2022

ANNUAL REPORT

CARMABI FOUNDATION

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Annual report 2022

FROM THE DIRECTOR

In 2022 we left the Covid pandemic behind us! We are aware that the virus is still there and the danger of a new variant still lurks. For the moment our daily work activities went back to normal. Visits to our parks increased to levels even higher than before the Covid pandemic. Our research program and school programs are expanding. Lockdowns became something of the past.

We depend on our stakeholders and we can thrive because of them. We therefore thank the government, other NGO's, volunteers, donors, and private individuals, who supported us. Without all of you it would not have been feasible to achieve our objectives.

Despite of the local and international measures a total of 168 scientists visited Carmabi, to conduct a wide variety of research projects. In addition, 88 students participated in various courses that were taught at Carmabi bringing the total number of visitors to our science center to 256. In total 41 scientific publications were published based on work done at Carmabi. Notwithstanding the epidemic the occupancy rate of our Science Center was 66%.

The Terrestrial Parks Department has done well. A total number of 76.197 visitors were welcomed in the Christoffel National Park in 2022. This is an increase of 45% compared to 2021. A total number of 103.527 visitors visited the Shete Boka National Park in 2022. This is an increase of 92% compared to 2021. In 2022 a total of 89.047 people visited the Hato Caves, an increase of 191% compared to the year before. The Open Day of the Christoffel National Park took place this year on the 7th of November.

In 2022 the Marine Parks Department consulted with various stakeholders regarding the Curacao Marine Park. The staff patrolled the entire area and continued working on the design and production of the buoys. They successfully replaced 8 buoys used by boats with dive tourists. They are working on installing new buoys for the fishing vessels. On the first of July 2022 the Curacao Rif Mangrove Park was opened for the public. The park was staffed with five rangers and two cashiers. The park received in total 14,723 visitors.

Continues on page 2...

Annual report 2022

FROM THE DIRECTOR

A total of 11.865 schoolchildren took part in the regular education program for primary schools. However, this year has also been a year of expansion for the Education Department. The Curacao Rif Mangrove Park education program has started this year and is aimed at children in group 7.

In addition, the Marine Youth Rangers program has started. This is a dedicated group of 31 teens doing year-round activities to learn and raise awareness about our marine- and wetlands ecosystems. The new Secondary Education Program for pre-exam classes focusses on the coral reef ecosystem and the influence of human behavior on the environment. Around 250 students followed this course. We also offered various activities for 650 people from different backgrounds and needs.

The Carmabi Consultancy department was consulted on nine occasions, either as part of developments or to assist with different scientific surveys, and many smaller request for biological information came in.

Biological inventories were conducted to provide information on the natural values of different areas on Curacao and terrestrial research was conducted on landscape ecology and vegetation and wildlife on Curacao, Aruba and St. Eustatius.

On the 20th of October 2021 the Oostpunt court case took place. Unfortunately, we lost this court case. On the 11th of January 2022 we appealed. We also lost the appeal. It is important to remember that the coral reef at Oostpunt is one of the best in the Caribbean. The coral reef on Curacao generates approximately $ 400 million yearly. Endangering the coral reef would therefore have a negative impact on the economy.

The year 2022 has been a year of growth in all departments. We expect this growth to continue in 2023. We are therefore looking towards 2023 with confidence!

Paul Stokkermans
Director Carmabi

scientific marine research

VISITING SCIENTISTS

168 scientists visited Carmabi in 2022. In addition, 88 students participated in Coral Reef Ecology courses and workshops that were taught by Carmabi and various universities and organizations from the Netherlands and the United States. The number of visiting scientists and students in 2022 was the second highest ever in Carmabi's history (Figure 1).

Approximately 20 researchers and students had to cancel previously booked trip to come conduct research at Carmabi due to COVID-19 restrictions. Most visitors in 2022 were from the Netherlands (45%) followed by the United States (32 %). Almost all the scientists and students that worked at Carmabi stayed at the facilities at Piscadera. The occupation of Carmabi's science center in 2022 was 66% which is also an improvement compared to the preceding (COVID) years (i.e., in 2021: 53%, 2020: 26%, 2019: 56.2%, 2018: 67%, 2017: 53%, 2016: 58%, 2015: 54%).

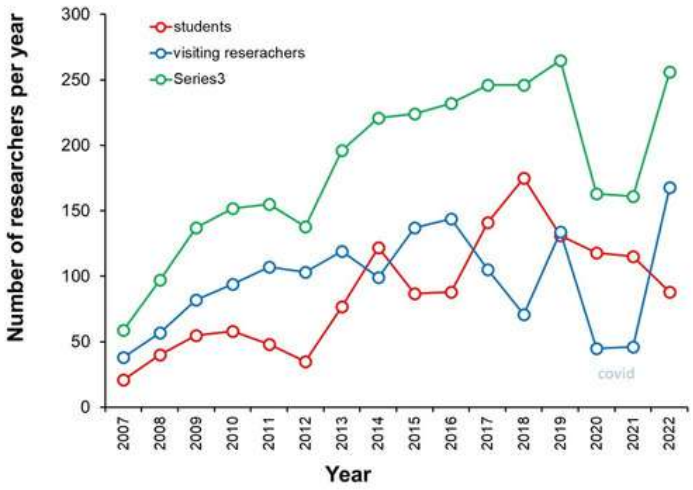

Figure 1

An overview of the areas in which researchers were active that visited or worked at Carmabi in 2022 is shown in Figure 2.

An overview of visiting scientists (PI name and home institute) is attached in Annex 1.

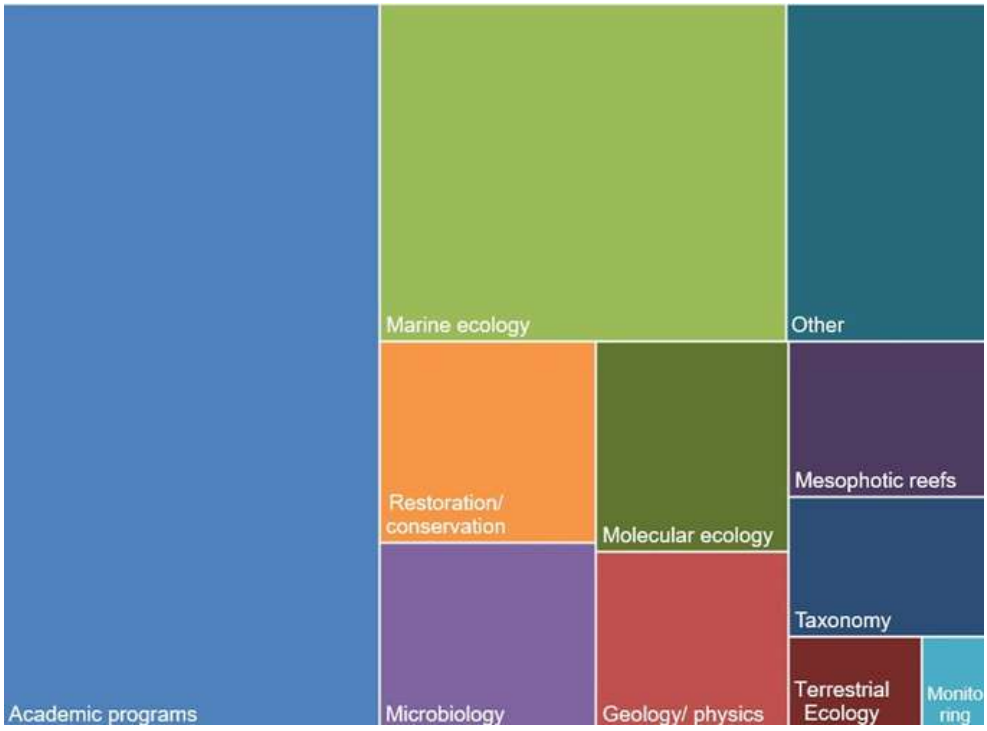

Figure 2

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PEER REVIEWED PUBLICATIONS

Forty-one publications appeared in peer reviewed scientific journals based on work that was conducted at Carmabi making 2022 the most productive year ever in terms of Carmabi's scientific output (Figure 3). The results of some of these studies have been featured in magazines, news programs and educational websites around the world. Furthermore, 14 reports were produced by MSc students that did their master's thesis' project at Carmabi.

An overview of all peers reviewed scientific publications published in 2022 is shown in Annex 2.

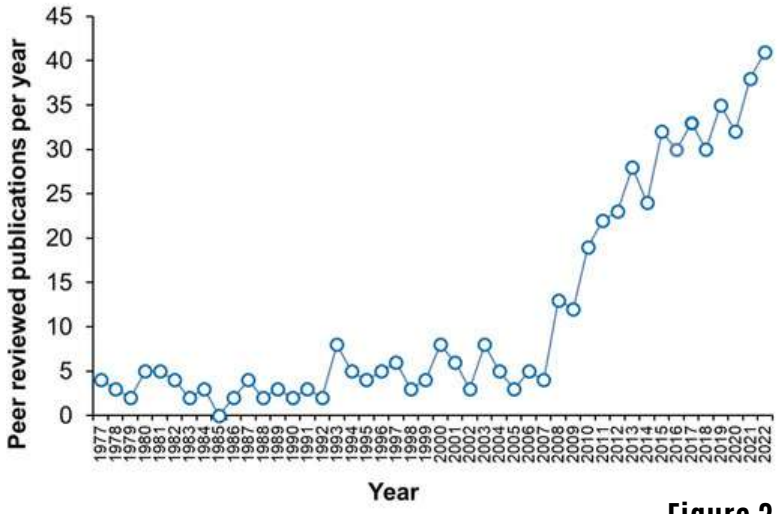


Figure 3

An overview of all peer reviewed scientific publications published per year since 1977.

FREE ADVICE, OUTREACH, AND CONSULTATION

Several organizations, government departments (Curacao, Aruba and The Netherlands), the press and others received free advice and information from the Carmabi Science Department during the year.

We assisted in 31 cases, both oral and written. In 2022 the Carmabi Science Department was featured/ interviewed in 87 items for international and local TV, radio and newspapers. Four documentaries on (marine) biology were filmed at Carmabi in 2022.

The Carmabi Research Station in Piscadera, Curacao.

scientific marine research

SELECTED PROJECTS 2022

Corals question on standing evolutionary theory in animals

In a discovery that challenges over a century of evolutionary conventional wisdom, corals have been shown to pass somatic mutations — changes to the DNA sequence that occur in non-reproductive cells — to their offspring. The finding demonstrates a potential new route for the generation of genetic diversity, which is the raw material for evolutionary adaptation, and could be vital for allowing endangered corals to adapt to rapidly changing environmental conditions.

For most animals, a new genetic mutation can only contribute to evolutionary change if it occurs in a germline or reproductive cell, for example in an egg or sperm cell. Mutations that occur in the rest of the body, in the somatic cells, were thought to be evolutionarily irrelevant because they do not get passed on to offspring. However, corals appear to have a way around this barrier that seems to allow them to break this evolutionary rule (Figure 4).

Only rarely does a new genetic mutation occur that gives an individual such a reproductive advantage. This slow process of waiting for rare mutations in a particular set of cells can be particularly problematic given the rapid nature of climate change. However, for some organisms, like corals, the segregation of reproductive cells from all other cells may occur later in development or may never occur at all, allowing a path for genetic mutations to travel from a parent's body to its offspring.

Corals can reproduce both asexually (through budding and colony fragmentation) and sexually, by producing egg and sperm cells. For the Elkhorn corals studied here, which broadcast their egg and sperm cells into the water in spawning events, eggs from one coral colony are usually fertilized by sperm from a neighboring colony. However, the research team found that some Elkhorn coral eggs developed into viable offspring without a second coral being involved, a kind of single-parent sexual reproduction.

Source: Eberly College of Science, Penn State University

The Elkhorn coral, Acropora palmata, grows into large stands via polyp budding and fragmentation so that many colonies belong to the same clone or genet. During growth, mutations can accumulate in its cells and new research shows that the Elkhorn coral is able to pass these mutations onto to their sexual offspring. This is unlike most animals that prevent such a transfer from the body to reproductive cells.

Figure 4

scientific marine research

SELECTED PROJECTS 2022

SEALINK Project continues on Curacao

In 2020, Minister of Education, Culture and Science, has announced that more than 7 million euros had been awarded to two projects within the NWO program Caribbean Research to strengthen the knowledge system and the embedding of scientific research in the Caribbean part of the Kingdom of the Netherlands. The research programs focus on issues that are of great societal and scientific importance for the Caribbean region and facilitate the transfer of knowledge via education and outreach. This is the first time that NWO has funded programs of this size in the Dutch Caribbean.

One of these two awarded projects is the SEALINK with program chair Prof Dr Mark Vermeij (University of Amsterdam, CARMABI Curacao). The project kicked off in the fall of 2021 when ~30 researchers involved in the project visited Curacao. The SEALINK Program will establish an integrative, transdisciplinary research program merging geology, hydrology, ecology, and sociology. This program will bring together a diverse consortium of scientists to create a new tradition of integrative, transdisciplinary science in the Dutch and wider Caribbean.

The program will leverage the remarkable scientific value that exists across the six islands of the Dutch Caribbean due to their existing differences in geology, coastal morphology, freshwater abundance, erosion, coastal development, and sewage infrastructure. By bridging multiple fields of research, SEALINK will reveal how natural processes and human influences along the land-sea continuum interactively shape the future of coral reef communities, and how this in turn affects the ability of coral reef systems to provide valuable benefits back to the human communities that live, work, and play just steps away (Figure 5).

For more information: https://www.sealinkcaribbean.net/

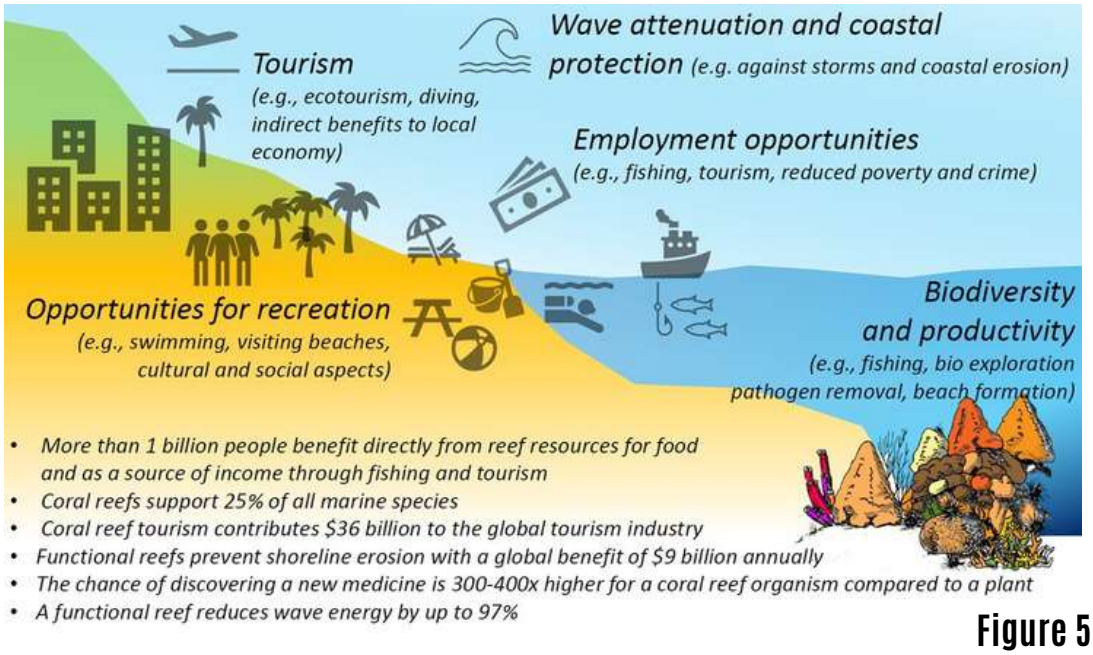


Figure 5

SEALINK will reveal how natural processes and human influences along the land-sea continuum interactively shape the future of coral reef communities, and how this in turn affects the ability of coral reef systems to provide valuable benefits back to the human communities that live, work, and play just steps away.

scientific marine research

SELECTED PROJECTS 2022

Sponges 'sneeze' to dispose of waste

Sneezing out mucus may be one of the oldest ways for organisms to get rid of unwanted waste. A group of researchers found that sponges, one of the oldest multicellular organisms in existence, "sneeze" to unclog their internal filter systems that they use to capture nutrients from the water. Additionally, authors find that other animals who live with the sponges use their mucus as food.

A sponge sneeze takes about half an hour to complete. Sponges gather food for themselves by filtering out organic matter from the water. They draw in and eject water from different openings, and sometimes the sponges will suck in particles that are too big. This is when the "sneezing" mechanism comes in handy. In videos that the authors included in the paper, you can see the water inlets slowly release mucus, and the mucus will accumulate at the surface of the sponge. Occasionally, sponge tissue will contract and push the waste-containing mucus into the surrounding water.

The paper recorded "sneezing" behavior in two species of sponges, the Caribbean tube sponge Aplysina archeri and another Indo-Pacific species of the genus Chelonaplysilla.

Source: Phys.org

Corals 'eat' using conveyer belts made of mucus

Coral reefs are a paradise, both for divers and wildlife: They provide a home or a feeding ground for nearly one-quarter of all life in the ocean. But exactly how coral nourishes itself has long been a mystery. Scientists have struggled to understand how coral, which is made up of thousands of immobile, genetically identical polyps, shares and regulates resources among its many parts.

To investigate, researchers coated 14 species of coral—10 in the lab and four in the wild—with tiny fluorescent beads, which are each smaller than a pinhead and glow under light-emitting diode light. The illuminated beads helped the scientists track how water and particles circulated around the polyps The fluorescent tracers showed that corals, including the brain shaped Diploria labyrinthiformis, work together like laborers on an assembly line to move water through branching currents on their surfaces and within the folds that connect individual polyps. Groups of polyps form subnetworks that move water and nutrients along; these groups are slicked in varying concentrations of mucus, which pull particles, like conveyer belts, into hungry corals' mouths.

Source: Science.org

scientific marine research

SELECTED PROJECTS 2022

Scientific research in the Caribbean part of the Kingdom on the rise

The research that takes place on and into the Caribbean part of the Kingdom of the Netherlands was inventoried in 2022 by the Rathenau Institute. How much research do organizations on the six islands carry out? What research is being done in the Netherlands and Europe? What is the research about and with whom do organizations on the islands cooperate? This study was done at the request of the Ministry of Education, Culture and Science, which is considering a follow-up to the Caribbean Research Programme, which will end in 2022.

The results of this study showed (amongst others) that research on and into the islands has grown in recent years, since 2012, the attention for research on and into the Caribbean part of the Kingdom has increased, both in the Netherlands and on the islands themselves and that the most common research themes are: (public) health, nature conservation and the Dutch Caribbean identity (Figure 6).

Source: Rathenau Institute

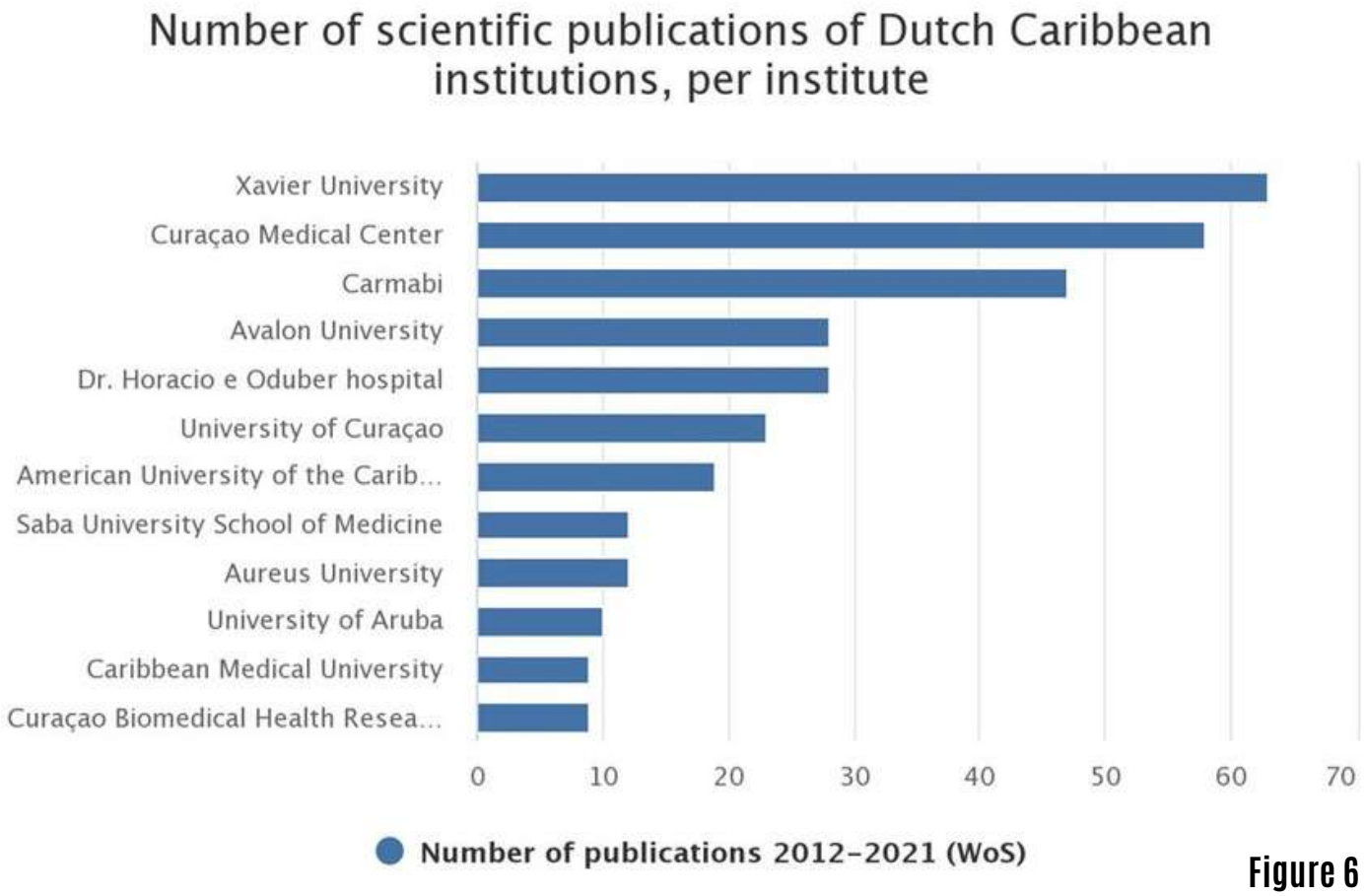


Figure 6

Source: Web of Science, editing Rathenau Instituut. Extraction 6 December 2021.
Notes: This overview contains only institutions with more than five publications. Included are articles, reviews, letters and proceedings papers. the Curacao Medical Center was named St. Elisabeth Hospital until 2019.

scientific marine research

SELECTED PROJECTS 2022

Sealink expedition 2022

From 7-18 April scientists of NIOZ on board the RV Pelagia (Figure 7) to collect data and samples in the Sealink project. In the interdisciplinary Sealink project, Dutch and Caribbean scientists are investigating how water quality affects coral reef health along the coast of Curacao. The effect of water quality on ecosystem functioning is influenced by processes that happen on land (groundwater flow, run-off and coastal development), as well as processes happening in the ocean (hydrodynamics, mixing).

The coral reefs on Curacao are situated between the land and the ocean and are therefore influenced by all these processes. For example, substances like pollution can flow into the sea after a rainstorm. But ocean currents can bring the hazardous substances to coral reefs further from the source of the pollution. During this expedition NIOZ researchers aim to determine how the water flows around the island of Curacao and define the biological and geochemical characteristics of the different water layers by collecting water samples. Water turbulence and mixing in combination with the bottom topography will determine how chemical and biological substances are distributed along the island and what potential influence they can have on coral reef health and biodiversity.

Source: NIOZ

RV Pelagia leaving Willemstad on 9 April 2022. Photo: NIOZ.

Figure 7

scientific terrestrial research

SELECTED PROJECTS 2022

Biological inventory of military practice and firing range Wacawa

The Carmabi Consultancy department and Wageningen University and Research continued the research, which commenced in 2021, on landscape ecology and vegetation and the Curacao white-tailed deer (Odocoileus virginianus curassavicus) population of the former Wacawa and St. Hyronimus plantation. The area is in use as military practice and firing range used by the Dutch Ministry of Defence and different local parties.

The main aim of the research is to provide detailed information on the state of nature of the area to provide a base layer for the development of a standardized practice map, detailing which military practices are conducted and how these are located spatially to minimize impacts on nature.

The ecological values of the landscape were surveyed in 2022, based on over 150 survey locations, and will be analyzed and reported in 2023. A diverse flora and many different landscape ecological vegetation types have been found and described, from the coastal limestone terrace landscape and accompanying species to the diabase and knip landscapes more inland. Overall the state of vegetation was found to be well developed. Especially the areas of Seru di Kueba and the Table mountain of St. Hyronimus included well developed vegetation and high natural values for the island of Curacao.

The Curacao white-tailed deer survey was conducted by use of wildlife camera's following a distance sampling protocol, based on 38 deployment locations. Deployment locations were randomly distributed covering the entirety of the Wacawa and Hyronimus plantations and were surveyed for at least 3 months. The survey was in parallel conducted in the Carmabi managed Christoffelpark, with another 39 deployment locations. Wildlife camera survey will be finalized in early 2023.

Biological inventory of military practice and firing range Wacawa - Two young Curacao white-tailed deer (Odocoileus virginianus curassavicus).

scientific terrestrial research

SELECTED PROJECTS 2022

Resurvey of forest stand structure Christoffelpark

Four of the eight forest stand structure plots in the Christoffelpark have been resurveyed in 2022 after the initial survey in 1997. The original protocol tagged trees using aluminium numbered tags and measured diameter of all trees bigger than one cm diameter in eight permanent 50m x 50m survey plots. The 2022 research remeasured all trees still present after the 1997 survey, often still having the original tags, and tagged and measured all new grown trees in similar fashion. The research was conducted together with students of Wageningen University and Research, the four remaining permanent plots will be surveyed in 2023.

Permanent vegetation plots provide great insights into the changes and succession of vegetation, especially following management interventions. Since the removal of introduced herbivores from the Christoffelpark in the early 1990s and the reduced impacts on vegetation from for example extensive tree felling and agricultural land use as part of the plantation era, vegetation is expected to have recovered.

Following the initial results of the repeated measurement of trees of the permanent survey plots it becomes clear that the forest stand structure is now more densely populated by trees compared to the 1997 situation. All plots saw a sharp increase in the number of trees as well as changes in tree species composition and healthier recruitment curves. These observations are indicative for a recovering and more natural forest stand structure and provide positive perspective for the recovering of Curacaos natural vegetation.

Resurvey of forest stand structure Christoffelpark - Historic tree tag in surveyplot Christoffelpark.

scientific terrestrial research

SELECTED PROJECTS 2022

Floristic diversity and vegetation research Aruba

Together with Wageningen University and Research, Carmabi visited Aruba to continue work on remapping vegetation after the initial 1999 survey (conducted by Carmabi) and the 2021 visit.

The field visit included the survey of 75 historic vegetation plots to understand if vegetation has changed by use of standardized protocol. Staff and volunteers of Fundacion Parke Nacional Aruba (FPNA), the local park management organization, were trained in using the protocol.

During the research 25 new plant species were recorded for the island, some which were already known to Bonaire and/or Curacao, others completely new to the ABC islands. Amongst the newly recorded species for Aruba there were both non-native and native range species.

Floristic diversity and vegetation research Aruba - View from Jamanota hill overlooking Hooiberg.

scientific terrestrial research

SELECTED PROJECTS 2022

Floristic diversity and vegetation research Statia (St. Eustatius)

Wageningen University and Research and Carmabi visited Statia to scout the island for future vegetation surveys and to get familiar with the local flora.

The visit included a start of resurveying historic vegetation plots from 1999 and helped the researchers to become familiar with the native flora of the island. The flora of the relatively small island is challenging since there are large differences in elevation, geological formations and soils giving rise to a large diversity with over 600 species of vascular plants.

The differences between the limestone of the White Wall formation, the sandy beaches, the rough cliffs and the Quill volcano give rise to this very diverse vegetation.

The collaborative research will be continued in 2023 with a two-week field trip to resurvey all of the 85 historic survey locations to provide insights in the change of vegetation.

Statia - View on Venus Bay, Boven National Park.

scientific terrestrial research

NATIVE PLANT NURSERY

Increasing number of plants

The Carmabi native plant and tree nursery is located in the Christoffel National Park and provides an important platform for terrestrial research. The main goal of the nursery is to study the islands' flora in detail, focussing on all stages of development of our native plants. This greatly improves our understanding of landscape ecology and vegetation.

Over the years, many new native species were successfully germinated in the native plant and tree nursery and more plants are now cultivated.

The successful germination of new species, helps to expand the knowledge of the native flora of Curacao. Newly germinated species included, amongst others, *Jacquinia arborea* and *Maytenus versluysii*. The rare tree *Guaiacum sanctum* was germinated in large numbers.

Over the last couple of years, the total number of plants and species greatly increased. To facilitate this increasing number of plants in the nursery, the greenhouse was expanded and is now tripled in size. This allows us to have larger stocks of native plants and trees available for landscaping purposes.

In total, over 130 species are currently cultivated in the Carmabi native plant and tree nursery.

Native plant and tree nursery - Young tree seedlings growing in the native plant and tree nursery.

advice & consultancy

CONSULTANCY

The Carmabi Consultancy department received requests on nine occasions, either as part of developments or to assist with scientific surveys. The department also received many requests for biological information from organizations and the public.

Biological inventories were conducted to provide information on the natural values of different areas on Curacao and terrestrial research was conducted on landscape ecology, vegetation and wildlife on Curacao, Aruba and St. Eustatius.

The consultancy team assisted other Carmabi departments, for example with the implementation of national park management strategies and the development of educational materials. The department also expanded the native tree and plant nursery to house the increasing number of species and plants.

The Curacao White Tailed Deer in the Christoffel National Park.

CONSULTANCY

SELECTED PROJECTS

Biological inventory of plantation Bloemhof

The department conducted a biological inventory of former plantation Bloemhof at the request of the owner. During prolonged rain periods, the plantation faces a high influx of water from the upland watershed.

To better manage this flow of water, general maintenance to waterworks and a series of measurements have been proposed.

The study conducted by Carmabi aimed to provide data for decision makers if the general maintenance and proposed measurements can take place in the Park zoned area (EOP) of plantation Bloemhof.

Biological inventory of plantation Bloemhof - Well developed gully vegetation.

Biological inventory of plantation Steenwijk

The former plantation Steenwijk was the ecological values of the landscape were surveyed to assist with the creation of a sustainable development plan for the area zoned for tourism (EOP). The area, located on the South coast close to Saliña Jan Thiel, consists of different limestone terraces and a large seasonal gully (locally known as rooi). The vegetation of the area was well-developed and a diverse avifauna was observed.

Observed nesting Blue-tailed Emerald (Chlorostilbon mellisugus) at plantation Steenwijk.

park management

FOUR TERRESTRIAL PARKS

One of the walking trails in the Christoffel Park.

One of the main focuses of Carmabi is nature management and nature conservation. The Parks Department of Carmabi is responsible for the management of four terrestrial parks: The Christoffel National Park (which includes the Savonet Museum), the Shete Boka National Park, The Hato Caves and recently the National Park Rif St. Marie Hermanus has been acquired by Carmabi for preservation and management.
The management of The Hato Caves is outsourced to Indian Caves BV. The parks are among the most popular attractions on the island for both locals and tourists.

Christoffel National Park
The Christoffel National Park compromises more than 2300 ha. of protected land and has the highest biodiversity in the ABC islands. The park is also home to an array of animals and plants including several endemic species. Visitors of the park can go hiking and climb the Christoffel Mountain.

Shete Boka National Park
The Shete Boka National Park is a coastal stretch of land consisting of thirteen inlets. Aside from its importance as a crucial turtle nesting site, the Shete Boka National Park offers spectacular views of the incoming waves and rock formation along the island's northern coast.

Hato Caves
The Hato Caves is the biggest and most prominent cave on the island. Formed more than 200.000 years ago below the see level, the Hato Caves is currently one of the most beautiful and popular natural occurrences on the island. Alongside its eminent beauty the Hato Caves offers a glimpse into the rich history of Curacao, from the remains of petroglyphs to its importance as sanctuary for runaway slaves.

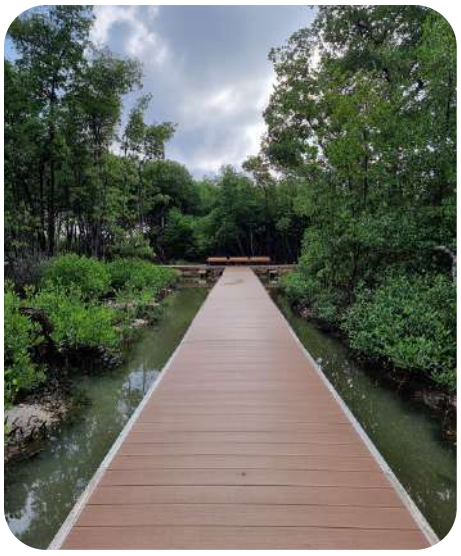
Rif St. Marie-Hermanus
Carmabi is establishing the new "National Park Rif St. Marie-Hermanus". The Bailey Bridge at the outlet of the Saliña Rif St. Marie has been constructed already. Also a camping place has been constructed. We are now looking into options to establish a ticket office at the entrance of the park. The park offers five stunning trails for visitors to enjoy a hike and enjoy the flora and fauna of the area.

View of Seru Grasia in the Christoffel National Park.

One of the visitor platforms at the National Park Shete Boka.

park management

TWO MARINE PARKS



The boardwalk in the Curacao Rif Mangrove Park.

Besides the four terrestrial parks, two marine parks are also managed by Carmabi: The Curacao Rif Mangrove Park and the Curacao Marine Park. The Curacao Rif Mangrove Park has opened its doors to the public in July 2022 and is already starting to become one of the most popular attractions for visiting tourists and the local public.

The Curacao Rif Mangrove Park

The Curacao Rif Mangrove Park is a remarkable city park on Curacao that consists of mangrove trees. Mangroves are essential for Curacao. These trees provide food and shelter for marine animals and are also used as nursery grounds for many marine animals. In addition, the mangroves provide coastal protection in the event of a hurricane, for example.

The Curacao Marine Park

The Curacao Marine Park is located off Curacao's southeast coast. It stretches from Lijhoek (12.070692°N, -68.873258°W) at Jan Thiel along 21.7 kilometers (13.5 miles) of shoreline from the low-water mark (or the openings of inland bays) to a distance of 100 meter from shore, to and around the most eastern tip of the island at Oostpunt to a location with coordinates 12.063775°N, -68.759379°W. The SPAW Area 1 includes 217 hectares of pristine fringing reefs.

The placement of one of the buoys in the Marine Park.

park management

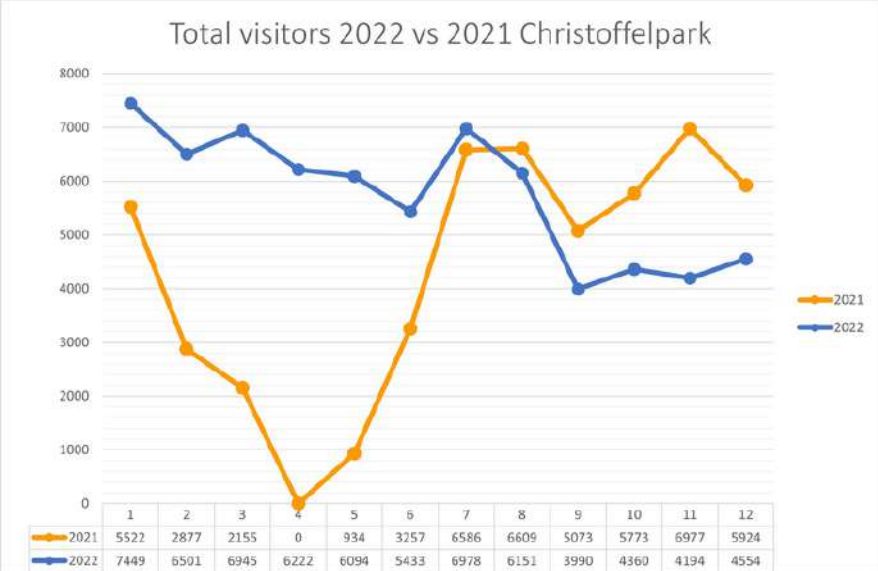
OVERALL VISITOR STATISTICS CHRISTOFFELPARK

The Christoffel National Park offers a variety of recreational activities to its visitors such as hiking, mountain climbing, camping and guided tours such as jeep safaris, bird watching and deer watching.

In 2022, the Christoffel National park welcomed 68.871 visitors, which is an increase of 31% compared to 2021 in which 52.502 visitors visited the park. (Figure 8)

There were 9.261 local visitors and 52.595 tourist visitors in the park in 2022. (Figure 9) 2.198 visitors visited our parks through the tour operators and 1.500 people visited the museum Savonet only.

FIGURE 8



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2022	7449	6501	6945	6222	6094	5433	6978	6151	3990	4360	4194	4554

	1	2	3	4	5	6	7	8	9	10	11	12
Lokalen	1416	981	1027	788	812	626	1324	796	362	462	258	409
Toeristen	5273	4737	5049	4876	4799	4423	4906	4713	3224	3449	3413	3733

FIGURE 9

park management

OVERALL VISITOR STATISTICS

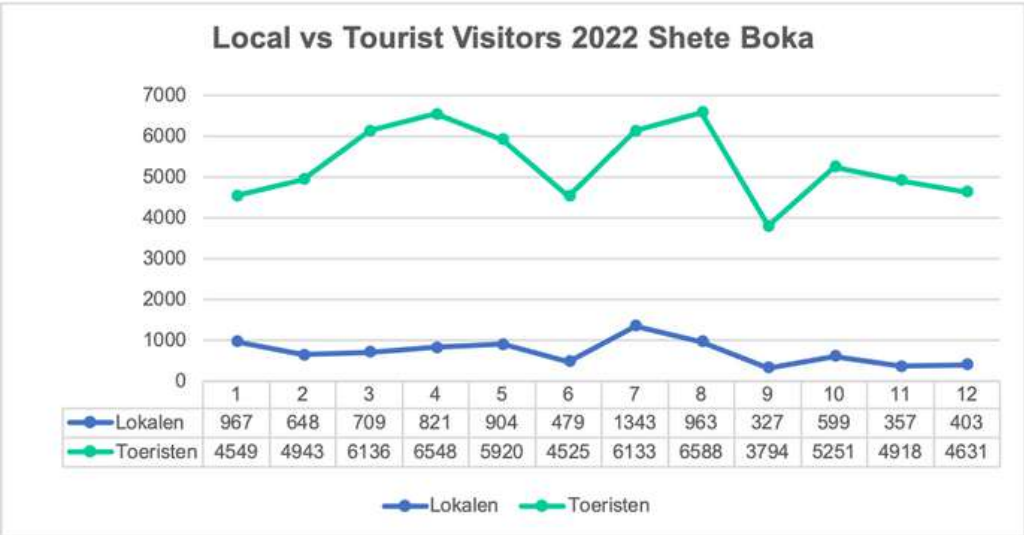
SHETE BOKA PARK

FIGURE 10

The National Park Shete Boka welcomed 103.527 visitors in 2022. This is an increase of 87% compared to 2021 in which 55.257 visitors visited the park. The mentioned amount includes local visitors, tour operators and cruise operators bringing passengers by touring cars. (Figure 10)

There were 8.520 local visitors and 63.936 tourist visitors in the park in 2022. (Figure 11) In 2022, a total of 31.071 visitors were from tour operators.

FIGURE 11



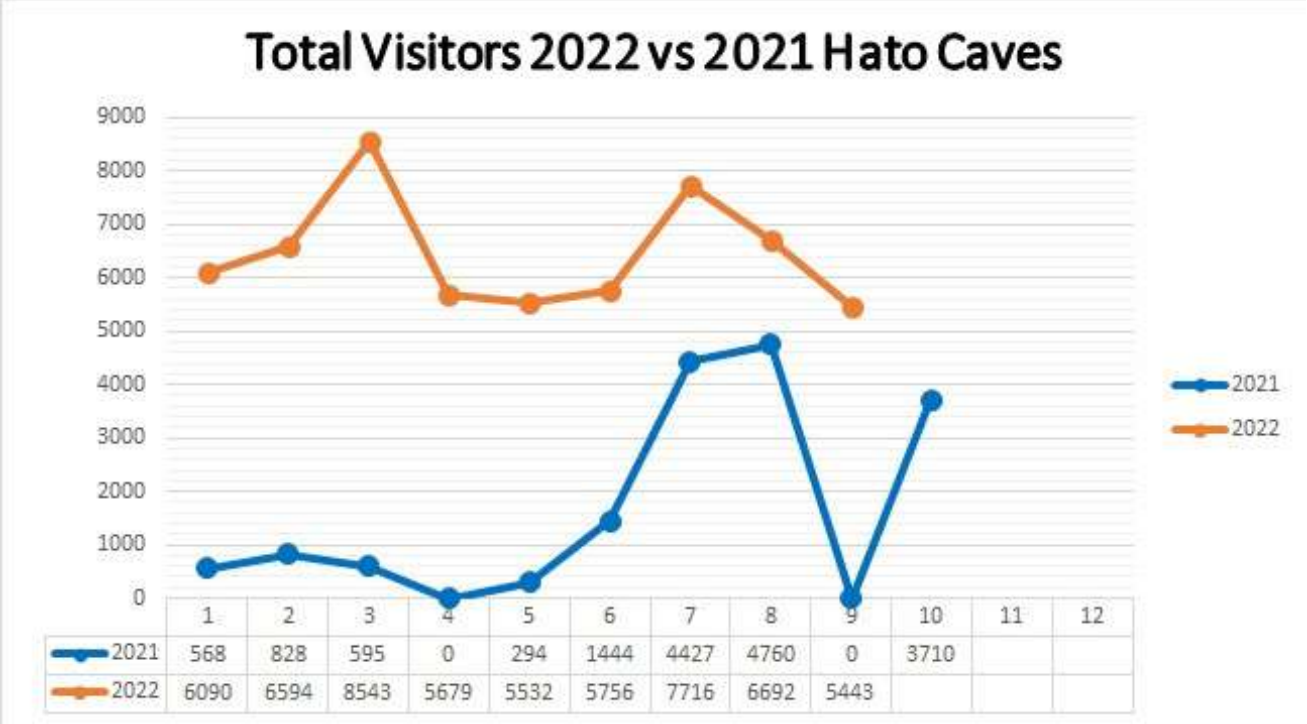
park management

OVERALL VISITOR STATISTICS

HATO CAVES

A total of 89.047 visitors visited the Hato Caves in 2022. This is an increase of 192% compared to 2021 in which the Hato caves welcomed 30.505 visitors. (Figure 12)

FIGURE 12



	1	2	3	4	5	6	7	8	9	10	11	12
2021	568	828	595	0	294	1444	4427	4760	0	3710		
2022	6090	6594	8543	5679	5532	5756	7716	6692	5443			

park management

OVERALL VISITOR STATISTICS

CURACAO MANGROVE PARK

As we opened our doors in July of 2022 we have seen that the park is very popular amongst Curacao residents and visiting tourists.

In 2022 the Curacao Rif Mangrove Park welcomed a total of 14.687 visitors. The mentioned amount includes i.e., a total of 9.602 local visitors and 5.085 tourists. (Figure 13, 14, 15)

We do not yet have the ability yet to compare our visitors with the previous year. As we proceed in 2023 with promoting our park to visiting tourists and residents we aim to see continuous growth with our visitors.

FIGURE 13

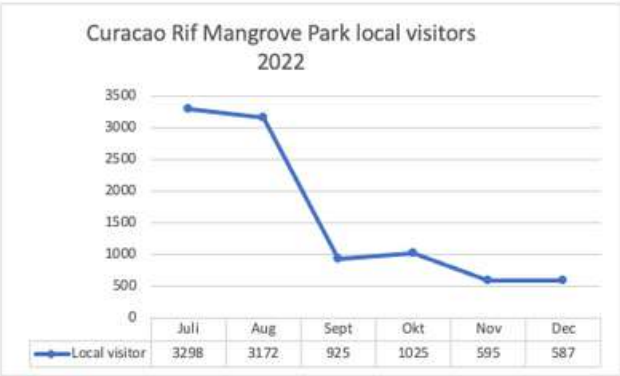


FIGURE 14

FIGURE 15

park management

SELECTED PROJECTS

SHETE BOKA PARK

Selected projects and other activities

Throughout the year, Carmabi has initiated several projects for the Shete Boka National Park to manage the paths, the inlets and to ensure a safe and pleasant visit to the parks by visiting tourists and locals.

Make Over Shete Boka Park Entrance

The Shete Boka National Park Entrance was given a makeover in which the ticket office and restroom facilities were painted with brighter colors.

Make over of the Shete Boka entrance and restroom facilities.

Fence on the well at Pos di Chal in the Shete Boka Park.

Fencing the "Pos di Chal"

As we combine showcasing the artifacts left behind after the abolition of slavery with the safety of our visitors, we take various measures to make their visit a safe one.

One of those measures taken in 2022 was fencing the 'Pos di Chal' so that so visitors are safe walking around it.

park management

SELECTED PROJECTS

CHRISTOFFELPARK

Selected projects and other activities

Throughout the year, Carmabi has initiated several projects for the Christoffel National Park to manage the trails, the museum, the security and to ensure a safe and pleasant visit to the parks by visiting tourists and locals.
A selection of our projects in the park.

Upgrade of the security system in the Christoffelpark

A security system consisting of security cameras and a conjoined alarm system was installed in the Christoffel Park. Specifically there are now cameras placed at the entrance of both the mountain side and the northern side of the park. Cameras were also placed inside each of the buildings currently being used daily (ticket office, restaurant, management office).

Upgrade of the security system at the Christoffelpark.

park management

SELECTED PROJECTS

CHRISTOFFELPARK

Replacement of doors and windows

The doors and windows around the Savonet complex were all replaced and repainted.

Maintenance on the doors of the ticket office.

Safety Instructions - Forms

Starting September 2022 safety instructions were introduced to our visitors through forms that have to be read and signed before purchasing a ticket to climb the Christoffel Mountain. (Figure 16)

Through these, we strive to better inform our clients of the safe way to climb the mountain in an enjoyable manner.

SAFETY REGULATIONS TO CLIMB CHRISTOFFEL MOUNTAIN

You are about to climb the Christoffel mountain. Read our safety instructions carefully, sign it and hand it back in at the cash register before climbing the mountain. Signing is mandatory!

1. Preparation for mountaineering

The Christoffelberg is a tough climb and you need a good condition for this. You shouldn't underestimate this. The mountain can be climbed from 6 a.m. to 10 a.m. We do this consciously because of the heat. We also recommend:

- At least 2 liters of water per person. If you do not have enough water with you, you can buy water at the cash register.
- Good (mountain) shoes
- A cap or hat against the sun and sunscreen
- A charged phone
- Eat enough on the go so that you can maintain your concentration and fitness and take plenty of breaks. It takes an average of an hour to climb the mountain to the top and also an hour down. Preferably go during the week. On weekends it is often busier.

2. Mountaineering is healthy and fit

Mountaineering can only be done if you are healthy and fit. If you are on vacation, make sure to acclimatize sufficiently before making the climb. Did you go out last night and drink a little too much and sleep too little? Then choose another day to climb just to be sure.

3. Self-knowledge

Don't push your limits. That keeps you safe. Stay on the designated route and do not deviate from this. On the mountain there are several sections of high difficulty, if these pieces are too difficult for you, stop climbing and do not go beyond your own limits. Don't just go mountain climbing. Better safe than sorry!

4. Take each other into account

The trip is of course only a success if everyone enjoys it. So always keep a close eye on everyone and do not do dangerous things. It is sometimes busy on the mountain, take each other into account. Give each other the space to climb safely and, if necessary, let others pass in a safe way.

5. Routes to the top

There are near the top two routes you can take. At the route on the right around the mountain you will be guided along an abyss. If you suffer from a fear of heights, this may not be the best route for you. At the route that goes left around the mountain, you will not pass here.

6. Weather and rain

In case of rainfall, we close the mountain and / or the park for safety reasons. But sometimes it can also happen that you are already on the mountain when it starts to rain. This creates the chance to slip. So keep this in mind.

Did you take a nice picture during your climb or at the top of the mountain? Tag us @christoffelnationalpark and who knows, maybe your photo will be shared on our socials!
In case of emergency, please call this number: **+5999 8640363**. Save this number to your phone!

If you agree with the following, please fill out the form and sign it

- Yes, I have read the above information and follow the safety regulations to climb the mountain.
- Yes, I am in good shape and have no medical problems (not even recently)
- Yes, I have enough water with me and the right equipment to climb the mountain

Date:..... Time:..... Name:.....

Telephone number:..... Signature:.....

The new safety instruction form

FIGURE 16

park management

EVENTS

CHRISTOFFEL PARK

Team Willemstad Savonet Race 2022

Aside from the yearly Open Christoffel Park Day, the Team Willemstad Savonet Race 2022 was held in the Christoffel and Shete Boka National Parks.

Starting and ending at the Christoffel National Park, this race also included passage through the Shete Boka National Park.

The bikers at the start of the Savonet Race.

Prime Minister Pisas visiting the Open Day at the Christoffelpark.

Open Day / Dia di Sabaneta 2022

The Open Christoffel Park day has also been held yearly in combination with the celebration of the neighborhood Savonet (Dia di Sabaneta).

This year the Open Day was held on November 27.

Despite bad weather on the island on that day it was enjoyed by many, including some of our leaders such as the Prime Minister.

Visitors could climb the Christoffel mountain free of charge. Interested visitors could also join a guided hiking tour to the north side if the Park.

For the more adventurous visitors, safari tours were held every hour in which participants got an introduction to the local flora and fauna.

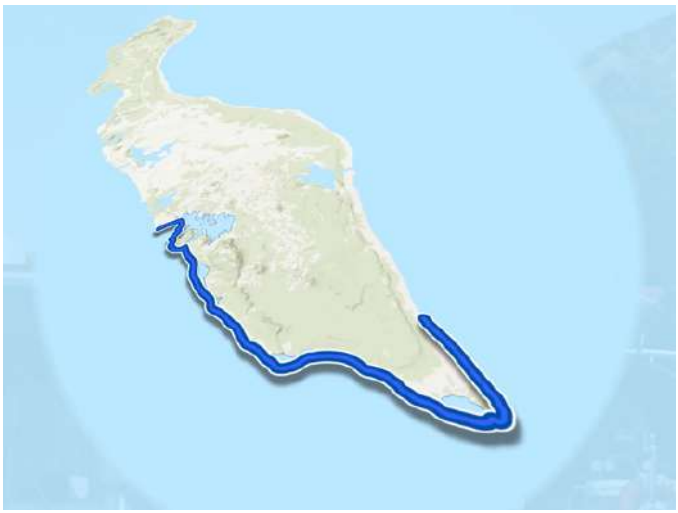
One of the jeep safari's in the Christoffelpark.

park management

SELECTED PROJECTS
MARINE PARK

Selected projects and other activities

In 2022 Carmabi established a new Marine Parks Department that is responsible for the management of the Curacao Marine Park (SPAW-area 1) and which will be also responsible for the management of the Curacao Rif Mangrove Park in Otrobanda in 2022. Throughout the year, Carmabi has initiated several projects for the Curacao Marine Park.



Location Curacao Marine Marine Park. **FIGURE 17**

Management Curacao Marine Park (SPAW-Area 1)

One of the main focuses of Carmabi is nature management and nature conservation. The Marine Parks Department is responsible for the management of the Spaw-Area 1 (CMP). The Curacao Marine Park (CMP) is located at the southeastern coastline starting at the western tip of Caracas Bay (Lijhoek) to East Point (Punt Kanon) and beyond the corner it stretched 20 km along the coastline and 100 meters offshore. (Figure 17)

Stakeholders

In 2022 the Marine Parks Department consulted with different stakeholder, patrolled the entire area and continued working on the design and production of the buoys, they successfully replaced 8 dive buoys in the Curacao marine Park and are working on including new buoys for the fisherman.

Head of the marine park (Duvan) and ranger (Roland) together with KUP, a fishery corporation.

park management

CURACAO MARINE PARK

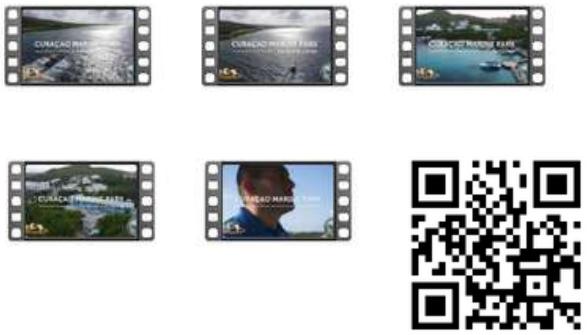
Selected projects and other activities

Film series about the marine park

To help with the protection of the SPAW area-1, the Marine Parks Department has started a film series. The goal is to make everyone more aware of the importance of our corals reef.

This film series consists of the following episodes:
- meet the team
- why is the Marine Park important?
- why are we putting buoys?
- surveillance in the Marine Park
- why do we clean up?

https://youtu.be/sJPzQ1098wM (see Figure 18 for the QR code link to this page)



Curacao Marine Park Film series.

FIGURE 18

Giving a helping hand when needed

During one of the filming days near Santa Barbara Beach, a small dinghy had engine trouble.
We decided to help the captain of the dinghy. When we were alongside, we discovered that the captain of the dinghy had no more fuel in his tank and we towed him towards the gas station. When we arrived at the gas station, the captain of the dinghy thanked us and then we continued with our filming day.

Dinghy with engine trouble assisted by the Carmabi Team.

park management

SELECTED PROJECTS

MARINE PARK

Boat training

The Marine Park Rangers must obtain the professional boat license. Conditions for this are having the VHF diploma and having the Red Cross first aid diploma. The rangers obtained these 2 diplomas and are now taking the course for the professional boat license. They passed the theory exam and are now working on the practical part.

Roland and Kevin training the MOB (Man over Board) situation for the boat license.

Collaborations

The marine park department received reports from concerned divers. One of them was about a turtle that was trapped in a gillnet and they went to free it, however the diver was afraid to get the net out of the water and came to us the next day to report this incident and requested our assistance.

We directly reported the incident to the Coast Guard, who on their turn, requested our assistance in removing the gillnet from the water to prevent further damage to marine life.

Carmabi Rangers and the Coast Guard collaborating to free a turtle that was trapped in a gillnet.

park management

SELECTED PROJECTS

MARINE PARK

Maintenance of our vessel "YARU"

Our vessel "YARU" is required to be inspected annually. The maintenance on the vessel is usually carried at our facilities in Piscadera.

Work includes wiring the solar panels, horn, VHF antenna, bilge pump flutter, cleaning life jackets, scrubbing the hull and repairing the navigation lights.

We also created new tank holders. The engines also received its required annual maintenance, which includes oil change, replace anodes and cleaning the propellers.

Roland working with Kevin on the new tank holder and "YARU" going for maintenance.

Working area for our diving equipment

The dive equipment and maintenance of the equipment is also carried out by the Marine Park department.

To properly carry this out and have the sufficient workspace, we adapted our former office closet to ensure all diving equipment can be stored in a proper way.

The upgraded closet for the diving equipment.

park management

SELECTED PROJECTS

MARINE PARK

Marine Park Buoys

The mooring buoys in the marine park are essential for the management and maintenance of the area. The mooring buoys are are designed in such a way that they are more firmly attached, visible and cannot cause harm for the environment or navigation.

In order to do this, we use specific working materials. (PVC pipe, glue, primer, paint, bolt and nuts ect.).

PVC for the buoys.

The bright yellow new buoys at the facilities in Piscadera.

Placement of one of the buoys with the visible Carmabi logo.

Deployment of the buoys

On the 24th of June 2022, we deployed our first four buoys. The buoys replaced buoy number 59 to 62 (tugboat to punt'i piku).

Again, on September 15th, four buoys were replaced. Buoy number 63 to 66 (Eel valley to Fuiksea).

These buoys are provided with reflective tape, Carmabi stickers, type of buoy and a number.

The mooring buoys are also equipped with a yellow rope with a loop to which the boats can be tied. These mooring buoys are set up in such a way that everyone can use them.

park management

SELECTED PROJECTS

MARINE PARK

Patrolling and inspecting buoys

One of the tasks of the Marine Park Department is to patrol and inspect the mooring buoys.

By inspecting the mooring buoys, we can gain insight into the quality of the rope and ensure that we can replace the buoy and rope in time.

Boat trip to the mooring buoys.

Diving out to the buoy to do the inspection.

Pulling out one of the mooring buoy ropes to check the quality.

Special Visit at the Carmabi facilities

We received a working visit at Carmabi from a Member of Parliament: Mr. Carolina. He received a tour and a detailed explanation from our department head Duvan Rios of all work within the marine park department. Subsequently, Mr. Carolina also visited our workshop and received an explanation from ranger Joel regarding the making of the Buoys.

Ranger Joel together with Mr. Carolina.

park management

SELECTED PROJECTS

MARINE PARK

Youth Ranger for a day

From the education department we were requested to guide 3 young VSBO students for a day and help them to gain insight into what exactly a marine park ranger does. They were given a tour of the workshop and received an explanation of the buoys that will be placed in the Marine Park. Than we took them out at sea for a patrol activity. Here they could sail the vessel and instructions from the ranger about the importance of the Marine Park. The Youth Rangers moored one of the buoys while snorkeling.

Preparing to go on the boat patrol.

The youth rangers snorkeling in the Marine Park.

High school students learning about the marine and mangrove park.

Marine park awareness

It is very important to raise awareness of our marine and mangrove park. We would like to give a special thanks to the Curacao Ports Authority (CPA) for inviting us to the World Maritime days at the Matheywerf. Here we were able to give a presentation about the parks to students and make them more aware of our marine life.

Assisting the Carmabi Marine Research Department

Together with students, the rangers went out several times to collect data on the current, temperature, salinity and other things. The students record data from various locations on Curacao for comparison to get information about how people and other factors influence the quality of the water.

In addition to the group that recorded water data, there was also a group that searched for sea snails and other small animals in the mangroves.

Assisting the Marine Research Department.

park management

SELECTED PROJECTS

MANGROVE PARK

Selected projects and other activities

Mangrove areas are diverse and important ecosystems. Diverse underwater life, consisting of algae, sponges and other animals and plants, can be found on mangrove roots. A variety of marine fauna, including fish, crabs and lobsters, can be found in between and on these roots.

Throughout the year, Carmabi has initiated several projects for the park.

Carmabi signed management agreement.

Managing the Curacao Rif Mangrove Park

The Curacao Rif Mangrove Park is a remarkable city park on Curacao that consists of mangrove trees. The park differs from other parks on the island because it offers a unique insight into a special nature reserve. Mangroves are essential for Curacao. These trees provide food and shelter for marine animals and are also used as nursery grounds for many marine animals. In addition, the mangroves provide coastal protection in the event of a hurricane, for example.

On the 11th of April, 2022, Carmabi signed a management agreement with the Government for the management of the Curacao Rif Mangrove Park.

Recruitment and training of staff

To ensure the safety, guidance and education of our visitors and to manage the nature in the park, we immediately recruited our rangers and cashiers.

For protecting, preserving and increasing the natural, educational and recreational value of the Curacao Rif Mangrove Park, the team must have the experience and the knowledge to ensure this.

The park hired 5 Park Rangers and 2 Cashiers. Their training process started right away to ensure the safety and well being and satisfaction of our visitors.

Recruitment and training of the new Park Rangers.

park management

SELECTED PROJECTS

MANGROVE PARK

Doors open on July 1st, 2022!

After a couple of months of learning, training and working together in the park the Mangrove Park officially opened its doors on 1st of July 2022.

At the Curacao Rif Mangrove Park, visitors can enjoy a variety of recreational activities such as walking in the park, guided walking tours and guided kayak tours.

Here they can learn about the history of the Rif area and the flora and fauna of the Mangrove Park.

The first official visitors.

Mangrove Park kayaking area.

park management

SELECTED PROJECTS

MANGROVE PARK

Visits of VIP's

The Curacao Rif mangrove park has been a hit since day one, during the last six months of 2022, the park had the honor to receive a visit of several VIP's. Local and international artists, Ministers, members of the Parliament and school children visited the park, and the list goes on!

Visit from local artists Ephrem J and Alexandra.

Visit by Secretary-General of the Dutch Ministry of Education, Culture and Science.

Visited by Diego Morán.

A delegation of the International Panel on Deltas and Coastal areas (IPDC) from The Netherlands, Aruba and St. Maarten visited.

A visit from local school children during their annual vacation plan

park management

SELECTED PROJECTS

MANGROVE PARK

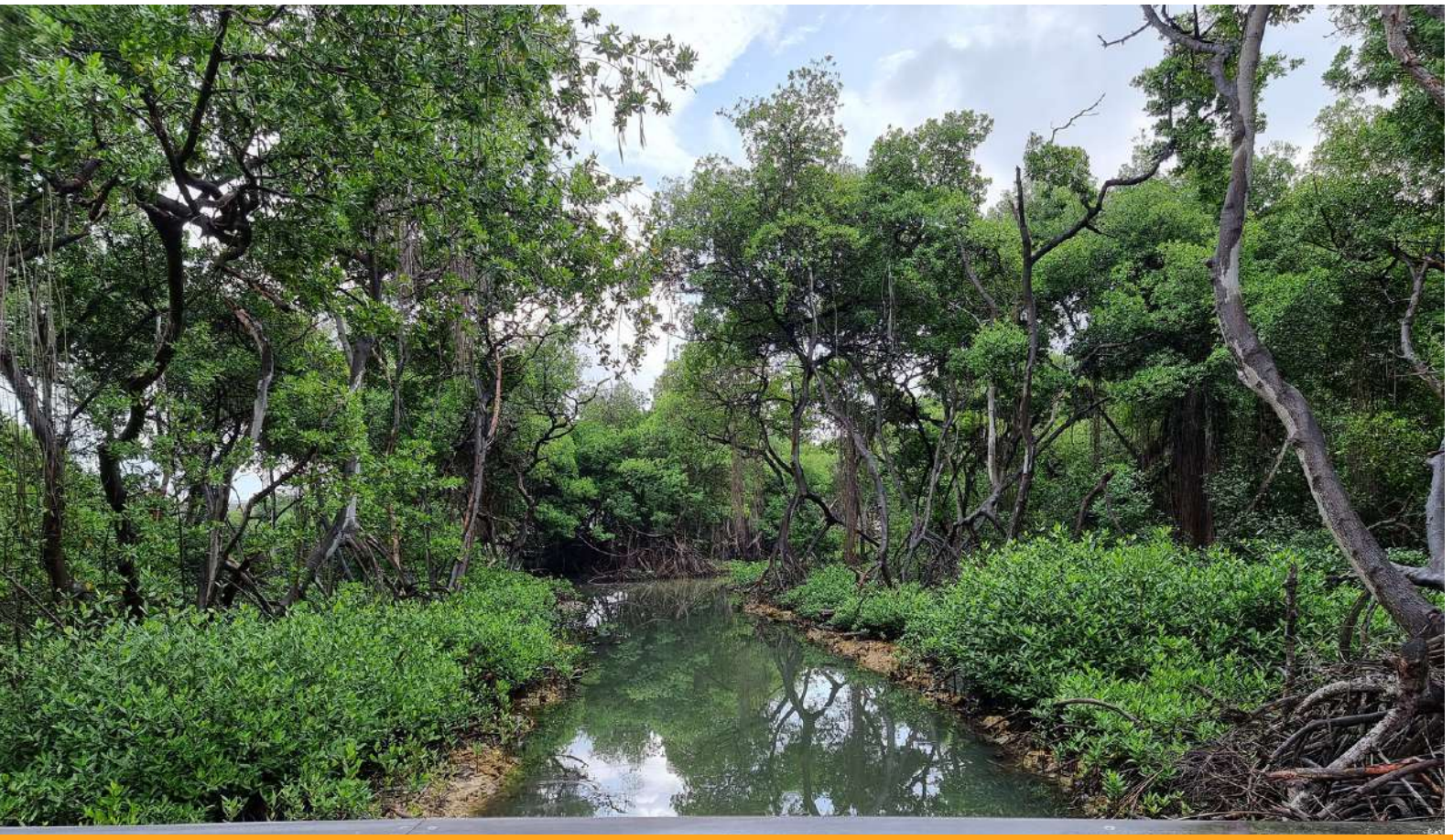
Continuous improvements

The mangrove park has a strong recreational character for local visitors and visiting tourists. It is very important to make the park accessible for everyone, including wheelchair users. With assistance from the government, a new walking path was installed from the entrance by the street all the way to the boardwalk.

Before.

After.

View from the boardwalk on the Mangroves and the Kayak path.



nature & environment education department

EDUCATIONAL PROGRAMS

Carmabi Education is responsible for educational programs for primary school children and secondary education students.

The activities of Carmabi Education's program include:

- Terrestrial Education Program for Primary Education: tours to teach children about our terrestrial nature at Savonet, Christoffel Park and the areas of Daaibooi & Shete Boka.
- Marine Education Program for Primary Education: tours to teach children about Curacao's marine nature at the Marine Education Center at Piscadera and at the Curacao Rif Mangrove Park in Otrobanda.
- School visits with microscopes supporting primary education with the program 'microworld'.
- Secondary Education Program for pre-exam classes with the focus on the coral reef ecosystem and the influence of human behavior on the environment.
- The Marine Youth Rangers is a dedicated group of teens (11–15-year-old) doing year round activities to learn and raise awareness on our marine- and wetlands ecosystems.
- Providing teaching materials for primary schools (Funderend Onderwijs) and high schools (Voortgezet Onderwijs).
- Support students secondary education with their thesis/ paper/ practical assignments on topics related to biology.
- Various other activities to increase general awareness.

St. Albertus College at the Christoffelpark.

TEP at Landhuis Savonet (Christoffelpark).

MEP at the Curacao Rif Mangrovepark.

nature & environment education

PRIMARY EDUCATION

Education Program

The programs for primary education consist of a Terrestrial Education Program (TEP) which includes guided tours within the parks and a Marine Education Program (MEP) which includes educational programs and a visit to the Marine Education Center (MEC).

TEP guides at Savonet.

Terrestrial Education Program (TEP)
The Christoffel Park was visited by children from class/ group 1 to group 8 of our primary school system (ages 4 till 12).

The younger children (group 1 and 2) visited the Christoffel Park as part of a program aimed at introducing them to the nature world around them, i.e., the 'Mondi Misterioso' program. The aim of this program is to learn how to better take care of our nature in a playful way by identifying various species of flora and fauna. In our program 'reptiles', the students (group 3) learn about the habitats, niches and role within the wider Curacao ecosystem of the reptiles that can be found on the island.

TEP: Kids from St. Albertus at Shete boka.

TEP: Kids encounter an Iguana.

Children of group 4 visited the Christoffel Park to learn about birds. The bird lessons involve lessons on our local birds in theory and by observing birds in the park. Group 5 visited the Christoffel park to learn more about trees and plants and how to recognize them. Lessons on wells, agriculture, and ruins around Savonet & Zorgvlied in the Christoffel Park are the topic of lessons for groups 6 and 7, whereas students from group 8 are taught specific lessons in the general nature/ ecology of islands at Shete Boka and Daaibooi.

nature & environment education

PRIMARY EDUCATION

Terrestrial Education Program Exam

All the lessons for the groups 4 up to 8 are followed by a small exam that can be made part of the school report. A total of 9586 children followed an educational program under the guidance of a group of 7 guides.

See figure 19 for a total overview of reached students in Elementary Education and other projects.

1. Terrestrial Education Program (TEP) children participation

Christoffelpark (Mondi Misterioso/ Nos Mondi) Group 1 & 2	1986
Christoffelpark (reptiles, reptilnan) Group 3	1165
Christoffelpark (birds, paranan) Group 4	1480
Christoffelpark (plants, palunan) Group 5	1161
Christoffelpark (Savonet, wells, agriculture and ruins) Group 6	1379
Christoffelpark (Zorgvliet, wells, agriculture and ruins) Group 7	1020
Daaibooi (ecology of an island) Group 8	267
Shete Boka (ecology of an island) Group 8	1128
Total	**9586**

FIGURE 19

Marine Education Program

The Marine Education Program provides a program for schoolchildren in group 6, 7 and 8. All programs involve excursions to Carmabi Piscadera where they receive an interactive program with presentations and a visit to the Marine Education Center (MEC).

As a part of the Marine Education Program (MEP) we started a new program for group 7 of Primary Education, ‘our mangroves’. With a combination of a theoretical part at Piscadera and a visit to the new Mangrovepark in Otrobanda school children learn about the importance of wetlands.

MEP School class in the new Mangrove Park

nature & environment education

PRIMARY EDUCATION

Marine Education Program

Schoolchildren group 6 (9-year-old) follow a program on Turtles and plastic waste, whereas children of group 8 (11-year-old) focus on the importance of marine life and especially corals.

A total of 2279 students followed an educational program at our Marine Education Center at Piscadera and the Curacao Rif Mangrove Park. (Figure 20)

A total of 7 guides has facilities with a classroom, covered patio, and Marine Education Center to run the programs in an interactive modern way.

Kids in the Marine Education Center with Mangrove poster

2. Marien Education Program (MEP) children participation

Group 6: Our turtles	1250
Group 7: Our mangroves	337
Group 8: Our coral reef	692
Total:	**2279**

FIGURE 20

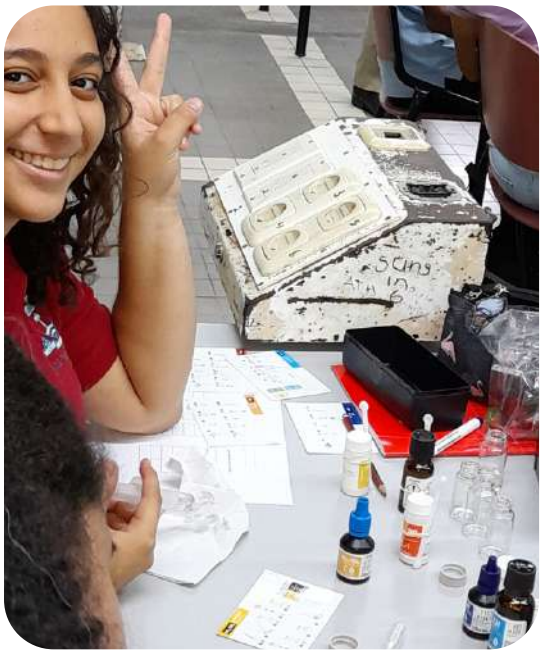
nature & environment education

SECONDARY EDUCATION

Environmental challenges

After a pilot period in March-May of 2022 we started in august of 2022 with the new program 'environmental challenges – water'. With this program we offer a 3-hour program on the school location for pre-exam classes (vsbo 3/ havo 4/ vwo 5) where we offer a combination of theory and practical assessments about the coral reef and the influence of our sewer waste and overfishing.

In 2022 we have reached 12 school classes (vsbo 3/ havo 4/ vwo 5), a total of about 250 students. See figure 21.



Secondary Education Program at Radulphus College (vwo 4)

Secondary Education Program at Maria Immaculata Lyceum (havo 4)

3. Secondary Education Program student participation

Pre-exam classes (3 vsbo/ 4 havo/ 5 vwo)	250
Total:	**250**

FIGURE 21

nature & environment education

SECONDARY EDUCATION

Marine Youth Rangers during their PADI Course

Marine Youth Rangers (MaYoR)

Besides the regular Nature and Environmental school education programs, Carmabi education offers a more extensive and profound nature awareness program. In school year 2022-2023, Carmabi Education started with the Marine Youth Rangers (MaYoRs).

These 31 young people (11–15-year-old) undertake activities twice a month on Saturdays such as snorkeling, diving, kayaking, theory lessons, clean ups to increase their knowledge and awareness of our marine environment. (Figure 22)

Marine Youth Rangers kick of in September 2022

4. Marine Youth Rangers (MaYoR) teen participation

youngsters (11-15 year old) doing year round activities	31
Total:	31

FIGURE 22

nature & environment education

SELECTED PROJECTS

Identification sheets

Identification sheets of the local nature has been made for Secondary Education. These have been printed / laminated and will be given to the schools at the beginning of 2023, together with practice assignments.

A visit to the new Curacao Rif Mangrovepark

A visit to the Christoffel National Park

Childrens book week (kinderboekenweek)

In the children's book week (Oct 31 – Nov 4), the department organized 3 days of events in collaboration with the BNK (library Curacao) in the Christoffel Park and the Marine Education Center with the theme 'giga green / biba berde'. About 350 children primary education participated in this event.

Childrens Book Week at Savonet

Childrens Book Week at Savonet

Escape boxes

Two escape boxes have been developed. By completing assignments children earn numbers from the code of the padlocks. With the code the children can open the boxes and free the (fake) animals. Here we collaborated with D-bottle and Limpi Curacao.

Escape boxes for Primary Education

Marine Youth Rangers during their PADI Course

nature & environment education

SELECTED PROJECTS

Digital Route Mangrovepark

With the PocketGuide hike app, a digital route is being developed for the Mangrove Park. This app will be tested at the end of December/early 2023 and will be launched for visitors to the mangrove park after any adjustments. This hike also serves as a test case for digital hikes in the Christoffel Park and Hermanus / Reef St. Marie.

Monthly Article about our nature

Every month an article is written for the newspapers Extra and Antilliaans Dagblad to inform a wide audience. Alternately written by the education and consultancy department. In addition, from December 2022,

Education will be part of the radio program 'humans & animals' on radio Hoyer 2 broadcasted every Saturday.

Achtergrond

Nos naturalesa ta interesante sigur!

PDF of the article in Antiliaans Dagblad dd. June 14th 2022.

extra Djamabra 26 Mart 2022 19

carmabi

Nos naturalesa ta interesante sigur!

Edukashon Carmabi

Prokreashon

Karkó

Piskarensia dimas

Queen Conch Hatchery Curacao

Educatie video Karko

PDF of the article in Extra dd. March 26th 2022.

Other groups

In addition to the focus on schoolchildren, the education department also offers activities for other groups. For example, foundations such as Pro Bista with their blind and visually impaired clients and the Verriet foundation with the mentally handicapped like to visit one of our parks or the Marien Education Center. For each group we make a program that fits the target group. (Figure 23)

5. Special awareness programs participation

Foundations (i.e. Pro Bista, Verriet), summer schools (fakansiplan)	300
Kinderboekenweek (Children's book week)	350
Total:	650

FIGURE 23

marketing & communications

EXPOSURE OF OUR WORK

Online presence

On social media the marketing and communications department continued looking for more engagement with (future) visitors, stakeholders and the population of Curacao.

The marketing and communications department posted various photo's, video's and content on our social media pages. Currently the following pages are being managed:

Facebook Pages:
- Carmabi Foundation
- Carmabi NME Education
- Christoffel National Park
- Shete Boka National Park
- Curacao Rif Mangrove Park
- Curacao Marine Park

Instagram Pages:
- Carmabi NME Education
- Christoffel National Park
- Shete Boka National Park
- Curacao Rif Mangrove Park

Tripadvisor Pages
- Christoffel National Park
- Shete Boka National Park
- Curacao Rif Mangrove Park

Google Maps
- Carmabi Foundation (Piscadera)
- Christoffel National Park
- Shete Boka National Park
- Curacao Rif Mangrove Park

Insights Facebook & Instagram Pages

For our Facebook and Instagram pages, we post a great diversity of content. The departments and parks are posting interesting content, guided by the marketing department.

marketing & communications

EXPOSURE OF OUR WORK

Audience and statistics Insights Christoffel National Park

An overview of our social media (Facebook & Instagram) statistics for the Christoffel National Park in 2022. (See below figures 24-27)

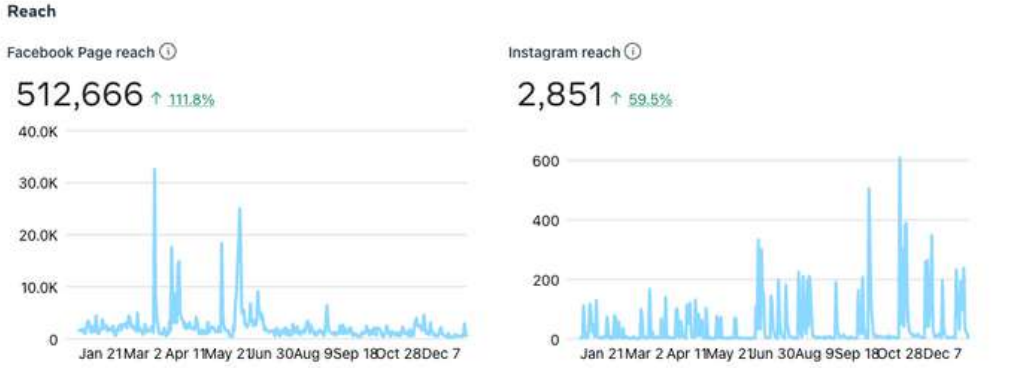


FIGURE 24

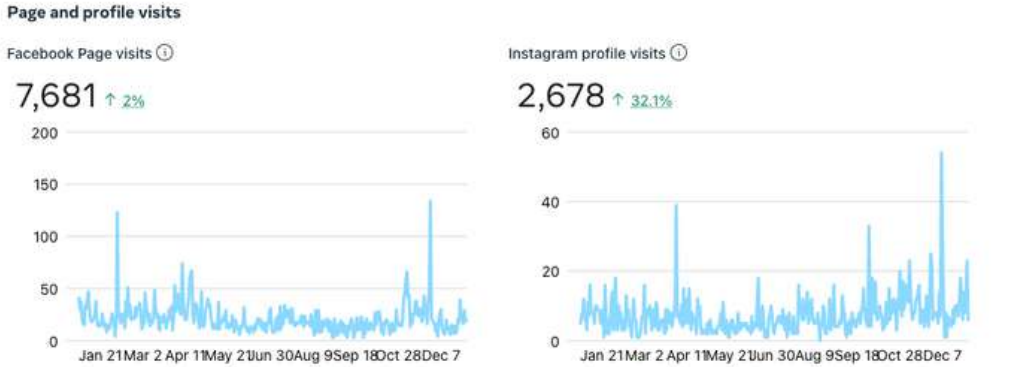


FIGURE 25

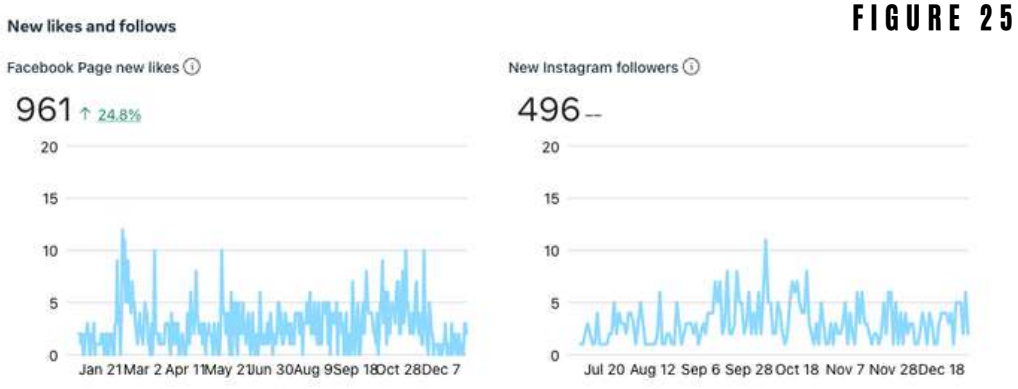


FIGURE 26

Top Three Best Performing Posts on Christoffel National Park

Title	Type	Date published	Reach
[WORLD EARTH DAY] Don't forget, tomorrow is World Earth D... Christoffel National Park Curacao	Post	Apr 21, 2022	5.9K Accounts Center acc...
[SAFARIPARK] Yes, the word is out! We are glad to announce ... Christoffel National Park Curacao	Post	Apr 1, 2022	4.9K Accounts Center acc...
[SAFARI TOUR] During our Open Day this Sunday we will orga... Christoffel National Park Curacao	Post	Nov 21, 2022	4.3K Accounts Center acc...

FIGURE 27

marketing & communications

EXPOSURE OF OUR WORK

Audience and statistics Insights Shete Boka National Park

An overview of our social media (Facebook & Instagram) statistics for the Shete Boka National Park in 2022. (See below figures 28-31)

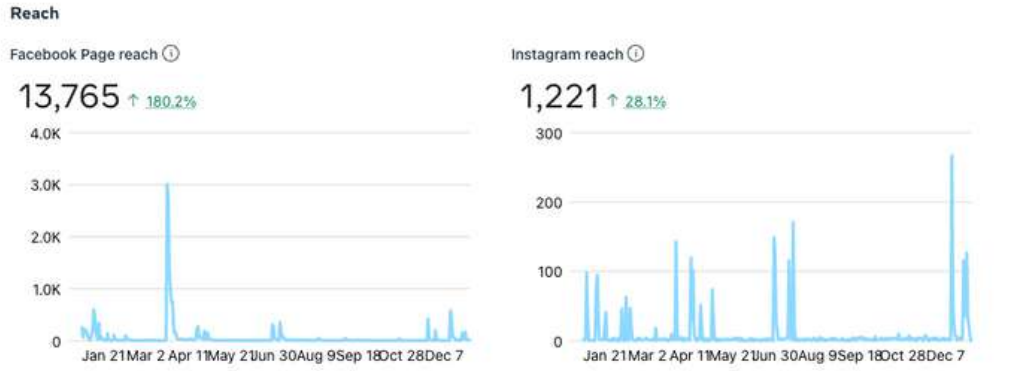


FIGURE 28

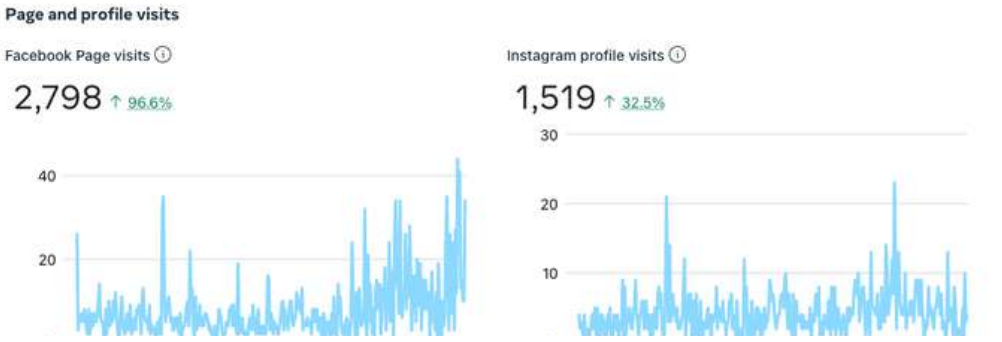
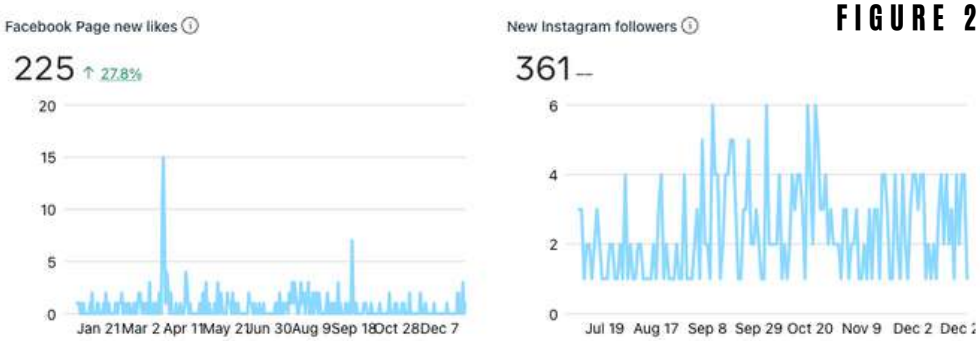


FIGURE 29



Top Three Best Performing Posts on Shete Boka National Park FIGURE 30

Title	Type	Date published	Reach
[WINNER] We did it! We were chosen to be the best attraction... Shete Boka National Park	Post	Mar 22, 2022	11.2K Accounts Center acc...
Wow! Isn't it stunning? 😲 We're nominated for best Caribbea... Shete Boka National Park	Post	Dec 13, 2022	1.5K Accounts Center acc...
[CLEAN UP] Last week a group of American students from the... Shete Boka National Park	Post	Jul 6, 2022	1.3K Accounts Center acc...

FIGURE 31

marketing & communications

EXPOSURE OF OUR WORK

Audience and statistics Insights Curacao Rif Mangrove Park

An overview of our social media (Facebook & Instagram) statistics for the Curacao Rif Mangrove Park in 2022. (See below figures 32-35)

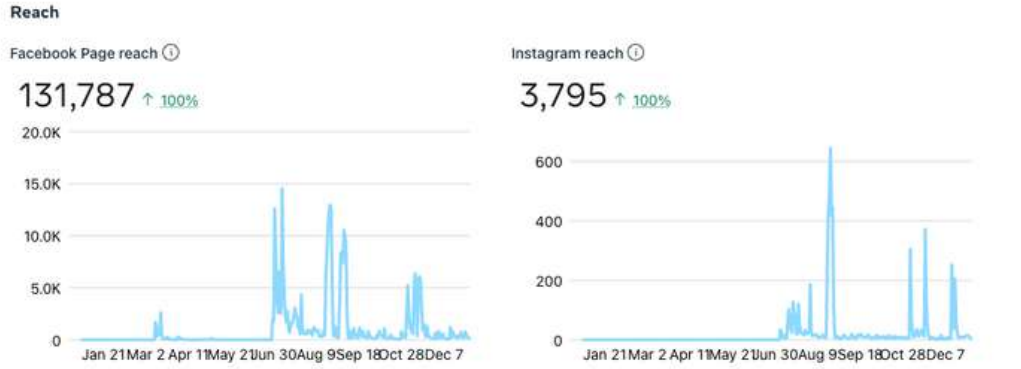
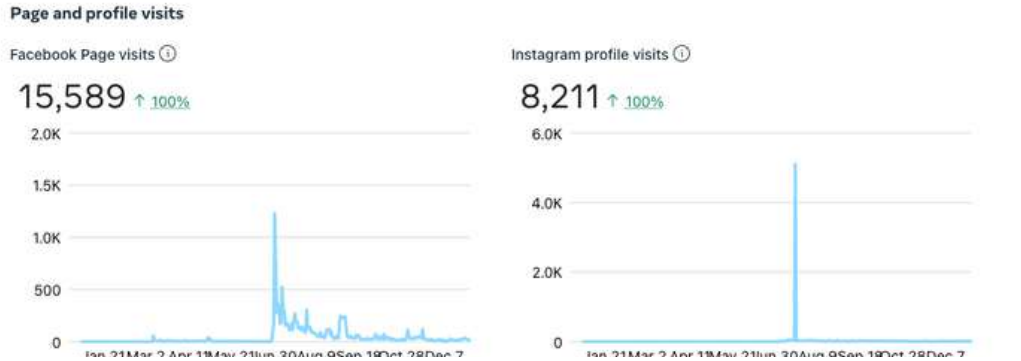


FIGURE 32



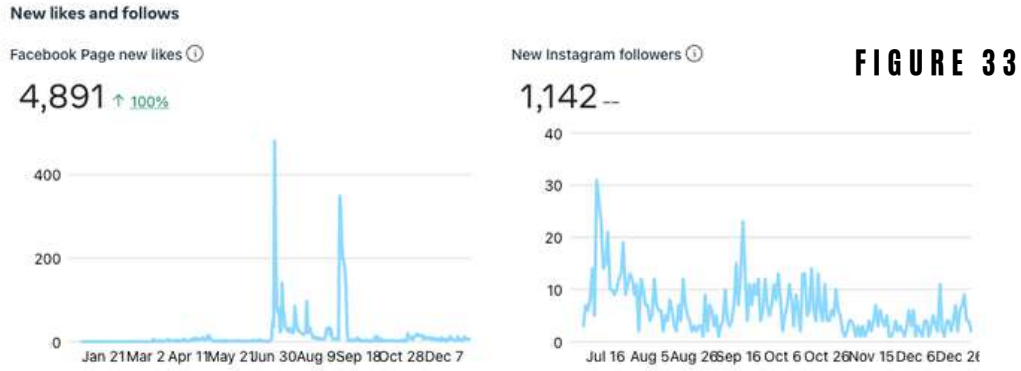


FIGURE 33

FIGURE 34

Top Three Best Performing Posts on Curacao Rif Mangrove Park

Title	Type	Date published	Reach
[TOUR SCHEDULE] There are many ways to explore the park ... Curaçao Rif Mangrove Park	Post	Jul 1, 2022	19.6K Accounts Center acc...
[OPENING] Yes we are open! We are very happy we finally ... Curaçao Rif Mangrove Park	Post	Jul 1, 2022	14K Accounts Center acc...
Opening Mangrove Park op 1 juli Het Curaçao Rif Mangrove Pa... Curaçao Rif Mangrove Park	Post	Jun 29, 2022	10K Accounts Center acc...

FIGURE 35

marketing & communications

EXPOSURE OF OUR WORK

Audience and statistics Insights NME Carmabi

An overview of our social media (Facebook & Instagram) statistics for NME Carmabi in 2022. (See below figures 36-39)

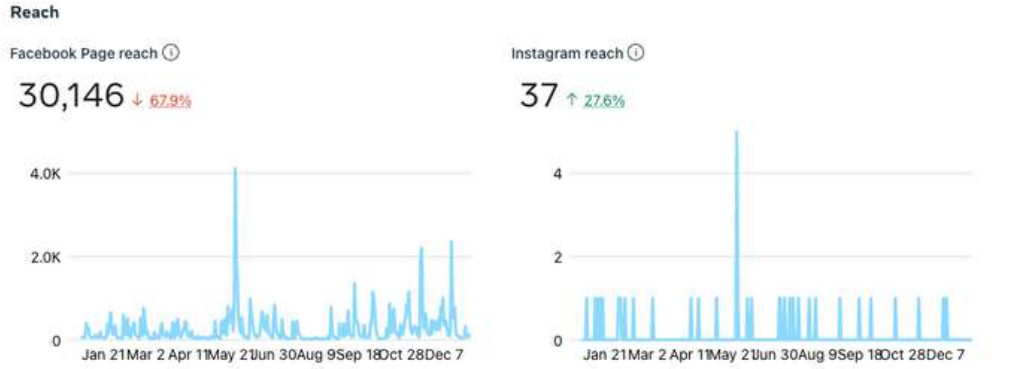


FIGURE 36

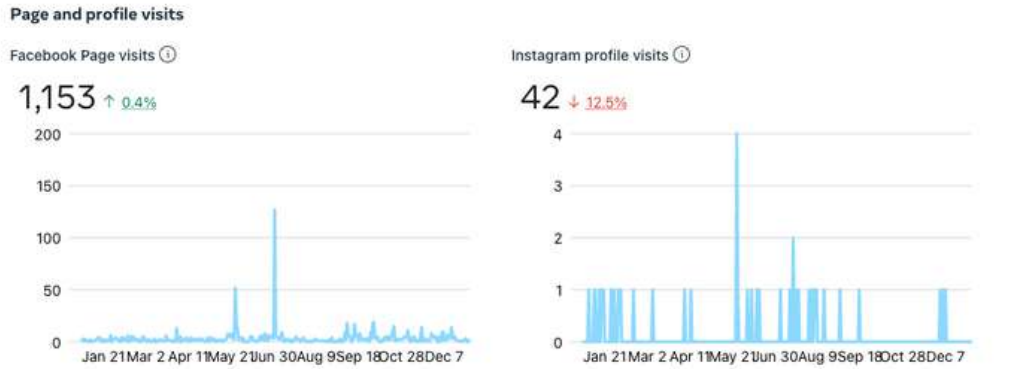


FIGURE 37

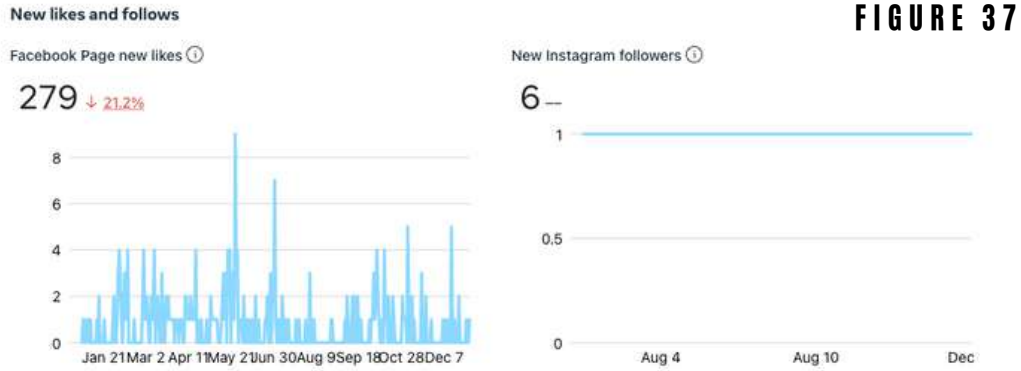


FIGURE 38

Top Three Best Performing Posts on NME Carmabi

Title	Type	Date published	Reach
Helaas komt onze natuur-educatie aan de jeugd te laat voor d... Carmabi NME education	Post	May 25, 2022	6.4K Accounts Center acc...
Door een samenwerking van NAAM - National Archaeological ... Carmabi NME education	Post	Dec 14, 2022	3.7K Accounts Center acc...
De leerlingen van groep 6B van het St Antonius College RKCS ... Carmabi NME education	Post	May 24, 2022	2.8K Accounts Center acc...

FIGURE 39

marketing & communications

EXPOSURE OF OUR WORK

Audience and statistics Insights Carmabi

An overview of our social media (Facebook) statistics for Carmabi in 2022. The Carmabi Foundation currently doesn't have an Instagram page. (See below figure 40 & 41)

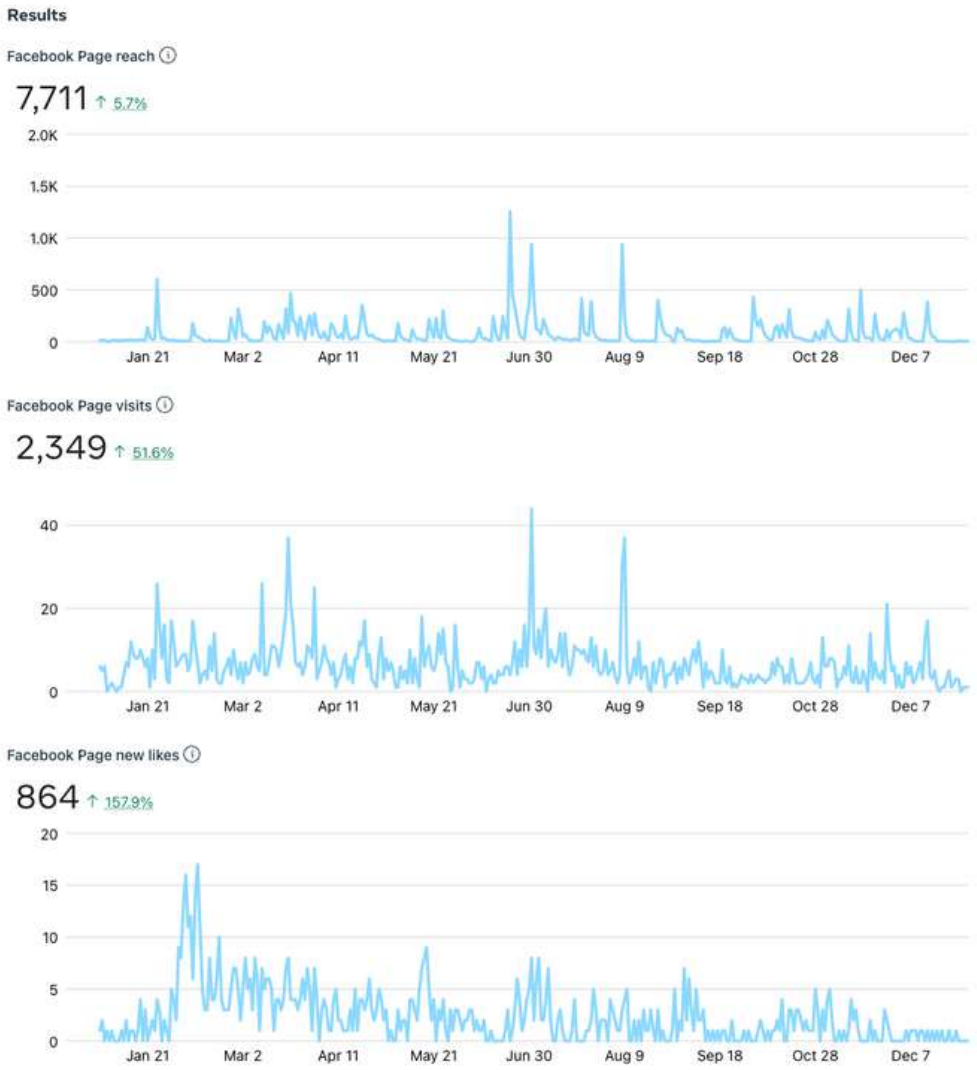


FIGURE 40

Top Three Best Performing Posts on Carmabi

Title	Type	Date published	Reach
[BON YDK] Onze collega Cor Hameete werd vandaag aangen... Carmabi Foundation	Post	Jun 22, 2022	2.1K Accounts Center acc...
This post has no text Carmabi Foundation	Post	Jul 1, 2022	1.5K Accounts Center acc...
This post has no text Carmabi Foundation	Post	Aug 8, 2022	1.3K Accounts Center acc...

FIGURE 41

marketing & communications

EXPOSURE OF OUR WORK

Highlights in the press and visits

The marketing & communications department sends out press releases throughout the year to gain more exposure for all the Carmabi departments. The department is also responsible for providing the media with statements about certain topics that are related to Carmabi. An overview of all the press releases that were sent out in 2022, including interviews and other important mentionings can be found in Annex 3.

Visit Lions Club International at Carmabi PIscadera

Visit Lions Club International

Lions Clubs International President Douglas X. Alexander visited CARMABI during a three-day visit to Curacao at the invitation of the Curacao Lions Club. The Curacao Lions Club has made a donation of ANG 5000 to Carmabi.

Visit of the Minister of GMN at Carmabi

Minister Pietersz-Janga from the ministry of health, environment and nature, visited the facilities of Carmabi at Piscadera on May 19th, 2022. The purpose of the visit was to get an introduction to the work Carmabi does. The minister visited the dry and wet lab and was introduced to the board and director of Carmabi.

Visit of the Minister of GMN at Carmabi

Celebration Independence Day

As per yearly tradition, Carmabi Director Paul Stokkermans was invited to celebrate Independence Day at the US Consulate with the Consul and FOL Commander. The celebrations were held on July 7th, 2022.

marketing & communications

EXPOSURE OF OUR WORK

Highlights in the press

The marketing & communications department sends out press releases throughout the year to gain more exposure for all the Carmabi departments. The department is also responsible for providing the media with statements about certain topics that are related to Carmabi. An overview of all the press releases that were sent out in 2022 can be found in Annex 3.

Interview at TeleCuracao

Interview at TeleCuracao

On April 21st, 2022 Carmabi Director Paul Stokkermans and Head of the Marine Parks Duvan Rios were invited for an interview at the TeleCuracao Program Trai Merdia. The interview was about Carmabi in general and the Curacao Rif Mangrove Park. They spoke about the upcoming opening of the park and about the activities for the Marine Park.

Job Fair Marriott

For the recruitment of staff for the Mangrove park, Carmabi participated in the job fair which was held at the Marriott Hotel Curacao.

Job Fair at Marriott

marketing & communications

EXPOSURE OF OUR WORK

Highlights in the press

The marketing & communications department sends out press releases throughout the year to gain more exposure for all the Carmabi departments. The department is also responsible for providing the media with statements about certain topics that are related to Carmabi. An overview of all the press releases that were sent out in 2022 can be found in Annex 3.

Placement of Buoys in the Marine Park

Placement of Buoys in the Marine Park

On Friday, June 24, the Marine Parks Department of Carmabi has placed the first buoys in the Curacao Marine Park (Spaw Area 1) at Oostpunt. Carmabi places the buoys so that fishermen and other park visitors no longer have to anchor in the Marine Park. The buoys can be used to safely moor and fish or dive from there.

Shete Boka voted best Caribbean Attraction

The Shete Boka National Park has been voted the best attraction in the Caribbean! The National Park was included in USA Today's annual 10 Best Readers' Choice Awards. That means that the best attraction of the Caribbean can be found on Curacao this year.

The natural bridge at the Shete Boka National Park

general

DCNA MEETINGS

MEETINGS DCNA 2022

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

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

The DCNA holds two board meetings every calendar year. The first meeting in 2022 was held on the 14th till the 18th of March in St. Maarten. The second meeting in 2022 was held in on Bonaire from the 16th till the 20th of November. During the Bonaire meeting the participants went on a field trip to the Mangroves at Lac. The fieldtrip was organized by the local NGO, Mangrove Maniacs. Both meetings were attended by Carmabi Director Paul Stokkermans.

Vertegenwoordigers Parken met Judith Brown (Blue Marine Foundation) d.d. 17 maart 2022 St. Maarten

Fieldtrip Mangroves Lac, Bonaire (with Mangrove Maniacs)

Fieldtrip Mangroves Lac, Bonaire (with Mangrove Maniacs)

Fieldtrip Mangroves Lac, Bonaire (with Mangrove Maniacs)

general

ANNUAL FINANCIAL STATEMENT

Carmabi Foundation

BALANCE SHEET AS OF DECEMBER 31, 2022
(after proposal of result appropration)

	2022 ANG	2021 ANG
Assets		
Non-current assets		
Plantations and Buildings (1)	880,018	814,915
Tangible fixed assets (2)	485,223	324,906
	1,365,241	1,139,821
Current Assets		
Receivables (3)	323,302	271,971
Stock (4)	3,003	2,778
Cash and cash equivalents (5)	1,852,250	1,306,148
	2,178,555	1,580,897
Total assets	3,543,796	2,720,718

general

ANNUAL FINANCIAL STATEMENT

Equity and liabilities

	2022 ANG	2020 ANG
Equity (6)		
Capital	106	106
Retained earnings	2,405,764	1,298,670
	2,405,870	1,298,776
Non-current liabilities		
Non interest bearing loans and borrowings (7)	-	154,000
Deferred income investment grants (8)	137,858	155,075
	137,858	309,075
Current Liabilities		
Deferred income project grants (9)	415,815	552,888
Pension contribution payable (10)	2,490	16,761
Taxes and social security payable (11)	61,837	6,043
Other liabilities (12)	519,926	537,175
	1,000,068	1,112,867
Total equity and liabilities	3,543,796	2,720,718

general

ANNUAL FINANCIAL STATEMENT

STATEMENT OF OPERATIONS FOR THE YEAR 2022

	2022	Budget 2022	2021
	ANG	ANG	ANG
Income			
Grants (13)	906,944	881,100	1,048,415
Earmarked grants (14)	63,624	31,000	31,364
Admission fees (15)	2,658,478	2,258,000	1,518,041
Rental income (16)	282,828	250,000	186,137
Other income (17)	844,839	987,900	507,199
Total income	4,756,713	4,408,000	3,291,156
Expenses			
Personnel expenses (18)	2,128,426	2,148,000	1,736,642
Depreciation expenses (19)	153,036	206,000	133,310
Other operating expenses (20)	1,373,422	1,912,000	1,499,143
Total expenses	3,654,884	4,266,000	3,369,095
Operational result for the year	1,101,829	142,000	(77,939)
Interest income	5,265	17,000	5,231
Result for the year	1,107,094	159,000	(72,708)
Appropriation of the result for the year			
Retained earnings	1,107,094		(72,708)
	1,107,094		(72,708)

general

BOARD & STAFF 2022

Board
-Odette Doest, President
-Edwin Flameling, Secretary
-Pieter van den Berg RA, Treasurer
-Karel van Haren, Board Member
-Marjolijn van Schaik, Board Member
-Manuel Boot, 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 Director

Research Department
-Mark Vermeij PhD, Head of Department
-Valerie Chamberland, PhD, Researcher
-Kelly Latijnhouwers, M.Sc., Restoration Technician

Terrestrial Parks Department
-Kenneth Tromp, Head of Department
-Cyrill Kooistra, Deputy Head of Department and head ranger
-Ercandace Naomi Cijntje, Management Assistant
-Briand Victorina, Head Ranger
-Edwords Alberto, Ranger
-Melvin Martinez-Estevez, Ranger
-Ergelijn Cijntje, Front Desk and Administration
-Roengelo Doran, Ranger
-Cheandel Maria, Ranger
-Dennert Doran, Ranger
-Araceli Ersilia, Front Desk Officer (Savonet)
-Merelyn Albertoe, Front Desk Officer (Shete Boka)
-Brenda Jantji, Front Desk Officer (Shete Boka)
-Janiska Spek, Janitor

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

Marine Parks Department (Marine Park)
-Duvan Rios (started 9th of June 2021)
-Roland de Cuba (started 15th of March 2022)
-Kevin Philbert (started 1st of October 2021)
Marine Parks Department (Mangrove Park)
-Oswald Fleming, Head Ranger (started 20st of April 2022)
-Juan Wyatt, Ranger (started 20st of April 2022)
-Germain Cristina, Ranger (started 20st of April 2022)
-Serlon St. Jago, Ranger (started 20st of April 2022)
-Elisha Janga, Ranger (started 1st of August 2022)
-Erla Hernandez, Front Desk Officer (started 20st of April 2022)
-Mirari Hodge, Front Desk Officer (started 20st of April 2022)
-Jeanshenou Clemencia, Stagiaire (started 29th of August 2022)

Nature and Environment Education (NME)
- Cornelis Hameete M.Sc., Head of NME department

Advice and Consultancy Department
-Erik Houtepen, M.Sc., Head of Department
-Tatiana van Stevenick, M.Sc., Terrestrial research and consultant

Administration Department
-Ethline Isenia, Head Administration Department
-Shahaira Martina, Assistant Financial Administration
-Nancy Provacia, Administrative Assistant
-Carlos Winterdaal, Technician

Communication and Marketing
- Kim Hendriksen

Security Piscadera is outsourced to:
-Megory Security

Cleaning Piscadera is outsourced to:
-Servisio na bo Ordu N.V.

Security Shete Boka is outsourced to:
-Hawks Eye Security

general

BOARD & STAFF 2022

ON CALL STAFF

Savonet
-Afiaretty Boelbaai (Cleaning Savonet)
-Richard Davelaar (Cleaning Shete Boka),
-Ingrid Doran (Cleaning Shete Boka)

Junior Rangers
- Adrion Plantijn

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

Marine Education Program (MEP) and Marine Education Center (MEC)
- Ruthsella Statius (Coordinator)
- Lisney Maria
-Sabrine Tapoka
-Ruthson Cecilia
-Padsy Elsevijf
-Joelliane (Lena) Windster
-Taira Daal
-Luyen Matilda-Allee

Marine Youth Ranger Program
-Lisney Maria
-Neve Antonia

Secondary School Program
-Pheadra Fernandez
-Max van Aalst

Left the organization in 2022
-Joël Dominguez, Marine Park Ranger
-Sue Shantely Lourens, Management Assistant
-Damian Poulo, Ranger
-Magda Inees, Janitor
-Jonathan Estanista, On Call Staff Marine Education Program
- Joycerette Bartholomeus, On Call Staff Marine Education Program

general

DONATIONS 2022

Organisations
Avila Hotel
Blue Marine Foundation
California Academy of Sciences
Coca Cola
Curacao American Preparatory School (CAPS)
Grant Thornton
Lionsclub
NME Fonds Nederland
Prins Bernhard Cultuurfonds Curacao
Sandals Curacao
OSK Advocaten (Van Oosten, Schultz, de Korte), Amsterdam

Individuals
Mevrouw I. Pfeiffer (Nederland)

scientific research

VISITING SCIENTISTS

Dr. Alessio Rovere (Univ. of Bremen, Germany) *Sea-level changes*
Dr. Andy Haas (Netherlands Institute for Sea Research, NL) *Land based sources of pollution*
Dr. Aschwin Engelen (Univ. of the Algarve, Portugal) *Course: coral reef ecology*
Dr. Bert Hoeksema (Naturalis Biodiversity Center, NL) *Invertebrate taxonomy*
Dr. Boris van Breukelen (TU Delft, NL) *Island hydrology*
Dr. Cassidy D'Aloia (Univ. of Toronto Mississauga, Canada) *Connectivity in cryptobenthic fishes*
Dr. Cynthia Silveira (San Diego State Univ., USA) *Coral microbiology*
Dr. Ellie Laetz (Univ. of Groningen, NL) *Photobiology of marine slugs*
Dr. Filip Volkaert (KU Leuven, Belgium) *Coral population genetics*
Dr. Forest Rohwer (San Diego State Univ., USA) *Coral microbiology and reef restoration*
Dr. Frank van Laerhoven (Univ. of Utrecht, NL) *Research uptake strategies*
Dr. Gustav Paulay (Univ. of Florida, USA) *Course: coral reef ecology*
Dr. Helen Threlkeld (Lawrence Univ. of Wisconsin, USA) *Anemone symbionts*
Dr. Igor Adameyko (Univ. of Vienna, Austria) *Coral physiology*
Dr. Iliana Baums (Penn State Univ., USA) *Genetics of Caribbean Acroporids*
Dr. Isaiah Bolden (Vanderbilt Univ., USA) *Geology of caves*
Dr. Isla Davidson (Univ. of Bristol, U.K.) *Fish recruitment dynamics*
Dr. Jasper de Goeij (Univ. of Amsterdam, NL) *Trophic structure of Caribbean reefs*
Dr. Javier del Campo (Univ. of Miami, USA) *Coral microbiology*
Dr. Joaquin Yus Dominguez (Univ. of Illinois Urbana-Champaign, USA) *Reef restoration technology*
Dr. Kristen Marhaver (Marhaverlab, CW) *Reproductive biology of corals*
Dr. Laura Govers (Univ. of Groningen, NL) *Shark abundance around Curacao*
Drs. Laurent Delvoye (Vlissingen, NL) *Coral histology*
Dr. Linda Wegley Kelly (San Diego State Univ., USA) *Coral microbiology and reef restoration*
Dr. Martine van der Ploeg (Wageningen Univ., NL) *Biophysical landscape processes*
Dr. Maya Powell (Univ. of North Carolina at Chapel Hill, USA) *Microbiology of Caribbean corals*
Dr. Michelle Achlatis (Univ. of Amsterdam, NL) *Sponge ecology*
Dr. Nicole Voogd (Naturalis Biodiversity Center, NL) *Sponge taxonomy and ecology*
Dr. P. Frade (Univ. of Vienna, Austria) *Microbial ecology of reefs*
Dr. Paolo Stocchi (Netherlands Institute for Sea Research, NL) *Hydrodynamics*
Dr. Patrick Griffith (Montgomery Botanical Centre, USA) *Palm trees*
Dr. Patrick Keeling (Canadian Institute for Advanced Research, Canada) *Protist biology*
Dr. Petra Visser (Univ. of Amsterdam, NL) *Course: coral reef ecology*
Dr. Petra Visser (Univ. of Amsterdam, NL) *Cyanobacterial mats*
Dr. Pierre Chopin (Free Univ. Amsterdam, NL) *Land use planning*
Dr. Pieter Johnson (Univ. of Colorado, USA) *Fish diseases*
Dr. Pim Bongaerts (California Academy of Sciences, USA) *Mesophotic reefs*
Dr. Rene van der Zande (CW) *Sponge ecology*
Drs. Roxanne Holmes (Univ. of Cambridge, U.K.) *Lionfish ecology*
Dr. Sancia van der Meij (Naturalis Biodiversity Center, NL) *Crabs and their coral hosts*
Dr. Thibault Bouderlique (Univ. of Vienna, Austria) *Coral physiology*
Dr. Valerie Chamberland (SECORE International, USA) *Postsettlement dynamics of Caribbean corals & reef restoration*
Dr. Verena Schoepf (Univ. of Amsterdam, NL) *Adaptation in Caribbean corals*
SEALINK Project (UvA, NIOZ, WUR, TUD, UU, VU, UoC, NL/ CW) *Land-sea interactions*

PEER REVIEWED PUBLICATIONS

An overview of all peer reviewed scientific publications published in 2022 is shown below:

1. Ballesteros-Contreras DC, Barrios LM, Preziosi R (2022) New microsatellite markers for the shallow coral Madracis auretenra from the Caribbean. PloS ONE 17(9): e0274895.
2. Ballesteros-Contreras DC, Barrios LM, Preziosi R (2022) Population structure of the shallow coral Madracis auretenra in the Caribbean Sea. Frontiers in Marine Science 840730.
3. Baums IB, Chamberland VF, Locatelli NS, Conn T (2022) Maximizing genetic diversity in coral restoration projects. In: van Oppen MJH, Aranda Lastra M (eds.) Coral reef conservation and restoration in the omics age. Coral reefs of the world 15. pp 35-53.
4. Bock N, Subramaniam A, Juhl AR, Montoya J, Duhamel S (2022) Quantifying per-cell chlorophyll a in natural picophytoplankton populations using fluorescence-activated cell sorting. Frontiers in Marine Science 850646.
5. Boscaro V, Holt CC, Van Steenkiste NW, Herranz M, Irwin NA, Àlvarez-Campos P, Grzelak K, Holovachov O, Kerbl A, Mathur V, Okamoto N, Piercey RS, Worsaae K, Leander BS, Keeling PJ (2022) Microbiomes of microscopic marine invertebrates do not reveal signatures of phylosymbiosis. Nature Microbiology 7(6):810-819.
6. Bouderlique T, Petersen J, Faure L, Abed-Navandi D, Bouchnita A, Mueller B, Nazarov M, Englmaier L, Tesarova M, Frade PR, Zikmund T (2022) Surface flow for colonial integration in reef-building corals. Current Biology 32(12):2596-609.
7. Campana S, Riesgo A, Jongepier E, Fuss J, Muyzer G, de Goeij JM (2022) Meta-transcriptomic comparison of two sponge holobionts feeding on coral-and macroalgal-dissolved organic matter. BMC genomics 23(1): 674.
8. Dillon EM (2022) Reconstructing historical shark communities on coral reefs using fossil dermal denticle assemblages (Doctoral dissertation, UC Santa Barbara).
9. Geertsma RC, Wijgerde T, Latijnhouwers KRW, Chamberland VF (2022) Onset of zooplanktivory and optimal water flow rates for prey capture in newly settled polyps of ten Caribbean coral species. Coral Reefs 41(6):1651-64.
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scientific research

PEER REVIEWED PUBLICATIONS

21. Levenstein MA, Marhaver KL, Quinlan ZA, Tholen HM, Tichy L, Yus J, Lightcap I, Kelly LW, Juarez G, Vermeij MJA, Johnson AJ (2022). Engineered substrates reveal species-specific inorganic cues for coral larval settlement. ACS Sustainable Chemistry & Engineering 10(12): 3960-71,
22. Levenstein MA, Gysbers DJ, Marhaver KL, Kattom S, Tichy L, Quinlan Z, Tholen HM, Kelly LW, Vermeij MJA, Johnson AJ, Juarez G (2022) Millimeter-scale topography enables coral larval settlement in wave-driven oscillatory flow. PLoS ONE 17(9): e0274088.
23. Little MJ (2022) Phage and bacterial ecology in marine holobiont disease and competition (Doctoral dissertation, UC San Diego).
24. Miller MW, Latijnhouwers KR, Bickel A, Mendoza-Quiroz S, Schick M, Burton K, Banaszak AT (2022) Settlement yields in large-scale in situ culture of Caribbean coral larvae for restoration. Restoration Ecology 30(3): e13512.
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26. Mueller B, Brocke HJ, Rohwer FL, Dittmar T, Huisman J, Vermeij MJA, de Goeij JM (2022) Nocturnal dissolved organic matter release by turf algae and its role in the microbialization of reefs. Functional Ecology 36(8):2104-18.
27. Polanco A, Waldock C, Keggin T, Marques V, Rozanski R, Valentini A, Dejean T, Manel S, Vermeij MJA, Albouy C, Pellissier L (2022) Ecological indices from environmental DNA to contrast coastal reefs under different anthropogenic pressures. Ecology and Evolution 12: e9212.
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29. Reimer, J.D., Wee, H.B., García-Hernández, J.E., Hoeksema BW (2022) Same but different? Zoantharian assemblages (Anthozoa: Hexacorallia) in Bonaire and Curacao, southern Caribbean. Coral Reefs 41(2): 383-96.
30. Restrepo C, Delgado D, Debrot AO, de Vries AJ, Houtepen E, de Freitas AJ (2022) Phenological trajectories of Caribbean very dry tropical forests diverge under different geologic formations. Biotropica 54(4): 933-46.
31. Sabrina Pankey M, Plachetzki DC, Macartney KJ, Gastaldi M, Slattery M, Gochfeld DJ, Lesser MP (2022) Cophylogeny and convergence shape holobiont evolution in sponge–microbe symbioses. Nature Ecology & Evolution 7:1-3.
32. Sandin SA, Alcantar E, Clark R, de León R, Dilrosun F, Edwards CB, Estep AJ, Eynaud Y, French BJ, Fox MD, Grenda D, Hamilton SL, Kramp H, Marhaver KL, Miller SD, Roach TNF, Seferina G, Silveira CB, Smith JE, Zgliczynski BJ, Vermeij MJA (2022) Benthic assemblages are more predictable than fish assemblages at an island scale. Coral Reefs 41(4):1031-43.
33. Sandin SA, French BJ, Zgliczynski BJ (2022) Emerging insights on effects of sharks and other top predators on coral reefs. Emerg Top Life Sci 6: 57–65.
34. Simal F, Smith L, Doest O, de Lannoy C, Franken F, Zaandam I, Simal D, Nassar JM. Bat Inventories at caves and mines on the Islands of Aruba, Bonaire and Curacao, and proposed conservation actions. Acta Chiropterologica 23(2): 455-74.
35. Simal F, Vallarino A, Beukenboom E, Paula R, Beaumont H, Zaragoza G, Wolfs E, Holian P, Albers E (2022) Brown Boobies (Sula leucogaster) roosting at Washington-Slagbaai National Park, Bonaire, Caribbean Netherlands. Journal of Caribbean Ornithology 33: 78–81.
36. Simal F, Vallarino A, Albers E (2022) Conservation opportunities for tern species at two Ramsar sites on Bonaire, Caribbean Netherlands. Journal of Caribbean Ornithology 35: 63–69.
37. Titus BM, Daly M (2022) Population genomics for symbiotic anthozoans: can reduced representation approaches be used for taxa without reference genomes? Heredity 13:1-4.
38. van der Meij SE, Bravo H, Scholten YJ, Dromard CR (2022) Host use of the elkhorn coral crab Domecia acanthophora (Brachyura: Domeciidae), with a phylogeny of the genus. Cahiers de biologie marine 63(3): 239-246.
39. van der Schoot RJ, Hoeksema BW (2022). Abundance of coral-associated fauna in relation to depth and eutrophication along the leeward side of Curacao, southern Caribbean. Marine Environmental Research: 105738.
40. Van Steenkiste NW, Leander BS. The molecular phylogenetic position of Mariplanella piscadera sp. nov. reveals a new major group of rhabdocoel flatworms: Mariplanellida status novus (Platyhelminthes: Rhabdocoela). Organisms Diversity & Evolution 31:1-8.
41. Vasquez-Kuntz KL, Kitchen SA, Conn TL, Vohsen SA, Chan AN, Vermeij MJA, Page C, Marhaver KL, Baums IB (2022) Inheritance of somatic mutations by animal offspring. Science Advances: eabn0707.

marketing & communications

CARMABI IN THE MEDIA

Datum	Media	Onderwerp
13 januari 2022	Amigoe	Carmabi in hoger beroep in Oostpunt-zaak
20 januari 2022	Antilliaans Dagblad	Nominatie 'Best Caribbean Attraction'
20 januari 2022	Amigoe	Rangers onderwaterpark druk met aanmeerboeien
26 januari 2022	Antilliaans Dagblad	Hotel, attractie en strand genomineerd
23 februari 2022	Extra	Parkrangernan a trein akshonnan di reskate ku Wardakosta
23 februari 2022	Amigoe	Training reddingsacties met de Kustwacht
24 februari 2022	Dolfijn FM	Radiointerview Kustwachttraining Park Rangers
2 maart 2022	Antilliaans Dagblad	Pro Bista neemt 'kijkje' in Savonet
2 maart 2022	Amigoe	Leden Pro Bista bij Savonet
10 maart 2022	Amigoe	Carmabi gestart met werving parkranger voor Mangrovepark
11 maart 2022	Tele Noticia	Televisie interview Duvan over Marine Park
21 maart 2022	Extra	Carmabi ku difikultat pa hana 'ranger' pa parke Pal'i Mangel
22 maart 2022	Amigoe	Shete Boka beste attractie in Cariben
22 maart 2022	Paradise FM	Radiointerview Shete Boka beste attractie Cariben
23 maart 2022	Antilliaans Dagblad	Shete Boka beste attractie in Cariben
23 maart 2022	Extra	Parke Nashonal Shete Boka Nombrá mihó atrakshon di Karibe
23 maart 2022	HITradio 915	Radiointerview Shete Boka beste attractie Cariben
29 maart 2022	Dolfijn FM	Radiointerview 1 april grap nieuwe Wildlife Safaripark
2 april 2022	Antilliaans Dagblad	Nos naturalesa ta interessante sigur! De Karkó
6 april 2022	Amigoe	Schildpad gered uit illegaal kieuwnet bij Marichi
9 april 2022	Amigoe	Bijzondere bezoeker
11 april 2022	Curacao.nu	Carmabi kondigt drie nieuwe natuurparken aan
13 april 2022	Amigoe	Beheer Mangrovepark bezegeld
14 april 2022	Antilliaans Dagblad	Mangrovepark naar Carmabi
20 april 2022	Tele Curacao	Televisie interview Paul en Duvan over Carmabi en de nieuwe parken
23 april 2022	Antilliaans Dagblad	World Earth Day activiteiten in Christoffelpark
24 april 2022	Amigoe	Activiteiten in Christoffelpark op World Earth Day
29 april 2022	AD / Extra	Krantenartikel De heuvels van Bandabou
28 mei 2022	AD / Extra	Krantenartikel Exoten
10 juni 2022	Amigoe	Unesco-deskundige op Curaçao in kader van bioreservaat
18 juni 2022	Amigoe	5000 gulden voor Carmabi
18 juni 2022	Curacao.nu	Donatie van 5000 gulden voor Carmabi
21 juni 2022	Antilliaans Dagblad	Donatie Carmabi van 5000 gulden
30 juni 2022	Curacao.nu	Samenwerking Carmai en Coca-Cola op gebied van water-educatie
30 juni 2022	Amigoe	Mangrovepark opent de deuren
30 juni 2022	AD	Mangrove Park: een oase in de stad
1 juli 2022	Bala	Kolaborashon Carmabi i Coca Cola
1 juli 2022	Amigoe	Lesprogramma 'Van afvalwater naar drinkwater' op school
6 juli 2022	AD	Genieten in Mangrove Park
6 juli 2022	Extra	Parke Mangrove a habri su portanan
8 juli 2022	AD	Boeien in Marine Park
8 juli 2022	Amigoe	Carmabi plaatst eerste boeien in Marine Park
9 juli 2022	Extra	Carmabi ta instalá e promé buinan na Parke Marina
19 juli 2022	AD	Monthly krantenartikel: Exoten
25 juli 2022	TeleCuracao	Uitzending van Bonochi Curacao
27 juli 2022	Amigoe	morgen Dag van de Natuurbescherming
27 juli 2022	Paradise FM	Radio-interview Dag van de Natuurbescherming
28 juli 2022	HITradio 915	Radio-interview Dag van de Natuurbescherming
28 juli 2022	AD	Vandaag Dag van de Natuurbescherming
30 juli 2022	AD	Oostpunt biedt kansen
30 juli 2022	Amigoe	Carmabi beheert zee aan kust, niet terrein
4 augustus 2022	Nu.cw	Carmabi plaatst eerste boeien in Curaçao Marine Park
23 augustus 2022	Moru Bon dia Tele Curacao	Interview Mangrovepark met Duvan en parkranger
27 augustus 2022	AD/Extra	Monthly krantenartikel: Symbiose
24 september 2022	Extra	Monthly krantenartikel: Landbouw
19 oktober 2022	Amigoe	Zorg om uitval mobiele dienst in nationale parken
27 oktober 2022	Amigoe	Hertelproject mangroven begonnen
28 oktober 2022	AD	Doel 1.3 miljoen mangroves planten
1 november 2022	AD/Extra/Amigoe	Open dag Christoffelpark en Dia di Sabaneta
3 november 2022	Nu.cw	Gratis de Christoffelberg te beklimmen op Dia di Sabaneta
3 november 2022	Curacao.nu	Open dag Christoffelpark en Dia di Sabaneta
3 november 2022	Dolfijn FM	Gratis Christoffedlberg beklimmen op Dia di Sabaneta
3 november 2022	Paradise FM	Radio interview Open dag Christoffelpark
4 november 2022	AD/Extra	Advertentie Open dag Christoffelpark
25 november 2022	AD, Extra, Amigoe en Vigilante	Persbericht Open Dag
26 november 2022	AD	Monthly krantenartikel: Landbouw