The Junior Ranger Program
STINAPA Bonaire

A detailed program overview
The Junior Ranger Program
Detailed Program Overview

Version: 1.0 2017

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Document layout and design by …
When the youth are given more opportunities to have a meaningful experience outdoors, they will be more likely to value nature, engage with it, and feel empowered to do something about it.

Nature Conservancy survey results – 2011
Summary

The Junior Ranger Program is an out-of-school nature education program run by STINAPA to help teenagers develop knowledge and understanding of nature and to create teenage role models who develop leadership skills, critical thinking and problem solving. They are educated about nature and the environmental problems on the island of Bonaire. The Junior Ranger Program is a complete package of nature education activities where teenagers come in contact with nature and learn by doing through activities that take place within nature conservation programs on Bonaire.

Any of Bonaire’s youth between the ages of 13 and 21 can join the Junior Ranger Program. The Junior Rangers are involved for years and they move up in rank every year. The motivator to join the program is that they have the opportunity to become PADI certified scuba divers. In addition, there is a yearly graduation ceremony where new Junior Rangers are brought into the program and everyone else moves up in rank. All are recognized for their achievements over the past year, for the classes they have attended and the certifications they have earned.

The program consists of the following levels:

1. Aspirant
2. Cadet
3. Trooper
4. Deputy
5. Captain
6. Commander

When beginning the program, Junior Rangers learn the basics about Bonaire’s nature and the environment. During this first year, they have to show their commitment to the program. After successful completion, they move into the next level and can start their open water dive course as Cadets. They then move through the five levels becoming more advanced in their diving, environmental, and leadership skills. They are becoming role models for the group.

The Junior Ranger Program runs throughout the school year. The Junior Rangers meet after school one day a week for educational activities and on Saturday mornings for environmentally focused recreational activities. During educational activities the group is divided. Since the Aspirants need to gain their general knowledge about the different topics in their first year, they meet at a separate time. Cadets through Commanders are educated together and topics are presented in a circular way throughout the years and levels. This group can join the Teens4Oceans chapter and join classes given by CIEE focusing on marine ecology. They participate in dive classes and specialty courses as well as classes focusing on skills training.
During Saturday’s outdoor activity, the group is mixed and interaction between Junior Rangers of all different levels and ages takes place. The whole group of Junior Rangers is divided into subgroups that work on different topics and activities both in the water and on land. Examples of Junior Ranger activities include beach cleanups, lora counting, coral restoration, practice dives, reforestation, painting rocks as warning signs, fish surveys, and so on. The scheduled activities are in line with the needs of the community and the island.
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1. Background

1.1 STINAPA and the Junior Ranger Program
The Junior Ranger Program of Bonaire was established by STINAPA and has been in existence since 2010. STINAPA (Stichting Nationale Parken Bonaire) is a non-governmental, not for profit foundation commissioned by the island government to manage the two protected areas of Bonaire: the Bonaire National Marine Park (BNMP) and the Washington Slagbaai National Park (WSNP).

As the island developed and the population increased, the conflicts between development and conservation have also increased. The worldwide effects of pollution and environmental change also impact the island and its ability to maintain its conservation ideals. Education and information are important tools for the conservation of Bonaire’s nature, along with management of protected areas, law enforcement and biological research. The support of the local population is important for nature and environmental policy. Support will be given when the population becomes aware of the environment. Awareness can be reached by means of education and information. Therefore, STINAPA has on staff an Education Coordinator working on the development and execution of three types of activities.

1.2 The Junior Ranger Program manual
The STINAPA Junior Ranger Program of Bonaire was created to motivate children to care about nature and have a positive attitude towards conservation, as well as creating a pool of local youth who might potentially become future marine or natural park rangers. An after school program was developed and the first Junior Rangers entered the program in 2010. As with any new program for teens, there were ups and downs and the program remained small for several years. Over time the program has grown and has a high success rate.

The STINAPA Junior Ranger Program of Bonaire has been a success and proven itself as a way of educating island youth to become aware of the nature on their island and the need to conserve it. It has been recognized by other islands and larger groups within the Caribbean. Replication of the program has been encouraged, as well as expansion of the program on Bonaire. Before, there were program descriptions, but no manual that described what is done and how it is done. In order to expand the program on Bonaire and to replicate it on other islands in the Caribbean, the program must be standardized. For this reason, this manual has been written.
Classroom activities

• Classroom activities and field activities are incorporated into the curriculum of all primary schools and are focused on students from the 1st to the 8th grade. During the first part of the school year, classroom presentations are given and field activities take place during the second part of the school year.

Field activities

• All primary schools on Bonaire are invited to participate in field activities organized from January through June. During these activities, children are in contact with nature. They learn about the rules and regulations of the BNMP; types of fauna and flora; the importance of keeping beaches free of litter; the importance of coral reefs; which animals are protected by law and why; sea and shore bird species and what their migratory habits are.

After school activities

• Snorkel program – Age group: 9 to 12 years. Each year approximately 100 children can join the snorkel program. The program lasts for four weeks. After theoretical lectures, children can snorkel and identify some of the marine species they learned about.
• Sharks of Bonaire – Age group: 13 to 16 years. An advanced version of the snorkel program is the Sharks of Bonaire program. It provides information about coral reefs, and about the importance of conservation and sustainable development.
• Junior Ranger Program – Age group: 13 to 21 years.
2. The Junior Ranger Program

2.1 Mission, Vision, Objectives

This program focuses on the future. The Junior Rangers are educated about nature and the environmental problems on the island of Bonaire. Furthermore, they are educated on endangered species, protected areas and invasive species. The Junior Ranger Program is a complete package of nature education activities where teenagers come in contact with nature and learn by doing through activities that take place within nature conservation programs on Bonaire. They assist marine biologists with queen conch monitoring and tagging activities in mangrove areas. They also help clearing the channels in Lac Bay for hydrological purposes and are taught along the way the importance of fresh water in the bay. The Junior Rangers are involved in sea grass bed research and they participate in clean-ups to maintain areas free of debris. Other projects include Coral Reef Restoration, bee keeping and reforestation all over Bonaire, especially in the National Park.

The mission, vision and the objectives of the Junior Ranger Program of STINAPA are as follows:
The Junior Ranger Program – STINAPA Bonaire

Mission

• To develop in the young people of Bonaire an appreciation for nature and the environment.

Vision

• A program of out-of-school nature education run by STINAPA to help teenagers develop knowledge and understanding of nature and to create teenage role models who develop leadership skills combined with critical thinking and problem solving.

Long-term objective

• To develop Bonaire’s youth who are well educated about the nature of the island into young adults who are capable of advocating for the island’s nature as STINAPA Rangers, employees of the dive industry or nature conservation organizations, government employees and/or informed and concerned citizens who have learned from the Junior Ranger Program the importance of nature conservation.

Specific objectives

• To create awareness about nature and environmental issues.
• To create leadership and the ability to do live presentations about the important issues of nature protection.
• To develop an understanding of the human impacts on threatened and endemic plants, animals and their habitats, and threats to Protected Areas (PAs).
• To build a sense of responsibility for conservation and a sense of making a meaningful contribution to conservation.
• To develop an understanding of how conservation is managed, to provide exposure to the professions working in PAs and to generate an understanding of everyone's responsibility for nature.
• To develop field skills and opportunities for participation in conservation and monitoring activities.
• To develop leadership and mentoring skills so that participants can take a leading role in content creation for the program and the implementation of activities.

Design principles

• Call on peer pressure to encourage youth to spend time outdoors (the program needs to be cool and not feel academic - it is not school).
• Give a progressively older feel to the program via gradually more significant activities and more advanced skills (use technology to explore nature, link with popular culture for delivery of program).
• Build on their growing sense of social responsibility to introduce the concept of taking action and encourage a sense of stewardship for nature.
• Use their sense of adventure and interest in exploration to navigate local ecosystems (Harness kids’ fascination with maps and pathways to encourage discovery and related skills development).
2.2 Program Concept

Youth involved
Any of Bonaire’s youth between the ages of 13 and 21 can join the Junior Ranger Program. The youth involved have an interest in nature.

Currently the program has about 30 active members. Because the program advocates school work coming first, some members become inactive for a time as their school work dictates.

Why would teens join such a program?
The motivator is - if they stick with the program for a year, they have the opportunity to become PADI certified scuba divers and they can move up the ranks in scuba diving from obtaining their open water certification to becoming a dive master. In addition, there is a yearly graduation where they receive certificates for their achievements.

Program levels
When starting the program, Junior Rangers spend 10 months as an Aspirant learning the basics about Bonaire and the environment. During this time, they have to show their commitment to the program. By the end of those 10 months, they have been presented with an overview of all of Bonaire’s nature and have developed a basic understanding of the nature both on land and underwater.

After successful completion, they move into the next level and they can start their open water dive course as Cadets. They then move through five levels (see figure 1) becoming more advanced in their diving, environmental, and leadership skills. They are becoming role models for the group.

This hierarchical approach is one of the elements of the program. It is an incentive for the Junior Rangers to continue with the program, since new opportunities and responsibilities arise when moving to a next level.

The Junior Rangers learn what is expected from them when they move up in rank. For example, when a Cadet is becoming a Trooper, they are expected to take care of the new Cadets like they were included in the group by the previous Troopers. They learn to support and motivate each other.

Junior Rangers can continue with the program until age 21, assisting STINAPA Rangers and other conservation groups on the island. The Junior Rangers are involved for years. The continuity of the program is important to ensure teenagers have a commitment to nature.
Graduation
Each year there is a graduation ceremony where new Junior Rangers are brought into the program and everyone else moves up in rank. All are recognized for their achievements over the past year, for the classes they have attended and the certifications they have earned.

Awards are also based on what is needed within the group and for individual participants, e.g. who needs a boost for something. Dive certificates are given at the completion of a dive course and these certifications are again recognized at the graduation ceremony.

Specialty awards can be given: bird expert, trees and planting expert, media expert, coral and fish expert, cave and bat expert, shark expert, turtle expert, etc. They can become an expert by participating in specific courses and activities if/when the opportunities arise. The ceremony provides an opportunity for other Junior Rangers to become motivated. “I want to do that as well!”

Hint!
The hierarchical approach and a yearly graduation ceremony are incentives to continue with the program.

2.3 Program Format and Structure
The Junior Ranger Program runs throughout the school year. There are no activities scheduled during school vacations. The Junior Rangers meet after school one day a week for educational activities and on Saturday mornings for environmentally focused, recreational activities. The weekly schedule of the Junior Ranger Program of Bonaire is shown in Table 1. Different topics

![Figure 1 – The levels of the Junior Ranger Program](image-url)
are presented at the educational activities. The program is a combination of practical activities and learning activities. After school activities need to be fun and interactive since they already went to school the same day.

During educational activities, the group is divided. Since the Aspirants need to gain their general knowledge about the different topics in their first year, they meet at a separate time. They need to have this basic level to continue with the more advanced materials covered within the regular program. Cadets through Commanders are educated together. During Saturday’s recreational activity, the group is mixed and interaction between Junior Rangers of all different levels and ages takes place. In this way the Aspirants are involved with the older Junior Rangers and they can experience what is coming in the next levels. The whole group of Junior Rangers is divided into subgroups that work on different topics and activities both in the water and on land (see chapter 3.3 for examples of activities).

Chapter 6.4 describes in detail how the activities are scheduled.

Table 1 - The weekly schedule of the Junior Ranger Program of Bonaire

<table>
<thead>
<tr>
<th>When</th>
<th>What</th>
<th>Who</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuesday afternoon (from 3-5PM)</td>
<td>Educational activity</td>
<td>Junior Rangers – a mixed group from Cadets to Commanders</td>
</tr>
<tr>
<td>Wednesday afternoon (from 3-5PM)</td>
<td>Educational activity</td>
<td>Aspirants</td>
</tr>
<tr>
<td>Saturday morning (from 9-12)</td>
<td>Environmentally focused recreational activity</td>
<td>Both Aspirants and Junior Rangers of all levels</td>
</tr>
</tbody>
</table>

Hint!

After school activities need to be fun and interactive since the teenagers already went to school the same day.

… a connection between protected areas and “local” young people.

The Junior Ranger Program…

… aspires to high environmental standards.
3. Program Content and Activities

3.1 Educational activities – Aspirants
When first entering the program, the Junior Ranger Aspirants receive a 10 month course. Program topics are presented in such a way that these new Junior Rangers have a thorough understanding of Bonaire’s environment prior to becoming full-fledged Junior Rangers and PADI certified scuba divers. See appendix I for an example of a detailed schedule for the Aspirants. The Junior Ranger Aspirants might be taught by the Education Coordinator or volunteers, who have a basic level of knowledge about the specific topic. Appendix II shows possible sources that could be used to develop the content of these lectures.

The following are possible topics that could be presented throughout the first year:

- Mother Earth – Basic geology, biology and ecology.
- What is Nature and Environment?
- History of the National Parks – General information about Bonaire’s parks and meet with the chief rangers
- Fish ID course
- Coral ID course
- Plant ID course
- Bird ID course
- Key species – Bats, sharks, migratory birds, coral reefs, sea turtles.
- Habitat and endangered species.
- Snorkeling
- Communication (verbal)

Hint!
Present the topics in such a way that the Junior Ranger Aspirants have a basic level of knowledge before they move up in rank.

3.2 Educational activities – Cadet to Commander
Educational activities for the next levels take place in mixed groups. All levels from Cadet and higher are taught together. This way interaction takes place between students of different levels. However, they are assigned to subgroups, since different educational activities are planned at the same time.

The structure of these activities is circular, which means that repetition occurs. Because the topics are taught by different lecturers each time and within varied groups of Junior Rangers,
the content and discussion about the same topic differs and new things can be learned every time.

The Junior Rangers are assigned to a specific lecture or activity based on what they need. This might occur when a Junior Ranger has missed a previous lecture about a certain topic or when a Junior Ranger needs more training on a specific topic.

For example, it is possible that a Captain is assigned to a lecture about a certain topic for the third time, so that he/she can develop his/her knowledge about this topic, since the content can differ or it is given by a different lecturer. They can also develop their leadership skills by interacting and helping a Cadet who takes the class for the first time.

**Hint!**

Present the topics in a circular way throughout the years and levels.

Education for Cadets through Commanders is given by experts in the specific field. These courses include the following topics:

- Classes given by CIEE (see appendix III for descriptions of these courses)
  - Fish Anatomy
  - Coral Reef Invertebrates
  - Microscopes and Microfauna
  - Community Ecology on Coral Reefs
  - Invasive Species
  - Coral Reef Conservation
- Teens4Oceans
  - Teens4Oceans is optional for the Junior Rangers. They can choose to join Teens4Oceans and make a commitment with this group. The Junior Rangers of Bonaire are one of the Teens4Oceans student chapters. By means of experiential learning, scientific research and innovative technologies, the participants of the Teens4Oceans group can make an impact in their own communities and the marine environment. In 2017 the Junior Rangers worked on and installed an electrified reef (electric coral nursery) in the marine park of Bonaire. See appendix IV for a description of the Teens4Oceans chapter on Bonaire and the electrified reef project the Junior Rangers are working on.
- Dive classes and specialty courses (See section 3.2.2).
- Skills training (See next section).
Figure 2 - Posters to announce the schedule of educational activities
3.2.1 Skills training

As the older Junior Rangers move through the program, the need to assist them in the development of public speaking and advocate skills has become apparent. Periodically, a training that focuses on this topic is scheduled. In addition, they are developing these skills during discussions and activities.

Currently, the Junior Rangers are trained in the following skills throughout the year:

- **Leadership skills**
  - The program helps teens to develop their communication and planning skills; their sense of responsibility and the skills needed to work in a team. This is consistently encouraged through announcements, briefings, participating in activities, working in different/mixed groups and by lectures focused on specific skills. These lectures are dependent on the needs of the group. When patterns and group dynamics are observed that indicate improvement is needed in this area, a lecture/activity will be organized and scheduled.

- **Public speaking**
  - During this training, Junior Rangers experience how it feels to give presentations for a group of people; learn how they can be in control of these feelings and what is important when giving a good presentation. These trainings include topics such as posture, articulation and public speaking.

- **Computer skills**
  - Computer skills is a follow up to “public speaking”. Junior Rangers learn how to prepare a good PowerPoint presentation and they are provided with more tips for developing and giving presentations.

- **Debating skills**
  - During this training Junior Rangers learn how to prepare for a debate and how to debate. At the end of each year, a debate is organized in which the Junior Rangers discuss a topic related to nature and the environment. (See figure 3). The Junior Rangers receive feedback from a jury consisting of professionals knowledgeable in the specific topic. Since they have to do research on the topic to prepare for the debate, they develop both their communication skills and their knowledge.
Hint!

Provide leadership opportunities for youth by increasing their responsibilities.
Organize the available expertise to provide lectures and training regarding specific skills.

Figure 3 - Poster to announce the debate

Two teams of Junior Rangers from Bonaire, face each other off in a live debate about the effectiveness of Marine Reserves.

Saturday, 19 November 2016 | Time: 9:30 am – 12 pm
Habitat Aquarius Conference Room
3.2.2 Dive training

As noted previously, the Junior Rangers learn to dive after they have successfully completed their first year. In their first year as Aspirants, they gain a basic understanding about the marine environment before they learn how to dive. There are different phases in their dive-training schedule, as shown in Figure 4.

All Junior Rangers start with a PADI Open Water Dive course, followed by several specialty courses to become a PADI Adventure Diver and then a PADI Advanced Open Water Diver. They can choose to continue and become a Rescue Diver. For Junior Rangers who remain in the program after age 18, they can also do Dive Master training. To become a Dive Master, they need to have 50 logged dives and have finished five specialty courses.

Figure 5 shows which specialty courses of the PADI Dive education structure are included in the Junior Ranger dive training program.

Figure 4 - Phases dive training Junior Rangers
The goal is to keep every Junior Ranger involved with a formal dive training course at least two or three times per year. A spreadsheet with all the courses is used to schedule the Junior Rangers in the diving courses.

In general, the Advanced Open Water level can be achieved in 2.5 years. This depends upon their participation in specific courses and when those courses can be scheduled. There are some age restrictions that must be considered. For example, you have to be 15 years old for the deep and wreck specialties.

Practice dives are scheduled on Saturdays so that the Junior Rangers increase their dive skills as well as gain confidence and increased comfort. Fish and coral identification can also be practiced during these dives.
3.3 Environmentally focused recreational activities

As explained, once a week the whole group of Junior Rangers participates in outdoor, environmentally focused, recreational activities. Different activities take place. Some Junior Rangers are diving for as part of their specialty dive courses and others volunteer for the various nature activities occurring on the island (See posters).

Nature activities depend upon what is scheduled on the island, in line with the needs of the community and what the community organizes. Examples of nature activities include beach cleanups, Lora (local endangered parrots) counting, coral restoration, painting rocks as warning signs and assisting other educational groups. On some Saturdays only one activity is planned for the whole group. This is important to foster unity.

Before an activity starts, a briefing is given that includes what the activity entails and why the activity is important. For example, before a beach cleanup starts, the Junior Rangers are told why waste has high negative consequences and they are motivated to take action for a cleaner environment.

**Hint!**

Be aware of and participate in programs and activities occurring on the island.
Figure 6 - Posters to announce the schedule of outdoor activities
Date: 04 March, Saturday
Bring hat, booties and water bottle

Place: LAGOEN
“Adopted Beach”

Time: 8.30 @ Wilhelmina Park
Catch the BUS!

Yuda protehá nos naturalesa i medio ambiente

STINAPA Bonaire
NATIONAL PARKS FOUNDATION
3.4 Opportunities and personal interest

The Junior Rangers develop skills, knowledge and understanding from the initial program and by practicing. They are also directed according to the interests they show in their courses and the role they want to have in the group. These new skills can be used in meaningful and real situations as they act as leaders and as youth ambassadors for STINAPA.

Courses and opportunities are offered to all Junior Rangers. When they ask to join a specific program, it is ensured they become part of that group. At the same time, Junior Rangers are not pushed to do something they do not want to do. Not all Junior Rangers want to be a Dive Master or a lionfish hunter and they do not have to be. This way they can develop expertise in topics according to their own interests.

Other skills can be learned during the activities, e.g. video or photography skills. This is dependent on the opportunities that come up to practice new skills. This is also dependent on the skills of volunteers, e.g. a volunteer advanced in photography can help the Junior Rangers to practice those skills.

The development of the teen is central to the Junior Ranger Program and is dependent on what they need. During the yearly graduation ceremony, they can achieve specialty awards: bird expert, trees and planting expert, media expert, coral and fish expert, cave and bat expert, shark expert, turtle expert, etc.

**Hint!**
Allow the Junior Rangers to develop knowledge and skills according to their personal interests.

Offer new experiences and opportunities for skills enhancement.
4. Norms and Discipline

4.1 Attendance
The Education Coordinator assigns Junior Rangers to specific lessons and topics. There are eight organized activities a month and they have to attend four activities to continue in the program. Of course there are exceptions to this four times a month attendance obligation.

- School comes first is an important principle of the program.
- Personal circumstances.
- At 21 years of age, Commanders are encouraged to do volunteer work with the program. Junior Rangers younger than 21 years who have passed all program levels and are certified Commanders can still join the activities of the program on a voluntary basis. The four times attendance obligation does not apply for them.
- Junior Rangers who are going abroad for a certain period of time (e.g. to study) are always welcome to join the program again or assist during activities when they return to the island.

Principle!
School comes first!

Aspirants who did not succeed their first year, but who are motivated to try it again, are given the opportunity to start their Aspirant year for a second time. It could be that this teen was not ready for the program when he or she started for the first time. Rejoining the program will be discussed with their parents.

Track who is attending what educational and recreational activities and note the personal development of each individual Junior Ranger. This provides an overview of the needs of individuals and the group. In some cases, the group can be split up into those who need a bit more practice on a certain topic. This keeps other Junior Rangers from being bored. Teens can be awarded as “Rookie of the year” for most attendance while an Aspirant.

Hint!
Track the attendance and development of the Junior Rangers.
The program helps teens to develop their communication and planning skills. For example, they must be timely in notifying the group when they cannot attend an activity and the reason why. They must also learn to contact the group in time when they need transportation to get to a planned activity.

It is important to motivate and communicate with the parents of the Junior Rangers, since parents and teens must manage time for the program together. They need to understand the importance of the program and its activities in order to motivate their children to participate. Most parents are interested in the program since their teens are participating. Some parents join activities at times and some others are volunteering. Section 6.5 describes how communication with parents is taking place.

**Hint!**

Motivate parents about the importance of their teens attending the activities of the Junior Ranger Program.

### 4.2 Basic norms

The Junior Rangers have to adhere to basic manners and norms. As stated in the previous section, they must announce when they cannot attend activities. They learn to be grateful for the courses, dive gear and other learning opportunities that are part of the program.

The Junior Rangers learn to have respect for nature, the volunteers and for each other. They learn to listen to and respect the ideas and opinions of their fellow Junior Rangers. They also learn teamwork and to help each other, not only when diving together, but also when group efforts make a difference, for example during a coastal cleanup.

The Junior Rangers are nature ambassadors and role models for the island. Therefore, they need to behave appropriately. It is important to remind them about the role they have as a Junior Ranger. "Remember! You are a Commander." “You are a Nature Ambassador for the island of Bonaire.” “I’m proud of you for being Nature Ambassadors of Bonaire.”
5. Outreach and Interaction

5.1 Junior Rangers Explore

The Junior Ranger Program of Bonaire is producing radio spots and video clips to broadcast on the local television and radio stations called Junior Rangers Explore. These informational television and radio spots are produced in order to spread the good work of the Junior Rangers, in particular their behavior and growing knowledge about our natural environment. These spots will reach the general Bonaire population and aim to positively influence audience behavior.

Each episode will feature two Junior Rangers who explore a certain topic. Topics discussed are climate change, coral reefs, coral bleaching, no fishing zones, sustainable living, reforestation, invasive species, sharks, parrotfish, migratory birds, bats, and lobsters. Additionally, the video clips will feature an “expert”, a fisherman, a teacher, a marine biologist, a business owner, etc., who will provide the information the Junior Rangers are seeking. Through their exploration, they will discover and learn many things about nature and the environment on Bonaire and the public will discover these things with them.

About 10 episodes are produced each year. The episodes will be short. The video clips are about 5–10 minutes each\(^1\) and the radio spots about 1,5 minute each. The radio spots are produced in both English and Papiamento, and broadcast on different radio stations five times a day. The radio spots rotate and are timed so that certain topics are broadcast depending on the season and what is occurring on the island. For example, the radio spot about lobsters is broadcast during the lobster season that starts in November.

The episodes are written by STINAPA’s education and communications assistant, but the Junior Rangers are fully involved in deciding the various topics which makes the process an intense learning experience for them. The dialogue is written as a dialogue or as “Do you know…?” Each episode will include an “action” element, where the Junior Rangers point out what we as viewers can do to improve our environment (such as waste separation, recycling and so on). It is also explained why conservation of certain species is important and why it is important to behave in a certain way. The Junior Rangers Explore radio and video spots send out a message to care about the environment and about the importance of conservation.

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\(^1\) STINAPA Junior Rangers Explore: Coral reefs (https://vimeo.com/137720394)
Throughout the making of these programs, the Junior Rangers are trained in leadership and presentation skills. A new generation of individuals with these skills and experiences now have the tools to responsibly manage our environment in the future.

**Hint!**
Engage kids with the community through presentations to the community and visitors.

### 5.2 Exchange and Interaction

Groups of teenagers (e.g. high school students, undergraduates) visit the island on a yearly basis and general or group meetings with the Junior Rangers are often organized. A presentation about the program is given by the Education Coordinator together with the Junior Rangers. The Junior Rangers are often providing presentations about specific topics.

There are opportunities to meet other youth working on projects related to the environment and marine ecosystems by participating in summer programs and internships at CIEE. Every year about four scholarships are offered to the Junior Rangers and sponsored by CIEE.

This interaction with other organizations and teenagers from different places is important for several reasons: to involve others and to share knowledge and information; to show the key aspects of the Junior Ranger Program of Bonaire; to show the importance of environmental education and of having nature ambassadors. The Junior Rangers convey a message to the visitors regarding the importance of the marine park.

When the Junior Ranger Program is implemented on other islands in the Caribbean, the ultimate goal is to organize exchange programs. Junior Rangers are nature ambassadors and should reach out to each other. In this way Junior Rangers can inspire each other, learn from each other, and gain knowledge and experience in other nature areas besides Bonaire. It allows the teenagers to develop their social, communication and leadership skills.

**Hint!**
Engage kids with other teenagers.

**Principle!**
The Junior Ranger Program aims to promote international exchange, to develop positive, cooperative and social skills, and to encourage the active citizenship of young people.
6. Program management

6.1 Application procedure

The program begins once a year at the start of the school year. Usually in June, when the school year ends, the graduation ceremony of the Junior Rangers takes place and the new Aspirants are brought into the program. Most teens are recruited and join the program between the ages of 12 and 13. They are recruited or request membership during the year and their names are placed on the “Aspirant List”. They are invited to attend the ceremony to be welcomed as new Aspirants.

Junior Rangers do not have to pay any fees when they join the program. This way, costs cannot be a disincentive to participate and the program is accessible for all children.

When the program started in 2010, students were recruited via Jong Bonaire because the Junior Ranger Program is an after school program. But as the program developed over the years, students also began applying via word of mouth. Jong Bonaire is still being informed when new participants can apply, but, in addition, parents and other teens themselves are asking to participate.

Only 10 students a year can join the Junior Ranger Program of Bonaire as new Aspirants. They do not have to possess certain abilities or a certain level of knowledge. The first 10 teens applying can join the program and then the program is full. We have found that if the group size of new participants is bigger than 10, it is at the expense of program quality. Attention to the learning process of each individual participant is reduced and it is more difficult for the group to bond. Also it is less feasible for logistical reasons, e.g. transport. It is a high priority to balance the group size with the capacities of the program.

Hint!

Access the teens in the way that is a good access point for your specific situation - schools, after school care organizations, and so on.

Provide access to the program independent of socio-economic status and in a non-discriminatory way.

Hint!

Balance the group size with the capacities available.

Grow casually. Make sure the program is stable before further expanding the program.
6.2 Organizational Roles and Capacities

The Junior Ranger Program is organized and coordinated by the STINAPA Education Coordinator along with the assistance of volunteers, multiple dive shops and local nature conservation programs.

The STINAPA Communications Coordinator and the Education and Communications Assistant work with the program in administration, organization of events (e.g. the graduation ceremony), and in communication by transferring information about the Junior Ranger Program to STINAPA and in public relations.

**Hint!**
When starting the program, decide on the distribution of tasks among staff members.

Volunteers and the support of various nature conservation organizations and dive shops is key to the program’s success. Therefore, it is important to build on and maintain a close connection with organizations and volunteers by outreach and networking where and whenever possible. Personal interaction and an active approach is the key. Be aware of the opportunities for collaboration or even a single lecture. Ask them for the possibilities!

**Hint!**
Outreach and network with local organizations and potential volunteers where and whenever possible.

**Local organizations**

The Junior Ranger Program has a direct link with several organizations on Bonaire where the Junior Rangers receive courses, workshops and lectures presented by the experts working within the different organizations. See Appendix V for a list of local organizations involved in the program. When implementing the Junior Ranger Program, it is highly recommended to collaborate with organizations located on the island.

- Nature organizations
  - The Junior Rangers of Bonaire are involved with the conservation efforts of every nature organization on the island. As a result they have a good overview of Bonaire’s nature and the work of these nature organizations. At the same time, the Junior Rangers are carrying out environmentally focused activities and conservation practices. They are giving something back to the island and nature conservation while helping the local organizations.
• Dive shops
  o Volunteers and stakeholders on Bonaire sponsor the PADI certification program for the Junior Rangers. In addition, several dive shops sponsor diving practice by donating air, dive and snorkeling gear.

**Hint!**
Work together with local partners and use the strengths of these other organizations.

**Volunteers**
As the program has expanded, the need for volunteers has also expanded. Coordination of these volunteers is needed so that the program can expand and thrive by adding new learning opportunities for the Junior Rangers as they occur. The volunteers of the Junior Ranger Program on Bonaire are working on and fulfilling the following tasks:

- Logistics, administration, graphics and writing
- Film and photography / developing documentaries
- Supervision during in-class activities of the Junior Rangers Aspirants
- Supervision during in-class activities of the Junior Rangers Cadets to Commander
- Supervision during outdoor recreational activities
- Providing dive training
- Providing dive practice
- Teens4Oceans
- Lecturers and guest lecturers

One volunteer per eight students could be used as a standard. However, in practice this number also depends on the availability of volunteers. Volunteers are assigned to a certain activity based on their availability; where supervision is needed; the interests of volunteers; and the contacts volunteers have. The collaboration between the Education Coordinator and volunteers is constantly evolving based on experience and program needs. Section 6.5 describes how communication with the volunteers takes place.

Volunteers help with the program based on their own motivation, which might differ among the volunteers. Some volunteers are parents of Junior Rangers and others desire to work with children. Being a volunteer for the program is a good opportunity to learn more about nature and to work towards a sustainable future together with the teens. Volunteers might get the opportunity to participate in courses and advance their diving skills and certification. However, this is not advertised when looking for volunteers, since you do not want volunteers to take advantage. Their main motivation needs to be to help with the program and to work with the Junior Rangers.
It is important that volunteers be dedicated to the program. They need to make valid time commitments to the program as activities need to be organized. Also, volunteers need to have a set of skills that are appropriate for working with teens. They need to have a feeling for teens and for the group as a whole.

Safety is of high priority. Make sure that volunteers are safe drivers when assigning them to transport duties. It is a plus when volunteers have a first aid certificate or training. They need to act as role models for the group.

Showing appreciation is important to keep volunteers motivated. This can be done by mentioning them in Facebook posts or public relations messages or by organizing activities for them such as a barbeque. Volunteers are also recognized during the graduation ceremony with an award.

### Hint!

- Learn how to coordinate and communicate with volunteers.
- Appreciate and recognize volunteers regularly for the work they do.

### 6.3 Organization and implementation procedures

The Education Coordinator regularly schedules educational and recreational activities in up to five sites at a time during the Saturday’s environmentally focused recreational activities. Coordination, supervision and logistics are part of each activity.

**Coordination**

The Education Coordinator is responsible for the coordination of activities, including planning, organizing, staffing and directing. The main tasks are:

- Planning the activities for specific locations and times (See Section 6.4).
• Assigning the Junior Rangers and volunteers to the different activities.

• Communicating these plans to both the Junior Rangers and volunteers.

• Coordination and supervision during the activities.

**Supervision**
During activities, supervision is done by the Education Coordinator and the volunteers who are present. They are responsible for the group and coordinating whatever is happening. The tasks of supervision include overseeing the activity, giving instructions, guiding Junior Rangers when needed and helping them to develop their skills and understanding.

**Logistics**
The Junior Ranger Program of Bonaire relies on parents for transport, to bring and pick up their teens when activities are planned. The Junior Rangers have to communicate when they need a ride to go to an activity. They can come together with other Junior Rangers or the Education Coordinator gives them a ride. After an activity, the Education Coordinator and volunteers make sure that all Junior Rangers have a ride home. During Saturday activities, a bus might be hired to take a big group to the location of the activity. In this case, the Junior Rangers and volunteers are meeting at a central meeting point.

The location for activities needs to be arranged. For educational activities, a big room in which lecturers can be given is needed. If possible, the location for educational activities should be central because of transportation.
### 6.4 Scheduling the activities

The planning of activities of the Junior Ranger Program of Bonaire is done by the Education Coordinator and is divided in four stages:

<table>
<thead>
<tr>
<th>Period</th>
<th>Task Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per year</td>
<td>• A list with educational and recreational topics is made for the upcoming year.</td>
</tr>
<tr>
<td>Per four months</td>
<td>• How these topics are scheduled depends on the availability of volunteers and instructors. For example, it could be that some people providing courses or lectures/ readings are only on the island once a year for only two weeks. An overview of available volunteers and related topics is made every four months. However, this schedule is flexible and can be changed.</td>
</tr>
<tr>
<td>Per month</td>
<td>• A more precise schedule is made every month, including the lectures and activities that are taking place.</td>
</tr>
<tr>
<td>Per week</td>
<td>• The final schedule is made per week. This schedule includes the activity, the location, time, attending volunteers and which Junior Rangers are assigned to which activity.</td>
</tr>
</tbody>
</table>

Flexibility is an important principle of the program, since things can change daily. There is a schedule that includes the activities that are taking place and which courses/topics are given when, but when circumstances change or when new opportunities arise this needs to be adapted.

**Hint!**

Be flexible and add activities as new things occur on the island.

Take school schedules and vacations into account when scheduling the educational after-school activities of the Junior Ranger Program.

Schedule activities where a longer block of time is required on the weekend.
In some cases, the schedule is made together with volunteers. Two examples:

- The dive instructors providing the dive courses create the dive schedule, which they then coordinate with the Education Coordinator, who knows what is going on and what the teens need.

- CIEE develops the topics and class descriptions for classes they can provide. CIEE and the Education Coordinator plan together when CIEE can give a lecture and when it is possible for the Junior Rangers attend.

### 6.5 Communication

... with local organizations

The Education Coordinator communicates with local organizations in one important way:

- Personal interaction is the most important and successful way to communicate with local organizations. Visiting the organizations helps to build a relationship and to maintain a close connection.

- As the local organizations are volunteering for the program, the ways of communicating with volunteers also apply to them.

... with volunteers

Communication with volunteers takes place in as many different ways as possible:

- A WhatsApp group for the program’s leaders allows announcements to be made and questions can be raised. All volunteers are added to the general Facebook page and the WhatsApp group.

- The Education Coordinator plans individual meetings with volunteers to discuss the program more in-depth. Also, the volunteer can suggest a meeting with the Education Coordinator when needed. Group meetings with all volunteers can be planned periodically.

- There is also contact with the volunteers before, during and after the activities.

... with parents

- A yearly meeting is organized with parents. Different topics are discussed during this meeting. Parents are informed about the program and diving, and questions can be raised.
• Parents are added to the Junior Ranger WhatsApp group and Facebook page. This way they have access to information and schedules. They can also contact the Education Coordinator via WhatsApp or phone.

• There is also personal contact with parents as they bring to or pick up teens from activities.

• Parents less actively involved are contacted in person in certain situations. For example, when their child is not attending activities or always coming late. It is important to contact the parents, to visit them and to talk with them individually.

... with the Junior Rangers

As shown in chapter 3 and 6.4, several activities are scheduled during the week. Obviously, it is crucial to communicate the schedule to the Junior Rangers.

• As shown in chapter 3, posters are designed for the days in which activities are planned. These posters are posted on the Facebook page and in the WhatsApp group. It is also important to make sure that everyone receives the information, since some people are not on Facebook or using WhatsApp.

• The WhatsApp group is used to inform the Junior Rangers about the schedule and for the Education Coordinator and volunteers post other notifications. Also, the Junior Rangers can raise questions on WhatsApp group and can inform the group when they cannot attend an activity.

• The Facebook page is also used to inform the Junior Rangers about the schedule and to post other notifications and announcements. In addition, informative videos regarding the environment and pictures of the activities are shared. When the pictures of the activities are shared, the Junior Rangers are supported and praised for their commitment and contribution.

• During and after the activities, there is time for (personal) conversations with the Junior Rangers.

Hint!
Make use of social media.

Make sure everyone receives shared information.

Present the schedule in an attractive manner, e.g. posters with pictures.
**Language**

It is important to consider language when communicating with the Junior Rangers, both during the activities and via social media. The common language chosen for the Junior Ranger Program of Bonaire is English. During the first year, PowerPoint presentations might be in Papiamentu, but the spoken language is English. After the first year, both the PowerPoint presentations and the spoken language are in English. English has been chosen for several reasons. Some Junior Rangers are most comfortable in speaking Papiamentu, some in Dutch and others in English. However, English is a common language for everyone to understand. Furthermore, it is important to develop English language skills for the future when they may wish to continue their studies in relation to the environment, nature conservation, marine biology, etc. Another reason is that most volunteers are native English speakers and educational presentations are given in English.

**6.6 Equipment and Logistical needs**

**Equipment needs**

- Dive courses
- Dive equipment
- Snorkel equipment
- Research equipment (e.g. microscopes, binoculars)
- Lecture equipment (e.g. beamer, computer)
- Extra: Virtual Reality Kit

**Logistical needs**

- Transportation
- Lecture room
- Storage
- Uniform (e.g. t-shirts)
- Drinks and snacks
- Certificates
- Small rewards / prizes

**Hint!**
Consider the language of communication.
7. Program Evaluation

To measure the performance of the Junior Ranger Program, key performance indicators are proposed. It is difficult to measure the long-term effects of the program as a change of attitudes and behavior. Therefore, the proposed indicators are related to management success and some qualitative feedback from the participants. It is recommended to reflect on the key performance indicators in the annual report of the NME department of STINAPA.

Key performance indicators:

- Attendance rate for lectures and activities.
- Number of participants in the different levels of the Junior Ranger program.
- Dropout rate of Junior Rangers after the first year.
- The diversity of activities where the Junior Rangers are engaged in.
- Number of staff and volunteers contributing to the Junior Ranger program.
- Number of hours worked on the Junior Ranger program by staff and by volunteers.
- Funds directly spent on the Junior Ranger program.
- Success stories and qualitative feedback from the Junior Rangers.
References

  - The Wild4Life Detailed Programme Overview (DCNA, 2012) describes several environmental education programs on four islands in the Caribbean (Bonaire, Saba, St Eustatius and St. Maarten). Some aspects of the Wild4Life document are used for this manual, as it also provides an overview of the Junior Ranger Program. However, this manual focuses and describes the Junior Ranger Program more in-depth and in detail.

### Appendix I – Schedule Junior Rangers Aspirants

#### Schedule Junior Rangers 2016 - 2017 Aspirants Wednesdays / Saturdays

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Place</th>
<th>Contact person</th>
<th>Activity</th>
<th>Present:</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 Aug</td>
<td>Intro 1 JR</td>
<td>DCNA</td>
<td>Desiree</td>
<td>Presentation/lecture</td>
<td></td>
</tr>
<tr>
<td>31 Aug</td>
<td>Intro 2 JR</td>
<td>DCNA</td>
<td>Desiree</td>
<td>&quot;</td>
<td></td>
</tr>
<tr>
<td>07 Sept</td>
<td>Coral Reef 1</td>
<td>DCNA</td>
<td>Desiree</td>
<td>Presentative + quiz</td>
<td></td>
</tr>
<tr>
<td>14 Sept</td>
<td>Coral Reef 2</td>
<td>DCNA</td>
<td>Desiree</td>
<td>&quot;</td>
<td></td>
</tr>
<tr>
<td>17 Sept</td>
<td>1st snorkel session</td>
<td>Te amo beach</td>
<td>Suzi / Pat</td>
<td>Presentative + film</td>
<td>World Ocean Day</td>
</tr>
<tr>
<td>21 Sept</td>
<td>Wetlands 1</td>
<td>DCNA</td>
<td>Desiree</td>
<td>&quot;</td>
<td>Lecture</td>
</tr>
<tr>
<td>24 Sept</td>
<td>2nd snorkel session</td>
<td></td>
<td></td>
<td>&quot;</td>
<td></td>
</tr>
<tr>
<td>28 Sept</td>
<td>Wetlands 2</td>
<td>Mangrove center</td>
<td>Desiree / Luigi</td>
<td>Lecture + kayak</td>
<td></td>
</tr>
<tr>
<td>01 Oct</td>
<td>3rd snorkel session</td>
<td>Lac Cai</td>
<td>Suzi / Pat</td>
<td>&quot;</td>
<td></td>
</tr>
<tr>
<td>05 Oct</td>
<td>Fish ID</td>
<td>DCNA</td>
<td>Pat / Kim / Suzi</td>
<td>&quot;</td>
<td></td>
</tr>
<tr>
<td>08 Oct</td>
<td>4th snorkel session</td>
<td></td>
<td></td>
<td>&quot;</td>
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<tr>
<td>19 Oct</td>
<td>Fish ID</td>
<td>DCNA</td>
<td>Pat / Kim / Suzi</td>
<td>&quot;</td>
<td></td>
</tr>
<tr>
<td>22 Oct</td>
<td>5th snorkel session</td>
<td></td>
<td></td>
<td>&quot;</td>
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<tr>
<td>26 Oct</td>
<td>Fish ID</td>
<td>DCNA</td>
<td>Pat / Kim / Suzi</td>
<td>&quot;</td>
<td></td>
</tr>
<tr>
<td>29 Oct</td>
<td>6th snorkel session</td>
<td>DCNA</td>
<td>Pat / Kim</td>
<td>&quot;</td>
<td></td>
</tr>
<tr>
<td>02 Nov</td>
<td>Fish ID</td>
<td>DCNA</td>
<td>Pat / Kim / Suzi</td>
<td>&quot;</td>
<td></td>
</tr>
<tr>
<td>05 Nov</td>
<td>Coastal Clean up</td>
<td></td>
<td></td>
<td>&quot;</td>
<td></td>
</tr>
<tr>
<td>09 Nov</td>
<td>Migratory birds</td>
<td>DCNA</td>
<td>Desiree / Caren</td>
<td>&quot;</td>
<td></td>
</tr>
<tr>
<td>12 Nov</td>
<td>Bird watching</td>
<td></td>
<td></td>
<td>&quot;</td>
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<tr>
<td>16 Nov</td>
<td>Trees &amp; Plants</td>
<td></td>
<td></td>
<td>&quot;</td>
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<tr>
<td>19 Nov</td>
<td>Tree Planting</td>
<td>Washington Park</td>
<td></td>
<td>&quot;</td>
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<tr>
<td>23 Nov</td>
<td>Bees</td>
<td></td>
<td></td>
<td>&quot;</td>
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</tr>
<tr>
<td>26 Nov</td>
<td>Visit Bee Oasis</td>
<td></td>
<td>Sabine / Johan</td>
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<td></td>
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<tr>
<td>30 Nov</td>
<td>Bats</td>
<td>DCNA</td>
<td>Desiree / Elsmarie</td>
<td>&quot;</td>
<td></td>
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<tr>
<td>03 Dec</td>
<td>Caves</td>
<td></td>
<td></td>
<td>&quot;</td>
<td></td>
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<tr>
<td>07 Dec</td>
<td>Deforestation</td>
<td>DCNA</td>
<td>Desiree / Lauren</td>
<td>&quot;</td>
<td></td>
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<tr>
<td>10 Dec</td>
<td>Echo Help</td>
<td></td>
<td></td>
<td>&quot;</td>
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</tr>
<tr>
<td>14 Dec</td>
<td>Reforestation</td>
<td>DCNA</td>
<td>Desiree / Lauren</td>
<td>&quot;</td>
<td></td>
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<tr>
<td>19 - 22 Dec</td>
<td>Slagbaai JR Camp</td>
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<tr>
<td>11 Jan ’17</td>
<td>Plate tectonics</td>
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<td>14 Jan ’17</td>
<td>Fraters park clean up</td>
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<tr>
<td>18 Jan ’17</td>
<td>Rocks</td>
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<td>15 Feb ’17</td>
<td>Life on the coast</td>
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<tr>
<td>18 Feb ’17</td>
<td>8th snorkel session</td>
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<tr>
<td>22 Feb ’17</td>
<td>Beach strolling</td>
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<td>01 Mar ’17</td>
<td>Biodiversity</td>
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<tr>
<td>08 Mar ’17</td>
<td>Overfishing</td>
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<tr>
<td>15 Mar ’17</td>
<td>Invasive Species</td>
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<tr>
<td>05 Apr ’17</td>
<td>Wetlands 2</td>
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<tr>
<td>12 Apr ’17</td>
<td>Echo Foundation</td>
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<tr>
<td>26 Apr ’17</td>
<td>Fish ID last</td>
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<tr>
<td>10 May ’17</td>
<td>Conch presentation</td>
<td>Diana</td>
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<td>17 May ’17</td>
<td>Global Warming</td>
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<td>24 May ’17</td>
<td>Coral ID</td>
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<td>31 May ’17</td>
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</tr>
<tr>
<td>Date</td>
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<tr>
<td>07 Jun '17</td>
<td>Sharks</td>
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<td>14 Jun '17</td>
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<tr>
<td>20 Jun</td>
<td>Merging GM</td>
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<tr>
<td>23 June '17</td>
<td>Graduation Ceremony</td>
<td></td>
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</tr>
</tbody>
</table>
Appendix II – Resources

- http://oceanexplorer.noaa.gov/edu/learning/welcome.html
- http://oceanexplorer.noaa.gov/edu/welcome.html#educ

Coral reefs
  - http://reefcheck.org
  - http://coralreef.noaa.gov/education/educators/resourcd/guides/resources/aware_g.pdf
  - https://www.nrdc.org/stories/what-you-need-know-about-ocean-acidification

Invasive species:
  - http://ocean.si.edu/ocean-news/5-invasive-species-you-should-know

Climate
  - http://climateteens.nasa.gov

- http://duurzaamheidpodocent.kennisnet.nl
- http://www.pbs.org/kqed/oceanadventures/educators/oceancareers/

How to use marine radio:
- http://coral.org/resources/guides_best_practices/for_everyone
Appendix III – Syllabus classes CIEE

**Fish Anatomy**
**Duration:** 2 days  
**Description:** Students will learn about the internal and external anatomy of fishes with an emphasis on how the form (shape and design) of features of fish fit the functions of that form. During the first week, students will explore the external anatomy of fishes starting with the shape and coloration of the body and fins of fishes. They next learn about more specific external structures such as the mouth, scales, and lateral line. During the second week, students will learn about the internal anatomy of fishes including gills, bones, muscles, swim bladders, and digestive tracts.  
**Learning Style:** During both weeks, students will learn through interactive powerpoint presentations that are augmented with dissections of lionfish. The course will culminate with a trivia game for students to show off the knowledge they gained and a presentation of their certificates of Junior Ichthyologist.  
**To Bring:** Both days will be in the lab so everyone will need closed-toed shoes. We will be working with lionfish with their spines intact, thus everyone should bring lots of caution.

**Coral Reef Invertebrates**
**Duration:** 2 days  
**Description:** The Junior Rangers are clearly well versed with the fishes of the reef. However, they may be less knowledgeable of the diversity of invertebrates that occur on the reef. During this module, students will learn about the diversity of invertebrate phyla on Bonaire’s coral reefs and then go on a snorkelling scavenger hunt to try to find as many different phyla as possible.  
**Learning Style:** The first week will include an interactive lecture on coral reef phyla and a couple activities to increase retention of the materials. The first activity will be coral reef phyla bingo. The second is “sculptionary” during which teams have to sculpt various marine organisms out of playdoye. During the second week students and staff will go on a snorkelling trip and students will attempt to find as many different examples of each phyla as possible (bring towels, masks, and snorkels!). A prize will go to the winner. The module will culminate with a presentation of certificates of Junior Invertebrate Zoologist.  
**To Bring:** During the first day, we will be in the lab so everyone will need closed-toed shoes. During the second day, we will be snorkelling and everyone should bring a towel, fins, snorkel/mask, wetsuit (if wanted), and a bathing suit. Junior Rangers and leaders can use the CIEE bathrooms to change if needed. During the second day, we would prefer that everyone leave their belongings on the back porch of CIEE so that everyone doesn’t need to go inside after the snorkel and bring in lots of water with them.

**Microscopes and Microfauna**
**Duration:** 2 days  
**Description:** During this lesson, students will learn about the anatomy and history of microscopes and about the microfauna that occur in the plankton and in the benthos. During the first week we will first learn how to collect plankton using a plankton net, how to use a Van Veen Grab Sampler to collect sediment to examine benthic organisms. Finally, students will learn about the anatomy and history of microscopes and get some practice with them. During the second week, students will learn about the major groups of organisms found in the plankton and in the benthos. They will then look at their samples under microscopes and make comparisons of planktonic and benthic fauna.  
**Learning Style:** The module will consist of a field trip to the yellow submarine dock and hands on experience using collection techniques. This will compliment interactive lectures on benthic and planktonic micro fauna and a scavenger hunt to find the largest number of different marine organisms. The course will culminate with a prize for the student who found the most species and a presentation of certificates of Junior Benthic and Plankton Ecologist.
To Bring: Both days will be in the lab so everyone will need close-toed shoes.

**Community Ecology on Coral Reefs**
**Duration:** 2 days  
**Description:** Community Ecology is the study of the interactions that occur between organisms, such as predation, parasitism, competition, and mutualism/symbiosis. During this module, students will learn about these different interactions and then get in the water to look for them.  
**Learning Style:** The module will include an interactive lecture on community ecology on coral reefs and a snorkelling scavenger hunt to find as many different interactions as possible (bring towels, masks, and snorkels!). A prize will go to the person or team that finds the most interactions. The module will culminate with a presentation of certificates of Junior Community Ecologist.  
**To Bring:** During the first day, we will be in the lab so everyone will need closed-toes shoes. During the second day, we will be snorkelling and everyone should bring a towel, fins, snorkel/mask, wetsuit (if wanted), and a bathing suit. Junior Rangers and leaders can use the CIEE bathrooms to change if needed. During the second day, we would prefer that everyone leave their belongings on the back porch of CIEE so that everyone doesn’t need to go inside after the snorkel and bring in lots of water with them.

**Invasive Species**
**Duration:** 1 day  
**Description:** The Junior Rangers are no doubt very well versed with lionfish and the lionfish invasion. However, they may be less knowledgeable about some of the research that has gone into learning about the lionfish invasion and other marine invasions. During this module, students will learn that there are a lot more invasive species than lionfish, what research has been done on lionfish and other invaders, why invasions happen, and what can be done to prevent invasions or to mitigate their effects.  
**Learning Style:** This module will consist of an interactive lecture and activities to increase information retention. The module will culminate with a presentation of certificates of Junior Invasion Biologist.  
**To Bring:** This lesson will be in the lab so everyone will need closed-toes shoes.

**Coral Reef Conservation**
**Duration:** 1 day  
**Description:** There is unfortunately a very large number of threats facing coral reefs: climate change, ocean acidification, nutrient pollution, overfishing and destructive fishing practices, and recreational SCUBA diver impacts. During this activity, students will learn about these various threats and what can be done to conserve corals. We ran a similar activity before on ocean acidification and climate change with Tjerk in his classroom, and it might be nice to do the same with this activity if possible.  
**Learning Style:** This module will include an interactive powerpoint lecture augmented with various activities. In one activity, students will learn how carbon dioxide from their breath increases the acidity of seawater. In another activity, students will see first hand that acidified water will dissolve the skeletons of hard marine organisms. In one last activity students will paly “Coral Reef Conservation Jenga” during which students add blocks if they pull “coral reef threat” cards and add blocks if they pull “coral reef conservation” cards. The module will end with a presentation for certificates of Junior Conservation Biologist.  
**To Bring:** This lesson will be in the lab so everyone will need closed-toed shoes.
Appendix IV – Teens4Oceans

In 2015, the Teens4Oceans chapter on Bonaire was formed by the Dive Manager of Harbour Village, Chris Ball, along with the Junior Ranger Program of Bonaire. The Junior Ranger Program has a partnership with the Teens4Oceans group from Gulliver Schools in Miami. To bring these groups together, an experimental project was designed which focused on learning more about the local coral reefs on Bonaire. It took about two years to receive the required permits and permissions from the local governing bodies and in February 2017, the first phase of the project was deployed (T4O, 2017).

The electrified reef project on Bonaire

Coral restoration has been one of the key aspects of marine sciences for years now. The electrified reef technology was developed by Professor Wolf Hilbertz and Dr Tom Goreau. This restoration technique has been used at numerous sites around the world. However, there is little data to support the method since it has never been properly studied. Therefore, one of the goals of the Teens4Oceans project on Bonaire is to produce a long term set of useful data by using underwater cameras, a set of voltage and water quality sensors, and students and scientists alike. A plan has been developed to test the method in a cohesive and scientific way to improve our understanding in how to protect the marine ecosystems (T4O, 2017).

How the electrified reef method works

Corals, like many marine invertebrates, build their skeletons out of calcium carbonate. This energy intensive process is done by pulling calcium and carbonate ions from the ocean and secreting them as a skeleton. In a similar fashion, an electrolysis reaction accomplishes the same feat. Electrolysis is basically the idea that direct electrical current can facilitate a chemical reaction that would otherwise not happen. Teens4Oceans decided to see if using this concept would also facilitate coral growth (T4O, 2017).

What we did

Our team of young Teens4Oceans students built two metal domes out of re-bar, a control dome and a powered dome, and sank them in the ocean. Once underwater, a negative wire is attached to one metal dome. This makes the dome a cathode. Then the anode, or positive, is placed inside the metal dome and power is established. Instantly, tiny little bubbles appear in the structure and days later the rebar becomes coated in a layer of calcium carbonate making it appear white. The comparison to the control dome is a stark difference as the control dome appeared as rusted metal (T4O, 2017).
The project can be followed on both the 360 and static ocean cameras to observe the contrast between the two experimental domes. The electric dome has already turned white and it is only a matter of time before life begins to settle in and on the new habitat. The other consequence of this project will be the increased habitat for fish. The structures actually act as fish aggregation devices, or FADs. We are curious to see whether fish will inhabit one structure over the other and why. Numerous other questions could be raised and researched (T4O, 2017).

It is not possible to immediately place corals on the structure, but in the next couple of weeks that process will start. Our hope is that corals on the electrified reef will grow much faster than those on the control. But, simple visual observation is not enough to prove the method works. Therefore, a set of data probes and electrical measurement equipment is installed. It is also possible to record pH, temperature, salinity, dissolved oxygen and Oxidative Redox Potential. Teens4Oceans is allowing to share data with STINAPA and other research agencies. For our students and the scientists working on this project, this will help to find out the truth about electrified reefs (T4O, 2017).
Appendix V – List of local organizations involved in the Junior Ranger Program of Bonaire

**Dive shops**
Buddy Dive – sponsors diving practice.
Dive Friends – sponsors diving practice.
Dive Inn – sponsors diving practice.
Flamingo Dive – sponsors diving practice.
Harbour Village – Teens4Oceans and sponsors diving practice.
VIP diving – sponsors the Junior Ranger PADI certification program and graduation ceremony.
Yellow Submarine – sponsors diving practice. Yellow Sub is part of Dive Friends.

**Local Nature Conservation programs and organizations**
CIEE Bonaire (semester abroad program and research laboratory) - provides plankton, lionfish dissection, fish anatomy and reef ecology courses to understand that everything needs everything else in order for humans to survive.
Coral Reef Restoration program – the Junior Rangers learn how to become volunteers for this specific program that helps to increase the coral population.
DCNA – Communication and outreach.
Echo Foundation – protecting the Lora parrot on Bonaire, a protected species. The Junior Rangers help with tree planting activities.
Klein Bonaire Reforestation project – the youth in the program are committed to plant trees and help in watering the new plants in this reforestation project.
Lion Fish Hunter group – the older Junior Rangers are trained to be lion fish hunters and are certified by the National Marine Park to protect the coral reef surrounding the island while hunting lionfish.
Sea Turtle Conservation Bonaire – sea turtles need protection from poachers as well as other threats such as plastic waste in the ocean, fishing lines that the turtles get tangled in resulting in death by drowning. (Project of WWF)