard or fleshy leaves are common here. The species commonly found include: Pepper Cinnamon (*Canella alba*), Black Loblolly (*Pisonia subcordata*), Choaky Berry (*Eugenia axillaris*), *Crossopetalum rhacoma* and White Chank (*Bourreria succulenta*).

**Condition**

Stoffers (1956) points out that part of the lowlands was used for cultivation and the remainder for charcoal burning and goat breeding. The vegetation must have been seriously disturbed in the past, yet Howard (1911) still found parts with almost original vegetation. Stoffers documented other lowland areas on St. Maarten where this habitat existed however; it is clear now that these areas have since been built upon.

**Value**

This succulent evergreen habitat is important on St. Maarten as it provides fleshy leaves from which various fauna can obtain food. This habitat is also only found in two small locations on St. Maarten and thus is highly valuable for biological and conservation purposes. There is also potential to promote these last two remaining areas as a place of interest for tourists if they are managed and protected in the future.

An area of Succulent Evergreen Shrubland would be protected by the proposed Geneve Bay Protected Area.
1.8.4. **Coastal Vegetation**

**Introduction**

The ‘littoral zone’ refers to the coastal area of an ocean or sea, lagoon or salt pond where the transition from land to water offers a unique habitat for different vegetation types to exist. Along the coast several vegetation types are found which have evolved due to a combination of varying environmental conditions i.e. low energy environments, saline water, and sandy soils. These vegetation types include:

- Littoral Woodlands, found bordering beaches and bays on the east coast.
- Salina Vegetation, found bordering the beaches on different bays, lagoons and salt ponds.
- Hippomane Woodlands, found on inland bays.
- Mangroves, found at Oyster Pond and Simpson Bay (discussed in the Intertidal Section).

**Littoral Woodlands**

Littoral woodland is found along the beaches of the Low Lands in the West and at several bays along the east coast. Littoral woodland develops on flat sand above open beach areas. It is often a narrow strip in a cove between the open beach and the hilly areas behind, or in a larger bay on a sand ridge between the open beach and a salt pond or salt flat. The sand soils have little structure and hold very little of the limited rainfall in these areas, salt input from spray is be considerable in these environments, resulting in these habitats being home to only the most tolerant of plant species.

Species diversity is low and typically only one species will form the canopy. The communities consist mainly of Sea Grape (*Coccoloba uvifera*), Button Wood (*Conocarpus erecta*), Flambeau or Blactorch (*Erithalis fruticosa*) and the Portia Tree (*Thespesia populnea*) (Image Group 9).

![Image Group 9: Seagrape (Coccoloba uvifera) (right) and Thespesia populnea (Left) (source: New York Botanical Gardens www.nybc.org).](image)

**Hippomane Woodlands**

Amongst the littoral woodlands on St. Maarten there are also Hippomane woodlands which are dominated by Manchineel trees (*Hippomane mancinella*), a flowering plant species native to the Caribbean and Central America. The name ‘Manchinella’ is Spanish for ‘little apple’ comes from the resemblance of the trees and its fruit has to apple trees. However the trees and fruits are highly toxic and should not be consumed. Reaching up to 15 metres high with a greyish bark, the tree has shiny green leaves and spikes of small greenish flowers.

In the St. Maarten Hippomane woodlands, Manchineel dominates, however other species are also found within the community, such as Buttonwood (different species), Yellow Balsam (*Croton flavens*), Wild Banana and Sea Purslane (*Halimione portulacoides*). This habitat can be found in small areas in several places along the coast and inland bays e.g. at Little Bay and Guana Bay but also further inland on the plantation Belvédère (Image Group 10). Many Manchineel trees died after Hurricane Luis, not only along the coast but also inland.
**Image Group 10:** Dead Manchineel trees at Belvédère (left) and hurricane damage to manchineel shrubbery at Guana Bay (right) (source: Rojer, 1997).

**Saliña Vegetation**

Salina vegetation is home to plant species that are tolerant of saline waters and sandy soils and evolve on the banks of beaches and inland salt ponds and lagoons where a low-energy wave environment prevails. Because of St. Maarten’s variety of bays, lagoons, and salt ponds, salt-tolerant vegetation is found in number of areas around the coast. This is in contrast to Saba and St. Eustatius, where this saliña vegetation is limited by the topography and relief of the land.

The brackish or sometimes hypersaline nature of these ponds results from their proximity to the sea, lack of rainfall, and high rates of evaporation. However, the salinity can fluctuate considerably; after heavy rains in the wet season for instance, the water will be more brackish than saline because of the diluting effect of the rainwater. These variable salinity conditions mean that only well adapted plants and animals can live in and around the ponds. A study of the salt ponds of St. Maarten can be seen in Appendix 2, along with a species list for Simpson Bay Lagoon.

Salina vegetation also grows on sand dunes which 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 (Anon., 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.
St. Maarten’s beaches are active and mobile and their features depend on the maritime conditions at any point in time. Beaches exist on the west and south and east shores:

- West: Cupecoy Bay, Mullet Beach, Maho Bay, Burgeaux Bay.
- South: Simpson Bay, Lay Bay, Cole Bay, Cay Bay, Little Bay; Great Bay.

The beach communities mainly consists of creeping species like the Beach Morning Glory (*Ipomoea pes-caprae*, Image Group 11) and the Sea Pea (*Canavalia maritima*), or low shrublike species such as White Lavender (*Tounefortia gnaphalodes*) and *Suriana maritima*. Other species include Sea Purslane (*Sesuvium portulacastrum*, Image Group 11) Saltwort or Beachwort (*Batis maritima*) and *Salicornia ambigu*a.

**Condition**

All coastal vegetation communities only occupy small areas on St. Maarten. Over the past 35 years the coastal habitats have suffered catastrophic damage form tourism development and population growth. Littoral vegetation is very important for stabilizing sand on the coast. Removal of sand for commercial purposes usually changes the capacity of this vegetation type to hold the sand, resulting in quickly disappearing sand dunes and beaches.
The sand dunes and beaches around much of St. Maarten have been developed for tourism resulting in destruction of flora and threats to wildlife such as nesting turtles (see Image Group 12). The recent construction of the Westin Beach Resort at Dawn Beach has had a significant impact on the dunes and the beaches. The dunes have been built on and vehicles continue to drive on the beaches, endangering the animals and plants that live there. Development and human activity on beaches disrupts nesting turtles that require low light conditions and no disturbance to lay their eggs.

In many places along the coast the Hippomane woodlands are cut down, since the trees are considered dangerous to tourism because of their toxicity. This activity has further degraded the littoral coastal vegetation community, as the tree roots hold soils and sand together. Without them, important soil washes away, leaving the area vulnerable to erosion and unable to provide habitat for other species.
Likewise, the salt ponds and their associated vegetation are threatened by filling for land reclamation and erosion which both reduce seawater quality and clarity. Changes in the sediments and nutrients in the salt ponds has lead to a reduction in abundance of plants and animals in these habitats.

Hurricane Luis destroyed much of the already stressed Littoral habitats including Hippomane Woodlands and mangroves. If mangroves are in good condition, not only do they withstand hurricanes and storm surges but they protect the land from flooding and storm damage. The coastal vegetation can be considered rare and endangered for St. Maarten due to overdevelopment and population pressures (Image 9).

Value

The Littoral Woodlands and Hippomane Woodlands are extremely important to St. Maarten as they provide excellent natural windbreaks and the roots of the tree stabilise the sand, thus helping to prevent beach erosion. This is important to protect all economic development such as tourist resorts, agriculture and residential and business properties.

The vegetation found in littoral coastal habitats that border the water are able to tolerate extreme conditions. As such, they offer an extremely important habitat for small animals for instance invertebrates like molluscs and crabs, which make the coastal habitats important foraging areas for birds, including plovers and sandpipers. The endangered Snowy Plover (*Charadrius alexandrinus*), uses the saltponds as a nesting area. Other regionally important species such as Oystercatcher (*Haematopus palliates*), Wilson’s Plover (*Charadrius wilsonia*), and Stilt Sandpiper (*Calidris himantopus*) have been observed in the wetlands (Brown & Collier, 2005) (Appendix 2).

Traditionally, the woodlands were used for construction and also many plants and leaves of trees in the woodlands are used for medicinal purposes. Blacktorch (*Erithalis fruticosa*) can be parched and pulverized before being applied to sores.

A small area of Hippomane and Littoral Woodland would be protected by the proposed Geneve Bay Protected Area.
The beach and dunes at Guana Bay are a favoured turtle nesting site, here the nest has been protected from trampling (source: NAFSXM).

The value of St. Maarten’s dunes and beaches which depend on the existence of coastal vegetation lies not only in the money which can be made from selling the sand for construction and to create artificial beaches 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 (TourMap, 2005). Additionally, beaches support fragile but important flora which binds the sand, prevents erosion and speeds further sand accumulation. Beaches are important nesting sites for 3 species of turtles; Green turtles (Chelonia mydas) Hawksbill turtles (Eretmochelys imbricata) and Leatherback (Dermochelys coriacea) (Powell, Henderson & Parmerlee, 2005). The main turtle nesting sites are; Gibbs Bay, Guana Bay, Simpson Bay (Image 10).

**Image 10:** The beach and dunes at Guana Bay are a favoured turtle nesting site, here the nest has been protected from trampling (source: NAFSXM).
1.8.5. Mangroves

Introduction
Mangroves are different species of plants and shrubs that are highly tolerant of saline water muddy waters. Mangroves are found only in depositional coastal environments where fine sediments, often with high organic content, collect in areas protected from high energy wave action. These areas are flooded daily by rising tides allowing the formation of large plant assemblages along inland water ways and sheltered coasts, collectively known as mangrove swamps or forests.

Around St. Maarten, four species of mangroves can be found; *Rhizophora mangle* (Red Mangrove), *Avicennia germinans* (Black Mangrove), *Laguncularia racemosa* (White Mangrove) and *Conocarpus erectus* (Buttonwood). Simpson Bay had the most significant stand of mangroves on St. Maarten, although coastal developments in the past have removed much of the forest.

Mangrove forests grow in different zones from the native terrestrial plants on land, over the shore line to the Red Mangroves with their specialised prop roots. Table 2 summarises the characteristics of the different vegetation zones.

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Mangrove woodlands can be found at Mullet Bay, Oyster Pond and Simpson Bay. Around Oyster Pond lagoon all four mangrove species can found however the populations of Red Mangroves (*Rhizophora mangle*) and Black Mangroves (*Avicennia germinans*) are sparse.

*Image 11:* A Red Mangrove (*Rhizophora mangle*) at Oyster Pond with its characteristic stilt roots. *(source: NAFSXM)*
All four mangrove species are found along the south side of Simpson Bay. Red Mangrove dominates near the airport and followed by a strip of Black and White Mangroves, while Button Wood grows further inland. This Mangrove stand becomes denser near Mullet Bay, where White Mangrove dominates. The cove at Cupecoy and Little Bay Pond also have stands of mangrove woodland.

**Condition**

Mangrove forests world-wide are under severe pressure and disappearing in an alarming rate. It is estimated that about 60% of the total mangrove areas in the world have disappeared. This is mainly contributed to large scale land clearance for coastal development. All of the mangroves on St. Maarten are currently threatened by pollution and development (Image Group 13), even though they only cover a very small area of the coastline. Around Little Bay Pond, Red Pond and Fresh Pond small mangrove stands remain, but without any significant Red Mangrove growth. Hurricane Luis in September 1995 caused severe damage to the mangrove forests, especially to the Red Mangroves. This highlighted the importance of mangroves in their coastal protection role. Some seedlings did survive the hurricane which alongside a Nature Foundation St Maarten initiated planting programme in 2000 should help to re-establish mangroves in critical areas.

Stoffers (1956) noted that the mangrove woodlands were severely impacted by people. In 1997 Rojer stated that both Simpson Bay and Oyster Pond are polluted by solid waste. Along Flamingo Pond, Red Pond and Fresh Pond small mangrove groups remain, but without Red Mangrove. Hurricane Luis in September 1995 caused severe damage to the mangrove vegetation, especially to the Red Mangroves, almost all the trees died. White Mangrove and Button Wood recover faster than Red and Black Mangrove.

**Value**

Mangroves are one of the most valuable natural resources on the planet. Mangrove wetlands provide habitat and also prime nesting and migratory sites for hundreds of bird species. Mangroves support
extensive coastal food webs, provide shoreline stability and erosion prevention, and storm protection.

The mangroves that still exist on St. Maarten are an important sanctuary, breeding and foraging ground for many wetland birds, marine invertebrates and fish. In the past, the bays have also been home for two globally endangered species: Green Turtles (*Chelonia mydas*) and Queen Conch (*Strombus gigas*).

Mangroves act as a filter for water being washed off the land by preventing harmful sediments from smothering the coral reef. By establishing themselves successfully, the mangrove trees become a thriving habitat for many other plants and animals as well as an important nursery for many species of fish. Fish using the mangroves as a nursery include Schoolmasters (*Lutjanus apodus*), Gray Snapper (*Lutjanus griseus*), Great Barracuda (*Sphyraena barracuda*) and the Foureye butterfly (*Chaetodon capistratus*).

The mangrove forests on St. Maarten provide a habitat for a number of different plants and animals dispersed from the muddy sediments through the trees into the canopy (see Figure 15). These include many invertebrates, reptiles, fish and birds.

**Figure 15:** The vertical distribution of large animals in mangrove forests

Significant invertebrates in the mangroves of St. Maarten are similar to those found in seagrasses e.g. Queen Conch (*Strombus gigas*), Milk Conch (*Strombus costatus*), Cushion Stars (*Oreaster reticulata*), Sea Cucumber (*Holothuria mexicana*), Sea Urchins (*Tripneustes venricosus, Lytechinus variegates, Meoma ventricosa*), the Upside Down Jellyfish (*Cassiopeia frondosa*) and the Atlantic Triton (*Charonia variagata*).

Many different fish species use the mangroves of St. Maarten as a habitat. The species most likely to be seen include; Striped Parrotfish (*Scarus croicensis*), Bluehead (*Thalassoma bifasciatum*), Silversides, Herrings, Barracuda and Anchovies (families *Atherinidae, Clupeidae, Engraulidae*). Other interesting species that use the mangroves include Spotted Eagle Rays (*Aetobatus narinari*), various species of Moray Eels and young sharks.

Several species of birds breed in and around the mangroves of St. Maarten, these species include: American Coot (*Fulica americana*), Moorhen (*Gallinula chloropus*), Yellow-crowned Night Heron (*Nyctanassa violacea*), Green Heron (*Butorides striatus*), Black-winged Stilt (*Himantopus himantopus*) and several plovers. Simpson Bay Lagoon is an important nesting ground for many more species and a roosting ground for migratory species on their route south (Brown & Collier, 2005).

The well being of the bays and mangroves is essential for a range of human uses. Bays attract beach users, snorkellers and kayakers that financially support local tourist orientated businesses.
1.8.6. **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 (Image Group 14).

Various forms of algae dominate rocky shore, since other organisms find it difficult to cope with extreme heat, desiccation and ultraviolet ray stress. Species of snails are very abundant in the rock pools of St. Maarten, and they 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).

**Image Group 14:** Rocky shores of St. Maarten (source: NAFSXM)

Rocky shores with significant intertidal communities can be found at a number of locations around St. Maarten, including Dawn Beach, Guana Bay; Great Bay; Cay Bay; Pelican Point – Lay Bay; Simpson Bay Lagoon; Beacon Hill; Cupecoy Bay; Burgeaux Bay; Little Bay; Pointe Blanche Bay; The Devil's Cupper; Back Bay; Geneve Bay; and Guana Bay Point. Marine life found here include: mussels, chitons (*Acanthopleura granulate*), sea urchins, grazing snails, sea stars, hermit crabs, sea anemones and mosses.
Image Group 15: Residential and tourist developments clinging to rocky shores Pont Blanch (left) and Cupecoy (right) (source: NAFSXM)
**Condition**

Around St. Maarten the rocky shores are mostly intact, although development pressure is threatening the removal of some to make way for tourist developments (Image Group 15). Some interesting formations exist, the significance of which is unknown.

The limestone around St. Maarten is continually being eroded by chemical, biological and physical erosion. These processes take many years to operate, and result in the formation of craggy cliffs and plateaus as well as complex drainage channels (Anon, 2003).

**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. The shore line (including sandy areas) also provides a habitat for birds such as the endangered Least Tern (*Sterna antillarum*) and Royal Terns (*Sterna maxima*) as well as the Sooty Tern (*Sterna fuscata*) (Brown & Collier, 2005). Other species found on rocky shores are listed in Appendix 2.

### 1.8.7. **Caves and Karsts**

Karstic (Limestone) caves located in the marine and terrestrial fossilised coral reefs around the island are distinctive ecosystems. The caves and tunnels underground contain many species of invertebrates, and are likely to be home to bats and fish species that only live in caves (Wagenaar Hummelinck, 1979). Relatively little is known about these environments on St. Maarten and they are a challenge to explore.
1.8.8. **FLORA**

**Introduction**

From the various studies conducted by Stoffers, Howard and Rojer over the years, it can be established that at least 522 wild plants are known to exist on St. Maarten - 506 seed plants and 16 ferns. However it is difficult to ascertain the exact number of species that exist today, as some are thought to have been extirpated by building development. There is no specific data available on the range of different species on St. Maarten, however Rojer (1997) states that some species only exist on the Dutch side and other only on the French side of the island. For instance it is well-known that one of the orchid species can only be found in the French side. (Vliegen, pers.comm.1996 cited in Rojer 1997).

Plants grow on most of St. Maarten although most species are limited to specific habitats e.g. epiphytic *Bromeliads* and *Araceae* are only found on moist hilltops and cacti are restricted to low-lying dry areas (Image Group 16). Halophilic plants, which thrive in areas where there are high concentrations of salt and water, can only be found in the saliñas and along the coast (Image Group 17).

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**Image Group 16:** Bromeliads and Araceae on hilltops (left) and the Cacti *Melocactus intortus* in the coastal area south of Guana Bay *(source: Rojer, 1997)*

Only one publication about mosses of St. Maarten is known ((Florschütz, 1967)). St. Maarten is home to relatively few mosses. Only two species have been accounted for *Stereophyllum cultelliforme* and *Hyophila tortula*. Both species are true mosses; no liverworts (leafless, stemless plants) are known to live on the island.

**Condition**

The diversity of terrestrial plants was undoubtedly higher on St. Maarten in the 20th Century before sugar plantations and later urban development stripped the land of native plant communities. Rojer (1997) states that it is quite possible that several species are now extirpated, since much of the natural habitat has disappeared or has been severely disturbed by development. This applies particularly to the vegetation found in the valleys and along the coast. Some communities mentioned by Stoffers in his 1956 publication could not be found in 1997, highlighting the reduction in species diversity that has occurred over the years.
Image Group 17: *Batis maritime*, commonly known as Saltwort or Beachwort found on the fringes of beaches and Salinas (source: [http://crd.dnr.state.ga.us](http://crd.dnr.state.ga.us)).

In some areas vegetation has grown back where plantations and cattle grazing destroyed the native vegetation in the early 20th century. In other areas, foreign species that have been imported are establishing themselves and out-competing native species. In 1909 the Pomeserrat (*Zizyphus mauritiana*) was observed only in the area around Philipsburg, where it was cultivated to a limited degree, while presently this tree dominates the vegetation in large parts of the Belvédère estate (Howard, 1991).

**Value**

There are two endemic plant species on St. Maarten: *Calypranthes boldinghii* (*Myrtaceae*) also known as Lidflower and *Galactia nummelaria* (*Fabaceae*). Both species have only been collected once, by Boldingh early in the 20th century, the first in the Low Lands and the second at Guana Bay (Stoffers, 1982/1979). Howard (1991) was unable to find these species during his one-week visit to the island. Considering this information, and the amount of human activity in the areas where the species could be found, it is likely that these species are extirpated. Attempts to rediscover surviving specimens are of high priority.
Howard (1991) mentions that four species are supposedly listed as rare or endangered in the "Redbook for St. Martin" but unfortunately does not name them. They could be the two island endemics (Lidflower (*Calyptranthes boldinghii* (*Myrtacaea*)) and *Galactia nummelaria* (*Fabaceae*)) the Narrow Leaved Calabash (*Crescentia linearifolia*) and Birds Cherry (*Myrcia citrifolia var. imrayana*). (Image Group 18). Other plants with limited distribution are listed in Table 3.

**Table 3:** Plants found on St. Maarten with limited distribution (source: Stoffers, 1960).

<table>
<thead>
<tr>
<th>Species</th>
<th>Common name</th>
<th>Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Agave scheurmaniana</em></td>
<td>Century Plant</td>
<td>St.Maarten and Anguilla</td>
</tr>
<tr>
<td><em>Alternanthera crucis</em></td>
<td>West Indian Joy</td>
<td>St.Maarten, St.Croix and Martinique</td>
</tr>
<tr>
<td><em>Cynanchum albiflorum</em></td>
<td>Type of vine</td>
<td>Curaçao and Jamaica and St. Maarten</td>
</tr>
<tr>
<td><em>Myrcia citrifolia var. imrayana</em></td>
<td>Redwood or Birds cherry</td>
<td>Netherlands Antilles Windward islands, Guadeloupe and Martinique (Image Group 18)</td>
</tr>
<tr>
<td><em>Aristida suringari</em></td>
<td>Type of grass</td>
<td>St. Maarten, St. Eustatius, Aruba, Bonaire, St. Croix and St. Thomas</td>
</tr>
</tbody>
</table>

Orchids are very attractive to collectors and traders. In St. Maarten orchids can be found in a number of places (ECNAMP, 1980). All the cacti of St. Maarten are listed in CITES Appendix II so it is illegal to trade them without a permit as they are deemed an endangered species. The Woolly Nipple Cactus (*Mammilaria nivosa*) (Image Group 18) is particularly attractive to collectors and only found in a small area. A species list of plants found on St. Maarten is presented in Appendix 2.
1.8.9. **FAUNA**

1.8.9.1. **INTRODUCTION**

The island of St. Maarten is an oceanic island and has never been connected by land to the ‘mainland’ of North or South America. This has resulted in relatively few animal species living on the island (Lazell, 1972). The only native mammals on St. Maarten are bats, birds are numerous and amphibian and reptile species have managed to reach the island in small numbers.

**Birds**

St. Maarten is classified as an important breeding area for seabirds. Several small rocky islands just off the shore provide an ideal habitat for breeding colonies of seabirds. 170 species of bird can be found on St. Maarten, of which 47 are resident and nesting birds, and 123 are migrants and non-nesting visitors (Brown & Collier, 2006). There are no endemic bird species on St. Maarten since birds can move easily between the islands, and there is a lack of habitat on St. Maarten, particularly undisturbed forest (Brown & Collier, 2004). The following descriptions include common birds and birds of conservation interest.

**Nesting terrestrial birds**

The Green-throated Carib (*Eulampis holosericeus*), the Antillean Crested Hummingbird (*Orthorhyncus cristatus*) (Image Group 19) Lesser Antillean Bullfinch (*Loxigilla noctis ridgewayi*) and Bananaquit (*Coereba flaveola*) thrive in secondary habitats, and occasionally live close to residential areas. It is not uncommon see these birds in backyards. Yellow Warblers (*Dendroica petechia*) are a common species found in dry bushland and mangrove woodlands (Brown & Collier, 2003).

There are a number of dove or pigeon species on St. Maarten including the Zenaida Dove (Zenaida aurita aurita)(Image Group X), Common Ground Dove (Columbina passerina) and the Eurasian Collared Dove (Streptopelia decaocto).

Several water birds breed on the ponds and lagoons including breeding White cheeked Pintail (Anas bahamensis), Common Moorhen (Gallinula chloropus),American Coot (Fulica americana), and the regionally endemic Caribbean Coot, all of which have been documented nesting in Fresh Pond, Little Bay Pond, and the Great Salt Pond (Brown & Collier, 2007) Yellow-crowned Night Heron (Nyctanassa violacea), Green Heron (Butorides striatus), Black-necked Stilt (Himantopus himantopus), Wilson’s Plovers, Killdeer, and American Oystercatchers (Haematopus palliatus) breed at numerous bays and wetlands. The small American Kestrel (Falco sparverius caribaearum) (Image Group 20), locally named Killy-killy, was hunted in the past, but today frequently visits populated areas. This species breeds island-wide using nesting cavities in trees, rock cliffs, and deserted human structures (Brown and Collier 2003).

Migratory Birds
St. Maarten is an important resting place for migratory birds, where they are able to forage on their way south before travelling on. The coastal habitats provide good food and resting places for their journey. Among these migratory birds are several songbirds and many shorebirds from North America and Canada. Lagoons and bays around the island provide essential stopover habitat for migratory birds while they travel past the island. Many migratory birds visit St. Maarten due to the great variety in coastal habitats (Brown and Collier 2005).

The migratory birds and winter guests include a number of birds of prey such as the Peregrine Falcons (*Falco peregrinus*), Northern Harriers (*Circus cyaneus*), Merlins (*Falco columbarius*) (Image Group 20) and Ospreys (*Pandion haliaetus*), all listed on CITES. The large groups of small waders passing through St. Maarten are a food source for the Merlin and the Peregrine Falcon. The survival of migrating birds of prey depends on them being able to find sufficiently large undisturbed hunting grounds and sufficient non-poisoned food.

**Seabirds**

The diverse coastal habitats including the small uninhabited islands of Pelican Key (Image Group 21), Molly Beday and Hen and Chicks off the coast of Geneve Bay are crucial habitats for nesting sea birds. Several seabird species breed on St. Maarten including; Audubon's Shearwater, Brown Pelican, Roseate Tern, Sooty Tern, Bridled Tern, Least Tern, Red-billed Tropicbird, The Magnificent Frigate Bird and Laughing Gull.

The Audubon's Shearwater (*Puffinus lherminieri lherminieri*) is likely to breed on Pelican Key and other isolated islands around St. Maarten. This species is hunted for food. It is one of the few species that breeds almost exclusively in the Caribbean region (R.v. & R.L., 1984). In 1984 75 breeding pairs of the Brown Pelican subspecies *Pelecanus occidentalis occidentalis* were seen on St. Maarten (Rojer, 1997). The low shrubs in which many of these species nest are capable of surviving hurricanes.
There are a number of different tern species that visit St. Maarten, Least Terns (*Sterna albilons antillarum*) have been known to nest on sand flats and coral shingles on St. Maarten. The endangered Royal Tern (*Sterna maxima*) may breed on St. Maarten, as courtship behaviour has been observed. Two other endangered Tern species, the Sandwich Tern (*Sterna sandwicensis*) and the Common Tern (*Sterna hirundo*) visit St. Maarten.

The endangered Red-billed Tropicbird usually breeds in inaccessible places such as holes in sheer cliffs. This offers some protection against humans although coastal development is a constant threat. A few pairs nest on Pelican Key and at Maho Bay. According to the ECNAMP report (1980) they also nest on Molly Beday and in the cliffs of Point Blanche. The Yellow-billed Tropicbird (*Phaeton lepturus catesbyi*) nests in the sea cave west of Maho Bay. There were reports of 15 pairs breeding on St. Maarten in the 1980s.

Frigate birds are always visible over the sea and bays of St. Maarten, although it is uncertain if they breed on Pelican Key and Molly Beday (ECNAMP, 1980). Laughing Gulls (*Larus atricilla*) are a summer guest, nesting on Pelican Key and other islands. In August 1996 about 90 Laughing Gulls were observed on Pelican Key, many were juveniles (Rojer, 1997).

**Reptiles and Amphibians**

There are thought to be 17 different species of non-marine reptiles and amphibians living on St. Maarten (Powell et al., 2005). Two species of tree lizard (*Anolis*) are found on St. Maarten. The Anguilla Bank Bush Anole (*Anolis wattsi pogus*) and the Anguilla Bank Tree Lizard (*A. gingivinus*). The Bush anole has been seen at Sentry Hill and Billy Folly, where humid forests on the hills and in ravines provide the perfect habitat. The Anguilla Bank Tree Lizard (*Anolis gingivinus*) (Image Group 22) lives in dryer habitats. This lizard is prolific and can be seen on the top of Marigot Hill and on the lower slopes on the west side of Sentry Hill inhabiting bushes, shrubs, trees, rocks, and stone walls.
The Anguilla Bank Ground Lizard (Ameiva pleei) is a rather large lizard (Image Group 22) and relatively abundant on St. Maarten. This lizard can be found in dry shrubs and dry woody vegetation, along the beaches in Beach Morning Glory, in grassland and around Opuntia cacti patches. Four species of Gecko live on St. Maarten; the Little Dwarf Gecko (Sphaerodactylus macrolepis parvus), Island Dwarf Gecko (Sphaerodactylus sputator), the Woodslave,(Hemidactylus mabouya) and the Turnip-tailed Gecko (Thecadactylus rapicauda) which is now very rare on St. Maarten.

The Grass Snake or Anguilla Bank Racer (Alsophis rijersmai) is the only snake commonly encountered on St. Maarten. It was thought to have been eradicated by the Mongoose (Powell R., R.J. & R.W., 1992). However, in 1992 there was a report of 5 specimens that were captured at Mary’s Fancy, and in the same year one was observed elsewhere in the field (Powell R. et al., 1992). A snake was also seen after the hurricane in January 1996 during a field trip at Flagstaff (EcoVision/AID Environment, 1996). The Red-bellied Racer (Alsophis rufiventris) and Worm Snake (Ramphotyphlops braminus) may exist on St. Maarten as rare, introduced populations (Powell et al., 2005).

Red-Footed tortoises (Geochelone carbonaria) once inhabited St. Maarten; wild populations are now thought to be extirpated. Red-Eared Sliders (Trachemys scripta) have been introduced by humans and have established a population in the ponds on St. Maarten.
Sea turtles are marine animals and although this section is limited to terrestrial flora and fauna, they require discussion because sea turtles need land to reproduce (sandy beaches bordering the sea). As St. Maarten has many sandy beaches, sea turtles should make frequent use of them for nesting (Rojer, 1997). Four species of sea turtle have been observed in the water around St. Maarten; the Green Turtle (*Chelonia midas*), Hawksbill (*Erytemochelys imbricata*), Loggerhead (*Caretta caretta*) and occasional Leatherback (*Dermochelys coriacea*). 

Two amphibians live on St. Maarten, the Cuban Tree Frog (*Osteopilus septentrionalis*) and Johnstones Whistling (*Eleutherodactylus johnstonei*). Frogs are common and relatively abundant on St. Maarten, having been introduced from neighbouring islands (Powell *et al*., 2005).

**Mammals**

Bats are the only native mammal on St. Maarten, eating insects, small fish and fruit. Bats live in caves around the island, near the coast and inland. Their populations depend on the existence of their food – fruit, fish and insects particularly in areas where there is little human disturbance. Raccoons (*Procyon spec.*), Mongoose (*Herpestes auropunctatus auropunctatus*), dogs and cats, and the Black Rat (*Rattus rattus*) have been introduced. The introduced species threaten the survival of local birds, amphibians and reptiles (Husson, 1960, Henderson, 1992. #34, Evans, 1990. #29).

The Little Black Bat (*Myotis nigricans nesopolus*) and the Bulldog Bat (*Noctilio leporinus*) were observed on St. Maarten through the 1900’s but are thought to be extirpated. Husson, in a review of the mammals of the Netherlands Antilles added three species of bats to fauna lists (*Brachyphylla cavernarum*, *Molossus molossus*, and *Tadarida brasiliensis*) as well as presenting additional information on *A. jamaicensis* (Husson, 1960). Koopman added the greater fishing bat *Noctilio leporinus* to the fauna of the island and commented on the other four species known from island (Koopman, 1968). Over a period of three years (2002-2004), NAFSXM undertook a survey resulting in the documentation of eight species of bat (Table 4) from the island of which three were reported on St. Maarten for the first time (*Monophyllus plethodon*, *Ardops nichollsi*, and *Natalus stramineus*).

**Table 4:** The 8 bat species documented on St. Maarten

<table>
<thead>
<tr>
<th>Common name</th>
<th>Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tree Bat</td>
<td><em>Ardops nichollsi,</em></td>
</tr>
<tr>
<td>Mexican Funnel-eared bat</td>
<td><em>Natalus stramineus</em></td>
</tr>
<tr>
<td>Insular single leaf bat</td>
<td><em>Monophyllus plethodon</em></td>
</tr>
<tr>
<td>St. Vincent Fruit-eating Bat</td>
<td><em>Brachyphylla cavernarum</em></td>
</tr>
<tr>
<td>Free-tailed Bat</td>
<td><em>Tadarida brasiliensis antilluarum</em></td>
</tr>
<tr>
<td>Mastiff Bat</td>
<td><em>Molossus molossus debilis</em></td>
</tr>
<tr>
<td>Jamaica Fruit-eating Bat</td>
<td><em>Artibeus jamaicensis</em></td>
</tr>
<tr>
<td>Greater fishing Bat</td>
<td><em>Noctilio leporinus</em></td>
</tr>
</tbody>
</table>

**Other animals**

170 invertebrates are known to live on St. Maarten. Including one species of scorpion, 4 species of mites, 116 species of insects and 47 species of land and freshwater snails (Rojer 1997). In August 1996, 6 species of butterfly were collected. According to a preliminary identification by Dr. A. Debrot of CARMABI Curacao these included a species that has not been reported before.

**Condition**

The fauna of St. Maarten is less biodiverse than some of the neighbouring islands because of recent pressures including habitat destruction, hunting and imported predators such as the Mongoose (*Herpestes auropunctatus auropunctatatus*), dogs, cats, and the Black Rat (*Rattus rattus*). One bird species, the Redtailed Hawk (*Buteo jamaicensis*), and two species of lizard, the Antillean Iguana (*Iguana delicatissima*) and the original population of the Green Iguana (*Iguana iguana*), no longer exist on the island (Image Group 23). Other animals such as goats and cattle threaten the survival of all kinds of plants they graze on, and the animals that depend on the plants for a habitat and food source.
Tourism development has removed critical areas of habitat for St. Maarten’s fauna. This has reduced the biodiversity of the island significantly. The stressed habitats are more vulnerable to natural disasters and are unable to recover as effectively as they would do if they were in good condition.

Birds
Many of St. Maarten's bird populations have been stressed by factors other than development. Doves, the Red-tailed hawk (*Buteo jamaicensis*) and several sea-birds were all considered good food sources by early settlers. The already stressed bird populations declined further when Hurricane Luis struck the island in 1995. Staff-members of AIDEEnvironment and Ecovision (1996) observed very few birds other than doves during field observations in January 1996 in the Colombier hills from Flagstaf to Cul de Sac.

Nesting birds
The Green-throated Carib and the Antillean Crested Hummingbird populations were decimated by Hurricane Luis through the force of the wind and the following food shortage. Trees were stripped bare of all foliage and flowers leaving very little food for the surviving individuals. In the past, because of hunting, dove species have been on the brink of extirpation on St. Maarten. The preservation of the woodland vegetation on the hills of St. Maarten, and in particular the vegetation of the hilltops with its many epiphytes, will benefit the existing populations.

Waterfowl numbers on St. Maarten have reduced due to coastal development and removal of key habitat. Not only in St. Maarten but also internationally, many habitats for waterfowl are disappearing completely or are severely disturbed. The conservation of wetlands and the importance of them as breeding areas and food sources for thousands of species of birds, many critically endangered is a growing international issue.

The Red-tailed Hawk, (*Buteo jamaicensis*) is extirpated; it was regarded as a chicken thief, and hunted extensively. It may continue to occasionally visit St. Maarten from the other islands as a
winter guest (Evans, 1990). If left alone and provided with undisturbed habitat such a visiting bird might possibly start breeding. In the Virgin Islands and in Saba the red-tailed Hawk is still breeding. The American Kestrel (*Falco sparverius caribaeorum*) was hunted in the past, and they are now seldom seen on St. Maarten.

**Migratory birds**
Several coastal habitats have already been destroyed to make way for tourism developments, reducing the habitat available for migratory birds. It is thought that the number of birds visiting St. Maarten such as Plovers (*Charadriinae sp.*) have reduced significantly due to habitat loss.

![Image Group 24: The Magnificent Frigate Bird - left, female in flight, Right, male with display pouch. (source: www.junglewalk.com)](image)

**Seabirds**
The breeding colonies of seabirds still in existence are generally much smaller than in the past, Van Halewyn and Norton (1984) concluded that a number of seabirds were endangered with extirpation. Breeding Brown Pelicans are extremely sensitive to disturbance by humans. The breeding colonies of Roseate Terns in the more northern colonies are declining. The Sooty Tern is the most abundant among the breeding species, although several breeding colonies in the Caribbean area have declined. The endangered Least Tern is threatened by mongoose and rats. The Magnificent Frigate Bird (Image Group 24) only breeds in 25 places in the Caribbean region. Declining and degrading mangrove woodlands in its range have had a negative effect on the size of the breeding population on St. Maarten. Coastal development and loss of nesting habitat has reduced the Caribbean breeding populations of the Yellow-billed Tropicbird (*Phaeton lepturus catesbyi*) by 50% (Walsh-McGehee, pers. comm., in Rojer 1997).

**Reptiles and amphibians**
Reptile populations on St. Maarten have been reduced by habitat destruction, hunting and the introduction of predators. The status of the reptiles and amphibians on St. Maarten is summarised in Table 5. Once abundant on St. Maarten, native Iguanas were thought to be extirpated through hunting pressure, mongoose predation and habitat loss (Henderson, 1992). In 1998 a small population of Antillean Iguanas was found inhabiting the Flamingo Pond area in St. Maarten, when it was being filled in for extension of the airport. The animals were rescued by Nature Foundation St. Maarten and released on Pic Paradis (Rojer 1997). The Green Iguana original population is probably completely extirpated. In 1992 extensive searches by Carmabi Curaçao could not confirm the animal’s existence in the wild. It is likely that that any Green Iguana’s on St. Maarten living in the wild are escaped pets from other original populations.

Tree lizards, ground lizards and geckos thrive on natural hillside vegetation which has been degraded and cleared in many areas on the lower slopes of St. Maarten for human development. The Anguilla Bank Ground Lizard is more sensitive to introduced predators than other lizard species (Henderson, 1992). The Slipperyback (*Mabuya sp.*) lizard is thought to be extirpated.

The Anguilla Bank Racer (*A. rijersmai*) is critically endangered on St. Maarten because of mongoose, cat and dog predation as well as human activity. This snake is not poisonous to humans and lives on insects, small amphibians, reptiles and small mammals.
Table 5: List of Reptiles and Amphibians present on St. Maarten and associated CITES Listing
(source: adapted from Powell et al., 2005)

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Cites</th>
<th>Status on St. Maarten</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lesser Antillean Iguana</td>
<td>Iguana delicatissima</td>
<td>II</td>
<td>Extirpated</td>
</tr>
<tr>
<td>Green Iguana</td>
<td>Iguana iguana</td>
<td>II</td>
<td>Rare, Introduced, possibly extirpated</td>
</tr>
<tr>
<td>Anguilla Bank Ground Lizard</td>
<td>Ameiva plei</td>
<td></td>
<td>Abundant</td>
</tr>
<tr>
<td>Green Tree Lizard</td>
<td>Anolis bimaculatus</td>
<td></td>
<td>Introduced, extirpated</td>
</tr>
<tr>
<td>Anguilla Bank Tree Lizard</td>
<td>Anolis gingivinus</td>
<td></td>
<td>Abundant</td>
</tr>
<tr>
<td>Anguilla Bank Bush Anole</td>
<td>Anolis wattsii pogus</td>
<td></td>
<td>Abundant</td>
</tr>
<tr>
<td>Woodslave</td>
<td>Hemidactylus mabouia</td>
<td></td>
<td>Abundant</td>
</tr>
<tr>
<td>Turnip-tailed Gecko</td>
<td>Thecadactylus rapicauda</td>
<td></td>
<td>Rare</td>
</tr>
<tr>
<td>Little Dwarf Gecko</td>
<td>Sphaerodactylus parvus</td>
<td></td>
<td>Abundant</td>
</tr>
<tr>
<td>Island Dwarf Gecko</td>
<td>Sphaerodactylus sputator</td>
<td></td>
<td>Abundant</td>
</tr>
<tr>
<td>Slipperyback</td>
<td>Mabouya sp.</td>
<td>Rare, possibly extirpated.</td>
<td></td>
</tr>
<tr>
<td>Anguilla Bank Racer</td>
<td>Alsophis rijgersmaei</td>
<td></td>
<td>Critically endangered</td>
</tr>
<tr>
<td>Red-bellied Racer</td>
<td>Alsophis rufiventris</td>
<td></td>
<td>Stray population</td>
</tr>
<tr>
<td>Worm Snake</td>
<td>Ramphotyphlops braminus</td>
<td></td>
<td>Rare, introduced</td>
</tr>
<tr>
<td>Red-footed tortoise</td>
<td>Geochelone carbonaria</td>
<td></td>
<td>Critically endangered</td>
</tr>
<tr>
<td>Red-eared Slider</td>
<td>Trachemys scripta</td>
<td></td>
<td>Abundant, introduced</td>
</tr>
<tr>
<td>Johnstones Whistling Frog</td>
<td>Eleutherodactylus johnstonei</td>
<td></td>
<td>Abundant, introduced</td>
</tr>
<tr>
<td>Cuban Tree Frog</td>
<td>Osteopilus septentrionalis</td>
<td></td>
<td>Abundant, introduced</td>
</tr>
</tbody>
</table>

Sea turtle nesting frequency on St. Maarten is very low because of extensive coastal development and the removal and disturbance of beaches. Hurricanes have also removed sand from nesting beaches in the past e.g. Hurricane Luis affected the beaches on the southern and eastern side of the island. In 1996 sea turtles were regularly seen in the sea surrounding St. Maarten. Green Turtles and Hawksbill Turtles are the most common. Not many turtles have been recorded nesting on St. Maarten, although there have been some Hawksbill and Green Turtle nests at Guana Bay and Oyster Pond. Today the three most important nesting beaches are Guana Bay, Gibbs Bay and Simpson Bay. There is annual Leatherback nesting mostly at Simpson Bay. Gibbs Bay and Guana Bay are threatened by development that will affect nesting behavior and hatching success rates.

**Mammals**

Hurricanes and urban development are the two main threats to bat populations on St. Maarten. When a hurricane wipes out habitats and food sources, bats can relocate to other islands where the habitats and food sources may be unaffected. The environment, unless stressed by other factors, tends to recover and attract the bat populations back over time. Where resort development has destroyed caves or other bat habitats, bat populations are lost. The once very abundant bat population on St. Maarten has declined significantly in the last 40 years.

**Other animals**

Many species of insect live on St. Maarten. After hurricanes, insect plagues affect St. Maarten e.g. after Hurricane Frederic in 1979 there were mosquito, fly and sandfly plagues. In August 1996 there was an aphid plague and swarms of white butterflies after Hurricane Luis. This is because the populations of insect-eating mammals and birds are usually decimated during a hurricane, resulting in an increase in the number of insects. Under normal conditions the balance between insects and their predators should re-establish itself. On St. Maarten populations of several insectivores (birds and bats) are permanently in decline which may in turn increase insect populations on the island indefinitely.

**Value**

St. Maarten is a home, migratory stop over or breeding site for 3 IUCN Red List Species, 10 CITES Appendix I species and 89 Appendix II species, including many lizards, birds, plants, fish, crustaceans and all of the corals found in the surrounding waters (Table 6). Further details on the classifications can be found in Appendix 2, or on the websites; [www.redlist.org](http://www.redlist.org) or [www.cites.org](http://www.cites.org).
The subspecies of tree lizard, the Anguilla Bank Bush Anole (*Anolis wattsi pogus*) is likely to be endemic to St. Maarten since it has become extirpated on neighbouring islands. The Anguilla Bank Ground Lizard (*Ameiva pleei*) the Anguilla Bank Tree Lizard (*Anolis gingivinus*) the Island Dwarf Gecko (*Sphaerodactylus sputator*), the Grasssnake (*Alsophis rijersmai*) and the Little Dwarf Gecko (*Sphaerodactylus macrolepis parvus*) are limited to St. Maarten and neighbouring islands. All sea turtle species are listed by CITES and all are in Appendix I, and most are listed on the IUCN Red List. Native populations of the CITES listed Green Iguana are probably extirpated.

There are two bird species that nest on St. Maarten that are endemic to the Lesser Antilles and the Virgin Islands; the Green-throated Carib (*Eulampis holosericeus*) and the Lesser Antillean Bullfinch (*Loxigilla noctis ridgewayi*). Other bird species with restricted ranges include:

**Table 6:** Birds found on St. Maarten with limited distribution (source: Rojer, 1997)

<table>
<thead>
<tr>
<th>Common name</th>
<th>Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antillean Crested Hummingbird</td>
<td><em>Orthorhyncus cristatus exilios</em></td>
</tr>
<tr>
<td>Zenaida Dove</td>
<td><em>Zenaida aurita aurita</em></td>
</tr>
<tr>
<td>Common Ground Dove</td>
<td><em>Columbigallina passerina nigirostris</em></td>
</tr>
<tr>
<td>Yellow Warbler</td>
<td><em>Dendroica petechia bartholemica</em></td>
</tr>
<tr>
<td>Bananquit</td>
<td><em>Coereba flaveola bartholemica</em></td>
</tr>
<tr>
<td>Caribbean Crackle.</td>
<td><em>Quiscalus lugubris guadeloupensis</em></td>
</tr>
</tbody>
</table>

All other species listed in Table 7 are highly threatened and their habitat and food sources should be protected to ensure their presence on St. Maarten in the future. This is not only important for biodiversity, but also economically for tourism, research and science.
Table 7: Endangered and significant fauna of St. Maarten.

<table>
<thead>
<tr>
<th>Species</th>
<th>Common Name</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Falco peregrinus</td>
<td>PERIGRINE FALCON</td>
<td>CITES Appendix I</td>
</tr>
<tr>
<td>Iguana iguana</td>
<td>GREEN IGUANA</td>
<td>CITES Appendix II</td>
</tr>
<tr>
<td>Falco sparrowius caribaeurn</td>
<td>AMERICAN KESTREL</td>
<td>CITES Appendix II</td>
</tr>
<tr>
<td>Larus atricilla</td>
<td>LAUGHING GULL</td>
<td>Great Salt Pond - Regionally significant stop-over site(^2)</td>
</tr>
<tr>
<td>Fulica caribaea</td>
<td>CARIBBEAN COOT</td>
<td>Little Bay Pond Fresh Pond - Regionally significant Near Threatened population</td>
</tr>
<tr>
<td>Circus cyaneus</td>
<td>NORTHERN HARRIER; HEN HARRIER</td>
<td>Marine Park is a migratory stop over</td>
</tr>
<tr>
<td>Falco columbarius</td>
<td>MERLIN</td>
<td>Marine Park is a migratory stop over</td>
</tr>
<tr>
<td>Monophyllus plethodon</td>
<td>LONG NOSED BAT</td>
<td></td>
</tr>
<tr>
<td>Ardops nichollsi</td>
<td>COMMON TREE BAT</td>
<td>Regionally significant populations</td>
</tr>
<tr>
<td>Natalus stramineus</td>
<td>FUNNEL-EARED BAT</td>
<td></td>
</tr>
<tr>
<td>Artibes jamaicensis</td>
<td>JAMAICAN FIG-EATING BAT</td>
<td></td>
</tr>
<tr>
<td>Brachyphylla cavernarum</td>
<td>PIG-NOSED/BLOSSOM BAT</td>
<td></td>
</tr>
<tr>
<td>Moelossus molossus</td>
<td>VELVETE MASTIFF BAT</td>
<td></td>
</tr>
<tr>
<td>Tadarida brasiliensis</td>
<td>BRAZILIAN FREE-TAILED BAT</td>
<td></td>
</tr>
<tr>
<td>Noctilio leporinus</td>
<td>FISHING BAT</td>
<td></td>
</tr>
</tbody>
</table>

\(^2\) Further, detailed information on the bird species of St. Maarten can be found at: [http://www.epicislands.org/](http://www.epicislands.org/)
### 1.9. References

Anon. (2003). Ecological Study on Rocky Shores from St Maarten (Netherlands Antilles), Universidad de Sevilla.


2. Management environment
### 2.1. 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. Nature Foundation St. Maarten chose to adopt an adaptive management framework for its management planning of the proposed St. Maarten Land Parks. 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 parks
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 strategies to address threats
6. Measuring the success of 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 proposed St. Maarten Land Parks 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 provides more detail on each of the three land parks, along with the threats and issues (Box 1) facing each area. Together with the Nature Foundation St. Maarten goals and objectives for St. Maarten Land Parks 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 Nature Foundation St. Maarten 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 management plan is an important component of the management success project. Setting clear goals and objectives makes it possible to begin evaluating management effectiveness and management success and assisting park managers to become more effective in planning and implementation.

**Box 1: Definitions of key terms used in Part 2**

<table>
<thead>
<tr>
<th>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 proposed St Maarten Land Parks include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rich diversity of flora, fauna and habitats (biodiversity).</td>
</tr>
<tr>
<td>Ecological processes such as reproduction and foraging.</td>
</tr>
<tr>
<td>Unique flora and fauna including species with limited distribution and endemic species.</td>
</tr>
<tr>
<td>Internationally and/or locally threatened and vulnerable species.</td>
</tr>
<tr>
<td>Geologically significant features.</td>
</tr>
</tbody>
</table>

| 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 resource. A threat can be an entity such as an organism which becomes a pest, or a process such as an increase in erosion which damages habitat. |
2.1.1. **PROPOSED PARKS OF ST. MAARTEN**

3 areas have been identified as having particular conservation value on St. Maarten, collectively for the management planning process they have been named ‘St. Maarten Land Parks’. The given name should be a point of further discussion with stakeholders as it is important that the name reflects the use of the areas and the views of those using them. Having one name for presents the ‘Parks’ as a united entity whilst allowing for the development of a zoning plan with individual areas.

2.1.1.1. **EMILIO WILSON ESTATE (EWE)**

The EWE is located on the western side of the road that runs through Cul-de-Sac valley to St. Peter covering about 90ha from the road to the top of Sentry Hill. It is the estate of Mr Emilio Wilson, who wished to protect it from further building development. His wish was supported by the Sint Maarten National Heritage Foundation, the Emilio Wilson Historical & Cultural Foundation, the Emilio Wilson Estate Foundation, St. Maarten Pride Foundation and Nature Foundation St. Maarten along with the people of St. Maarten. Through pressure from these five NGOs and the community, the Island Government voted against a permit for housing development and officially accepted Mr. Wilson’s wish in 2005 (Declaration No. 1020). The EWE covers land that sugar plantations were based upon during the 18th and 19th centuries. The Estate includes 9ha of land leased to the Emilio Wilson Historical & Cultural Foundation and 80+ha of land that includes Sentry Hill, rock walls, historical sites and caves that were mostly used as shelters in times of hurricanes. Further details about EWE are presented in Appendix 2; Haviser J. (2006) An Archaeological Survey of Emilio Wilson Estate, Specific areas of proposed development.

2.1.1.2. **GENEVE – BACK BAY**

Geneve Bay is on the east coast of St. Maarten and is circled by hills running from Guana Bay Point in the north to Back Bay in the south. The area covers approximately 100ha and has a number of different owners. It is one of the few places on St. Maarten where no construction has taken place and is home to a number of possible historical sites and geological formations.

2.1.1.3. **HILL TOPS**

The St. Maarten Hillside Ordinance stipulates that no building should occur on hill tops, ridges and above the 200 meter altitude contour. This covers the hillside areas of Cole Bay Hill, Sentry Hill, St. Peters Hill, Concordia Hill, Marigot Hill, Waymouth Hill and Williams Hill. These areas along with the other conservation areas proposed are represented on Figure 16.

2.1.2. **NATURE FOUNDATION ST. MAARTEN**

Nature Foundation St. Maarten (NAFSXM) has a permanent Board of Directors, which oversees Foundation activities. The Foundation is non-profit, relying on in-kind and other donations and grants. NAFSXM is based in Cole Bay and is mandated with the responsibility of operating the St. Maarten Marine Park.

2.1.2.1. **ACTIVITIES**

Although there are no Terrestrial Protected Areas on St. Maarten, about 46% of NAFSXM’s staff capacity is spent dealing with Terrestrial Issues. St. Maarten Marine Park accounts for the remaining 54% of staff capacity. Some of the activities already carried out include:

- Outreach and education programmes about terrestrial issues including presentations, newsletters and radio programmes
- Lobbying with partners for the Emilio Wilson Estate and mandatory EIAs for future development.
- Issue of CITES permits

Dealing with public enquiries concerning flora and fauna of St. Maarten.

2.1.2.2. **ST. MAARTEN MARINE PARK**

Established in 1997, covering 5128ha, The Sint Maarten Marine Park surrounds the entire Dutch side of the Island from Oyster Pond to Cupecoy Bay, to the 200 foot depth range. It is a voluntary protected area, with no legal protection. This should soon be changed with the Marine Park Ordinance approval. Activities are concentrated on the eastern side of the island, where the dive sites Molly Beday, Pelican Rock, Hen and Chicks, and Cow and Calf as well as the Proselyte area are located. These areas embody some of the last pristine marine locations on the island, with excellent diving, breeding grounds for marine birds, fish, sea turtles, queen conch and other marine life.
Figure 16: Location of the proposed St. Maarten Land Parks

The areas drawn on this map are representative and the boundaries drawn need to be identified definitively.
2.2. **Vision, Mission and Goals**

Part of management planning develops and articulates an ideal condition, state or appearance for the future of the proposed St. Maarten Land Parks. The IUCN World Commission on Protected Areas recommends that this is communicated in the form of a *Vision* statement. The *Mission* Statement defines how Nature Foundation St. Maarten will seek to achieve the vision in one succinct statement. *Goals* follow on from the management mission (Figure 17). They are more specific statements of intentions, setting out the conditions that management aims to achieve. They are statements of ‘outcomes’ rather than how to achieve them. How the goals are achieved is time and priority dependent and accomplished through clearly defined aims, actions and objectives (Figure 17).

**Figure 17**: Flow diagram to illustrate linkages between Vision, Mission, Goals of the St. Maarten Land Parks and the Strategies, Aims, Actions and Objectives that form part of annual planning.
2.2.1. **VISION**

St. Maarten Land Parks as thriving actively managed and sustainably used Protected Areas.

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2.2.2. **MISSION**

To manage, conserve and restore St. Maarten’s proposed Land Parks’ natural, cultural and historical resources for education, preservation and sustainable use with continued stakeholder participation, for the benefit of current and future generations.

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**Box 2**: Definitions of conservation management terms used in the Vision and Goals.

‘Active’ and ‘Successful’ Protected Area Management are two terms that are difficult to define. Through the DCNA Management Success Project the following clarifications can be made although exact definitions continue to be debated within the international conservation community.

**Successful management**: The effective guidance and control of action required to execute pre-defined objectives. Effectiveness depends on how decisions are made in respect of the threats facing the resource and how the capacity available to tackle the threats is deployed.

**Active management**: where actions are carried out by dedicated staff within an organised administration with pre-defined objectives to proactively tackle issues and threats. A passively managed Protected Area would lack defined objectives and would react to threats and issues in an ad-hoc fashion.
2.2.3. **Goals**

1. **Manage the St. Maarten Land Parks successfully as regionally and globally significant protected areas, within an effective legislative framework and with commitment from stakeholders.**

   St. Maarten Land Parks will face 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. Maarten can build on its successes to become regional and global flagship for the effectiveness of protected areas.

2. **Stabilise conserve and restore, through practical conservation and active management;**
   a) **the natural values of St. Maarten including threatened, rare and endangered species, habitats, biological diversity, ecosystem processes, environmental functions and aesthetic values.**
   b) **the cultural historical and archaeological resources**

   2) a) By conserving and managing all aspects of St. Maarten Land Parks, NAFSXM will safeguard the vital life-support processes of the environment including: photosynthesis, maintenance of food chains, movement of nutrients, degradation of pollutants, conservation of biological diversity, productivity.

   b) St. Maarten Land Parks management must address the full spectrum of human values to make the Protected Area’s a success. This goal will ensure that NAFSXM 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.

3. **Facilitate the use of St. Maarten Land Parks for: a) Recreation, b) tourism, c) information, education and outreach, d) research, e) monitoring and training.**

   The areas allocated as part of St. Maarten Land Parks should be used appropriately by stakeholders. Nature Foundation St. Maarten should aim to manage and balance the key uses to maximise the Parks’ values as multiple use areas.

4. **Ensure the appropriate promotion of St. Maarten Land Parks as traditionally and contemporarily valuable, sustainable, multiple use resources whilst establishing rules, guidelines, permits and enforcing legislation.**

   It is essential that NAFSXM 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.

5. **Ensure the involvement of stakeholders and the general community to cultivate a sense of ownership and continuing support for the regulations, zoning and management practices of management authorities and the St. Maarten Land Parks.**

   By involving stakeholders five key benefits arise, each of which will help in the pursuit of St. Maarten Land Parks mission; 1) Increased sense of ‘ownership’, 2) Greater support for the protection of the area, 3) Greater public involvement in decision-making, 4) Formation of links between planning for conservation and planning for development, 5) Provision of a mechanism for communication.

6. **Establish and maintain co-management agreements with the Sint Maarten National Heritage Foundation, the Emilio Wilson Historical & Cultural Park Foundation and the Emilio Wilson Estate Foundation for the management of the Emilio Wilson Estate.**

   This management plan covers the work of Nature Foundation St. Maarten, and it must seek and maintain co-management agreements with other relevant parties. By naming the key partners working with the Emilio Wilson Estate, allowances are made to develop separate agreements and documents for co-management.

7. **Build partnerships with landowners to facilitate the establishment and management of St. Maarten Land Parks.**

   The Geneva Bay Area, Hilltops and parts of the EWE are owned by a number of private individuals. It is a key goal of Nature Foundation St. Maarten to work with these individuals on a number of levels to establish and manage Land Parks on St. Maarten.
2.3. **Statement of Significance / Values**

2.3.1. **Statement of Significance**

None of the terrestrial environments of St. Maarten are protected, including biologically diverse rainforest, drought resistant habitats and lagoons. St. Maarten Terrestrial Parks will offer excellent hiking in with views of the island and neighbouring Saba and St Eustatius. The proposed Protected Area’s will help conserve and restore St. Maarten’s natural, cultural and historical resources for the benefit of current and future generations. St. Maarten and its habitats are a home, migratory stop over or breeding site for 10 IUCN Red List species, 9 CITES Appendix I species and 89 Appendix II species including the 2 endemic plants\(^3\), the endemic Anguilla Bank Bush Anole (*Anolis wattsi Pogus*) and many other plants and animal species with limited distribution. St. Maarten Terrestrial Parks could attract visitors and contribute to income for many people on the island employed in restaurants, hotels and other services.

![Image 12: Thriving forest of St. Maarten](source: Jan Blok)

2.3.2. **Values**

The terrestrial environments of St. Maarten are valuable for a wide range of reasons. For example, a tree can be valued for its direct use value (as timber), indirect use value (environmental functions), existence value (simply being there), and an option value (value of things that it could be used for in the future). These are summarised in Box 3, the main values associated with the proposed St. Maarten Terrestrial Parks and NAFSXMM are presented on the next page (Figure 18).

**Box 3:** Examples of the range of values associated with terrestrial ecosystems\(^4\).

<table>
<thead>
<tr>
<th>DIRECT USE VALUES</th>
<th>INDIRECT USE VALUES</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Timber</td>
<td>• Watershed functions: Soil conservation, Water supply, Water quality, Flood / storm protection, Fisheries protection (from sediment runoff), Carbon fixing</td>
</tr>
<tr>
<td>• Fuelwood / charcoal</td>
<td>• Biodiversity (habitat, food source, breeding ground)</td>
</tr>
<tr>
<td>• Non-Timber Forest Products (NTFPs)</td>
<td>• Global climate; Carbon storage</td>
</tr>
<tr>
<td>• Genetic information: Agriculture, Pharmacy</td>
<td></td>
</tr>
<tr>
<td>• Recreation / tourism</td>
<td></td>
</tr>
<tr>
<td>• Research / education</td>
<td></td>
</tr>
<tr>
<td>• Cultural / religious</td>
<td></td>
</tr>
</tbody>
</table>

**EXISTENCE VALUES:** The intrinsic value of something; the value of the benefits derived from the asset’s existence alone.

**OPTION VALUES:** The potential value of the resource for future (direct or indirect) use.

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\(^3\) *Calyptranthes boldinghii* (*Myrtacaeae*) also known as Lidflower and *Galactia nummelaria* (*Fabaceae*).

Figure 18: A summary of values associated with the terrestrial environment of St. Maarten and NAFSXM.

**Resource NON-USE Values**

**Environment**
- Habitat that is home to many species including endangered, rare and endemic plants and animals.
- Variety of terrestrial ecosystems
- Breeding grounds for birds and other animals
- Migratory stop over
- Shoreline protection from coastal plants binding sand and soils, preventing erosion.
- Montane thickets, Evergreen and Semi-evergreen seasonal forests are valuable since dry tropical forests are threatened by human activities internationally.
- The hills receive most of the rainwater. The vegetation and the soil retain water and have an important role in the island's water supply whilst limiting the flooding which can occur in the lower-lying parts of the island.
- The vegetation on the hills combats erosion and protects the lower-lying parts of St. Maarten from landslides and the coastal waters from siltation.

**Biodiversity**
- Endemic: *Calyptranthes boldinghii* (Myrtaceae) also known as Lidflower and *Galactia nummelaria* (Fabaceae), Anguilla Bank Anole (*Anolis wattsi Pogus*).
- Biodiversity of the neighbouring reef and seagrass other marine environments and the associated wildlife.

**Value of NAFSXM as an institution**
- NAFSXM is valuable as a conservation body.
- Networking capabilities.
- Centre for outreach and education.
- Coordinator of research and monitoring.
- Government and stakeholder facilitator.
- Promote responsible use of the island and sharing between users.
- Nature preservation and restoration.
- Representative of St. Maarten.

**Resource USE Values**

**Recreation**
- Walking.
- Guided tours.
- Picnics.
- Camping.

**Historical**
- Remnants of sugar cane plantations and slavery buildings.
- Old trail networks and paths.
- Old historical walls that also have a function in erosion control and water management.

**Cultural**
- Education for sciences, art and other subjects.
- Aesthetic values - Views of the rest of St. Maarten and neighbouring islands.

**General**
- Grazing livestock.
- Scientific research resource.
Name: Emilio Wilson Estate

Location: On the image above, the Orange area represents the land leased by the Emilio Wilson Estate Foundation. The Purple area covers the remaining 80+ ha of land. Further detailed maps of the area can be seen in Appendix 2.

Values:
- EWE has significant cultural and historical values particularly in the lower section of the site. This includes remnants of sugar cane plantations (Industry and Golden Rock Plantation), slavery related buildings. Other areas of cultural importance include Ebenezer, Union Farm, Madame Estate, Belvedere, Bishop Hill slave cemetery, Cul-de-Sac cemetery. Further details can be seen in Appendix 2 within Haviser J. (2006) An Archaeological Survey of Emilio Wilson Estate, Specific areas of proposed development.
- A slave path to the caves on Sentry Hill runs through the site. The caves were mostly used as shelters during hurricanes.
- Semi-evergreen seasonal forest occurs in the higher parts of the EWE area.
- This area may be home to St. Maarten’s endemic plants *Calyptranthes boldinghii* (*Myrtaceae*) also known as Lidflower and *Galactia nummelaria* (*Fabaceae*).
- It is one of the very few areas on the island which is low-lying and yet not built on. All of the surrounding areas have been used for residential housing and sport facilities.
- The rock walls throughout the estate serve a hydrological function.
- The whole area links up with the Hill Tops area which is important for the function habitats, as the area will be larger and more continuous.

Rational: The EWE has significant cultural and historical value and can provide access to the Hill Tops. Trails through the estate to the top of Sentry Hill pass through areas of high biological value that are undisturbed.

Use: Recreation, Guided Tours, Research

There is a single entrance with some facilities for visitors to the area on the L.B. Scott Road. This can be used as a point to disseminate information before visitors walk through the site. This area offers opportunities for recreation as there are a number of open spaces. The two sign posted trails into the adjacent land also start here, one which goes to the top of Sentry Hill and connects to the trail which follows the hill range to St. Peters Hill, and a short trail which turns off halfway up the slope and returns back to the car park.

Threats: Development of residential areas, construction of the planned road ‘Link 7’.

Status: 9ha area on a 60 year lease to The Emilio Wilson Historical and Cultural Foundation, most of the remaining 80+ ha is owned by the heirs of Mr. Emilio Wilson. Negotiations are underway to purchase this land or to gain a long lease on it so that it can be saved from construction.
### Geneve Bay Area

**Name**: Geneve Bay Area

**Location**: From Guana Bay Point Inland to existing roads and open mine, down to the ridge north of The Devils Cupper, below Back Bay

<table>
<thead>
<tr>
<th>Values</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>• This area may be home to St. Maarten’s endemic plants <em>Calyptranthes boldinghii</em> (<em>Myrtacaea</em>) also known as Lidflower and <em>Galactia nummelaria</em> (<em>Fabaceae</em>).</td>
<td></td>
</tr>
<tr>
<td>• The Geneve Bay area is home to many species of cacti. All cacti are recognised as endangered and are on the CITES list of plants protected against international trade.</td>
<td></td>
</tr>
<tr>
<td>• The Geneve Bay area offers a unique undisturbed transect from land at 200m height to the sea and beyond into the conservation area of the MPA down to 200ft.</td>
<td></td>
</tr>
<tr>
<td>• One of the only coastal areas on St. Maarten that has not been built on.</td>
<td></td>
</tr>
<tr>
<td>• Geneve Bay point is believed to have historical value as a site where pirates would land contraband.</td>
<td></td>
</tr>
<tr>
<td>• Geneve Bay, Back Bay and the surrounding areas are on the shore of the St. Maarten Marine Park Conservation zone, any change in land use of the areas is likely to severely damage the marine environment through runoff and pollution.</td>
<td></td>
</tr>
<tr>
<td>• The small, uninhabited islands Pelican Rock, Molly Beday and Hen and Chicken, off the coast of Geneve Bay, are very important for nesting sea birds and vulnerable to any disturbance from land.</td>
<td></td>
</tr>
</tbody>
</table>

**Rational**
The Geneve Bay area is the last significant coastal area and inland catchment on St. Maarten that has not been built upon. Limited access has preserved the area. Use should be managed and limited to guided tours to protect the habitats and species on the site and to prevent constructions from damaging the neighbouring marine reserve. This trail then follows the coastline and goes through the valley on the way back to the car park. The other trail runs in a south-easterly direction towards Back Bay and then doubles back along the coast and through the valley.

**Use**
Guided Tours, Research, walking trails, use of beaches allowed, but tourist developments prohibited.

**Threats**
Development, Invasive species.

**Status**
None
Forest on Sentry Hill

Satellite image (the red arrows indicate access corridors)

Plants within the Hill Top forest

<table>
<thead>
<tr>
<th>Name</th>
<th>Hill Tops⁶</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>The western hill range includes, from south to north: Cole bay (176 m), Sentry Hill (340 m), St. Peter Hill (317 m), Concordia Hill (290 m) and Marigot Hill (307 m). The eastern hill range comprises Williams Hill (256 m) and Flagstaff, the top of which is located on the French side of the island at 390 m. This hill range continues through the French territory to St. Maarten’s highest point: Pic du Paradis (411 m). In the event of cooperation with the French, a considerably bigger nature park could be created.</td>
</tr>
</tbody>
</table>
| Values        | • The seasonal evergreen forest on the Hill Tops is some of the last original forest remaining on St. Maarten and are globally endangered.  
• Aesthetic values; the original evergreen forests give the island exceptional landscape qualities which attract tourists to the Island.  
• The Hill Tops are home to many endangered animal and plant species, including Bromeliads, Araceae, Orchids, American Kestrels and A. wattsi pogus.  
• Vegetation prevents hillside erosion; maintains climatic micro gradients; stores of genetic resources and aids water retention for St. Maarten.  
• The Hill Tops are an outstanding location for managed and well placed trails for organised hikes and recreational walkers.  
• Rocks on Sentry Hill represent a Geological Library, holding information about St. Maarten’s past. |
| Rational      | The 200m+ contour is easily defined and legislation already exists for the area in the St. Maarten Building Ordinance. Views from the hilltops are outstanding and the lack of development on the hills gives St. Maarten some wilderness and natural beauty which is essential for attracting the tourists that the economy depends upon. Access corridors between the sites on land <200m need to be established for wildlife between the different areas – indicated by the red arrows in the satellite image above. Some construction has taken place over the 200 metre contour these areas should be accepted but monitored for expansion. Belvedere, the low-lying area between Waymouth Hill and No Name has particular historical and cultural value and should be considered in the development of a comprehensive zoning plan. |
| Use           | Recreation, Organised Tours, Research. |
| Threats       | Development, invasive species |
| Status        | Legally protected from development above 200m, but enforcement is ineffective. |

⁶ Cole Bay Hill, Fort Hill, Naked Boy Hill and the hill above with No Name are not included in the Hill Tops Park as they are too fragmented, but should be included in any legislation developed, for aesthetic reasons.
The conservation zone is located adjacent to the Geneve Bay area.

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>CONSERVATION ZONE</th>
<th>ANCHORING ZONE</th>
<th>TRAFFIC ZONE</th>
<th>SHIPPING/INDUSTRY ZONE</th>
<th>MULTIPLE USE ZONE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SWIMMING</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BEACH RECREATION</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SNORKELLING, DIVING</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>JET-SKI/POWER BOATS</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>FISHING</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>ANCHORING</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>COMMERCIAL SHIPPING</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 20:** Zonation of St. Maarten Marine Park.
2.4. Zoning

Spatial planning of land use is essential for the sustainable management of terrestrial environments. Parts of St. Maarten (and the surrounding marine environment) need to be zoned for conservation. The locations of the St. Maarten Land Parks are detailed on the following pages and shown on Figure 16. These were identified as important areas during fieldwork in 2008 and by considerable stakeholder consultation and cover less than 11% of the land surface of St. Maarten (Table 8). Within these areas, zones need to be identified for management, for example, recreation areas, trails, limited access areas for conservation and so on. This can only be achieved with further stakeholder consultation once the management of the areas has been consolidated.

Table 8: Approximate coverage of the proposed St. Maarten Land Parks

<table>
<thead>
<tr>
<th>Location</th>
<th>Area (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hill Tops</td>
<td>208ha</td>
</tr>
<tr>
<td></td>
<td>- 79ha – St Peters Hill area</td>
</tr>
<tr>
<td></td>
<td>- 48ha – Williams Hill area</td>
</tr>
<tr>
<td></td>
<td>- 79ha – Waymouth Hill (Mildrum) area</td>
</tr>
<tr>
<td>Geneve Bay</td>
<td>76ha</td>
</tr>
<tr>
<td>EWE</td>
<td>9ha and 80ha up to Sentry Hill</td>
</tr>
<tr>
<td>Total</td>
<td>382ha = 11% of St. Maarten’s land area</td>
</tr>
</tbody>
</table>

(source: DIVA Netherlands Antilles GIS)

2.4.1. Marine Park Zones

Any land based activity has the potential to effect the marine environment which provides a resource for tourism, fisheries and shipping. Although it is yet to be legally recognised, St. Maarten Marine Park has zones to protect valuable areas of marine habitats. Six zones are to be established in the St. Maarten Marine Park to ensure the sustainable use of the marine resources. These zones include a conservation zone, anchoring zone, a traffic zone, The Great Bay Large ship anchorage zone and a shipping/industry zone. (Figure 20) The marine park also has other areas that have been allocated as multiple-use zones. The zones for the marine park form the basis of the Marine Park Ordinance and were originally proposed in: ‘Sint Maarten Marine Park Boundaries and Zones’ (March 1998) by Carmabi and EcoVision N.V.

Conservation zones have been defined because of their significant natural values such as the presence of unspoiled coral reefs and their function as nursery areas for many marine animal species. The conservation zone bordering Geneve Bay gives the opportunity to protect a representative natural area of St. Maarten. Conservation of the land around Geneva Bay offers enhanced protection to the neighbouring, high value marine environment.

2.4.2. Trails

Trails currently exist on the hill tops although they are not regularly managed and are only mapped minimally (Table 9, Figure 19). There are also trails in the Geneve Bay area which are unmarked, the area is largely untouched. Trails provide clear, safe routes for walkers to follow and they are labelled with way markers. They also serve to concentrate walking activity along paths, preventing erosion and excessive disturbance of the environment. Any management of the trails will require extensive maintenance including clearing vegetation and constructing steps and navigable paths, a trail around the Hill Tops would be approximately 9km long.

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\(^5\) 226 hectares for 200m + land, 18 hectares of land over 200m are on the small fragmented hilltops.
Table 9: Details of existing trails on St. Maarten.

<table>
<thead>
<tr>
<th>#</th>
<th>Name</th>
<th>Classification</th>
<th>Hiking Time (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3 summits</td>
<td>Strenuous one-way</td>
<td>4</td>
</tr>
<tr>
<td>1A</td>
<td>South Reward</td>
<td>Moderate loop</td>
<td>1.45</td>
</tr>
<tr>
<td>1B</td>
<td>Emilio Wilson</td>
<td>Strenuous loop</td>
<td>2.45</td>
</tr>
<tr>
<td>1C</td>
<td>Sentry Hill</td>
<td>Strenuous loop</td>
<td>2.30</td>
</tr>
<tr>
<td>2A</td>
<td>Bethlehem</td>
<td>Strenuous one-way</td>
<td>2.30</td>
</tr>
<tr>
<td>2B</td>
<td>Zorg &amp; Rust</td>
<td>Moderate one-way</td>
<td>1.10</td>
</tr>
<tr>
<td>3</td>
<td>3 Bays</td>
<td>Easy/moderate loop</td>
<td>2.45</td>
</tr>
<tr>
<td>4</td>
<td>2 Forts</td>
<td>Easy/moderate loop</td>
<td>1.30</td>
</tr>
<tr>
<td>5</td>
<td>Guana Bay</td>
<td>Easy loop</td>
<td>1.30</td>
</tr>
</tbody>
</table>

Figure 19: Location of existing trails of St. Maarten (source: St. Maarten National Heritage Foundation)

Note: Satellite images on the following pages are from Google Earth, and have been adapted. Photographic images were taken by Jan Blok.
2.5. Governance

Nature Foundation St. Maarten is a non-governmental organisation. It was established in 1997 with a primary concern to protect nature, whilst in the process strengthening its economical and educational value, and potential of its natural resources. NAFSXM has 7 board members who meet once a month. St. Maarten Terrestrial Parks will be managed by Nature Foundation St. Maarten within the current institutional structure which may need to be adapted as part of the development of the Land Parks. The EWE will be co-managed with Sint Maarten National Heritage Foundation, the Emilio Wilson Estate Historical & Cultural Park Foundation and the Emilio Wilson Estate Foundation.

2.5.1. Board

Nature Foundation is the body charged with the management of the St. Maarten Marine Park. It is a foundation registered locally on St. Maarten and governed by a volunteer Board of seven. The former manager of Nature Foundation, Andy Caballero, now sits on the Board. The day to day management of the Foundation is carried out by a full time staff of three along with various part time consultants and volunteers. The Manager, Beverly Nisbeth, is also the Nature Foundation representative on the Board of the Dutch Caribbean Nature Alliance.

Table 10: Board members

<table>
<thead>
<tr>
<th>POSITION</th>
<th>YEARS ON BOARD</th>
<th>BACKGROUND</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan Beaujon Chairman</td>
<td>9</td>
<td>General manager, Windward Islands Bank. Involved in many aspects of the community. Has been chairman since 2000.</td>
</tr>
<tr>
<td>Frank Boekhout Secretary</td>
<td>6</td>
<td>Retired biology and English teacher. Provides assistance and local scientific expertise in the field of nature conservation.</td>
</tr>
<tr>
<td>Malou Carty Treasurer</td>
<td>5</td>
<td>Plays as active role in fundraising and community service oriented activities.</td>
</tr>
<tr>
<td>Robby Lawrence Member</td>
<td>2</td>
<td>Shipping agent and cargo vessel owner specialising in inter-Caribbean trade. Experienced fisherman and sailor.</td>
</tr>
<tr>
<td>Delroy Pierre Member</td>
<td>0</td>
<td>College and high school science teacher. Provides assistance in structuring education programme.</td>
</tr>
<tr>
<td>Andy Caballero Member</td>
<td>2</td>
<td>Environmental consultant and former marine park manager.</td>
</tr>
<tr>
<td>Gloria Heyliger Member</td>
<td>2</td>
<td>Financial accountant</td>
</tr>
</tbody>
</table>

The management body meets with the manager/director on a monthly basis minutes are circulated amongst board members, the marine park manager and the office manager.

2.5.2. Institutional Arrangements

The following provisions have been made to help organise and structure NAFSXM:

Table 11: Institutional arrangements

<table>
<thead>
<tr>
<th>BOARD BOOK / OPERATIONAL MANUAL</th>
<th>✔</th>
</tr>
</thead>
<tbody>
<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>✔</td>
</tr>
<tr>
<td>ANNUAL REPORT</td>
<td>✔</td>
</tr>
</tbody>
</table>

2.5.3. Committees

Nature Foundation St. Maarten sits on two committees, Heineken Regatta Steering Committee and the St. Maarten Classic Yacht Regatta.
2.6. **Legal Framework**

Although there are no legally recognised Terrestrial Protected Area’s on St. Maarten, legislation exists for the island which relates to the conservation of flora and fauna. The establishment of Nature Parks is a requirement in island legislation, national policy and international conventions that St. Maarten is party to. Nature Foundation St Maarten has produced a list of recommendations for the amendment of current legislation to empower conservation efforts which can be seen in Appendix 3. All relevant legislation is presented in Appendix 4.

2.6.1. **Island Legislation**

2.6.1.1. **Nature Conservation Ordinance St. Maarten - AB2003, No. 35**

The Island Territories of the Netherlands Antilles are responsible for the development of a nature policy and related legislation and its implementation. The Nature Conservation Ordinance St. Maarten was established in on 1st September 2003 and presents articles relating to the management and protection of flora and fauna. The most relevant Articles are presented in Box 4, the full ordinance can be seen in Appendix 4. The Nature Conservation Ordinance requires that nature parks are established by means of separate island ordinances and does contain regulations for the procedure of establishing nature parks as well as the realization of the relevant island ordinances. Provision is also made for an entrance fee system.

**Box 4: Key points from the St. Maarten Nature Conservation Ordinance.**

**ARTICLE 8**

1. The establishment of a nature park as meant in Article 10 of the National Ordinance shall occur by Island Ordinance, in which the following is included:
   (a) a map, on which the boundaries of the area are accurately indicated,
   (b) an explanation, containing in any case the manner in which the continuation of the nature values of the area in question will be realized;
   (c) regulations concerning accessibility and use;
   (d) regulations concerning the establishment of fees and duties to cover management expenses.

2. A reservation that entails a smaller demarcated area within a nature park with strict regulations for its use or entry and that serves to protect a nesting or breeding area or the special biodiversity of an area in the nature park can be designated by means of an Island Ordinance.

**ARTICLE 15**

1. It is prohibited to commit, to have committed or to allow acts that can cause damage to or compromise the natural beauty or natural scientific value of a nature park or that mar a nature park.

**Other Island Legislation**

Other legislative tools relevant to conservation and Protected Area management include those listed below, full copies of which can be seen in Appendix 4:

- St. Maarten Waste Ordinance - AB1993, No. 03.
- St. Maarten Marine Park Ordinance DRAFT.
- St. Maarten Waste Water Ordinance - AB2002, No. 05.
- St. Maarten Monuments Ordinance - AB2000, No. 01.
- St. Maarten Development Planning Amendment - AB2000, No. 03.
- St. Maarten Development Planning Amendment - AB2004, No. 01.

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7 As part of the development of the Land Parks, Nature Foundation St Maarten should consult with the French side of the island to find out about any legislation that exists and its success.
2.6.2. **Netherlands Antilles Legislation**

2.6.2.1. **National Nature Conservation Ordinance - Ao2001, No. 41**

The ‘National Nature Conservation Ordinance’ E-publication ‘PB 2001, No. 41’ details legislation and regulations at a federal level. Section 3 explains which tasks are the responsibility of either the federal or island governments. For example, every 5 years, the federal government is responsible for establishing an island-wide nature policy plan (Art. 9), the island government is responsible for the allocation of nature reserves (Art. 10) and the protection of species listed in the Sea Turtle Convention, the Bonn Convention, the SPAW Protocol and the Convention on Biological diversity (Art. 11 - 14). A copy can be seen in Appendix 4.

2.6.3. **International Treaties and Conventions**

The international treaties and conventions are relevant to St. Maarten Land Parks as they have been signed by the Netherlands include:

- CITES; Convention Of International Trade In Endangered Species.
- 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.

The most relevant articles from the International Treaties and Conventions that St. Maarten is party to are outlined below. For further details on the agreements see Appendix 4.

2.6.3.1. **The CITES Convention**

**Article 7**

- The Convention of International Trade in Endangered Species regulates trade in all listed species, and all specimens must have the necessary permits and certificates, and meet accompanying conditions, for import, export, re-export, transit, trans-shipment or introduction from the sea.
- Annex I includes species cannot be traded for purposes that are commercial or at all detrimental to the species.
- Annex II includes species require an export or re-export permit with conditions is required, but no import permit is needed unless required by national law.
- Permits and certificates can be retracted if they would not have been granted had the full information been made known at the time of application, or if the permits conditions are not honoured.

Punishment for intentional violation of Article 7 is imprisonment of up to 4 years or a fine of up to ANG 1,000,000, or both.

2.6.3.2. **The Protocol Concerning Specially Protected Areas and Wildlife (SPAW).**

**Article 6**

- The Island Council is responsible for the protection and conservation of the species mentioned in the SPAW Protocol Annexes and its requirements.
  - For species in Annexes I, II it is forbidden to pick, collect, cut, uproot, or trade commercially the flora, or their seeds, parts or products, and to take, possess, kill or trade commercially the fauna, or their eggs, parts or products. It is forbidden to disturb such species, particularly during periods of breeding, incubation, migration or other biological stress.
  - For species in Annex III, management plans should be developed including the prohibition of non-selective means of capture and harvesting, the institution of closed seasons, and regulation of taking possession, transport or commercial trade of living or dead species and their eggs, seeds, parts or products.
• Exemptions from these prohibitions can be granted by General Ministerial Resolution if approved by the Scientific and Technical Advisory Committee.

Punishment for intentional violation of Article 6 is imprisonment of up to 4 years or a fine of up to ANG 1,000,000, or both.

2.6.3.3. **The Convention on Biological Diversity**

The Island Council is responsible for the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the use of genetic resources, and requirements of the Convention. There are two specific requirements relating to protected areas in the Convention on Biological Diversity, articles 8a and b (Box 5).

**Box 5:** Articles of Incorporation into the Convention on Biological Diversity relating to the establishment of Protected Area Network’s

\'(a) Establish a system of protected areas or areas where special measures need to be taken to conserve biological diversity;

(b) Develop, where necessary, guidelines for the selection, establishment and management of protected areas where special measures need to be taken to conserve biological diversity;’

2.6.3.4. **Convention on the Conservation of Migratory Species**

All indigenous animal and plant species listed in Annex I of the Bonn Convention, Annexes I and II of the SPAW-protocol, Annex I of the CITES Treaty and Annexes I and II of the Sea Turtle Treaty are designated as protected animal and plant species.

2.6.4. **Policies**

Netherlands Antilles Nature Policy 1996 -2000 has expired. It is unclear to what extent this plan still applies or if a new Nature Policy plan or Tourism Plan will be implemented through the process of constitutional change. Further details can be seen in Appendix 4.

There are two relevant island policies that are not covered by legislation; The Hillside Policy and the St. Maarten Beach Policy, both of which can be seen in Appendix 4. The key areas of these policies are in Box 6:

**Box 6:** Key points of the St. Maarten Hillside Policy

'The Hillside Policy states that:
1. only residential development is allowed in the hillsides.
2. general guidelines be established for building in the hillside area, indicating minimum lot sizes, maximum building percentages, regulations for excavating, building of roads and prevention of erosion, etc. The conditions differ depending on the slope of the land and the location of the land in altitude.
3. no building should occur on hill tops, rides and above the 200 meter altitude line.
4. a hillside nature park is projected for the hillside area of Cole Bay Hill, Sentry Hill, St. Peters Hill, Concordia Hill, Marigot Hill, Waymouth Hill and Williams Hill.
5. certain hillsides, which are considered important for their visual impact on the general landscape, should also be conserved.

The main objective of the policy is to conserve the green hillsides, protect and if needed restore their value for the benefit of the environment, the tourist industry and quality of life on St. Maarten. By regulating development in the hillsides and by setting building guidelines, the Island Government wishes to limit erosion and uncontrolled rain and waste water run-off which affects the whole island environment from the hill tops to the coral reefs.

To follow this policy, the Island Government must apply the guidelines in the development of a zoning plan for St. Maarten. Any development plans and building permit requests for land on hillsides should only be granted in accordance with the policy.
The St. Maarten Beach policy covers the strip of sand with a width of at most 50 meters, of which the surface consists of natural sea sand situated along the sea, or, in absence of natural sea sand, the strip of land with a width of 25 meters from the high waterline, situated along the public waters. This is relevant to the coastline of the Geneve Bay Area. The main points from the Beach policy are covered in Box 7:

**Box 7: Summary of St. Maarten’s Beach Policy**

The Island Government will strive to ensure that:
1. the beaches are openly accessible for the general public, which means that there must be a wide access that is free from physical and mental barriers (levers, hotels etc.).
2. no construction works or activities that occupy the space on the beach in a way that restricts normal use of the beach for others, will occur on the beach. The Island Government’s position is that construction works on the beach are annoying and disfiguring to the surroundings. It is not desirable for dwellings, hotels, businesses, etc. to be built or situated on the beach.
3. the beaches will be protected against pollution, disturbance, destruction, etc. and against erosion, hurricanes, etc.

### 2.6.5. PERMITS

The current permitting process by-passes Nature Foundation St. Maarten as a statutory advisory body. The permitting process is generally as follows:

1. Stakeholder writes letter to Executive Council (if they are concerned by following rules).
2. Executive Council send request to VROM.
3. VROM write advice and send back to Executive Council.
4. Executive Council approve (or not).

**Table 12:** Permitting procedures

<table>
<thead>
<tr>
<th>PERMIT</th>
<th>DETAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research/Collection</td>
<td>For collection –requests have to be made to NAFSXM. The application is then forwarded to the executive council NAFSXM have an outline agreement with any researchers that they give any data and a report or other products to NAFSXM. Other issues; Protected organisms need permission from central government. Hygiene department and others need to be consulted for any export.</td>
</tr>
<tr>
<td>Tour operators.</td>
<td>Business licence from economic affairs dept.</td>
</tr>
<tr>
<td>Building, Land clearance</td>
<td>Buildings go through VROM, some advisory roles as a public consultation.</td>
</tr>
</tbody>
</table>
2.6.6. **GUIDELINES**

As there are no Terrestrial Protected Areas on St. Maarten, no guidelines for their use have been developed. St. Eustatius and Saba have Terrestrial Protected Area’s, and have already developed guidelines (Box 8 and Box 9). These could be considered to help develop guidelines for the proposed St. Maarten Land Parks.

**Box 8:** Guidelines for visitors to The Quill/Boven National Park and Botanical Garden on St Eustatius (source: STENAPA)

1. Do not leave litter in the national park. Keep all plastics and containers in your bags and deposit them in waste disposal bins inside the gate of the parks office in Gallows Bay.
2. Keep to the sign posted pathways as the quill slopes are prone to erosion and rock falls that are made worse by hikers when they leave the pathway. On the hike to the crater bottom, bear in mind that the trail makes u-turns around big trees and rocks.
3. protect wildlife by keeping to the pathways – do not touch or remove any plants or animals.
4. Fires are not permitted at any site in the National Park.
5. The trails that are graded as difficult are prone to rock falls and are not routinely maintained. It is advisable to organise a guide when intending to take these trails to avoid taking the wrong route or falling down on unstable slopes.
6. Take at least one large water bottle per hiker as it is hot and humid on the climb to the crater rim. Sturdy shoes and a sunhat are strongly recommended.
7. Poisonous animals in the Quill National Park are limited to the colourful centipedes, small scorpions, bees and wasps. These animals will not sting you if left undisturbed, particularly centipedes and scorpions which are found under rotting wood or near termite nests. We recommend carrying epi-pens and anti-histamines if hiker’s are sensitive to stings.

**Box 9:** Guidelines for users of Saba’s trails and Terrestrial Park. (source: Saba Conservation Foundation)

**Trail Manners**
- Help to keep the trail clean. Please carry your own litter out to be properly disposed of in a trash container!
- Leave the trail cleaner than you found it by picking up any litter that other people have left behind!
- A picked flower soon dies. Please leave all plants and flowers for others to enjoy after you!
- Be considerate to others. Loud noises can disturb wildlife as well as other hikers wishing to enjoy the serenity of the area!
- All trails are on private land, and we are allowed to use the trails because of the landowners’ generosity. Please respect the rights of the landowners and do not wander off the trails. Do not pick the fruits in the plantations!

**User guidelines**
- Hiking and other strenuous activities in extreme heat can be hazardous. Pace yourself and rest often!
- Carry plenty of drinking water with you. The heat of the tropical sun will force you to increase considerably your normal fluid intake!
- Protect yourself against sunburn or sunstroke by wearing a broad-brimmed hat and a high-strength sun-block lotion!
- Sturdy walking, running or tennis shoes are sufficient for the trails. However, hiking boots will provide an additional level of comfort and security on the more strenuous trails!
- As you gain elevation and enter the rainforest, the temperature may drop markedly. You may want to bring along a light jacket or anorak!
- Trails can frequently be slippery, especially in the rain forest. A hiking stick can provide an extra level of confidence and can be rented or purchased at the Trail Shop!
2.7. Physical Resources

Nature Foundation St. Maarten has a variety of resources available for use by staff. This includes offices, electronic and scientific equipment. St. Maarten Marine Park currently uses the resources listed below (Table 13). The establishment of St. Maarten Land Parks will require further physical and human resources to facilitate management, examples are outlined in Figure 21.

Table 13: Physical resources available to NAFSXM.

<table>
<thead>
<tr>
<th>RESOURCE</th>
<th>DETAILS</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUILDINGS</td>
<td>OFFICES 2 OFFICE UNITS</td>
</tr>
<tr>
<td></td>
<td>STORAGE WAREHOUSE</td>
</tr>
<tr>
<td>TRANSPORT</td>
<td>4x4 TRUCK 1 NISSAN 2WD, 10 YEARS OLD, 88,000 MILES</td>
</tr>
<tr>
<td></td>
<td>BOAT 26 FT 6 YEAR OLD HARD HULL BOAT WITH 2 90HP OB ENGINES</td>
</tr>
<tr>
<td>COMMUNICATION</td>
<td>FAX MACHINE 1 CANON FAX, COPIER, SCANNER</td>
</tr>
<tr>
<td></td>
<td>LAND LINE 3 TELEPHONE UNITS</td>
</tr>
<tr>
<td></td>
<td>RADIOS 1</td>
</tr>
<tr>
<td></td>
<td>VHF RADIO 1</td>
</tr>
<tr>
<td>LAND</td>
<td>HIDE 2</td>
</tr>
<tr>
<td></td>
<td>LETTER BINS 2</td>
</tr>
<tr>
<td></td>
<td>SIGN BOARDS</td>
</tr>
<tr>
<td>ELECTRONIC</td>
<td>DESK TOP 2 OLD COMPUTERS 2 NEW COMPUTERS</td>
</tr>
<tr>
<td></td>
<td>NOTEBOOK 2 OLD NOTEBOOKS (LAPTOPS)</td>
</tr>
<tr>
<td></td>
<td>CAMERA DIGITAL PENTAX OPTIO W20 7.0 MEGAPIXELS AND UNDERWATER HOUSING.</td>
</tr>
<tr>
<td></td>
<td>VIDEO CAMERA 1</td>
</tr>
<tr>
<td></td>
<td>PROJECTOR 1</td>
</tr>
<tr>
<td></td>
<td>INTERNET WIRELESS BROAD BAND</td>
</tr>
<tr>
<td></td>
<td>TELEVISION SONY 22”</td>
</tr>
<tr>
<td></td>
<td>VCR TOSHIBA</td>
</tr>
<tr>
<td></td>
<td>STEREO 1 SONY CASSETTE RECORDED/CD PLAYER</td>
</tr>
<tr>
<td></td>
<td>FRIDGE 1</td>
</tr>
<tr>
<td></td>
<td>FIELD GLASSES 2</td>
</tr>
<tr>
<td></td>
<td>PH METER</td>
</tr>
<tr>
<td></td>
<td>WATER TEST KIT 1</td>
</tr>
<tr>
<td></td>
<td>GPS 1 OLD HAND HELD</td>
</tr>
<tr>
<td></td>
<td>FIRST AID KIT 1</td>
</tr>
<tr>
<td></td>
<td>OXYGEN KIT</td>
</tr>
<tr>
<td>OTHER</td>
<td>OTHER MISCELLANEOUS STORAGE ITEMS, 1 TENT (10FT X 20FT), 7 X PLASTIC CHAIRS, 5 X MONGOOSE TRAPS, 4 DIVING KNIFE, 4 FLASHLIGHT, 2 NET BAG.</td>
</tr>
</tbody>
</table>

Transport
4x4 truck

Land infrastructure
- Sign boards.
- Trail Markers.
- BBQ pits.
- Trails.
- Car parks.
- Fences.
- Roads.
- Litter Bins.
- Picnic tables.
- Benches.

Other (these can be shared with St. Maarten Marine Park)
- Fax Machine.
- Telephone.
- VHF radio.
- Base station.
- Signboards.
- Computers.
- Laptop computers.
- Camera.
- Projector.
- Screen.
- Internet.
- Field Glasses.
- Maintenance Equipment.
- First Aid kit.

Figure 21: Examples of physical resources required for St. Maarten Land Parks
2.7.1. INFORMATION SOURCES

Each of the factors listed in Table 14 have been identified by Kenchington, R. A. (1990). (Managing Marine Environments, Taylor and Francis, New York), or through the DCNA Management Success Project as important background information for the running of any Protected Area. A good source of information is considered to be recent, comprehensive and easily accessible.

**Table 14**: Sources of information available to Nature Foundation St. Maarten

<table>
<thead>
<tr>
<th>Information</th>
<th>Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geological maps</td>
<td>†</td>
</tr>
<tr>
<td>Baseline habitat maps</td>
<td>†</td>
</tr>
<tr>
<td>Community descriptions</td>
<td>†</td>
</tr>
<tr>
<td>Species lists</td>
<td>†</td>
</tr>
<tr>
<td>Status of commercially important species</td>
<td>†</td>
</tr>
<tr>
<td>Status of endangered, threatened and endemic species</td>
<td>†</td>
</tr>
<tr>
<td>Aerial photographs</td>
<td>✔</td>
</tr>
<tr>
<td>Digital Satellite Images</td>
<td>†</td>
</tr>
<tr>
<td>Hydrological survey</td>
<td>-</td>
</tr>
<tr>
<td>Land use plans</td>
<td>-</td>
</tr>
<tr>
<td>Topographical maps</td>
<td>-</td>
</tr>
<tr>
<td>Economic valuation</td>
<td>-</td>
</tr>
<tr>
<td>Cultural valuation</td>
<td>-</td>
</tr>
<tr>
<td>Traditional usage</td>
<td>†</td>
</tr>
<tr>
<td>Current use and usage levels</td>
<td>†</td>
</tr>
<tr>
<td>Socio-economic survey</td>
<td>-</td>
</tr>
<tr>
<td>User Fee Survey</td>
<td>†</td>
</tr>
<tr>
<td>Other</td>
<td>-</td>
</tr>
</tbody>
</table>

✔ = Good source, † = available but insufficient, - = not available
2.8. Human Resources

2.8.1. STAFF

Three staff members work for Nature Foundation St. Maarten, one ranger works full time on the Marine Park while the Manager and Office Administration spend some time on terrestrial issues. The roles of the staff members are outlined below. No staff have been appointed to a Terrestrial role that might serve St. Maarten Land Parks. This is because of a lack of capacity and the fact that NAFSXM has no mandate for management of a terrestrial park. Initially a full-time manager and a ranger will be required to be responsible for basic operational tasks. St. Maarten Land Parks staff need to be part of NAFSXM so the management of the MPA and TPA can be carried out by one organisation.

Table 15: NAFSXM staff.

<table>
<thead>
<tr>
<th></th>
<th>MPA/TPA Time split</th>
<th>Years of service</th>
<th>Academic qualification</th>
<th>Special police powers</th>
<th>VHF radio operator</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>Park safety/law</th>
<th>Park stakeholders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manager</td>
<td>50/50</td>
<td>2</td>
<td>MSc</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Beverly Mae</td>
<td></td>
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<tr>
<td>Nisbeth</td>
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<tr>
<td>Accounts and</td>
<td>50/50</td>
<td>1</td>
<td>BA</td>
<td>✓</td>
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<tr>
<td>Office Admin.</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Marisa Brandy</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
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</tr>
<tr>
<td>Etienne Laake</td>
<td>100/0</td>
<td>1</td>
<td>Diploma</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Marine Park</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Ranger</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

2.8.2. VOLUNTEERS

Local volunteers should be recruited to help with the management tasks of the proposed St. Maarten Land Parks. This would serve two important functions; involving local stakeholders and providing human resource to an otherwise understaffed Protected Area. International volunteers could also be used to increase the human resources available.

2.8.3. INTERN PROGRAMME

Interns are a useful human resource for coordinating volunteer activities for the e.g. trail maintenance, sign building, species monitoring, planting, and maintenance. Additional activities for interns could include participation in school presentations, collection of fees from tourists, and ensuring maintenance of general use areas.
2.9. **Finance**

2.9.1. **Overview**

Nature Foundation St Maarten relies on income from grant funding for projects and to cover operational costs (Table 16 Error! Reference source not found. and Figure 22). The main expenditures for NASXM are wages and operating costs (Table 17). Further financial figures can be seen in Appendix 3 – NAFSXM’s annual Report.

**Table 16: NAFSXM sources of income 2007.**

<table>
<thead>
<tr>
<th>INCOME</th>
<th>US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grants DOEN</td>
<td>$90,866</td>
</tr>
<tr>
<td>Grants IUCN</td>
<td>$20,588</td>
</tr>
<tr>
<td>Grants PBCF</td>
<td>$32,950</td>
</tr>
<tr>
<td>Grants WWF-INNO</td>
<td>$12,723</td>
</tr>
<tr>
<td>Grants EOS</td>
<td>$80,247</td>
</tr>
<tr>
<td>Grants SHHC</td>
<td>$14,045</td>
</tr>
<tr>
<td>Donations, souvenir sales Charitable donations</td>
<td>$ 110</td>
</tr>
<tr>
<td>Donations, souvenir sales CITES permits</td>
<td>$ 40</td>
</tr>
<tr>
<td>Donations, souvenir sales Sale of books</td>
<td>$ 206</td>
</tr>
<tr>
<td>Donations, souvenir sales PJIA</td>
<td>$28,090</td>
</tr>
<tr>
<td>Donations, souvenir sales Notarispraktijk Schaepman N.V.</td>
<td>$ 500</td>
</tr>
<tr>
<td>Donations, souvenir sales AUC</td>
<td>$ 1,800</td>
</tr>
<tr>
<td>Other income Loan Disbursement</td>
<td>$20,000</td>
</tr>
</tbody>
</table>

**Figure 22: NAFSXM sources of income 2007.**

**Table 17: NAFSXM Expenditure Jan - Dec 2007**

<table>
<thead>
<tr>
<th>Human Resources</th>
<th>Wages</th>
<th>$96,692</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Resources</td>
<td>Other staff related costs</td>
<td>$3,193</td>
</tr>
<tr>
<td>Human Resources</td>
<td>Accountant</td>
<td>$1,978</td>
</tr>
<tr>
<td>Transportation</td>
<td>Car Maintenance</td>
<td>$2,542</td>
</tr>
<tr>
<td>Transportation</td>
<td>Boat Maintenance</td>
<td>$4,754</td>
</tr>
<tr>
<td>Transportation</td>
<td>VHF permit</td>
<td>$169</td>
</tr>
<tr>
<td>Transportation</td>
<td>Maintenance Marine Park</td>
<td>$3,953</td>
</tr>
<tr>
<td>Office</td>
<td>Mortgage</td>
<td>$1,882</td>
</tr>
<tr>
<td>Office</td>
<td>New Office</td>
<td>$16,782</td>
</tr>
<tr>
<td>Office</td>
<td>Supplies/rates</td>
<td>$13,944</td>
</tr>
<tr>
<td>Equipment</td>
<td></td>
<td>$14,365</td>
</tr>
<tr>
<td>Information and education</td>
<td>Printing Annual Reports</td>
<td>$4,544</td>
</tr>
<tr>
<td>Travel</td>
<td></td>
<td>$6,253</td>
</tr>
<tr>
<td>Other</td>
<td>Bank charges general</td>
<td>$56</td>
</tr>
</tbody>
</table>

The organisation needs an additional finance to cover annual operational costs in the long term. Work is ongoing with DCNA to establish a Conservation Trust Fund for one terrestrial and one marine park on each of the six Dutch Caribbean islands. This will help secure additional
operational funds, however the Trust Fund cannot be touched until earliest 2016 making it necessary to explore additional sources of income.

2.9.1.1. Grants
By developing St. Maarten Land Parks, Nature Foundation St. Maarten will qualify for a wider range of grants from local and international funding bodies. This will help the foundation to become financially sustainable.

2.9.1.2. Government Subsidies
As noted in the Nature Conservation Ordinance St. Maarten, the Executive Committee of the Government can grant financial compensation for the costs of implementing a St. Maarten Land Parks Management Plan to ‘those who can exercise a real right with regards to areas of the nature park’ (Article 9, Section 3).

2.9.1.3. Sales and Fees
Souvenir sales and sales of any renewable forest resources could be a possible source of income for Nature Foundation St. Maarten from the St. Maarten Land Parks. Fees are an important source of finance that should be used for Nature Foundation St. Maarten. On St. Eustatius, STENAPA has designed a fees system focussing on watersports and the users of the terrestrial parks; this is outlined in Error! Reference source not found. and could be a starting point for further developing the fees system for Nature Foundation St. Maarten.

**Box 10:** Current and proposed fees systems for users of the STENAPA Protected Area’s

(source: STENAPA)

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

2.9.1.4. Other Income
Donations and other contributions could add to Nature Foundation St. Maarten’s income. A friends of Nature Foundation St. Maarten scheme could be set up whereby members pay an annual subscription fee of varying amounts that goes directly into nature conservation on the island. In return, the members receive clothing, concessions, stickers, guided walks, National Park Admission Tags etc. A similar scheme has been successfully established on St. Eustatius. Other sources of income include fines and rent e.g. camp site fees.
### 2.10. Stakeholder Identification

Involving local communities (and other stakeholders) in regular, effective participation is essential for successful PA management. It is particularly important for the management of terrestrial environments to work very closely with those using the land resources directly and those using adjacent marine environments. This is because these areas are intrinsically linked by natural flows and processes. On St. Maarten this will be made possible by the work of St. Maarten Marine Park and the proposed St. Maarten Land Parks being managed by one foundation – Nature Foundation St. Maarten.

An important step in establishing effective stakeholder relationships is to identify the stakeholders and their likely roles within St. Maarten Land Parks. Initial steps have been taken to develop relationships with the key stakeholders in Table 18. When issues arise on a day to day basis and other projects are established, effectively identifying and prioritising the key stakeholders is essential to guarantee that all necessary groups are considered whilst ensuring transparency.

**Table 18:** Stakeholder profiles of the proposed St Maarten Land Parks (those in italics were not consulted with for this plan, but should be included in any future consultations)

<table>
<thead>
<tr>
<th>Group</th>
<th>Stakeholder</th>
<th>Stake</th>
<th>Benefits of involvement</th>
<th>Management Strategy</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public departments</td>
<td>VROM(^8), Head of Culture Department, Project Planning Bureau DPP.</td>
<td>Decision making for island developments and tourism</td>
<td>Increase successful lobbying, legal, logistical, and financial support</td>
<td>Regular contact and involvement</td>
<td>Management, Board</td>
</tr>
<tr>
<td>NGOs</td>
<td>Emilio Wilson Estate Foundation, Sint Maarten National Heritage Foundation, the Emilio Wilson Historical &amp; Cultural Park Foundation, St. Maarten Pride Foundation.</td>
<td>Partners in conservation on St. Maarten. In co-management of EWE</td>
<td>Contribution to knowledge and any work relevant to the NGO.</td>
<td>Regular consultation and training</td>
<td>Staff, Management, Board</td>
</tr>
<tr>
<td>Tourism sector</td>
<td>Tourist Bureau, St. Maarten Hospitality and Trade association.</td>
<td>Service to those coming to visit St. Maarten.</td>
<td>Support for conservation activities, outreach for visitors.</td>
<td>Regular contact and involvement, Information.</td>
<td>Staff, Board, Management</td>
</tr>
<tr>
<td>NAFSXM Staff</td>
<td>Manager and office assistant ranger.</td>
<td>Governance of NAFSXM</td>
<td>Representative, co-management board to guide decisions.</td>
<td>Regular consultation and training</td>
<td>Management, Board</td>
</tr>
<tr>
<td>NAFSXM Board</td>
<td>7 members</td>
<td>Governance of NAFSXM</td>
<td>Representative, co-management board to guide decisions.</td>
<td>Regular consultation</td>
<td>Management</td>
</tr>
<tr>
<td>Tourists</td>
<td>Hikers, Cruise visitors</td>
<td>Visits to the Protected Area's, spending on local goods and services</td>
<td>Income for the island, developing the islands profile internationally.</td>
<td>Information, Education, Outreach</td>
<td>Staff</td>
</tr>
<tr>
<td>Community</td>
<td>Local users, school children</td>
<td>Use of Protected Area's, support for Protected Area's</td>
<td>Ownership will improve chances of conservation success.</td>
<td>Information, Education, Outreach</td>
<td>Staff Management Board</td>
</tr>
<tr>
<td>Partners</td>
<td>Archaeologists SIMARC, EPIC.</td>
<td>Assistance with building capacity</td>
<td>Development of capacity to manage.</td>
<td>Regular consultation and training</td>
<td>Staff, Board, Management</td>
</tr>
<tr>
<td>Media</td>
<td>Radio station, Herald reporters</td>
<td>Publication of outreach materials, articles and publicised events</td>
<td>Execution of communications plan, awareness raising.</td>
<td>Regular consultation and training</td>
<td>Staff management</td>
</tr>
<tr>
<td>Government</td>
<td>Island Council</td>
<td>Decision making various aspects of island life, Island representatives</td>
<td>Raise conservation's profile on island and regionally. Successful lobbying</td>
<td>Regular consultation and training</td>
<td>Management, Board</td>
</tr>
<tr>
<td>Law enforcement</td>
<td>Public Prosecutor, Chief Police Inspector</td>
<td>Consultee for enforcement and legislation.</td>
<td>Guidance, training, enforcement.</td>
<td>Regular consultation and training</td>
<td>Management, Board</td>
</tr>
</tbody>
</table>

\(^8\) VROM (planning, housing, spatial development, environment),
2.11. Stakeholder Input

Stakeholders of St. Maarten Land Parks were consulted with extensively in December 2007 and April 2008 to obtain feedback on various aspects of the Management Plan. The consultations were carried out using meetings and questionnaires (Table 19). 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.

Table 19: Stakeholder consultation methods.

<table>
<thead>
<tr>
<th>Group</th>
<th>Meeting</th>
<th>Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public departments</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>NGOs</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>Tourism sector</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>Staff</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>Board</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>Tourists</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>Community</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>Partners</td>
<td>✔</td>
<td></td>
</tr>
</tbody>
</table>

2.11.1. Meeting Feedback

The following pages summarise the main threads of input from the stakeholder meetings held in December 2007 and April 2008. Feedback from stakeholder meetings relating to the Vision, Mission, Goals, the Management Plan structure, and values of St. Maarten Land Parks have been incorporated into the text. Each of the comments below involved either extensive discussion or occurred in more than one meeting, they are not written in any particular order.

2.11.1.1. Uses

General

- “Now is a good opportunity to develop ideas in these areas as there is little history of public use – starting from scratch”
- People need to enjoy and use these areas responsibly. Hence rules and regulations are necessary. Plus their enforcement is important. We need to be careful not to open up the areas too much.
- There are possible important historical sites on both areas
- Planting of fruit trees and examples of agriculture as it used to be on an agricultural station with give a cultural perspective.

Future usage

- Funding is needed and/or income generation: a fee structure is needed for things like hiking; a visitor centre; possible business creation (such as local guides or concessions), and; hiking and biking trails
- Could add the possible development of a nursery on the estate. Also maybe a visitor centre, museum and historical resource centre on the park area.
- A need to be clear about your product i.e. It’s (the EWE) not another Loterie Farm. There will be low key areas with hiking trails, bird watching, etc. There are some cruise ship visitors who are environmentally conscience and so could come in small groups e.g. on guided hikes like on Saba, or as individuals (if promoted to them). If a relationship was developed with taxi drivers to include the 2 areas when giving an island tour to people wanting this kind of experience.
- There could be a demonstration area about environmental issues/alternative energy on the EWE.
- Can’t have high impact activities here – need to assess carrying capacity of both areas.
2.11.1.2. **ZONATION**

- It’s (EWE) not zoned yet for conservation (in the land-use plan) but it will be in 1-1 1/2 years time. “We don’t need to own a place to zone it”. “We need a healthy relationship with the owners”. Within the estate the historical network of paths should be kept (including along the crest of the hill), then elsewhere should be kept as ‘full conservation zones’ i.e. the steep bits. There should be a ‘recreation zone’ e.g. parking, visitor centre, etc.
- “Leave it as it is as much as possible – not too many trails”.
- The historic paths are important.
- “Keep the old walls as they’ve been there for hundreds of years and are important in erosion/water control”
- Agreement about the 2-fold approach: government zoning for conservation, and zoning for different levels of use within the parks. Ecotourism can work, tight controls can keep people to the trails and road access to the parks will be needed. There can be different lengths/degrees of difficulty of trails.
- Seems logical on the EWE to have visitor facilities near the road and leave the remainder of the hill quiet, though there should be some controlled agriculture and trails as well as remote areas. “Effectively this lower area already is a high impact formal site with parking and a bar”.
- A 'Monuments Use Plan' has been suggested by Dr. Jay Havisier, and includes monuments that are within the proposed St. Maarten Land Parks (Appendix 2).

![Image 13: The EWE viewed from Sentry Hill with visitor facilities near the road (source: Jan Blok)](source: Jan Blok)

2.11.1.3. **ISSUES**

**Management Issues**

- Concerns about one group on the island 'hi-jacking the agenda'.
  
  **Ownership**
  
  - Possible threat is landowners not wanting to sell.
  - Currently land ownership is a bar to getting on with the plan. Past proposals to put in trails were blocked by the owner of Geneva Bay because of fears over public safety and liability, as well as an objection to too many cars going down that road.

  **Governance:**
  
  - Lack of a government national park policy plan – this plan should not just be an exercise
  - There is a need for policy support for this plan. Key stakeholders should write a joint letter to the Lieutenant Governor “It’s important that we work together and form a partnership”. We need a legal framework.

  **Working with constituents**
  
  - There is a need for government support for this plan, though “In government some people see environment as standing in the way of economic development......Environment is not a priority in govt. right now, it’s poverty reduction”.


• Key point: “There is public support for the EWE because of its high profile and local people’s links to it. We need to do the same for all the parks by raising awareness and explaining about their value. There isn’t a history or tradition of on St. Maarten. The indigenous people are in a minority here and need to get their voice heard”.

  Enforcement
• Enforcement will be essential to counter the ‘roaming youth’ (as opposed to roaming animals elsewhere…….) e.g. a grounds keeper is needed at the EWE.
• The 2 other major issues remain funding and lack of human resources.

Current Issues
  Development
• For some people the proposal for a new road through the lower half of the estate could be a useful limiting boundary, whilst for others it destroys the integrity of the estate. Other threats would be: possible future development for tourism e.g. hotels; and; natural threats such as hurricanes, flooding and wash outs.
• Tourism development pressure – need political support to resist it.
  Visitor numbers
• Worry about people pressure – need to control numbers
• Need for enforcement.
• Currently land ownership is a bar to getting on with the plan. The Emilio Wilson Park is managed separately from the estate, although naturally this is a gateway into the estate.
• There is no need to fear the pressure of tourism/recreational activities. ”We can decide how many people use the trails per day, for instance”. Plus certainly Back/Geneva Bay is out of the way and has limited parking and narrow road access – never likely to get coaches up there.
• There’s a concern that if facilities are installed it will attract ‘the wrong kind of people’ and vandalism. “We don’t want seats and litter bins everywhere”. But a view indicator at Back Bay would be good.
• Litter/pollution – more education needed in schools.
  Invasive species
• Other island-wide issues which could affect the 2 areas are: monkeys (imported from St. Kitts – estimated to be around 70 at present) which harass dogs and sometimes people; other invasive species such as mongoose, raccoons and slider turtles in ponds.

Image 14: View of St Johns where development up hillsides threatens the values of St. Maarten’s terrestrial environment (source: Jan Blok)

Future issues
• The impact of the new road on the EWE if it goes in.
2.11.1.4. **MANAGEMENT ACTIVITIES**

*Monitoring and research*
- A need for an inventory survey before the plan is implemented (there was a 1996 report about the nature plus others about archaeology and cultural history), plus you need to make use of the existing govt. cultural policy.

*Information-Education-Outreach*
- Need interpretation on both sites

*Resources*
- Need staff – quantity and quality, including the training of local people to work on these sites.

2.11.2. **QUESTIONNAIRES**

A total of 159 questionnaires were completed by the community, schools and visitors. Four key questions were asked relating to values, uses, issues and outreach. Answers were provided in a structured format, copies of the questionnaires and the results can be seen in Appendix 5. The results were analysed in detail to evaluate the responses of each stakeholder group.

1. What is the most important part of St. Maarten’s environment for you?

![Diagram showing survey results]

**Figure 23:** Questionnaire results: Values.

The Natural environment is the most important aspect of St. Maarten for 55% of the respondents, in particular for the local community and schools. Visitors consider the recreational values of St. Maarten to be the most important. The local community and schools also considered Historical Sites, Culture and Animals and plants to be of importance. Significantly, school respondents did not place much value on the recreational possibilities provided by St. Maarten’s environment.
2. Which activities do you take part in?

Most respondents use the terrestrial environment for picnicking and BBQ’s with 87 of 159 taking part. 50% of the respondents (mostly the local community and schools) use open spaces for sport activities. Cultural events, hiking and tours also featured highly as activities that Visitors in particular take part in. School pupils have relatively little experience of Wildlife spotting and tours.

3. Which of the following do you see as the most important challenge facing Terrestrial Environment of St. Maarten?

Pollution, Over Development and Over population are all issues that are linked to one another and considered to be the most important challenge facing any management of the terrestrial environment of St. Maarten. 62% of respondents saw Pollution as an issue and 57% saw overdevelopment as an issue. These 2 issues were the most significant from the point of view of visitors.
4. Would you make use of maps, brochures, presentations, staff or buildings?

![Bar chart showing the number of respondents that might make use of facilities]

**Figure 26: Questionnaire results, outreach.**

Respondents were asked hypothetically which outreach and information sources they would make use of. 43% of people asked indicated Tours would be the most frequently accessed. The local community representatives indicated that a Botanical Garden and/or a visitor centre would be frequently visited.

**2.11.2.1. COMMENTS**

The questionnaires used had 'Other' categories for each question to allow respondents to express alternative views. Comments were also welcomed in addition to the responses solicited, these are summarised below:

**Question 1**
- Other: sustainable development and reclaiming green spaces
- Is there “environment” on this island under all that concrete?
- Living in a well cared for environment

**Question 3**
- It’s not reclamation because it’s not ours to claim, let alone reclaim
- The identification of individual habitats
- Because of over population, pollution and deforestation are also prevalent. If this were curtailed so would the others

**Other comments**
- The environment is the most important – a clean environment means healthy people.
- I would like to see more green areas on the island, but also have them properly maintained – and here is the problem – Who is responsible? The Government?
- Get rid of garbage
- Restore culture and history completely
- I don’t know about the relationship between TNF and Govt. but co-operation on a comprehensive conservation policy for remaining untouched areas would be great.
- Further support for the upkeep and help make the island aware of our environment.
- Development and environment are at odds – an unlikely portfolio for govt.
- Hiking trails could be properly identifies, tended and documented i.e. guide books and maps. Should be accessible to all not just the Heritage Foundation and their monthly hikes.
- Give locals a chance to save the environment e.g. working holidays, tending the forests, cataloguing flora and fauna. It would be helpful and educational after an initial investment of time and effort to set up.
2.11.3. **St. Maarten Tourism Master Plan Report Input**

In 2005 the St. Maarten Tourism Master Plan was published involving numerous tourism partners, community councils, youth organizations, government officials and representatives from the neighbouring Leeward Islands. The following exerts from the document are the most relevant for the St. Maarten Land Parks. The following text has been adapted from TourMap (2005), and the full document can be seen in Appendix 5.

**Box 11: Tourism Master Plan Key findings**

*Findings*
The fundamental appeal of St. Maarten is nature-based – scenery, topography, the ocean and the natural attractions of the island. As such the destination and the quality of the experience which it delivers are extremely sensitive to the quality of the environment. Tourists assigned a high priority to good environmental practice and identified several issues which the tourism strategy would need to address. These issues included:

- Protection of the natural environment.
- Waste management/pollution.
- Land use planning.
- Visual pollution.

Emerging from the consultations and interviews with tourism operators the principal concerns focused on:

- Unregulated development and encroachment of coastline and hillsides.
- Marine and waterway pollution, including the Salt Pond, the Lagoon and bays.
- Litter, rubbish collection and dumping, disposal of used vehicles and batteries etc.
- Visual pollution – advertising hoardings, building designs incompatible with surroundings, etc.
- Vehicle emissions and noise pollution.

Only one out of four tourism operators consider the performance of government to be ‘adequate’ or better in regard to protection of the environment.

Almost two thirds of tourism stakeholder respondents considered that the tourist industry on St. Maarten is not sufficiently conscious of the relationship between the environment and tourism. This would suggest an opportunity for the tourism sector to project a more pro-active role in this critical area. However, there is some scepticism as to whether the tourism sector is prepared to bear the cost of good environmental management practices within the sector.

**Box 12: Tourism Master Plan Recommendations.**

*Recommendations*

Government should:

- publicly engage with the St. Maarten Nature Foundation and other relevant parties.
- develop a consensus on the critical environmental issues facing St. Maarten.
- take steps to update and, where necessary, strengthen the existing legislation to close any loopholes.
- work with the Nature Foundation and relevant government departments to provide the resources needed to ensure compliance in all practices which do or are likely to impact negatively on the quality of the St. Maarten physical environment.

Regular monitoring (to international standards) of pollution levels within the St. Maarten physical environment would, in many cases, make it possible to identify pollution in the early stages of development and help prompt corrective actions before environmental damage becomes irreversible.
Image 15: Development around the coast for tourism has left few natural areas on St. Maarten (source: Jan Blok)

Box 13: Tourism Master Plan Summary

Summary
Tourism, which is the primary source of income on St. Maarten, often fuels or in some cases is the sole catalyst of many of these issues, when improperly managed. Traditional tourism management can cause many negative social and environmental impacts and in so doing threatens the tourism industry’s prospects for continuous prosperity. Over- and improper development destroys mangroves and wetlands, yachts and divers damage coral reefs, and hotels and cruise ships often discharge raw sewage into ponds, lagoons and the sea. It is of vital importance to a tourism destination that nature and environment are healthy and well maintained. Tourists are drawn by the islands biodiversity and unique natural and cultural characteristics. The preservation of these aspects all depend on a clean environment. A polluted environment or lack of natural values, if not properly addressed, could in time lead to the demise of tourism. While improperly managed tourism development often has negative impacts on the environment, tourism can also pay a significant contribution to environmental protection when managed in a sustainable manner. This emphasises the fact that tourism and environmental protection are interrelated and co-dependent.

The implementation and enforcement of proper environmental legislation, planning and assessment procedures are important aspects of environmentally sustainable tourism development. In order to achieve a sustainable balance between environmental protection and tourism development Sint Maarten’s Government Departments (VROM, ROB), Environmental as well as Community based NGO’s and community representatives should have a more prominent role in deciding which opportunities for tourism development can be sustained over the long term. Acceptance of the limits to development due to the lack of space, the carrying capacity of the island’s natural resources and the need for sustainable action should be a guiding principle in the management of St. Maarten’s tourism development.
2.12. Issues
The proposed St. Maarten Land Parks face a range of issues, some of which have historically pressured management and the natural resources of St. Maarten. The proposed areas are currently challenged with constraints on management and external issues that can be human-induced or natural, and may originate from within the areas or from beyond their 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 facing St. Maarten Land Parks are accounted for at the end of this section.

2.12.1. Historical Issues
Historical issues are pressures on, and threats to, the values of the proposed areas that have been identified in the past. No historical issues were raised during stakeholder consultations, since the Protected Area’s do not exist and a knowledge gap exists with regards to specific information about historical threats. Development and the construction of roads and houses was mentioned as a persistent threat that has a catastrophic impact on the values of the environment of St. Maarten.

2.12.2. Management Issues
As there is currently no active management of St. Maarten Land Parks many stakeholders found the exercise of identifying existing or future management issues a difficult task. However, the following issues were raised:

2.12.2.1. Resources
Staff/finance
At present there are no allocated staff or funding resources for St. Maarten Land Parks. These are essential for an actively managed Protected Area.

Information sources
There is a significant amount of information about St. Maarten’s flora and fauna; however specific site inventories are outdated and incomplete. The information available is insufficient for management as it is not in an accessible format.

2.12.2.2. Governance
Legislation
There is no enforced legislation offering protection to the terrestrial or marine environments of St. Maarten. Adoption of the St. Maarten Nature Ordinance is required to consolidate the hillside policy and designate protected areas on the island. Legislation relating to the import and export of flora and fauna also needs to be strengthened to protect St. Maarten’s natural resources.

Ownership
Other than the 9ha area of the EWE that is leased, none of the Land in this proposal is owned publicly or by one of the conservation organisations of the island. The land of Geneva Bay, The Hilltops and the EWE are privately owned and the private owners may seek to profit from the land by selling the land for residential or commercial development.

Institutional organisation
A number of groups on the island have an interest in the EWE, and some also have an interest in the proposed other Parks of St. Maarten. Without a clear mandate for each organisation, and a clear co-management structure, Nature Foundation St. Maarten risks investing scarce resources in an unsustainable Protected Area development project.

2.12.2.3. Working with Constituents
Government
Government support is essential to establish policies and legislation.

Community
There is little awareness amongst the population about the value of the EWE and other proposed areas for St. Maarten Land Parks. Information, education and outreach is very limited about the
terrestrial environment resulting in a lack of a sense of ownership, support for management, involvement in decision-making and partnership building.

### 2.12.3. Current 'external' issues

External issues are those that arise beyond the operations of Nature Foundation St. Maarten, and are a source of threat to the resources or values associated with the Proposed Protected Areas.

### 2.12.3.1. Climate change and natural disasters

**Climate change**

Climate change will increase biodiversity loss, affecting both individual species and their habitats. Vegetation zones are typically expected to move towards higher latitudes or higher altitudes following shifts in average temperatures. The vulnerability of an ecosystem to climate change depends on its species’ tolerance of change, the degree of change, and the other stresses already affecting it. For example, where land is cleared for development, increased temperatures and changes in rainfall may prevent plants from growing back, resulting in increased erosion and all the associated problems. In addition, disturbances such as fires, floods and insect plagues are expected to become more frequent as conditions change. The table below summarises the likely effects of climate change on St. Maarten and its habitats.

**Table 20:** Likely impacts of climate change on St. Maarten (adapted from: www.unep-wcmc.org)

<table>
<thead>
<tr>
<th>Landscape type</th>
<th>Key climatic variables</th>
<th>Implications for biodiversity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-lying islands</td>
<td>• Relative sea-level rise</td>
<td>Loss of land area, seabird nesting colonies. Increased human demands on remaining terrestrial habitats</td>
</tr>
<tr>
<td></td>
<td>• Storm frequency and severity</td>
<td></td>
</tr>
<tr>
<td>Forests (general)</td>
<td>• Changes in rainfall, temperature and potential evapotranspiration.</td>
<td>Major changes in vegetation types, forests may disappear in certain areas at a rate faster than the potential rate of migration to, or re-growth in, new areas</td>
</tr>
<tr>
<td></td>
<td>• Increased frequency of fire and storms.</td>
<td></td>
</tr>
<tr>
<td>Tropical Montane Forest</td>
<td>• Changes in degree of cloud cover versus and sunlight hours</td>
<td>Drying out and invasion or replacement of montane species by lower montane or non-montane species</td>
</tr>
<tr>
<td></td>
<td>• Hurricane frequency and severity</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Drought frequency and annual rainfall distribution</td>
<td></td>
</tr>
<tr>
<td>Arid and semi-arid areas</td>
<td>• Precipitation patterns</td>
<td>With a few exceptions dry areas are expected to become hotter and drier</td>
</tr>
<tr>
<td></td>
<td>• Minimum winter temperatures</td>
<td>• Increased salinisation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Loss of grassland</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Loss of arable land</td>
</tr>
<tr>
<td>Mangroves</td>
<td>• Relative rate of sea-level rise, changes in hydrological balance in estuarine systems</td>
<td>Decrease in extent as coastal zone becomes &quot;squeezed&quot; between sea and inland agriculture</td>
</tr>
<tr>
<td></td>
<td>• Storm frequency and severity</td>
<td></td>
</tr>
<tr>
<td>Coral Reefs</td>
<td>• Sea-surface temperature, indirect chemical effects of higher CO2 concentrations in the water</td>
<td>Prolonged exposure to even minor (&gt;1°C) rises in temperature causes coral bleaching and may result in coral death</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Impacts may be compounded by chemical effects of increasing CO2 concentrations which could reduce calcification rates.</td>
</tr>
<tr>
<td>Wetlands</td>
<td>• Mean summer temperature</td>
<td>Increased variability in the hydrological cycle leaving inland wetlands to dry out with lower species diversity</td>
</tr>
<tr>
<td></td>
<td>• Mean annual precipitation</td>
<td>• Warming of 3 - 4°C. could eliminate 85% of all remaining wetlands</td>
</tr>
<tr>
<td></td>
<td>• Flooding</td>
<td></td>
</tr>
<tr>
<td>Coastal marshes</td>
<td>• Relative rate of sea-level rise, changes in hydrological balance</td>
<td>Habitat loss of estuaries and deltas, particularly where these are backed by agricultural or urban land, preventing natural retreat</td>
</tr>
<tr>
<td></td>
<td>• Storm frequency and severity</td>
<td>• Implications on migratory species and their flyway patterns</td>
</tr>
</tbody>
</table>
Natural Disasters
St. Maarten faces annual threats from hurricane damage. Hurricanes seriously damage habitats with the wind speeds in excess of 200 kph, erosion and increased runoff into the ocean through disproportionate amounts of rainfall in a small amount of time. A healthy habitat should recover in time, however, threats from grazing animals and invasive plant species will make full recovery slow, or perhaps impossible.

Other natural events that may have an impact on St. Maarten’s habitats include active 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 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. NAFSXM can also make a small yet vital contribution to the global effort by continuing to adopt environmentally friendly business and operating practices.

2.12.3.2. Development
Development for tourism infrastructure e.g. hotels, road, recreational facilities is a constant threat to the environment of St. Maarten. The main impacts of development are:
- Erosion problems resulting from the construction of the buildings, roads and a golf course,
- Loss of habitat.
- Expected soil, groundwater and marine pollution resulting from maintenance of gardens and of any change in land use.

Image 16: A road channels water and sediment from the slopes of St. Maarten into the marine environment (source: D.R. MacRae)

Construction of Link 7.
There are plans to building a road to provide access (Link 7) to St. Peter, as an alternative to the L.B. Scott Road, which is often jammed with traffic. The route for Link 7 follows the 60 metre contour line and dissects the Emilio Wilson estate. This will prevent animals and plants moving freely
around the area, disrupting the succession from the hilltops to the brook in the. Furthermore, the area will become less attractive for recreational use and management problems will develop in connection with accessibility.

2.12.3.3. **EROSION**
One of the main environmental consequences of development is erosion. Soil loss due to increased erosion does considerable damage to terrestrial and marine resources as the eroded material is no longer available for plants to use on land and also reduces water quality and smotheres coral reef organisms. The increased water running off the island also contains pollutants such as oil from roads, and fertilizers which directly kill marine organisms. The rainwater does not get the chance to soak into the soil and replenish the groundwater supplies, which dries out soil and stresses remaining plants.

2.12.3.4. **INVASIVE SPECIES**
Alien species that would not usually be found on the island often establish populations that threaten native wildlife and become invasive. They are usually introduced from agriculture, accidentally or when pets are released into the wild.

A small population of Green Monkeys (Chlorocebus sp), were taken as pets by slavers and transported with enslaved Africans, to Barbados, Saint Kitts, Nevis, and a population has established itself on St. Maarten. Although their population is yet to reach invasive levels (around 70 at present), they harass dogs and sometimes people.

Other invasive species such as mongoose, raccoons are a very serious threat to St. Maarten's native wildlife. These predators feed on the eggs, young and adult small animals of the island, including endangered reptiles and birds. Slider turtles in the ponds of St. Maarten are also efficient hunters, feeding on native plants and animals.

None of these alien species on St. Maarten have natural predators, so their populations are free to grow until their food resources are exhausted and St. Maarten is left with a massively reduced biodiversity.
2.12.4. **Future Issues**

There are a number of issues that are likely to arise in the future and will pose a threat to the values of St. Maarten’s terrestrial environment. Some of these are already serious threats on neighbouring islands, and may well already be issues on St. Maarten but are yet to be recognised. The establishment of St. Maarten Land Parks will uncover more threats that must be managed; the most likely are outlined below.

2.12.4.1. **Invasive Species**

*Corallita (Antigon leptopus)*

Corallita (also known as Mexican Creeper) is a vine that is often introduced as an ornamental species. It becomes a serious threat to native plants and animals by forming dense impenetrable thickets, smothering the natural vegetation, killing the native species which changes the structure and functions of habitats (Image Group 25). The plant grows very quickly and can grow from tiny fragments putting native species in shade restricting their growth. In some places, the plant has covered whole plant communities, including tree crowns, blocking the sunlight from reaching the leaf surface preventing the growth of the trees as well as under storey plants. Many beautiful and often valuable wild fruit trees are overgrown and killed. Although various countries have put the species on their list of pests which need control management, no fully effective control methods have been discovered.

*Image Group 25: Corallita forms dense thickets on St. Eustatius smothering native vegetation*  
(source: Kalli De Mayer)

The species is found at lower elevations, typically below 200m. Around 15-20% of St. Eustatius is covered by Corallita. Recent research carried out on St. Eustatius outlined the main threats from Corallita (Box 14)
Box 14: The main problems caused by Corallita on St. Eustatius (Ernst, J. J. & Ketner, P. (2007). Corallita Pilot project St Eustatius, Netherlands Antilles. ABC advice series.)

- Reduced development of natural vegetation, particularly on former arable fields, by smothering native plants under a thick carpet of branches and leaves.
- Reduced germination of native plants, which is a serious threat to the survival of rare species.
- Smothered trees and large shrubs along roads and in gardens.
- Modification of soil conditions developing a homogenous litter layer 20-30cm deep.
- Invasion of Protected Area’s, where it climbs into the tree crowns. From there seeds can disperse into the parks and germinate in open spaces.
- Threat to the status of the endangered lesser Antillean Iguana. Corallita is probably a threat to the natural diet and movement of the lizard when its habitat is overgrown.
- Ground lizards may be excluded from some areas.
**Free-roaming livestock**

Free roaming goats, sheep, donkeys and cows cause extensive damage to vegetation on large areas of land, which may become a problem on St. Maarten. The shrub layer can be reduced to bare soil because of feeding preferences; young shoots are eaten before having a chance to develop and reproduce. Considerable erosion problems develop in heavily grazed areas because there are no roots in the ground to help bind the soil together. Together with traditional agriculture which does not constantly protect the soil against erosion, this results in less rainwater infiltration in the soil and more runoff. This increased runoff is the driving force behind soil erosion. The fertile topsoil, an exhaustible resource is washed into sea, not only stripping the land but also polluting and smothering marine life and killing the coral reefs that the tourism industry depends upon. The extremes of these effects can be seen along the coast where all water concentrates its energy as it runs down the slopes and giant erosion gullies develop.

Roaming livestock are also a constant threat for crop farmers and backyard gardeners who need to invest in expensive fencing to protect crops.

**Bees**

Swarms of the Africanised Honey Bee have established themselves on St. Eustatius, and can be considered an invasive species as they compete with local species. They may come to represent a hazard to hikers and those using the outdoors on St. Maarten. The Africanized bee in the descended from 26 Tanzanian queen bees (*A. m. scutellata*) accidentally released by a bee-keeper in 1957 in the southeast of Brazil. The bees were the offspring of honey bees from Europe and southern Africa. Hives containing this particular species were noted to be especially defensive. Unfortunately, following the accidental release, the African queens eventually mated with local drones, and their descendants have since spread throughout the Americas and into the Caribbean.

The African Bee has specific characteristics that make it particularly well adapted to change and any attempts to remove it;

- Tends to swarm more frequently.
- Is more likely to migrate as part of a seasonal response to lowered food supply.
- Has greater defensiveness when in a resting swarm.
- Guards the hive aggressively, with a larger alarm zone around the hive.
- Has a higher proportion of "guard" bees within the hive.
- Deploys in greater numbers for defence and pursues perceived threats over much longer distances from the hive.
- Cannot survive extended periods of forage deprivation, preventing intrusion into areas with harsh winters or extremely dry late summers.

### 2.12.4.2. Collection / Hunting

If St. Maarten Land Parks are established, some species may be hunted within the designated areas. This may include the Iguana which is for its meat and for sale as a pet. Older individuals that are larger in size and preferred for meat produce more offspring. Some bird species may be hunted for food and plant species may be removed by collectors. The removal of individuals directly reduces the current population and reduces the viability of the population for the future.

#### 2.12.4.3. Visitor Numbers

Unmanaged visitation of the proposed St. Maarten Land Parks by the community and visitors may result in a range of issues including littering, vandalism and erosion. This will reduce the value of the Parks for recreational use and as habitats for the species living there.

#### 2.12.4.4. Constitutional Change

Future constitutional changes due to be implemented in 2008 are likely to affect finances, legislation and cultural aspects of the proposed St. Maarten Land Parks.
2.12.5. **ST. MAARTEN MARINE PARK ISSUES**

The main issues facing St. Maarten Marine Park were identified through the process of management planning in 2006/2007. Development and pollution were the most significant external issues facing the marine park which have implications for St. Maarten Land Parks planning; these are summarised in Box 15. Uncontrolled development on land not only removes habitat but seriously threatens other terrestrial and marine environments.

**Box 15: External issues facing St. Maarten Marine Park**

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*Development/conversion of land use*

Building developments for tourism are often carried out near to the waters edge. This presents particular problems for pollutants entering the marine park through bad practice. When it is windy or it rains, cement, sediments, bags and other site rubbish can be blown or washed into the sea if preventative steps are not taken. These can then cause considerable damage to coral reef organisms, seagrasses and mangroves. Other changes in land use such as agricultural development, new car parks, beach creation installation of platforms and piers can increase the amount of pollutants entering the sea through increased run-off and other changes in hydrology. Habitats can also be removed or affected by a change in land use or land use patterns e.g. turtle nesting beaches and coral reef. The main issues arising from stakeholder consultation input were:

- General severe concern over all new buildings on the island.
- The continuing development of hotels including the planned 3500 new rooms by 2010 (TourMap 2005, St. Maarten Tourism Masterplan) a severe threat to the natural values and use of St. Maarten’s marine resources.
- Concerns over the development of a new pier to support up to 8 cruise boats at once.

*Pollution*

Sewage is a source of major damage St. Maarten’s marine environment. Sewage makes its way into St. Maarten’s marine environment through inadequate waste water treatment and use. Sewage is a cocktail of substances, a number of which are dangerous marine ecosystems and can cause human illness. Terrestrial run-off from St. Maarten into the marine environment is a source of nutrients, sediments and other pollutants such as hydrocarbons (oil based chemicals), pesticides and herbicides, heavy (poisonous) metals. Ballast waters that are ejected from ships can contain and a range of pollutants and alien species which can become invasive, displacing native organisms. Jet fuel expelled from aircraft using the runway at Princess Julianna airport may also be having an impact on the marine environment. The main issues with pollution mentioned in the stakeholder meetings include:

- Considerable amounts of sewage and waste in Simpson Bay Lagoon.
- The water in Oyster Pond is Dutch owned but half of the surrounding land is French owned. The Oil storage facility located in the centre of the pond is used mainly by the French and leaks hydrocarbons into the water.
- Oil spills – concern over the protocol and ‘ownership’ of spills. SOL are the only company on the island with the equipment to contain spills and loose productivity of their own operation cleaning up other spills.
- Illegal fuelling – tax avoidance by fuelling from water based barges, fuel is also delivered to yachts. Illicit re-fuelling often results in leaks and spills. Litter from religious practices where items are given to the sea as offerings is an eyesore.
2.12.6. **SUMMARY OF ISSUES**

The main issues facing the proposed St. Maarten Land Parks have been identified through extensive stakeholder input (Box 16). Before Nature Foundation St. Maarten can address the variety of issues that the proposed St. Maarten Land Parks will face, the priority should be to develop management capacity. This can be achieved whilst lobbying with partners to prevent and development taking place on the proposed sites.

**Box 16:** Key issues and threats facing St. Maarten Land Parks.

<table>
<thead>
<tr>
<th>Management Issues</th>
<th>External Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Resources.</td>
<td>• Development.</td>
</tr>
<tr>
<td>– Staff/finance.</td>
<td>– Construction of Link 7.</td>
</tr>
<tr>
<td>– Information source.</td>
<td>• Erosion.</td>
</tr>
<tr>
<td>• Governance.</td>
<td>• Invasive species.</td>
</tr>
<tr>
<td>– Legislation.</td>
<td></td>
</tr>
<tr>
<td>– Ownership.</td>
<td></td>
</tr>
<tr>
<td>– Institutional Organisation.</td>
<td></td>
</tr>
<tr>
<td>• Working with constituents.</td>
<td></td>
</tr>
<tr>
<td>– Government.</td>
<td></td>
</tr>
<tr>
<td>– Community.</td>
<td></td>
</tr>
</tbody>
</table>

It is essential that an effective management strategy for these issues and threats is established and actioned. The recognition of the current key issues facing St. Maarten Land Parks 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. Maarten Land Parks which are likely to arise in the future, these can then be considered in current planning.
3.1. Introduction

The way Nature Foundation St Maarten management responds to the critical threats and persistent issues is likely to be the single most important factor affecting the immediate and long-term viability of the St. Maarten Land Parks. The ultimate mission is;

'To manage, conserve and restore St. Maarten’s natural, cultural and historical resources for education, preservation and sustainable use with continued stakeholder participation, for the benefit of current and future generations.'

Activities that build capacity, engage stakeholders, and/or promote policy actions are important contributors to the pursuit of the St. Maarten Land Parks mission. By carrying out specific strategies to address particular threats and issues identified by stakeholders, Nature Foundation St Maarten will continue to address the mission and goals effectively. The work schedule for the year 2008/2009 will have to be developed once there is capacity for Nature Foundation St Maarten to set about establishing St. Maarten Land Parks.

3.2. Key Strategies and actions

The key issues and threats facing the proposed St. Maarten Land Parks have been identified following extensive stakeholder input. The following strategies are considered critical by stakeholders for Nature Foundation St Maarten to deal with and should form the basis of management actions in pursuit of the mission, and goals of St. Maarten Land Parks. Stakeholders should be involved as much as possible and partners consulted, especially the DCNA for information and best practice sharing.

The strategies proposed address Management Issues, which relate to developing the management capacity of Nature Foundation St Maarten and External Issues which relate to threats facing the St. Maarten Land Parks from sources beyond the operations of Nature Foundation St Maarten.

3.2.1. Strategies for Management Issues

M1. Increase staff capacity.

A lack of staff restricts the work that can be carried out by NAFSXM in relation to developing St. Maarten Land Parks. Stakeholders widely recognised that NAFSXM does not have the staff capacity to actively manage any land parks on St. Maarten.

**Actions**

**Employ A Terrestrial Park ‘Manager’**

The efforts of Nature Foundation St Maarten staff are currently spread thinly over St. Maarten Marine Park, leaving little or no capacity for developing St. Maarten Land Parks. When finance becomes available via increased fees, funding or other source of income, staff capacity of NAFSXM should be expended by at least a TPA manager.

The employee should be sufficiently educated with an environmental background, ideally have a guide diploma and a working knowledge of Caribbean Terrestrial flora and fauna. Other qualifications that are desirable include Dutch and English language, first aid, project management, monitoring, fund raising, media and communications and experience working within Protected Area’s. An employee with these qualifications and experience will increase the capacity for Nature Foundation St Maarten to manage the St. Maarten Land Parks.

**Use local and international volunteers**

Train local people and international volunteers and interns to work in specific areas such as designing and delivering environmental education programmes, monitoring resources, trail maintenance and administration help.
M2. Pursue sustainable financing.
Limited sources of sustainable financing put pressure on Nature Foundation St Maarten’s limited human and physical resources, and increases reliance on project funding and volunteer workers.

**Actions**

*Introduce a compulsory nature fee for all visitors to the island.*
The implementation of a nature fee dependent on the amount of time visitors are spending on the island should be explored. A fee of $1 per night may suffice and could be added as a generic surcharge to the price of an overnight stay at all hotels and guesthouses. The contribution could be enforced as a compulsory tax through an island ordinance.

*Continue to explore other possibilities for finance.*
Continued liaison with DCNA to access the trust fund being developed to cover the operational costs of Protected Area’s on the DCNA islands. Explore the possibility of an airport levy and change collection boxes at the airport.

M3. Develop key information sources
There is a great deal of information that exists about the flora and fauna of St. Maarten; however, it is not in a form that is readily available to aid management, and is outdated.

**Actions**

*Develop active and accessible species data.*
To include species numbers, population sizes and distribution, this will be useful for establishing the St. Maarten Land Parks and for future Park Management. Species lists could be accessed via the Nature Foundation St Maarten website.

*Update Maps*
For effective conservation it is essential that up to date, detailed and relevant maps are available to NAFSXM staff, and users of St. Maarten Land Parks. To select and zone conservation areas a complete inventory is needed of all the locations of animal and plant species with particular conservation value, especially the 2 endemic plant species and the endemic Anolis lizard. Work with St Maarten Heritage Foundation to locate key cultural sites within the proposed St. Maarten Land Parks.

**Legislation**
The main legislative issues raised are dealt with within the following action points:

- Develop a comprehensive zoning plan.
- Clarify ownership and establish access.
- Consolidate institutional organisation.
M4. Clarify ownership and establish access.
Currently Nature Foundation St Maarten does not own or manage any terrestrial sites on St. Maarten. Most of The Emilio Wilson Estate is owned by private individuals with only 9ha on long lease to the Emilio Wilson Heritage Foundation. The Geneve Bay and Back Bay area is owned by large families and the Hill Tops are owned by multiple private individuals. St. Maarten Land Park management will be most effective with NAFSXM\(^9\) obtaining ownership of one or both areas. Given the organisation's financial situation this would only be possible using external financing.

**Actions**

**Identify and work with land owners**
Continue to work with the landowners of the area of the Emilio Wilson Estate which is not under lease. Identify and sensitise the landowners of Geneve Bay area and the hill range from Sentry Hill to Marigot Hill with targeted outreach about the development of St. Maarten Land Parks. Stakeholders recommended that attempts to manage the Williams Hill and Flagstaff hill range should be made as a last step to establishing St. Maarten Land Parks, although the landowners should be identified as soon as possible.

**Explore possibilities for purchase of Land on St. Maarten.**
Use the zoning plan developed to work with funders and partners (DCNA) to acquire funds for land purchase and management.

**Pursue legislation for ownership and access**
Lobby the island territory’s government to establish an ordinance to mandate Nature Foundation St Maarten with the management of St. Maarten Land Parks. Where necessary establish co-management agreements with other conservation organisations. Investigate any relevant legislation that may help with access and make use of existing government cultural policy.

\(^9\) and those organisations in co-management of the EWE.
M5. Consolidate institutional organisation

Nature Foundation St. Maarten was established to act as the sole management body mandated with the management of a Marine Park and Terrestrial Parks on St. Maarten. EcoVision / AIDEnvironment recommended that the management of the Parks on St. Maarten should be carried out by one institution to increase the effectiveness of conservation management on the island. Cooperation with the Emilio Wilson Estate Heritage Foundation and other partners applies specifically to the Emilio Wilson Estate area.

**Actions**

**Establish NAFSXM as the management body for St. Maarten Land Parks.**
Use the St. Maarten Land Parks Management Plan to define the role of Nature Foundation St Maarten as the body with the responsibility for management of St. Maarten Land Parks. This does not constitute one organisation ‘Hi-jacking the agenda’ (a concern expressed in stakeholder consultation), but clearly defines the one institution responsible for Park management as outlined in initial conservation planning documents. This will be an essential aspect for establishing and developing the St. Maarten Land Parks so efforts can be co-ordinated easily and stakeholders and other constituents see one united and defined front for conservation.

**Clearly define a co-management agreement for the EWE**
Nature Foundation St. Maarten should work with The Emilio Wilson Estate Foundation, Sint Maarten National Heritage Foundation, and the Emilio Wilson Historical & Cultural Park Foundation to develop a management plan for the area along side the NAFSXM priority to establish St. Maarten Land Parks.

**Lobby to establish Nature Foundation St Maarten as a statutory consultee**
Petition the Island Government to establish Nature Foundation St Maarten as a statutory consultee for any future developments, changes in land use, land use planning and any other related activities.
M6. Develop a comprehensive zoning plan

The government of St. Maarten lacks any cohesive vision, planning and regulation for nature conservation. Nature Foundation St Maarten should be involved in any vision forming and spatial planning from initial steps and therefore needs a clear zoning plan for the proposed sites managed for conservation. The zoning plans should also detail key aspects of management for each area.

**ACTIONS**

**Initial information gathering and preparation**
Define the goals of the zoning plan. Summarise relevant legal and policy documents and clearly define and detail current stipulations in the flora and fauna ordinance. Gather relevant conservation and management documents.

**Design of conservation zones**
Clarify current legislation in the zoning plan. A definitive, accurate map of the proposed St. Maarten Land Parks should be produced with detailed descriptions and locations of zones and their uses. Consider establishing zones for recreation, guided tours, research and conservation within the areas of the EWE, EWE Hillside area, Geneva Bay and Hill Tops. Include detail on the location of any information centres and signage. Consider future development of conservation zones to include the lagoons, any buffer zones required and co-ordination with the natural reserves on the French side.

*Clearly document, record and justify the decisions made at each step of the zoning plan design.*

**Stakeholder consultation**
Present the proposed zones for stakeholders; take into account comments and stakeholder needs through meetings and other relevant stakeholder consultation methods.

**Draft plan preparation**
Prepare a draft zoning plan, use detailed maps and brief tables of text to summarise the plan. Include justifications and stakeholder input within a brief report.

**Review of Draft**
Encourage stakeholder ownership by offering the final draft plan for review. Solicit review by internationally recognised peers working in the field of conservation and protected areas.

**Finalisation and future development**
Plan the implementation of the zoning plan, whilst working with the government to adopt spatial planning for the whole island. Use the clear ideas presented in the zoning plan to pursue the option to make NAFSXM a statutory consultee for any development projects or other projects that may have an effect on conservation. NAFSXM should develop a list of priorities and solutions regarding development.
M7. Increase interaction with constituents

A number of key stakeholders had very little regard for conservation or the environment; this included the government and local community. The main misunderstandings come from a lack of knowledge relating to the value of the environment, resulting in a lack of a sense of ownership, support for any management, involvement in decision-making and partnership building. There is public support for the EWE because of its high profile and because many local people have an affinity with the site.

**Actions**

**Targeted outreach**
Target groups with specific outreach (a proposal for a communication strategy is presented on Page 131. Possibilities include for outreach:
- Open guided hike days
- Distribute results of monitoring and research, especially recommendations and summaries.
- Coordinate with other organisations to promote St. Maarten as an outstanding, responsible tourism destination.
- 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. Maarten for a variety of audiences e.g. St. Maarten Airport, tourist office, harbour, restaurants/bars and hotels.
- Not all information should be saleable - some simplified leaflets should be free.
- Involve local and international volunteers of all ages with volunteer work.
- Develop a programme to engage with conservation efforts on the French side of St. Maarten.
- Ensure effective interpretation on all sites under management of St. Maarten Land Parks.

**Staff training:**
Develop staff and board communication expertise and knowledge, areas of education could include:
- Contextual training in the history of St. Maarten and conservation, to include a time line of the development of Nature Foundation St Maarten.
- Tourism training in customer service and professionalism.
- Training in community involvement and public awareness.

**Recognition**
Along with legal and administrative provisions, this management plan will be essential to pursue future national, regional and international recognition. Such recognition will enhance ownership amongst residents. The Island Council should be approached for national recognition once St. Maarten Land Parks have been established.
3.2.2. Strategies for external issues

E1. Promote Environmentally Responsible Development

Irresponsible development on St Maarten is a serious threat to the island’s terrestrial resources. Landscaping and building removes habitats and increases the chances of building occurring in new undeveloped areas and also causes sedimentation and nutrient enrichment of the marine environment. This reduces the value of marine resources especially for the tourism industry, the mainstay of the St Maarten economy. Recommendations have been made by developers to keep building hotels and tourist resorts to cope with the demand for rooms, representing a serious threat to the environment on St Maarten.

Actions

Oppose the construction of Link 7
This road threatens to dissect the Emilio Wilson Estate along the 60m contour line. Work with partners and those in co-management of the estate to oppose the plan and suggest viable alternatives.

Raise awareness
Identify stakeholders and interested parties and target with materials emphasizing the importance of the natural environment on St Maarten and the effect of development. Educate the government through outreach and frequent consultations about the importance of the environment to the island and the impacts of development.

Lobby for integration and legislation
Petition the Island Government to address the lack of integrated coastal Zone Management. Suggested improvements from stakeholder input include insisting on a comprehensive Environmental Impact Assessment for any new developments.

Develop a programme of construction best practice
Develop best practice construction guidelines and an incentive programme in liaison with terrestrial NGOs and other stakeholders. Market, publish, monitor and maintain the profile of the guidelines. Launch any associated programmes.

Erosion

The main problems caused by erosion will be addressed through promoting responsible environmental development and by managing any free roaming livestock.
E2. Evaluate, Monitor and manage invasive species

Mongoose and Racoons are a serious threat to the flora and fauna of St Maarten, especially the endangered birds and other small animals of the island. These aliens do not have any natural predators on the island, and their eradication may enable the re-introduction of native species currently extirpated.

Green monkeys and Slider Turtles may become an issue in some locations although little is known about their impact.

Collect and disseminate information about invasive species
Establish a programme to evaluate the ecology, impact and distribution of the Mongoose and Racoon on St Maarten. Collect any information about Green Monkeys and Slider Turtles. Use the information collected to raise awareness amongst stakeholders, especially those that may be in a position to assist with the control of the invasives. Contact neighbouring islands to consolidate knowledge on regional invasive animal and plant species.

Implement a control program
Evaluate different control methods, including trapping, hunting, use of toxins and baiting. Co-ordinate with other islands in the region and internationally that have similar issues to establish best practice. Apply chosen control methods.

Monitor invasive species populations
Monitor the populations of the invasive animal species and the impacts they are having on the native flora and fauna. Monitor impacts of control program on populations. Develop and implement contingency plans to contain and exterminate any incursion by invasive animals into areas with high conservation values.

Pursue relevant legislation
Establish which legislation can be applied to control invasive animal and plant species. Lobby for existing import legislation to be upheld and implemented more effectively. Identify any gaps in the current legislation and propose viable amendments.
3.3. **Strategic Summary**

The table below is a product of the management planning process and extensive stakeholder input. It summarises how the Strategies developed through planning address the Goals of Nature Foundation St. Maarten and the main issues facing St. Maarten Land Parks.

### Goals
1. Manage the St. Maarten Land Parks successfully as regionally and globally significant protected areas, within an effective legislative framework and with commitment from stakeholders.
2. Stabilise to conserve and restore, through practical conservation and active management;
   a) the natural values of St. Maarten including threatened, rare and endangered species, habitats, biological diversity, ecosystem processes, environmental functions and aesthetic values.
   b) the cultural historical and archaeological resources
3. Facilitate the use of St. Maarten Land Parks for: a) Recreation, b) tourism, c) information, education and outreach, d) research, e) monitoring and training.
4. Ensure the appropriate promotion of St. Maarten Land Parks as traditionally and contemporarily valuable, sustainable, multiple use resources whilst establishing rules, guidelines, permits and enforcing legislation.
5. Ensure the involvement of stakeholders and the general community to cultivate a sense of ownership and continuing support for the regulations, zoning and management practices of management authorities and the St. Maarten Land Parks.
6. Establish and maintain co-management agreements with the Sint Maarten National Heritage Foundation, the Emilio Wilson Historical & Cultural Park Foundation and the Emilio Wilson Estate Foundation for the management of the EWE.
7. Build partnerships with landowners to facilitate the establishment and management of St. Maarten Land Parks.

<table>
<thead>
<tr>
<th>#</th>
<th>STRATEGIES</th>
<th>Main Goals Addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>M1</td>
<td>Increase staff Capacity</td>
<td>✓</td>
</tr>
<tr>
<td>M2</td>
<td>Pursue sustainable financing</td>
<td>✓</td>
</tr>
<tr>
<td>M3</td>
<td>Develop a comprehensive zoning plan</td>
<td>✓</td>
</tr>
<tr>
<td>M4</td>
<td>Clarify ownership and establish access</td>
<td>✓</td>
</tr>
<tr>
<td>M5</td>
<td>Consolidate institutional organisation</td>
<td>✓</td>
</tr>
<tr>
<td>M6</td>
<td>Develop Information sources</td>
<td>✓</td>
</tr>
<tr>
<td>M7</td>
<td>Increase interaction with constituents</td>
<td>✓</td>
</tr>
<tr>
<td>E1</td>
<td>Promote responsible environmental development</td>
<td>✓</td>
</tr>
<tr>
<td>E2</td>
<td>Evaluate and monitor invasive species</td>
<td>✓</td>
</tr>
</tbody>
</table>
### 3.4. Communication strategy

This table outlines the rationale and methods for communicating with the main stakeholders that Nature Foundation St Maarten are likely to work with to achieve the goals St. Maarten Land Parks. The most relevant action points for each stakeholder group to be involved with have also been highlighted. Those in italics were not consulted for this management plan.

<table>
<thead>
<tr>
<th>GROUP</th>
<th>TARGET AUDIENCE</th>
<th>OBJECTIVES</th>
<th>WEBSITE</th>
<th>LIST SERVERS</th>
<th>ANNUAL REPORT</th>
<th>NEWSLETTER</th>
<th>E-NEWS</th>
<th>BROCHURES</th>
<th>SIGNAGE</th>
<th>PRESENTATIONS</th>
<th>MEETINGS</th>
<th>PRESS / TV / RADIO</th>
<th>BBQ / OPEN DAY</th>
<th>MANAGEMENT PLAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public departments</td>
<td>VROM(^{10}), Head of Culture Department, Project Planning Bureau DPP.</td>
<td>Developing practical solutions to conservation and management issues, e.g. zoning.</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
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</tr>
<tr>
<td>NGOs</td>
<td>EWE Foundation, Sint Maarten National Heritage Foundation, St. Maarten Pride Foundation, the Emilio Wilson Historical &amp; Cultural Park Foundation</td>
<td>Promote conservation activities and build relationships with other similar initiatives.</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
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<td>✔️</td>
</tr>
<tr>
<td>Tourism sector</td>
<td>Tourist Bureau, St. Maarten Hospitality and Trade Association.</td>
<td>Establish SXM as a responsible hiking and diving destination in the Caribbean.</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
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<td>✔️</td>
</tr>
<tr>
<td>Tourists</td>
<td>Hikers, Cruise visitors</td>
<td>Importance of conservation and visitor role in conservation management</td>
<td>✔️</td>
<td>✔️</td>
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<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Community</td>
<td>Local users, school children</td>
<td>Stimulate interest in St. Maarten Land Parks, educate about conservation management and build support for management decisions</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
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</tr>
<tr>
<td>Partners</td>
<td>Archaeologists, SIMARC, EPIC</td>
<td>Muster continued interest through involvement and active feedback</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
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<td>✔️</td>
</tr>
<tr>
<td>Media</td>
<td>Radio station, Herald reporters</td>
<td>Communication of objectives, management strategies, communication methods, outcomes and events</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
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<td>✔️</td>
</tr>
<tr>
<td>Law enforcement</td>
<td>Public Prosecutor, Chief Police Inspector</td>
<td>Coordinating efforts in Law enforcement and the development of legislation.</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
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<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Private sector</td>
<td>Companies and individuals</td>
<td>Value of the Parks, education about the environment and fund raising</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
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<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Researchers and scientists</td>
<td>Regional and International</td>
<td>Stimulate relevant management orientated research into issues of interest to, including science and Protected Area Management</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
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<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Funders</td>
<td>Current/future funders, AMFO, foundations, individuals</td>
<td>Build donor confidence in and donor cultivation</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
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<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
</tbody>
</table>

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\(^{10}\) VROM (planning, housing, spatial development, environment),
3.5. **Future Issues likely to arise.**

The main issues facing the proposed St. Maarten Land Parks have been outlined in the previous section and mainly relate to the management of the areas. The issues outlined below were identified by stakeholders as issues that may be threats currently or are likely to become threats in the future. Free-roaming livestock, Coralita and collection and hunting are current threats facing Saba and St Eustatius. Africanised Honey Bees are currently an issue on St Eustatius and could be a future issue on St. Maarten.

**Manage free – roaming livestock**

With many goats and pigs, grazing freely on St Maarten, habitats are seriously threatened. Managing the free-roaming livestock will have a number of positive outcomes. With fewer roaming, grazing livestock there will be reduced erosion, protection for plants and habitats that would otherwise be eaten, increased potential for sustainable agriculture and livestock production as well as opportunities for the home garden production of fruits and vegetables. Where possible, work carried out to address this issue in other areas regionally and internationally should be consulted as well as managers of other Protected Area’s with roaming livestock issues.

**ACTIONS**

**Collect and disseminate information to improve understanding of feral livestock ecology, impacts and control methods.**

The success of any actions will be dependent upon a high level of cooperation between all key stakeholders. These include landholders, community groups, feral animal harvesters and local government. While any focus needs to be on minimising the impacts of roaming livestock on vulnerable species and communities, the fact remains that feral livestock populations were founded by domestic animals which escaped or have been left free to roam. Educating the community to ensure their skilled and effective participation in roaming animal control activities, and to improve their knowledge of the impacts that free-roaming livestock have upon native species and communities, is an essential component of the plan.

**Implement a livestock control program in specific areas of high conservation priority**

Review and locate the species and conservation areas at risk from grazing pressure. Fence areas of special conservation interest. Carry out a cull of goats in areas of high conservation value, seek firearm permits for Key NAFSXN staff.

**Monitor and publish the effects of the livestock management**

Monitor the status of free-roaming animal populations, including favoured grazing areas and the numbers of animals. Regularly check the status of the species and areas threatened by free-roaming livestock. Develop and implement contingency plans to contain and exterminate any incursion by feral animals into areas with high conservation values.

**Pursue legislation**

The police currently have the power to round up and destroy livestock found wandering around residential areas. These regulations are not put into practice and the roaming livestock problem persists. Legal protection is needed for high conservation value species.
Control and monitor Corallita

Native vegetation can be overgrown by Corallita and fences around private houses are torn down by the weight of the vine. Large trees are killed by the vine which overgrows and chokes them, while turning the under-storey into a homogenous layer of rotting leaves, destroying habitats. The total eradication of Corallita is impossible as the plant can reproduce from the tiniest of fragments.

**ACTIONS**

**Collect and disseminate information about the threat from Corallita.**
The success of any actions will be dependent upon a high level of cooperation between all key stakeholders. Government must assist the effort to control the plant. Use regional and international reports and other materials to communicate with stakeholders.

**Co-ordinate a Corallita control programme**
Work with stakeholders and partners to carry out a control programme; clear trees in gardens and by roads as well as backyards, hedges and fences. Identify any hotspots for clearance, prioritise those areas with particular conservation value.

**Monitor Corallita growth**
Monitor effects of control methods on the Corallita population every 2 weeks in the hotspots identified. Monitor sites free of Corallita for early warning signs of infestation, including; new building sites and borders conservation areas. Monitor occurrences of other flora identified as potential future invasives, including the Rubber vine (*Cryptostegia grandiflora*) and The Brazilian pepper tree or Christmas tree (*Schinus terebinthifolius*).

**Pursue relevant legislation**
Encourage government to enforce property maintenance responsibilities, especially with regard to Corallita on public and government owned land. Seek the application of legislation relating to the import of invasive species\(^\text{11}\) and the protection for high conservation value species.

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\(^{11}\) This includes the Mongoose, which poses a threat to the island’s fauna such as the endangered Red-bellied Racer Snake.
Monitor and manage Africanized Honey Bees

Swarms of the Africanised Honey Bee may establish themselves on St. Maarten, and can be considered an invasive species as they compete with local species. They represent a hazard to hikers and those using the outdoors. NAFSXM will not have the expertise to deal with the technical aspects of reducing the population of the Africanized Honey Bees.

**Actions**

**Deal with nests on an ad hoc basis**
Nests pose an instant threat to those using the outdoors. NAFSXM should work with the government and other organisations to remove the nests on an ad hoc basis should they appear. Continually investigate the most effective strategies and equipment for dealing with nests.

**Establish a monitoring protocol**
Locate the occurrence of nests on a map of the island, for future reference.

**Disseminate outreach materials**
Develop and disseminate guidelines on what to do if a nest is found and if a nest is disturbed, working in partnership with stakeholders and partners including other islands and states in the region that are experiencing Africanized Honey Bee infestation.

**Seek advice and expertise from island and regional Bee keepers.**
Identify a location to establish hives of European Honey Bees to cross pollinate and re-direct the gene pool of the Africanized Honey Bees. Monitoring the occurrence of the Africanized Honey Bee nests will help with this. An expert bee keeper may be able to provide new or improved ways of maintaining colonies that are reasonably free of "African" genes.

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Evaluate and manage collection and hunting

A variety of plants are targeted by collectors, animals may also be targeted. The effect of collection on St. Maarten’s fauna is not known and could be severely effecting populations in the future.

**Actions**

**Collect and disseminate information about taking species from wild stock.**
Gather information from regional and international conservation groups about the impact of hunting these species. Target information released at the people likely to be involved in the collection, and try to encourage them to come forward to help in the evaluation of the impact of the activity.

**Evaluate the impact of collection**
Monitor collection and hunting activity and establish baseline figures for the populations of the effected species.

**Manage collection and hunting of species**
Depending on the outcome of the impact evaluation, management strategies should be put in place. These should reflect the severity of the impact. Explore the possibility of seasons for collection and hunting. Although Orchids, Bromeliads and Cacti are listed as species to be protected there are no penalties for transporting them around the Netherlands Antilles. This leads to the repeated digging of plants for inhabitants of other islands in the Netherlands Antilles.
### 3.6. Management Activities

Planning for the core aspects of operational management occurs on a week by week basis as guided by an annual work plan and budget. Table 21 lists the range of activities likely to be taking up core management time throughout the life of this management plan (the list is not definitive – other activities are likely to take place). The strategies and actions proposed at the beginning of this section need to fit around the most essential core management tasks. Prioritising and executing these is the responsibility of the Protected Area management.

**Table 21: Core management tasks for St. Maarten Land Parks.**

<table>
<thead>
<tr>
<th>Task</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ADMINISTRATION</strong></td>
<td>• Institutional arrangements.</td>
</tr>
<tr>
<td></td>
<td>• General administration.</td>
</tr>
<tr>
<td></td>
<td>• Financial management.</td>
</tr>
<tr>
<td></td>
<td>• Maintenance.</td>
</tr>
<tr>
<td></td>
<td>• Transportation.</td>
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<tr>
<td></td>
<td>• Patrolling.</td>
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<tr>
<td></td>
<td>• Personnel management.</td>
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<tr>
<td></td>
<td>• Work management.</td>
</tr>
<tr>
<td></td>
<td>• Planning.</td>
</tr>
<tr>
<td></td>
<td>• Project management.</td>
</tr>
<tr>
<td></td>
<td>• Reporting.</td>
</tr>
<tr>
<td><strong>MONITORING AND RESEARCH</strong></td>
<td>• Monitoring.</td>
</tr>
<tr>
<td></td>
<td>• Usage / visitor numbers.</td>
</tr>
<tr>
<td></td>
<td>• Site characterization.</td>
</tr>
<tr>
<td></td>
<td>• Research.</td>
</tr>
<tr>
<td></td>
<td>• Damage assessment.</td>
</tr>
<tr>
<td></td>
<td>• Evaluation.</td>
</tr>
<tr>
<td><strong>LAW ENFORCEMENT</strong></td>
<td>• Legal framework.</td>
</tr>
<tr>
<td></td>
<td>• Interpretation of legal issues.</td>
</tr>
<tr>
<td></td>
<td>• Enforcement.</td>
</tr>
<tr>
<td></td>
<td>• Legal mechanisms.</td>
</tr>
<tr>
<td></td>
<td>• Emergency response.</td>
</tr>
<tr>
<td><strong>INFORMATION - EDUCATION - OUTREACH</strong></td>
<td>• Communication strategy.</td>
</tr>
<tr>
<td></td>
<td>• Visitor centre.</td>
</tr>
<tr>
<td></td>
<td>• Interpretation.</td>
</tr>
<tr>
<td></td>
<td>• Print work.</td>
</tr>
<tr>
<td></td>
<td>• Media relations.</td>
</tr>
<tr>
<td></td>
<td>• Education programme.</td>
</tr>
<tr>
<td></td>
<td>• Website.</td>
</tr>
<tr>
<td></td>
<td>• Newsletters.</td>
</tr>
<tr>
<td></td>
<td>• Representation.</td>
</tr>
<tr>
<td><strong>TRAVEL - TRAINING</strong></td>
<td>• Meetings.</td>
</tr>
<tr>
<td></td>
<td>• Training courses.</td>
</tr>
<tr>
<td><strong>WORKING WITH CONSTITUENTS</strong></td>
<td>• Decision makers.</td>
</tr>
<tr>
<td></td>
<td>• Partners.</td>
</tr>
<tr>
<td></td>
<td>• Stakeholders.</td>
</tr>
<tr>
<td></td>
<td>• Volunteers.</td>
</tr>
</tbody>
</table>
3.7. Implementation and revisions

The master copy of this document is the property of the manager of St. Maarten Land Parks.

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 might face St. Maarten Land Parks. A framework for this is on the next page, as suggested by expert review.

Distribution
The main working document of the management plan is assembled in a handbook type folder with the extensive appendices included on a CD-ROM. This will be kept and updated by the manager of Nature Foundation St Maarten. The proposed St. Maarten Land Parks 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 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
Necessary updates should be added in Part 4. Stakeholder input to the running of the SXMLP will be an ongoing process. It is recommended that formal stakeholder input regarding the effectiveness of the management plan is carried out every 3-4 years, in conjunction with the revision of Part One. The recommendations for reviewing and revising the management plan should be seen as guidelines. Following the successful establishment of St. Maarten Land Parks the management planning and review process will be consolidated and revisions may become less frequent and/or more specific. Suggested management plan revision programme;

<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 3-5 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>

The plan should be reviewed in detail with stakeholder input at the earliest in mid 2011, but no later than mid 2013. Processes for updating this management plan have been recommended by the peer reviewers. These can be seen in the Appendix 6.

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 Nature Foundation St Maarten website to enable stakeholders and interested parties to access the main information relating to St. Maarten Land Parks.
**Suggested framework for developing objectives to carry out the strategies identified**

*(All content below for example only)*

**Action:** Design and implement a comprehensive zoning plan

**Goals addressed:** 1, 2a and 2b, 3, 4, 5, 6, 7.

**Threats addressed:** Legislation, Ownership, Lack of information sources (maps), Development

**Aim:** To accurately locate zones needed in the TPA, 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>Objective</th>
<th>Output <em>(objectively verifiable)</em></th>
<th>Agency/Personnel*</th>
<th>Budget*</th>
<th>Week/ time unit number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning</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>Information gathering</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Definition</td>
<td>List of 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 management plan stakeholder consultations.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stakeholder Consultation</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>Draft plan preparation</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>Review of draft</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, add feedback.</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, add feedback.</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>Finalisation</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>Signage, staff and stakeholder orientation meetings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Publish plan</td>
<td>Maps, leaflets <em>(design time and output)</em></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>Ongoing</td>
</tr>
</tbody>
</table>

*Agency/personnel and budget requirements to be decided on site by management.*
4. Additions and Developments.
## Appendices

<table>
<thead>
<tr>
<th>#</th>
<th>Content</th>
</tr>
</thead>
</table>
| 1  | **Data** | Climate information  
St Maarten References  
St. Maarten Socio-Economic Data |
| 2  | **Background information** | EWE documents  
Red List and CITES Classifications  
LIST OF SPECIES FROM ROCKY SHORES  
Mangrove species details  
Marine Park Map Jan 2008  
Plants of Sint Maarten - Species List  
Salt Ponds report  
Species List Simpson Bay Lagoon  
Species_Data_St Maarten  
St Maarten TNC Vegetation Map  
SXM Heritage Use Plan June 07 |
| 3  | **NAFSXM documents** | Employee handbook 2006  
NAFSXM ANNUAL REPORT 2007  
Recommendations for legislation improvements |
| 4  | **Legal documents** | Treaties and conventions  
060412 Mariene Park Verordening  
060420 Mariene Park Verordening MVT 200406  
A5-NationalGilPollutionCompensationOrdinance-Ao1996-170  
D3-SXM-WasteOrdinance-AB1993-03  
D4-SXM-DevelopmentPlanning-AB1993-13  
D4-SXM-DevelopmentPlanning-AB1993-13-amalgamated  
L5-SXM-NatureConservationOrdinance-AB2003-35  
D6A-SXM-GreatBayPilotBeachPolicy  
D6-SXM-BeachPolicySummary  
D7A-SXM-HillsidePolicyExtended  
D7-SXM-HillsidePolicy  
D8-SXM-MarineParkOrdinanceDRAFT  
D9-SXM-WasteWaterOrdinance-AB2002-05  
D10-SXM-MonumentsOrdinance-AB2000-01  
D11-SXM-DevelopmentPlanningAmendment-AB2000-03  
D12-SXM-DevelopmentPlanningAmendment-AB2004-01  
D13-SXM-MonumentsRegistrationResolution-AB2004-14  
D14-SXM-MonumentsOrdinanceExplanation  
D15-SXM-MonumentsResolutionAddendum  
DECREEEnglais  
International Treaties and Conventions relevant to the Netherlands Antilles  
MVt translated 061127 |
| 5  | **Stakeholder input** | Materials  
Results  
TourMap Final Report and Action Plan July 2005 |
| 6  | **Peer reviews** | Review of Plan for PA's, St Maarten by Robert L-S. FINAL  
St Maarten Review Comments [Dan Palaczny] |