

ROATÁN CRUISE TERMINAL. ENVIRONMENTAL EDUCATION AND AWARENESS RAISING PROGRAM.

GENERAL GOAL AND SPECIFIC OBJECTIVES

Bay Islands' coral reef ecosystem is part of the Mesoamerican Barrier Reef System: the Atlantic Ocean's largest reef and the second largest barrier reef of the world. This ecosystem is characterized by an extensive coverage of live corals representing genetic banks, natural nurseries of marine flora and fauna species, with one of the highest diversities in the Caribbean. In this coral ecosystem forty two coral species and one hundred fish species have been identified. (1).

The general goal of Roatán Cruise Terminal's Environmental Education and Awareness Raising Program is stressing the significance of the Bay Islands' ecosystems and resources. This program is aimed to continue improving environmental behavior in both cruise ship visitors (including crew members) and the local population.

The specific objectives (2) of this program are:

- *To continue raising awareness.* To help cruise ship visitors and the local population to continue acquiring awareness of the Bay Islands' ecosystems as a whole.
- *To continue increasing sensitivity.* To help cruise ship visitors and the local population to continue gaining a variety of experiences in, and a basic understanding of, the Bay Islands' ecosystems.
- *To continue improving attitudes.* To help cruise ship visitors and the local population to continue acquiring a set of values and feelings of concern for the Bay Islands' ecosystems and to continue motivating them for actively participating in its environmental improving and protection when feasible.
- *To continue developing skills.* To help cruise ship visitors and the local population to continue acquiring skills for identifying and solving relevant Bay Island's environmental problems when feasible.
- *To continue encouraging participation.* To continue providing cruise ship visitors and the local population with an opportunity to be actively involved in solving relevant Bay Island's environmental problems when feasible.

It is important to note that considering the diversity of the social group composed by Cruise Ship visitors and local population the objectives above can't be achieved at the same level on the different members of the group: Cruise Ship tourists might be only for a few hours in Roatán and never return, some might visit several times, crew members are frequent visitors and the local population is also diverse and can have different levels of involvement in the program.

METHODOLOGY

The environmental education methods for achieving the general and specific goals of Roatán Cruise Terminal's Environmental Education and Awareness Raising Program are conditioned by the characteristics of the social group participating in the program and by the kind of activities carried out by its members.

Most of the methods would obviously have an indirect/practical approach rather than formal class-room methods, which are virtually ineffective in this context.

The methods applied in the program are the following:

- *Nature trail*
- *Walkway to Mahogany Beach*
- *Exhibits*
- *Environmental signage system*
- *Brief printed educational materials*
- *Educational materials posted in Mahogany Bay Cruise Center's Website*
- *Practical activities*
- *Environmental presentations*
- *Adopting Schools*
- *Environmental training*

Nature trail

The nature trail runs through 213 meters (700 ft.) in an area of Mahogany Bay Cruise Center which was left untouched by the construction of the Center and where Roatán's flora and fauna can be observed. The nature trail is an environmental education method acting mainly upon:

- Both kinds of Cruise ship visitors:
 - Tourists
 - Crew members

- From the local population:
 - Employees from shops and food and beverage facilities
 - RCT's employees
 - School students
 - General visitors

The main ecosystems and environmental features corresponding to this trail are:

- Roatán's vegetation
- Roatán's fauna
- Mangroves. For this particular ecosystem RCT's Mangrove Restoration Project is the most important aspect.



Fig. 1. Nature trail



Fig. 2. Nature trail



Fig. 3. Mangrove restoration project

The main objectives that can be achieved are:

- *To continue raising awareness*
- *To continue increasing sensitivity*
- *To continue improving attitudes (partially)*

Walkway to Mahogany Beach (including bridge)

The walkway is an environmental education method acting mainly upon:

- Both kinds of Cruise ship visitors:
 - Tourists
 - Crew members.

- From the local population:
 - Employees from shops and food and beverage facilities
 - RCT's employees
 - School students
 - General visitors

The main ecosystems and environmental features corresponding to this trail are:

- Roatán's vegetation
- Mangroves

The main objectives that can be achieved are:

- *To continue raising awareness*
- *To continue increasing sensitivity*
- *To continue improving attitudes (partially)*

Exhibits

Roatán's Heritage Exhibit, has two modules:

One is devoted to Roatán's shrimp industry including a replica of a shrimper, which illustrate how important was marine life and still is to sustain Roatán's economy.



Fig. 4 . Shrimpers of Roatán exhibit

The second module is devoted to a Historic overview of the Garinagu culture. This exhibit shows how the sustainable agricultural exploitation of the terrestrial environment of Bay Islands contributed to appropriately provide the main food requirements for this community. This module has signs and samples of the main plants which were in the core of Garinagu agriculture.

Cohune palm

Attalea cohune

Leaves of the Cohune palms are the principal thatch used by Garinagu, and also referred to as "thatch log" in the Bay Islands. When the leaves are used for roofing, they are called manaca. For the dugu, the Garinagu make houses entirely out of manaca, even the doors.

In Spanish, the name of this palm is corozo – the origin for the name of the Garifuna community named Corozal (a place of many corozo palms).

Cohune nuts were previously an important part of the edible oil industry in Honduras. The high point in their exportation was during World War I when the nuts were used to make charcoal filters for gas masks.

Cohune nut oil has been widely used as a lubricant, for cooking and soap-making, and lamp oil. The heart of the cohune palm, located in the last four feet of the trunk before the base of the leaf stems, is considered a delicacy. The fruits of the Cohune palm are made into sweet meats and are also used as livestock feed.

One of nature's most majestic and dramatic palms, the Cohune grows to a height of 50' with leaves up to 33 feet long.

Cassava plant



Cassava Root



Cassava

Maniot esculenta

Cassava is also known as yucca or manioc. According to legend, the Garinagu hid cassava, a mainstay of their diet, inside their clothes, where it stayed alive watered by the sweat of the tightly packed captives. They planted the cassava on Roatan, where it grew abundantly.

Garifuna women are widely known for their tradition of making cassava bread. Cassava is the root of a perennial shrub that grows three to six feet tall, with large palmate leaves and yellow, green and purple flowers.

This root is classified as bitter or sweet depending upon the quantity of cyanogenic glycoside (cyanide) present, determined by climate and soil conditions. Since the cyanide is a toxin, cassava must be cooked before it is eaten.

Cassava produces more calories than any other crop in the world, except for possibly sugar cane. For this reason, cassava is a staple crop for close to 500 million people in Central America, South America, Africa and Asia.

Cohune palm nuts



Dried Manioc



Cohune palm

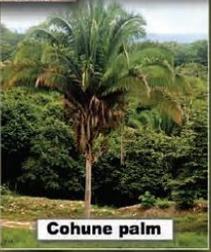




Fig. 5. Garinagu culture exhibit. Plants sustaining Garinagu agriculture



Fig. 6. Garinagu culture exhibit. Plants sustaining Garinagu agriculture

This exhibit is an environmental education method acting mainly upon:

- Both kinds of Cruise ship visitors:
 - Tourists
 - Crew members.
- From the local population:
 - Employees from shops and food and beverage facilities
 - RCT’s employees
 - School students
 - General visitors

The main ecosystems and environmental features corresponding to Roatán’s Heritage Exhibit are:

- Roatán’s marine life
- Roatán’s vegetation

The main objectives that can be achieved are:

- *To continue raising awareness*
- *To continue increasing sensitivity*
- *To continue improving attitudes (partially)*

Environmental signage system

RCT has an environmental signage system strategically located all along Mahogany Bay Cruise Center. This environmental education method acts mainly upon:

- Both kinds of Cruise ship visitors:
 - Tourists
 - Crew members.
- From the local population:
 - Employees from shops and food and beverage facilities
 - RCT's employees
 - School students
 - General visitors

MANGROVES

Mangroves are found primarily in tropical and subtropical regions around the world. They are a diverse group of unrelated trees, palms, shrubs, vines and ferns that share a common ability to live in waterlogged, salty soils subjected to regular flooding.

Their extensive root systems and canopy form a nursery and habitat for countless species of fish, mollusks and crustaceans. Many experts estimate that up to 75% of commercial fish species spend a portion of their lives being protected by mangroves.

Mangrove Destruction and Restoration

Over the past 25 years, as much as 35% of the world's remaining mangrove forests have been destroyed. Most of the destruction has been caused by human activities such as clearing the land for shrimp farms but natural destruction can also occur from large hurricanes, tsunamis or changes in hydrological conditions.

Large-scale mangrove restoration projects have sprung up in many areas around the world such as Southeast Asia where shrimp farming has taken a huge toll on mangroves as well as here in Central America. One example is a project on Roatan's sister island of Guanaja, whose mangroves were decimated by Category 5 Hurricane Mitch in 1995.

Mahogany Bay's Contribution

On a smaller scale, we have begun our own efforts to restore mangroves to our shoreline. The plants you see growing up through the white pvc pipes here in this little cove as well as along the shoreline adjacent to the north pier are red mangroves (*Rhizophora Mangle*). The PVC will be cut and removed once they are firmly established.

In areas of land less prone to flooding behind the red mangroves, we have planted another species commonly known as White Mangrove (*Laguncularia Racemosa*). To date, we have planted over 400 Red and 180 White Mangroves and are dedicated to continually plant mangroves from our nursery.

A Few Environmental Benefits of the Mangroves:

- **Protection from strong winds and waves:** Mangroves' protective buffer zone helps shield coastlines from storm damage and wave action, minimizing damage to property and losses of life from hurricanes and storms.
- **Soil stabilization and erosion protection:** The stability mangroves provide is essential for preventing shoreline erosion. By acting as buffers catching materials washed downstream, they help stabilize land elevation. In regions where these coastal fringe forests have been cleared, tremendous problems of erosion and siltation have arisen.
- **Trapping of carbon dioxide:** Mangroves absorb CO2 and store carbon in their sediments, thereby helping to lessen the impacts of global warming.

For more information on Mangrove restoration worldwide, we recommend the Mangrove Action Project with information at the following website: <http://www.mangroveactionproject.org>

Fig. 7. Sign describing the environmental importance of Mangroves and RCT's Mangrove Restoration Project.

Welcome to Roatán • Bienvenido a la Isla de Roatan

BEACH & CORAL REEF ETIQUETTE

Beach Etiquette

- Please don't discard or leave trash on the beaches; place all trash in trash containers.
- Please don't light fires on or near the beach area.
- Please fill in any holes created while playing in the sand.

Coral Reef Etiquette

Coral ecosystems are the most biologically diverse of all marine systems and serve as a refuge for many species. The reefs surrounding Roatán are part of the 561 mile-long Mesoamerican Barrier Reef System which is the 2nd largest in the world behind Australia's Great Barrier Reef. While reasonably well preserved, these reefs are quite fragile and therefore vulnerable to human pressure. Most of Roatán's accessible coral reefs lie within protected Marine Park waters.

THEREFORE WE ASK THAT YOU PLEASE:

- Don't touch, stand upon, walk on, grab onto, drag equipment along, or otherwise disturb the coral.
- Don't collect or capture marine life, including shells, whether living or dead.
- Don't anchor on coral reefs.
- Don't throw any trash into the sea.
- Don't use hooks, spear guns, Hawaiian slings or other devices capable of harming marine flora or fauna.
- Don't use gloves or knives.

REMEMBER, ALTHOUGH MANY CORAL SPECIES MAY LOOK LIKE ROCKS OR PLANTS, THEY ARE ACTUALLY COLONIES OF VERY DELICATE LIVING CREATURES.

RESPECT THE ENVIRONMENT

Don't disturb wildlife or plants; remember that you are visiting their habitat. Don't feed the fish; doing so could modify their behavior. Cut the rings of plastic can holders before disposing of them in trash receptacles to prevent animals (fish, turtles or birds) from eating or getting tangled in them. Please collect any plastic or other trash you may find floating on the reefs or washed ashore and place in the nearest trash receptacle.

HAVE FUN

In addition to its many recreational beach and water activities, Roatán also offers many land-based activities to ensure your visit here is enjoyable. Remember, take only pictures and bring home only memories.

And finally... *Enjoy your stay in Roatán and come back soon!*

Legend • Leyenda	
	
	

Prepared in cooperation with:



GUIA DE CONDUCTA EN LAS PLAYAS Y ZONAS DE ARRECIFES

Etiqueta de Playa

- Por favor no tirar basura en las playas, por favor colocar los residuos en los contenedores de basura.
- Por favor no encender fogatas en la playa o en las áreas cercanas.
- Por favor rellene los hoyos que se hayan formado al jugar en la arena.

Etiqueta de Arrecifes

Los ecosistemas coralinos constituyen los sistemas de mayor diversidad biológica del medio marino, y proveen refugio a organismos de muchas especies. Roatán ocupa el segundo lugar a nivel mundial en arrecifes verticales; en este momento los arrecifes presentan un grado de conservación aceptable, sin embargo, su fragilidad como ecosistema lo hace vulnerable a la presión del hombre. La mayor parte de los arrecifes alrededor de la isla están localizados en áreas protegidas por el parque marino.

POR LO CUAL LE PEDIMOS QUE POR FAVOR:

- No tocar, pararse, pisar, sujetar, arrastrar equipo o remover el fondo marino sobre las formaciones coralinas.
- No coleccionar o capturar organismos marinos vivos o muertos.
- No anclar en fondos marinos con arrecife
- No botar cualquier tipo de residuo al mar que pueda alterar el ecosistema
- No emplear dardos, anzuelos, arpones, entre otros que dañen a los organismos de la fauna y flora marina
- No usar guantes ni navajas o cualquier otro instrumento para tocar el arrecife.

RECUERDE, QUE AUNQUE LAS ESPECIES CORALINAS PAREZCAN PIEDRAS O PLANTAS, EN REALIDAD SON COLONIAS DE CRIATURAS VIVIENTES MUY DELICADAS.

RESPETE EL MEDIO AMBIENTE

Por favor no moleste los animales silvestres y las plantas; recuerde que usted es un visitante en su hábitat. No alimente a los peces, hacerlo puede, hacerlo puede modificar su conducta. Por favor corte los aros plásticos de empaque de latas antes de botarlos en los basureros para evitar que los peces, tortugas y aves se enreden. Si encuentra basura en lugares públicos, por favor recójalos y colóquelos en los recipientes adecuados.

¡DISFRUTE!

Además de las actividades acuáticas recreativas que pueden realizar, esta isla también cuenta con sitios arqueológicos y muchos otros atractivos en tierra, que harán de su visita una grata y divertida experiencia. Recuerde, solo tome fotografías y llévese solo bonitos recuerdos a casa. Y por último... *Disfrute de su estadía en la bella isla de Roatán!*

Fig. 8. RCT's Beach and Coral Reef Etiquette sign in English and Spanish

The main ecosystems and environmental features corresponding to the environmental signage system are:

- Coral reefs
- Marine life in general
- Beaches
- Roatán's vegetation
- Mangroves

The main objectives that can be achieved are:

- *To continue raising awareness*
- *To continue increasing sensitivity*
- *To continue improving attitudes (partially)*

Brief printed educational materials

All passengers, crew members and other visitors have available a unique beach and coral reef etiquette card. This card consists of a small map of the island, and the importance of the preservation of the coral reefs and the island beaches. The cards are available at selected locations in the cruise terminal. The cards can also be used as a souvenir or a bookmark.



Fig. 9. Roatán Beach & Coral Reef Etiquette Card

RCT has also sponsored the publication of a Fish and Coral Identification Booklet, as shown below:

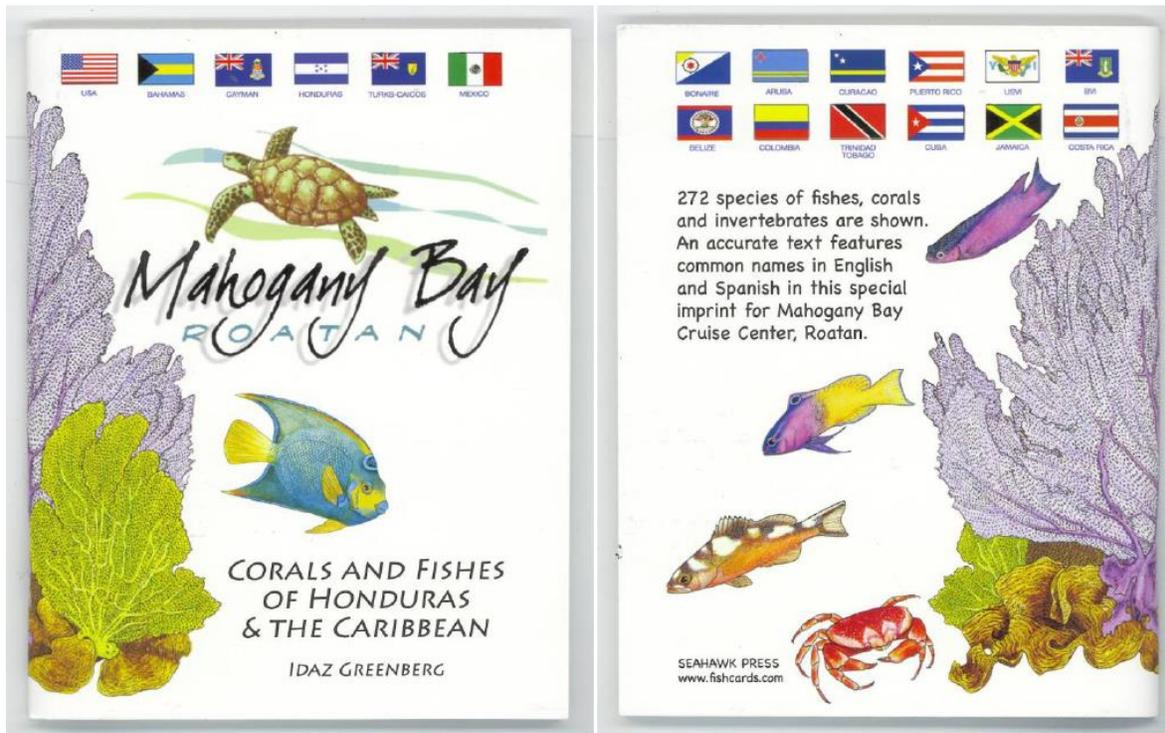


Fig. 10. Fish and Coral Identification Booklet

This environmental education method acts mainly upon:

- Both kinds of Cruise ship visitors:
 - Tourists
 - Crew members.
- From the local population:
 - Employees from shops and food and beverage facilities
 - RCT's employees
 - School students
 - General visitors

The main ecosystems and environmental features corresponding to this card are:

- Coral reefs

- Marine life in general
- Beaches

The main objectives that can be achieved are:

- *To continue raising awareness*
- *To continue increasing sensitivity*
- *To continue improving attitudes (partially)*

Educational materials posted on Mahogany Bay Cruise Center's Website

Coral reef restoration project. A brief description of this project illustrated by photos will be posted on Mahogany Bay Cruise Center's web site.



Fig. 11. RCT's Coral Reef Restoration Project

Mangrove restoration project. A brief description of this project illustrated by photos will be posted on Mahogany Bay Cruise Center's web site.

This environmental education method acts mainly upon Mahogany Bay Cruise Center's web site visitors, such as:

- Both kinds of Cruise ship visitors:
 - Tourists
 - Crew members.
- From the local population:
 - Employees from shops and food and beverage facilities
 - RCT's employees
 - School students
 - General visitors

The main ecosystems and environmental features corresponding to this environmental education method are:

- Coral reefs
- Marine life in general
- Mangroves

The main objectives that can be achieved are:

- *To continue raising awareness*
- *To continue increasing sensitivity*
- *To continue improving attitudes (partially)*

Practical activities

RCT will organize systematic clean-ups of the coastal area, especially in the immediate area of influence of the facility with special emphasis in Mahogany Bay Beach and surrounding mangrove system. Volunteers should be involved in these clean-ups when required. Special days like Earth Day, should be used as motivation to involve crew members and the local population when appropriate.

This environmental education method acts mainly upon:

- From Cruise ship visitors:

- Crew members.
- From the local population:
 - Employees from shops and food and beverage facilities
 - RCT's employees
 - School students
 - Other sectors of the local population if appropriate

The main ecosystems and environmental features corresponding to this environmental education method are:

- Beaches
- Mangroves

The main objectives that can be achieved are:

- *To continue raising awareness*
- *To continue increasing sensitivity*
- *To continue improving attitudes*
- *To continue developing skills*
- *To continue encouraging participation*

Environmental presentations

RCT would give space inside the Mahogany Bay Cruise Center for conducting environmental education presentations and talks for visitors and local population, if appropriate according to visitors' schedules and other planned activities.

This environmental education method could act mainly upon

- Both kinds of Cruise ship visitors:
 - Tourists (some might be interested although is not envisioned many)
 - Crew members.
- From the local population:
 - Employees from shops and food and beverage facilities

- RCT's employees
- School students
- General visitors

The main ecosystems and environmental features corresponding to this environmental education method would depend on the presentation's subject but could likely be:

- Coral reefs
- Marine life in general
- Beaches
- Mangroves

The main objectives that can be achieved are:

- *To continue raising awareness*
- *To continue increasing sensitivity*
- *To continue improving attitudes (partially)*

Adopting Schools

RCT will adopt a School to contribute to the environmental education of Roatán's students.

The students would be invited to visit Mahogany Bay Cruise Center, will be given a coral reef and beach etiquette card and other educational materials and will be also informed how to access the website. Their visits would comprise for instance:

- Flying beach chair
- Nature trail
- Walkway to Mahogany Beach
- Exhibits
- Environmental signage system

They would receive information about RCT's water conservation program by explaining and showing them the rainwater catchment system and the irrigation system with reused water.

They could also be invited to participate in certain Environmental presentations and practical activities such as beach clean ups and others.

The main ecosystems and environmental features corresponding to this environmental education method are:

- Coral reefs
- Marine life in general
- Beaches
- Mangroves
- Roatán's vegetation
- Roatán's fauna
- Roatán's water resources

The main objectives that can be achieved are:

- *To continue raising awareness*
- *To continue increasing sensitivity*
- *To continue improving attitudes*
- *To continue developing skills*
- *To continue encouraging participation*

Environmental training

RCT will implement an environmental training program using those valid and current conditions from SERNA's Environmental Licenses and Technical Reports corresponding to RCT's operational phase as the basis in order to enable each employee to carry out those environmental operating procedures of which they are responsible for to undertake.

The main ecosystems and environmental features corresponding to this environmental education method would depend on the specific employee responsibility.

The main objectives that can be achieved are:

- *To continue raising awareness*
- *To continue increasing sensitivity*

- *To continue improving attitudes*
- *To continue developing skills*
- *To continue encouraging participation*

Activities already carried out before the submission of this plan

- RCT's Environmental Consultant gave talks to the environmental coordinators of each contractor, who in turn conveyed the information to their subordinates.
- RCT participated in a Town hall presentation on declaring the Cordelia Bank a protected area.

REFERENCES

- 1.- Decreto 75-2010. Ley Especial de las Áreas Protegidas de las Islas de la Bahía. June 10, 2010
- 2.- Hungerford, H. R. and T. L. Volk. *Changing Learner Behaviour through Environmental Education*. World Conference on Education for All-Meeting Basic Learning Needs. Roundtable: Environmental Education: A component of Sustainable Development. United Nations. March 1990.