

Bonaire Welcomes Back Indiana University



Elkhorn Coral, photo by: © Hans Leijnse

A group of students from Indiana University (IU) recently visited Bonaire. Since 2015, IU has been sending students to Bonaire as part of their Conservation and Sustainability Management study abroad program. Each year, a group of 10-13 college students work together with the local conservation groups to exchange ideas, gain real-world experience and learn about Bonaire's culture, language, and ecology.

Typically, students spend their first week working directly with organizations, learning about the local environment and customs. The second week is spent developing a unique project in which a pair of students can expand on this knowledge, introducing their own personal touch, and give back to Bonaire. In the past, student groups have worked with variety of organizations such as ECHO, STINAPA, STCB, Wolf's Company and Posada Para Mira. These projects range from tree planting to beach clean ups to establishing an initiative to turn food-waste into nutrient rich soil for local farmers.

Now, let's take a closer look into some of last year's projects:

Compost

The Food and Agricultural Organization of the UN¹ estimates that around one third of all food produced is wasted. One pair of IU students decided to work with a local organization to put this food-waste to better use. Working with Posada Para Mira Restaurant owner, they restarted a composting initiative which would

encourage both commercial and individual participation. This would keep food-waste out of the landfill and work to achieve the Caribbean Waste Collective's 2025 goal for Bonaire. Posada Para Mira, a local restaurant, is open 5 days a week and estimates that during the week they generate around 10 gallons of food-waste a day, and up to 50 gallons a day on the weekend. Composting not only helps cut waste entering the landfill, but it can also create nutrient rich soil which can be used to grow new crops. An 80 gallon compost container was brought onto the island this year, funded by an online donations website also established by IU students, to facilitate the composting at Posada Para Mira Restaurant.

Coral

A different project focused on the link between coral farming and fish biodiversity, looking to better understand why certain types of coral are more attractive for coral restoration efforts. This study monitored fish populations around several different Acropora (staghorn and elkhorn coral) and Millepora (fire coral) sites, to determine which type of coral had larger fish populations. Surprisingly, fire coral was found to have many benefits, such as high survivability, high growth rate, and the ability to reduce the flow of water through its fan structure to allow more delicate species to grow around it. However, in the end, this study concluded that Acropora coral species tended to host a larger variety of fish, which explains why it is typically preferred for coral restoration projects.

Feral Goats

Feral goats can be seen all over the island, and one group of students worked to examine how other communities have dealt with similar problems on high herbivory. Goats were introduced to the island in 1526 by Spanish conquistadors. With no natural predators, they've continued to roam the island, now numbering around 29,000 individuals. Historically, Bonaire was covered by native dry-evergreen bushland but overtime, overgrazing has led to a dominance of thorny shrub-cacti. To reduce the impacts of high herbivory other countries have used sterilization strategies, hunting and other culling techniques and fencing. All these strategies have their pros and cons. Currently, fencing is the only observed management strategy being implemented on Bonaire. Students worked with a local scientist who has been leading an ongoing study of 13 different areas, which have been isolated from goats. After 8 years, four different plants showed higher abundance in these control plots, highlighting the effects of overgrazing. This shift away from native plants has led to an increase in erosion and sedimentation of coral reefs. Studies such as these highlight the importance in environmental management when balancing native and invasive species.

Sea Turtles

The temperature of sand can play an important role in the development of sea turtle eggs, as

warmer sands lead to an increased number of female sea turtle hatchlings. With global temperatures rising, this is leading scientists to worry about the future of sea turtle populations. One pair of students worked to determine the influence of shade on the regulation of sand temperatures. To complete this study they tested different areas which were shaded naturally (trees, brush), artificially (structure built over sand) and without any shade. Artificial shading actually increased temperature of the sand, potentially by preventing heat from escaping the sand. In fact, they found that even after the sun had set, it still had a heating effect on the sand, although this sand would eventually cool overnight. Natural shade showed a decrease in sand temperature compared to unshaded areas but this was not found to differ statistically. With this information, a case could be made for implementing above ground shelters (to mimic natural shading like trees) over nests or planting trees to keep the sand cool, to ensure a balanced hatchling population between male and female sea turtles.

Responsible Tourism

According to recent TEEB² research, tourists spend around \$125 million USD annually on Bonaire, with nearly 40% of this going towards nature focused activities. As such, it will become increasingly important for the government of Bonaire to strategically manage its tourism to

ensure it grows in a sustainable and environmentally conscious way. The final student project centered on the importance of having a Strategic Tourism Plan. The objective of the study was to determine which of the 89 dive sites on Bonaire are most active and categorize coral health based on dive site popularity. They showed evidence from both the literature and observational studies that the most popular dive sites experience the highest losses of coral communities through both disease and physical damage. This information is important when developing a way to quantify the value of environments and their potential services. This research contributed to the Wolf's Company's Natural Capital Mapping project which will aid the government in prioritizing efforts in the future.

Collaborative opportunities, such as these, are crucial for finding innovative and integrated solutions to some of the islands most significant problems. By working together, each party can bring a different perspective to the issues to ensure a sustainable future for Bonaire. We look forward to welcoming Indiana University back to the island and can't wait to see what projects they come up with in 2019 and beyond.



Feral Goat, photo by: © Christian König

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