



DUTCH CARIBBEAN NATURE ALLIANCE
DCNA Management Success Report

January - December

2017

Dutch Caribbean Islands

- Data has not been received from Aruba since 2012.
- Data was not received from SGENAPA in 2017. Where presented data for St Eustatius / SGENAPA is from 2016.

Island	Management	Parks
<i>Aruba</i>	<i>Fundacion Parke Nacional Arikok</i>	<i>Parke Nacional Arikok</i>
Bonaire	SGENAPA	Bonaire National Marine Park Washington Slagbaai National Park
Curaçao	Carmabi	Christoffel/Shete Boka Park Curaçao Underwater Park
Saba	SCF	Saba National Marine Park Saba Bank National Marine Park Saba Terrestrial Park and Trails
<i>St Eustatius</i>	<i>SGENAPA</i>	<i>St Eustatius National Marine Park</i>

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		<i>The Quill and Boven National Park and Botanical Garden</i>
St Maarten	Nature Foundation St Maarten	Man of War Shoal Marine Park

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Acronyms

			Conservation of Sea Turtles
		IBA	Important Bird Area
		IOARES	Dutch research institute connected to Wageningen University
		IUCN NL	International Union for Nature Conservation, Netherlands
		JAZ	Island Legal Department
		LVV	Island Agriculture and Fisheries Department
		MPA	Marine Protected Area
		NFSXO	Nature Foundation St. Maarten
		NFWF	National Fish and Wildlife Foundation, USA based funding organisation
		NGO	Non-Government Organisation.
		NIOZ	Nederlands Instituut voor Onderzoek der Zee, research institute in the Netherlands
		NOAA	National Oceanic and Atmospheric Administration
		NPL	Nationale Postcode Lotterij - Dutch Postcode Lottery
		OCOA	EU Association of the Overseas Countries and Territories
		PA	Protected area
		PBCF	Prince Bernhard Culture Funds
		PBNF	Prince Bernhard Nature Funds
		PDO	Park Management Organisation
		RAVON	Reptiles, Amphibians and Fish Research Netherlands
		RESCQ	RESCQ Coral Restoration Project
		SBDU	Saba Bank Management Unit
		SCF	Saba Conservation Foundation
		SCRIPPS	The Scripps Research Institute, California
		SCSCB	Society for the Conservation and Study of Caribbean Birds
		SEMP	St. Eustatius National Marine Park
		SLAC	Simpson Bay Lagoon Authority
		SOS	Save Our Sharks
		SPAW	The Protocol Concerning Specially Protected Areas and Wildlife (also SPAW-RAC)
		SSV	Special Security Service
ACS	Association of Caribbean States		
AGOA	French Antilles Marine Mammal Sanctuary		
AIS	Automatic Identification System (for identifying the status and movements of registered marine vessels)		
AFOFO	Antilliaanse (Dede Financierings) Organisatie		
AOLC	Association of Marine Laboratories in the Caribbean		
BNDP	Bonaire National Marine Park.		
BONHATA	Bonaire Hotel and Tourism Association		
BRUV	Baited Remote Underwater Video		
BZK	Dutch (Ministry of the Interior and Kingdom Relations		
CADU	Caribbean Amerindian Development Organization		
CAOPAO	Caribbean Marine Protected Area Managers (Organisation).		
CARIMAO	Caribbean Marine Mammals Preservation Network		
CARDABI	Caribbean Research and Management of Biodiversity Foundation		
CI	Conservation International		
CIEE	Council of International Education and Exchange		
CITES	Convention for International Trade in Endangered Species		
COMO	Commissie (Marine) Milieu		
COB	Curaçao Tourism Board		
CURO	Council of Underwater Resort Operators (Bonaire)		
DCNA	Dutch Caribbean Nature Alliance		
DROB/DROV	Island Spatial Planning Department		
EEZ	Exclusive Economic Zone		
EPIC	Environmental Protection in the Caribbean		
EZ	Dutch (Ministry of Economic Affairs		
EPNA	Fundacion Parke Nacional Arikok		
GCFI	Gulf and Caribbean Fisheries Institute		
GCORN	Global Coral Reef Monitoring Network		
GIS	Geographical Information System		
IAC	Inter American Convention for the		

STCB	Sea Turtle Conservation Bonaire
STENAPA	St. Eustatius National Parks Foundation
STINAPA	Stichting Nationale Parken Bonaire
TCB	Tourism Corporation Bonaire
TNC	The Nature Conservancy USA
TPA	Terrestrial Protected Area
UNA	University of the Netherlands Antilles, based on Curacao
UNEP CAR	United Nations Environment Programme – Caribbean Regional Office
UNESCO	United Nations Educational, Scientific and Cultural Organisation.
USFW	U.S. Fish and Wildlife Service.
WAIIT	The Waitt Institute
WIDECASG	Wider Caribbean Sea Turtle Network
WNF	Wereld Natuur Fonds – World Wildlife Fund, Netherlands
WSNP	Washington Slagbaai National Park (Bonaire)
WTT	World Turtle Trust, Hawaii USA
WWF	World Wildlife Fund

The Dutch Caribbean

With their population of less than 300,000 and land area of 80,000 hectares (200,000 acres), the Dutch Caribbean islands are remote, tiny and as a consequence easily overlooked. But their natural heritage is rich and diverse making them the 'hotspot' for biodiversity within the Kingdom of the Netherlands. The Dutch Caribbean boasts a range of unique, threatened and endangered habitats and species ranging from primary rainforest to magnificent coral reefs. The islands of Aruba, Bonaire and Curaçao alone are home to over 200 endemic species and subspecies, which live nowhere else in the world.

The six islands form two distinct groups which are not only separated by more than 900 kilometres (560 miles) of open water, but are also linguistically, culturally, geologically and ecologically divided.

The Windward Islands of Saba and St. Eustatius are volcanic in origin with lush vegetation ranging from seagrapes and aloe in the coastal areas to ferns and mountain mahogany trees at altitude. There are coral reef pinnacles, patch reef and fringing reef and St. Maarten also has numerous salt ponds and mangrove stands. The Saba Bank, 5km from Saba is the largest coral atoll in the Caribbean.

By contrast the Leeward Islands of Aruba, Bonaire and Curaçao have semi-arid vegetation consisting largely of cactus, acacia and other trees and plants that thrive in dry conditions. Bonaire and Curaçao are unique in being true oceanic islands as they are separated from South America by a deep-water trench. Aruba on the other hand was formerly part of the South American mainland. Bonaire's reefs are considered some of the healthiest in the Caribbean. All three islands have fringing coral reefs, seagrass and mangrove stands as well as extensive bays and salinas.

Conservation

Nature conservation is nothing new to the Dutch Caribbean. The first terrestrial protected area, or "park" in the Dutch Caribbean, was established on Bonaire on the 9th of May 1969. It was followed in 1978 with the Christoffel Park on Curaçao and in 1979 by the creation of the first marine park in the Dutch Caribbean, the now famous Bonaire National Marine Park. Other islands quickly followed suit and the goal is to create at least one terrestrial and one marine park on each island in order to optimally protect and preserve the island's natural heritage whilst allowing for wise and sustainable use of these resources, particularly by tourism.

Common constraints on Dutch Caribbean parks include limited and at times unreliable government support, lack of funding and poor spatial planning on the islands. The main threats include development pressure and associated pollution, particularly in the coastal zone, invasive species and overuse such as overgrazing by free roaming goats, sheep, cattle and donkeys. There are entrenched local issues over land tenure and persistent over harvesting of marine resources such as grouper, lobster and conch.









Figure 1 Location of the Dutch Caribbean Islands

Park Management Organisations

Each of the parks within the Dutch Caribbean is managed by a not-for-profit nongovernmental organization or foundation which has a co-management arrangement with local stakeholders. The following table gives a comparative overview of the established parks within the Dutch Caribbean.

Figure 2 Dutch Caribbean Park Management Organisations

Island	Mgmt. Body	Park	Features
Aruba	Fundacion Parke Nacional Arikok 	Parke Nacional Arikok <i>Est. 2000</i>	This terrestrial park covers approximately 18% of Aruba and includes rough hills of lava and limestone rocks formed from fossilized coral. The island's highest hill, Mount Jamanota (188 metres/ 617 feet), is within the protected area. The park is home to various species of cacti, approximately 50 species of trees and is the last refuge of Aruba's endemic rattlesnake. (3,400 hectares/8,400 acres*)
Bonaire	STINAPA Bonaire 	Washington Slagbaai National Park <i>Est. 1969</i>	The first natural sanctuary in the Dutch Caribbean, this park encompasses almost 19% of the island and includes its highest point, Mount Brandaris. The park is a haven for migratory birds, the island's endemic parrot, and flamingo, iguana and nesting sea turtles. (5,600 hectares/14,000 acres*)
		Bonaire National Marine Park <i>Est. 1979</i>	The park extends around all of Bonaire and Klein Bonaire and encompasses the islands' continuous fringing coral reefs, seagrasses and mangroves. The park is home to more than 340 species of fish, more than all of the Florida Keys. (2,700 hectares/6,700 acres*)
Curaçao	CARMABI Foundation 	Klein Bonaire <i>Est. 2000</i>	An uninhabited satellite island off Bonaire's western shore, Klein Bonaire is an important stopover for migrating birds. Its shores are nesting grounds for the globally endangered Hawksbill and Loggerhead sea turtles. (600 hectares/1,500 acres*)
		Christoffel Park <i>Est. 1978</i>	This terrestrial protected area contains rare and endangered species in less disturbed habitat. Some of Curaçao's flora and fauna are found only within its boundaries. Mount Christoffel, the island's highest point (375 metres/1,230 feet), is in the centre of the park. (2,300 hectares/5,700 acres*)
		Shete Boka Park <i>Est. 1994</i>	Shete Boka Park protects the island's rocky, high-energy north coast, including several pocket beaches where globally endangered sea turtles come to nest. (470 hectares of coastline/1,200 acres*)
Saba	Saba Conservation Foundation 	Curaçao Underwater Park <i>Est. 1983</i>	The Curaçao Underwater park extends along the island's southeastern contour from the high-water mark to a 60-metre depth. Just off the leeward shore is a pristine fringing reef. (600 hectares/1,500 acres*)
		Saba National Park and trails (<i>Est. 1999</i>)	Saba's terrestrial protected areas consist of the national park—stretching from the Pirate Cliffs in the northeast to the cloud forest at the peak of Mount Scenery, the highest peak in the Kingdom of the Netherlands (877 metres/2,877 feet), and 16 historic trails. (Saba National Park—35 hectares/86 acres; Mount Scenery Reserve—six hectares/15 acres*)
		Saba National Marine Park <i>Est. 1987</i>	The Saba National Marine Park surrounds the island, stretching from the high-water mark to a depth of 60 metres, and protects spectacular coral pinnacles, the seabed and overlying waters. (800 hectares/2,000 acres*)
St. Eustatius	St. Eustatius National Parks Foundation (STENAPA) 	Saba Bank National Park <i>Est. 2010</i>	Saba Bank, just five kilometres from Saba, is a submerged atoll, the third largest of its kind in the region, and is incredibly rich in biodiversity. A flat-topped seamount rising 1,800 metres (5,900 feet) from the sea floor, it is crowned by a ring of growing coral reef. The bank is home to more than 200 species of fish, including two species discovered in 2009 and 12 newly discovered species of marine algae. (268,000 hectares/662,000 acres*)
		Quill/Boven National Park <i>Est. 1997</i>	This park consists of the Quill, a dormant volcano, and Boven, an area of hills on the northern tip of St. Eustatius. Almost all of the 482 wild plant species of the island are found within the park, along with lush secondary rain forest and cloud forest. Eight hiking trails along the Quill and seven in Boven have been open since 2000. (540 hectares/1,350 acres*)
St. Maarten	Nature Foundation St. Maarten 	St. Eustatius National Marine Park <i>Est. 1996</i>	The park protects an area from the high-water mark to a 30-metre depth contour around the island. Within the park are stands of rare black coral and two actively managed no-fishing reserves. Humpback whales regularly pass through as they follow their migration route. (2,750 hectares/6,800 acres*)
		Man of War Shoal Marine Park <i>Est. 2010</i>	The Marine Park is a sanctuary to some of the most pristine marine environments of St. Maarten. The park is a home or migratory stopover for whales, dolphins, numerous species of shark, sea turtles and hundreds of fish species. (3,100 hectares/7,600 acres*)

Park areas

The size of a protected area affects the amount and types of biodiversity protected as well as the level and diversity of threats the area faces. These in turn greatly affect the burden placed on the capacity of the park management

organisations to carry out operations. The following data is the most recent information to be extracted from the DCIA GIS project

The largest terrestrial park in the Dutch Caribbean is the Washington Slagbaai National Park covering 5,643 hectares and 20% of the Island of Bonaire. The largest marine park by far is the Saba Bank National Marine Park at 2,652 square kilometres.

Table 1 Dutch Caribbean Park sizes

Terrestrial		Protection hectares	Island area hectares	% protected
	Aruba	3,500	19,300	18
	Bonaire	5,643	28,800	20
	Curaçao	2,293	44,400	5
	Saba	43	1,300	3
	St. Eustatius	540	2,100	26
	St. Maarten	0	3,473	0

Territorial Waters		Protection hectares	Territorial Waters hectares	% Protected
	Bonaire	2,700	348,200	0.78
	Curaçao	1,036	497,700	0.21
	Saba	1,300	161,100	0.81
	St. Eustatius	2,750	117,400	2.34
St. Maarten	3,100	47,684	6.50	

Approximately one-third of the Saba Bank lies within the Saban territorial waters and all of it within the Dutch Caribbean Exclusive Economic Zone. The **Saba Bank National Marine Park** covers 265,247 hectares (2,652 square kilometres).

Introduction

The Dutch Caribbean Nature Alliance (DCNA) aims to support the land and marine protected areas (PA's) on each of the islands of the Dutch Caribbean, to promote the PAs and nature conservation and to fundraise. Fundraising for DCNA includes attracting grantors, major donors and corporate sponsors with a view to creating a Trust Fund for nature conservation. The islands have already attracted considerable funding from, amongst others, WWF NL, Stichting DOEN and the Dutch National Postcode Lottery.

A critical component of effective fundraising is the ability to demonstrate success. For this reason DCNA has developed a detailed data collection and analysis system, based on the IUCN 'management effectiveness framework'. This system not only captures baseline data but also acts as a tool for analysing the conservation success, institutional progress and management effectiveness at each of the protected area sites. As the project continues, valuable time series data are obtained every year as the capture sheets used to gain the information are updated. This time series information established in 2004 will reflect changes in the priorities of the PDOs as the time distribution between core management tasks changes as well as the emphasis on different projects and research being carried out.

The ability of the Nature organisations to deal with the pressures they face comes down to their management capacity. This report outlines the context within which management is taking place, the elements of the management capacities of the organisations of the islands and the management activities carried out.

Purpose of this document

This report presents the information collected during most recent phase of the management success project. The information contained within this document should be used by interested parties to raise awareness about the management activities taking place within the DCNA and the local, regional and international significance of the protected areas. If more information is required by the reader on any aspect of this report, the initial capture sheets for the Island of interest should be referred to prior to contacting the organisation responsible.

It should be noted that this report is part of a work in progress and some data may be unavailable. A separate report: The DCNA Management Success Report, contains all of the data from all of the contributing DCNA islands for comparison.

Management success

A desired outcome of the Management Success project is to be able to repeat the data collection process and develop an effective set of time series data on the success of management. In this way the success and effectiveness of any change in management practice or policy should be detectable and accountable. The definition of 'effective management' of protected areas is currently under debate within the international conservation community, although the following definition is often used by those involved with PA management:

"The efficient and orderly use of human and material resources on a planned basis directed to achieve management objectives" (Desbler, W.O. 1982)¹.

This project will continue to develop criteria for defining effective management within an adaptive management framework where successes can be judged against clearly defined goals and objectives for each of the protected areas. In January 2008 a consultant was used to collect the data for the project within a two-week time frame. This provided the first full set of data, a valuable snapshot of the PA management for 2007 and crucial feedback for the data collection process directly from the PDOs involved.

Project Update

The Survey Monkey methodology of 2014-2015 was largely found to be an ineffective method of collecting data and the gaps had to be filled by direct consultations with park managers. During 2015 a new data collection tool was developed in Microsoft Excel. Managers were interviewed in December 2015 and follow up data was collected via E-mail, VOIP conversations and social media research. The data collection framework also adopted the revised Operational Management task list that managers of the parks of the Dutch developed in 2015. Since 2015 the data updates have been repeated. The project methodology and baseline data should be reviewed every five years, as of 2018 a project review is required.

¹ Desbler, W.O. 1982. A systematic approach to effective management of protected areas in 'World National Parks Congress, Bali, IUCN Commission on National Parks and protected areas'.

Understanding how a protected area works.

The following generic information on PA context, capacity and operational activities is provided for guidance and to help explain the scope of the work of protected areas. There are three main aspects to protected areas: the context within which they operate, the capacity they have to operate and the management work carried out, these are outlined in Figure 3.

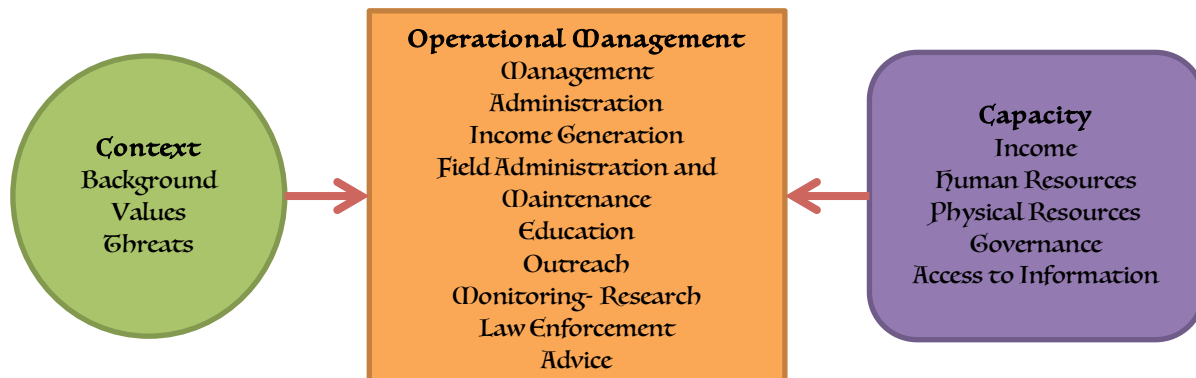


Figure 3 The main aspects of context, capacity and operational management that contribute to the working of a Park.

Context

A protected area is managed within defined physical and management characteristics that represent the 'Context' of the protected area. The context of the protected area defines how the protected area is likely to be managed. Three main aspects of context have been identified through the Management Success project:

Box 1 Contextual aspects of PA management.

Background	The setting that a protected area works within is usually fixed within the medium to long term. This includes physical aspects such as the size, geology and location of the protected area, and a number of management aspects such as the name, date established, contact details, tenure, zonation, strategic statements and adherence to any international conventions.
Values	The values of a protected area can be locally, regionally or internationally significant examples of biological diversity, habitats, or cultural, recreational and historical sites. Protected area's also have very significant values in terms of the opportunity for economic gain for users e.g. tourism related activities such as diving. Other values are the environmental services provided by the habitats of any protected area and the value of the institution that operates the protected area, particularly as a focus for conservation activity.
Threats	Protected areas face a range of threats to their values. The relationships between threats and the effects on the resources and values of a protected area are complex, and often interrelated. The most significant threats are a result of invasive / introduced species, changes in land use and development of infrastructure, including buildings for tourism. These threats contribute to the direct loss of habitat and species from protected areas.

Capacity

The management tasks that take place within a protected area depend on the resources available to the PDO. If the resources are not available or are restricted, the 'Capacity' the PDO has to carry out management tasks is limited. The three main elements of capacity are:

Box 2 Capacity aspects of PA management

Income	Income for PDOs can come from a variety of sources including subsidy, fees, grants and 'friends of...' schemes. Sufficient income is required for a PDO to secure human and physical resources to carry out the key operational management tasks. Another key aspect of income is its sustainability, a constant minimum flow of income is required to keep staff and maintain resources.
Human resources	A fully staffed PDO will typically employ a manager, and an assistant manager/chief ranger for each PA as well as rangers, an administrator and education officer. Additionally, they might have dedicated project staff. The larger PDOs frequently also employ a director to oversee the management of the land and marine parks, lobbying activities, fundraising and communication work. PDOs may actively or passively run volunteer programmes, have interns, trainees and consultants working for them.
Physical resources	The physical resources that a PDO has access to greatly affect the ability of the staff to carry out work. A sufficiently equipped PDO will typically have unrestricted access to buildings (offices, workshop), communications (including computers), transport, maintenance equipment, moorings (for OPAs), scientific and field equipment.
Governance	Institutional arrangements for board operations, communication, personnel and day to day management as well as well-structured and minuted meetings give a protected area more robust operational foundations. A protected area should have local and international legislation to define the area that is protected and regulate the use of the area. This will ideally be the product of a wider nature or environmental policy plan adopted and enforced by local and national government. Planning, control of permitting procedures and well-publicised guidelines also increase the governance capacity of a protected area.
Access to information	Protected area staff, board members and stakeholders need access to up to date and accurate information about the protected area. This increases the capacity of the protected area to make well informed management decisions, and to produce effective information, education and outreach.

Operational Management

The 'Operational management' of protected areas has been clearly defined through the development of the management success project and annual input from the park managers of the Dutch Caribbean. Achievements of the PDO can be divided between the elements of PA operational management:

Management	<p>PDOs will typically serve as a secretariat for their Boards and will be involved in preparing and organising Board meetings, agendas and minute taking. Management will also be responsible for planning, budgeting, routine reporting, as well as all aspects of personnel management. Income related activities carried out by PA management include administering government subsidies, franchises and similar, grant funding, organising and purchasing souvenir items and similar. Additionally, PDOs may run 'friends of ...' groups, actively soliciting donations from the public and from corporate sponsors.</p>
Administration	<p>This includes organising an office, correspondence, filing, bookkeeping, accounting, organising invoices and payments. It also includes work planning and developing work schedules for staff, some project management, collecting and administering admission fees and the sale of souvenir items and similar.</p>
Income Generation	<p>Operational activities mainly carried out by management and office staff relating to the administration of Government Subsidies, Fees, Concessions, Activities, Sales, Grants and Donations.</p>
Field Administration and Maintenance	<p>The maintenance of moorings in MPA's, trails and roads in CPA's accounts for a considerable amount of staff time. Other maintenance tasks include running and maintaining buildings vehicles, boats and communications equipment. Patrolling is also a core field tasks that takes up considerable amounts of staff time. Formal patrols often include some other activities such as assisting PA users, maintaining moorings/trails and basic monitoring e.g. inventory.</p>
Education	<p>Education refers to formal training. Most PDO's have structured Junior Ranger programmes and/or Snorkel Programmes that compliment school programmes and courses for local teachers.</p>
Outreach	<p>PDOs are engaged in multiple activities designed to provide information and to educate islanders, visitors and specific PA user groups. Generally, these are formulated in a communication plan and will include developing programmes for targeted audiences to increase knowledge about the PA, change behaviour and/or build stewardship. Some PAs have visitor centres or a museum with information on their protected area. Most provide guided tours, dives and hikes, have signage and outreach materials, including posters, brochures and leaflets (often in multiple languages). PDOs actively engage their local media through published material, television and radio. All PDOs have websites and most have some form of newsletter and carry out regular updates to social media. Outreach refers to the passive supply of information to an audience and the active dissemination of information.</p>
Monitoring-Research	<p>PDOs are engaged at some level in collecting information on the state of their natural resources and the use of resources. Monitoring programmes, as well as being used to look at changes over time, are frequently run to address specific management issues. Site characterization is an important part of every PDOs dataset and includes physical mapping and biological inventories. Additionally, PDOs may run hypothesis driven scientific research projects to address specific issues such as the impact or control of invasive species or the impact of user groups on a resource. Damage assessment, evaluation and the effects of restoration work are other possible subjects for research and monitoring work.</p>
Law Enforcement	<p>Local and international legislation forms the basis for the legal protection of the PA and enforcement of conventions, laws, rules and regulations are a core task of every PDO. PDOs are engaged in interpreting the legislation for all user groups, providing guidance and advice as well as actually enforcing the law by issuing verbal and written warnings, giving summary fines and writing up offences. Other legal mechanisms such as forming rules, publishing guidelines, permitting and issuing exemptions are useful tools to control and regulate activities in PAs. PDOs are frequently involved in the permitting processes not only for activities with the protected area but also in adjacent buffer areas. PDOs also provide emergency response and are involved in identifying and developing appropriate response scenarios for high-risk threats and</p>

	site damage assessment.
Advice	<p>PDOs work with decision makers to integrate management priorities into island and national planning, give advice, petition government and are frequently represented on government advisory boards. PDOs engage other stakeholder groups through a process of collaboration, providing training, information and advice. Partnerships are built and nurtured with other organisations such as research institutions, conservation organisations and funders both on island and abroad to strengthen the PA and to gain access to resources and expertise. Some PDOs have structured or informal volunteer groups with whom they work on a regular basis. All PDOs are represented at DCNA Board meetings; additionally, many attend international events such as conferences and symposia in other countries around the world. Staff spend significant amounts of time representing PDO's at training courses that are held by other local, regional and international organisations.</p>

PROJECTS

Projects are carried out in addition to the operational management required to run a protected area. A project is a unique venture with a beginning and an end, undertaken by people to meet established goals usually within defined constraints of time and resources. Projects form an important part of protected area management where sufficient capacity is available to establish specific programmes to investigate and address contextual issues, build capacity or develop operational management.

The Context of the PAs of the Dutch Caribbean

Background

The following information gives background details of the protected areas in the Dutch Caribbean. This information is important to set the context of the management activities that have taken place during 2015.

Area

Terrestrial

St. Maarten is the only island in the Dutch Caribbean with no terrestrial protected area. Global targets have been set by the IUCN World Commission on Protected Areas to protect 10% of land areas. Aruba, Bonaire and St. Eustatius currently protect in excess of 10% of their land area.

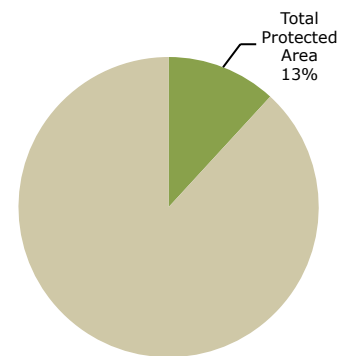
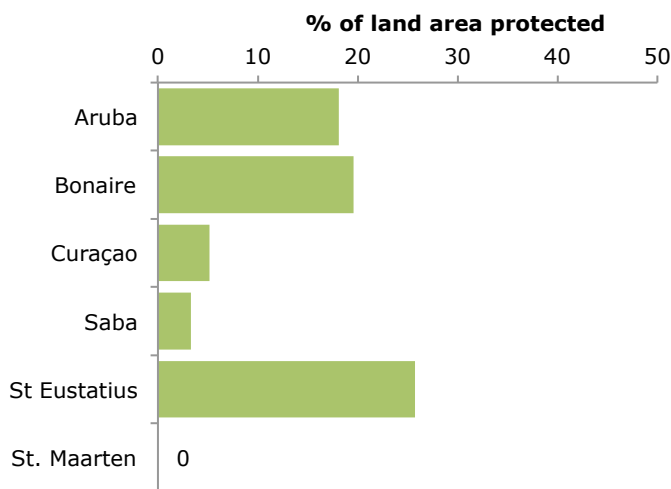


Figure 4 % of land area protected on each Dutch Caribbean Island

Figure 5 PAs coverage in the Dutch Caribbean

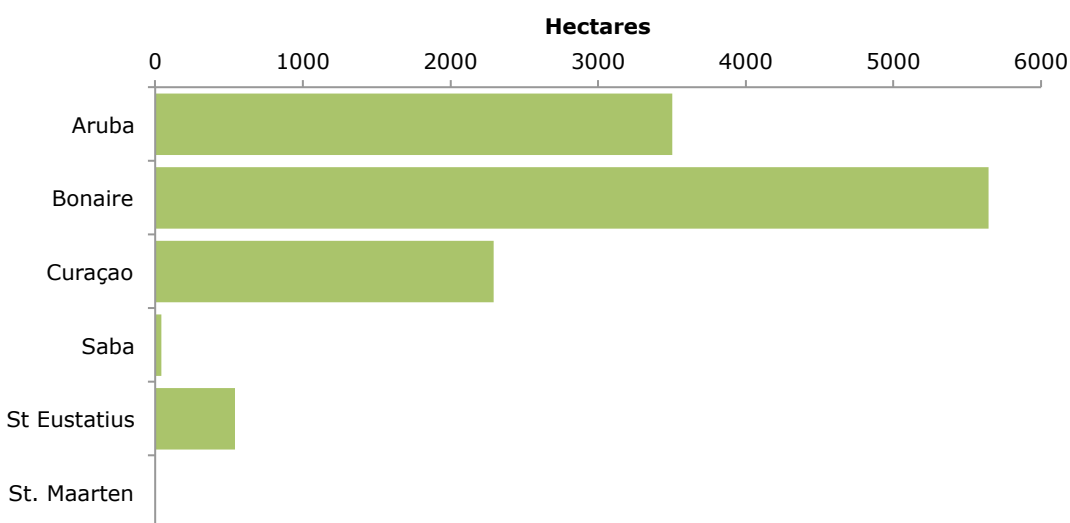


Figure 6 Sizes of PAs in the Dutch Caribbean

Marine

Globally, 1.17% of the oceans are protected. In 2011 data on the size of the EEZ and the Territorial Waters of the islands in the Dutch Caribbean became available. Data also became available on the extent of the Saba Bank. These figures are required to establish the percentage of protection offered by the marine parks. With the inclusion of the Saba Bank, the area protected within the Dutch Caribbean exceeds the Global average within the EEZ's.

Table 2 Dutch Caribbean marine protection

	Protected (hectares)	TOTAL AREA, (hectares).	D.C. % protected	Global average ² %
MPA Protection Total (EEZ+TW)	9,286	8,128,718	0.11	2.86
MPA Protection TW	9,286	6,681,134	0.14	6.3
Including Saba Bank TOTAL (EEZ+TW)	274,533	8,128,718	3.38	2.86

Table 3 Saba Bank area and protection

	Saba	St Eustatius
Saba Bank sq.km	2644.32	34.62
Saba Bank %	98.71	1.29
EEZ	8033.39	1107.16
TW	1611.00	1174.00
EEZ+TW	9644.39	2281.16
Saba Bank EEZ sq.km	2015.31	31.34
Saba Bank EEZ %	75.23	1.17
Saba Bank TW sq.km	629.01	3.28
Saba Bank TW %	23.48	0.12
Existing MPA sq.km	8.15	26.94
% TW protected	39.54	2.57
sq.km TW protected	637.01	30.22
% EEZ protected	25.09	2.83
sq.km EEZ protected	2015.31	31.34
Protection total sq.km	2652.47	61.56
% protected total	27.00	1.30

Increases in management area with the inclusion of the Saba Bank

St Eustatius: 3.2 sq.km more in TW + 31.34 sq km more in EEZ

Saba: 629.01 sq.km more in TW + 2015.31 sq.km more in EEZ

² World Data Base on Protected Areas 2010

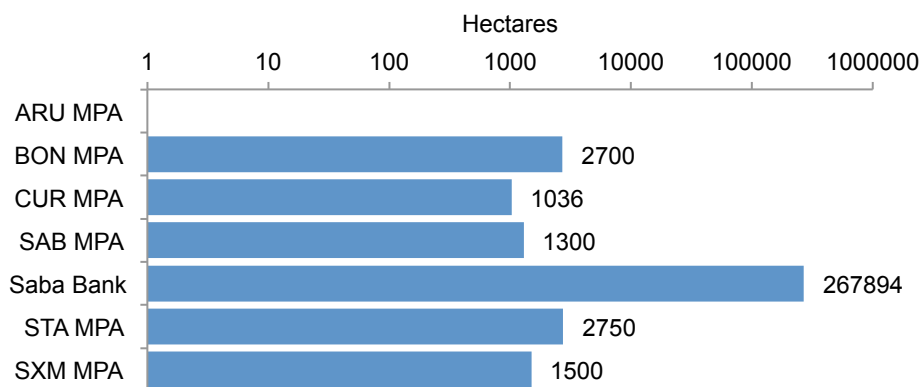


Figure 7 Sizes of MPAs in the Dutch Caribbean.

Geology

The geology of the Dutch Caribbean islands has an impact on the management of the PAs. The rock type establishes the nature of the slopes and soil, which in turn form the characteristics of water catchments. Any erosion of soils taking place may have to be managed especially if it made worse by e.g. grazing animals. Erosion not only directly removes soils but deposits them within the marine environment, destroying habitats.

Table 4 Geological summary of the Dutch Caribbean islands

Aruba	The northern and middle zone predominantly consists of basalt lava ("Aruba lava formation"), as does the western part of the southern zone. It is characterized by in cross-cut v-shaped dry riverbeds, that in the current climate almost always are dry (rooi). Part of the sea coast is covered with lower limestone terrace, the waves there forming steep 8-10 meter high cliffs. The rest is diorite (also called tonalite, or granodiorite), a sandy area with outcrops of large, white (quartz) black (felspar) and transparent (mica) speckled boulders with odd shapes. They erode quickly by a sort of peel-off process caused by a micro-organism. Inland there are some formations of middle limestone terrace, with cliffs where a rooi has cut them. Then there are faults, intrusions, quartz veins that sometimes contained gold. Until 1916 there was a gold industry in Aruba.
Bonaire	The core of the island consists of strongly folded and faulted rocks of volcanic origin, silica rich sediments and turbidites formed during the Cretaceous era some 120 million years BP. Overlying this are later fossil reef and reef-generated calcareous deposits.
Curaçao	Curaçao Lava Formation, Knip Group & Limestone terraces (see Beets, 1972)
Saba	<p>The lower slopes of Saba consist mainly of agglomerates and tuffs. Pyroclastic material can be found in various locations and lava flows form tongues of land protruding into the sea at 2 locations. A viscous lava plug formed in the main crater of the volcano laying the foundations for the top of Mt Scenery. Several other lava domes formed around the main peak. Before becoming dormant, volcanic activity formed a sulphur and gypsum layer which was exploited at the Sulphur mines through the 19th century.</p> <p>The Saba Bank is raised +/- 1000m above the average depth of the surrounding sea floor and is approximately rectangular with the long axis running ENE-WSW, 65 km long and 40 km wide, the total surface area being 2679 km². The bank is tilted with the north-western part of the being deeper than the south-eastern part. Most of the Bank is between 20 and 50 m depth, but a substantial eastern part is between 13 and 20 m depth. The Saba Bank is located at the intersection of three different types of geology: the tectonically active Greater Antilles island chain, the Aves Ridge and the volcanic island arc chain near the north-eastern boundary of the Caribbean Sea. The bank is a submarine plateau with patch, reef flat and reef slope formations in shallower water favourable for coral growth. It is thought that the whole bank could be an actively growing coral reef atoll, one of the largest in the world.</p>
St. Eustatius	<p>Quill - typically conical dormant volcano and intact circular rim - last explosion 7500-8000 years ago. Boven - remains of a strato volcano 1 million years ago of which only the most solid deposits remain (including Boven hill).</p> <p>Patch reef - larval outcrops and flows that have been colonised by reef - these areas surrounded by sandy</p>

	substrate Coral reef - typical spur and groove system along a wall in the Southern Reserve.
St. Maarten	Coral Reefs mostly Patch reef containing hard and soft corals, seagrass beds, mangroves communities (red, black and white mangrove), sandy bottoms a few large rocks and some small land masses (islets or keys).