

DUKEENGAGE IN COSTA RICA

Habitat and Water Resource Restoration and Research in the Bellbird Biological Corridor, Costa Rica. *This program is organized by the Monteverde Institute in collaboration with DukeEngage.*

Applicant Alert: Non-US citizens should contact the DukeEngage office (dukeengage@duke.edu) prior to submitting an application for DukeEngage-Costa Rica program for information on visa requirements.

Program Dates: June 6 - July 31, 2019

(Dates subject to change up until the point of departure.)

Service Themes

- Environment/conservation
- Community development/outreach
- Research

Program Focus

Implementing and researching collaborative conservation actions for the restoration of tropical habitat and water resources that will directly benefit the environment and the rural Costa Rican communities in the Bellbird Biological Corridor. The program also attempts to improve the restoration process through research of reforestation techniques and results.

Curricular Connections: While students from environmental, ecology, and biology concentrations may be very interested in the fieldwork and research of this program, students from all backgrounds are invited as the project involves understanding policy, socio-economic factors, and community development as they relate to conservation and water use. (See additional curricular connection information below.)

Program Leaders

- Debra Hamilton, MEM, Executive Director of the Monteverde Institute and co-founder of the Fundación Conservacionista Costarricense (FCC or the Costa Rican Conservation Foundation). Debra researches reforestation techniques and the threatened Three-wattled Bellbird (*Procnias tricarunculatus*).
- Deedra McClearn, PhD, adjunct instructor Biology Department, Duke University, and visiting lecturer, Duke Kunshan University, China (Fall 2017). Deedra has worked on study abroad programs in Costa Rica, South Africa, and China. Her current research in Costa Rica is on the growth and reproduction of understory ferns and canopy trees in relation to seasonal and long-term weather/climate. She is the DukeEngage-Costa Rica Faculty Fellow.
- Victorino Molina, course coordinator for the Monteverde Institute, co-founder of the Fundación Conservacionista Costarricense, and president of the Santa Elena Aqueduct and Water Association.
- Julio Rojas, Forest Engineer and course assistant, Monteverde Institute. Julio leads reforestation activities and provides logistical support to the group.
- Jessica Arias, PhD candidate in agroforestry, Monteverde Institute, provides logistical support and leads community activities where agriculture and culture are the focal points.

Program Overview

While students are in the Bellbird Biological Corridor in Costa Rica, they will collaborate with the Monteverde Institute (MVI), the Costa Rican Conservation Foundation (FCC), and other Corridor founders to restore habitat and improve water resource quantity and quality. The students will work in all facets of tropical reforestation (seed collection, germination, seedling maintenance, deliveries, and planting of seedlings) and the corresponding research to learn of

efficient seed germination methods, seedling survivorship, growth rates, herbivory effects, and habitat restoration success with different degrees of maintenance. Two years in a row, the DukeEngage students built a tree nursery for community associations. In 2017 and 2018, the DukeEngage program initiated a rapid ecological assessment of forest integrity in a 15-year-old planted forest. This assessment will continue in 2019. In conjunction with habitat restoration, the reforestation program of the Monteverde Institute and FCC has an emphasis on the conservation of water resources. Therefore, the students will be involved in restoring degraded areas and possibly building rainwater gardens to 1) increase filtration of agricultural and storm water run-off into the soil and 2) decrease erosion and sedimentation of rivers. All of this work will involve communication and collaboration with the community members living in the corridor.

The program mixes in other projects that help the communities, such as painting the recycling drop off centers, and encourages students to share their talents by teaching locals any specific skills that they may have. For example, in 2018, the DukeEngage students taught knitting, Zumba, and art.

The Bellbird Biological Corridor spans >64,000 hectares from sea level to 1850m above sea level and was founded by six conservation and education organizations in the Monteverde zone of Costa Rica. At present, four sub-councils from the 28 communities in the corridor manage priorities and actions. Tropical forest restoration, habitat connections, and water conservation is imperative to enhance species survival and altitudinal migrations as well as water conservation for the local communities. These goals can only be accomplished with the help of volunteers and students.

Student Learning Objectives/Outcomes

In the program, students will be active participants in the following:

Tropical Forest Restoration

- Learn the fundamentals of tropical reforestation through seed collection and germination, nursery maintenance of seedlings, and the planting of trees on degraded pasture;
- Learn the characteristics and identification of different tropical tree families and species;
- Research reforestation success through data collection and analysis regarding seedling survival, tree growth, and the effects of maintenance (weed removal) and herbivory on planted seedlings;
- Calculate sequestered carbon dioxide in trees that are > 8 years of age;
- Practice dissemination of methods of research results and the importance of habitat restoration; and
- Demonstrate basic knowledge of key biological concepts such as tropical seasonality, biodiversity, altitudinal corridors, habitat restoration, and habitat connectivity.

Storm-water and agricultural runoff conservation

- Employ community outreach techniques in rural villages to convey the importance of habitat restoration and reducing stream and river contamination from runoff water;
- Perform site assessments, in collaboration with residents, to determine areas with excessive channeling of storm water, areas of agricultural runoff into rivers, and areas that accumulate storm water; and
- Construct rainwater gardens designed to slow water runoff and increase infiltration into the soil resulting in a slow release of water at the downslope side of the garden.

Communication

- Verbally communicate in Spanish after eight weeks of Spanish instruction and interaction with community members;
- Assess effective communication methods in rural settings from projects ranging from blogs, flyers, phone apps, and direct conversations; and
- Present project results and experiences in formal settings.

At the end of the program, students will:

- Be able to analyze their own global perspectives, compare their attitudes to those of other people (including their fellow students), and reflect on how their perspectives might have changed over the course of the DukeEngage experience;
- Be able to explain to others the complex interplay of stakeholders and factors (biological, economic, governmental, social) in community-based conservation efforts;
- Design, implement, analyze, and present a component of the forest integrity assessment or conservation work as a capstone of the program; and
- Have the skills to communicate in Spanish at a basic to advanced level with Costa Rican residents.

Partnership Opportunities

Students will work with Bellbird Biological Corridor council members throughout the region to develop and implement restoration actions regarding habitat restoration and water conservation. Partners include the Monteverde Institute, Costa Rican Conservation Foundation, the Bellbird Biological Corridor local council, and four regional sub-councils. All partners are committed to accomplishing the goals of the Bellbird Biological Corridor: conservation of biodiversity, sustainable use of natural resources, and enhancement of the wellbeing of the communities.

Monteverde Institute — founded in 1986

www.monteverde-institute.org

Mission: To advance sustainable living at the local and global level through place-based education, applied research, and collaborative community programs.

Bellbird Biological Corridor — founded in 2005

www.corredorbiologicopajarcampana.org

Mission: The Bellbird Biological Corridor promotes integrated actions to reestablish and maintain biological connectivity, the conservation of natural resources, and local community well-being.

Fundación Conservacionista Costarricense or Costa Rican Conservation Foundation — founded in 2000

www.fccmonteverde.org

Mission: To protect, conserve and restore habitat on the Pacific slope of Costa Rica.

Program Requirements

Language Requirements: Spanish knowledge is recommended as it will enhance the overall experience but is not a requirement. Course leaders and many community partners are bilingual.

Coursework Requirements: There are no required courses for this program but any forestry, botany, engineering, community development, environmental sciences, water resource management, Spanish, or Latin American courses would be beneficial. Basic computer skills and statistical knowledge will be useful.

Personal Qualities: Students should be willing and eager to be a team member, ready for physical work, culturally sensitive, self-motivated, and open to new experiences. A sense of humor, patience, and a desire to be challenged will be welcomed.

Curricular Connections

The most direct curriculum linkages of this program would be with the Nicholas School of the Environment in both environmental sciences (tropical ecosystems, biological corridors, restoration ecology, forest management) and environmental policy (NGOs, strategic adaptive management with multiple stakeholders, GEF and World Bank initiatives). Relevant courses would include ENVIRON 240S Biodiversity Issues and Field Methods, ENVIRON 245 Theory and Practice of Sustainability, ENVIRON 265 Environmental Law and Policy, ENVIRON 270A Conservation Biology and Policy, ENVIRON 282A Environmental Science and Policy of the Tropics, ENVIRON 361LS Field Ecology. Additional connections would be with Public Policy and Latin American Studies.

Program Details

Description of the Community: Monteverde and Santa Elena are two adjacent and contiguous communities in the cloud forest region of the Tilarán Mountains of Costa Rica at approximately 1400m in elevation. Monteverde is a misty, humid, and windy region with a mean annual temperature of 18C (64 F) and an annual rainfall of about 3,000 millimeters (118 inches). June and July are in the middle of the rainy season. See the Monteverde Institute website for more description: <http://www.monteverde-institute.org/monteverde.html>

Typical workdays will start by 8am and last until 3pm. For lowland regions, where the temperature is hot, early morning schedules are best. Work will typically be outdoors in warm to hot temperatures and will include rainy days. Research days are at field sites and at the Monteverde Institute. While all students will participate in all aspects of the program, students will be encouraged to assume leadership roles in segments of the program for which they have special interests and passions.

Housing and Meals: Students will stay as a group in a local hotel near the Monteverde Institute that specializes in student housing for the first week of the program and field stations for most of the other weeks. One week in the middle of the program will be spent at a lowland site (hotel) for reforestation work in the lower elevations of the Bellbird Biological Corridor. Full amenities (potable water, toilet and bathing facilities, electricity, phone and internet) are available at both the hotel and the field station. Meals will be provided by the lodging establishments. Rice and beans are the mainstay of the diet in Costa Rica and includes lots of fresh fruit and vegetables. The typical dish is called a “casado” and consists of a meat entree, rice, beans, salad, and a vegetable. Vegetarian and vegan diets are very easy to accommodate with the Costa Rican diet.

If you do not eat certain types of food for cultural, religious, or personal reasons, please contact the DukeEngage office, dukeengage@duke.edu, to discuss whether or not your dietary needs can be reasonably accommodated at this program site.

Transportation: DukeEngage provides transportation to and from service placements and all scheduled program activities. Students will be transported to the field sites or walk if they are within 2 km. Students will walk, use the public bus, or hire a taxi for their own personal enrichment and extracurricular activities. The hotels are located in small towns that are between 0.5 km to 3 km from the main town of Santa Elena. The first hotel is 0.5 km from the Monteverde Institute (walking distance or public bus service); the field station is approximately 7 km away and will receive MVI transport services.

Communication: Students will be provided with a basic local cell phone for program-related and emergency communication. Internet service will be available at the main lodging sites and at the Monteverde Institute. No internet will be available during field work. Computers are available at the Monteverde Institute.

Local Safety and Security; Cultural Norms, Mores and Practices: DukeEngage strongly advises all applicants to familiarize themselves with the challenges travelers commonly encounter at this program site in order to make an informed application decision. We recommend starting with these two resources:

- The International SOS (ISOS) portal for up-to-the-minute travel, health and security advice ([Log in to the Duke ISOS portal](#) with your Duke NetID)
- The [Diversity, Identity and Global Travel](#) section of the DukeEngage website

Opportunities for Reflection: Students will keep journals. Weekly team meetings will include personal thoughts and discussions. Communications via blogs, videos, e-portfolios, and other methods will be encouraged. In addition, pre-trip

preparation will include either the Global Perspective Inventory (GPI) or the Intercultural Effectiveness Scale (IES) and follow-up discussions. One of these assessments will be repeated during the program to review changes in perspectives.

Other Opportunities: Community interaction is encouraged and there are sports (ultimate Frisbee and soccer), dances, religious services, and community potluck lunches. Students will be encouraged to participate in community events throughout the region. Open water swimming is not a sponsored activity in any DukeEngage program.

More Information

A video was created to show the project, people and places of the program:

<https://www.dropbox.com/s/ssjkn4rzlfiducw/Duke%20Engage%20v1a%20720p.m4v?dl=0>

A video was produced after the 2017 program:

<https://www.dropbox.com/s/k1yrpvtkrujy6ru/DUKEENGAGE%20VIDEO%20FINAL%20v1.m4v?dl=0>

A 2018 student, Christina Holloway, composed a video of the student's experience

<https://drive.google.com/file/d/1JlXyalW3yCnRe9-PBmwfCGJ5EJL7Lw46/view?usp=sharing>

A poster, with credit to the DukeEngage programs, was presented at the 2017 Ecological Society of America Conference that includes work done by the program:

- Hamilton D, Chincilla R and Zúñiga J. Tropical storm Nate: the resilience of conservation efforts, the environment and community – Monteverde, Costa Rica [version 1; not peer reviewed]. *F1000Research* 2018, **7**:1439 (poster) (doi: [10.7490/f1000research.1116062.1](https://doi.org/10.7490/f1000research.1116062.1))

A poster, presented at the 2015 Ecological Society of America Conference, covers the reforestation project and related research:

<http://digital.lib.usf.edu/SFS0056013/00001>

The following video presents the Monteverde Institute:

<https://www.youtube.com/watch?v=To17KmlvKaw&list=PLNNFjCwaamIWYdDgkb6fwjpDCw-SFJzul>

The Bellbird Biological Corridor's website is:

<http://www.corredorbiologicopajarocampana.org/>