



tropical marine ecology & conservation

Photo by Zsuzsanna Pusztai

*"Genius is one percent inspiration and ninety-nine percent perspiration."
- Thomas Alva Edison -*

NEWSLETTER

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Lac Bay

CIEE Student Independent Research projects on Marine Ecology at Lac Bay, Fall 2010



Lac Bay, the largest bay in the Netherlands Antilles, provides a diverse array of interconnected ecosystems. Coral reef, sand flats, seagrass beds, mangrove forests, and salt pans compose this 700 ha



Ramsar-protected sanctuary. Individually, these biotopes offer vital habitat for an abundance of species; as a network of biotopes, Lac Bay serves as a highly productive nursery, nesting site, spawning area, and feeding ground.



The student-driven studies being performed in Lac Bay will elucidate the intricacies of this unique set of systems and further our understanding of the ways in which we can protect important natural areas.



Paul Patitsas - Juniata College

Hi I am Paul Patitsas and I am scientific diver in training for CIEE! I am doing a population assessment in Lac Bay to determine



the age, distribution and abundance of queen conchs (*Strombus gigas*). With the help of other students we are

systematically evaluating the bay by laying down 200m measuring tapes at 25 sites in the bay and searching for conch within a few meters on each side of the tape. Queen conch are a threatened species; so it is really important to find out how many there are in Lac because they require 50 individuals per hectare to reproduce successfully. When the number of conch dip below this level it becomes more difficult for the population to recover. This phenomenon is referred to as the Allee effect and conch are not the only marine species in ocean susceptible to it. Hopefully my study will provide some useful data to the marine park, which is responsible for protection of Lac Bay and the waters surrounding Bonaire.

Gina Jaber - Juniata College

For my independent research project, I am studying the upside-down jellyfish. This jellyfish, which can be found in tropical waters and in mangrove areas, lives in a symbiotic



relationship with a type of algae called zooxanthellae. The zooxanthellae are responsible for the color and perhaps the upside down nature of this jellyfish. I am gathering data on the color, bell size, and tentacle pattern

and length of the upside-down jellyfish. I am also taking water samples to see if there is a correlation between water quality, color, and bell size.

Ian Kroll - Vassar College

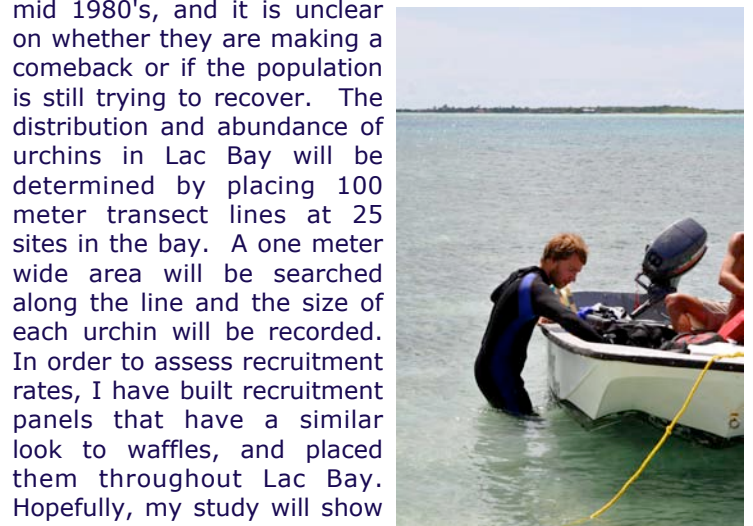
Mangroves are an important part many marine ecosystems on not only Bonaire, but also in many parts of the world. Oftentimes, upside-down jellyfish are found in these mangrove areas. However, there is little known about the interactions between the



mangroves and upside-down jellyfish. My project focuses on what type of mangrove environment the jellyfish prefer and whether or not they can be used as an indicator of mangrove health. The results from this project could be used in novel approaches to mangrove assessment and conservation.

Daniel Sternberg - University of Oregon

I am studying the distribution and recruitment rates of the long-spined sea urchin, which are important grazers on coral reefs. Caribbean populations of the urchins were wiped out to less than 1% of their original densities in the mid 1980's, and it is unclear on whether they are making a comeback or if the population is still trying to recover. The distribution and abundance of urchins in Lac Bay will be determined by placing 100 meter transect lines at 25 sites in the bay. A one meter wide area will be searched along the line and the size of each urchin will be recorded. In order to assess recruitment rates, I have built recruitment panels that have a similar look to waffles, and placed them throughout Lac Bay. Hopefully, my study will show that the populations of this keystone herbivore are improving, but preliminary analysis shows that the density throughout Lac Bay is very low with the exception of one shallow water area in the southern end of the back reef.



Katie Shultz - Arizona State University

Many kinds of reef fish utilize mangrove and sea grass habitats as nurseries, including the commercially important barracuda. The mangroves in Lac Bay are currently in various states of degradation, and the focus of my project is to determine if this gradient of health has an effect on



where juvenile barracuda prefer to live. Assuming a correlation is found, potential conservation and economic implications include increased support for preserving healthy mangroves as a sanctuary for juvenile barracuda and other fish.

Andrew Brendle - University of Colorado at Boulder

My project is about the addition of Queen Conch shells (as a source of natural refuge) in three different habitat types; mangrove, sand flat and back reef that have varying degrees of complexity. I expect that habitats that are more complex will have less demand for shelter. There are large piles of shells along the edge of the bay from past conch fishing that I am using for this project. In my study, I will



determine the relative demand of refuge among the three habitats, what types of animals will use the refuges and if there is a change of type of organism using the shells over time. A total of fifteen shells were placed in each of the three habitats. Three shells will be collected each week for four weeks to see what is living in them. The shell will be scooped up with a plastic bag and brought back to the shore in buckets where the organisms will be identified and shells will be crushed to look for animals living deep inside. It will be interesting to see

what fish or crabs are using the shelters and if there are differences among the three habitats.

AnnaRose Adams - Oregon State University

Live corals are important to reef ecosystems because they can provide homes for many types of fish that live on reefs. When corals die, the fish are less likely to use coral for protection, which can reduce the amount and types of fish found on the reef. In Lac Bay, scientists have noticed a new species of algae overgrowing corals that can cause death of the coral and a change in the amount of live coral on the reef. One of the corals that is being overgrown by the algae is fire coral. There are many types of coral reef fish associated with the fire coral in Lac Bay. The purpose of my research is to see if fish will still use fire coral covered in this alga as habitat. The results of the study will provide a better understanding of the impacts of this unidentified alga on reef life in Lac Bay.



Michael Hansen - University of Minnesota, Twin Cities

Rainbow parrotfish, considered the largest plant eating fish in the Atlantic Ocean, are currently listed as a threatened species. I am studying the abundance and sizes of rainbow parrotfish in the mangroves and back reef of Lac Bay. I believe that juvenile rainbow parrotfish are using the mangroves as a nursery habitat and then moving to the reef after growing up. To learn about the rainbow parrotfish, my partner and I are kayaking to different parts of Lac Bay and counting the



rainbow parrotfish at certain locations. I also estimate the size so that I can determine what size classes are more abundant in which habitats. I hope that my research could be used to help protect the mangroves because of their importance as a nursery habitat. Rainbow parrotfish may be the only species of reef fish for which mangroves are essential habitat.

Alexandra Gulick - Oregon State University

I am a junior at Oregon State University majoring in marine biology. My study investigates the foraging tactics used by



the Tricolor Heron in the seagrass beds and mangroves of Lac bay. I expect that the Tricolor Heron will use different behavior to catch prey in the two habitats. For my study, I will watch and record the behavior of herons in the early morning when they are

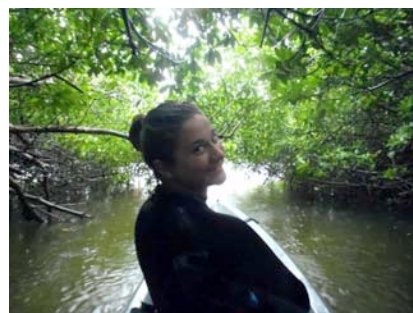
feeding along the outskirts of the bay. The most used and most effective (in terms of prey capture) foraging tactics for the two habitats will be determined. Understanding the behaviors of the heron and the differences in foraging success between the habitats is basic information about the ecology of this interesting bird.

Rachael Vietheer - Ursinus College

My independent research project is conducted in the mangrove channels located in Lac Bay, Bonaire. Mangrove trees are home to many juvenile fishes and their roots consist of many species of invertebrates and algae. A study has found that prop roots with sponges growing on them may enable increased growth of the root and production of other organisms residing in the area. My research focuses on what types of roots (clean, covered in algae, or have sponges) have the most fish and invertebrates, and the species diversity and richness of fish and invertebrates located on the roots with sponges. The results from this study will add information about a little known habitat and the organisms growing on or around the mangrove roots in Bonaire's beautiful Lac Bay.



Marissa Pauling - University of Oregon



I am studying the seagrasses in Lac Bay where queen conch are present to determine what the conch are eating. This is important since it is not entirely known how and what queen conch eat. It has been suggested that

queen conch scrape the epiphytes, algae that use sea grass as a base to grow on, off the seagrass blades. Thus my study compares epiphyte loads of seagrass blades from areas where conch are present and where they are lacking to see if there is a difference in seagrass epiphyte community composition or biomass that might explain the distribution of queen conch in the bay.

Tom Stabler - Goucher College



I am doing a study on the newly discovered alga, *Ramicrusta* sp. and its color differences when interacting with three types of coral: *Millepora complanata* (fire coral), *Montastrea annularis* (boulder star coral), and *Porites astreoides* (mustard hill coral). *Ramicrusta* sp. tends to be a deep burgundy when overgrowing fire coral but when it overgrows boulder star coral or mustard hill coral it is a bright orange. I am doing field observations to assess the differences in color when overgrowing the different species of coral and a field experiment to see if light has any effect on the color of *Ramicrusta* sp. And I am doing a lab experiment with fire coral metabolites to observe what affects *Ramicrusta* sp. color and if it is related to exposure to fire coral or light.

Beth Tyrie - Wofford College

This fall semester at the CIEE Bonaire Research Station, I am working on understanding the roles and mechanisms of limited adaptive camouflage of the peacock flounder. The peacock flounder uses its camouflage to capture prey and avoid predators, but why is the flounder only equipped with limited camouflage instead of being able to blend in with any substrate? To answer this question I am doing computational and behavioral analysis through videography, digital photography, and computer programming at Yellow Sub Reef on the leeward side of Bonaire and Lac Bay on the windward side of the island.



Osha Rudduck - DePaul University



Seagrass beds are important habitats as they provide a home to all kinds of marine life, protect coral reefs from over sedimentation (sediments can kill corals) and protect shorelines from erosion by slowing waves before they hit shorelines. I am

studying seagrass beds in Lac Bay and looking at how the seagrass beds affect sedimentation rates and wave energy. By looking at these variables within the beds, my study will investigate the likely changes that might occur if the seagrass beds were lost.

Amanda Brunner - Oregon State University

My individual research project characterizes the seagrass beds within Lac Bay, Bonaire. A recent study showed that



(www.bonaireturtles.org)

sea turtles within Lac Bay grow faster and larger than sea turtles around other areas of the Caribbean. My project is aimed to find out if there is some characteristic of the seagrass that turtles prefer. Seagrass is the primary source of food for the turtles. I am measuring growth rates of the seagrasses in different areas of the bay. I will also be measuring the algae that grow on the seagrass blades, to determine if this affects either the growth of seagrass or the grazing rates of turtles. I am also determining the density of the seagrass beds to see if that is an important factor in turtle grazing rates. Perhaps my study will show what characteristic of seagrasses are attracting sea turtles.

Quinn de la Concepcion - Colorado College

My project is about the relationship between the long-spined urchins (*Diadema antillarum*) and a recently-discovered calcarous alga (*Ramicrusta* sp.). This calcarous alga grows quickly and so far a predator that eats this alga has not been identified. I'm comparing two adjacent, similar sites in Lac Bay, one where the long-spined urchins live and one where they do not. I am documenting the amount of calcarous alga in the presence or absence of the urchins to



discern whether there is a possible relationship between the two. If a negative relationship between the two is found where the urchins inhibit the growth of the alga, this could possibly warrant further experiments regarding urchins as a possible predator on the alga.