CARMABI Foundation Annual Report 2015

CARMABI Annual Report 2015
CARMABI 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:
Mr. P. Stokkermans
Mrs. S. Berendse
Mr. J. de Freitas
Mrs. E. Isenia
Mr. M. Vermeij
Ms. A. Richardson
Ms. E. Cijntje
Lucidity Communications

Photos by:
Mr. P. Stokkermans
Mr. M. Vermeij
Mr. J. de Freitas
Mrs. S. Berendse
Ms. A. Richardson
Lucidity Communications

Cover photo by: Gail Johnson

CARMABI

Caribbean Research and Management of Biodiversity Foundation

Annual Report 2015


CARMADI

TABLE OF CONTENTS

FROM THE DIRECTOR

In 2015 CARMABI celebrated its 60th year anniversary. The Caraibisch Marien-Biologisch Instituut (CARMABI) was established in 1955 as a marine biological research institution. In 1962 the Stichting Nationale Parken Nederlandse Antillen (STINAPA) was established with the purpose, amongst others, to manage nature areas. In 1996 CARMABI and STINAPA became one organization which was named the Caribbean Research and Management of Biodiversity (CARMABI) Foundation.

The anniversary celebrations began on the 21th of May with a big reception that coincided with a meeting of the Association of Marine Laboratories of the Caribbean (AMLC). On June 26th, the new Marine Education Center (MEC) at Piscadera was opened by the Governor of Curaçao. Christoffel National Park and Shete Boka National Park both hosted open days on August 9th, which were organized in conjunction with the neighborhood association of Savonet.

Friends, associates, partners and the Government have shown much support and have contributed a lot towards the success of the foundation throughout 2015, which is highly appreciated by the board and staff of CARMABI. In 2015 we also saw a substantial expansion of the number of volunteers. Throughout this year we already had a group of volunteers for the Terrestrial Education Program and the Junior Ranger Program. The new volunteers added to the group were for our new Marine Education Program, our nursery for indigenous trees, the bird monitoring program and our turtle monitoring program. Currently a total of 52 volunteers are involved in our programs. We greatly appreciate the contributions of these volunteers. Without them we simply would not be able to do our job.

CARMABI's Research Department has done very well. In 2015, a total of 137 scientists visited CARMABI, to conduct a wide variety of research projects. In addition, 87 students participated in various courses that were taught at CARMABI. Also, a total of 33 scientific publications were published based on work done at CARMABI. More scientific insight in the ecological processes shaping Curaçao's reefs is essential for improving existing and new strategies to ensure the long term survival of these unique assets of our island.

The Parks Department has worked hard to protect the nature and promote tourism. The total number of visitors at the Christoffel National Park and Shete Boka National Park showed a slight increase compared to 2014. The number of visitors at the Christoffel National Park in 2015 amounted to 39,453 visitors (9,972 local and 29,481 foreign), which was a 4.4% decrease with respect to 2014. The number of visitors in the Shete Boka National Park totaled 83,567 visitors (11,070 local and 72,506 foreign), which was a 6.7% increase. The Savonet museum was visited by 4,493 visitors, which was a small increase compared to 2014. Our Nature and Environment Education Department is

responsible for the Terrestrial and Marine Educational Programs for primary school children. The terrestrial program consists of tours regarding our terrestrial nature in the Christoffel National Park and the areas of Daai-booi and Shete Boka National Park. The Marine Educational Program includes a lecture about the coral reef ecosystem, interactive exercises and a visit to the Marine Education Center (MEC). In 2015, an estimate of 12,050 school children participated in both educational programs. This is an increase of approximately 2,000 school children compared to 2014, when the total number amounted to almost 10,000. Both programs were guided by a total of 12 volunteers. Apart from the educational programs, this department also organizes visits to schools pertaining a special theme and gives lectures and tours to high school students.

What is our outlook for 2016? In 2016 we plan to start the preparations for the renovation of the old CARMABI building. The renovation will be funded by the government of Curaçao. It was initially scheduled to start in 2015, but the funds were delayed. However, the plan is to start this year. The old CARMABI building was built in 1955, a new wing was added in 1965 but since then, it has never been renovated, resulting into deterioration of the building. This makes the renovation an urgent matter.

With respect to nature, two threatened animal species got a lot of attention last year, namely the sharks and the turtles. These two species will also be getting a lot of attention in the coming years. Regarding the turtles, a new monitoring program, managed by our Parks Department, is currently in full swing. Turtles travel the oceans but always go back to the beach were they were born to make a nest with eggs. This makes monitoring very interesting and also provides a lot of information for conservation measures and educational programs. In addition, the monitoring is of importance for our tourism.

With regards to the sharks, the Dutch Postcode Lottery has provided 1.6 million Euro to the Dutch Caribbean Nature Alliance (DCNA) for a new program on sharks. Since CARMABI is a member of the DCNA, CARMABI has benefitted from these funds to include sharks in our education and research programs. Sharks play a very important role in keeping the coral reef healthy and thus need to be protected to maintain a healthy reef.

Paul Stokkermans
Director CARMABI Foundation

1. OUR MISSION, VISION AND HISTORY

Mission

Contribute to the sustainable development and management of the natural resources of the Netherlands Antilles through research, nature management and environmental education.

Vision

Be a leading organization in the Caribbean on applied natural sciences by means of knowledge acquisition, knowledge dispersal and nature management applications, to support the sustainable development of nature.

History

CARMABI was founded as a marine biological research station in 1955. His Royal Highness, the late Prince Bernhard of the Netherlands, laid the first stone of the institute.

From the start, aside from research, applied nature conservation and education were also important areas of activity brought together in 1962 under the allied National Parks Foundation of the Netherlands Antilles (better known as STINAPA).

In 1996 CARMABI and STINAPA merged into one organization, the Caribbean Research and Management of Biodiversity Foundation, better known under the original acronym CARMABI.

Today CARMABI provides facilities and logistical support to upwards of 200 visiting researchers and graduate students per year, manages nine protected areas on Curacao (the largest of which is the 2300 hectare Christoffel National Park) and runs an educational program reaching about 12,000 school children per year.

2. MARINE RESEARCH

2.1 Visiting scientists

137 scientists visited CARMABI in 2015. In addition, 87 students participated in Coral Reef Ecology courses and workshops that were taught by CARMABI and various universities from the Netherlands, Colombia, and the United States. The number of visiting scientists and students in 2015 illustrates a continued positive trend of increasing visitors after the official opening of the new Science Center in 2013 (Figure 1a). Most scientists in 2015 were from the United States (45%) followed by the Netherlands (21%) (Figure 1b). Almost all of the scientists and students that worked at CARMABI stayed at the newly constructed laboratory/dormitory facilities. The average duration of researchers staying at CARMABI increased significantly in 2015, resulting in a total of 6536 (2014: 4256) personal working days (i.e. one visiting scientist working one day). This signals an upward trend over the last few years, i.e., (2013: 4,226), (2012: 4,329), (2011: 3,752) and (2010: 1,767). An overview of the areas in which all researchers that visited or worked at CARMABI is shown in Figure 1c and an overview of visiting scientists (PI name and home institute) is provided in the appendix.

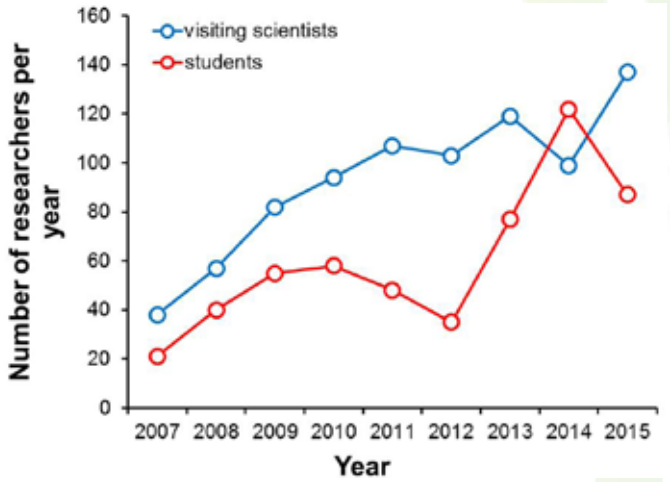


Figure 1a: Number of researchers visiting CARMABI through time.

In addition, two PhD students who studied at CARMABI defended their research successfully and received their PhD's from the University of Amsterdam (Joost den Haan) and the University of Utrecht (Ben Mueller). Also CARMABI researchers participated in four international meetings related to coral reef research and management.

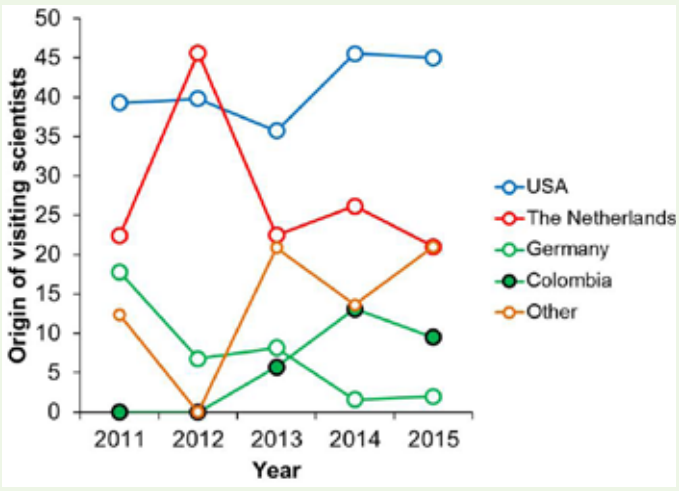


Figure 1b: Origin or researchers visiting CARMABI through time.

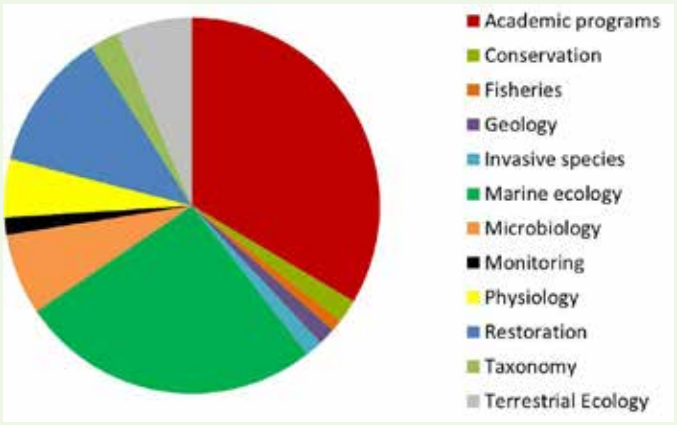


Figure 1c: Areas of expertise of visiting researchers in 2015.

2.2 Peer Reviewed Scientific publications

A total of 33 publications appeared in Peer Reviewed Scientific journals based on work that was conducted at CARMABI, making 2015 by far the most productive year ever in terms of CARMABI's scientific output (Figure 2 on page 11). The results of some of these studies have been featured in magazines, news programs and educational websites around the world. Furthermore, 19 reports were produced by M.Sc. students that did their master's thesis' projects at CARMABI. An overview of all Peer Reviewed Scientific publications accepted for publication or published in 2015 are shown in appendix 2.

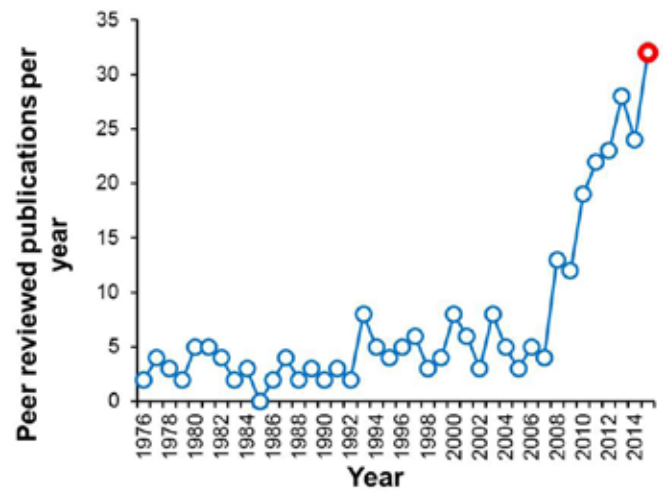


Figure 2: research output of researchers working at carmabi through time in terms of peer reviewed papers.

2.3 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 184 cases, both oral and written (2014: 157, 2013: 111, 2012: 72). In 2015 the CARMABI Science Department was featured/interviewed in 144 (2015: 167, 2013: 86, 2012: 57) and in 175 international (known) items for local TV, radio and newspapers.

2.4 Selected research projects

Throughout 2015, several research projects took place such as; the delay of the coral's reaction to devastating effects of an oil spill that took place in 2012, measurements of coral reefs around the island, scientific assessment of Curaçao's coastal waters showing healthy and thriving coral and fish populations, the rare glimpse on how coral can aid future conservation and also the impressive progress on turtle monitoring. More about these projects are presented in appendix A.

Photo by Gail Johnson.

3. PARKS AND MUSEUM

Beautiful landscape of Christoffel Park - (Photo by: Gail Johnson)

3.1 General

The Parks Department had a good year in 2015. While aiming for stable visitor rates in comparison to 2014, there was actually a growth in the number of visitors in the Shete Boka National Park and the Savonet Museum, while there was a small decrease of visitors in the Christoffel National Park.

3.2 Visitor Statistics

3.2.1 Christoffel National Park

In 2015, a total of 39,453 people visited the Christoffel National Park. That was a decrease of 4.4% in comparison to 2014 (figure 3). In the Christoffel National 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 also bird spotting tours.

3.2.2 Savonet Museum

In 2015, 4,493 people visited the Savonet Museum. This number is an increase of 40.6% (figure 4 on page 13). The increase is mainly due to the visits of Curaçao Actief. This tour operator includes a 5 to 10-minute visit to the Savonet Museum. Although this is not enough to see all that the museum has to offer, it stimulates the participants to come back. Also, a lot of effort was made to stimulate the combination ticket sales.

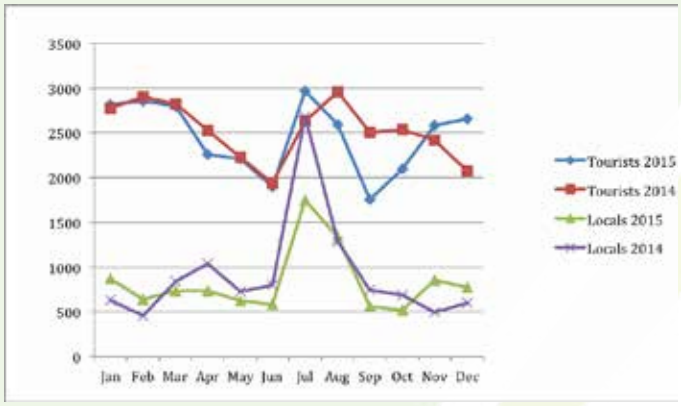


Figure 3: Visitor rates for the Christoffel National Park.

3.2.3 Shete National Boka

83,576 people visited the Shete Boka National Park in 2015. This is an increase of 6.7% from 2014 (figure 5).

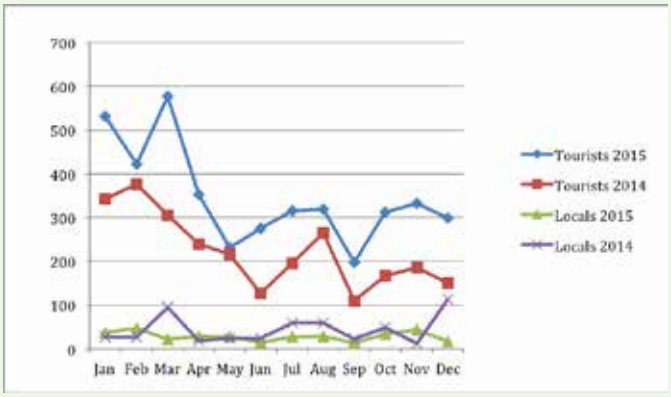


Figure 4: Visitor rates for the Savonet Museum.

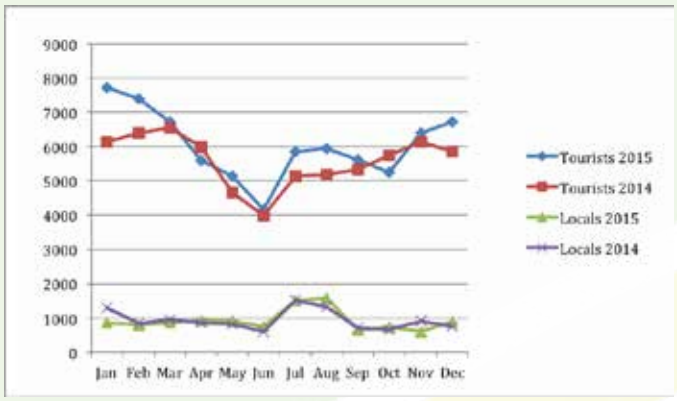


Figure 5: Visitor rates for the Shete Boka National Park.

3.3 Personnel

3.3.1 Junior Ranger Program

Vurgell Cijntje, Connie Mingelie and Haydelson Lourens particiated in the Junior Ranger Program in 2015. The idea of this program is to train the youth of Banda'bou, making it possible to work in all of the parks during the weekends. During this program they learn about different aspects of nature conservation and they are also guided by Senior Rangers. The Junior Rangers participate in specific workshops that will add value to their personal development. This project is beneficial for both CARMABI as well as the youngsters, who are rewarded financially.

3.3.2 Staff training

Ranger Braind Victorina went to Barbados for three weeks for intensive training in monitoring the nesting activity of sea turtles at the Barbados Sea Turtle project. Marjolijn Christianen, Jurjan van de Zee and Gielmon Echbrechts came to Curaçao and trained

Sabine Berendse and Pieter de Geus in the placement of a satellite transmitter. In addition, they also trained Sabine Berendse and most of the turtle volunteers in doing an in-water survey.

Junior Rangers in training.

Ranger Edwords Albertoe and two volunteers, Annelies Stoll and Ard Vreugdenhil, went to Bonaire to train with Sea Turtle Conservation Bonaire (STCB) on doing in-water surveys. Adrian del Nova came to Curaçao and gave the CARMABI rangers basic training on bird monitoring. He also gave a course about data-analysis in which Sabine Berendse partook.

Ranger giving introduction to the tourists.

3.3.3 Staff changes

The contracts of Jurwin Rifaela and Gregory Kasteneer were not renewed. In their place Humphrey Janzen and Sue-Endrick Sluis were hired.

3.4 Preview for 2016

In 2016, there will be an exposition dedicated to sea turtles organized in collaboration with Sea Turtle Conservation Curaçao (STCC) in the conference room of Savonet Museum. By organizing a nature exposition and combining it with the museum, we project an increase in the percentage of visitation for 2016.

4. NATURE AND ENVIRONMENTAL EDUCATION (NME)

Photo by: Lucidity Communications.

4.1 Educational Programs

The CARMABI Nature and Environment Program consists of two programs, the Terrestrial Education Program (TEP) and the Marine Education Program (MEP). The TEP includes guided tours within the parks of CARMABI and the MEP consists of presentations, interactive exercises and a visit to the Marine Education Center (MEC). A total of 56 schools participated in the educational programs of the Nature and Environment Education Department (NME). The parks that were visited were the Christoffel National Park, Daaibooi, Shete National Boka National Park. As from September 2015, the Marine Education Center at Piscadera was also added to the list. Due to lack of equipment, only one school was visited for classroom-teaching by one of our volunteers. Apart from this, the schools informed us that they prefer to visit the parks instead of classroom teaching. It is a nice outing for the school children. In 2015, a total of 12,041 school children participated in the CARMABI educational program. This is a 25% increase compared to the year 2014, when 9,590 school children visited the park. Reasons for the increase is because of the introduction of the new Marine Education Program at Piscadera and the addition of two educational activities in the Christoffel National Park for the younger age group (group 1, 2 and3). Another reason is that more schools started to include a visit to the parks in their compulsory school curriculum.

4.1.1 Terrestrial Education Program

9,960 school children varying from 4 to 12 years old visited the Christoffel National Park throughout the year. The activities in the park are focused on different themes such as our local birds, trees, plants, reptiles, agriculture, man-made wells and also the ruins. Shete Boka National Park was visited by 1,155 school children from group 8 (between 11 and 14 years old), which was a small increase compared to last year when 1,050 visited this area. The decrease

in the number of school children for group 8 compared to 2014 is due to the increased interest of the schools in Shete Boka National Park and the new MEC at Piscadera, which also focuses on this age group.The younger school children (2,811) from group 1 and 2 visited the parks as an introduction to the nature world around them during the so-called “Mondi Misterioso” activity. The aim of this activity is to teach them to care more for nature in a playful way by recognizing different flora and fauna. A total of 1,557 children of group 4 went to the Christoffel National Park for lessons on birds. The bird lessons involve obtaining knowledge about our local birds in theory and by observing birds within the park. A total of 1,468 children from group 5 visited the Christoffel National Park to learn more about our trees and plants. They also got the opportunity to practice recognition of the trees and plants in the park. Lessons on wells, agriculture and ruins in the area of Savonet and Zorgvlied in the Christoffel National Park, were visited by 3,363 school children of groups 6 and 7. All the lessons for the groups 4 up to 8 include a small test. The grade of the test is sometimes part of their school report card for the lessons of “Kennis der Natuur (KDN)”.

Educational session about the nature at Savonet Museum.

Through the school visits, 36 children were reached for lessons on the Micro-World. The Micro-World program entails the use of a microscope. Due to the fact that the microscopes were in repair, a great part of the year our volunteers were not able to visit many schools. This was compensated by inviting the school children of group 3 to the park to teach them more about reptiles. A total of 761 school children visited the Christoffel National Park and received information on the different species of reptiles of Curaçao.

4.1.2 Marine Education Program

The existing education program is almost completely focused on terrestrial nature. With the opening of the Marine Education Center(MEC) in September 2015, the marine nature was introduced in the education program of NME. The marine education component balances the education focus, because attention is now devoted to both terrestrial nature and marine nature. The program for the Marine Education Program (MEP) consists of the following: 1) The school children follow some introductory lessons in school by their teacher. 2) The teacher receives a book beforehand and a teacher’s guide on the Coral Reef Ecosystem from CARMABI. 3) This is followed by a visit at CARMABI Piscadera, where the children will attend a PowerPoint presentation in the Auditorium on the coral reef ecosystem. The focus is on the importance of the coral reef for the ordinary citizen. 4) After this presentation the children take a test and the group is divided in two.

Photo by: Lucidity Communications.

The first group attends a PowerPoint presentation about Sharks, while the other group visits the 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 consists of three sections. The first section is the reception area, where a photo exhibition can be seen. The second section is about the marine in general. This part shows interesting things that can be seen under water. Also, a coral skeleton collection is on

provided. In the third part, different research groups exhibit their research; 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 school children sit and watch a video about the importance of the coral reef and coral spawning. They can ask questions and walk around on their own. After the shark presentation, the school children take another test and then swap with the group that visited MEC. This is organized this way due to the fact that a maximum of 15 people is allowed in the MEC because of its capacity and safety reasons.

4.2 Save Our Shark (SOS) Project

SAVE OUR SHARKS

Sharks have roamed our oceans since before the time of dinosaurs. Worldwide over 100 million sharks are killed every year as a result of fishing and shark finning activities. Sharks are being driven to the brink of extinction by our ignorance and greed. Most of the sharks in the Netherlands are not found in the North Sea, but in the waters of the Dutch Caribbean. Over thirty species of sharks and rays, from tiger to bull sharks and from the hammerhead to nurse sharks, frequent the coral reefs and coastal waters of Bonaire, Curaçao, Saba and the Saba Bank, St. Eustatius and St. Maarten.

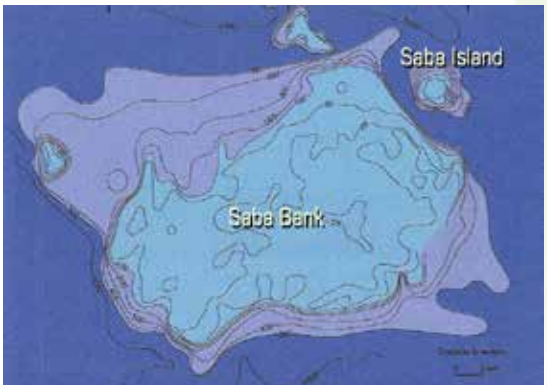


Photo on: http://oliverbenson.com/.

The Dutch Caribbean Nature Alliance (DCNA) has received funding from the Dutch Postcode Lottery (Nationale Postcode Loterij) to run a three-year project entitled “Save Our Sharks”. The objective of this project is to work with local fishermen, scientists and local communities to put an end to the slaughter of sharks in the Dutch Caribbean and to encourage islanders to benefit from their presence as a valuable tourism asset.

The following concrete results are expected from the execution of the project:

- Substantial popular support for shark conservation.
- Complete ban on commercial and targeting fishing for sharks.
- Establishment of sanctuaries as safe havens for sharks.

The organizations involved in this project are:

- Board of the Dutch Caribbean Nature Alliance (DCNA)
- Saba Conservation Foundation
- St. Maarten Nature Foundation
- STENAPA
- STINAPA, Bonaire
- Arikok National Park Foundation
- CARMABI Foundation

Overview of activities executed by CARMABI within the framework of this project so far are:

- Shark exhibition in the CARMABI Marine Education Center.
- Information and presentation to regular schools on shark conservation.
- Information and presentation to children participating in an afternoon school program on shark conservation.
- Information on shark conservation to all Marine Education Center visitors.
- Distribution of book “Shark Stanley”; a book funded by The PEW Charitable Trust.
- Organizing activities during Shark Week July 5th - July 12th, 2015

After an educational session at the Marine Education Center, it is time to to make a test.

Students walking towrds the "mondi" at the Christoffel National Park.

5. ADVISORY AND CONSULTANCY SERVICES

5.1 General

Beside managing parks and conducting marine and terrestrial research, CARMABI also provides advisory and consultancy service provided by our experts, such as reforestation with indigenous plant species, conduct surveys, develop management plans and reviews and much more. In 2015, the advisory and consultancy department did various consultancies for the Government and private sector.

5.2 Activity Evaluation

The year 2015 was a hectic year full with activities. After three years of working with biologist and former colleague Mr. Clifford de Lannoy, MSC, he left CARMABI on February 1st to work at the Ministry of Public Health, Nature and the Environment as an inspector in Curaçao. Despite his departure, a lot still had to be done. That is why we advertised for his position at CARMABI both locally, through the Curaçao House in The Netherlands and our network of befriended biologists. Several rounds of selection were held, but for a number of reasons we were not able to reach an agreement with the selected candidates.

The lack of a second biologist hampered the output of the department, which led to Mr. John de Freitas (Head of Consultancy department) having to pull out of the bat research and water bird monitoring group in which we had participated actively. The bat research group existed already for about two years and both Mr. de Lannoy and Mr. de Freitas were very active in this project. The results of the bat research were published this year in the Journal of Mammology in which both Mr. de Lannoy and Mr. de Freitas were co-authors of this important paper. The water bird monitoring group consisting of mainly volunteers was formed as a result of the very successful water bird monitoring workshop hosted at CARMABI in January. For this workshop we also had participants from the other Dutch Caribbean islands. Contact was maintained with both the group of volunteers as well as the participants of the other Dutch Caribbean islands. We expect to assume a more active role when a second biologist forms part of the Consultancy department again.

This year the research on the germination of indigenous tree species was continued for which we received the help of two students from HAS Hogeschool in Den Bosch, the Netherlands. The research on use of medicinal plants by the local population was continued with interviews held at people's homes. These persons had agreed with a more in-depth interview by a professional interviewer during a previous telephone survey research held by students of the University of Curaçao (UoC). This aimed at getting preliminary data on the use of medicinal plants as a treatment against a medical ailment or in connection with some health issue. This is a co-operative research (project) with Dr. Mark Hawkins of the Socio-economic Faculty of the

UoC. The home interviews took place with interviewers recommended to us by the Curaçao Bureau of Statistics (CBS). Similar surveys have been done in many Caribbean countries under the TRAMIL umbrella (an organization that promotes and investigates safe usage of medicinal plants in the Caribbean).

Considerable effort was also given to provide relevant data for the EU BEST Initiative Ecosystem profiling on Caribbean islands. BEST stands for: Voluntary Scheme for Biodiversity and Ecosystem Services in Territories of European Overseas. The European BEST Initiative was launched in 2010 by the European Parliament to promote conservation and sustainable use of biodiversity and ecosystem services in EU Ors and OCTs.

In March CARMABI also participated with its tree nursery in the CuraDoet program and received valuable help and sponsorship for the tree nursery. We even had a couple from Brazil that formed part of the CuraDoet group. We were also very lucky that at the end of the CuraDoet activity a few of the members of that group volunteered to continue helping on a regular (weekly) basis and they are still doing that.
In 2015, just like in the previous three years, Mr. de Freitas participated in meetings aimed at advancing the idea to develop the mangrove area of Rif (Otrabanda) into a sustainable educational and recreational park. In that same year meetings were held with the Curaçao Ports Authority and the Ministry of Traffic, Transportation and Spatial Planning.

Consultancies were done for Imares (The Netherlands), Ministry of Traffic, Transportation and Spatial Planning (Curaçao) and two local companies.

Nursery at CARMABI Foundation at Piscadera.
Photo by: Lucidity Communications

6. OTHER ACTIVITIES

6.1 Annual Congress NBA – DCAA 2015

On the 5th and 6th of November 2015, the annual congress organized by the Dutch Caribbean Accountancy Association (DCAA) and the Dutch Corporation of Accountants (Nederlandse Beroepsorganisatie van Accountants (NBA)) took place at the Renaissance Hotel in Curaçao. The congress was attended by almost 200 participants and facilitates NBA members working on the Dutch Caribbean islands to earn compulsory Permanent Credit Points. The congress was organized by Mr. Peter Bongers on behalf of the DCAA and Mr. Willem Verhoog on behalf of the NBA. The chairperson was Professor Hans Gortemakers.

The theme of the congress was "Knowledge

Full room during the Annual Congress organized by DCAA and NBA

different aspects of knowledge management. For this congress, the Director of CARMABI, Mr. Paul Stokkermans, was asked to talk about Knowledge Management at CARMABI. During his presentation, Mr. Stokkermans, elaborated on CARMABI's dual role as both a research institution with its own research program and a field station that facilitates foreign students and scientists. He gave an overview of CARMABI's facilities such as laboratories and accommodation. He explained that CARMABI offers many advantages to visiting students and scientists because of the presence of a coral reef in relative good quality, direct access to the sea and fast issuing of research permits. He also stated that in the marine area the research spin-off includes a direct contribution to the economy by the visiting students and scientists (scientific tourism) of Fl.1 million, improved management of the coral reef (the coral reef generates Fl.1.6 million annually) and input for the marine education program. In the terrestrial area, the spin-off included rabies data generated by bat research benefitting public health, data on the research of indigenous trees benefitting reforestation and many inputs for the terrestrial education program.

6.2 Christened of the book "KOHÚ DI SABANETA" by Ergo (Echi) Cijntje

The Local author, Ergo (Echi) Cijntje, has written various novels in Papiamentu about life in the past on the Savonet Plantation. Nowadays, the CARMABI Savonet Museum and the offices of the CARMABI Department of Parks are located at the Savonet plantation complex. The Savonet area and the area known as the Christoffel National Park has a rich cultural history. In this area, three plantations could be found in the past. These include the Savonet plantation, now completely renovated, as well as the Zorgvliet and the Zevenbergen plantations. The last two plantations are in ruins at this point in time. CARMABI is working very hard to consolidate these ruins and develop a historic tour. For CARMABI, the cultural heritage is as important as the nature in the area. Therefore, we are very grateful for several books that have been written about life on the plantation in past times.

The first book written by Mr. Cijntje, titled "Gacha e Mucha di Sabaneta" tells the story of a

Mr. Ergo (Echi) Cijntje and Mrs. Candace Cijntje-Isree

young slave girl living on the Savonet Plantation. She was bought by a wealthy white

She was bought by a wealthy white man who lived in town and who had fallen in love with her. Because the family of the man had to remain ignorant about the relationship, she worked as a servant in his house. The book was christened at Savonet plantation in the year of 2011. The madrina (godmother) of the book was former Minister-President of the Netherland Antilles, Mrs. Maria Liberia-Peters,and the padrino (godfather) was former Minister of Education, Culture and Sport, Dr. Rene Rosalia. CARMABI's Director, Mr. Paul Stokkermans, gave the welcome speech at the start of the ceremony.

The second book, titled "Kohú di Sabaneta", is about a slave named Kohú who lived on the Savonet Plantation. A white young woman from town fell in love with him. The relationship caused all kinds of problems, resulting in an unexpected and dramatic ending of the book. The book was presented on the 28th of March at Savonet plantation. The madrina was Mrs. Jeanne Henriquez, expert on the cultural history of Curaçao, and the padrino was Minister of Health, Environment and Nature, Dr. Ben Whiteman. The yaya (nursemaid) of the book was Ms. Cicely van der Dijs, whose ancestors were previously owners of Savonet plantation. This time around Mr. Paul Stokkermans was granted the opportunity once again to give the welcome speech at the start of the ceremony.

Minister of Health, Environment and Nature, Mr. Ben Whiteman during his speech.

"Anita di Shibrei". The book tells the story of a young girl living on Savonet plantation in the first half of the 20th century, who went to study to become a teacher at a boarding school that is being run by nuns at the Brionplein in Otrobanda. This book has been published but has not yet been published.

6.3 IUCN Regional Conservation Forum Panama 2015

The IUCN (International Union for Conservation of Nature) helps the world find pragmatic solutions to the most pressing environment and development challenges. It supports scientific research, manages field projects all over the world and brings governments, non-government organizations, United Nations agencies, companies and local communities together to develop and implement policy, laws and best practice. CARMABI is also a member of the IUCN. From September 3rd-5th, 2015 the IUCN

Biomuseo in Panama, designed by Frank Gehry.

Regional Conservation Forum for Mesoamerica and the Caribbean took place in Panama City. CARMABI's director, Mr. Paul Stokkermans, who is also a member of the IUCN Caribbean Committee, attended the forum. The inaugural session took place on the morning of the 3rd of September. Present were, amongst others, the General Director of IUCN, Mrs. Inger Andersen, the President of IUCN, Mr. Zhang Xinsheng, and the Minister of Environment of Panama, Ms. Mirei Endara. The forum consisted of a number of workshops that contributed to the new IUCN program for 2017–2020.

Furthermore, a reception and dinner were hosted on September 3rd by the Government of Panama at the Chancellery (Ministry of Foreign Affairs) in the Palacio Bolivar. A cocktail party was held on the September 4th at the new Biomuseo. In the Biomuseo, designed by the famous architect Frank Gehry, a guided tour was offered. The museum offers a lot of information on the biodiversity of Panama. The main theme is the rise of the Istmus of Panama, about 3 million years ago, which made it possible for the animal species of South America to move to North America and vice versa. On September 5th, a field trip to the Metropolitan Natural Park took place.

Smithonian Educational Center in Punta Culebra.

Mr. Paul Stokkermans also visited the Smithonian Educational Center at Punta Culebra at the entrance of the Panama Canal. The education center is visited by schools in the morning and open to the general public in the afternoon. The information obtained was used to further develop the CARMABI Marine Educational Program (MEP).

Mr. Paul Stokkermans in Panama.

6.4 Meetings DCNA 2015 on Saba 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 headquarter of the DCNA is located in 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. Also, 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.

Furthermore, the DCNA 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 meetings every

Group picture with the representatives of the Government, Board Members of DCNA during the board meeting in Curaçao.

calendar year. In 2015, the meetings were held on March 24th-26th on Saba and October 27th-29th on Curaçao. The main topic of the meeting that was conducted in Saba “DCNA beyond 2016”. Presentations were held by Tighe Geoghegan on institutional Capacity Building, Romain Renoux and Amandine Vastlet on the BEST initiative, Paul Hoetjes from the Dutch Ministry of Economics, Angelo Villagomez from the Pew Charitable Trust, Ingvild Harkes from the Wereld Natuur Fonds (WNF) and Nathalie Ward from NOAA. During the opening session of the Board meeting on Curaçao, the director of CARMABI, Mr. Paul Stokkermans, hosted the event and also presented CARMABI ’s successes and challenges. During the meeting, amongst other items, concerns of the parks were discussed, the Articles of Incorporation were revised and important documents regarding the Save Our Sharks (SOS) project were signed. Furthermore, on October 27th the agenda included a lunch with Governors, Ministers and Patrons. In the evening, the DCNA 10th year anniversary celebration was held at the CARMABI premises.

During the meeting in Saba.

Mr. Paul Stokkermans introducing the speech of the chairman of DCNA, Mr. Glenn Thode.

The 10th anniversary celebration poster.

6.5 Opening of new entrance and toilets at Shete Boka

After months of preparation and construction, Shete Boka National Park now has a new more accessible entrance as well as new user-friendly toilets for the employees as well as the visitors of the park. The festive opening was celebrated among the

representatives of the Government of Curaçao, representatives of Curaçao Tourism Board (CTB), Ms. Nienke Eshuis (Architect), Director Director of CARMABI, Mr. Paul Stokkermans and Head of the Parks Department at CARMABI, Ms. Sabine Berendse.

From left to right: Ms. Sabine Berendse, Mr. Hugo Clarinda (Interim Director CTB), Mr. Faisal Dilrosun (replacement of Minister Ben Whiteman), Mr. Ritzel Godfried (Head of Product Development CTB), Ms. Nienke Eshuis (Architect), Minister Palm of Economic Development), Mr. Peter Bongers (Former Director of CARMABI) and Mr. Paul Stokkermans.

Minister Economic Development, Mr. Palm, dancing folklore music during the opening of new entrance and toilets at Shete Boka.

6.6 Opening CARMABI Marine Education Center (MEC)

On June 26th, the opening of the CARMABI Marine Education Center (MEC) took place. The MEC is a museum about the marine life in the sea around Curaçao. The MEC is located on the CARMABI premises at Piscadera. The Governor of Curaçao, Mrs. Lucille George-Wout was honored to open the museum by cutting a ribbon placed at the entrance of the museum. The construction of the museum has taken quite some time.

Volunteers helping with the reconstruction.

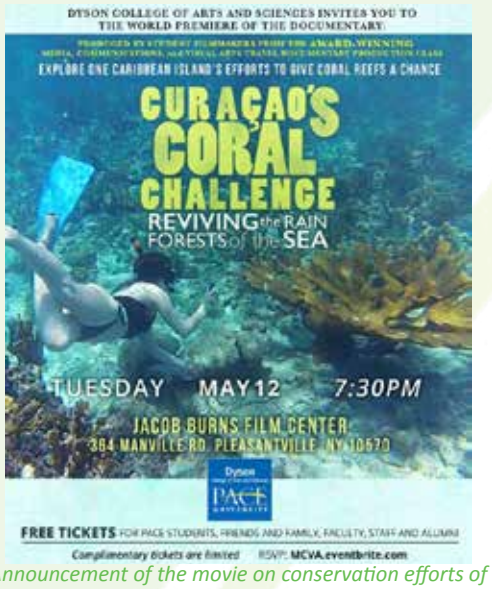
First, three old workshops in the old CARMABI's building had to be joined and renovated. The funds needed for the renovation were donated. A group of students from the University of Illinois, led by Professor Bruce Fouke, assisted with the demolition work. When the renovation was completed the work on the exhibitions started. This was a long process in which many students who were doing research at CARMABI as well as the interns assisted. The target group of the museum is the school children of Curaçao. The exhibition is focused on marine life in general in the sea around Curaçao and on research done by CARMABI on the coral reef around Curaçao. All explanations are in Papiamentu, English and Spanish.The museum is part of a broader Marine Education Program (MEP), which includes lessons at schools, a presentation on the importance of the coral reef, interactive exercises and a visit to the museum. The MEP started in September 2015 and the frequency of school visits is one per week, although we plan to increase this as soon as more funding becomes available. The museum is open for the general public every afternoon, week days from 2pm to 5pm. During the week-end the museum is closed. Upon presentation of a "sedula" (identification card) the entrance fee for locals is Naf. 3,00 (children Naf. 1,00) and for tourists the entrance fee is $3 (children $1).

6.7 Association of Marine Laboratories of the Caribbean meeting on Curaçao

From May 18th – 22nd, the Association of Marine Laboratories of the Caribbean (AMLC) held its 37th Scientific Conference on Curaçao. The conference was organized by the CARMABI, who also used the occasion to celebrate their 60th anniversary. The AMLC meeting has seen rapid growth over the past years and is the only Caribbean-focused meeting of its kind.
More than 200 scientists, policy-makersand students, all with an interest in marine science and policy, came to Curaçao to attend this five-day meeting. Scientists working in the Caribbean gave presentations on the dynamics shaping Caribbean reef ecosystems and focused on solutions for recovery of imperiled coral reefs and fisheries. Examples of proposed solutions included a new focus on the protection of herbivores (like parrotfish and urchins), maintenance of high water quality and the use of both biological and cultural data for zonation. Representatives of the Global Coral Reef Monitoring Network (GCRMN) presented a new standardized approach for monitoring the health of the region's coral reefs and are working hard

to build consensus for the adoption of these protocols. This would allow researchers and policy-makers to compare study results on the health of different coral reefs and the effectiveness of different management actions throughout the Caribbean. A special treat for the participants was the celebration of CARMABI's 60th anniversary. A participant stated, "It was good to see scientists and policy makers interact. This interaction between science, policy and management is essential to generate cost effective reef management strategies". In summary, the AMLC meeting was far more than just a conference. It was a productive exchange of data, strategies, and solutions that will enable Caribbean islands to reverse the declining health of their coral reefs and fisheries, making strides towards using the ocean without using it up.

Source: Curaçao Chronicle (June 1st 2015)



Announcement of the movie on conservation efforts of Curaçaoan reefs.

6.8 Opening speech during the 60th Anniversary of CARMABI on MAY 21st

"Minister Mrs. Suzy Camelia-Römer of VVRP, colleague-biologists, board members, invited guests and personnel of CARMABI all gathered together for the 37th annual Association of Marine Laboratories of the Caribbean conference.

Mr. Stokkermans giving the opening speech during the 60th anniversary of CARMABI.

"My name is Paul Stokkermans and I am the Director of CARMABI. It is a great honor and pleasure for me to welcome you all here at CARMABI to celebrate CARMABI's 60 years of existence. We especially want to extend a warm welcome to all participants of the conference of the Association of Marine Laboratories of the Caribbean, the AMLC. This conference is held every two years and we are privileged to host this year's conference in Curaçao. The AMLC was founded in 1956 and CARMABI was one of the founding fathers at that time. I have been told that, although the conference is not over yet, it already can be classified as a great success. I sincerely hope that, besides an update in marine scientific information, you also had or will have some time to enjoy our island on land as well as in the sea. Not only from a biological point of view but also enjoy our rich cultural heritage.

Today it is exactly 60 years ago that CARMABI was founded. Back in 1955 CARMABI's main goal was pure scientific marine biological research. Seven years later, in 1962, the Netherlands Antilles foundation for national parks, STINAPA, was founded with the purpose to manage national parks. Later on, both foundations merged and the new CARMABI was born with a broad statutory goal of biological research, sustainable nature management and education.

At this moment CARMABI has four sections focusing on research, both marine and terrestrial, management of nature parks, nature education and consultancy.

The premises of CARMABI at Piscadera Baai have been built in stages. The first building was the section at the east side of the stairs. This section was built in 1955. The first stone was laid by the late Prince Bernhard of the Netherlands. The second wing, at the west side of the stairs, was built in 1965 and opened by the late Queen Juliana of the Netherlands. The facilities for some 200+ visiting scientists and students every year. The Science Center was opened by our present King Willem-Alexander, in November 2013. We are proud to tell that this illustrates that the royal family has close ties with the development of CARMABI and its goals. We must also not forget to mention our other presence at the Western part of the island, Banda Abou, namely in the areas of Christoffel National Park and Shete Boka National Park. Both places are prime areas where pristine nature has been opened for tourists as well as for our own people without endangering the natural values. If you still have time, please don't hesitate to make a stop at one of these places or at least visit our museum with a contemporary presentation of our natural-historical culture.

No doubt that each phase of CARMABI's history has had its own challenges. At this point in time the challenges are many and more than ever. Nature is being threatened seriously. On land habitat fragmentation is progressing rapidly and threatening various species, such as the Curaçao white tailed deer. In the sea, coral reefs are deteriorating at a rapid pace with the notable exception of East Point, which is still in good shape and one of the three best reefs in the Caribbean. Our nature parks are very beautiful but part of the infrastructure is in bad shape. If you have hiked to the top of the Christoffel mountain recently you will notice that the parking place resembles a moon landscape and the path to the top is a gully. Also the fence of the park is in a bad shape. Funding to keep this infrastructure in place is becoming increasingly difficult to obtain since subsidies are decreasing while costs are increasing rapidly. In a fast changing society, even guaranteeing sufficient security for our visitors is becoming increasingly more important and expensive.

Fortunately, we have also reached many of our goals during past years through an aggressive and out of the box proactive management attitude. After the construction of the Science Center we continued building and have constructed a two-story dive center on the beach. This dive center is rented to a dive school.
Furthermore, we renovated the bottom part of the old CARMABI Building. In this renovated section we established the Marine Education Center, which will be part of a broader Marine Education Program. This program will start with lessons on schools and ends with a visit to the Marine Education Center. This Marine Education Center exhibits in particular the coral reef ecosystem. Researchers have contributed with their research in a hands-on way that is understandable and interesting for children. The center is almost finished and we are working very hard to have it completely finished for the official opening at the end of June.
However, today we have already opened the doors for you all to see. Please feel free to enter and do not hesitate to share your feedback with us! At Shete Boka we have constructed a new entry and new bathrooms, which will facilitate all visitors and especially the tour buses with cruise tourists visiting the park. Furthermore, we have started a program for bird monitoring and a program for turtle monitoring, just to name a few.
To finalize here are some of our plans for the future:

- We are improving our research program so Curaçao can manage its natural resources in an even better way. Doing so, we are also improving our tourism product. (or industry)
- We are developing our natural parks sustainably so nature is protected and more visitors; both local and tourists will be able to enjoy our nature to the fullest.
- We are improving and enlarging our education programs so our youth understands the importance of nature and how nature benefits the entire population through income generation and job creation.

Curaçao's nature, both onshore and offshore is unique and our most important natural resource, in terms of generating income to the island. CARMABI's goals have been, and still are, the protection and management of our natural resources and to make sure that it will be for the benefit of all people living in Curaçao, now and in the future. We have come a long way, exactly 60 years now, and we are fully committed to fulfill our goals for years to come.
Again, thank you very much for accepting our invitation and being part of our celebration, and I hope you will enjoy this evening with us!"

Guest and representatives of CARMABI enjoying a drink during the social event.

6.9 Open day Parks of CARMABI in combination with Dia di Sabaneta

On August 9th, the park department was open for free to the public in honor of the 60th anniversary of CARMABI. This "open house" was combined with Dia di Sabanata, a festivity which is annually organized by the people that live in the neighborhood of Savonet. The combination of the two created a good synergy. Minister Ben Whiteman gave a speech and the day was filled with cultural activities.

6.10 Vacation activity for the kids during the summer of 2015

6.11 Visit of Marine Staff on February 29th, 2015

6.12 PEW Shark Event at the Gouverneur restaurant

6.13 On Blue Water Day (June 4th, 2015), RBC donated ANG. 5000,- to CARMABI for the Marine Education Center.

7. FINANCIAL OVERVIEW

Balance sheet as of December 31st, 2015
(after proposal of result appropration)

	2015 ANG	201 ANG
Assets		
Non-current assets		
Property and plant	976,989	1,020,036
Other fixed assets	388,022	329,070
	1,365,011	1,349,106
Current Assets		
Receivables	244,072	147,233
Stock	20,194	27,996
Cash and cash equivalents	489,642	346,057
	753,908	521,286
Total assets	2,118,919	1,870,392

		2015
		ANG
	Equity and liabilities	
	Equity	
	Capital	106
6	Earmarked reserve	11,267
0	Retained earnings	1,035,491
6		1,046,864
	Non-current liabilities	
	Non interest bearing loans and borrowings	154,000
3	Deferred income investment grants	262,453
6		416,453
7		
6		
	Current Liabilities	
	Deferred income project grants	228,621
	Pension contribution payable	-82
	Taxes and social security payable	41,615
	Other liabilities	385,448
		655,602
2	**Total equity and liabilities**	2,118,919

	2015 ANG	2014 ANG
Income		
Grants	607,723	449,400
Earmarked grants	(2,992)	41,369
Admission fees	1,232,730	1,195,623
Rental income	225,589	216,749
Other income	456,064	533,838
	2,519,114	2,436,979
Expenses		
Personnel expenses	1,239,149	1,359,477
Depreciation expenses	99,184	88,191
Other operating expenses	923,403	850,648
	2,261,736	2,298,316
Result for the year	257,378	138,663
Interest income	4,425	7,230
Result for the year	261,803	145,893
Appropriation for the year		
Retained earnings	261,803	145,893
	261,803	145,893

Embracing the beauty of nature.

The mountain of Christoffel, one of the pride and joys of CARMABI.

8. BOARD OF 2015

Peter Bongers
President

Alvin Francisco
Treasurer

Jeff Sybesma
Secretary

Edwin Flameling
Board Member

Olga Lodowica
Board Member

Olga Kostrzewski
Board Member

Kenneth Heidweiller
Government Representative

As of September 1st, 2015, Mr Alvin Fransisco took the responsibilities and duties of the President Mr. Peter Bongers over, followed by Ms. Olga Kostrzewski on November 10th, 2015.

9. PERSONNEL

Board
Peter Bongers, President (resigned Aug. 31st, 2015)
Jeffrey Sybesma PhD, Secretary (resigned Jan. 5th, 2016)
Alvin Francisco, Treasurer (resigned Feb. 12th, 2016)
Edwin Flameling, Board Member
Olga Lodowica, Board Member (left March 12th, 2016)
Olga Kostrzewski, Board Member (resigned Feb. 25th, 2016)
Kenneth Heidweiller, Board Member

Patron
Professor Jaime Saleh, Former General Governor of the Netherlands Antilles

Carmabi ambassador in the Netherlands
André Cohen Henriquez

Management
Paul Stokkermans M. Sc. , Director
Mark Vermeij PhD, Deputy and Scientific Director

Research Department
Mark Vermeij PhD, Head of Research Department
Valerie Chamberland, M.Sc., Researcher

Parks Management Department
Sabine Berendse, Head of Department
Cyrill Kooistra, Head Ranger and Deputy Head of Department
Wolter Samboe, Senior Ranger (Events)
Gregory Kastaneer, Senior Ranger
Jurwin Rifaela, Senior Ranger
Humphrey Janzen, Senior Ranger
Sue-Endrich Sluis, Senior Ranger
Briand Victorina, Ranger
Edwords Alberto, Ranger
Araceli Ersilia, Front Desk Officer
Merelyn Albertoe, Front Desk Officer
Rachel Tokaai, Assistant Events and Sales
Xiomara Concetion, Janitor

Head Marketing and Communication
Eunice Cijntje, Head of Department

Nature and Environmental Education Department
Angela Richardson, Head of Department

Advice and Consultancy Department
John de Freitas M.Sc. Head of Department

Administration Department
Ethline Isenia, Head of Administration Department
Shahaira Martina, Financial Assistant
Larissa Hooi-Francisca, Administrative Assistant
Rosemary Olivo Busto, Janitor
Magda Inees, Janitor
Carlos Winterdaal, Technician

Left the organization in 2015
Gregory Kastaneer, Senior Ranger
Jurwin Rifaela, Senior Ranger
Thessa Flemming, Head Marketing and Communication

Hato Caves
Contracted to Indian Caves N.V. (Monica Vrolijk)

Paul Stokkermans
Director

Mark Vermeij
Head Research & Deputy Director

Ethline Isenia
Head Administration

Sabine Berendse
Head Parks Department

John De Freitas
Head Advice & Consultancy

Angela Richardson
Head Nature & Environmental Education Department

Eunice Cijntje
Head Marketing & Communication

Araceli Ersilia
Front Desk Officer

Briand Victorina
Ranger

Carlos Winterdaal
Technician

Cyrill Kooistra
Senior Ranger / Deputy Head Parks Department

Edwords Alberto
Ranger

Humphrey Janzen
Head Ranger

Larissa Hooi-Francisca
Administrative Assistant

Magda Inees
Janitor

Merelyn Albertoe
Front Desk Officer

Rachel Tokaai-Redan
Assistant Events & Sales

Rosemary Olivo Busto
Janitor

Shahaira Martina
Financial Assistant

Sue-Endrick Sluis
Ranger

Valerie Chamberland, M.Sc.
Researcher

Xiomara Concetion
Janitor

Experience the history of Curaçao like any other.

SPECIAL THANKS TO THE VOLUNTEER OF CARMABI

Volunteers Terrestrial Education Program (TEP):
Arien Liberia
Clarette (Retty) Schoop - Coordinator
Charetty Jansen
Sonaly (Naly) Rijnschot
Ruthline (Ruth) Bernadina
Ruthsella Statius

Marine Education Program (MEP):
Angelique Kok
Cees van Houten - Coordinator
Emma Alves
Jonathan Estanista
Sabrine Tapoka
Tessa van de Zande

On-Call Personnel of Savonet:
Alietta Cijntje (Front Desk)
Giovanni Domacassee (Ranger)
Jonathan Hansen (Ranger)
Ronadyne LaCruz (Front Desk)
Richard Davelaar (Cleaning Shete Boka)
Sharlette Victorina (Front Desk)
Sue-Shantely Lourens (Front Desk)

Junior Rangers:
Connie Mingeli
Haydelson Lourens
Vurgell Cijntje

Bird eye view of the surroundings of CARMABI at Piscadera.

10. SPONSORSHIP, PARTNERS AND SUPPORTERS

Partners, Sponsors, Supporters and Donations:

A. Maduro, Barbados Sea Turtle Project, Bellavue Curaçao, BirdsCaribbean, Carla Daniel (BSTP), Christof, CITRO, CMTC Community Service Foundation, Coastguard, Coca-Cola, Curacao Actief, Curacao Clean Up, CuraDoet,Darren Browne (BSTP), Dutch Caribbean Nature Alliance, Elise Benedictus (DCNA), Emeray Martha-Neuman (DCNA), Familie Finies, F.E. Perret-Gentil, Flip Sluiter, Gielmon Egbrechts (STCB), H. Schepers, IMARES, J. Kwidama, Jeroen Pauw, Julia Horrocks (BSTP), Jurjan van der Zee (RUG), Kailani boattrips, Kalli de Meyer (DCNA), Karen Eckert (WIDECAST), Kim Russel, Kompa Leon Green, Kon. Ned. Akademisch Encology Funds, Korpodeko, Lisa Becking (INMARES – WUR), L. Sedney, M. Jonis, Mabel Nava (STCB), Maduro & Curiels Bank (MCB), Marjolijn Christianen (RUG), Mermaid boattrips, Ministery of GMN, Miss Ann boattrips, MRC Rental, Postcode Lotterij - Save Our Sharks, RBC Royal Bank, Rotary Club, Piscadera Harbour Village, St. Percy Henriquez Fonds, St. Prins Bernhard Cultuurfonds Caribisch Gebied, Rijksuniversiteit Groningen, Sea Turtle Conservation Bonaire, Sue Willis (STCB), Uniek Curacao, Vivian's Nursery, WIDECAST.

Volunteers Bird Monitoring:

Anna Rojer, Annette de França, Ans Bronneberg, Carel de Haseth, Clifford de Lannoy, Eric Newton, Jaime Maria, Jeltje Maduro, Liesbeth van de Kar, Odette Doest , Robyn Fidanque, Yede van der Kooy.

Volunteers Nursery:

Colin Engels, Cor Boye, Filomena Kleinmoedig, Ingrid Profas, Kareljan Williams (assisted with research projects), Peter van den Broek, Priscella De Lannoy-Martines, Rudmara Martina (also germination research), Sandra Felicia, Sterlande Janvier (also germination research), Valeria Figueroa (also germination research).

Volunteers Sea Turtle Conservation Curaçao:

Alyn Kuiper, Andrew Thode, Angela Richardson, Annelies Stoll, Annemieke Klaarbergen, Ard Vreugdenhil, Arjan Vreugdenhil, Babette van Ravenswaaij, Bas Bongers, Bastiaan Vermonden, Briand Victorina, Connie Mingeli, Corinne Senior, Dirk Meij, Edwords Albertoe, Ergelyn Cijntje, Finn Simonetti, Frensel Mercelina, Glenn Fraites, Humphrey Janzen, Ilse Koster, Ineke Gauvin, Jasper Meij, Jeffrey Sybesma, Joes Grimmelt, Joey Wit, Juni Wever, Jurwin Rifaela, Kuko Elisabet, Leonie Nijburg, Marianne van der Meij – Kros, Myung van Leeuwen, Nathalie Slingerland, Peter Bongers, Pieter de Geus, Robert Jan van der Houwen, Ronadyne La Cruz, Rosa de Geus, Sahana Simonetti, Sontje Lourens, Sue Endrick Sluis, Sue Shantely Lourens, Terence Ching, Theo Vreugdenhil, Thijs Giskes, Thijs Vreugdenhil, Ton Kros, Vurgell Cijntje, Willemijn Jussen, Walter Samboe, Yaír Stokkermans.

Volunteers of CARMABI helping during a cleaning day.

APPENDIX

A. MARINE RESEARCH

A.1. Overview of visiting scientists (PI name and home institute)

Dr. M. Pierotti (Smithsonian Tropical Research Institute) Panama
Dr. M. Thomas (Florida State Collection of Arthropod) USA
Dr. W. Humphreys (Western Australian Museum) Australia
Dr. E. Berezikov (ERIBA) Netherlands
Dr. H. Oosterhuis (Wageningen University) Netherlands
Dr. D. Petersen (SECORE) USA
Dr. A. Lillis (North Carolina State University) USA
Ms. A. Ritger (Dartmouth College) USA
Dr. M. Christianen (Wageningen University) Netherlands
Dr. E. Caves (Duke University) USA
Ms. S. Snowden (Pittsburgh Zoo and Aquarium) USA
Dr. M. Warner (University of Delaware) USA
Dr. B. Mueller (CARMABI) Curaçao
Dr. H. Brocke (Max Planck Institute) Germany
Dr. D. Warren (Macquarie University) Australia
Dr. K. White (Global Shark Conservation Campaign PEW) USA
Dr. L. Thomas (Sustainable Fisheries Group) USA
Ms. M. Nava (Sea Turtle Conservation Bonaire) Bonaire
Mr. L. Delvoye (CARMABI) Netherlands
Dr. A. Delnuevo (DCNA) Bonaire
Dr. C. Staub (Duquesne University) USA
Dr. B. Titus (Ohio State University) USA
Dr. R. Eytan (Texas A&M University) USA
Dr. K. Matterson (University of Alabama) USA
Dr. A. Engelen (University of the Algarve) Portugal
Dr. T. Collins (Florida International University) USA
Dr. P. Frade (University of Vienna) Austria
Dr. D. Meps (Biodiversität und Klima Forschungszentrum) Germany
Dr. S. Calhoune (San Diego State University) USA
Drs. V. Chamberland (CARMABI) Curaçao
Dr. B. Leander (University of British Columbia) Canada
Dr. C. Poirier (Monterey Bay Aquarium Research Institute) USA
Dr. T. Richards (University of Exeter) United Kingdom
Dr. A. Simpson (Dalhousie University) Canada
Dr. J. Lukes (Laboratory of Molecular Biology of Protists) Czech Republic
Dr. P. Keeling (Canadian Institute for Advanced Research) Canada
Dr. F. Rohwer (San Diego State University) USA
Dr. B. Fouke (University of Illinois) USA
Dr. C. Prada (Pennsylvania State University) USA
Dr. B. Hoeksema (Netherlands Biodiversity Center) Netherlands
Drs. D. de Bakker (Wageningen University) Netherlands
Dr. E. Meesters (IMARES) Netherlands
Dr. K. Marhaver (CARMABI) Curaçao
Dr. C. Silveira (San Diego State University) USA
Dr. C. Begin (Florida State University) USA
Dr. P. Visser (University of Amsterdam) etherlands
Dr. J. Sanchez (Universidad de los Andes) Colombia

A.2. An overview of all peer reviewed scientific publications accepted for publication or published in 2015

1. Alexander BE, Mueller B, Vermeij MJA, van der Geest HH, de Goeij JM (2015) iofouling of inlet pipes affects water quality in running seawater aquaria and compromises sponge cell proliferation. PeerJ, 3, e1430.
2. Alexander BE, Achlatis M, Osinga R, van der Geest HG, Cleutjens JP, Schutte B, de Goeij JM (2015) Cell kinetics during regeneration in the sponge Halisarca caerulea: how local is the response to tissue damage?. PeerJ, 3, e820.
3. Bernal MA, Floeter SR, Gaither MR, Longo GO, Morais R, Ferreira CEL, Vermeij MJA, Rocha LA (205) High prevalence of dermal parasites among coral reef fishes of Curacao. Marine Biodiversity: 1-8.
4. Bongaerts P, Carmichael M, Hay KB, Tonk L, Frade PR, Hoegh-Guldberg O.(2015) Prevalent endosymbiont zonation shapes the depth distributions of scleractinian coral species. R. Soc. Open Sci. 2: 140297.
5. Bongaerts P, Frade PR, Hay KB, Englebert N, Latijnhouwers KRW, Bak RPM, Vermeij MJA, Hoegh-Guldberg, O (2015) Deep down on a Caribbean reef: lower mesophotic depths harbor a specialized coral-endosymbiont community.

Scientific reports:5.
6. Brocke HJ, Polerecky L, de Beer D, Weber M, Claudet J, Nugues MM (2015) Organic matter degradation drives benthic cyanobacterial mat abundance on Caribbean coral reefs. PLoS ONE 10(5): e0125445.
7. Brocke HJ, Wenzhoefer F, De Beer D, Mueller B, Van Duyl FC, Nugues MM (2015) High dissolved organic carbon release by benthic cyanobacterial mats in a Caribbean reef ecosystem. Scientific reports: 5.
8. Carballo-Cárdenas EC (2015) Controversies and consensus on the lionfish invasion in the Western Atlantic Ocean. Ecology and Society 20(3):24.
9. Chamberland VF, Vermeij MJA, Brittsan M, Carl M, Schick M, Snowden S, Schrier A, Petersen D. Restoration of critically endangered elkhorn coral (Acropora palmata) populations using larvae reared fromwild-caught gametes. Global Ecology and Conservation 4:526-37.
10. Chaves-Fonnegra A, Feldheim KA, Secord J, Lopez JV (2015) Population structure and dispersal of the coral-excavating sponge Cliona delitrix. Molecular ecology 24(7): 1447-1466.
11. Dornburg A, Moore J, Beaulieu JM, Eytan RI, Near TJ (2015) The impact of shifts in marine biodiversity hotspots on patterns of range evolution: evidence from the Holocentridae (squirrelfishes and soldierfishes). Evolution 69: 146-161.
12. Engene N, Tronholm A, Salvador-Reyes LA, Luesch H, Paul VJ (2015) Caldora penicillata gen. nov., comb. nov.(Cyanobacteria), a pantropical marine species with biomedical relevance. Journal of Phycology 51(4), 670-681.
13. Eytan RI, Evans BR, Dornburg A, Lemmon AR, Lemmon EM, Wainwright PC, Near TJ (2015) Are 100 enough? Inferring acanthomorph teleost phylogeny using Anchored Hybrid Enrichment. BMC Evolutionary Biology 15 (1): 113.
14. Gaither MR, Bernal MA, Fernandez-Silva I, Mwale M, Jones SA, Rocha C, Rocha LA (2015) Two deep evolutionary lineages in the circumtropical glasseye Heteropriacanthus cruentatus (Teleostei, Priacanthidae) with admixture in the south-western Indian Ocean. Journal of fish biology 87(3): 715-727.
15. Garg N, Kapono CA, Lim YW, Koyama N, Vermeij MJA, Conrad D,Rohwer F, Dorrestein PC (2015). Mass spectral similarity for untargeted metabolomics data analysis of complex mixtures. International Journal of Mass Spectrometry 377: 719-727.
16. Granados-Cifuentes C, Neigel J, Leberg P, Rodriguez-Lanetty, M (2015) Genetic diversity of free-living Symbiodinium in the Caribbean: the importance of habitats and seasons. Coral Reefs 34: 1-13.
17. Haas AF, Guibert M, Foerschner A, Calhoun S, George E, Hatay M, Dinsdale E, Sandin SA, Smith JE, Vermeij MJA, Felts B, Dustan P, Salamon P, Rohwer F (2015) Can we measure beauty? Computational evaluation of coral reef aesthetics. PeerJ, 3, p.e1390.
18. Hartmann AC, Sandin SA, Chamberland VF, Marhaver KL, de Goeij JM, Vermeij MJA (2015) Crude oil contamination interrupts settlement of coral larvae after direct exposure ends. Mar Ecol Prog Ser. 536:163-173.
19. Hester ER, Barott KL, Nulton J, Vermeij MJA, Rohwer FL (2015) Stable and sporadic symbiotic communities of coral and algal holobionts. The ISME journal. 2015.
20. Hofmann LC, Bischof K, Baggini C, Johnson A, Koop-Jakobse K, Teichberg M (2015) CO2 and inorganic nutrient enrichment affect the performance of a calcifying green alga and its noncalcifying epiphyte. Oecologia 177: 1157-1169.
21. Iglesias TL, Dornburg A, Brandley MC, Alfaro ME, Warren DL (2015) Life in the unthinking depths: energetic constraints on encephalization in marine fishes. Journal of Evolutionary Biology 28.5: 1080-1090.
22. Kambesis PN, Mylroie JR, Mylroie JE, Larson EB, Owen-Nagel AM, Sumrall JB (2015) Influence of karst denudation on the northwest coast of Curaçao, in Glumac, B and Savarese, M. (eds.) Proceedings of the 16th Symposium on the Geology of the Bahamas and other Carbonate Regions, p. 200-212
23. Loh T, McMurray SE, Henkel TP, Vicente J, Pawlik JR. (2015) Indirect effects of overfishing on Caribbean reefs: sponges overgrow reef-building corals. PeerJ 3:e901.
24. Marhaver KL, Vermeij MJA, Medina MM (2015) Reproductive natural history and successful juvenile propagation of the threatened Caribbean Pillar Coral Dendrogyra cylindrus. BMC ecology, 15(1): 9.
25. Quéré G, Nugues MM (2015) Coralline algae disease reduces survival and settlement

success of coral planulae in laboratory experiments. Coral Reefs 34: 1-8.
26. Quéré G, Steneck RS, Nugues MM (2015) Spatiotemporal and species-specific patterns of diseases affecting crustose coralline algae in Curaçao. Coral Reefs 34: 259-273.
27. Quéré G, Meistertzheim A, Steneck RS, Nugues MM (2015) Histopathology of crustose coralline algae affected by white band and white patch diseases. PeerJ 3: e1034.
28. Richards VP, DeBiasse MB, Shivji MS (2015) Genetic evidence supports larval retention in the Western Caribbean for an invertebrate with high dispersal capability (Ophiothrix suensonii: Echinodermata, Ophiuroidea). Coral Reefs 34: 313-325.
29. Simal F, de Lannoy C, García-Smith L, Doest O, de Freitas JA, Franken F,Zaandam I, Martino A, González-Carcacía JA, Peñaloza CL, Bertuol P, Simal D, Nassar JM (2015). Island–island and island–mainland movements of the Curaçaoan long-nosed bat, Leptonycteris curasoae. Journal of Mammalogy 96: 579-590.
30. Van der Meij SE, Van Tienderen KM, Hoeksema BW (2015) A mesophotic record of the gall crab Opecarcinus hypostegus from a Curaçaoan reef. Bulletin of Marine Science 91(2): 205-206. Click here for pdf
31. Vermeij MJA, Debey H, Grimsditch G, Brown J, Obura D, DeLeon R, Sandin SA. (2015) The negative effect of gardening damselfish (Stegastes planifrons) on coral health depends on predator abundance in a Caribbean MPA. Marine Ecology Progress Series 528: 289-295.
32. Williams, SM, Mumby PJ, Chollett I, Cortés J (2015) Importance of differentiating Orbicella reefs from gorgonian plains for ecological assessments of Caribbean reefs. Mar. Ecol. Prog. Ser. 530:93-101.
33. Williams SM, Chollett I, Roff G, Cortés J, Dryden CS Mumby PJ (2015) Hierarchical spatial patterns in Caribbean reef benthic assemblages. Journal of Biogeography, 42: 1327–1335.

A.3. Selected research projects of Research Department

A.3.*1 Coral's delayed reaction to devastating effects of an oil spill*

Coral reefs in the Caribbean have been declining for decades, largely as a result of development, overfishing, and disease. An oil spill in 2012 threatened to further harm this fragile ecosystem on the island of Curaçao, as oil blanketed an area roughly the size of thirty soccer fields (photo 1). Aaron Hartmann, then a graduate student at the Scripps Institution of Oceanography at UC San Diego, was in Curaçao finishing his final field season when the oil spill

Photo 1: Oil washed ashore at Rif Marie after the 2012 oil spill.

happened. The spill occurred weeks prior to the annual spawning season for many corals, prompting Hartmann and colleagues to test how lingering oil contamination affects corals during their earliest life stages.

Their research, published in 2015, concludes that the oil spill most affected the ability of coral larvae to transition to their adult stage, and that this response became apparent after, rather than during, the time larvae were swimming in oil-contaminated water. The study, "Crude oil contamination interrupts settlement of coral larvae after direct exposure ends," appeared in Marine Ecology Progress Series. When corals reproduce, their eggs amass at the sea surface and, after fertilization, larvae swim for days near the surface before moving down to the reef and going through metamorphosis. Through this process, coral larvae "settle" and become adults. Given this mobility, and that larvae may move away from oil contamination, Hartmann and colleagues examined the response of larvae during and after exposure, in contrast to the common practice of testing the immediate and direct effects that toxins have on animals. Surprisingly, they found that the larvae showed strong latent (delayed) effects, indicating that the impact on the coral population was not immediately observed. "A human analogy to these so-called latent effects would be if a person had a seemingly healthy childhood in a

city with smog issue, moved away to somewhere with fresh air as an adult, then developed smog-related respiratory issues years after they moved," said Hartmann, now a researcher at San Diego State University and at the Smithsonian National Museum of Natural History. The latent effects of oil exposure manifest as higher larval death rates and arose more than a week after exposure to oil had ended. In addition to killing larvae, oil exposure dramatically hindered the ability of larvae to settle on the seafloor, causing added stress to an already endangered species. "The greatest limitation of environmental impact assessments following catastrophic events is that most are not designed to measure damage to ecosystems beyond the immediate aftermath," said Hartmann. "We found that long-term ill effects of oil contamination on coral larvae can be quite large. Thus, by not including post-event or post-exposure harm in environmental impact assessments, we miss much of the damage done by events like oil spills." "This study highlights the fact that there are multi-layered effects of oil spills," said Stuart Sandin, an associate professor of marine ecology at Scripps Oceanography and study co-author. "Over time, it will be important to understand how pollution from oil – whether it is from an oil spill or other recreational activities, such as boating – affects the way marine animals move throughout the ocean, and especially on the spawning patterns of the corals." In addition to Hartmann, the study was co-authored by Sandin from Scripps Oceanography, Mark Vermeij, Kristen Marhaver, and Valérie Chamberland from the CARMABI, as well as Jasper de Goeij from the University of Amsterdam. The study was funded with grants from the National Science Foundation, the Government of Curaçao, and the Innovational Research Initiatives Scheme of the Netherlands Organization for Scientific Research.

Source: Scripps Oceanography News (September 30th, 2015)

A.3.2 Health of coral reefs can be measured by how beautiful they look

Can beauty be quantified? A study revealed that scientists can measure coral reef health through an analysis of the aesthetic quality of reefs or how beautiful they look (Figure A1). Art historians and philosophers from all over the world and from different eras have been

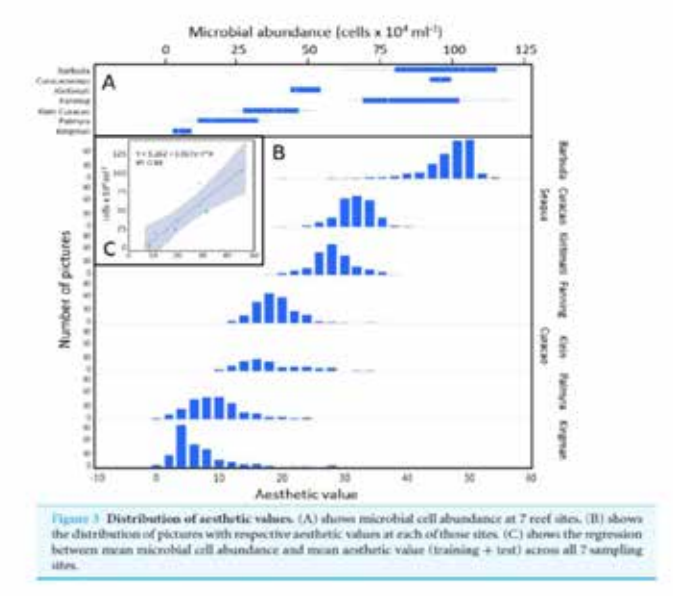


Figure 3 **Distribution of aesthetic values.** (A) shows microbial cell abundance at 7 reef sites. (B) shows the distribution of pictures with respective aesthetic values at each of these sites. (C) shows the regression between mean microbial cell abundance and mean aesthetic value (training + test) across all 7 sampling sites.

Figure A1: Relationship showing that the beauty of reef pictures measured by a computer can be related to water quality for various reefs around the world.

looking for ubiquitous and valid criteria that can measure ugliness and beauty. Now, a multidisciplinary team of experts was able to develop a new computational method that can assess what people regard as aesthetically pleasing. Their first application is the assessment of coral reefs. The study, which was issued in the journal PeerJ, evaluated images of coral reefs and 109 aesthetic features present in the images. These features included relative color, size and location of noticeable objects in the image, as well as color intensity, diversity and texture of the image. Through specifically-designed software, researchers analyzed about 2,000 images of coral reefs and compared them to the customary monitoring procedure known as the National Center for Ecological Analysis and Synthesis (NCEAS) score. The NCEAS score describes the increasing impact of humans on reefs. Researchers then found links between the scores of random images of coral reefs and their corresponding reef ecosystem. Andreas Haas, the study's lead author and a postdoctoral scholar from San Diego State University, said their findings suggest that how people perceive beauty is well-aligned with thriving and healthy ecosystems. Haas explained that the perception of beauty is not entirely subjective, and that it is affected by natural components that show degraded or healthy conditions of an object. He added that measuring the visual features of reef ecosystems is a cost-effective technique that targets their socioeconomic value which is their natural

beauty. Sue Sargent, a marine biologist, said previous methods for coral reef health assessment relied on researchers who were highly-trained for observation, but now that a new method has been developed, ordinary citizens could also perform reef monitoring through their computers. It could free up important research funding, she said. “Many animals live in and around coral reefs, so it is crucial that we protect them from further harm,” added Sargent. The study is a collaborative effort between SDSU, the Getty Research Institute, and the Scripps Institutionof Oceanography, Caribbean Research and Management of Biodiversity (CARMABI), the Université de Paris-Saclay, the College of Charleston, and the University of Amsterdam.

Source: Tech Times (November 10th, 2015)

A.3.3 Scientific assessment of Curaçao’s coastal waters show healthy and thriving coral and fish populations

A recent two-week long scientific assessment surveyed over 150 dive sites of Curaçao’s shallow water reef sites and found signs of healthy coral and fish populations around the island, particularly in Oostpunt. The scientific assessment was a critical step in Blue Halo Curaçao and its comprehensive, science-based approach to ocean zoning. Last November, the Waitt Institute led the assessment in joint partnership with the Government of Curaçao, using the Waitt research vessel as a “moving laboratory.” Twelve expert Caribbean marine biologists gathered in Curaçao to conduct the survey. “The expedition was a massive team effort. It would not have been possible without our science team, the ship’s crew, and support from the Government of Curaçao,” said Andy Estep, Waitt Institute Science and Field Manager. “Conducting an expedition at this scale has never been done before on Curaçao and it’s exciting to think of what the science will show us about Curaçao’s coral reefs.” The survey included coral, fish, invertebrate, and water quality surveys every 700 meters along the island’s south shore and approximately every 3 kilometers along the north shore (Figure A2). In total, the team accumulated 517 hours underwater surveying over 80 kilometers of reef habitat. “This successful expedition allows us to answer some scientific questions

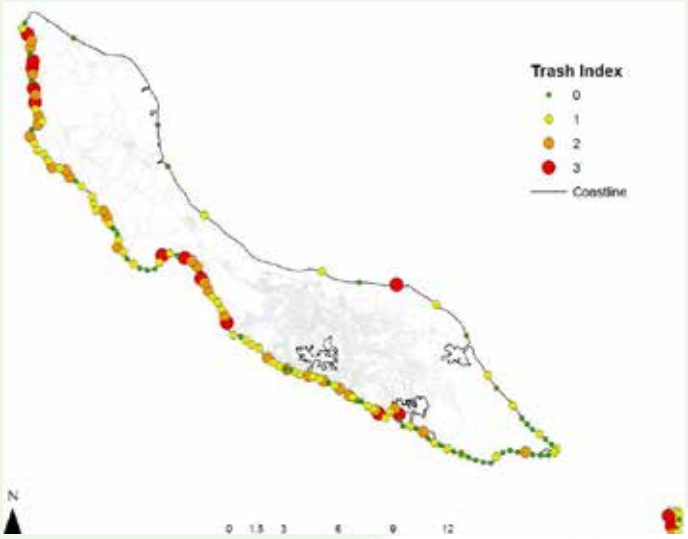


Figure A2: Preliminary data of the November 2015 expedition indicating areas in red where reefs are severely polluted by trash.

regarding the dynamics of Caribbean reef systems,” said Dr. Mark Vermeij, Scientific Director at CARMABI. “In addition, this assessment makes Curacao’s reefs the best surveyed reefs of any country on the planet which is obviously crucial for the design of future management strategies.” While the data collected will be analyzed over the next few months, preliminary findings show that Curaçao has not only some of the healthiest reefs in the Caribbean, but also some of the most impacted. Scientists were discouraged to find that nearly every dive site visited contained some form of trash: empty beer bottles, anchors, abandoned fishing nets, car tires and more. The good news is that this particular problem can be solved. “The people of Curaçao have an important role to play in reversing this disturbing trend as is indiscriminate dumping of trash all over the island, “said Gisette Seferina, Site Manager of Blue Halo Curaçao. “There is a fundamental paradigm shift that needs to come about in the way people regard their common spaces, and these includes the coastal areas and the sea itself.” Interestingly, Oostpunt contained almost no trash in comparison with the rest of the island. “We were thrilled to survey Oostpunt. It was an incredible experience to have a glimpse back in time to what a healthy Caribbean coral reef used to look like,” said Estep (photo 2 on page 46).

“The people of Curaçao should know they have one of the healthiest Caribbean coral reefs alive.” The aim of the scientific assessment is to produce a report on marine resources around Curaçao. A

Photo 2: Reef at Oostpunt showing high abundance of important fish species and endangered coral species.

map of coastal habitats will also be created. Similarly, a report on the stakeholders' usage of the sea resulting from a Listening Tour, launching in January, will be compiled and presented to the government and the people of Curaçao as a complement to the scientific assessment's findings, and can be used to support the creation of policies to manage the shallow waters around the island sustainably.

Source: Curacao Chronicle (December 22nd, 2015)

3.4. Rare glimpse into how coral procreates could aid future conservation

A rare and threatened Caribbean coral species has for the first time been successfully bred and raised in the lab, according to research published

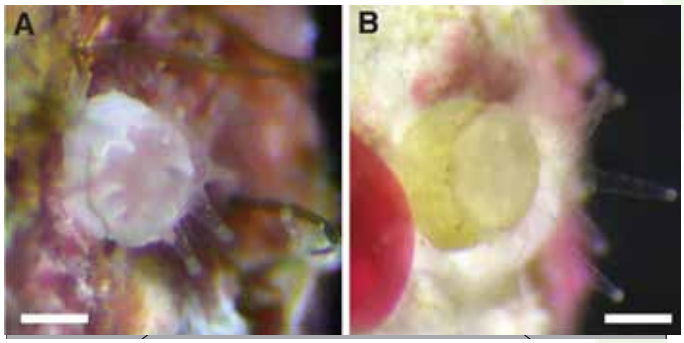


Photo 3: Settled primary polyps of D. cylindrus.

in the open access journal BMC Ecology. The study provides the first photos and documentation of juveniles of this species (photo 3), and could provide information to help bolster local coral reef conservation. The team also plans to 'out-plant' these lab-grown juveniles in the wild which could help populations become more resilient to climate change. The Caribbean Pillar Coral Dendrogyra cylindrus is rare and understudied, and small juveniles of this species have never been seen in over 30 years of surveys in the Caribbean.

The species is one of very few corals in the Caribbean that forms large branches, which can provide shelter for important fish species and reduce the energy of storm surge as it approaches shore. Lead author and TED Senior Fellow, Kristen Marhaver, from the CARMABI on the Caribbean island of Curaçao said: "Strangely enough, pillar corals happen to spawn just half an hour before another threatened coral that is far better studied - the elkhorn corals. So the reason why for so many years we've never witnessed spawning pillar corals is that, while they were spawning, virtually all coral spawning researchers and photographers in the Caribbean were on their boats doing final preparations on their dive gear for elkhorn coral spawning. It was literally right under our noses for years." Pillar Corals form a unique 'smoke stack' shape like no other coral species, and they display unusual mating behavior compared to most spawning coral species. Most spawning corals are hermaphrodites that release large bundles of eggs and sperm. Pillar corals, which only spawn on a few specific nights of the year, build colonies that are either all-male or all-female. The males first release sperm into the seawater, shortly followed by the females releasing their individual eggs. This makes collection and breeding research extremely difficult. Kristen Marhaver, who began this work while she was a postdoctoral researcher at the University of California at Merced, USA, said: "Now that we've successfully reared juvenile Pillar Corals in the lab, not only can we study them in more detail to find out what factors could be threatening their survival in the wild, but it also means that we can try to out-plant a small number back to the reef. We don't know if this will work and it is certainly not a cure-all for the reef. But especially in such a rare coral species, a tiny boost of a few new individuals could make a big difference in their genetic diversity, allowing their populations to adapt and become more resilient to the changing environment in the oceans." After studying the sunset times and lunar cycles taken from other spawning observations, the research team timed their egg and sperm collection around the most likely annual spawning times - exactly three nights

after the August full moon and around 100 minutes after sunset. At depths of 6 to 7 meters on a Curaçaoan coral reef with a large population of Pillar Corals, the team arranged nets and funnels over the female colonies to automatically collect eggs, and used syringes near the male colonies to manually collect sperm from spawn clouds as they appeared. The team then attempted to fertilize the eggs by mixing the collected eggs and sperm underwater and on shore. In the lab, the team carefully adjusted several factors related to fertilization times and seawater type and nurtured the eggs to develop into larvae. They managed to successfully grow the embryos to the swimming larvae stage - the first time this have ever been seen - and settled them onto ceramic tripods in water tanks. Now that they have determined how best to grow these coral in the lab, work can begin on studying how different factors affect their survival. By testing in the lab the effect of water type, contaminants, or the presence of different species of animals and bacteria, they may be able to translate these findings to the wild, and explain why juvenile pillar corals are missing in certain areas, helping to support local coastal protection. Populations of branchingcoral colonies are often genetically identical, making them extremely susceptible to threats such as disease and temperature shock. The team therefore plans to return a few lab-reared juveniles to the reef to see if they will grow and help jumpstart the population's genetic diversity. This could help the species adapt and become more resilient to threats such as climate change.

Source: Phys.org (March 16th, 2015)

3.5. Sea turtle Monitoring

Boka Mansalina and Boka Braun were surveyed three times a week in the period from the 15th of May until the 15th of December. Klein Curaçao was monitored twice a week from May 15th and monitoring efforts were still ongoing as of January 2016. All sea activities encountered were documented to assess the number and success of all nesting activities. Post hatching nest excavations were conducted to estimate how many juvenile turtles find their way to the water. Evaluating nest success is an important component of the monitoring program and defined as the percentage of eggs per clutch that successfully hatched. Three types of turtle activities are possible.

We distinguish between a dry run, an attempt or a nest: (1) a dry run is an activity where the turtle only makes a crawl over the beach but returns to the water without making a body pit, (2) an attempt is when a turtle makes one or more body pits, but does not lay eggs and (3) a nest is when a turtle lays eggs and covers the nest. In the case of a nest it is noted whether the nest is confirmed (eggs were sighted) or not (=suspected nest, eggs were not sighted but the tracks with an obvious covering suggest that a nest was laid). In the Shete Boka area four hawksbill nests were documented for Boka Mansalina (suspected nests). The first one was registered on August 20th and the last one on September 8th. On two of the calculated due dates dead hatchlings were found that had gone the wrong direction (i.e., not towards the ocean) and they dried out after the sun came up. Since no nest excavations were done in 2015, the number of hawksbill hatchlings for Boka Mansalina was estimated by using the hatching numbers of 2014 for the same beach. In 2014 the average clutch size was 118 eggs (range 108 – 128 eggs) and the hatching success was 85.2%. Using the numbers of 2014 it is estimated that Boka Mansalina produced 402 hawksbill hatchlings in 2015. At Barbara Beach two hawksbill nests were recorded. The first was found on May 27th and the second on June 11th. Exact nest locations were not found, so no post hatching excavation could be performed. Around the due date hatchlings were nonetheless spotted, whereby one hatchling that got stuck was rescued and released. Based on to the average hawksbill clutch size for Boka Mansalina and taking a hatchling success of 75% (the sand at Barbara Beach is heavily compressed) Barbara Beach produced an estimated 177 hawksbill hatchlings in 2015.

Photo 4: Two green turtles.

On Klein Curaçao, 54 nests of green turtles (photo 4) were documented (confirmed and suspected). The first nest was registered on June 7th and the last nest was registered on the 13th of December. At this moment, 19th of January 2016, 7 nests are still due to hatch. The six nests yielded an average of 110 eggs (Range 71 -166 eggs). Four of these nest hatched naturally and two of these nests were relocated. The hatching success of the nests that hatched naturally was 63.4%. Using the data of the excavated nests an estimated 3,842 green turtle hatchlings made their way to the ocean. In collaboration with Marjolijn Christianen from the Rijksuniversiteit Groningen (RUG), Jurjan van der Zee and Gielmond Egberts (Funchi), from Sea Turtle Conservation Bonaire (STCB), an in-water survey was done at three key sea turtle foraging grounds. Boka Ascencion, Wacawa and Klein Curacao. The purpose of these in-water surveys (photo 5) was to tag, sample, measure and photograph individual turtles.

Photo 5: In water surveys of sea turle abundance at Boka Ascencion.

The in-water surveys led to the capture of 1 hawksbill and 31 green turtles. Another three green turtles were fitted with a satellite transmitter when they came to nest and were also tagged, sampled, measured and photographed. During the in-water survey the turtles were also checked for the presence of Fibropapillomatosis (FP) tumors which is an important threat to green turtle populations worldwide. The disease manifests in sea turtles in the form of benign, contagious tumors that occur on the turtle's soft and hard tissues, including the flippers, neck, plastron and carapace, eyelids and cornea. None of the turtles that were captured on Curaçao had any signs of Fibropapillomatosis. A future research question might be whether there is a significant difference to Bonaire concerning the occurrence of FP tumors and if so then what the reasons could be.

6.6 A new film explores Curaçao's effort to become a Caribbean haven for coral

Participants of the workshop on rearing coral larvae.

After months of reporting and planning, a week of filming in March and many long nights in the editing suite, 10 Pace University communication students (with guidance from Professor Maria Luskay and Andy Revkin), have completed the movie "Curaçao's Coral Challenge – Reviving the Rain Forests of the Sea." The film had its premiere on May 12th at the Jacob Burns Film Center, in Pleasantville, New York (USA) and will broadcast on TeleCuraçao. The 25-minute documentary outlines how Curaçao is struggling to expand tourism without degrading it's coral reefs, the prime asset which is drawing visitors. In the film, marine biologists from the 60-year-old CARMABI Research Institute, Secore Foundation and Waitt Institute explain why the island's geography and other factors have fortuitously preserved remarkably vibrant reefs in some spots in spite decades of pollution, cruise ship traffic and coastal construction.

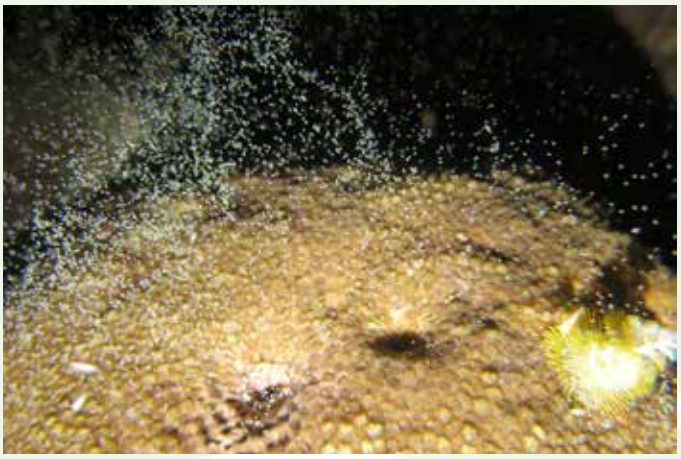
Source: Dot News, New York Times (13 May 2015)

6.7 Successful coral spawning workshop in September

In 2015, the SECORE's coral spawning workshop in Curacao was held September 30th until October 8th. It was the sixth workshop as part of our ongoing coral restoration research project in collaboration with the CARMABI and the Curaçao Sea Aquarium. Curaçao was SECORE's first study site, aiming at better understanding the sexual reproduction of corals and developing new restoration strategies. Over the last years, the main focus of this

workshop was the endangered elkhorn coral. In 2015, a small team of our experts worked on this species in August and September. During this year's workshop research was focused on several new coral species, some of them never described before. A mass-spawning event of Siderastrea sidereal, a gonochoric species with male and female colonies, was observed for the first time and researchers collected their gametes and accordingly reared larvae. Furthermore, larvae were raised of the broadcast spawners Montastraea faveolata, M. cavernosa, Colpophyllia natans, Diploria strigosa, Stephanocoenia intersepta and the spawncasters Dendrogyra cylindrus and Eusmilia fastigiata. Two film teams were also present and all documented spawning events which will appear in a German/French produced nature documentary.

Source: www.secore.org



Stephanocoenia intersepta releasing eggs during the annual coral spawning.

B. TERRESTRIAL RESEARCH

B.1 Usage of medicinal plans in Curaçao

This research is based on a similar methodology propagated by the Caribbean organization TRAMIL. TRAMIL is an ethnopharmacological research program and stands for Traditional Medicine of the Islands. TRAMIL was founded in 1982 to understand, validate and expand health practices based upon the use of medicinal plants in the Caribbean. The Caribbean is considered as a region of high biodiversity and high cultural diversity. In the region there exists a mosaic of cultures and it comprises knowledge of medicinal plants from indigenous African and European traditions.

However, this is threatened by intergenerational loss of cultural knowledge and ecological degradation. Since 1982 more than 50 ethnopharmacological surveys have been done on more than 30 island and littoral countries of the Caribbean. About 200 plant species have been identified to be of significant use. A similar protocol for all surveys have been propagated and used. This project has been set up as a collaborative project between CARMABI (Drs. John de Freitas) and the University of Curaçao (UoC; Dr. Mark Hawkins) and consists of three stages:

1) A screening questionnaire. This has been done by students from the Socioeconomic faculty of the UoC and based on a random selection of telephone numbers in the Curaçao telephone book.

2) Home visits to respondents who are using botanicals and agreed to a home visit in the screening questionnaire. Interviewers were selected upon recommendation of the Central Bureau of Statists Curaçao (CBS).

In November 2015 training of the interviewers took place in the CARMABI auditorium and home visits started. Two questionnaires were used in the home interviews: one showing possible medical problems possibly treated with botanicals. The main questionnaire researches plant species and part(s) used in the treatment, how the remedy is prepared, where the plant was collected or bought, what the source of knowledge or use was, and possible precautions needed in use or preparation of the remedy. In the final stage of the project the results will be analyzed and discussed, also using publications on the use of medicinal plants in the Caribbean and their effects. In this stage the plants collected by the interviewers will be looked upon as to which species they belong and material shared with two Caribbean herbaria.

In the screening questionnaire the following medical conditions were the three most often

The leaves of this tree 'kashu/kashipete' (Anacardium occidentale) are used against abdominal pains. (Photo: Jeanne van Hoop)

reported for which medicinal plants were being used for (from over 1000 responses):

1) Respiratory (colds, flu, cough, asthma): 36%

2) Gastrointestinal (stimulate appetite, internal cleansing, gas, stomachache, diarrhea): 28%

3) General well-being (tonic): 7.5%.

The most often used plants were well-known plants on the island: yerba di hole (Ocimum spp.), oregano (Lippia alba), sentebibu (Aloe vera), lamungras (Cymbopogon citratus), gember (Zingiber officinale), basora pretu (Cordia c urassavica), manzanilla (Matricaria recutita) and yerba bueno (Mentha spicata).

B.2 Water bird monitoring course and subsequent monitoring during the year

The Caribbean Water bird Census workshop took place at CARMABI on January 13th -16th, 2015 under auspices of CARMABI and sponsored by DCNA, BirdsCaribbean, Cornell University and Curaçao Actief. Participants from all six Dutch Caribbean islands participated in the course.

The Caribbean is home to over 185 species of water birds including a number of endemic and globally threatened species and many migrants.

The Caribbean Water Bird Census (CWC) Program is a partnership of Caribbean organizations, communities and individuals that monitor water birds. It is led by Birds Caribbean and its goal is to learn more about the distribution, status and abundance of water birds in the Caribbean in order to improve science-based conservation planning and management of the beautiful water birds and their habitat. After the Caribbean Water bird Census - Monitoring Training workshop in January 2015 at CARMABI, given by Lisa Sorenson (BirdsCaribbean) and Jeff Gebracht (Cornell University) and sponsored by DCNA, we set out to form a group to do the monitoring of some of the most important aquatic areas on the island. The group consisted of volunteers with different backgrounds (mostly retired school teachers and a few retired biologists).

Participants and course teachers (Lisa Sorenson , Jeff Gerbracht and Fernando Simal) during the workshop.

The group originally consisted of the following persons:
Ans Bronneberg, Odette Doest, Robyn Fidanque, John de Freitas , Elizabeth van de Kar, Clifford de Lannoy, Jeltje Maduro, Eric Newton, Anna Rojer, Wotty Samboe and Marijn Tijdens. Later in the year, Annette de Franca joined the group. Shortly after the onset of the activities we decided to split the original group of some nine persons into two groups. One would do the aquatic areas in the eastern part of the island and the other one the aquatic areas in the suburbs west of Willemstad. In the eastern section of the island the area that has been best monitored is the Salina of Jan Thiel where monitoring takes place at eight locations. One visit was paid to the fresh water ponds of Klein Kwartier and also the sewage water treatment plant of Seru Lora. Visits to these two latter areas required obtaining permission from the government to enter.

Waste water treatment plant Klein Hofje:
July 13rd; August 31st; October 19th; November 9th; December 21st.
Blue Bay: February 2nd, 18th; July 27th; September 7th; October 26th; December 7th.
Salina St. Michiel: July 13;rd August 31st; October 9th; November 9th.
Saliña Jan Kok: Augustus 10th; October 26th.
Freshwater dam of Malpais: December 7th.
Saliña Jan Thiel: January 14th, 23rd, 27th; July 27th, 30th; August 3rd; September 3rd, 12th.
Waste water treatment plant at Seru Loraweg: March 3rd.
Freshwater ponds at Klein Kwartier: March 6th.

Four interesting observations were made by Carel de Haseth at the freshwater ponds of Klein kwartier and are related to the following four bird species:
Circus Cyaneus (northern harrier), Calidris Pugnax (ruff), Eudocimus Albus (white ibis) and a banded frigate bird (Fregata magnificens). The Circus Cyaneus is a rare visitor from North America and it was the second time that is was recorded in Curaçao. The Calidris pugnax is the first record for Curacao. It was a juvenile Ruff, Calidris pugnax (previously Philomachus pugnax), an Old World sandpiper that strays into the New World on a regular basis. Presumably this bird came from western Europe and the species is observed every fall in Washington, DC originating in Siberia (D. Paulison, pers. comm.). The white ibis is a visitor from South America in the dry season, but for Curaçao it was only the second time this species was observed on the island. The frigate bird was seen in May and had been banded at its wings in Barbuda some years ago as part of a PhD research project.
(source: http://www.unb.ca/research/alar/people/sarah-trefry.html)

Two volunteers (Anna Rojer and Eric Newton) and John de Freitas birdwatching at the salina between Cas Abou and San Juan. (Photo: Marijn Tijdens)

One of the other outcomes of the CWC workshop was also that CARMABI got a small donation from Birds Caribbean and their managing the process in close contact with the publisher in the USA for the second publication of the three (double-sided) Bird ID Cards which are being used by the volunteers for bird determination and also sold at the Christoffel National Park.

The front of the double-sided Bird ID cards for the aquatic bird species of Curacao.

The banded frigate bird (Fregata magnificens) in the surroundings of the freshwater pools of Klein Kwartier. (Photo: Carel de Haseth).

B.3 Plant Phenology research

B.3.1 *Phenological traits of indigenous plant species on three geological formations in Curaçao*

Monthly data on rainfall and phenology were collected over a period of two and a half years by biologists, Mr. John de Freitas and Mr. Dolfi Debrot. Location of the three transects in and in the direct surroundings of the Christoffel National Park. From right to left: transect Limestone Formation (LF; Wacao), transect Curaçao Lava Formation (CLF) and transect Knip Formation (KF) (figure B.1).

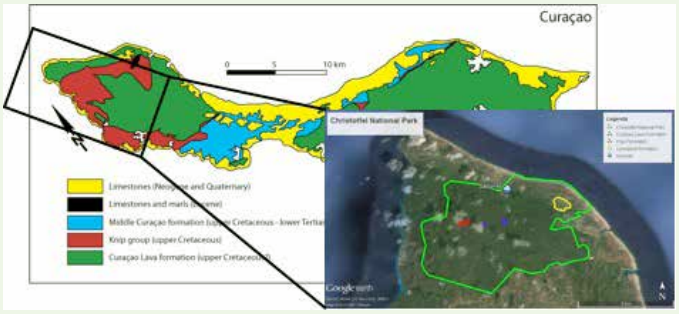


Figure B.1: the location of the three transects used.

The data was registered and collected for the following phenological characteristics according to five intensity categories: flowering, fruiting (including percentage of mature fruits), flushing, yellow leaves and plant cover. Data was collected over the three transects for a total of 69 plant species according to the following categories: 43 tree species, 16 shrub and vine species, 6 succulent species, and 4 epihyte species. Epiphytes were only present in the Knip Formation transect. The number of tree and shrub and vine species monitored in the three transects is as follows:

Transect	Tree species	Shrub species
CLF	15	9
LF	26	8
KF	31	6

MSc. student, Marijn Tijdens, of the University of Wageningen, stayed until April and worked on the analysis of the flowering and fruiting phenology of the tree species of the transects. She was received funding from the FONA and Van Eeden Fonds (both from the Netherlands).

Border of the Curacao Lava Formation in which the transect was laid out in the Christoffelpark

Site name	Date observations	Maximum number of birds observed
Klein Hofje	July 13; August 31; October 19; November 9; December 21	169
Blue Bay	February 2, 18; July 27; September 7; October 26; December 7	81
Salina St. Michiel	July 13; August 31; October 19; November 9	273
Salina Jan Kok	Augustus 10; October 26	66
Freshwater dam of Malpais	December 7	13
Salina Jan Thiel	January 14, 23, 27; July 27, 30; August 3; September 3, 12	172
Seru Loraweg	March 3	160
Klein Kwartier	March 3	108

Table 1. Characteristics of monitoring sites and maximum number of birds counted at each site during the year.

View of Knip vegetation transect.

View of the limnestone terrace vegetation of Wacao in which the limestone transect was laid

B.3.2 Indigenous tree species germination research and nursery

The main purpose of this project is to enhance the use of indigenous plant species in landscaping and reforestation projects. For this reason, CARMABI keeps a (small) tree nursery and does research on the best germination method for the indigenous tree and shrub species. Important help was received from different sources: Subsidy from the Curaçao Government (Ministry of Gezondheid, Milieu en Natuur): The tree nursery received a one-time subsidy from the Ministry of Public Health, Environment and Nature (GMN) of Fl. 15.204,00 as part of a one-time subsidy of a total of Fl. 105.684,- to four CARMABI projects.

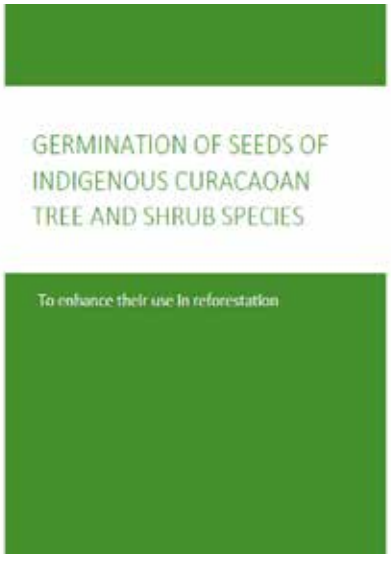
CuraDoet helps the tree nursery project of CARMABI. Just like in 2014, we received very useful help from the CuraDoet for our tree nursery project of indigenous plants. The popular CuraDoet voluntary days were in 2015 on March 20th and 21st. On March 20th, nine volunteers under the umbrella of CuraDoet helped CARMABI.
In addition, a donation from CurDoet was made to buy the necessary material to use during this event. The nine volunteers came to CARMABI with a lot of enthusiasm and left their marks with a total makeover of the tree nursery. We are really thankful to CuraDoet and the following volunteers for making a difference.

Volunteers during CuraDoet: Filomena Kleinmoedig, Ingrid Profas, Lisette Snijder, Ronia Calmes-Lucio, Bernice Calmes, Liesbeth van de Kar, Marcela Lorena Correa, Matias Bonfiglio, Elaine Francisca and Joep Althuizen accompanies by Mr. John de Freitas.

University students help as part of their community project in their curriculum. A few students from the University of Curaçao (UoC) volunteered during several days at CARMABI and helped in the tree nursery and the green house

germination research of CARMABI. We thank the following UoC students for their contribution: Valeria Figueroa, Rudmara Martina and Sterlande Janvier.
In addition, two of the volunteers of the CuraDoet group (Ingrid Profas and Filomena Kleinmoedig) that helped on March 20th, offered on the same day to help in the nursery on a permanent basis on the Friday mornings. A few weeks later they started, a former colleague and good friend, Sandra Felicia, joined them. Through newspaper and Facebook articles on the tree nursery, JuniBoyé, and Mr. Peter van den Broek also joined the volunteer group. We are very happy with the help of all these volunteers, because their input is really valuable to us.

Germination trials with seeds of indigenous tree species by HAS students student of HAS University of Applied Sciences, Yoeri Godfried (September 20th, 2014 thru February 8th, 2015), conducted research on the following tree species: Bourreria succulenta (watakeli), Capparis (Quadrella) odoratissima (oliba), Myrcia curassavica and Zanthoxylum flavum (kalabari). HAS University of Applied Sciences student, Marleen Peters (March 23rd, 2015 thru August 7th, 2015), researched the germination of the following tree species: Bourreria succulenta (watakeli), Bursera bonairensis (karsteniana) (pal'i sia blanku), Guaiacum officinale (wayaká) and Haematoxylon brasiletto (brazía). We thank volunteer Kareljan Williams for her help with this project. The third HAS University of Applied Sciences student, Tim van den Hurk, arrived on November 23rd and was at CARMABI until March 4th, 2016.



Sale of indigenous plants from CARMABI nursery started in August. Sales takes place on the morning of the last Friday of the month. The purpose of this activity is to increase the use of indigenous plants in gardens and other areas on the island. Articles in newspapers and certain Facebook sites are being used to indicate sale dates. In September a number of seedlings were sold for the reforestation project on Klein Bonaire, amongst them were a few rare species: Krugiodendron ferreum (koubati), Eugenia procera and Zanthoxylum monophyllum (bosua).

Reforestation project dry woodlands Caribbean islands is a proposal based *on* reforestation in two conservation areas on the island was written for NatureCaribé (a network of Caribbean environmental organizations) as part of their Caribbean-wide reforestation proposal project in dry woodlands. Together with reforestation proposals from other Caribbean countries, this proposal will be used for funding requests to the EU. Dry woodlands are one of the most threatened ecosystems in the world.

B.3.3 Mangrove area in Rif (Otrabanda) as an educational and recreational park
This year, just like in the previous three years, meetings were held in order to advance the idea to develop the mangrove area of Rif (Otrabanda) into a sustainable educational and recreational park. In 2015 meetings were held with Curaçao Ports Authority and the Ministry of Traffic,

Transportation and Spatial Planning.

Aerial view of mangrove area of Rif (Otrabanda).

B.3.4 Overseas migration by bat species in caves on the ABC islands

The research of this nectar-feeding bat species was initiated some years ago by biologists Jafet Nassar (Venezuela) and Fernando Simal (Bonaire). In May of 2015, an article was published in the Journal of Mammalogy based on the research data obtained on each of the three ABC islands over the last couple of years. The title of the article is 'Island-island and island-mainland movements of the Curaçaoan long-nosed bat, 'Leptonycteris curasoae'. On each of these islands monthly visits to the main caves were made for the study of the bat species present. For Curaçao, CARMABI biologists, Clifford de Lannoy and John de Freitas, were part of the team that each month visited the four main caves of the island and that consisted of a number of volunteers as well. Dr. Sophie Petit concluded in one of her researches on the bats of Curaçao that changes in colony size of Leptonycteris curasoae over the years could be because of movement between Curaçao and Bonaire for mating, feeding and dispersal of young. Flowers and fruits of columnar cacti are the food sources most frequently used by Leptonycteris curasoae on the ABC islands. The Paraguaná Península produce abundant flowers and fruits between April and November, but between December and February, these resources become barely available. The other two Leptonycteris curasoae species occurring in other parts of the continent are known to be capable of flying long distances (tens of kilometers) or migrate in search for adequate food resources. In the IUCN Red List L eptonycteris curasoae are considered 'vulnerable' and in Curaçao critically endangered.

Leptonycteris curasoae before being released during one of the research evenings in one of the caves on Curaçao.

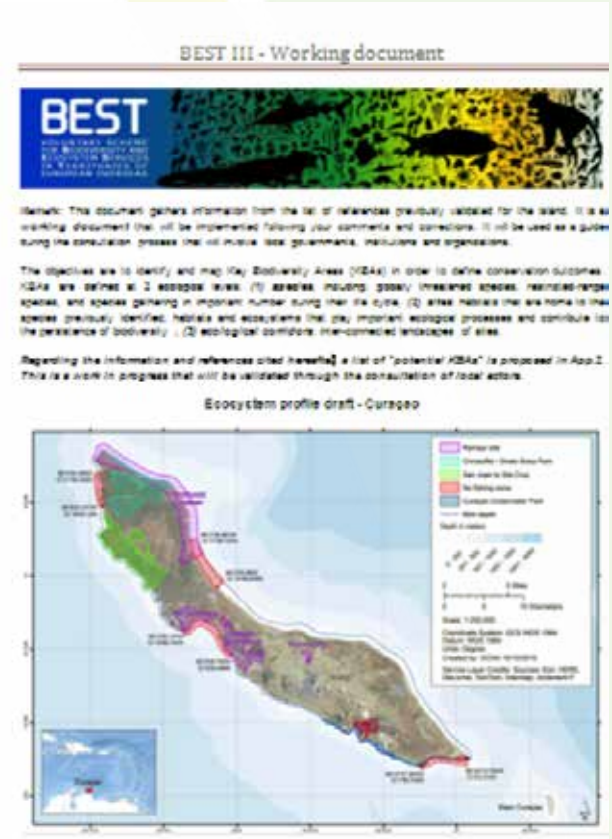
Up to April 2014, 11 long-distance oversea flights were recorded: 4 bats marked on Bonaire caught in Curaçao, 3 marked on Aruba caught in Venezuela, 2 marked on Bonaire caught in Aruba, 1 marked in Curaçao caught in Bonaire and 1 marked on Bonaire caught in Venezuela. Therefore, it can be concluded that there is exchange between the different populations. A possible explanation is that the animals migrate seasonally as a response to cyclical changes in local resource availability and the yearly reproductive regime.

B.3.5 EU BEST (Biodiversity and Ecosystem Services in territories of European Overseas)

An Ecosystem profile of Curaçao was written for the Caribbean hub for BEST. The European BEST Initiative is focused on conservation and the sustainable use of biodiversity and ecosystem services in EU outermost regions and overseas countries and territories. These territories contain high levels of endemism and a rich biodiversity. In 2010 the EU has taken c ommitments within the International Convention on Biological Diversity to halt the loss of biodiversity and ecosystem services in the EU and to help stop global biodiversity loss by 2020. The main threats to the terrestrial biodiversity of the insular Caribbean are habitat destruction and fragmentation due to heavy urban tourism and commercial development; overexploitation of living resources and predation by invasive alien species. For the marine environment, pollution is also considered a major threat.

The Profile document gives an overview of all relevant information on aspects of terrestrial and marine nature of the island (treaties,

endemic, threatened and rare species, relevant policy plans, laws and treaties. Based on these data presented, and in order to define conservation outcomes, Key Biodiversity areas (KBA) are distinguished as well as potential KBAs. Ecological corridors are also proposed and indicated on a map of the island.



EU BEST.

B.4 Consultancy Assignments

B.4.1 Influence of exotic grazers on vegetation Washington-Slagbaai National Park (Bonaire)
February 12th - 14th, Mr. John de Freitas, Dr. Pim van Hooft and Dr. Milena Holmgren of the Wageningen University, plus their four students visited Bonaire in order to initiate an ecological study of the impact of introduced grazers (goats and donkeys) on the vegetation of the Washington Slagbaai National Park (WSNP). Dr. Dolfi Debrot of Imares initiated this project with funding of the Ministry of Economic Affairs, Agriculture and Innovation (EL&I). In 2008, Mr. John de Freitas had described the vegetation in and outside (treatment sites) of the 9mx9m exclosures that had been constructed in the previous months by STINAPA-Bonaire in the WSNP. Both areas (in and outside the exclosure) were divided in 3mx3m plots in which the vegetation was described. During the fieldwork, the exclosures were visited and a qualitative survey done of the regeneration that had taken place over the seven years. An important result was the fact that a better regeneration had taken place in exclosures surrounded by relatively richer vegetation compared to exclosures surrounded by poorer vegetation. Help was also provided with the determination of plant species during the fieldwork and the later course of the project.

From left to right: Pim van Hooft, John de Freitas and Milena Holmgren.

B.4.2 Ecological survey coastal area St. Jorisbaai
Upon request of the Ministry of Traffic, Transportation and Spatial Planning, an ecological survey was done of a terrestrial area bordering the St. Jorisbaai in connection with a request of a private organization to develop a small ecotourism and recreational area there.

B.4.3 Survey of plant species in Park area, De Savaan
This survey was done (with emphasis on the occurrence of rare plant species) upon request of Curaçaose Wegenbouw (CWM) that was working on restoring the possibility to inspect the formerly installed electricity lines below the ground. These lines partially run in an area that has been designated as a 'park area' with the Curaçao Island Development Plan (E.O.P.).

B.4.4 CITES-BES Advices
In 2015, a total of 17 recommendations were presented to the Dutch CITES Office concerning

the export of plants or animals from one of the BES-islands.

B.4.5 Advice on replanting in Playa Kanoa area
As a compensation measure for placement of larger wind-turbines, the project developer must replant areas where vegetation was damaged in the process of placement of the larger wind-turbines. This is one of the government conditions that was put in the permit in order for the project to be developed in this conservation area. Advice was given on where, how and which species to use to replant.


CARMABI
Caribbean Research & Management of Biodiversity