

## Engaging Scientists and Students in Costa Rica

*Left: Students assist with installing solar panels at the Taboga Reserve research field station.*

*Right: Team members at the 2019 Dow Symposium*

### GLOBAL IMPACT ARTICLE SERIES

**E**ngaging with local researchers and students is essential for promoting international and interdisciplinary work in environmentalism. University of Michigan (U-M) faculty and students are collaborating with researchers in Costa Rica, which inspired the need for a biological field station. The current facilities, located within the Taboga Forest Reserve, are not in use due to funding deficiencies, but they serve an essential purpose for advancing sustainable energy, ecology, agriculture, and fishery research and studies.

In partnership with U-M researchers and La Universidad Técnica Nacional, a Dow Distinguished Award student team is establishing a net-zero carbon research and education center in Costa Rica. This project is also a School for Environment and Sustainability (SEAS) Master's Project. This field station brings together scientists and students and provides researchers with a place to investigate relevant sustainability and ecological topics.

**// This project provides students the opportunity to go to Tobago and learn about conservation, ecology, and sustainable systems,"** says Tom Hayek, member of the team and Environment and Sustainability student.

### IN THE FIELD

In the summer of 2019, the team traveled to Costa Rica to research energy use at the site. The team is working on a carbon-neutral energy plan and recommendations for the best sustainable energy options.

#### Steps for the Energy Plan:

- Construct a detailed energy forecast that included present and desired electricity demand and energy generation
- Gather data on local renewable energy resources
- Create a model to determine how energy could be harnessed most efficiently from crop residue

The team used energy modeling software (HOMER) to design a microgrid and create an optimized energy model for the living quarters and research lab. Compiling the data, the team created a blueprint for a microgrid system that will allow the station to become carbon neutral.

The team made a second trip to Costa Rica in February of 2020 to meet with people from La Universidad Técnica. They discussed project ideas and developed a biomass gasification system that will serve as one of the sustainable energy resources to power the research station.

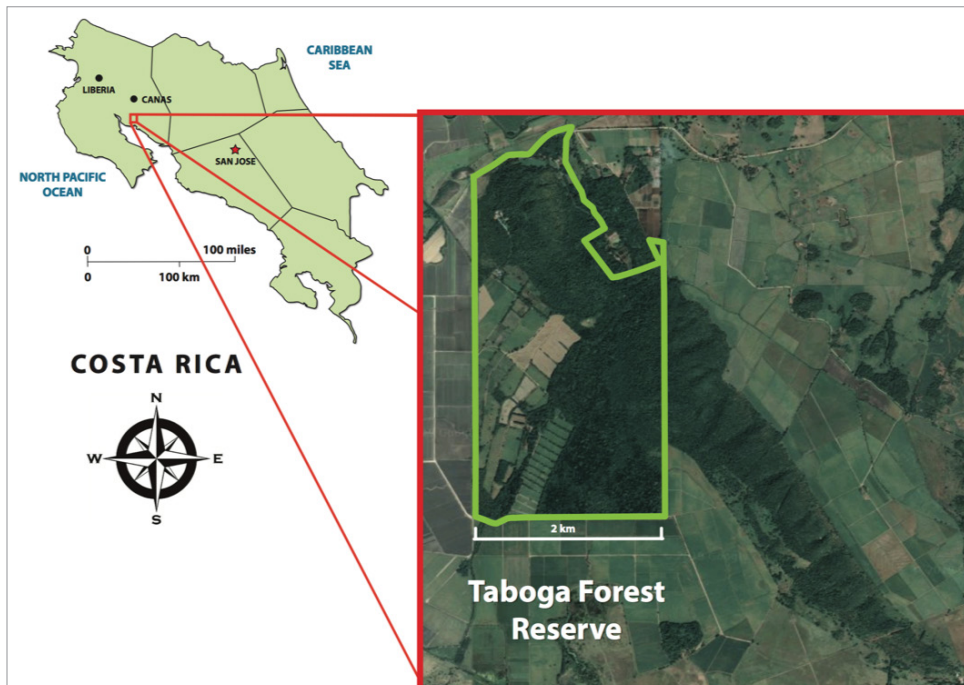
"[We] learned a lot in the field. [We were able to] work with multiple institutions and multiple teams, [which shows] the importance of teamwork on these large projects to address large, ongoing challenges," says Hayek.

## ON-GOING PROJECT

This project comprises four phases, with the first phase slated for completion in April 2020, and the final project to be completed by April 2023.

After completing the initial work successfully, the team received an additional \$50,000 Large Grant from the Dow Sustainability Fellows Program. The team will use these funds to purchase additional solar panels, support travel expenses, and engage the community in grant application workshops and other outreach activities.

"[We can] use this learning environment to help the next generation of students and researchers, and hopefully from that, they are able to share the knowledge to establish more sustainable systems," says Hayek. "[Hopefully we can] use this place as a model for future net-zero field stations or developments," adds Hayek.



Taboga Forest Reserve

## PROJECT TEAM

- Andrew Harrison, College of Engineering and School for Environment and Sustainability (SEAS)
- Jacob Picardat, SEAS
- Thomas Hayek, SEAS
- Maya Lapp, College of Wooster, Mathematics
- Amelia Linde, Taubman College of Architecture and Urban Planning

## FACULTY ADVISOR

- Jose Alfaro, SEAS
- Jacinta Feehner, Psychology and Anthropology
- Thore Bergman, Ecology and Evolutionary Biology and Psychology

## CLIENT

- Sustainability Without Borders

## READ MORE

- Full Project Report
- Dow Sustainability Fellows Program
- Dow Global Impact Series

This project addresses the following United Nations Sustainable Development Goals.

## SUSTAINABLE DEVELOPMENT GOALS



The Dow Sustainability Fellows Program at the University of Michigan (U-M), made possible by Dow, supports full-time graduate students at U-M who are committed to finding interdisciplinary, actionable, and meaningful sustainability solutions. The program prepares future sustainability leaders to make a positive difference in organizations worldwide. We believe that diversity, equity, and inclusion are key to individual empowerment, and the advancement of sustainability knowledge, learning, and leadership. See: <http://sustainability.umich.edu/dow>