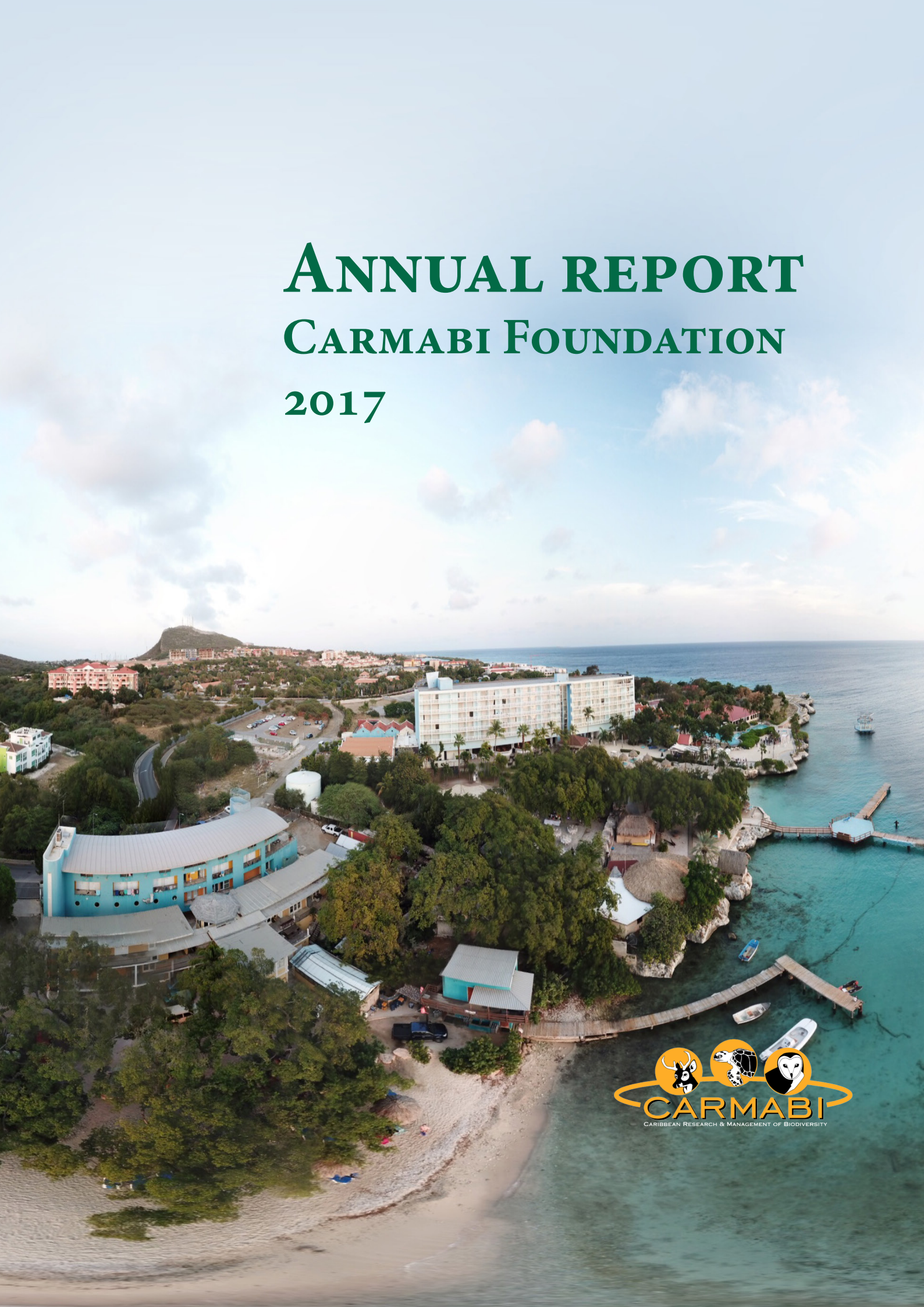
Annual report
Carmabi Foundation
2017



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CARMABI Annual Report 2017
Caribbean Research and Management of Biodiversity Foundation©
P.O. Box 2090 Curaçao
Phone: (+5999) 462-4242
Fax: (+5999) 462-7680
E-mail: info@carmabi.org
Website: www.carmabi.org

With contributions by:
Ms. L. Nijman
Mr. P. Stokkermans
Mr. J. de Freitas
Ms. E. Isenia
Mr. M. Vermeij
Mrs. A. Richardson

Photos by:
Mr. P. Stokkermans
Mr. M. Vermeij
Mr. J. de Freitas
Mr. P. Keeling

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1. FROM THE DIRECTOR

The road constructions in front of the entrance of the Christoffelpark were completed in October of 2017. We are pleased to see the improvements that were done. Speed bumps and signage were placed to ensure more safety of the visitors of the Christoffelpark. We would like to take this opportunity to thank the Government of Curaçao for these constructions.

In September 2017, St. Maarten, Saba and Statia were hit by hurricane Irma, followed by hurricane Maria two weeks later. Besides all human suffering and material damage, nature was hit hard. Through the DCNA, of which Carmabi is a member, financial support was provided for our sister park organizations on the Windward Islands.

Protecting nature is not possible without support from a broad network. We therefore want to thank the government, NGO's, private individuals and volunteers for their support in 2017. Without their generous support, we would never have performed as well as we did in 2017.

Carmabi's research department has performed an outstanding job in 2017. In total 105 scientists visited our research station in Piscadera to conduct a wide variety of research projects. In addition, 141 students participated in high-level courses, taught at Carmabi. In total 33 scientific publications were published based on work that was done at Carmabi. Getting more scientific insight in the ecological processes shaping Curaçao's reefs is essential to improve existing and to implement new strategies to ensure the long-term survival of these unique assets to our island.

The park management department has worked tirelessly to protect nature and to promote tourism. The parks department has worked hard to protect nature and promote tourism. The total number of visitors in the Christoffel National Park amounted to 41.579 in 2016 and 42.402 in 2017. This was an increase of 2% compared to 2016. Starting 2017, the Christoffelpark entrance tickets include access to the Savonet Museum.

The total number of visitors in the Shete Boka National Park amounted to 70.240 in 2017. This was an increase of 13.2% compared to 2016.

The Nature and Environment Education Department of Carmabi is responsible for education and awareness about terrestrial and marine biology on Curaçao. For primary schools educational programs are being developed continuously on these subjects. The terrestrial program consists of lectures and field tours about our terrestrial nature in the Christoffel Park as well as the areas of Daaibooi & Shete Boka. The marine educational program includes lectures, interactive exercises and a visit to the Marine Education Center at Carmabi Piscadera about the coral reef ecosystem. In 2017, almost 11,000 students participated in these educational programs. 12 enthusiastic volunteers guided these programs. In addition the nature and environment education department creates teaching materials for schools, teachers and students. This information is distributed through our social media pages and our website extensively. The department is also in charge of the school visits, giving lectures at primary, middle and high schools with different terrestrial and marine themes. We also provide information, on request, to groups or individual students about studying (marine) biology as their future opportunity.

Looking forward to 2018… On the 2nd of March 2017, a collaboration agreement between Carmabi, the Curaçao Marine Research Center (CMRC) and the government of Curaçao was signed. This agreement was based on a decision of the Council of Ministers dated the 26th of November 2014. A total amount of ANG 8,730,266 has been made available for both Carmabi and the CMRC to improve its infrastructure in order to put Curaçao on the world map as an island specialized in marine biological sciences. This project is to be completed by the end of 2019. From the total amount, NAF 3,823,000 has been allocated to Carmabi. These funds will be used for the renovation of the old Carmabi building, the construction of a pier, the renovation of the wet laboratory (a building with aquaria for research purposes), the purchase of a boat and 2 vehicles, the purchase of laboratory equipment and the purchase of an automated system for monitoring water quality. This project is extremely important for Carmabi. However, the funds have not been made available yet. We are expecting that this will happen in 2018. Other important projects, such as the Marine Park at Eastpoint and the Mangrove Park at Rif in Otrobanda are experiencing delays. We hope these projects can start in 2018.

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Stokkermans

Paul Stokkermans
Director – CARMABI

2. PARKS AND MUSEUM

A visit from the Radulphus College at the Christoffel National Park. A view from the top.

Carmabi manages the Christoffel Park, the Savonet Museum and National Park Shete Boka. These parks house an array of animal species, plants, trees and breeding spots for turtles that are all studied and protected by Carmabi. With approximately 40000 visitors annually in The Christoffel Park and 70000 visitors in National Park Shete Boka, these parks function as an important touristic attraction on Curaçao.

Overview 2017

The year 2017 marked the introduction of new procedures, completion of overdue maintenance and the implementation of more efficient processes. The general motto: Safety, Security and Service was introduced.

Safety

Because of the risk of sunstroke accidents due to extreme heat and humidity between 11 and 1 PM, the opening and closing hours of the Christoffelpark were adjusted to earlier hours. In addition, an instructional film was produced to inform visitors on how to visit the park safely and to prevent sunstrokes.

Directional signs were placed to help visitors better find their way in the parks.

All roads and hiking trails were made accessible again. A company was contracted, to assist with this between March and June 2017. We also examined whether new trails should be constructed in the near future.

Security

In the beginning of 2017, the parks experienced some unfortunate situations when it comes to security. Drastic security measures were taken and the number of robberies in the park dropped to 0 towards the end of 2017. Frequent security inspections, camera's, monitoring of the visitors at the gates and the regular contact with CTB, Police and Politur contributed to this improvement. Measures were taken to increase the safety in Shete Boka National Park by closing of certain areas of risk until new security measures become effective in 2018.

Service

Many Curaçaoans visited the park because of the open day which was organized. (311 visitors on 1 day) During the holidays a special discount was applied to Curacaoans who currently live abroad. It also led to an increase in visitors in the last quarter.

Various projects have commenced in 2017. A new telephone system and Internet connection were purchased to improve the availability of these services at the parks to improve customer service in the coming years. These will be installed in the beginning of 2018. Other challenges in 2017 were power outages, security issues and a lack of marketing for the parks. These are items that are now high on the priority list for 2018. With new tenants in the restaurant at the Christoffelpark, an increase in customer satisfaction with regards to the service and food can be noticed. The restaurant receives many compliments. Visitors can now enjoy free coffee in the ticket office until 10 AM; this is very well received by visitors of the park.

Internal processes

A great focus was put on reducing energy cost and to work with durable materials. A start was made with this project by installing switch boxes and LED lights. Besides that, part of the conference room was closed, leading to a massive reduction in use of air-conditioning.

New procedures for the cash register and finance department have been standardized in the final months of 2017. More reliable reports are being provided because of this.

External influences

The road to Westpunt was being reconstructed from the beginning of 2017, causing a decrease in visitors for that period. The road constructions were completed by October 2017, leaving the entrance of the Christoffel park with a brand new road with trees and speed bumps, making it safer to visit the park.

The Tula Mega Pier was finished, accompanied by an increase in Cruise tourists. The additional tourists from the Cruise Ships led to an increase in total amount of visitors in 2017 for Shete Boka compared to 2016.

Overall visitor statistics 2017

In 2017 a total of 42.401 people visited the Christoffel Park, whilst in 2016 this was a total of 41.579 people. This is an increase of 2,0 % in comparison to 2016. Included in this number are the activities and tours that are organized. Starting from the beginning of 2017, all Christoffelpark entrance tickets included entrance to the museum. The Shete Boka National park showed an increase of 13.2% compared to 2016.

Christoffel National Park

In 2017 a total of 42.401 people visited the Christoffel Park, whilst in 2016 this was a total of 41.579 people. This is an increase of 2,0 % in comparison to 2016. Included in this number are the activities and tours that are organized. In the Christoffel Park, visitors have the option to join different activities on a weekly basis such as jeep safari's, mountain hikes, moon and deer walks and bird spotting tours. The increase of tour operators that visit the park with tourists has resulted in a small growth in revenue and visitors. The number of visitors of 42402 in 2017 included 9625 local visitors.

Directional signs in the park

Activities and tours

In total, 1961 persons participated in activities such as the moon and walks tour, jeep safari's and bird spotting tours in 2017. In 2016 this was a total of 2266 participants. There was a decrease in participation in activities of 13,5% in 2017 compared to 2016. In 2018, a great emphasis will be put on the promotion of the tours and activities to ensure that those numbers will be back on track.

Savonet Museum

Plantation Savonet is one of the oldest on the island as it dates from the middle of the 17th century. Over centuries it has also been one of the most prosperous plantations on the island. The residence has an 18th century baroque architectural style. Unique are the various surrounding buildings like storerooms, stables and cattle corrals, which were all part of the plantation enterprise. Inside the main plantation house and some of the annexes, the Savonet Museum is set up. It is also the center and entrance of the Christoffel National Park.

Starting from the beginning of 2017, all Christoffelpark entrance tickets included entrance to the Savonet museum.

Shete National Boka

The Shete Boka National Park was visited by 70240 people in 2017. In 2016 there was a total visitor number of 62024. This means an increase of 13.2% compared to 2016. This number includes the tour busses that visit the Shete Boka.

The number of tour operators and cruise tourists increased explosively by 55.5%. This increase is in line with the expectations of the CPA (Curaçao Ports Authorities) because of Hurricane Irma on the Windward Islands and the destruction of the ports there and the newly constructed 2nd mega pier in the Rif area near Otrobanda.

Personnel

Learning and development

The parks welcomed youngsters from an employment-oriented school in Barber Joseph Civilis to do a 2-week on the job training program with the rangers to improve their working skills. There were several youngsters working for the parks in the summer vacation and 2 junior rangers are helping out on Saturdays. Also there were 2 trainees from the Clusius College in Holland, who did an internship. They presented a landscape plan for the entrance at Savonet and included an idea for preserving our whale skeleton.

Staff changes

Two extra rangers were hired in 2017.

Also Sue-Shantely Lourens started working for Carmabi part time, started October 2017, as management assistant.

Two employees, Sabine Berendse and Humphrey Jansen have left the organization.

As of April 1st, 2017 Dominique Adriaens started as Park Manager.

Students from the Carmabi Nature and Education program also visit the park often

The Christoffel Park offers daily tours and activities for its visitors

3. NATURE AND ENVIRONMENTAL EDUCATION (NME)

Our Nature and Environment Education Department (NME Natuur & Milieu Educatie) is responsible for educational programs. Our main focuses are elementary school students and high school students to educate them on terrestrial and marine biology on Curaçao. The programs consist of tours focusing on our terrestrial nature in the Christoffel Park and the areas of Daaibooi & Shete Boka. It also offers an interactive tour in the Marine Education Center combined with a lecture about the Coral Reef Ecosystem. In addition, we provide teaching materials for primary (Funderend Onderwijs FO) and high school (Voortgezet Onderwijs VO).

In 2017, 10,636 students participated in the educational programs (See table 1). This is an increase compared to the year 2016 (9,081 students). 12 volunteers guided these programs. Apart from the educational programs, NME also organizes school visits with different themes (such as our program 'microworld - life under the microscope' and 'The beauty of bats') and provides lectures and tours to high school students.
Educational Programs

The Carmabi Nature and Environment Program consist of a Terrestrial Education Program (TEP), which includes guided tours within the parks and a Marine Education Program (MEP), which includes a presentation, interactive exercises and a visit to the Marine Education Center (MEC). A total of 50 schools participated in the educational programs of the Nature and Environment Education Department. We also offer a program where a Carmabi team visits the school, however the schools prefer to visit the parks instead of classroom teaching. It is a great outing for the students.

In November 2017, we purchased new microscopes to revive the school program 'microworld' in 2018. The use of microscopes is an addition to our program. The great advantage is that we can include 'microworld' in our existing tours. This mean the students that already take part in our programs, will have the opportunity to join the 'microworld' program at no additional costs.

Terrestrial Education Program

The Christoffelpark was visited by 9,434 students from respectively group 1 to group 8 of our elementary school system (ages vary from 4 till 12 years old). The activities in the park focus on different themes such as our local birds, trees/ plants, reptiles, agriculture/ wells & ruins.

Below an overview of the amount of students subdivided in themes/ age group:

The younger students, from group 1 and 2 visited the park as an introduction to the nature world around them during the so-called 'Mondi Misterioso' activity. The aim of this activity is teaching students to care more for nature in a playful way by recognizing different flora and fauna. In our program 'reptiles' the students (group 3) learn all about reptiles and their habitat and niche in our nature. Group 4 went to the Christoffelpark for lessons on birds. The bird lessons involve obtaining knowledge about our local birds in theory and by observing birds within the park. Group 5 visited the Christoffelpark to learn more about our trees and plants and got the opportunity to recognize the trees and plants in the park. Groups 6 and 7 received lessons on wells, agriculture and ruins in the area of Savonet & Zorgvlied in the Christoffelpark. All the lessons for the groups 4 up to 8 include a small test for the students; the grade can be part of their school report.

Marine Education Program

The program for the marine education exists of three parts. First the students follow introductory lessons at school from their teacher. The teacher receives a book and teacher's guide on the Coral Reef Ecosystem from Carmabi prior to the lessons. The school introduction is followed by a visit to Carmabi Piscadera where the students attend a presentation in the Auditorium on coral reef ecosystems. The focus lies on the importance of the coral reef to the people of Curaça0. After this presentation the pupils complete a test and the group is divided in two.

One group receives a presentation on Sharks. The other group visits the Marine Education Center (MEC) where they can see what they have learned. The MEC is an exhibition room offering a unique view to the underwater world. The MEC exists of three sections. In the first section, in the reception area, a photo exhibition can be viewed. The second part shows interesting things which can be found under water. In addition, a coral skeleton collection is exhibited and information on East Point (Oostpunt) is provided. In the third part different groups from the Carmabi Research Station, exhibit their studies and findings; sea turtle monitoring, deep sea research, coral larvae, marine geology of Curaçao, medicine research, mangrove project, information on sharks and underwater research instruments and tools. During the tour through the MEC the pupils view various videos about the importance of the coral reef and coral spawning. They can ask questions and walk around on their own. The students can use an iPad and walk around the MEC and answer questions, it is like a scavenger hunt/ web quest. After the shark presentation the students make another test and then swap with the group that visited MEC.
Vacation Plan / Other groups

Our TEP and MEP programs are also available for other groups, such as after-school projects, foundations for students, vacation-plans, etc. A total of 404 children attended such programs.

The Education Department made different programs for all ages and all levels. Thanks to our experience we can make or adjust a program if needed.
Save Our Sharks (SOS) Project

The Save Our Sharks project makes it possible to give information to the public specifically about the importance of sharks and about marine ecosystems and food chains in general.

The Dutch Caribbean Nature Alliance (DCNA) has received funding from the Dutch Postcode Lottery (Nationale Postcode Loterij) to run a three-year-project titled 'Save Our Sharks'. In this project a lot of approaches come together; like work with scientists and education of our youth and people of Curaçao in general, local fishermen etc. The goal is show the importance of the sharks to our nature and tourism (local and worldwide).

A visit to the Marine Education Center at Carmabi Piscadera

The project started in 2015 and in 2017 we continued with the Marine Education Center, the MEP project, distribution of teaching materials about marine life and sharks (for elementary and secondary education), creating teaching materials and organizing activities during the shark-week in June.

Other educational activities

In 2017 the educational department worked on other

projects besides our TEP, MEP and MEC.

Students of secondary schools can make an appointment with our department for help with different exam projects, like the sector- of profielwerkstuk (main thesis). We develop teaching materials for high-school teachers and students. We also give information about further higher education, mainly the interest for 'applied biology (toegepaste biologie, HBO) or 'marine biology' (VWO).

We also provide programs for special weeks at school, like small internships, extracurricular theme-week, etc. Therefore we work together with other partners, like Ryan de Jong (mangrove restoration).

4. SCIENTIFIC RESEARCH

Visiting scientists

105 scientists visited Carmabi in 2017. In addition 141 students participated in Coral Reef Ecology courses and workshops that were taught by Carmabi and various universities and organizations from the Netherlands and the United States. The number of visiting scientists and students in 2017 illustrates a continued positive trend of increasing visitors after the official opening of the new Science Center in 2013 (Figure 1a). Most scientists in 2017 were from the United States (66%) followed by the Netherlands (25%). Almost all of the scientists and students that

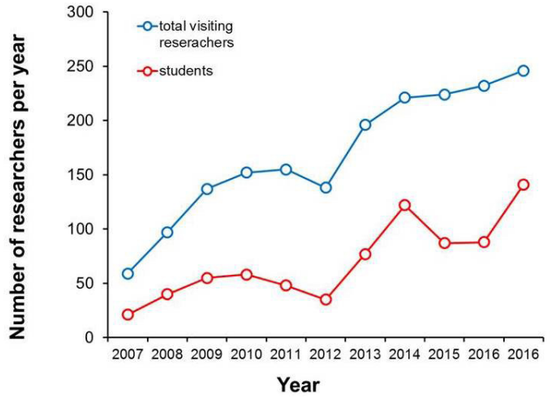

Figure 1a. Increase in reserachers visiting Carmabi between 2007 and 2016

worked at Carmabi stayed at the newly constructed laboratory/ dormitory facilities and the average duration of researchers staying at Carmabi increased significantly in 2017, resulting in a total of 6619 personal working days, i.e. one visiting scientist working one day were achieved and also signals an

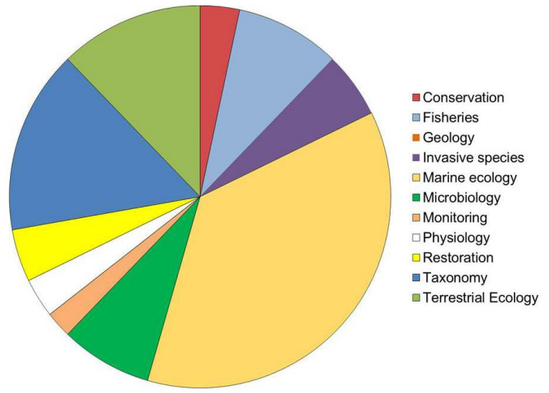

Figure 1b. Areas of expertise of visiting researchers in 2016

upward trend over the last few years (2016: 6827, 2015: 6536, 2014: 4256. The occupation of the new science center was 53% (2016: 58%, 2015: 54%, 2014: 47%, 2013: 28%). An overview of the areas in which all researchers that visited or worked at Carmabi were active is shown in Figure 1b. An overview of visiting scientists (PI name and home institute) is provided below:

- Dr. Jason Dombroskie (Cornell University, U.S.A.)
- Dr. Kristen Hultgren (Seattle University, U.S.A.)
- Dr. Michael Lesser (University of New Hampshire, U.S.A.)
- Dr. Mark Slattery (University of Mississippi, U.S.A.)
- Dr. Rhiannon Davies (Appleby College, Canada)
- Dr. Margaret Miller (SECORE, U.S.A.)
- Dr. Burton Lim (Royal Ontario Museum, Canada)
- Drs. Fernando Simal (Wild Conscience, Bonaire)
- Dr. Jasper de Goeij (University of Amsterdam,

The Netherlands)
- Drs. Mischa Streekstra (Wageningen University, The Netherlands)
- Dr. Amy Wagoner (University of Illinois at Urbana-Champaign, U.S.A.)
- Dr. Erik Meesters (IMARES, The Netherlands)
- Drs. Didier de Bakker (NIOZ & Wageningen University, The Netherlands)
- SECORE International (U.S.A.)
- Dr. Amy Ringwood (University of North Carolina at Charlotte, U.S.A.)
- Dr. Hermann E. Gaub (Ludwig-Maximilians-Universität, Germany)
- Ben Emanuel (BROADREACH, U.S.A.)
- Dr. Carl Thurman (University of Northern Iowa, U.S.A.)
- Dr. Isabelle Cote (Simon Fraser University, Canada)
- Dr. James Reimer (University of the Ryukyus, Japan)
- Dr. Slava Ivanenko (Moscow State University, Russian Federation)
- Dr. Simone Montano (Università degli Studi di Milano-Bicocca, Italy)
- Dr. Ronald Vonk (Naturalis Biodiversity Center, The Netherlands)
- Dr. Charles Fransen (Naturalis Biodiversity Center, The Netherlands)
- Dr. Arjen Speksnijder (Naturalis Biodiversity Center, The Netherlands)
- Dr. Bert Hoeksema (Naturalis Biodiversity Center, The Netherlands)
- Dr. Emma Perry (Unity College, U.S.A.)
- Dr. Matthew L. Partin (Bowling Green State University, U.S.A.)
- Dr. Chris Ratzlaff (UBC Zoology Department, U.S.A.)
- Dr. Kenneth Hoadley (University of Delaware, U.S.A.)
- Dr. Michael Lesser (University of New Hampshire, U.S.A.)
- Dr. Iliana Baums (Penn State University, U.S.A.)
- Dr. Aaron O'Dea (Smithsonian Tropical Research Institute, Panama)
- Dr. Michele Pierotti (Smithsonian Tropical Research Institute, Panama)
- Dr. Benjamin Mueller (University of Amsterdam, The Netherlands)
- Drs. Dorian Luh (Twente University, The Netherlands)
- Drs. Thomas Swierts (Naturalis Biodiversity Center, The Netherlands)
- Dr. Bert Hoeksema (Naturalis Biodiversity Center, The Netherlands)
- Dr. Aschwin Engelen (University of the Algarve, Portugal)
- Dr. Christophe Vieira (Gent University, Belgium)
- Dr. Jocelyn Behm (Temple University, USA)
- Dr. Petra Visser (University of Amsterdam, The Netherlands)
- Dr. Martin de Graaf (Wageningen University, The Netherlands)
- Dr. Mark Vermeij (Carmabi, Curaçao)
- Dr. Valerie Chamberland (SECORE, U.S.A.) Dr. Ben Mueller (University of Amsterdam, The Netherlands)
- Dr. Stuart Sandin (Scripps Institution of Oceanography, U.S.A.)

Peer reviewed scientific publications

Thirty-three publications appeared in peer reviewed scientific journals based on work that was conducted at Carmabi making 2017 the most productive year in terms of Carmabi's scientific output ever (Figure 2). The results of some of these studies have been featured in magazines, news programs and educational websites around the world. Furthermore, 31 reports were produced by MSc students that did their master's thesis' project at Carmabi.

An overview of all peer reviewed scientific publications accepted for publication or published in 2017 is shown below:

- Andradi-Brown DA, Vermeij MJA, Slattery M, Lesser M, Bejarano I, Appeldoorn R, Goodbody-Gringley G, Chequer AD, Pitt JM, Eddy C, Smith SR (2017) Large-scale invasion of western Atlantic mesophotic reefs by lionfish potentially undermines culling-based management. Biological Invasions:1-6.
- Böhm T, Hoeksema BW (2017) Habitat selection of the coral-dwelling spinyhead blenny, *Acanthemblemaria spinosa*, at Curaçao, Dutch Caribbean. Marine Biodiversity 47:17-25.
- De Bakker DM, van Duyl FC, Bak RPM, Nugues MM, Nieuwland G, Meesters (2017) 40 Years of benthic community change on the Caribbean reefs of Curaçao and Bonaire: the rise of slimy cyanobacterial mats. Coral Reefs 36: 355–367.
- Chamberland VF, Snowden S, Marhaver KL, Petersen D, Vermeij MJA (2017) The reproductive biology and early life ecology of a common Caribbean brain coral, *Diploria labyrinthiformis* (Scleractinia: Faviinae). Coral Reefs 36: 83–94.
- Chamberland VF, Latijnhouwers KR, Huisman J, Hartmann AC, Vermeij MJA (2017) Costs and benefits of maternally inherited algal symbionts in coral larvae. Proc. R. Soc. B: 284, 20170852.
- Chamberland VF, Petersen D, Guest JR, Petersen U, Brittsan M, Vermeij MJA (2017) New seeding approach reduces costs and time to outplant sexually propagated corals for reef restoration. Scientific reports 7(1):18076.
- Dube CE, Mercière A, Vermeij MJA, Planes S (2017) Population structure of the hydrocoral *Millepora platyphylla* in habitats experiencing different flow regimes in Moorea, French Polynesia. PLoS ONE 12(3): e0173513.
- García-Hernández JE, Hoeksema BW (2017) Sponges as secondary hosts for Christmas tree worms at Curaçao. Coral Reefs 36(4):1243.
- Glasl B, Bongaerts P, Elisabeth NH, Hoegh-Guldberg O, Herndl GJ, Frade PR (2017) Microbiome variation in corals with distinct depth distribution ranges across a shallow–mesophotic gradient (15–85 m). Coral Reefs 36(2):447-452.
- Griffith MP, De Freitas J, Barros M, Niblick LR (2017) Sabal antillensis (Arecaceae): A new palmetto species from the Leeward Antilles. Phytotaxa. 303(1); 56–64.
- Hartmann AC, Petras D, Quinn RA, Protsyuk I, Archer FI, Ransome E, Williams GJ, Bailey BA, Vermeij MJA, Alexandrov T, Dorrestein PC (2017) Meta-mass shift chemical profiling of metabolomes from coral reefs. Proceedings of the National Academy of Sciences: 201710248.
- Hartmann AC, Marhaver KL, Vermeij MJA (2017) Corals in healthy populations produce more larvae per unit cover. Conservation Letters. 2017.
- Hoeksema BW, Fransen CH (2017) Host switch by the Caribbean anemone shrimp *Periclimenes rathbunae* in Curaçao. Coral Reefs: 36(2):607.
- Hoeksema BW, Bongaerts P, Baldwin CC (2017) High coral cover at lower mesophotic depths: a dense *Agaricia* community at the leeward side of Curaçao, Dutch Caribbean. Marine Biodiversity 47(1): 67-70.
- Hoeksema BW, Harry A (2017) The invasive sun coral *Tubastraea coccinea* hosting a native Christmas tree worm at Curaçao, Dutch Caribbean. Marine Biodiversity 47(1):59-65.
- Hoeksema BW, Reimer JD, Vonk R (2017) Biodiversity of Caribbean coral reefs (with a focus on the Dutch Caribbean). Marine Biodiversity 47: 1-10.
- Hovestadt A, van Leeuwen S (2017) Terrestrial molluscs of Aruba, Bonaire and Curaçao in the Dutch Caribbean: an updated checklist and guide to identification. Vita Malacologica 16: 1-39.
- Kenny NJ, de Goeij JM, de Bakker DM, Whalen CG, Berezikov E, Riesgo A (2017) Ancestrally shared regenerative mechanisms across the Metazoa: A transcriptomic case study in the Demosponge *Halisarca caerulea*. Marine Genomics 37: 135-147.
- Lamb, AD, Watkins-Colwell GJ, Moore JA, Warren DL, Iglesias TL, Brandley MC, Dornburg A (2017) Endolymphatic sac use and reproductive activity in the Lesser Antilles endemic gecko G*onatodes antillensis* (Gekkota: Sphaerodactylidae). Bulletin of the Peabody Museum of Natural History, 58(1): 17-29.
- Losos DN, Weaver JB, Fies TW, Herrel A, Fabre AC, Losos JB (2017) The curious case of the left-sided dewlap: Directional asymmetry in the Curaçao anole, *Anolis lineatus*. Breviora 553(1):1-7.
- Mueller B (2017) First documentation of encrusting specimen of *Cliona delitrix* on Curaçao: a cause for concern? Marine Biodiversity Records 10: 10.
- Mueller B, Meesters EH, van Duyl FC (2017) DOC concentrations across a depth-dependent light gradient on a Caribbean coral reef. PeerJ, 5, e3456.

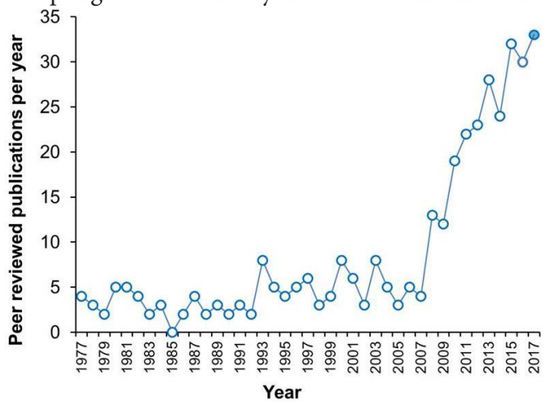

Figure 2. Research outpunt in terms of peer reviewed papers through time

- Nagelkerken I, Huebert KB, Serafy JE, Grol MG, Dorenbosch M, Bradshaw CJ (2017) Highly local zed replenishment of coral reef fish populations near nursery habitats. Marine Ecology Progress Series 568:137-150.
- Naman CB, Leber CA, Gerwick WH (2017) Modern natural products drug discovery and its relevance to biodiversity conservation. Microbial Resources: 103-120.
- Potkamp G, Vermeij MJA, Hoeksema BW (2017) Host-dependent variation in density of coral-livorous snails (Coralliophila spp.) at Curaçao, southern Caribbean. Marine Biodiversity: 1-9.
- Potkamp G, Vermeij MJA, Hoeksema BW (2017) Genetic and morphological variation in coralliv-orous snails (Coralliophila spp.) living on different host corals at Curaçao, southern Caribbean. Contributions to Zoology 86(2):111-144.
- Reijnen BT, van der Meij SET (2017) Coat of many colours—DNA reveals polymorphism of mantle patterns and colouration in Caribbean *Cyphoma* Röding, 1798 (Gastropoda, Ovulidae). PeerJ 5:e3018.
- Rippe JP, Matz MV, Green EA, Medina M, Khawaja NZ, Pongwarin T, Pinzón C, Jorge H, Castillo KD, Davies SW (2017) Population structure and connectivity of the mountainous star coral, *Orbicella faveolata*, throughout the wider Caribbean region. Ecology and Evolution 7(22):9234-9246.
- Salcedo-Sanz S, Muñoz-Bulnes J, Vermeij MJA (2017) New coral reefs-based approaches for the model type selection problem: a novel method to predict a nation's future energy demand. Inter-national Journal of Bio-inspired Computation 10(3):145-58.
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Free advice, outreach and consultation

Several organizations, government departments, the press and others received free advice and information from the Carmabi Science Department during the year. We assisted in 178 cases, both oral and written. In 2016 the Carmabi Science Department was featured/ interviewed in 92 local and in 475 international (known) items for TV, radio and newspapers.

Selected projects and other activities in 2017

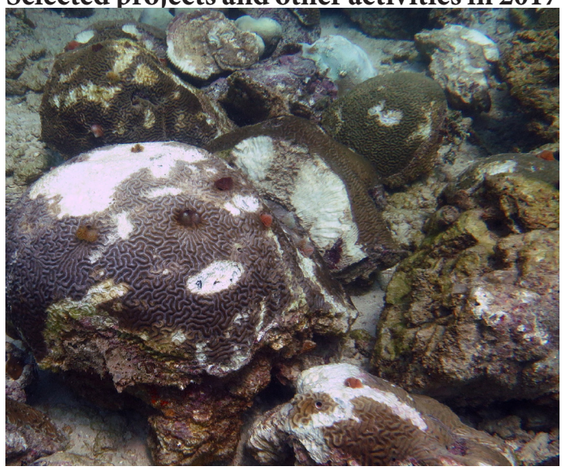


Figure 3 Example of a section of reef that was damagued during the preparations for the construction of Megapier II

Assessment of damage inflicted during the construction of Megapier II

On April 22nd, 2017, vessels (a large barge and a smaller working boat) were observed making prepa-rations to install moorings to be used for mooring cruise ships docked at the future second megapier. Many corals between depths of approximately 2 and 15 meters, covering the entire reef plateau in this area, were damaged during these activities. Carmabi divers confirmed that the coral reef had been impacted in an area roughly estimated at 3.7 hectares (Figure 3). Locally, deep "scars" in the reef bottom were observed as if the reef had been ploughed resulting in total mortality of all marine life in such areas. A large number of endangered corals were killed or damaged. Combining all observations, 654 colonies of all coral colonies surveyed (n= 1667) were damaged or destroyed, i.e., on average 39.2% of all colonies had experienced some form of impact (i.e., were scarred, dislodged, fragmented or combinations thereof). A report was made to inform relevant stakeholders on the degree of the damage caused, accessible for everyone through this link.

Assessment report on the state of Curaçaoan reefs

Coral reefs in the Caribbean are degrading rapidly with a loss of ~50% in just 4 decades. If these rates of decline continue, researchers project that 60% of Caribbean coral reefs will be lost over the next 30 years. The cumulative impacts from runoff, pollution, tourism overuse, destructive fishing and climate change contribute synergistically to these region wide trends. In collaboration with the Waitt Institute and Scripps Institution of Oceanography, we found the same is true for Curaçao. The importance of coral reefs for society and the economy is enormous. Reefs provide direct monetary value through fisheries harvest and tourism revenues. In addition, and as important, they provide indirect non-consumptive such as protection against storm surge and flooding and providing habitat for commercial and other fish species.

The assessment valued Curaçao's coral reefs at more than $445 million per year through their support to the tourism and fishing industry alone. The Assessment described here was to inform the devel-opment of a Sustainable Ocean Policy to improve the health of marine ecosystems around Curaçao so they can sustainably support coastal economies and liveli-hoods. To develop such policy, a marine survey was conducted in November 2015 to assess the abundance and composition of reef and fish communities and water quality at 148 sites around the island. In addition, existing information was used to evaluate changes through time in the state of Curaçao's reefs and their value to the people of Curaçao. This Assessment complements a series of documents produced by the Waitt Institute and its partners (an analysis of Curaçao's legal system, a marine science review, and an economic valuation of the island's marine resources) that collectively can help inform the design and implementation of a Sustainable Ocean Policy.

The assessment can be downloaded through this link.: https://goo.gl/WSrjyn

Coral on healthy reefs produce more offspring

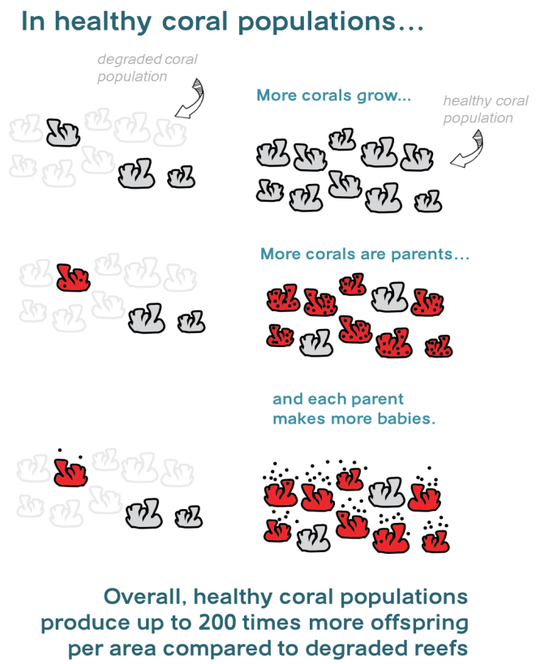


Figure 4 Infographic showing why corals on healthy reefs produce much more offspring than similar looking con-specifics on degraded reefs

In coral reef conservation and management, the prevailing metric of reef health is percent coral cover, a measurement commonly used with the assumption that each unit of live coral tissue has equivalent ecological value. In this study led by researchers from Carmabi and Scripps Institution of Oceanography it is shown that the reproductive output of a coral population is not proportional to the cover of coral present. Instead, when compared to declining popula-tions nearby (near Willemstad), high cover coral populations (near Oostpunt) produced up to four times more larvae per square centimeter of tissue, resulting in up to 200 times higher larval production per square meter of reef. In the wake of unprecedented global coral bleaching, our findings suggest that the largest reductions in coral reproduction may occur when corals are lost from previously healthy popula-tions (Figure 4).

Unraveling the complexity of molecules on coral reefs

Coral reefs harbor an incredible diversity of life, both sea creatures we can see and microbial life that we cannot. These organisms generate an enormous number of molecules as they eat food, photosyn-thesize, reproduce and ward off infections. Yet many thousands more coral reef molecules with medicinal

potential are unknown to science. A recent study yielded a promising new method for screening the molecular output of reef life for important chemical properties, which could make it much easier to identify the next generation of coral reef-derived drugs and better understand the diversity of molecules found in the ocean. "We know what so few of these molecules are and what they do," said the study's lead author, Aaron Hartmann. "That's a pretty big roadblock to developing therapeutic drugs derived from them." Hartmann led the study alongside SDSU biologist Forest Rohwer and colleagues from the University of California, San Diego; the National Oceanic and Atmospheric Administration; the European Molecular Biology Laboratory in Heidelberg, Germany; Imperial College London; the CARMABI Foundation Curaçao; the University of Amsterdam, and Bangor University in Wales. They isolated each organism's molecules and sent them through an instrument called a mass spectrometer that measured each molecule's mass. Next, they broke the molecules apart with a laser and analyzed the masses of those pieces.

This analysis helps answer a long-standing mystery in marine biology: Why do coral reefs have such vast molecular diversity? It was found that even closely related organisms tweak their molecules just slightly to better defend themselves. "Molecular relatedness can tell you about the potential chemical reactions exhibited by these unknown molecules," Hartmann said. "That, in turn, can tell you something about their potential therapeutic value." So instead of screening each individual molecule one-by-one to see if it has medicinal properties, this technique would allow drug discovery scientists to easily hunt for chemical properties exhibited by known drugs. Using this method, we're not held back by the fact that our molecular database is pretty sparse," Hartmann said. "If you know what chemical reactions are important, you can then go looking for molecules with those properties."
Source: San Diego State University (2017)

Successful Symposium in Amsterdam organized by UvA and Carmabi

A scientific symposium for Dutch coral reef researchers took place on December 1st (2017) at the Amsterdam Sciencepark Congress Centre. Approximately 150 researchers and students attended this event and the informal gathering afterwards. Scientists, policy makers and other interested parties

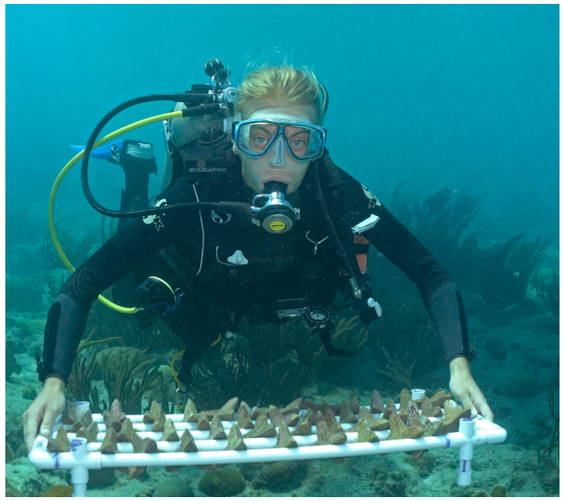


Figure 5 IA diver swims out with the new tiles that can be sown on degraded reefs. Credit B Mueller

conducting basic and applied research in fields related to tropical marine biology presented results of recently conducted studies and developments covering all aspects of marine science and management. These experimental and observational studies of demography, behavior, and physiology provide the raw material for scientists, managers, and the public to advance their understanding of coral reef ecosystems as effective management and conservation depends upon such fundamental appreciation of the basic ecological workings of reef organisms.

A new method to increase the number of corals on degraded reefs

Today, reef degradation occurs at a scale of hundreds and thousands of square kilometers. In contrast, current restoration activities are usually less than one hectare in scale. These efforts are limited by the fact that only labor-intensive, and therefore costly, techniques are currently available. "If we want restoration to play a more meaningful role in coral reef conservation, we need to think in new directions. The newly developed sowing approach is an important step towards reaching this goal since it will allow the handling of large numbers of corals in a very short amount of time at significantly lower costs. In this new approach, coral larvae are settled on specifically designed substrates that are self-stabilized and attach to the reef through natural processes. After a few weeks to months these so-called "Seeding Units" (i.e., substrates together with initial coral polyps) are sown on the reef by simply wedging them in crevices rather than requiring manual attachment. Until today, transplanting for instance 10,000 individual corals on one hectare using common methods requires several hundred to a few thousand person-hours. "Sowing the same number of corals could be achieved in less than 50 person-hours, a time saving of over 90 percent. The method is a new tool in the tool box to restore degraded reef habitats. However, without additional measures to improve fish communities and water quality the sowing method itself is unlikely to be successful as more than factor needs to be altered before complex reef communities can regrow.
Source: https://phys.org/news/

Surveying the remote reefs of Palau

The goal of this research expedition was to conduct high-resolution ecological surveys of the nearshore coral reef habitats of the southern islands of Palau (Figure 6) as part of the 100-island challenge of which Curaçao is also a part. The research team was comprised of scientists from across the globe and various agencies, including Moss Landing Marine Lab (USA), CARMABI (Curaçao), Coral Reef Research Foundation (Palau), The Nature Conservancy (USA), and OneReef (USA). To accomplish the scientific goals of this research expedition, the team employed a collection of standardized approaches to quantify the structure and workings of the fish and benthic

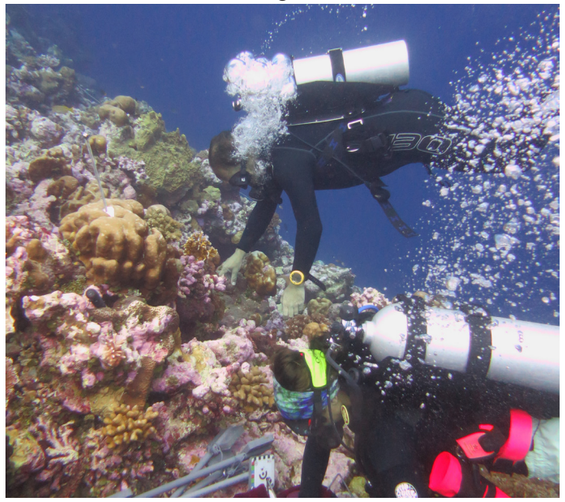


Figure 6 Researchers take watersamples and measurements on the threedimensional complexity of reefs around Palau

communities found at each island. In order to contextualize the coral reef habitats, temperature loggers were deployed across the surveyed islands to monitor temperature regime. Generally, survey sites were identified randomly and each site was separated by 1-2 km of linear distance along the reef. In some cases (14 sites), sites that have been established in previous expeditions in 2014 and 2016 were re-surveyed to document and quantify change in the benthic and fish communities.
Source: http://100islandchallenge.org/

New Techniques for Coral Restoration in the Caribbean

In May 2017, SECORE hosted a workshop in collaboration with Carmabi as part of the Global Coral Restoration Project initiated by SECORE, California Academy of Sciences and The Nature Conservancy, and supported by CARMABI Foundation, Curaçao Sea Aquarium, Columbus Zoo and Aquarium, Shedd Aquarium as well as State of Hawaii Division of Aquatic Resources. The opening day of the workshop started with a seminar, accepting the challenge to give a more global picture of coral restoration, addressing current obstacles and potential solutions. These seminars could be watched online by everyone around the world. The workshop further fostered the exchange between participants and organizers, working in the fields of coral science, restoration, aquaculture and marine resource management through hands-on work, such as rearing coral larvae, practicing the art of micro-fragmentation and outplanting techniques, as well as theoretical sessions on how to select outplanting sites and monitor restoration efforts.

5. ADVISORY AND CONSULTANCY SERVICES

This department conducts terrestrial research and provides advisory services to private and governmental organizations on topics regarding terrestrial biology. Below follows an overview of the activities carried out by or in which Carmabi biologist John de Freitas was involved. Besides the following, information, advisory and species determination services were provided (free of charge) on many occasions during the year, mainly to private persons.

Photo 1 Photo 1. Dr. Patrick Griffith standing near a Sabal antillensis in its habitat on Curaçao. (Photo: Carmabi archive)

Research shows that the indigenous Sabal palm species is endemic to Curaçao and Bonaire

In January Dr. Patrick Griffith visited Curaçao and Bonaire to study the Sabal palm species present on both islands, with Curaçao having the largest population of this palm species. Dr. Griffith is executive director of Montgomery Botanical Center (MBC) in Florida (U.S.A.). The MBC keeps living specimens from wild plant populations worldwide, but emphasizes palms and cycads in population-based collections.
On Curaçao the Sabal palm is only found on the higher Knip hills, which partially lie in the Christoffelpark. In a treatment of Venezuelan palms, the author Wessels Boer reported the Curaçao Sabal palm as *S. mauritiiformis*. Van Proosdij's recent pocket flora (2012) tentatively classified it as *Sabal cf. causiarum. S. causiarum* is found in the Lesser Antilles and Hispaniola.
During fieldwork, material was collected of specimens of the palm and these were analyzed (including leaf segment lamina transections) at the lab of the MBC. Based on a comparison of relevant characteristics of our indigenous Sabal palm species with other Sabal palm species including those of the two Sabal palm species mentioned above, it was concluded that the Curaçao and Bonaire Sabal palm is endemic to the islands and has been named Sabal antillensis. The findings were published in an article that appeared in April in Phytotaxa vol. 303: '*Sabal antillensis* (Arecaceae): a new palmetto species from the Leeward Antilles' (authors: M. Patrick Griffith, John de Freitas, Michelle Barros & Larry R. Noblick). A photo of the palms on Curaçao was also used on the cover of the 303 volume of Phytotaxa.

Photo 2 One of the tables during the CTB workshop at Avila Beach Hotel. Standing on the left is moderator Kurt Schoop and next to him is Faisol Ayoubi of CTB. (Photo: CTB archive)

The future management of the coastal area of Marie Pampoen

The Curaçao Tourist Board (CTB) organized a workshop on February 8th, to discuss the possibilities to develop and manage the coastal area of Marie Pampoen according to sustainable principles. Besides key stakeholders, CARMABI biologist John de Freitas participated in this workshop in which discussions were held based on three themes: organizational structure, management and roles of parties involved and possibilities to gain financial sustainability. The management structure of the Shete Boka Park (managed by Carmabi) was considered as a good model to use for the management of the Marie Pampoen area. The outcomes of the discussions were summarized in a document that was sent by the CTB to all stakeholders.
Interest from abroad in the insect fauna of Curaçao
Dr. Chris Ratzlaff, Curatorial Assistant in the Spencer Entomological Collection at the Beaty Biodiversity Museum at the University of British Columbia (Canada) visited Carmabi during April 21th - 28th. Carmabi biologist John de Freitas selected potentially interesting habitats for the research of Dr. Ratzlaff and accompanied him on his field trips to collect insects on the island. Based on initial work with material collected, Dr. Ratzlaff determined that the specimens correspond to species in 89 insect families and 50 orders.

Germination studies of seeds of indigenous tree species

From May 1st till July 7th, Aeres Applied University student Hidde Derks (study Applied Biology) performed germination experiments with *Bourreria succulenta, Schoepfia schreberi* and *Pilocarpus goudotianus*. The latter two are rare tree species. Trials were also made with cuttings of several plant species that were treated with two plant hormones. 123 survey respondents were interviewed, and this resulted in 261 completed survey forms. The survey was undertaken to document which plants are frequently used and for what ailments they are used. The data collected will be helpful in analyzing the use of the medicinal plants as part of our cultural heritage. The results will also be discussed in the light of what is known about the (possible) toxicity of the plants used. The respondents reported the use of 71 different plant species for medicinal purposes. The plants were mostly collected in their garden or the neighborhood of the respondents. The most commonly used medicinal plants are: *Lippia alba* (oregano), *Ocimum americanum* (yerba hole), *Cymbopogon citratus* (lamungras), *Cordia curassavica* (basora pretu), *Moringa oleifera* (benbom) and *Annona muricata* (sorsaka). The most commonly used plant parts are the leaves or combination of the plant leaves and other plant parts. The remedies are mostly prepared by steeping the plant parts in hot water or boiling them and are most often consumed orally. The most commonly treated medical conditions include stomach and intestinal problems, infection and fever, general health and well-being, problems with high blood pressure, respiratory problems and diabetes.

Photo 3 Keynote speech on the inauguration day of the conference. (Photo: John de Freitas)

Participation in the 21st International conference of Birds Caribbean

John de Freitas participated in the bi-annual Birds Caribbean conference, held in Cuba. Carmabi's participation was sponsored by the Prins Bernhard Cultuurfonds Caribisch Gebied. The title for this conference was 'Celebrating the diversity of the Caribbean' and was surely reflected in the diversity of topics of the 135 presentations, varying from scientific to practical. A total of 232 participants from 25 mostly Caribbean countries joined the conference. Each conference day started with a lecture by a keynote speaker. The following is a small selection of the topics that were treated during the conference:

- Promoting bird tourism in the Caribbean for sustainable development and conservation: updates on the Caribbean birding trail and marketing tools to enhance your efforts.
- Advances in avian ecology and applied research.
- Round-table discussion: Journal of Caribbean Ornithology, past, present and future: an open call for suggestions to improve the journal.
- Ecology of migrants and the importance of stopover sites in the Caribbean.
- Habitat restoration and best management practices for the conservation of Caribbean birds and biodiversity.

Premiere of a unique documentary on the aquatic birds of Curaçao

A significant amount of time was devoted this year to the realization of this documentary. The funds were donated by the Prins Bernhard Cultuurfonds Caribisch Gebied and ACU Credit Union. Carmabi contracted Caribbean Filmcom to make this documentary in extensive collaboration with Carmabi. The documentary idea came from John de

Freitas during the workshop on aquatic birds, hosted by Carmabi in January of 2015, and sponsored by DCNA and BirdsCaribbean. The documentary lasts 39 minutes and shots were taken at five wetland areas popular with aquatic birds on Curaçao: Klein Hofje, Jan Thiel, Klein Kwartier (LVV), dam of Muizenberg and Jan kok. A short film is also available for each of the five wetland areas where was filmed in order to increase use of the film material by e.g. schools and the tourism sector. On November 17th the documentary premiered in the auditorium of Carmabi. It is the first time such a documentary on aquatic birds has been made in the Caribbean.

Photo 4 Screenshot of one of the images (flamingos) in the documentary. (Photo: Caribbean Filmcom archive)

Lecture by Dr. Steven Groot (Wageningen University) on quality of seeds for sowing

On November 29th, Dr. Steven Groot held a lecture for the public in the auditorium of Carmabi. The title of the lecture was 'Quality of sowing seeds'. Dr. Steven Groot has been conducting research for over 25 years on seeds and is at present Senior Researcher at Wageningen Plant Science, which is a part of the Wageningen University and Research Centre. A main part of his lecture was devoted to the causes of deterioration of seed quality and how to prevent that negative process. Seeds are living material and the preservation of their quality is important in crop production, reforestation projects and gene banks for future generations.

Curaçao visited by entomologist from Cornell University

Dr. Jason Dombroskie and his wife stayed at Carmabi from December 15th – 20th. John de Freitas accompanied them on most of their fieldtrips to identify interesting habitats for Dr. Dombroskie's research. Dr. Dombroskie main research interest is the systematics of microlepidoptera, especially the tortricid moths (Tortricidae; leafroller moths). Many of these insects are economically important pests in agriculture and forestry. Dr. Jason Dombroskie is the manager of the Cornell University Insect Collection and the coordinator of the Cornell University Insect Diagnostic Lab. Publications and reports John de Freitas co-authored or contributed to:

- Aliabadian, M., N. Alaei-Kakhki, O. Mirshamsi, V. Nijman & A. Roulin. 2016. Phylogenby, biogeography, and diversification of barn owls (Aves: Strigiformes). Biol. J. Linnean Soc. 119(4): 904-918.
- Debrot, A.O., Freitas, J. de, en R.J.H.G. Henkens. 2017. Plantensoorten (Bonaire) Pp. 99-104. In: A.O. Debrot, R.J.G.H. Henkens, P.J.F.M. Verweij (eds.): Staat van de natuur van Caribisch Nederland 2017. Wageningen Marine Research (University & Research Centre) Report C086/17: 214 pp.
- Debrot, A.O., J. Langley, M. Vermeij, D. Slijkerman, R. Jongbloed, I. van Beek, J. de Freitas, L. Pors, R. Jak, C. Rockman & J. Cremer. 2017. Description of the outstanding universal value (OUV) of the proposed marine nomination properties of the Bonaire and Curaçao marine parks (BCMP).184 pp.
- Freitas, J.A. de & B. Vermonden. 2017. An ethnobotanical survey of medicinal plants in Curaçao based on the Tramil methodology. Carmabi Report. 63 pp.
- Henkens, R.J.H.G., Debrot, A.O. en J.A. de Freitas. 2017. Tropisch nevel- en regenwoud. Pp. 24-31. In: A.O. Debrot, R.J.G.H. Henkens, P.J.F.M. Verweij (eds.): Staat van de natuur van Caribisch Nederland 2017. Wageningen Marine Research (University & Research Centre) Report C086/17: 214 pp.
- Henkens, R.J.H.G., Debrot, A.O. & J.A. de Freitas. 2017. Droge tropische bossen Pp. 32-38. In: A.O. Debrot, R.J.G.H. Henkens, P.J.F.M. Verweij (eds.): Staat van de natuur van Caribisch Nederland 2017. Wageningen Marine Research (University & Research Centre) Report C086/17: 214 pp.
- Nijman, V. & M. Aliabadian. 2013. DNA Barcoding as a tool for elucidating species delineation in wide-ranging species as illustrated by owls (Tytonidae and Strigidae). Zool. Sci. 30: 1005-1009.
- Tijdens, M.E. 2016. Phenological patterns of indigenous tree species in three different geological settings on Curaçao. Carmabi & Wageningen UR Report. 76 pp.

Photo 5 One of the micromoths (Ethmia cypraeella) found in the Christoffelpark. It was previously only known from northern Venezuela. It is approx. 1 cm long and nothing is known of its life history. (Photo: Jason Dombroskie)

6. OTHER ACTIVITIES

Meetings Dutch Caribbean Nature Alliance (DCNA) on Statia and Curaçao

CARMABI is a member of the Dutch Caribbean Nature Alliance (DCNA). The directors of the park organizations on the 6 Dutch Caribbean islands are board members of the DCNA. The office of the DCNA is on Bonaire. The objective of the DCNA is to safeguard the biodiversity and promote the sustainable management of the natural resources of the islands of the Dutch Caribbean, both on land and in the water, for the benefit of present and future generations, by supporting and assisting the protected area management organizations and nature conservation activities in the Dutch Caribbean.

The DCNA also manages a trust fund. This trust fund is funded by donors such as the Dutch Postcode Lottery and the Ministry of the Interior and Kingdom Relations. The purpose of the trust fund is to provide core funding to cover the operational costs of the designated marine protected area (marine nature park) and the designated terrestrial protected area (land nature park) on each of the islands of the Dutch Caribbean.

The DCNA holds two board meetings every calendar year. In 2017 the meetings were held 21th – 23th March on Statia and 11th – 12th December on Curaçao. Both meetings were attended by Carmabi Director Paul Stokkermans who is also the treasurer of the DCNA board. The Statia board meeting was also attended by the treasurer of the Carmabi board, Mr. Pieter van den Berg. The Curaçao board meeting was also attended by vice-president of the Carmabi board, Mr. Kenneth Heidweiller, and the secretary of the Carmabi board, Mr. Richard Cardose.

The Statia board meeting focused on the future of the DCNA. During the Statia board meeting the progress of the Save Our Sharks (SOS) project was also discussed. The Save Our Sharks project is an important three-year project which is funded by the Postcode Lottery in the Netherlands. The budget component which will be spent on the six Dutch Caribbean islands amounts to nearly 1 million Euros. The project focuses on research, the involvement of the local communities and fishermen.
The Curaçao board meeting was actually a special board meeting where the discussion about the future of the DCNA was continued. Also discussed was the emergency assistance offered by the DCNA to the park organizations on the Windward Islands after the hurricanes Irma and Maria. Assistance was provided to the Saba Conservation Foundation, STENAPA on Statia and the St. Maarten Nature Foundation.

Signing Collaborative Protocol CMRC – Carmabi to advance marine science on Curaçao

On the 2nd of March 2017 a Cooperation Agreement was signed by Carmabi, the Curaçao Marine Research Center (CMRC) and the government of Curaçao. A total amount of ANG 8,730,266 is available for Carmabi and the CMRC together for improving its infrastructure in order to put Curaçao on the world map as an island specialized in the marine biological sciences. Of this amount NAF 3,823,000 is available for Carmabi.

Part of this Cooperation Agreement was a Protocol for Cooperation between Carmabi and CMRC. This protocol was signed on the 5th of June 2017 at the CMRC by Adriaan "Dutch" Schrier, director of the CMRC and Paul Stokkermans, director of Carmabi.

Miss Teen International H2O Ambassador 2017

The Miss Teen International H2O Ambassador 2017 was held November 2017 in the Renaissance Hotel. The participants came from Latin America, the Caribbean and Europe. This was no ordinary miss contest as all the participants had to be involved in a water conservation project in their home country.

They also had to present this project during the contest. Carmabi director Paul Stokkermans was asked to judge the projects. The points that were given for the project were part of the total judgment of the pageant and thus contributed to the decision who was going to win.

The participants also had to bring a souvenir from their home country. These souvenirs were auctioned on the 8th of November and the income of the auction was donated to Carmabi. Furthermore the misses visited Carmabi, where director Paul Stokkermans gave an explanation about the organization Carmabi and the importance of nature conservation. The misses made a tour with Ryan de Jongh in the mangroves of the Piscadera Bay, where he explained them about the restauration work he is doing on for the Mangroves. They enjoyed the tour very much.

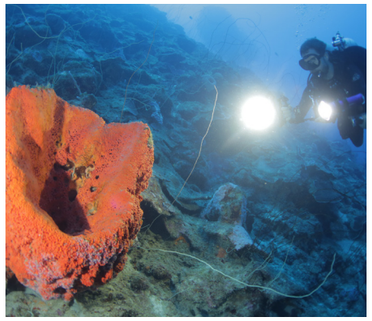
Stranded seaturtle returned to ocean

On the 9th of June 2017 just before seven in the morning director Stokkermans received a phone call from a pedestrian on the Koredor at Otrobanda. The pedestrian reported a sea turtle just next to the Koredor who seemed to be lost. The sea turtle also had laid eggs on top of the sand. In this case however the sand at the Koredor had hardened because of human activities and the sea turtle could not dig a hole and deposited instead the eggs on top of the sand.
Director Stokkermans and some volunteers went quickly to the Koredor and assisted the sea turtle back to the sea. Doing so they had to lift the sea turtle over a small wall. The eggs were taken by volunteers and transported to an artificial nest.

Delegates visit plantations

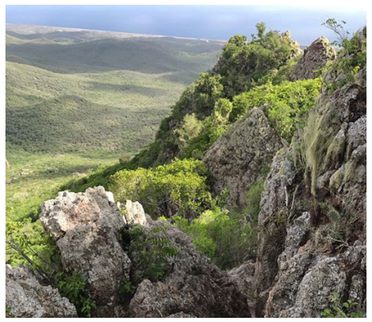
In November of 2017 a group of delegates visiting Curaçao with regards to the World Heritages, visited the Savonet Museum, the plantation and Shete Boka National Park as part of a tour to various plantations on the Western side of the island. Minister Zita Jesus-Leito was also part of the group of delegates and joined director Paul Stokkermans to view the waves in the Boka Table cave.










7. FINANCIAL OVERVIEW

Carmabi Foundation

DRAFT BALANCE SHEET AS OF DECEMBER 31, 2017
(after proposal of result appropration)

	2017 ANG	2016 ANG
Assets		
Non-current assets		
Property, plant and equipment (1)	942,561	955,543
Other fixed assets (2)	333,086	347,392
	1,275,647	1,302,935
Current Assets		
Receivables (3)	256,156	253,147
Stock (4)	18,063	18,462
Cash and cash equivalents	805,790	504,976
	1,080,009	776,585
Total assets	2,355,656	2,079,520

STATEMENT OF OPERATIONS FOR THE YEAR 2017

	2017 ANG	Budget 2017 ANG	2016 ANG
Income			
Grants (12)	502,196	449,100	607,686
Earmarked grants (13)	141,658	108,468	81,552
Admission fees (14)	1,272,031	1,431,141	1,230,564
Rental income (15)	229,737	211,522	231,131
Other income (16)	621,833	697,022	467,251
	2,767,455	2,897,253	2,618,184
Expenses			
Personnel expenses (17)	1,390,404	1,544,159	1,384,502
Depreciation expenses (18)	120,077	121,860	110,329
Other operating expenses (19)	1,260,730	1,158,211	948,024
	2,771,211	2,824,230	2,442,855
Result for the year	(3,756)	73,023	175,329
Interest income	8,510	4,237	8,394
Result for the year	4,754	77,260	183,723
Appropriation for the year			
Retained earnings	4,754		183,723
	4,754		183,723
Equity and liabilities			
Equity (5)			
Capital	106		106
Retained earnings	1,235,235		1,230,481
	1,235,341		1,230,587
Non-current liabilities			
Non interest bearing loans and borrowings (6)	154,000		154,000
Deferred income investment grants (7)	225,301		243,877
	379,301		397,877
Current Liabilities			
Deferred income project grants (8)	578,141		240,809
Pension contribution payable (9)	-3,008		12,450
Taxes and social security payable (10)	37,336		50,875
Other liabilities (11)	128,545		146,922
	741,014		451,056
Total equity and liabilities	2,355,656		2,079,520

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Savonet
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