

Research Overview

August 2019

CATEGORY	SUBJECT	DC ISLANDS	ORGANIZATION(S): LEAD SCIENTIST(S)
Bats	Impact of barriers in maternity caves	BON	HAS: Jilly Sarpong (student) Wildconscience: Fernando Simal VISR: Jafet Nassar
Birds	Suitability study and reforestation of exclosures facilitating the Yellow-shouldered Amazon Parrots (<i>Amazona barbadensis</i>)	BON	Echo: Julianka Clarendá
Birds	Perception of local people on the conservation of Yellow-Shouldered Amazon Parrot	BON	WUR: Younes Zian (student), Luuk Fleskens Echo: Julianka Clarendá
Climate change	Teatime4science (seagrass and mangroves http://www.teatime4science.org)	BON	STINAPA: Sabine Engel
Coral Reef Ecosystems	Larval biology of corals and reef microbiology	CUR	MC: Kristen Marhaver CARMABI
Coral Reef Ecosystems	A first study of myxozoan diversity in the Caribbean: new insights into host range and life cycles?	EUX	SMNH: Inga Martinek CNSI
Coral Reef Ecosystems	Parrotfishbehavior and population trends	BON	Calpoly: Hannah Rempel Dive friends Bonaire (citizen scientist)
Coral Reef Ecosystems	NIOZ-MARUM Expedition Caribbean coral reefs, between resilience and warmer climates (drones, bathymetric surveys and different types of sensors)	CUR	NIOZ: Fleur van Duyl, Paulo Stocchi, Andi Haas MARUM: Alessio Rovere, Ciro Cerrone (PhD student) ZMT: Elisa Casella
Environmental friendly alternatives	Industrial Compostable Alternatives for Styrofoam (Literature study Funded by WWF-NL)	BON SAB EUX	WWF-NL: Arjan de Groene, Claudia Alessio
Fisheries	Market & Supply Chain Analysis study (Funded by WWF-NL)	BON SAB EUX	WWF-NL: Pieter van Baren The Good Fish Foundation: Irene Kranendonk

Research Overview

August 2019

CATEGORY	SUBJECT	DC ISLANDS	ORGANIZATION(S): LEAD SCIENTIST(S)
Fisheries	Historical fisheries (Funded by WWF-NL)	BON SAB EUX	WWF-NL: Pieter van Baren Terramar Museum Bonaire: Ruud Stelten
Fisheries	Co-management in small scale fisheries (Literature study Funded by WWF-NL)	BON SAB EUX	WWF-NL: Pieter van Baren, Simaima Petzold, Philipp Pattberg
Fisheries	Testing and comparing various lionfish traps to study their potential use in a directed lionfish fishery (funded by WWF-NL)	SAB	SCF (SBMU): Ayumi Kuramae Izioka VHL: Tom Brokke and Marc Veldman (students)
Fish	Killifish Genome Size Variability	AUA	FPNA: Giancarlo Nunes BU: Nicholas Sakich
Fish	Shark telemetry project	BON	STINAPA: Caren Eckrich and Roxanne-Liana Francisca HAS: Brent Hoogervorst (student)
Plants	Testing effective ways to grow native plants	BON	Echo: Johan van Blerk
Plants	Germination of seeds of indigenous trees of Curaçao	CUR	CARMABI: John de Freitas
Plants	Vegetation Christoffel Park	CUR	CARMABI: Erik Houtepen
Reptiles	Lesser Antillean iguana nest research (funded by WWF-NL)	EUX	RAVON: Tim van Wagensveld, Ronald Zollinger

Long Term Projects

CATEGORY	SUBJECT	DC ISLANDS	ORGANIZATION(S): LEAD SCIENTIST(S)
Anthropogenic impact	Anthropogenic Impact Analyses, Aruba National Park	AUA	FPNA: Giancarlo Nunes
Coral Reef Ecosystems	Deep Reef Observation Project (DROP) (ARMS: Autonomous Reef Monitoring Structures)	CUR	Smithsonian: Carole Baldwin
Coral Reef Ecosystems	Developing a plan to manage the waters around Curaçao sustainably, profitably, and enjoyably for this and future generations - including mesophotic reef dropcam project	CUR	Waite Institute (Blue Halo Curaçao): Kathryn Mengerink
Coral Reef Ecosystems	Diadema Antillarum Population Assessment	EUX	CNSI: Kimani Kitson-Walters VHL: Alwin Hylkema STENAPA: Jessica Berkel
Coral Reef Ecosystems	Bloom dynamics of benthic cyanobacterial mats on coral reefs	BON	FSU: Ethan Cissell (Ph.D. student), Sophie McCoy
Coral Reef Ecosystems	The role of parrotfish behavior in structuring benthic coral reef communities	BON	FSU: Joshua Manning (Ph.D. student), Sophie McCoy
Coral Reef Restoration	Epigenetic responses to environmental stressors in Acropora corals, and applications to coral reef conservation	BON	FIU (EEL): Serena Hackerott (PhD student), Jose Eirin-Lopez RRFB: Francesca Viridis
Coral Reef Restoration	St. Maarten's Coral Restoration Project	SXM	NFSXM: Tadzio Bervoets, Melanie Meijer zu Schlochtern CRF
Coral Reef Restoration	Plant a million coral initiative (IntelliReefs)	SXM	NFSXM: Tadzio Bervoets, Melanie Meijer zu Schlochtern SeaLagacy, Reeflife Restoration and Sea to Sky ventures
Coral Reef Restoration	Development of restoration methods for threatened Caribbean coral species	BON, CUR	RRFB: Augusto Montbrun, Francesca Viridis SCORE Project CARMABI: Mark Vermeij Score: Valerie Chamberland
Coral Reef Restoration	Postsettlement dynamics of Caribbean corals & Reef restoration	CUR	CARMABI: Mark Vermeij Score: Valerie Chamberland

Long Term Projects

CATEGORY	SUBJECT	DC ISLANDS	ORGANIZATION(S): LEAD SCIENTIST(S)
Coral Reef Restoration	Artificial structures that encourage larvae settlement and discourage the growth of competitor species	CUR	University of Illinois: Amy Wagoner Johnson, Bruce Fouke, Gabriel Juarez San Diego State University: Forest Rohwer CARMABI: Kirsten Marhaver, Mark Vermeij
Database	Dutch Caribbean Species Register: Taxonomic knowledge system Dutch Caribbean (http://www.dutchcaribbeanspecies.org/)	All	Naturalis: Sander Pieterse, Hannco Bakker, Bert Hoeksema
Interstitial biodiversity	Moleculair biodiversity analysis of marine communities by metabarcoding	EUX	Naturalis: Arjen speksnijder ANEMOON: Niels Schrieken
Invasive species	Impact of <i>Halophila stipulacea</i> on the availability of benthic diatoms as a food source for a commercially important deposit feeders in a native and invasive habitat	EUX	CNSI: Johan Stapel, Kimani Kitson-Walters, Anna Maitz
Mangrove ecosystems	Mangrove habitat compensation and reforestation	AUA	FPNA: Giancarlo Nunes
Marine ecosystems	Taxonomy and biodiversity in Lac Bay	BON	STINAPA Sabine Engel, Caren Eckrich Ecosub: Godfried van Moorsel CEAB: Daniel Martin
Marine ecosystems	Marine species discoveries in the Dutch Caribbean	All	Naturalis: Bert Hoeksema CNSI CARMABI
Marine Park	Marine Park Aruba	AUA	FPNA: Sietske van der Wal DNM: Gisbert Boekhoudt
Marine Litter	Clean Coast Bonaire (Citizen science project, OSPAR methodology)	BON	Boneiru Duradero: Sharon Bol, Carolyn Caporusso
Plants	Botanical Garden Aruba	AUA	FPNA: Natasha Silva
Plants	Wildlife Garden Reserve	AUA	FPNA: Giancarlo Nunes
Public Health	DNA waterscan: Monitoring disease vectors in the Caribbean (mosquitoes and midges)	CUR EUX	Naturalis: Klaas-Douwe B. Dijkstra ECPHF: Teresa Leslie CBHRI: Delia-Maria Goilo (NWO DUCAMID project)

Long Term Projects

CATEGORY	SUBJECT	DC ISLANDS	ORGANIZATION(S): LEAD SCIENTIST(S)
Reforestation	Reforestation Project on St. Eustatius	EUX	Mac & Field: Tim van Wagensveld & Stacey Mac Donald STENAPA: Clarisse Buma LVV: Gershon Lopes
Reptiles	Behavior of the endemic Aruban Whiptail lizard	AUA	FPNA: Giancarlo Nunes Eckerd College: Jeff Goessling
Reptiles	Boa Life History	AUA	FPNA: Giancarlo Nunes Eckerd College: Jeff Goessling
Sponges	The role of sponges as key ecosystem engineers of coral reef ecosystems Pumping iron: can iron availability fuel the sponge loop and affect coral reef community structure? (Misha Streekstra)	CUR	Uva: Jasper de Goeij, Benjamin Mueller CARMABI: Mark Vermeij PhD students: WUR: Misha Streekstra UvA: Sarah Campana*, Meggie Hudspich*, Niklas Korner* * Part of the ERC project "SPONGE ENGINE — Fast and efficient sponge engines drive and modulate the food web of reef ecosystems"
Threats and risks	Are human activities (related to an oil terminal and dive tourism) a risk for ecosystem services ?	EUX	WUR: Diana Slijkerman
NWO Projects in the Dutch Caribbean			
Bioproducts	Stand-alone production of algal products for food, feed, chemicals and fuels - Bioprospecting and directed evolution of microalgae from Bonaire	BON	WUR: R.H. Wijffels, Rin Barten, Rocca Chin-on, Robin Barten (PhD students) Institute for Sustainable Technology: Rita Peachey
Coral restoration	Artificial Reefs On Saba and Statia (AROSSTA)	SAB EUX	VHL: Alwin Hylkema, Marlous Heemstra WUR: Dolfi Debrot STENAPA: Jessica Berkel SCF: Kai Wulf, Aymi Kuramae Izioka CNSI: Johan Stapel Students: Marnik van Cauter (VHL) & Martijn Peters (VHL)

Long Term Projects

CATEGORY	SUBJECT	DC ISLANDS	ORGANIZATION(S): LEAD SCIENTIST(S)
Environmental psychology	Confronting Caribbean Challenges: Hybrid Identities and Governance in Small-scale Island Jurisdictions - Behavioral differences between/within the BES islands when it comes to nature conservation and cultural heritage.	BON, SAB, EUX	KITLV, Leiden University: Gert Oostindie (Project director) KITLV, Leiden University: Stacey Mac Donald (PhD student)
Invasive species	Exotic plant species in the Caribbean: foreign foes or alien allies? (1) Socio-economic impacts of invasive plant species (2) Ecological impacts of invasive plant species	BON, SAB, EUX	(1) UU: Jetske Vaas (PhD student), Peter Driessen, Frank van Laerhoven and Mendel Giezen (2) UU: Elizabeth Haber (PhD student), Martin Wassen, Max Rietkerk, Maarten Eppinga. CNSI
Invasive species	Global defaunation and plant invasion: cascading effects on seagrass ecosystem services	BON	WUR: Marjolijn Christianen, Fee Smulders (PhD student) Smithsonian: Justin Campbell (coordinator Caribbean wide research project), Olivier Kramer STINAPA: Sabine Engel, Jessica Johnson
BO-projects in the Dutch Caribbean (Min EZ)			
Coral Reef Ecosystems	BO-43-021.04-003 –Inventory corals Includes monitoring and research of the longest coral reef time-series in the world (since 1973)	BON, CUR	WUR: Erik Meesters
DCBD	BO-43-021.04-001 - Expansion knowledge system Dutch Caribbean	AUA, BON, CUR, SAB, EUX, SXM	WUR (Alterra): Peter Verweij
Invasive species	Socio-ecological connectivity of tropical coastal ecosystems: how to enhance restoration and conservation of ecosystem services (Study on (1) carbon and nutrient fluxes between the mangroves, seagrass bed and coral reef at Lac Bay 2) the impact of Sargassum events on seagrass beds and mangroves in Lac Bay and 3) Lac Bay as a socio ecological system.)	BON	RU: Luuk Leemans (PhD student), Marieke van Katwijk WUR: Marjolijn Christianen
Fisheries	BO-43-021.04-006 - Fish stocks and fisheries Caribbean Netherlands	EUX, SAB, BON	WUR: Dolfi Debrot CNSI: Kimani Kitson-Walters PiskaBon, STINAPA SCF: Kai Wulf, Ayumi Kuramae

Long Term Projects

CATEGORY	SUBJECT	DC ISLANDS	ORGANIZATION(S): LEAD SCIENTIST(S)
Marine biodiversity	BO-43-021.04-002 – Saba Bank – Marine biodiversity	SAB	WUR: Erik Meesters (benthic communities), Dolfi Debrot, Thomas Brunel, Leo Nagelkerke (fish stocks)
Marine mammals & sharks	BO-43-021.04-005 – Management plan marine mammal and shark sanctuary Yarari	SAB, EUX	WUR: Dolfi Debrot, Dick de Haan, Meike Scheidat, Ayumi Kuramae Izioka SCF (SBMU): Ayumi Kuramae Izioka
Marine mammals	BO-43-021.04-007 – Marine mammals in the Dutch Caribbean	BON, SAB, EUX	WUR: Dolfi Debrot, Dick de Haan, Meike Scheidat
World Heritage nomination	BO-43-021.04-004 – World Heritage nomination Bonaire National Marine Park	BON	WUR: Dolfi Debrot Wolfs Co.: Esther Wolfs UNESCO: Josephine Langley DRO: Frank v Slobbe CARMABI: Mark Vermeij, John de Freitas Curacao Footprint Foundation: Leon Pors
“Nature Funding” Projects in the Dutch Caribbean (Min EZ)			
Coastal ecosystems (Lac Bay: Mangroves and seagrass beds)	Ecological restoration Lac Bay and South coast, Bonaire	BON	STINAPA: Sabine Engel WUR: Klaas Metselaar STCB: Mabel Nava DRO: Frank van Slobbe
Invasive species	Feral Pig Control	BON	Echo: Julianka Clarenda DRO: Frank van Slobbe
Reforestation	Reforestation Project	BON	Echo: Julianka Clarenda DRO: Frank van Slobbe
Invasive species	Goat eradication and control in Washington Slagbaai National Park	BON	STINAPA DRO: Frank van Slobbe
World Heritage nomination	World Heritage Nomination Bonaire Marine Park and/or other interconnected sites	BON	Wolfs Company: Esther Wolfs, Boris van Zanten, Amilcar Guzman, Viviana Lujan DRO: Frank van Slobbe

Long Term Projects

CATEGORY	SUBJECT	DC ISLANDS	ORGANIZATION(S): LEAD SCIENTIST(S)
Terrestrial ecosystems	Combating Erosion and Nature Restoration on Bonaire	BON	Bonaire Agri & Aqua Business BV: Sherwin Pourier Wayaká Advies BV: Jan Jaap van Almenkerk DRO: Frank van Slobbe
Terrestrial ecosystems	Cave and karst nature reserve	BON	DRO: Frank van Slobbe, CARIBSS: Fernando Simal
Nature communication	Campaign environment and nature on Bonaire	BON	DRO: Frank van Slobbe, Peter Montanus
Agriculture	Horticultural Project	SAB	Government of Saba: Randall Johnson
Recreation	Hiking trails	SAB	Government of Saba: Robert Zagers
Pollution	Tent Reef Protection	SAB	Government of Saba: Robert Zagers
Invasive species	Goat buy-back program	SAB	Government of Saba: Randall Johnson
	Yacht mooring project	SAB	Government of Saba, SCF: Kai Wulf
	Saba national park	SAB	Government of Saba, SCF: Kai Wulf SABARC: Ryan Espersen
	Crispeen trail project	SAB	Government of Saba: Robert Zagers, SCF: Kai Wulf
Community outreach	Nature Awareness project	EUX	Government of St Eustatius STENAPA: Clarisse Buma CNSI: Johan Stapel, Hannah Madden
Nature management	Strengthening management of nature	EUX	Government of St Eustatius STENAPA: Clarisse Buma
Invasive species	Rodent assessment and control	EUX	Government of St Eustatius CNSI: Johan Stapel, Hannah Madden ECPHF: Teresa Leslie
Coral ecosystems	Coral restoration	EUX	Government of St Eustatius STENAPA: Jessica Berkel, CNSI: Johan Stapel
Erosion	Erosion control	EUX	Government of St Eustatius CNSI: Johan Stapel

Monitoring Overview

August 2019

CATEGORY	SUBJECT	DC ISLANDS	ORGANIZATION(S): LEAD SCIENTIST(S)
Birds	Flamingo Abundance	BON	DRO: Frank van Slobbe Cargill STINAPA: Paulo Bertuol
Birds	Monitoring vulnerable parrot nests (remote camera sensing work)	BON	Echo: Julianka Clarenda, Sam Williams
Birds	Aruban Brown-Throated Parakeet Conservation	AUA	FPNA: Giancarlo Nunes , ABC: Greg Peterson
Birds	Aruban Burrowing Owl Conservation	AUA	FPNA: Giancarlo Nunes ABC: Greg Peterson GLOW: David Johnson
Birds	Yellow-shouldered Amazon parrot roost counts	BON	Echo: Julianka Clarenda DRO: Peter Montanus, Diego Marquez STINAPA: Albert Christiaan
Birds	Bird Monitoring (Caribbean Waterbird Census)	BON SXM	STINAPA: Paulo Bertuol EPIC: Adam Brown
Birds	Tern monitoring (artificial nesting islands)	BON	STINAPA: Paulo Bertuol Cargill, DRO WUR: Dolfi Debrot
Birds	Terrestrial Bird and Habitat Monitoring	BON CUR SAB SXM EUX	Echo: Julianka Clarenda STINAPA: Paulo Bertuol, Caren Eckrich STENAPA CNSI Curassavica: Michelle da Costa Gomes CARMABI: Erik Houtepen Nature Foundation: Binkie van Es
Birds	Red-billed Tropicbird monitoring	SAB	STENAPA, SCF: Kai Wulf
Birds	Pelican monitoring	SXM	NFSXM: Melanie Meijer zu Schlochtern

Monitoring Overview

August 2019

CATEGORY	SUBJECT	DC ISLANDS	ORGANIZATION(S): LEAD SCIENTIST(S)
Coral reef ecosystems	Global Coral Reef Monitoring Network	BON CUR SAB EUX SXM	STINAPA: Caren Eckrich CARMABI: Mark Vermeij SCF (SBMU): Ayumi Kuramae Izioka STENAPA: Jessica Berkel NFSXM: Tadzio Bervoets CNSI: Johan Stapel, Kimani Kitson-Walters Students: Julia Stuijtzand (WUR) en Wiebke Homes
Coral reef ecosystems	Monitoring and research of the longest coral reef time-series in the world (since 1973) (Part of BO-11-019.02-022 –Inventory corals)	BON CUR	WUR: Erik Meesters, Didier de Bakker (PhD student) NIOZ: Fleur van Duyl, Rolf Bak
Environmental	Water quality testing	SXM	NFSXM: Tadzio Bervoets, EPIC: Natalia Collier
Environmental	Nutrient (phosphate, ammonium, nitrate and nitrite) monitoring of St Eustatius' coastal waters	EUX	CNSI: Johan Stapel
Fish	Shark monitoring: - Shark sightings - Shark Abundance, distribution and movements (tagging, acoustic telemetry)	AUA BON CUR SAB SXM EUX	WUR: Erwin Winter, Dolfi Debrot, Martin de Graaf FPNA: Giancarlo Nunes, STINAPA: Caren Eckrich CARMABI: Mark Vermeij SCF(SBMU): Ayumi Kuramae Izioka, Guido Leurs STENAPA: Jessica Berkel, NFSXM: Tadzio Bervoets
Fish	Spawning monitoring: Red hind surveys on Moonfish Bank	SAB	SCF (SBMU): Ayumi Kuramae Izioka
Fish	Fish and fishery monitoring (Barracuda's, sharks and eagle rays, tarpons, marine mammals, (fishing) boats, fisherman)	BON	STCB: Mabel Nava
Hydrology	Hydrology Lac Bay	BON	STINAPA: Sabine Engel WUR: Klaas Metselaar
Insects	Bee tracking	BON	Echo: Julianka Clarendia STINAPA: Sabine Engel, Johan Blerk
Invasive species	Goat and/or donkey removal: - Washington Slagbaai National Park - Lac Bay area (exclusion plots) - Quill National Park (exclusion plots)	BON EUX	STINAPA: Paulo Bertuol WUR: Dolfi Debrot DRO: Frank van Slobbe STENAPA

Monitoring Overview

August 2019

CATEGORY	SUBJECT	DC ISLANDS	ORGANIZATION(S): LEAD SCIENTIST(S)
Invasive species	Lionfish abundance and control	BON, CUR SXM, SAB EUX	STINAPA: Paulo Bertuol (50 meter traps) CARMABI: Mark Vermeij, NFSXM: Tadzio Bervoets SCF (SBMU): Ayumi Kuramae Izioka STENAPA: Jessica Berkel
Invasive species	Feral pig population assessment (trapping)	BON	Echo
Mammals	Bat monitoring	AUA, BON	FPNA, WildConscience: Fernando Simal, Linda Garcia
Mammals	Dolphin monitoring (since 1999)	BON	Ron Sewell
Mammals	Marine Mammal Monitoring (noise loggers Saba Bank)	AUA SAB EUX SXM	WUR: Bart Noort, Dolfi Debrot SCF (SBMU): Ayumi Kuramae Izioka AMMF: Angiolina Henriquez STENAPA: Jessica Berkel (sighting forms) NFSXM: Tadzio Bervoets (sighting forms), SCCN
Molluscs	Conch (<i>Strombus gigas</i>) on St. Eustatius, Saba Bank, Anguilla	SAB EUX	WUR: Martin de Graaf, Erik Boman (PhD student) SCF (SBMU): Ayumi Kuramae Izioka
Plants	Monitoring of tree growth and survivorship in reforestation areas	BON	Echo: Julianka Clarendia
Reptiles	Lesser Antillean Iguana: Monitoring population density & removing invasive Green Iguana and hybrids (Mohamed bin Zayed Species Conservation Fund)	EUX	STENAPA: Clarisse Buma, RAVON: Tim van Wagenveld, UvA: Thijs van den Burg
Reptiles	Red-bellied racer snake monitoring	EUX	CNSI: Kimani Kitson-Walters
Reptiles	Boa Life History	AUA	FPNA: Giancarlo Nunes, Eckerd College: Jeff Goessling
Reptiles	Behavior of the endemic Aruban Whiptail lizard	AUA	FPNA, Eckerd College: Jeff Goessling
Seagrass and mangrove ecosystems	Seagrass and mangrove monitoring (BON: also conch and benthic fauna)	BON EUX SXM	STINAPA: Sabine Engel, Caren Eckrich WUR: Klaas Metselaar, NFSXM: Tadzio Bervoets CNSI: Kimani Kitson-Walters
Seagrass ecosystems	Seagrass restoration BESE elements	BON	STINAPA: Sabine Engel, WUR: Marjolijn Christianen
Reptiles	Sea turtle monitoring: -Satellite tracking -Nest monitoring -In water surveys (BON, CUR, SXM) -Fibropapillomatosis presence (BON)	AUA, BON, CUR, SAB, EUX, SXM	TurtugAruba Foundation STCB: Mabel Nava, STCC: Sabine Berendse STENAPA: Jessica Berkel SCF: Kai Wulf, NFSXM: Tadzio Bervoets

Monitoring and Research Wishlist

The Dutch Caribbean nature conservation organisations are in need for research projects on specific topics to safeguard biodiversity and promote the sustainable management of the natural resources of the islands.

1. Coastal water quality/nutrients and interaction with groundwater:

Note: Recently during the NICO expedition researchers looked at this around Bonaire and Curaçao.

- Possible link to fish diseases/incidence of Fibropapillomatosis in green turtles in Lac, Lagoon and Curaçao can be used to determine the linkages with water quality, pollutants in sediments, etc serving as indicators, or sentinels for the health of these important ecosystems.
- Pollutants (oil, heavy metals, pesticides, endocrine disruptors, plastics, microbial etc) entering coastal waters (subterraneously) from land and their effects on marine organisms (Curaçao).
- Quantifying terrestrial hydrological controls on nutrient and sediment fluxes into shallow seas (Bonaire).
- Stoichiometric aspects of nutrient enrichment on Caribbean reefs (Curaçao).
- What do coral communities do "well" in places where they are not expected? What makes corals cope with more nutrients, warmer waters etc? (Curaçao)
- Design of cheap but effective waste water systems (using waste to generate biomass, energy etc.) (Curaçao)
- Water quality & pollutants in sediment of Spanish Lagoon (Aruba).
- Economical and feasible waste and waste water management options (St. Maarten).
- Water quality testing and impacts of poor water quality on marine life (St. Maarten).
- Monitoring the sedimentation on the reefs around Saba.

2. Climate Change

- Evaluation of the most probable effects of climate change and sea level rise (all islands), including risk analysis in coastal zones including coral reefs and recommendations for coastal zone management and climate proofing.
- Effects on sea turtles and their nesting beaches.
- Effects of changing temperatures and hurricane damage on cloud forest of Saba.
- Develop an effective terrestrial monitoring program to enable hurricane damage and recovery assessment.
- Island specific mitigation measures for climate change effect (St Maarten).

3. Hydrology

- Mapping of groundwater levels and flows [Bonaire].
- Nearshore-offshore mixing (Curaçao).
- A thorough study of Simpson Bay 's hydrology and water quality, particularly related to land-based sources of pollution. Identify key sources of pollution and track them back to their source (St. Maarten).

4. Morphodynamics

(near shore coastal hydrodynamics, current models):

- Currents and sand transportation (and production from Halimeda) in Lac (Bonaire) – very important to management of this Ramsar site. **Note:** HVL student has started to investigate this
- Investigate all sand producing organisms to better understand where sand (and beaches) come from (Curaçao).
- Effects on beach accretion and depletion Statia and potential of reef restoration/beach restoration.
- Sedimentation rates (St. Maarten).

5. Yarari Sanctuary

- Marine mammals: aerial survey (SSS islands (Saba Bank and waters surrounding Saba, St. Maarten and St. Eustatius), seasonal presence, isolation and abundance as well as seasonal migratory destination(s) and population history of humpback and Bryde's whales in the Dutch Caribbean.
- Sharks: Ecological role of Saba Bank for sharks (nursery for nurse sharks, tigersharks, silky sharks?).
- Analyze 10 year dolphin sighting database (Bonaire)
- Ecological role of the Saba Bank passage (between Saba and Saba Bank) for deepwater sharks (e.g. dog fish).

Monitoring and Research Wishlist

The Dutch Caribbean nature conservation organisations are in need for research projects on specific topics to safeguard biodiversity and promote the sustainable management of the natural resources of the islands.

6. Invasive species:

- Follow up studies of impact of rats (and cats) on nesting tropic birds.
- The effects of the invasive seagrass *Halophila stipulacea* on the native seagrasses in the area of Lac Bay, St. Eustatius and St. Maarten, and the ecological impacts (e.g. on green turtles feeding in Lac [and Lagun], Bonaire and St. Eustatius; on conch feeding and recruitment [aggregations of juvenile conch under *Halophila* in Statia], sea urchins, etc.)
Note: NWO funded Projects by Marjolijn Christianen (WUR) looked at this in relation to sea turtles. Also Erik Boman (WUR) & CNSI looked at this in relation to conch.
- *Scaevola taccada* (White inkberry/Beach naupaka) spread and potential impact on sea turtle nesting on Klein Bonaire.
- Donkey, cat, pig population size distribution and grazing impact on Bonaire. **Note:** Echo is working on a pig control programme.
- Management of *Corallita*
Note: A running NWO project looked at this.
- Trapping lionfish in deep waters. **Note:** A project is running by WUR and WNF on the Saba Bank.
- Impact and potential management plans for invasive species. This includes: monkeys, iguanas, mongoose, african land snail, racoons, red eared slider (St. Maarten).
- Invasive species (size, distribution, threat management): boa, rubber vine, tilapia, goats, rats, cats, dogs, cane toad (Aruba).

7. Birds

- Migratory birds – patterns, habitat use with an emphasis on nesting species (Bonaire).
- **Yellow shouldered parrot:**
 - ◇ Genetics of yellow shouldered parrot (establish uniqueness of Bonairean Parrot as compared to Venezuelan islands).
 - ◇ What is the effective (i.e., breeding) population size of lora as compared to the total population.
- **Flamingos**
 - ◇ Ecology of the flamingos, in particular the Pekelmeer and flamingo sanctuary. Food availability and fluctuations and effects on breeding success.

8. Carrying capacity/management effectiveness

- BNMP reef carrying capacity and implications for management (only old and dubious data available, urgent need for an update under current circumstances and how carrying capacity is influenced by management, e.g. can carrying capacity be increased with proper management. Consider also new types of recreation such as kite surfing and assess actual effects).
- Effectiveness of nature management, both marine and terrestrial (is management having an effect and what management actions should be improved or instated?)
- Saba/Statia trails (effects of use, potential mitigation measures?)
- Assess effectiveness of restoration efforts (e.g. reforestation, are the right species being planted, is the focus on rare species correct or counterproductive? **Note:** Echo is working on this on Bonaire). Aruba would like to see reforestation of native, endangered, and key fauna supporting flora.
- Study the difference between cruise tourism and stay-over tourism regarding their pressure on the terrestrial and marine environment, taking into consideration the infrastructure needed to accommodate these types of tourism [Bonaire]. **Note:** Wolfs Company did a study on this.



Photo by: © Miro Zumrik

Monitoring and Research Wishlist

The Dutch Caribbean nature conservation organisations are in need for research projects on specific topics to safeguard biodiversity and promote the sustainable management of the natural resources of the islands.

9. Fisheries research

- **Conch:** vertical (depth) migration of conch.
- **Commercial fish species:** identify reproductive season or peak spawning period and area and assess connectivity between islands.
- **Saba Bank:**
 - ◇ carrying capacity of main target species (red snappers and lobster (also part of BO program) Feasibility of habitat restoration/artificial habitat for lobster fisheries on the Saba Bank.
 - ◇ Unused stocks: identify potential and sustainability of currently unused fish stocks such as diamond-back squid, swimming crabs.



Photo by: © Mark Vermeij

10. Sociological study of nature perception in the community

- How does the local community perceive nature and nature conservation and to what degree do they enjoy nature, how might this be improved? How effective is current communication, if any, to improve enjoyment of nature in the community and perception of the need to protect nature?
- Sustainable tourism – perception/expectations of tourists and residents as tourism grows (Bonaire).
- Invasive species control on islands where free-roaming livestock is a cultural norm – changing traditions in a changing world (Bonaire).
- Sociological/anthropological study of the cultural value of the endangered Lesser Antillean iguana *Iguana delicatissima*. How often is it caught? Perceived as a delicatessen? (St. Eustatius)
- Assess the extent of current pollution from land by plastic bags, styrofoam and other plastic debris. How willing are people to change their behavior vis a vis plastic bags, and what would be needed to effectively curb the continued generation of this type of marine debris.
- Sustainable development opportunities for tourism dependant islands (St. Maarten).

11. DNA barcoding to monitor biodiversity (is already running on St Eustatius by Naturalis)

- Biodiversity inventory: terrestrial. (St. Maarten and Aruba (also marine))
- Endemic, Endangered, and Keystone species (size, distribution, conservation management): Shoco (continue program), Bats (continue program), Prikichi, Santanero, Cascabel (renew program), Pollinators, Key fauna supporting flora (Aruba).
- Natural history Flora and Fauna distribution.

12. Improve baseline data on sharks (continue Shark research, especially shark tagging, movement and abundance).



Photo by: © Stan Shea

Monitoring and Research Wishlist

The Dutch Caribbean nature conservation organisations are in need for research projects on specific topics to safeguard biodiversity and promote the sustainable management of the natural resources of the islands.

13. Coral reefs

- Which herbivores can be used to reverse coral to algal phase shifts? Which algae are consumed and which ones aren't? (Curaçao)
- Effects of habitat fragmentation and its effect on gene flow on coral reefs (Curaçao).
- The contribution of waterflow to reef health (Curaçao).
- Shipping impacts to nearshore coral reef environments (Bonaire).
- GCRMN reef monitoring (St. Maarten needs funding for long-term project).
- To battle and research the impact of stony coral tissue loss disease (St. Maarten)
- Coral restoration, as we lost about 60% of our corals or more in the last 2 years (St. Maarten).

14. Economic valuation of key habitats (St. Maarten)

15. Environmental impact assessment landfill (St. Maarten)

16. Anthropogenic stressors:

- Effects, potential mitigation measures: Off-road vehicles (Aruba).
- Carrying capacity of (1) Off-road vehicles, (2) Conchi – (3) Natural Pool, Caves (Aruba).

17. Sargassum and Seagrass:

- Sargassum predictions, impacts, management (All).
- Sea grass research such as abundance, distribution and status (St. Maarten).

18. Turtles:

- Fibropapillomatosis in green turtles: cause, spread and severity of the disease (Bonaire, Curaçao).
- Sea Turtle Research (St. Maarten).

19. Mangrove Restoration (St. Maarten)



Photo by: © Brenda Kirkby

Monitoring and Research Wishlist

The Dutch Caribbean nature conservation organisations are in need for research projects on specific topics to safeguard biodiversity and promote the sustainable management of the natural resources of the islands.

Additional notes:

The following are research questions from previous years and still very much valid for Aruba, Curaçao and St. Maarten. They are mostly completed or underway on the Caribbean Netherlands' islands but some are still valid.

Collection and evaluation of baseline data

including species inventories and production/updating of habitat maps for key habitats and species including:

- **Marine environments**
(coral reefs, seagrass beds, mangrove forests):
 - ◇ **Habitat maps** for all marine ecosystems: Aruba, Bonaire (windward side), Saba [done], Saba Bank, St Eustatius [done], St Maarten
 - ◇ **Revised habitat maps for the leeward shore:** Bonaire [done], Curaçao [note that there are habitat maps for Bonaire and Curaçao produced by Fleur van Duyl but these are now decades out of date. Recently a report from WUR came out (Mücher et al. Hyperspectral Coral Reef Classification of Bonaire). During the NICO expedition bathymetric data has been collected by Dr. Henk de Haas (NIOZ) for the Dutch Caribbean islands but this data still needs to be analyzed.
- **Terrestrial environments:**
 - ◇ **Habitat maps** for Aruba [habitat maps produced and ground truthed by CARMABI exist for all islands except Aruba]
 - ◇ **Species inventories** (all islands) [Statia starting soon]
 - ◇ **Cost effective methods for assessing terrestrial habitat change** [remote sensing is now being proposed for monitoring]
 - ◇ **Detailed inventories and mapping for key ecosystems** including
 - › Cactus habitats (Bonaire)
 - › Elfin forest (Saba)
 - › Boven forest types (Statia)
 - ◇ **Baseline data and population dynamics** (including reproductive biology and conservation ecology) for **key species** including:
 - › Caribbean coot
 - › Northern Caracara
 - › Red bellied racer (Saba, Statia)



Photo by: © Diego Marquez

List of Acronyms

AUA	Aruba
BON	Bonaire
CUR	Curaçao
SAB	Saba
EUX	St. Eustatius
SXM	St. Maarten
ABC	Aruba Birdlife Conservation
AMMF	Aruba Marine Mammal Foundation
BEST	Biodiversity and Ecosystem Services in Territories of European overseas
BO project	Policy Supporting Research project
BU	Brock University, Canada
Calpoly	Cal Poly Marine Conservation Lab
CARIBSS	Caribbean Speleological Society
CARMABI	Caribbean Research and Management of Biodiversity Foundation
CEAB	The Blanes Centre for Advanced Studies, Spain
CRF	Coral Restoration Foundation
DCNA	Dutch Caribbean Nature Alliance
DCBD	Dutch Caribbean Biodiversity Database
DNM	Directie Natuur en Milieu, Aruba
DRO	Directorate of Spatial Planning and Development, Bonaire
EcoPro	Ecological Professionals Foundation
ECPHF	Eastern Caribbean Public Health Foundation
EPIC	Environmental Protection in the Caribbean
ETH	ETH Zürich, Switzerland
FIU (EEL)	Florida International University Environmental Epigenetics Lab

FSU	Florida State University
FPNA	Fundacion Parke Nacional Aruba
GLOW	Global Owl Project
HAS	HAS University of Applied Sciences, the Netherlands
LVV	Department of Agriculture, Animal Husbandry & Fisheries, St. Eustatius
MinLNV	Ministry of Agriculture, Nature and Food Quality
MC	Marhaverlab, Curacao
MARUM	MARUM – Center for Marine Environmental Sciences, Bremen
NFSXM	Nature Foundation St. Maarten
Naturalis	Naturalis Biodiversity Center, Leiden, The Netherlands
NEV	Dutch Elasmobranch Association
NIOZ Sea Research	Royal Netherlands Institute for Sea Research
NTU	Nottingham Trent University, UK.
NWO	Netherlands Organisation for Scientific Research
RAVON	Reptielen Amfibieën Vissen Onderzoek Nederland
RRFB	Reef Renewal Foundation Bonaire
RuG	University of Groningen, the Netherlands
RU	Radboud University Nijmegen, the Netherlands
SCCN	Southern Caribbean Cetacean Network
SABARC	Saba Archaeological Center
Scripps	Scripps Institution of Oceanography, U.S.A.
SDSU	San Diego State University, U.S.A.
SLA	SeaLife Arizona, U.S.A.
SBMU	Saba Bank Management Unit

SCF	Saba Conservation Foundation
SCORE	SCORE International, U.S.A.
Smithsonian	Smithsonian's National Museum of Natural History
STCB	Sea Turtle Conservation Bonaire
STCC	Sea Turtle Conservation Curacao
STENAPA	St. Eustatius National Parks Foundation
STINAPA	National Parks Foundation Bonaire
SU	Swansea University, UK
TU	Temple University, USA
UIU	University of Illinois Urbana-Champaign, U.S.A.
UC	University of California, Berkeley, U.S.A
UF	University of Haifa, Israel
UAA	University of the Algarve, Portugal
UU	University of Utrecht, the Netherlands
UvA	University of Amsterdam, the Netherlands
VHL	University of Applied Sciences VHL, the Netherlands
VISR	Venezuelan Institute of Scientific Research
VU	VU University Amsterdam, the Netherlands
Wildconscience	Wildlife Conservation, Science and Education
WNF	World Wide Fund for Nature
WMR	Wageningen Marine Research, the Netherlands
WUR	Wageningen University and Research Centre, the Netherlands
WUR (Alterra)	Wageningen Environmental Research, the Netherlands
ZMT	Das Leibniz-Zentrum für Marine Tropenforschung, Bremen