

PART 2. The Management environment

Introduction

Understanding the goals and objectives of a protected area as well as the range of direct and indirect threats are essential elements of any management plan.

The Bonaire National Marine Park chose to adopt an adaptive management framework for its management planning. The adaptive management framework provides a logical approach to management planning which is highly prioritized and threat orientated.

The key elements of the adaptive management framework are:

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

Information on the significance of the ecosystems, habitats and species found within the Bonaire National Marine Park as well as their general condition has been presented in Part 1. This is summarized and highlighted in the statement of significance and values (below). Part 2 goes on to identify the threats and issues facing the marine park. Together with the Park's goals and objectives this information is used to build a framework for management.

This approach is based firmly on the IUCN management cycle which seeks to ensure that there is continuous learning by reassessing and re-evaluating the success of management actions, programmes and initiatives.

The Dutch Caribbean Nature Alliance, of which STINAPA Bonaire 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 Bonaire National Marine Park management plan is an important component of the management success project. Setting clear goals and objectives for the marine park makes it possible to begin evaluating management effectiveness and management success and assisting park managers to become ever more effective in their management planning and implementation.

Natural values: The intrinsic natural values of the marine park include:

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

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

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

Box 1: Definitions of key terms used in section 2

Bonaire National Marine Park

The Bonaire National Marine Park surrounds the islands of Bonaire and Klein Bonaire extending from the high water mark to the 60 metre depth contour and covering an estimated 2700 hectares. It was first established in 1979, but due to financial difficulties was not actively managed from 1984 until 1991 when it was revitalized utilizing Dutch Government grant funding (MJP fonsen). Comprehensive legislation exists and is enforced. The Bonaire National Marine Park headquarters are located at Barcadera, some 5km north of the main town on Kralendijk.

The major use of BNMP is for recreational diving and snorkelling with some subsistence fishing by local people and other watersports. Until January 2006 visitors to the marine park paid a flat rate entry fee of \$10. This was changed to a graded fees system (outlined in Table 6) where yearly fee payers receive a tag and a right to enter into Washington Slagbaai National Park. Those that choose to pay daily receive a coupon which does not include entry into Washington Park

Divers	\$25 a year or \$10 a day
Other users	\$10 per year or \$2 per day

Table 1: BNMP's fees schedule

The Park manager is responsible for the day to day management of the Marine Park, whilst STINAPA Bonaire (Stichting Nationale Parken Nederlandse Antillean), is responsible for policy decision making, finances and personnel.

Statement of significance and values

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

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

Box 2: Significance and values explanation

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

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

Statement of significance

The marine environment of Bonaire is unique in the Caribbean being one of only four true oceanic islands separated from the South American mainland by a deep water trench. The Marine Park on Bonaire which was established in 1979 and has been under active management since 1991, has been recognised as a National Park by the Central Government of the Netherlands Antilles and as a Demonstration site by UNEP (United Nations Environment Programme) and ICRAN (International Coral Reef Action Network). It includes 2,700 hectares of globally threatened coral reef, seagrass and mangrove ecosystems all of which are considered to be in excellent condition. Bonaire's reefs are considered the healthiest in the Caribbean according to data from the Atlantic and Gulf Rapid Reef Assessment protocol. Bonaire's marine environments include all five of the RAMSAR sites within the Netherlands Antilles and are home to 111 globally endangered species including 6 on the IUCN Red list, 11 species on CITES Appendix I and 94 on CITES Appendix II.

Box 3: Statement of Significance.

Values of the Bonaire National Marine Park

INTERNATIONAL AND NATIONAL SIGNIFICANCE

The Bonaire National Marine Park is of major international and national significance.

Internationally Bonaire is recognised for its five globally important wetland sites which have been included under the RAMSAR Convention namely: Saliña Slagbaai, Goto, the island of Klein Bonaire, Lac and Pekelmeer

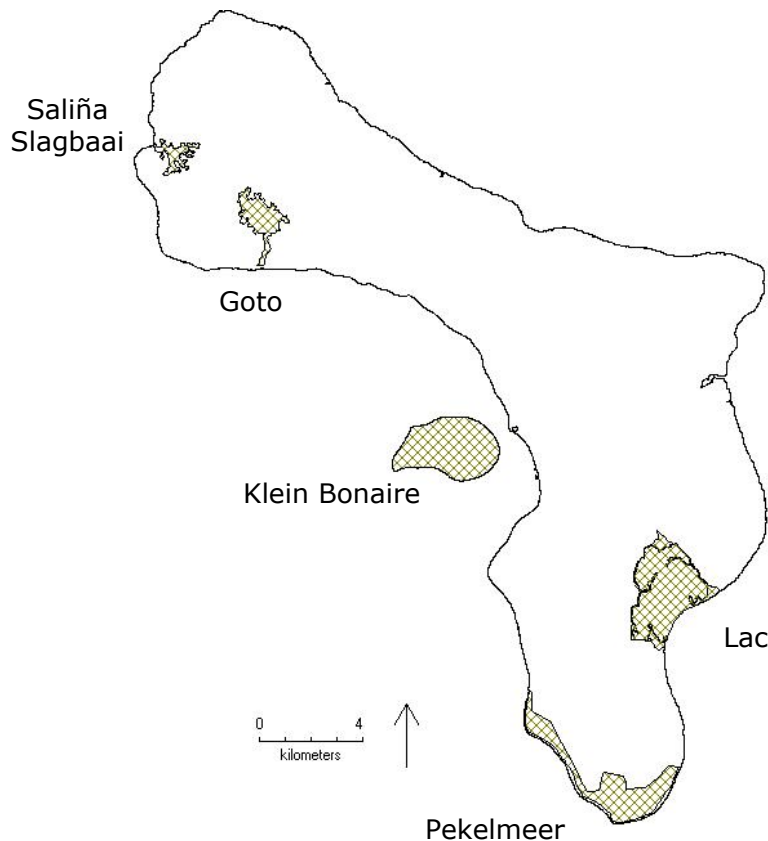


Figure 1: Ramsar sites of Bonaire

Saliña Slagbaai and Goto are most important for migratory wetland birds and provide important foraging grounds for the Caribbean Flamingo (*Phoenicopterus ruber*). The undeveloped satellite island of Klein Bonaire which lies approximately 750m to the west of Bonaire preserves vestiges of the island's original vegetation and is an important stop over point for migrating wetland birds. Lac, which contains thriving seagrass beds and actively growing mangroves, is the largest semi enclosed bay in the Netherlands Antilles and an important nursery site for conch and many species of reef fish as well as being a critical foraging ground for globally endangered juvenile green turtles. The salt pans adjacent to the Pekelmeer RAMSAR site are home to the largest and most important breeding grounds for the Southern Flamingo.

The Bonaire National Marine Park has been declared a UNEP/ICRAN Demonstration site by the United Nations Environment Programme and the International Coral Reef Action Network for its innovative work on sustainable financing and successful private sector participation by hoteliers and dive operators and is in the process of preparing a nomination to become the world's first marine transboundary World Heritage Site. The United Nations Environment Programme have also included Bonaire's coral reefs its list of coral reefs of international significance. Details of 'Demonstration site' and the 'World Heritage Site' recognitions are presented in Appendix 29.

The Bonaire National Marine Park includes examples of all three globally threatened coastal ecosystems: coral reefs, seagrass beds and mangroves. The reefs around Bonaire are unusually in that they are fringing reefs, starting more or less at the shore line and extending seaward into deep

water within 200m of the shore. According to recent AGRRA surveys, Bonaire's reefs are also considered amongst the healthiest in the Caribbean.

BIODIVERSITY

Within the Bonaire National Marine Park there are about 470 species of fish (<http://www.reefbase.org/>) 57 recorded species of hard and soft coral and along with an uncounted number of other marine invertebrates. Virtually every species of hard and soft coral recorded in the Caribbean can be found on the reefs of Bonaire. The diversity of fish life is unrivalled outside of the Florida Keys. Within Lac around 225 species of fish have been recorded. Klein Bonaire is home to some of the last remaining natural vegetation including Acacia, Prosopis, Capparis, Haematoxylon, Lantana and Croton species and is used as a stop over point by countless species of migratory wetland birds.

Despite repeated bleaching episodes throughout the 1990s and two recent serious storm events in 1999 (Hurricane Lenny) and 2004 (Hurricane Ivan) Bonaire's reefs remain amongst the best developed and most biodiverse in the Caribbean today.

In addition to diverse and healthy reefs, Bonaire has very well developed and extensive populations of parrotfish. Studies by PhD students indicate that the parrotfish populations spawn at different times along the length of Bonaire's leeward shore indicated that each may form a discrete biological unit. This behaviour is thought to be linked to micro current patterns and is designed to aid larval retention on the reef. Overfishing of this keystone species could therefore be catastrophic as they may not easily recolonize vacated reef areas. It is the high numbers of grazing parrotfish which are believed to have saved Bonaire's reefs when another major grazing invertebrate, the Black Spiney Urchin, suffered a population crash in the early 1980s due to disease.

Bonaire's windward shore is an important safe haven for the Caribbean lobster which is subject to only low levels of harvesting due to the prevailing adverse weather and sea conditions and the nature of the shoreline (razor sharp fossil reefs called 'ironshore').

ECOLOGICAL PROCESSES

One of the most important features of Bonaire's reefs are their location. Bonaire is located upstream of the reefs of Colombia and San Andres, Central America and the Gulf Coast. For species with long larval stages and migratory species Bonaire may prove to be a significant source of marine life. Studies of parrotfish genetics, for example, indicate that there may be a strong link between populations living on the northernmost shore, in the Washington Park, and parts of Curacao.

Sediment traps

Bonaire's salinas are a critical component of the island's ecosystems and play a vital role in trapping and containing storm water and associated sediments.

Foraging grounds

Lac is not only the largest semi enclosed seagrass and mangrove bay in the Dutch Caribbean but also a vitally important foraging ground for juvenile green turtles which can be found in the bay in their hundreds cropping on manatee and turtle grass.

Nesting grounds

The sandy beaches on the north eastern shore of Klein Bonaire have also proved to be important turtle nesting grounds for Hawksbill, Loggerhead and Green turtles whose range state extends from Puerto Rico in the north to the island off Nicaragua in the west. 61 nests were recorded on 2004.

Spawning grounds

Grouper spawning grounds have been identified at various sites around the island including seaward of Goto, Red Slave and at Spelonk where local fisherman have long known that grouper congregate seasonally to 'wash their eggs' (laba webu). More recently Ocean Trigger breeding grounds have been discovered on Bonaire's windward shore at Spelonk.

Breeding grounds

It is also important to note that the most significant breeding population in the Caribbean of the Flamingo can be found within the salt company property on the south end of Bonaire adjacent to the Pekelmeer RAMSAR site. Whilst flamingos forage at various sites around the island they have only established breeding colonies adjacent to the Pekelmeer and more recently in Goto, on the south shore of the Washington Park. It is believed that this nesting site is critical to their survival.

Nursery grounds

In addition to its importance as a nesting and foraging ground, Lac has an important roles as a nursery ground for many species of marine fish and for the globally threatened Queen conch. The extensive sandy areas in Lac, for example at Awa di Meuchi, are where larval conch settle and spend their first year of life before emerging to forage amongst the sea grass beds.

UNIQUE HABITATS AND MARINE LIFE

The mangrove stands surrounding Lac can be considered a unique habitat since they do not show the zonation pattern common to mangrove systems around the world but are made up of approximately 50% red mangrove around the actively growing seaward edge and 50% black mangrove in the drier interior. Unlike other mangrove systems which are fed by fresh water inflow from rivers, the mangroves of Lac are fed by the sheet flow of water from the bay itself. This has created a unique environment which is a critical habitat and nursery ground for many marine invertebrate and avian species. Bacterial mats found around Lac and some of the Saliña's have an unknown value, but are likely to have a key role in the food chain.

THREATENED AND ENDANGERED ECOSYSTEMS, HABITATS AND SPECIES

CORAL REEFS, MANGROVES AND SEAGRASSES

Coral reefs, mangroves and seagrass beds are all considered globally endangered ecosystems. The latest figures indicate that 70% of the world's coral reefs could be lost in our lifetime whilst estimates suggest 60% of mangroves have been destroyed globally through mostly due to dredging, aquaculture and land conversion. Despite recent impacts such as bleaching events and storm damage, Bonaire's coral reefs are considered amongst the most diverse and healthiest in the Caribbean. A recent AGRRA survey of the wider Caribbean using multiple indices to provide a measure of coral reef 'health' found Bonaire's reefs to be in the top five regionally. Healthy coral reefs, seagrasses and mangroves provide the increasing numbers of people living on Bonaire with a wide range of products and services. The following table outlines some of the more general values[†] associated with these key ecosystems on Bonaire.

Coral reefs	Seagrasses	Mangroves
<ul style="list-style-type: none">▪ Habitat for many animals and plants▪ Tourism▪ Recreation – diving and other watersports▪ Fisheries▪ Shoreline protection through reduction of wave energy▪ Production of coral sand	<ul style="list-style-type: none">▪ Provide habitat and food for many animals and species▪ Tourism▪ Provide shelter for juveniles of many commercial fish species▪ Consolidate sediments and reduce wave energy▪ Traditional uses e.g. weaving, roof thatch, compost,	<ul style="list-style-type: none">▪ Habitat for many plants and animals▪ Tourism▪ Fishery▪ Nursery for fish▪ Recreational value for windsurfers and other watersports▪ Traditional uses: charcoal and lime production

Table 2: General values of Coral Reefs, Mangroves and Seagrasses

ENDANGERED SPECIES

The islands of Klein Bonaire and Bonaire provide a safe refuge for 111 internationally recognised endangered species including 6 which are included on the IUCN Red list, 11 species on CITES Appendix I and 94 on CITES Appendix II. All corals are listed in CITES Appendix II and any trade in them or removal of them is prohibited by law, this includes any fossilised corals/coral rock.

[†] Not all values are related to the direct use of the resources. For example, the well-being of the environment of Bonaire has a value for; 1. future generations that will want to use the resource and may find new uses such as medicines, and 2. the present generation who value the knowledge of the continued existence of a healthy marine resource (Cesar, 2000).

SPECIES	COMMON NAME	STATUS	
		IUCN Red list	CITIES
<i>Chelonia mydas</i>	GREEN TURTLE	Endangered	Appendix I
<i>Dermochelys coriacea</i>	LEATHERBACK	Critically endangered	Appendix I
<i>Eretmochelys imbricata</i>	HAWKSBILL TURTLE	Critically endangered	Appendix I
<i>Caretta caretta</i>	LOGGERHEAD TURTLE	-	Appendix I
<i>Lepidochelys olivacea</i>	OLIVE RIDLEY	-	Appendix I
<i>Physeter catodon</i>	GREAT SPERM WHALE	-	Appendix I
<i>Balaenoptera edeni</i>	BRYDE'S WHALE	-	Appendix I
<i>Balaenoptera physalis</i>	FIN WHALE	-	Appendix I
<i>Megaptera novaeangliae</i>	HUMPBACK WHALE	-	Appendix I
<i>Amazona barbadensis</i>	YELLOW-SHOULDERED AMAZON	Vulnerable	Appendix I
<i>Falco peregrinus</i>	PEREGRINE FALCON	-	Appendix I
<i>Leptonycteris curasoae</i>	SOUTHERN LONG-NOSED BAT	Vulnerable	-
<i>Guaiacum officinale</i>	LIGNUM-VITAE	Endangered	-

Table 3: Key endangered species of Bonaire.

The regionally threatened Black Spiny Urchin, (*Diadema antillarum*), which was almost wiped out by a pathogen which swept through the Caribbean in 1985 is slowly making a come back on Bonaire's windward and leeward shores. It was first found colonizing the salt company intake channels. It is a keystone species and a major reef herbivore. The diadema die off has had a significant impact on many Caribbean coral reefs where its absence had frequently trigger a phase shift from coral dominated reefs to algal monocultures.

Regionally threatened acroporids, staghorn and elkhorn corals, are also slowly recolonizing the near shore environment at selected locations around the island. Like the Black Spiny Urchin, acroporids suffered a mass die off in the early 1980s throughout the Caribbean basin.

SUMMARY OF THE VALUES OF BONAIRE NATIONAL MARINE PARK

The following page summarises the key values associated with Bonaire National Marine Park as identified in the stakeholder meetings in January 2006. Values were identified in relation to specific places, uses, history, and the institution itself. For more specific values of Bonaire National Marine Park identified from stakeholder input refer to the meeting minutes in Appendix 10.

Historical/cultural sites

- The Windjammer Wreck from the 1800's located between Karpata and BOPEC.
- Hilma Hooker Wreck
- Historical buildings at Slagbaai
- Quarantine Buildings on Klein Bonaire
- Red and White slave hut groups
- Conch Piles at Cai

Industry

- Tourism forms the basis of Bonaire's economy
- Cruise ship stop over
- BOPEC oil terminal
- Cargill salt production
- Small aquaculture venture
- Shipping

Recreation

- >50 dive moorings around the island and a range of shore dives.
- Swimming snorkelling
- Windsurfing
- Kitesurfing
- Kayaking
- Sailing

Fisheries

- Artisanal (small, traditional) fishery
- Commercial fisheries
- Fishing in Lac
- Pelagic fisheries

A summary of the key values associated with Bonaire National Marine Park

(As identified during the January 2006 stakeholder input consultations)

Image courtesy of Earth Sciences and Image Analysis Laboratory, NASA Johnson Space Centre. (<http://eol.jsc.nasa.gov>) photo number: STS075-706-41.JPG



Klein Bonaire

- Nesting and feeding ground for turtles
- Diverse coral reefs
- Dive and other watersports.
- Recreation
- Historical sites
- Valuable vegetation community

Lac

- Recreation
- Traditional artisanal fishery
- Historical conch piles at Cai
- Healthy, diverse mangrove stand
- Flourishing seagrass beds
- Traditional uses include navigation, and charcoal production
- Freshwater wells
- The salinas/channels hydrological role

Saliñas/Salt flats

- Habitat for many species.
- Breeding grounds for Flamingos
- Migratory stop over for bird species
- Resource for Cargill salt works which is seen as a sustainable operation
- Saliñas act as a sediment trap and filtration system for terrestrial run off

Others

- High biological diversity
- Healthy marine ecosystems
- Variety of marine ecosystems
- Sustainable tourism
- Highly accessible
- Traditional place names
- Research and education
- Freedom to use a healthy environment

BNMP Institution

- Essential for the conservation of the marine environment on Bonaire.
- Very important in an outreach and education role.
- Partners for the government
- BNMP has an obligation as an internationally recognised and effective protected area

Mission and goals

The mission statement of the Bonaire National Marine Park is:

TO CONSERVE AND MANAGE THE NATURAL, CULTURAL AND HISTORICAL RESOURCES, ALLOWING THEIR SUSTAINABLE USE FOR THE BENEFIT OF CURRENT AND FUTURE GENERATIONS.

The four strategic goals of the Bonaire National Marine Park focus on biodiversity conservation, management, promotion of sustainable use within the park and protection of cultural and historical sites within the park. They have been chosen to provide for the protection and conservation of the island's unique marine resources whilst allowing appropriate recreational and commercial use to be made of the park.

Goals[†]

1. MAINTAIN AND/OR RESTORE THE ECOSYSTEMS, BIOLOGICAL DIVERSITY, AND ECOLOGICAL PROCESSES.

By protecting habitats, BNMP safeguards the vital life-support processes of the sea including:

- photosynthesis,
- maintenance of food chains,
- movement of nutrients,
- degradation of pollutants
- conservation of biological diversity
- productivity

This provides an essential foundation for sustainable, nature-based tourism, Bonaire depends on

2. MANAGE THE MARINE PARK AS A REGIONALLY AND GLOBALLY SIGNIFICANT AND SUCCESSFUL MULTI-USE MARINE PROTECTED AREA.

Bonaire National Marine Park 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, BNMP can build on its reputation as a regional and global flagship for the success of protected areas.

3. ALLOW USE OF THE MARINE PARK BY PROMOTING NON DESTRUCTIVE ACTIVITIES AND WORKING WITH STAKEHOLDERS TO ESTABLISH GUIDELINES AND REGULATIONS TO MINIMIZE IMPACTS ON THE ENVIRONMENT.

By addressing unsustainable and destructive activities, BNMP can go some way to ensure the existence of the resource it is protecting for current and future generations.

By involving stakeholders five key benefits arise, each of which will help in the pursuit of BNMP's objectives:

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

4. PROTECT AND/OR RESTORE THE CULTURAL AND HISTORICAL RESOURCES IDENTIFIED AS SIGNIFICANT

To be of greatest benefit BNMP must address the full spectrum of human values. This will ensure that BNMP 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.

[†] These goals are not written in any particular order or priority. Further information about rationales behind MPA's go to : www.iucn.org/themes/wcpa/pubs/guidelines.htm, and look at the Guidelines for Marine Protected Areas

Legal protection

The Marine Park continues to be protected by the Verordening Marien Milieu - Marine Environment Ordinance (A.B. 1991 Nr.8) and associated island resolutions containing general provisions (EBHAMS). The park manager, chief ranger and two rangers have special police powers, and cannot only write out a summons but can also issue summary fines to deal with offences under the Marine Environment Ordinance. Park personnel have attended training courses in law enforcement with a view to obtaining special police powers (Buitengewoon agent van politie). The course included information on how they should conduct themselves and what powers they have to enforce the legislation. The Island Government has an inventory of all those persons with special police powers and the ordinances which they may use to ensure an integrated approach to law enforcement.

Most of the problems that involve law enforcement are associated with development of the coastal zone, modification of the shoreline, illegal sand mining, creation of beaches and illegal placement of moorings, piers and the like. Activities associated with the coastal zone are difficult to control as the Marine Environment Ordinance only covers the marine environment, not the adjacent coastal areas. The ordinance also has no "preventative" component, in other words illegal activities cannot be prevented, only prosecuted after the fact and prosecution is often difficult.

Bonaire has a small but persistent spear fishing problem and occasional problems with recreational divers who are unable or unwilling to control their buoyancy under water or who remove items (such as soft corals and shells) from the reef. BNMP is working with SSV, police and airport authorities to avoid export of collected corals and other CITES listed organisms. Signboards have already been made and placed at strategic locations informing visitors about CITES regulations. There have also been problems with shipping - dumping of dirty ballast or other substances, leaking of oil, groundings. The legislative tools, management agreements and policy plans available to BNMP are as follows:

Current Legislation

- Bouw- en woningverordening (A.B. 1961, no. 17)
Building and housing ordinance. (regulates building and housing practices)
- Verordening marien milieu (A.B. 1991, no. 8)
Marine environment ordinance. (regulates use of Marine Park, fisheries and Lac)
- Havenreglement (A.B. 1975, nr. 33)
Harbour ordinance (regulates shipping and use of the harbour)
-
- Waterveiligheidsverordening Bonaire (A.B. 1974, no. 5)
Water safety ordinance (regulates speed and behaviour on the water)
- Eilandsverordening Afvalstoffen Bonaire (Ao. 1994, no. 5)
Regulation of waste (solid waste and litter)
- Eilandsverordening ruimtelijke ontwikkelingsplanning Bonaire (Ao. 1994, no. 22).
Development plan. (aims to promote responsible spatial development and sustainable environmental management.)
- Hinderverordening Bonaire (Ao. 1995, no. 4)
Nuisance ordinance. (Regulations on prevention and minimizing danger, damage and nuisance for people and environment)

Pending Legislation

- Concept eilandsverordening afvalwater
Regulation on waste water (draft).
- Concept eilandsverordening natuurbeheer
Nature management ordinance (draft).

Management agreement

- Management agreement between the Island Government of Bonaire and STINAPA Bonaire giving STINAPA management of the Marine Park (5th July 1991)
- Management agreement between the Island Government of Bonaire and STINAPA Bonaire giving STINAPA management of the Washington plantation (9th Oct 1990)

Former and Pending Policy Plans

- Meerjarenplan Milieu en Natuur 2001 – 2005 (Ned. Antillen)
Multi year Environmental and Nature Plan (Central Government)
- Natuurbeleidsplan Bonaire 1999-2004 (29th June 1999)
Nature Policy Plan Bonaire
- Milieubeleidsplan Bonaire. 2004 – 2009 (draft)
- Environmental Policy Plan Bonaire 2004 – 2008 (draft)

The relevant policy plans can be found in Appendix 11.

Marine Environment Ordinance (A.B 1991 nr.8)

The Marine Environment Ordinance was passed in 1991 but was revised (2001) to include provision for the protection of the island of Klein Bonaire as part of the Marine Park. It provides a general framework to protect the marine park and control activities within the park, to regulate fisheries and there is a special section concerned with the protection of Lac. The full translation of the Marine Environment Ordinance is presented in Appendix 12

The ordinance contains a number of EBHAMs (island resolution containing general provision). EBHAMs are used to leave the possibility open to further regulate activities which become problematic, to extend and increase user fees and to protect additional species and or areas. They are relatively easy to write and approval can be quite fast as they only need the approval of the Executive Council.

Existing EBHAMs (these can be found in Appendix 13) include:

- Gazetting of Marine Environment Ordinance (EBHAM 28th Jun 1991 Nr.9)
- Permitting anchoring in the bay of Kralendijk (EBHAM 28th Jun 1991 Nr.10)
- Regulation of permitting for dive operators (EBHAM 13th Dec 1991 Nr.21)
- Regulation of diver admission fees (EBHAM 13th Dec 1991 Nr.22)
- Regulation of legal fees for permits (EBHAM 22nd Dec 1993 Nr.18)
- Regulation of fees for private moorings (EBHAM 20th Mar 1996 Nr.3)
- Prohibition of anchoring in the Marine Park (EBHAM 18th Aug 1999 Nr.11)
- Regulation of payment for use of yacht moorings (EBHAM 18th Aug 1999 Nr.12)
- Protection of Klein Bonaire under Marine Environment Ordinance (EBHAM 25th April 2001 Nr.13)

Relevant International treaties and conventions to BNMP

- Convention on Biological Diversity (CBD)
- Ramsar Convention on Wetlands (Ramsar)
- Convention on International Trade in Endangered Species (CITES)
- Convention on Migratory Species (Bonn convention)
- World Heritage Convention
- International Convention for the Prevention of Marine Pollution from Ships (MARPOL)
- Inter American Convention for the Protection and Conservation of Sea Turtles
- UNEP Regional Seas Conventions: Caribbean
 - Cartagena Convention
 - Land based sources of marine pollution (LBSMP) protocol
 - Oil Spill protocol
 - Specially protected areas and wildlife (SPAW) protocol

Central Government regulations

Central government

- Landsverordening grondslagen natuurbeschermer en bescherming (P.B. 1998, no. 49)
Framework ordinance addressing nature management and protection
- Landsverordening grondslagen ruimtelijke ontwikkelingsplanning (P.B. 1976, no. 195)
Framework ordinance addressing spatial planning
- Concept Landsverordening grondslagen milieubeschermer
Draft framework ordinance for environmental management

Concept Landsverordening Vissereij

Draft fisheries ordinance

The following tables outline planning provisions, permits that are issued for BNMP, which rules and guidelines are issued by BNMP, board member details, other organisational provisions and meeting details.

Permits

Permits issued by BNMP	Advisory body	Issued by
Public Moorings	CMM [†]	Government
Private Moorings	CMM	Government
Specialised Moorings	CMM	Government
Piers	CMM	
Research	CMM	
Collection	CMM	
Watersports	CMM	Government
Tour operators	CMM	Government
Guides	CMM	Government
Camping	BNMP	
Building	CMM	
Natural resource extraction	Government	

Table 4: Permits issued by BNMP

To apply for a permit relating to any of the activities mentioned above, the following procedure must be followed:

1. Apply to the BC (Executive council).
2. All things relating to marine park – BC ask advice of CMM before granting initial permits.
3. For construction or business on or near the MPA, other specific permits need to be sought from the relevant department

[†] CMM = Commissie Marien Milieu (Marine environment commission)

This process is currently causing problems for BNMP. The first permits issued by DROB are sometimes seen as permission to build because people don't understand correct procedure. People often go ahead and build or start businesses without the correct permits, and without the CMM being consulted. Often the work done is irreversible and many irresponsible individuals and groups pretend to misunderstand the procedure and pay the worst-case 5000 Nafl fine. This highlights the need for an integrated approach to coastal management on the island. This can only be achieved if the marine park is a made consultee for terrestrial developments, and any advice the marine park offers is taken as definitive.

Rules and guidelines

The rules and guidelines published by BNMP can be enforced by the Marine Environment Ordinance. A number of rules and guidelines were published up until 2006, when revisions were made. The rules and guidelines can be found on information boards, (see Appendix 14) and in the relevant brochures;

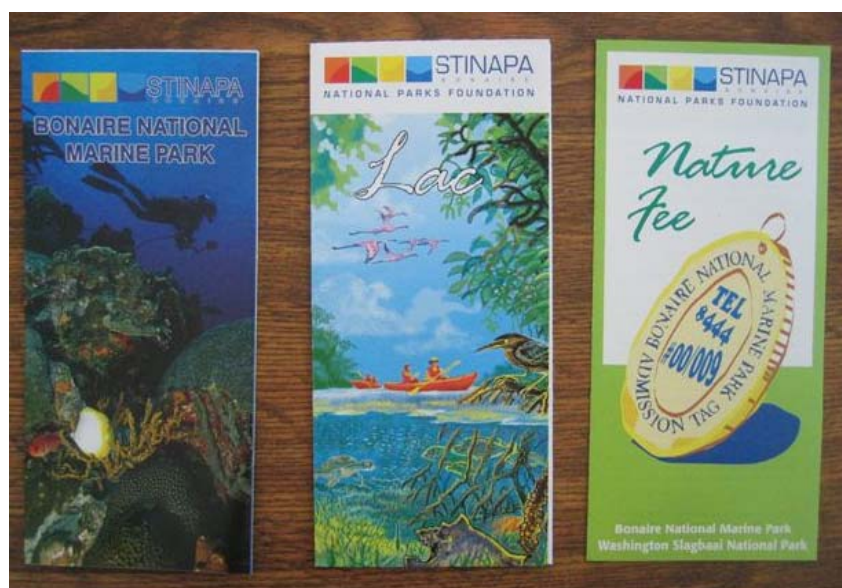


Image 1: (Top) Signage at Lac with general guidelines and rules

Image 2: (Above Left) The brochures currently in use by BNMP.

Image 3: (Above right) BNMP Manager Ramon De Leon with tags and brochures

Name	Content
Bonaire National Marine Park	Information on the formation of coral reefs and Bonaire's fringing reefs. An introduction to STINAPA, WSNP, Environmental education, General rules, guidelines, (below), contact details and a map of Bonaire's dive sites
Lac Brochure	Lac description, Mangrove details, History of Lac, Details on Green Turtles Outlines of windsurfing, kayaking, snorkelling, scuba diving, fishing guidelines for Lac. Zonation map of Lac and a code of conduct
Nature fee Brochure	Nature fee – who pays what, Justifications of the Nature Fee, where to get the tags from, outline of the work that STINAPA carries out, brief descriptions of WSNP and BNMP and the education/outreach work that is carried out.

PARK INFORMATION & REGULATIONS

The following guidelines and recommendations are presented in the BNMP brochure and at places around the island on posters:

General Marine Park Guidelines

- Please pay the Nature Fee before using the Bonaire
- A dive orientation from your dive operator is mandatory before you can dive in the Bonaire National Marine Park.
- Anchoring is forbidden in the Bonaire National Marine Park. Please use the mooring buoys provided.
- Spear fishing is prohibited. If you have a spear gun, please leave it in safe keeping at the Customs office.
- It is forbidden to remove anything alive or dead from the Bonaire National Marine Park.
- Make sure you do not damage the reefs in any way. Especially don't touch the corals and avoid silting up the bottom.
- For more information on regulations check the brochures our website or contact us.

Recommendations to Divers

- Practise good buoyancy control. If you can't remember how to get neutrally buoyant, ask your dive guide or instructor to help you out.
- Secure all consoles in such a way that they cannot trail along or get caught.
- Do not wear gloves or kneepads when diving within the Bonaire National Marine Park.
- Do not handle, torment or feed marine species.
- Do not manipulate or move marine species from their natural habitat.
- Take only pictures and leave only bubbles.
- Diving East Coast recommended with local guide.

Governance: institutional arrangements

When the Marine Park was revitalised in 1991 its management was given by the Island Government to STINAPA, Bonaire - a local not for profit, non governmental organisation which was already managing the islands terrestrial park (Washington Slagbaai Park) as well as Karpata and the cave system at Barcadera. Management was assigned to STINAPA under a management contract whereby a Begeleidingscommissie (consisting of representatives of STINAPA, tourist industry and persons nominated by the Government) was formed. The intention was to give the Marine Park into the hands of a local, non-governmental conservation organisation whilst allowing for input from the user community.

When it became clear that this two tier approach to management did not work well in reality the Island Government stepped in and, with the board's consent, appointed new members to the board to represent the broadest array of interests. The nine man board of STINAPA officially appointed representatives from the local agricultural co-operative, fishing community, tourism industry, hoteliers, dive operators as well as four of the original board members.

The Park manager is responsible for the day to day management of the Marine Park, whilst STINAPA Bonaire is responsible for policy decision making, finances and personnel.

STINAPA Bonaire

The STINAPA board has 11 positions, 9 of which are currently filled.

Members Name	Position	Interest	Contact details
Evo Cicilia	Chair	Government (DEZA)	717-8960 540-2925 evocici@bonairelive.com
Ronella Croes	Vice Chair	TCB	717-8322 786-8322 gm@tourismbonaire.com
Jeannette Nolen Heitkonig	Secretary	Local representative	717-5280 786-8196 raljea@flamingotv.net
Herbert Piar	Treasurer	Local representative	717-8157 786-5572 isyas@flamingogotv.net
Corinne Gerharts	Member	BONHATA	717-8778 786-8110 corine@bonairetours.com
Diana Sint Jago	Member	BONHATA	717-5134 717-8534 diana@bonhata.org
Bruce Bowker	Member	CURO	717-8819 bruce@caribinn.com
Papy Cicilia	Member	Gov.	717-8868 560-7440 papy@telbonnet.an
Jack Chalk	Member	Local representative	717-8290 560-7253 jack@habitatdiveresorts.com

Table 5: The STINAPA Board

Organisation and meetings

The following governance and administrative documents and framework exist for the marine park. Copies of the house rules and evaluation forms can be seen in Appendix 15. Staff uniforms can be seen in the human resources section of this part on the management plan.

		Comments
Byelaws	✓	
Daily board	✓	
Staff work book	✓	House rules
Job descriptions for staff	✗	
Uniforms for staff	✓	
Staff id badges		Planned for 2005
Staff evaluations	✓	After 2 month probation, then every 6 months
Annual report	✓	Date of last report: 12/04
Annual audit	✓	Date of last audit: 2004

Table 6: Institutional arrangements



Image 4 : BNMP full uniform and badge detail.

The following meeting schedule is followed within the marine park

	Frequency	Are the meetings minuted?	Are the minutes circulated?	To whom?
Board member meetings	Monthly	✓	✗	
Board member and manager/director meetings	Monthly	✓	✓	MTM members and board of directors
Manager/director and staff meetings	Monthly	✓	✓	All STINAPA staff

Table 7: Meeting arrangements

Physical Resources

Marine Park headquarters is located at Barcadera, some 5km north of the main town on Kralendijk. BNMP has a range of physical resources at its disposal; these are outlined in the table below.

Resource		Detail
Buildings	Office(s)	4 offices, administrative section, 2 store rooms, kitchen/diner, , parking for several cars. Shade for boats/cars. (Offices are from the government)
	Meeting room	With 4m moorings board, extensive library, table and chairs for 10 people and a/c
	Workshop	Workshop, with high pressure washer, dive kit, mooring equipment, lift bags, tools and maintenance parts. storage container
	Boat shed	To fit 2 boats
Transport	4*4 Truck	1*double cab 4*4, 2005, Toyota 2.7 turbo diesel. 1 double cab 4wd 2000, Toyota diesel
	2WD Pick up	1* double cab 2wd, 2005, Isuzu 2.7 diesel 1 double cab 2wd 2000, Toyota diesel
	Hard Hull, out board engine	24' hard boat with a 115 hp outboard Yamaha engine 15' Boston Whaler with a 15hp outboard Yamaha engine
	Rigid Inflatable, out board engine	19' Delta RIB powered by an 85hp outboard Yamaha engine 14' Zodiac with 90hp outboard Yamaha engine
Communication	Fax machine	1 fax machine in admin area – 2005, Brother
	Telephone (Land line)	5 phone points
	Cell phones	All staff members, 2005, 50 nafl a month allowance,
	Radios	Porta-phones in all cars and main office
	VHF radio	In 2 boats and one hand set.
	Base station	Located in main office
	Moorings	>140 moorings, Open moorings on the West coast: 26 drill moorings, 23 Block moorings, 28 barrels. 40+ blocks for public moorings between Harbour village marina and Karels beach bar pier. For a diagram of the construction of the mooring, see Appendix 16.
Other Equipment	BBQ pits	2 on Klein Bonaire needing updating
	Litter Bins	5 bins on Klein Bonaire that are looked after by BNMP
	Signboards	2 AT Karpata reserve, 5 at Cai, 2 at Sorobon, 2 to the south (with STCB). 2 at the commercial kayak entry/exit point at Lac. 2 at the roundabout, 1 in the south near Cargill salt works.
	Marker stones	59 dive sites with yellow marker stones with dive site names written in black
	Desk top Computer	5 desk top computers, 2004.
	Lap top Computer	5 laptops, 4 from 2005, 1 from 2004
	Camera	5 Nikonos cameras with a variety of lenses and strobes. 2 digital cameras – 3.3 megapixels for patrolling
	Video camera	Sony VX1000 video camera with underwater housing
	Projector	2 slide projectors, 1 Dell multimedia projector
	Internet	Broadband internet connection
	BC	16 Scubapro jackets
	Regulator(s)	16 regs Scubapro
	Tank	15 tanks
	Weights (sets)	16 sets
	Wetsuits	16
	Mask Fins Snorkel	30 full snorkel sets
	Drying oven	1 drying oven
	Microscopes	Binocular microscope
	Fridge	1 fridge
	Balance	2 balances
	CTD probe	YSI Conductivity, Temperature, Depth probe
	pH meter	One pH meter
	Water quality test kit	1
	GPS	Shared with Washington Park
	Drill mooring equip.	Pneumatic Helix drill equipment
	First Aid kit	1 kit
	Oxygen kit	1

Table 8: Bonaire National Marine Park physical resources

Human Resources

At the beginning of 2006 Bonaire National Marine Park itself employed 7 skilled staff members, with a further 6 working for STINAPA Bonaire on BNMP and WSNP business. A summary of the staff members, their position and skills can be seen below, with photographs and e-mail contact on the following pages.

Summary

		Director	Manager	Chief ranger	Ranger 1	Ranger 2	Ranger 3	Ranger 4	Ranger 5	Ranger 6	Accountant	Receptionist	Communications Officer	Education officer	Cleaner
STAFF DETAILS	Initials	EB	RdL	DD	ST	GZ	GIC	KR	DR	DK	KR	JAF	KVD	CM	?
	Shared position?	Yes	No	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes
	Full Time or Part Time?	FT	FT	FT	FT	FT	FT	FT	FT	FT	FT	FT	FT	FT	PT
	Years of service	2	<1	>10	5	>10	1	<1	<1	<1	6	6	<1	2	>10
	Academic qualification	BA	MSc	-	-	-	-	-	-	-	-	-	HBO	-	-
	Evaluation														
	Dive qualification	R	I	DM	A	OW	A	A	DM	DM	-	-	DM	OW	-
Additional qualifications	Special police powers		✓	✓	✓			✓		✓	✓				
	VHF radio operator	✓	✓		✓			✓	✓			✓			
	Vehicle/boat maintenance		✓	✓	✓	✓									
	First aid	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
	Conflict resolution	✓	✓												
	Captains licence														
	IT Training	✓	✓				✓				✓	✓	✓	✓	
	Media and communication	✓			✓								✓		
	Species specific training			✓	✓	✓			✓						
	Monitoring		✓							✓					

Table 9: Summary of the staff of BNMP

Key

FT = Full Time, PT = Part Time, R = Rescue Diver, I = Instructor, DM = Dive Master, A = Advanced Diver

* The Director and office staff (shaded grey) share work time between Washington Slagbaai National Park and BNMP

Staff Members 2006



Elsmarie Beukenboom
Director
director@stinapa.org



Ramon de Leon
Manager BNMP
marinepark@stinapa.org



Kerenza Rannou
Accountant
accounting@stinapa.org



Edwin Domacassé
Chief Ranger BNMP



July-Ann Frans
Administrative Assistant
julyann@stinapa.org



Sixto Trenidad
Ranger BNMP



Crisanta Martha
Environmental Education
Coordinator
nme@stinapa.org



Karel Rosaria
Assistant Ranger BNMP



Karen Van Dijk
Communication officer
communications@stinapa.org



Duvan Rios
Assistant Ranger BNMP



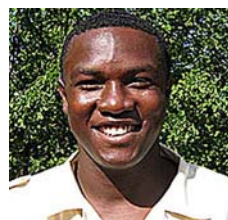
George Saragosa
All Around Assistant



Denice Keller
Assistant Ranger BNMP



Sally Thodé
Interior maintenance person



Gregory La Croes
Assistant Ranger BNMP

Table 10: Staff members of BNMP

Stakeholders

Local

Stakeholder	Role
Building and zoning department. DROB	Partner in decision making
Legal department	Law making, advice
Environment department	Partners in CMM, advice,
Prosecutors office	Law enforcement and advice
Harbour office	Law enforcement, advice, partners in CMM
Coast Guard	Law enforcement
Agriculture department LVV	Partners in CMM, advise in fisheries related issues,
Police	Law enforcement
SSV	Law enforcement
TCB	To promote the BNMP and distribute information
Fisherfolk – Cai	To give advice in fisheries related issues and use of the protected area issues
Town fisherfolk	To give advice in fisheries related issues and use of the protected area issues
Dive operators	Tags sales, information distribution, users statistics, training, law enforcement
Other watersports	Tags sales, information distribution, users statistics, training, law enforcement
Volunteer groups	Coral reef monitoring, fish population monitoring, help with the tags system, gathering statistic data,
Other NGO's	STCB – To carry research in sea turtle ecology, conservation, outreach and education

Table 11: Local stakeholders

International

Partner	Role
DCNA	To safeguard biodiversity and promote sustainable management of the protected area in the Dutch Caribbean. Tasks include fund rising, promotion, providing support to parks, and creating an information centre.
AGRRA	To provide training and advice in coral reef monitoring
TNC	To provide training and advice in coral bleaching and other reef related problem. To provide help in fund specific projects

Table 12: International stakeholders

Stakeholder input into the BNMP management plan

The following pages summarise the main threads of input from the Stakeholder meetings held in January 2006. Each of the comments or observations mentioned below came up in more than one, and often most of the consultations. These have been taken into account in the text of this document. The presentation given and minutes from the stakeholder meetings can be seen in Appendix 10. Further details from the stakeholder meetings have formed the basis of this part of the management plan and have been woven into the text.

Mission

The mission statement should include a reference to present and future generations
Cultural and historical resources need to be recognised by a group, or have some protocol of recognition
BNMP's number one priority needs to be environmental/ecological issues

Goals of the Marine Park

Goals 1 and 2 should include and/or at the beginning
Goal 3 caused much discussion, and some re-wording was suggested
Goal 4: use of 'Allow' and 'non destructive' could be change to 'promote' and 'low impact'

Values of Bonaire National Marine Park

The significance of the marine resource for Bonaire is invaluable
BNMP as an institution is essential for the well being of the marine resources of Bonaire
Without BNMP economic decline would occur on Bonaire
BNMP is very well respected by industry, locals and visitors as a management body and consultee.
The wrecks, old buildings, Conch shell mounds, Boka di Koko, Puitu, Saliña at Cai, Boka di Pos, Isla Yuwana, Boka Fagon all hold significant cultural value.
The World Heritage Site bid should be mentioned in the management plan

Uses of BNMP

Use of Kayaks needs to be continually regulated
Concern over the future use of jet skis
Reduction in the number of shore dive sites
Research should continue to play an important role for BNMP
The carrying capacity of Bonaire and maximum watersport operator numbers should be established.

Zonation

More zones and a zoning plan are needed
Kite Surfing zone needs to be established
Fish Protected Areas need to be established
Lac needs a zoning plan for kayaking, conch no fishing zone
The nature policy plan should define the MPA to include the Exclusive Economic Zone, 12 nautical miles from the shoreline.
Buffer zones landward of the marine park should be created to protect nesting turtles and establish some influence over coastal development
Confusion of the location of the reserves and the upper limit of the current MPA. Uncertainties of where the High Water Mark is, and if this includes the salinas.
The whole of Klein Bonaire is under the control of BNMP and needs a structured zoning plan

Issues facing BNMP

Political constraints and communication with government/government support are a major issue facing the success of the marine park.

Unsustainable development in all sectors identified as the main physical threat facing the marine park.

Nutrient enrichment seen as a major issue

Considerable concern over the planned development at Lac – Sorobon, and its likely negative effects on the environment

Future issues are likely to be related declining coral cover and public relations

Kite surfing considered a danger to many users

Further discussion

An effective communication and outreach plan is needed

Confusion over the new fees system, who it applies to and concern over the cost of lost tags after the price increase

There is a need to establish the economic benefits of BNMP

BNMP should have greater enforcement powers, especially for people who break rules repeatedly

Requests for a BNMP hotline, where staff members can be contacted.

Klein Bonaire and Lac need their own management plans nested into the BNMP management plan.

Recommendations for the management plan to be reviewed through a structured process and stakeholder consultation every few years.

BNMP staff and offices should be more visible and user friendly

TOURIST CONSULTATION

Tourists were consulted with through a questionnaire, where entry into a free prize draw was offered as an incentive. 200 tourists were questioned by a researcher[†] in the airport during February 2006. Copies of the questionnaires and responses can be seen in Appendix 17. Tourists were asked questions relating to the activities they took part in whilst visiting Bonaire, the most memorable part of their visit, which facets of the marine park they had used and which issues facing the marine park they considered to be most significant.

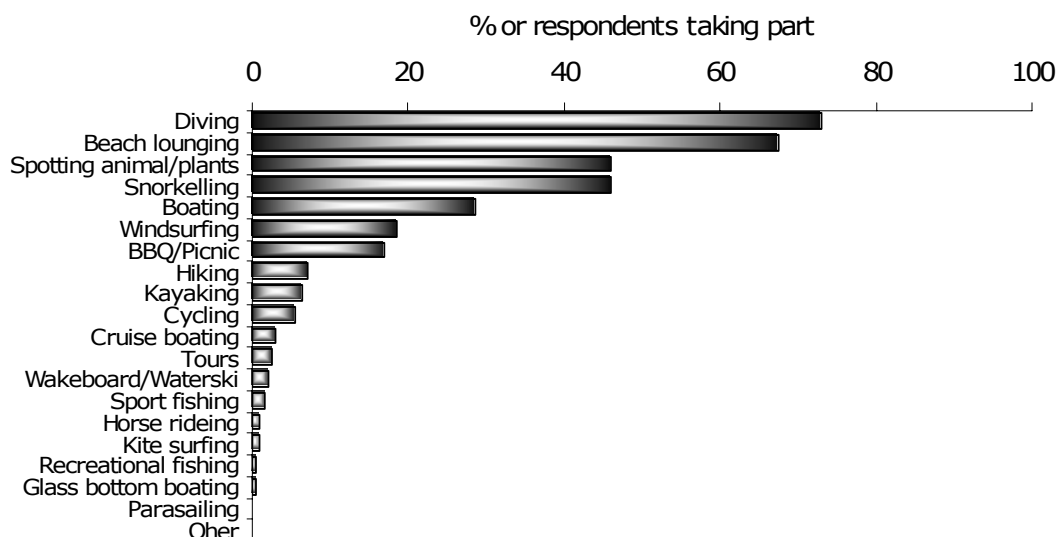


Figure 2: % of tourists taking part in recreational activities

As Figures 34 and 35 show, most visitors to Bonaire had taken part in diving, beach recreation, snorkelling or wildlife spotting. This made the marine environment and related recreational activities the most memorable part of most peoples stay on Bonaire.

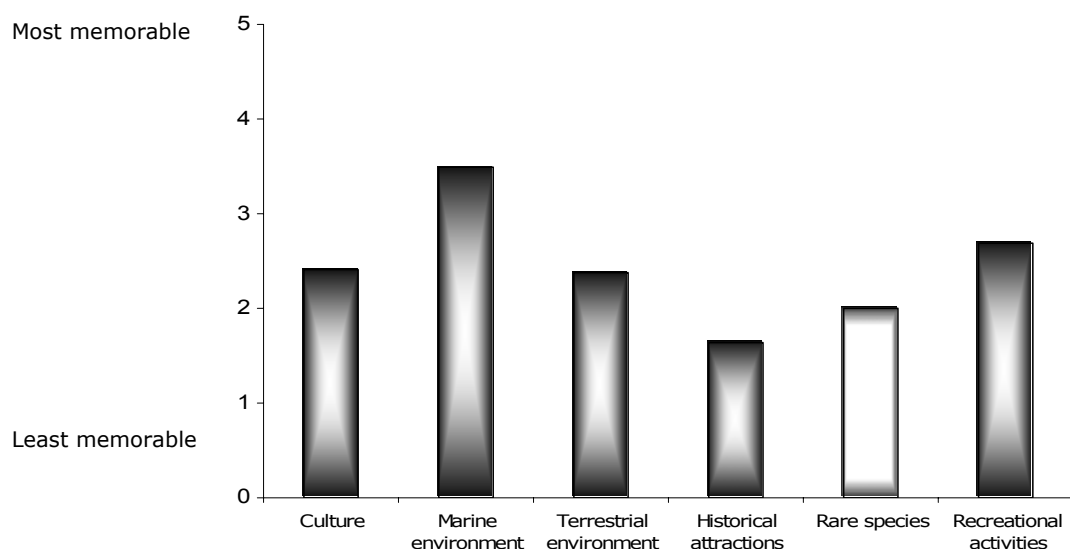


Figure 3: Most memorable part of participant's trip to Bonaire

When the tourists were presented with a list of challenges facing the Marine Park, the one that was ranked as the highest importance was pollution, followed by litter and development. To gain an understanding of what the tourists thought about the Marine Park, they were asked if they had made use of any of the facilities provided by the Marine Park. Most tourists (about 70% of those

[†] Maria Uyarra, a researcher from the University of East Anglia (UK) carried out the questionnaires (m.uyarra@uea.ac.uk)

questioned) had used maps of some description. A few people had used leaflets, but less than 10% had visited or made contact with the Marine Park headquarters or staff members. A similar number had made use of any presentations.

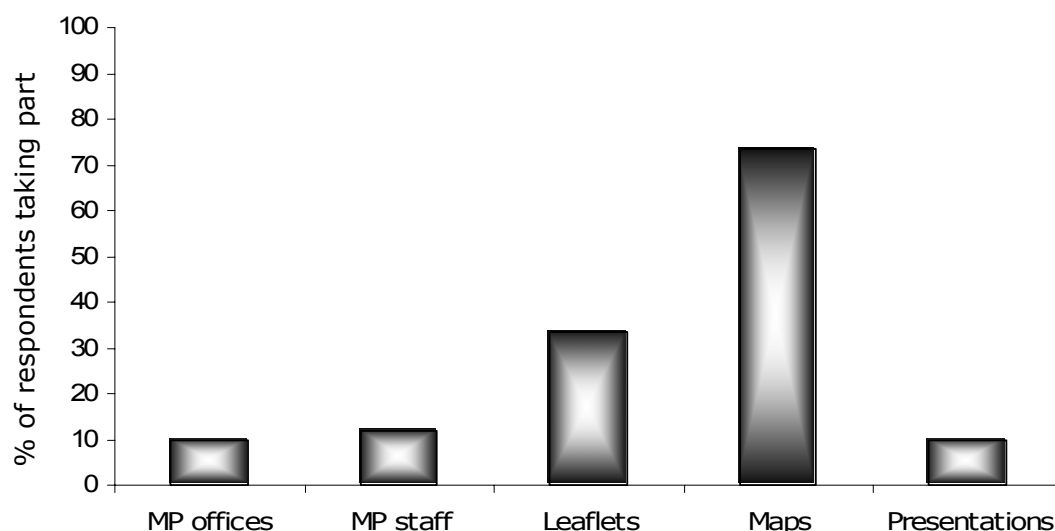


Figure 4: Visitors use of Marine Park outreach.

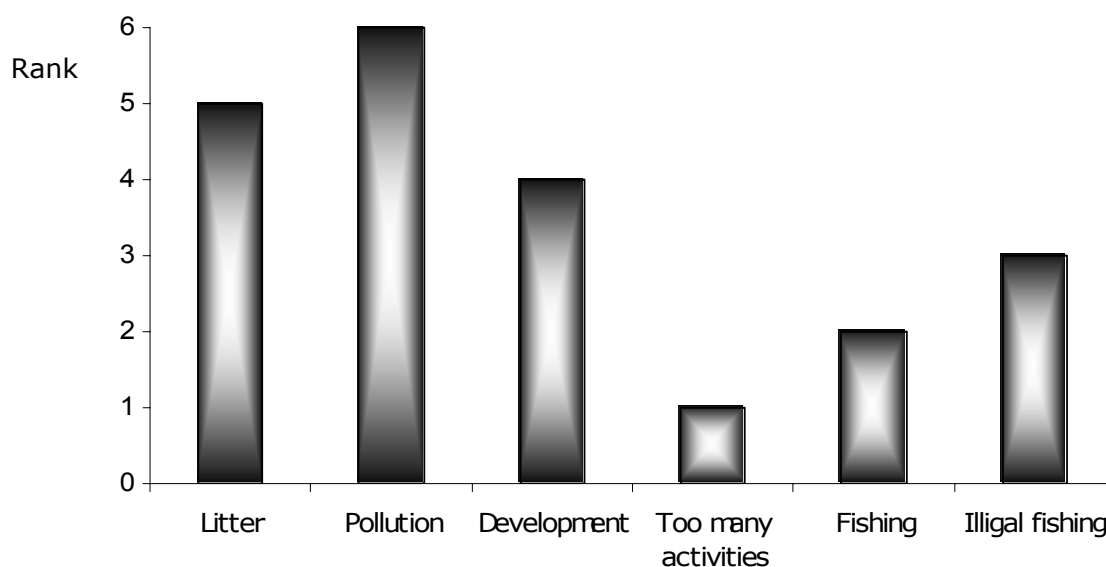


Figure 5: Challenges facing BNMP

From the results it seems that visitors are not aware of the activities of the Marine Park, although they are aware of some of the issues facing the marine environment.

These findings underline the importance of the marine environment for Bonaire's tourist industry. With such a high percentage of visitors either coming to Bonaire to experience the marine environment or making use of it whilst visiting, its health and well-being is essential for the islands economy.

CONSULTATION WITH LOCAL PEOPLE

Interviews were carried out in October 2005 to investigate the knowledge, attitude and opinions the local residents of Bonaire have about STINAPA/Bonaire National Marine Park. 200 people were interviewed in during the International Bonaire Sailing Regatta.

The main points highlighted by the survey were as follows:

- 77% of those interviewed knew that BNMP exists
- 28% knew where the marine park is.
- 75% of people interviewed thought that it is a good thing to have rules for BNMP,
- 76% that they care for the marine environment.
- 76% of people agree that BNMP contributes significantly to tourism and conservation.

This study shows that local people support the work of BNMP and value the institution. This support is essential for the running of the Marine Park, without it, many aspects of the work carried out by BNMP would fail. Many of the persons interviewed felt that BNMP should give out more information and raise awareness about the work of STINAPA. This is a very important issue for the future actions of the marine park. The responses and work carried out by STINAPA can be seen in Appendix 17.

Uses

BNMP as a multiple use area encourages a range of uses, which generally complement one another. The following table briefly outlines the main uses.

USE	DETAIL
Animal/Plant spotting	Visitors and locals alike take part in activities like walking and snorkelling to observe the native wildlife of Bonaire
Aquaculture	There is one aquaculture venture on the Island that raises two species of shrimp in an enclosed system – refer to the notes in Part 1 for further details.
Artisanal fishing	Some fishermen at Lac use the bay as fishing grounds and others use Sorobon pier to moor their boats which they use to fish in pelagic environments.
Beach lounging	No Name Beach on Klein Bonaire, Pink Beach, Donkey Beach, and Sorobon/ Cai at Lac are the main beaches used for beach lounging and recreation.
Boating	Power boats are used for pleasure and to offer tours of the island as well as trips to Bonaire
Camping	Some camping takes place on the beaches of Bonaire. A permit is required for at No Name Beach on Klein and fires are not permitted.
Collection	The collection of artefacts from the Marine Park has been prohibited
Commercial fishing	Commercial fishing mainly takes place beyond the boundaries of the marine park, though some of the fish caught in Lac are sold on.
Cruise boats	Between 3-6 cruise boats visit the Island every month, a total of around 80 boats per year (see Figure 30) and the passengers disembark for yours of the island and the marine park.
Diving	Diving and related activities are the mainstay of Bonaire's economy. It is frequently rated as the number one dive destination for shore diving in the world by the Diving press. Sales of dive tags to divers and other water users sustainably finances STINAPA Bonaire.
Education	A number of small independent education base businesses run on the island, who make use of the marine parks resources alongside schools and other establishments
Jet skiing	The rental of jet ski's has been prohibited, though a few people on the island continue to use private craft
Kayaking	Kayaking has established itself as an upcoming pastime on Bonaire. Many hotels rent out sea kayaks to visitors and a kayaking business has been set up near Cai to take visitors on tours of the mangroves
Kite surfing	Kite surfing has established itself as a new watersport on the island with approximately 600 people taking instructed courses in 2005. It has been prohibited from Lac and has found a new home in the area of the Atlantis dive site on the south west coast of the island. Further details of Kitesurfing can be seen in Appendix 18.
Natural resource extraction	The Cargill salt works use the flat topography of the south of the island to their advantage to evaporate water from the large salt pans, leaving salt behind which can be exported.
Snorkelling	Many visitors to the island, including cruise boat passengers take part in snorkelling along the coral reefs or around the mangroves.
Sport fishing	A small number of sport fishing operators run businesses on the island, fishing for larger pelagic fish in deeper waters than the current marine park boundary
Glass bottom boating	One boat with an underwater viewing platform operates from a pier near Kralendijk, usually taking passengers on trips around Klein Bonaire
Tours	Boating companies take visitors on tours of Klein Bonaire
Waterskiing	Some waterskiing takes place in the bay of Kralendijk
Windsurfing	Windsurfing is a popular pastime on Bonaire relying on the consistent windy conditions on the East Coast. The majority of windsurfing takes place in Lac with two windsurfing businesses based in Sorobon. Some windsurfers illegally take to the salt lakes of the Pekelmeer Ramsar site in the South.
Yachting	Many people use the bay of Kralendijk to moor their yachts. The reliable winds make sailing a significant pass time on the island.

Table 13: The main uses of BNMP.

Local people and visitors' alike use the marine park, most visitors being from the United States and the Netherlands as can be seen in Figure 31

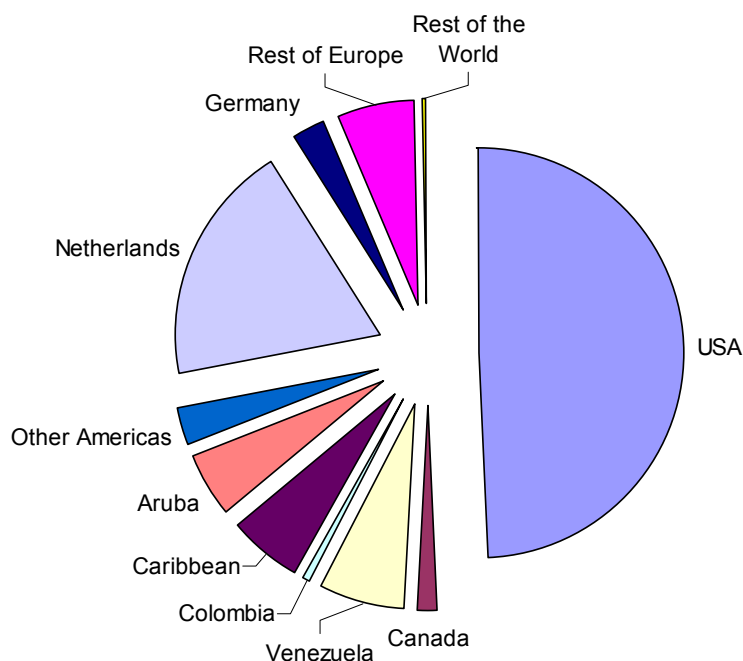


Figure 6: International visitors by country/region 1992-2002

(source: Bonaire Tourism Authority, see Appendix 19)

The amount of people buying marine park tags to use the Marine Park on a yearly basis remains at about 27,000 to 28,000 people, as can be seen in Figure 32. It is important to note, when looking at these figures that an estimate of between 20-30% of tags are re-used at some point, by local people and people coming back to the island. It is therefore not a possibility to use these figures to give an accurate indication of user numbers.

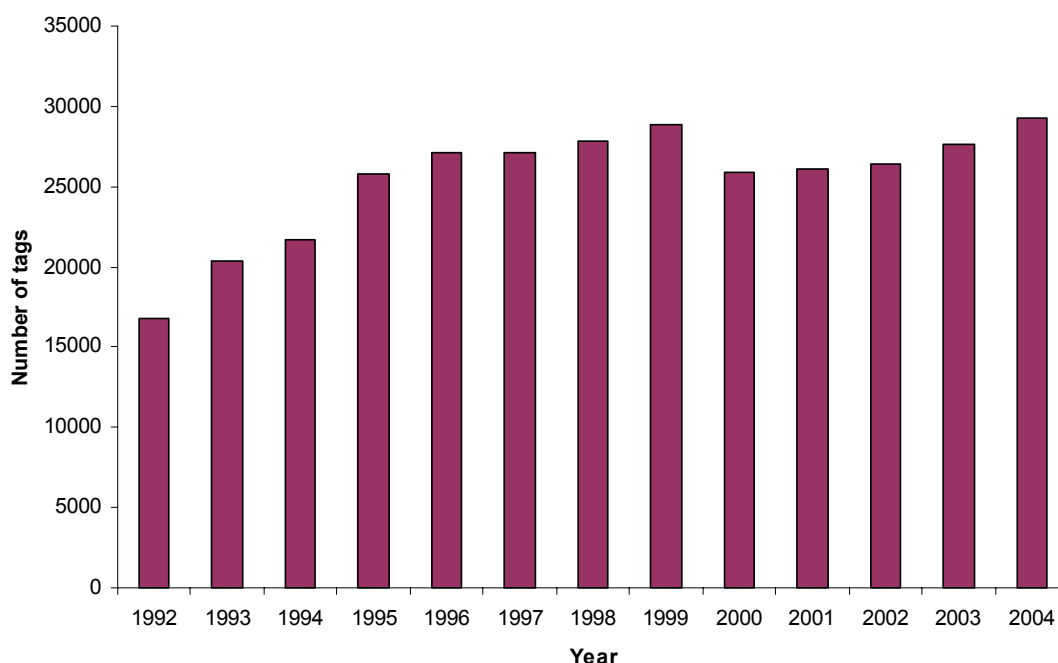


Figure 7: Marine Park Tag sales 1992-2004

(Source: BNMP records, data is presented in Appendix 20)

Most of the boats using Bonaire's waters are tankers visiting the BOPEC oil terminal and local boat traffic. Figures that distort this are the movements of tug boats from the harbour, which have at least twice as many journeys as the tankers (due to return trips). There have been changes in the amount of boat traffic in recent years, particularly the amount of airport/jet fuel boats visiting the fuel pier, see Figure 33.

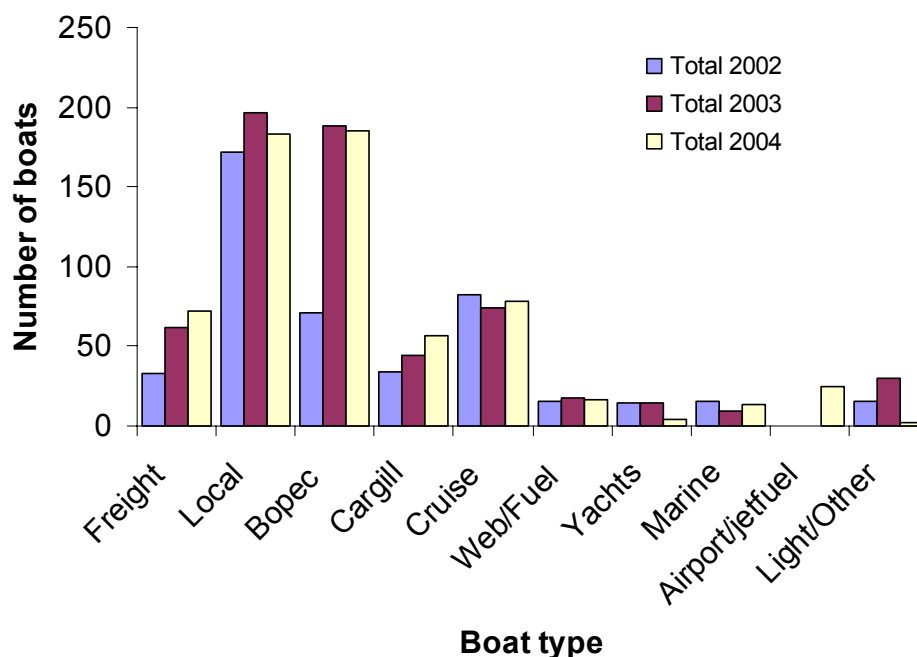


Figure 8: The number of different types of boats using Bonaire's waters.

(Source: DEZA publication 2004, see Appendix 2)

The nature of boat traffic has not changed excessively, other than a marked reduction by almost a quarter of local boat traffic, possibly due to the end of ferry services to Curaçao, and doubling of the amount of boat traffic visiting BOPEC (See Figures 34 and 35)

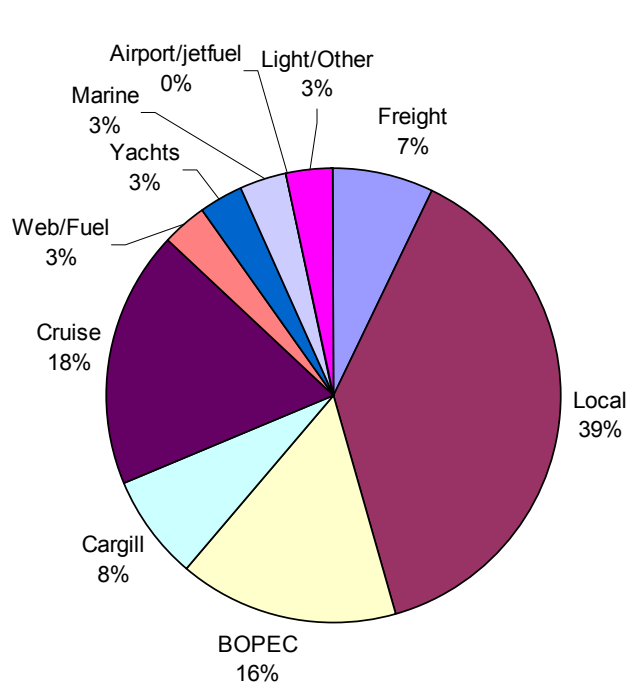


Figure 9: The nature of Boat Traffic in 2002 (left)

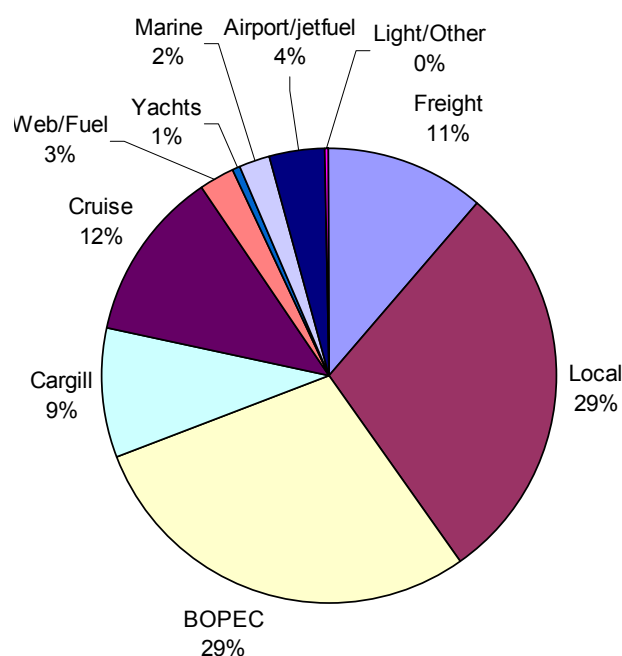


Figure 10: The nature of boat traffic in 2004 (right)

Zoning

When the marine park was first established in 1979 it was decided to take a holistic approach and to protect the waters around the entire island of Bonaire and Klein Bonaire. The rationale for this decision was that the islands themselves are small and that this would afford the most reliable and enforceable protection for the island's reefs, seagrass and mangrove systems as it would be practically impossible for activities such as dredging or destructive fishing practices to go on outside of the park which might impact the island's marine resources.

The boundaries for the marine park were chosen so as to be easily identifiable and to include within the park boundaries the most important user groups. Hence the high water mark was chosen as the landward boundary and the 60m depth contour was chosen as the maximum safe diving depth for SCUBA diving at that time. With regard to the shoreline it is clear that anything which is wet during the course of the normal tidal cycle (excluding storm events and extreme meteorological conditions) falls within the marine park. There is generally speaking a debris line at the high water mark. Also within the mangroves the high water mark is clearly visible on the mangrove prop roots.

With regard to the seaward extent of the marine park, whilst the legal limit of protection is set at 60m the park has generally been regarded to extend in principle beyond this and to give certain amount of protection to the seabed. This has allowed the park to prohibit anchoring in deep water off the island of Klein Bonaire and in mid channel between Bonaire and Klein Bonaire by cruise boats.

When the park was first established little regard was given to the situation of Bonaire's salinas and in fact separate protection was sought for a number of them (Saliña Slagbaai, Gotomeer) via the RAMSAR convention. It has since become clear that there is subterranean water flow between the salina's and the sea and that they are at least partially tidal which would lend weight to the argument that they too should be considered part of the Marine Park. Furthermore when salinas have been opened to the sea in the past e.g. Saliña Wayaka in the Washington Park the consequences for the adjacent coral reefs have been devastating.

The Flamingo Paradise (man made lagoonal area adjacent to Plaza Resort) was similarly under dispute but in this case it is clear that the water in the lagoon system is continuous with the adjacent sea and the lagoons can be considered an extension of the Marine Park.

Most recently the Island Government of Bonaire chose to extend the landward boundary of the Marine Park by including within the Park boundaries the island of Klein Bonaire. This is the first known example of a Marine Park extending shorewards to include an entire uninhabited island.

Bonaire has two legally designated marine reserves located at;

- Playa Frans north to Slagbaai
- Karpata north to the entrance of the Gotomeer (Lake Goto)

These areas were set aside when the park was first established in 1979. Their goal was to provide the marine park with control areas or reference sites which would allow the park to gauge the impact of watersports activities on the health of Bonaire's reefs. Whilst the park was not under active management (from approximately 1983 – 1990) the reserves were not respected and there were regular publicized dive trips to the northern most reserve and routine fishing activity in both reserves therefore their value as reference sites was compromised. From 1991 onwards access to the reserves was again restricted.

Within the marine reserves diving, snorkelling and other watersports are strictly prohibited. No anchoring is allowed but fishing vessels passing through the reserves are allowed to fish but may not set fish traps (Marine Environment Ordinance Article 5).

The boundaries of the marine reserves have never been strictly defined. Traditionally the Marine Park has allowed divers and snorkellers to enter the water on the edge of the reserve area providing they also exit the water outside of the reserve area. Essentially therefore a buffer area has existed on the northern and southern edges of both reserves estimated to extend no more than 300m into the reserve. The location of the park and reserves can be seen in Figure 36.



Figure 11: Map of Bonaire showing the main dive sites (numbered 1-63) and Marine Reserves

Analysis of issues

Before defining the specific management objectives for BNMP, the key issues facing the operation and values of the protected area need to be identified. Bonaire National Marine Park is challenged with constraints on management and the existence of historical, current and future issues. Such issues can be human-induced or natural, and may originate from within the protected area or from beyond its boundaries. Often they will manifest themselves in the form of social or economic demands upon the protected area.

Historical issues

Historically the marine park was established to control the perceived threat of diving and the dive industry to the health and wellbeing of the island's reefs. Even when the marine park was revitalized in 1991, the main threat to the reefs was considered to come from SCUBA diving and related activities. Consequently for several years the park focused on addressing issues such as misuse of moorings and anchoring by the dive industry and diver impact on the reefs by visiting divers.

A keystone work produced in 1994 by Drs Callum Roberts and Julie Hawkins paved the way to a broader and more balanced approach to management which took into account the impact of yachting, fishing and coastal development. After 1994 marine park management made a concerted effort to inform users of the less obvious but more pervasive problems of nutrient enrichment and sedimentation as threats to Bonaire's reefs and to address issues such as the lack of a waste treatment facility, landscaping practices and building and construction practices in the coastal zone.

A Pew Fellows meeting held on Bonaire in 2003 brought world renowned researchers and scientists back to the island, some of whom had worked on Bonaire's reefs decades previously. It also brought to light data on Bonaire's reef fish populations from 1974 which indicated that Bonaire's reef fish populations are severely over fished, particularly the groupers, snappers and grunts and prompted the park to immediately consider the establishment of Fish Protected Areas to protect remnant carnivore populations.

Management issues

- **Lack of legal jurisdiction, lack of integrated coastal zone management.**

- This produces a significant barrier to conservation because of the considerable links between the terrestrial and marine environments of Bonaire

- **Relationship of BNMP and STINAPA with government**

- A lack of communication between STINAPA and the government means the politicians running the island do not understand the fragility and economic value of Bonaire's marine environments

- **Outreach**

- Lack of presence is seen as a major constrain to the success of BNMP, many stakeholders would like to see some presence in Kralendijk and at the airport, as well as increased communications with rangers.
- Dive orientations are essential to the well being of the marine park as more and more divers visit the island and need to be standardised to prevent damage to Bonaire's reefs

Current 'external' issues

BNMP has been through two processes for identifying the key issues facing the protected area. Firstly, a Strategic Planning Process with Coral Resource Management (2004 for a full copy see Appendix 21), secondly, a threat identification process for the Dutch Caribbean Nature Alliance Management Success Project (2005, for full details see Appendix 22).

ISSUES IDENTIFIED BY THE DCNA MANAGEMENT SUCCESS PROJECT

The DCNA Management Success Project used the WWF method of ranking issues facing the Marine Park. The manager of the marine park was presented a list of issues facing the marine park and asked to give them a number relating to the extent, impact and permanence of the threat presented by that particular issue. Numbers were allocated from 1-4, 1 being low impact, permanence or threat and 4 representing a high impact, permanence or threat. These figures were analysed and resulted in a figure for the degree of threat to BNMP that each issue represented, as presented in Figure 37. Further details of the methodology can be found in Appendix 22.

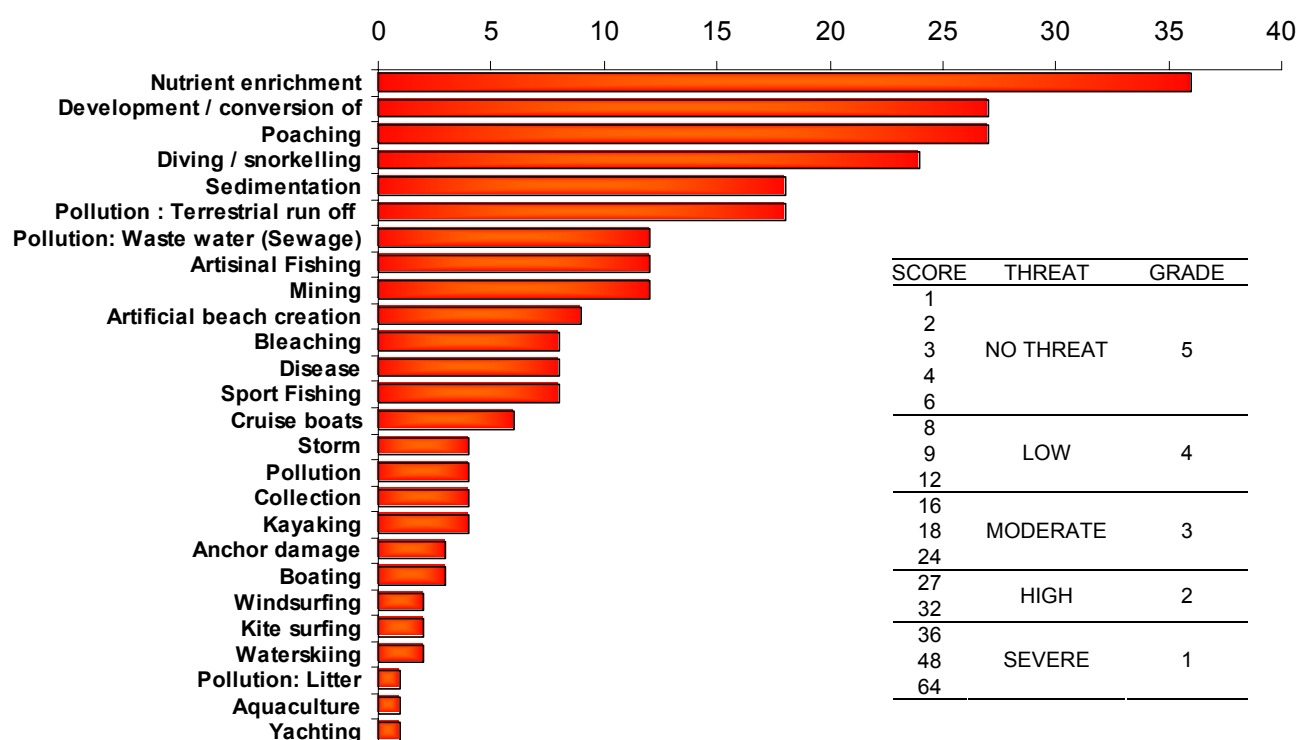


Figure 12: Results of the Management Success Project threat Analysis

The same exercise was carried out by Washington Slagbaai National Park where invasive species and farming were identified as the main threats facing the terrestrial natural environment. One of the key problems with agriculture on the island is the grazing of livestock, in particular goats which are considered an invasive species. Herds of goats can decimate vegetation which leads to excess runoff and erosion. In turn the eroded soils and sediments are washed into the marine environment, causing sedimentation and nutrient enrichment. This is an important factor for integrating efforts to tackle run-off pollution in the marine park.

ISSUES IDENTIFIED BY THE BNMP STRATEGIC PLANNING PROCESS

Issues facing BNMP were identified and management interventions were identified. The process was carried out by BNMP management and Kalli De Meyer, Executive Director of Coral Resource Management. Each of the issues identified was given a level of priority from 1-5, 1 being highest priority.

Grade	Status
5	Required
4	Necessary
3	Important
2	Essential
1	Critical

Table 14: Issue priority levels from BNMP strategic planning

The resulting strategic planning document can be seen in Appendix 21.

ISSUES IDENTIFIED BY BNMP STAKEHOLDER CONSULTATION

For simplicity the main issues raised during the stakeholder consultations of January 2006 have been counted by the number of stakeholder groups that raised each issue and considered it important. To fit with the scoring method from the management success project and the strategic plan, the issues have then been ranked, with 1 being the most frequently raised issue. Issues not included in the table were not brought up in the stakeholder meetings. Full analyses can be seen in Appendix 22.

	Stakeholder input rank score
Pollution : Terrestrial run off	0
Artificial beach creation	0
Development / conversion of land use	1
Sedimentation	0
Bleaching	0
Disease	0
Mining	0
Sport Fishing	0
Collection	0
Nutrient enrichment	5
Storm	0
Yachting	0
Boating	2
Diving / snorkelling	4
Poaching	4
Pollution: Litter	0
Pollution: Waste water (Sewage)	5
Waterskiing	4
Artisinal Fishing	4
Cruise boats	5
Kayaking	4
Kite surfing	4
Pollution	4
Windsurfing	4
Anchor damage	5

Table 15: Issue identification from stakeholder consultation

ANALYSIS

The following table presents a hierarchical list of the issues identified by the three methods outlined above.

	Stakeholder input	Strategic plan	Management success	Total
Pollution : Terrestrial run off	0	0	3	3
Artificial beach creation	0	0	4	4
Development / conversion of land use	1	1	2	4
Sedimentation	0	1	3	4
Bleaching	0	1	4	5
Disease	0	1	4	5
Mining	0	1	4	5
Sport Fishing	0	1	4	5
Collection	0	1	5	6
Nutrient enrichment	5	1	1	7
Storm	0	1	5	6
Yachting	0	1	5	6
Boating	2	0	5	7
Diving / snorkelling	4	0	3	7
Poaching	4	1	2	7
Pollution: Litter	0	2	5	7
Pollution: Waste water (Sewage)	5	0	4	9
Waterskiing	4	0	5	9
Artisanal Fishing	4	2	4	10
Cruise boats	5	0	5	10
Kayaking	4	1	5	10
Kite surfing	4	1	5	10
Pollution	4	1	5	10
Windsurfing	4	1	5	10
Anchor damage	5	1	5	11

Table 16: A hierarchical list of the issues identified by the three threat analysis identified

These results appear skewed since not all of the issues identified were brought up in each of the issue identification processes (so a score of 0 makes the issue more important than identified). To correct this, those issues that did not come up in all of the issue identification processes have been excluded. Table 21 summarises the most significant external issues facing BNMP as identified by stakeholder consultation, the management success project and strategic planning, the most significant issues are placed at the top of the list.

	Stakeholder input	Strategic plan	Management success	Total
Development / conversion of land use	1	1	2	4
Nutrient enrichment	5	1	1	7
Poaching	4	1	2	7
Artisanal Fishing	4	2	4	10
Kayaking	4	1	5	10
Kite surfing	4	1	5	10
Pollution	4	1	5	10
Windsurfing	4	1	5	10
Anchor damage	5	1	5	11

Table 17: A summary of the most critical issues facing BNMP as identified by the 3 described threat analysis processes

DETAILS OF THE CURRENT 'EXTERNAL' ISSUES IDENTIFIED AS SIGNIFICANT

ISSUE	Description
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, 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 etc 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. Current projects causing concern include the proposed hotel development of 500+ rooms around Lac. The grazing of livestock (goats and donkeys) , which are considered invasive species' in Washington Slagbaai National Park, also reduces the cover of vegetation which increases run off and pollution from terrestrial sediment.
Nutrient enrichment	Nutrients are chemicals that are used by plants and animals for growth and energy. The main nutrients used on coral reefs are nitrogen and phosphorus compounds. Sewage from the human population is the main source of nutrient pollution on Bonaire's coral reefs. Corals usually thrive in nutrient poor environments and coral reef ecosystems are designed to quickly recycle any excess nutrients in the system. When there are elevated levels of nutrients around coral reefs algal growth and eutrophication kill coral (eutrophication occurs in an aquatic ecosystem where high nutrient concentrations stimulate blooms of algae, especially in areas where there is limited water circulation). Chemicals and microbes associated with nutrient pollution also harm corals. Any damage to the corals on a reef will affect the whole reef and the human use of the reef e.g. a decline in diving tourism because damaged reefs are less attractive to visitors.
Poaching	Poaching of conch, fish, and turtle species from a number of locations takes place. The removal of the animals is illegal (sometimes internationally prohibited) and causes a depletion in the stocks. Such a reduction in numbers directly endangers the populations and reduces reproduction rates. This makes the fishing greatly unsustainable, and is likely to endanger the health of the reef in general.
Artisanal Fishing	There are some issues with local fishermen taking undersized fish.
Kayaking	Kayaking around the mangroves of Lac has become a popular activity. It puts pressure on the seagrass environments through trampling, grounding and paddles scraping the seagrass and associated organisms.
Kite surfing	Recreational activities are a threat to BNMP through the disturbance of the natural environment. The arrival of Kitesurfing on Bonaire has raised a number of conflicts between user groups, mainly relating to safety and the crowding of waters. Kitesurfing has been prohibited in Lac but has found a new area on the South West of Bonaire (see Figure 32)
Pollution	Sewage makes its way onto Bonaire's coral reefs through inadequate waste water treatment and use. Sewage is a cocktail of substances, a number of which are dangerous to coral reef ecosystems and those who use them. Sewage is a source of major damage to Bonaire's coral reefs and a cause of human illness. Terrestrial run-off from Bonaire onto the fringing reef 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 (especially those visiting the oil storage facility in the North of Bonaire) can contain a range of pollutants and exotic species which can become invasive, displacing native organisms. Jet fuel expelled from aircraft using the runway at Flamingo airport may also be having an impact on the reefs around Donkey beach.
Windsurfing	Windsurfing mainly takes place in Lac, where swimmers, snorkellers and fishermen also make use of the marine park. Conflicts centre around safety issues and the trampling of seagrass on the fringes of the bay where windsurfers launch and turn
Anchor damage	Anchoring is prohibited in the Marine Park (other than boats smaller than 12' in length using a stone anchor) since it damages the reef. However, the stone anchors used by local boat users can damage the reef and some anchoring still takes place illegally. This causes issues with tourists who having been through a dive orientation (where environmental awareness is taught), go into the marine park and see local people damaging the reefs.

Other issues considered important

Diving / snorkelling	Recreational SCUBA diving and snorkelling are often considered a non-extractive use of coral reefs causing relatively little environmental damage. Recently it has become clear that this is not the case. With the continued growth in the popularity of the sports in Bonaire, divers and snorkellers can have a considerable effect on the reef. This comes from the direct contact of people and their equipment with reef organisms and also from the more serious indirect impacts resulting from diver associated anchor damage, sewage discharges, sedimentation and other forms of pollution from the tourist developments. Suggestions have been made to provide an artificial reef for divers to take pressure away from key dive sites. In 2006 a private project installed 14 REEFBALL's at Sand Dollar condominiums dive site (Bari Reef).
Sedimentation	Sediment or suspended matter is insoluble particles of soil and other solid inorganic and organic materials that become suspended in water. Sedimentation is a natural process resulting from erosion of land and transport of soil to the sea (terrigenous sediments), or from resuspension of sediment previously deposited (such as carbonate from coral reefs). The main sources of sediment inputs to the coral reefs of Bonaire are considered to be runoff and sewage. Agricultural activities, deforestation, urbanisation and poor land management are key human activities that can increase runoff and consequently sedimentation on coral reefs.
Artificial beach creation	Tourists visiting Bonaire often prefer to have a beach to sit and relax on near the waters edge. The geology of the leeward shore provides very little space for beaches near to the main human settlements. Artificial beaches have been created in some places and can cause sedimentation of the reef as the sand dumped on the site of the beach is washed into the sea.
Cruise boats	Around 80 cruise boats visit BNMP per year, bringing thousands of visitors. They can be a source of pollution, where sewage and ballast are emptied into the marine environment. Ballast discharge in the BNMP is forbidden; all ships coming to Bonaire need to sign a ballast water declaration that states they have changed ballast water at least 12 miles from the island. Visiting boats have also been known to have oil leaks, and cruise ships have dumped broken glass onto the reefs near to the piers.
Mining	Beaches are protected by law against sand extraction, though sand extraction is allowed in certain areas. During the 1990's sand was extracted from a number of illegal sites along the length of the windward shore. During this process a number of cultural and historical resources were damaged along with turtle nests and breeding grounds for bird species; particularly where sand dunes were disturbed. Sand continues to be extracted illegally.
Bleaching Disease Storm	Bleaching is when corals lose their colour and eventually die. Corals also suffer from disease. Although bleaching and disease can be brought on by pollution and other 'human' factors, they are difficult to manage since they can also be caused by 'natural' phenomena making them difficult to manage. Likewise, the destruction that storms can cause cannot be managed, though storms present a very real threat to BNMP.
Collection	Some species found in BNMP are collected by people for pets, or by tourists as souvenirs. This includes many of the species on the CITIES species list, such as hard corals which are collected to be ornaments, and the Lora. Fish are also collected from the reef and put into aquariums.
Pollution: Litter	Litter can smother and kill wildlife through being consumed and becoming stuck on body parts. Plastic bags are often mistaken for jellyfish by feeding turtles.
Aquaculture	There is a small aquaculture venture growing shrimp on the east of Bonaire, near to Lac. It is considered to be only a very small threat to BNMP since it takes only water from the Marine Park (algae, which is food for the shrimp is grown in tanks). Waste from the building is expelled into the salt pans of Cargill in very small amounts, where it evaporates, becomes food for Brine Shrimp which Flamingos feed on and even helps the process of salt crystallisation.

FUTURE OF ISSUES FACING BNMP

Since planning is about the future, the factors which can affect the future of BNMP must be identified and evaluated. Whilst such predictions are at best uncertain, the identification of future trends in ecological change, visitor use, conflicts, economics and related pressures should be attempted. An understanding of the socioeconomic environment is of particular importance. Predictions are not just about future issues – they also help to identify opportunities for planning, beneficial change, remediation or restoration. The following expectations of change come directly from the extensive stakeholder input of January 2006

FUTURE ECOLOGICAL CHANGE

- Decrease in coral cover (assuming development continues unchecked)
- Mangrove and seagrass damage (assuming development continues unchecked)
- Fish stocks are expected to decrease, however, if the fish protected areas are established, an increase in fish biomass is expected in 2-3 years.

FUTURE VISITOR USE

- Change in flight numbers
- Carrying capacity limits may be exceeded in some areas of use.
- The number of divers is expected to increase
- The number of Kitesurfers visiting the island is expected to increase (see Appendix 18) and begin to make a significant contribution to the islands economy.
- Increase in tourism is expected and the economic department in 2004/currently advise that more rooms are build to accommodate the expected increase
- Influx of visitors from Aruba and Curacao may occur – placing further stresses on BNMP's resources.
- Dive operations plan to start centres on the East coast

FUTURE CONFLICTS

- Coastal development and environmental protection are expected to continually be mismatched, unless steps are taken in outreach and enforcement.
- Less conflict between fisherfolk and other users is expected through the establishment of zones and improved communication
- The development of hotels at Lac is likely to come up against stiff opposition
- The closure of any more shore diving sites with preference given to private coastal developments and other users.
- As the water around Bonaire becomes busier with users, safety issues will become of greater concern. The role of BNMP, the police, the harbour master and other agencies needs to be clearly defined in relation to who carries out safety outreach/rescues etc.

FUTURE ECONOMIC ISSUES

- Although more tourists are expected to visit Bonaire over the coming years, some loss in tourism revenue may be caused through a decline in the ecological integrity of the marine environment.
- Some concerns have been raised over the future political and economic status of the island if Bonaire becomes part of Holland. Particular concerns were raised over an influx of workers and the likely associated unsustainable development.
- Loss of tourism revenue
- Continued increases in energy prices

OTHER FUTURE ISSUES

- The success of the planned waste water treatment plan is a major concern.
- Some concern over the future role of BNMP as an institution and the possibility of a loss of respect if BNMP's role is continually sidelined in favour of 'economic' development and construction.

Summary of issues

The main issues facing BNMP have been identified through stakeholder input, management opinion in the Management Success Project and by the Strategic Planning Process 2005. These are:

Management issues

- **Lack of legal jurisdiction, lack of integrated coastal zone management.**
- **Relationship of BNMP and STNAPA with government**
- **Outreach**

External issues

- 1. Development / conversion of land use**
- 2. Nutrient enrichment**
- 3. Poaching**
- 4. Artisanal Fishing**
- 5. Kayaking**
- 6. Kite surfing**
- 7. Pollution**
- 8. Windsurfing**
- 9. Anchor damage**

Over the coming years, pressures on BNMP are likely to increase so it is essential that an effective management strategy for these issues is established. By dealing choosing an effective course of action to deal with one of these issues, value will be added by outcomes that will have a knock on effect and go some way to tackle other issues that have been identified. An example of this would be to tackle poor building practices and in the process reduce problems of sedimentation and some nutrient loading

Alternatively, BNMP can identify essential projects which deal with multiple issues, a good example of this would be to devise a comprehensive zoning plan to tackle kiting, kayaking, fishing, windsurfing and anchor damage issues.

The recognition of the key issues facing BNMP is essential to the production of an effective work plan and strategy, which is presented in the next section.