

Cooperative Center for Study Abroad 2022 Belize: Land and Sea Program: May 2022

INSTRUCTOR:

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Dr. Livingston is a Professor of Biological Sciences at Georgetown College in Georgetown, Kentucky. She regularly teaches courses in Introductory Biology, Cellular & Molecular Biology, Physiology, and Developmental Biology.

COURSE DESCRIPTION AND OBJECTIVES:

Study examples of Earth's most diverse ecosystems by exploring both tropical rainforests and a coral reef in Belize. At Blue Creek Field Station, you will live and work within a primary rainforest surrounded by a wealth of biodiversity ranging from large buttressed trees to howler monkeys. While on South Water Caye, part of the longest coral reef in the Western Hemisphere, you will study reef structure, mangrove forests and grass beds while swimming among brilliantly-colored reef fish and corals.

Learning Objectives: Students will gain an understanding of:

- the biotic and abiotic features of coral reef and rainforest ecosystems, as well as associated ecosystems (rivers, caves, mangroves, and grass beds).
- the intricate relationships that shape these communities.
- the factors that contribute to the high levels of biological diversity in these communities.
- the threats and conservation issues that impact tropical ecosystems.

TEXTBOOKS:

Kricher, John. 1999. A neotropical companion: An introduction to the animals, plants, and ecosystems of the new world tropics. 2nd ed. Princeton University Press. Princeton, New Jersey.

Humann, Paul, and Ned Deloach. 1995. Snorkeling Guide to Marine Life: Florida, Caribbean, Bahamas. New World Publications, Inc. Jacksonville, Florida.

* These texts may be purchased through an online book seller.

OTHER REQUIRED ACADEMIC ITEMS:

- Minimum of 2 journals (bound notebooks are better) and pencils (better than ink in the rain).
- 8 copies of each "Fact Sheet" (see below)
- Snorkeling gear (mask, fins, snorkel). Bring quality gear. If possible, test it before class. Your home school may be able to provide this for you, so please check. Otherwise, you will have to purchase.

COURSE GRADE:

Item:

2 Quizzes (15% each)	30%
Journal	10%
2 Reflection papers (10% each)	20%
Species Accounts	10%
2 Individual Presentations (10% each)	20%

Details:

- **Quizzes (30%):** The first will focus on tropical rainforests, while the second will focus on coral reefs. Testable material will include readings and presentations on site (by faculty and students).
- **Daily Journal (30%):** Students will keep a daily journal describing what they see and learn, as well as their general impressions of Belize and its people. These journals will be typed and edited after students return home. *Journals will be due June 8, 2022 and may be sent to my Georgetown College email.*
- **Reflection Papers (20%):** After your return home, you should select two biological subjects of interest to you -- one based on your experiences in the rainforest, and one based on your study of the coral reef. Research these subjects and write 3-4 pages that expand on your understanding of each topic. While these subjects may be mentioned in your journal or species accounts, these pages should provide a more in-depth explanation of the topic than you could develop on site. Sources should be properly cited and documented. Besides the two required books, you should consult at least two other academic sources (articles, reviews, and/or books). If you are unsure if the source is legitimate, please ask me. *Reflection papers will be due June 8, 2022 and may be sent to my Georgetown College email address.*
- **Species Accounts (10%):** Students will write species accounts of 30 notable organisms they observe throughout the course. These accounts should be informative accounts that include descriptions (morphology, habitat, behavior, etc.) based on direct observations and should include common names and the classification of each species. Do not simply list what you saw. Include accounts of 15 species from each ecosystem (rainforest and coral reef). The species selected should represent a diversity of taxa (for example, don't limit yourself only to fish on the coral reef). Accounts should be typed and edited after students return home. I will check these while in Belize to insure you are documenting properly. *Species accounts will be due June 8, 2022 and may be sent to my Georgetown College email address.*
- **Presentations (20%):** Each student will make two presentations (10% each) describing some aspect of a rainforest (forest, rivers, or caves) and a reef (coral reefs, grass beds, or mangrove forests) ecosystem. The presentations will include a one-page "Fact Sheet" that will be distributed to classmates and faculty (bring 8 copies for each presentation). The fact sheets should summarize the major points of the presentations. The oral presentations should last approximately 5-10 minutes and will be made in an informal setting during gatherings at each field station. A blackboard will be the only available teaching tool. *Presentations and "fact sheets" will be prepared prior to arrival in Belize.*

Selecting a topic: A list of topics is included at the end of this syllabus, although you may submit one of your own for approval. To select a topic, email me. **Requests will be honored in the order they are received.**

Content / Grading: Presentations and fact sheets should be informative and go beyond a simple "encyclopedia" account; however, there is a strict one-page limitation to the fact sheet. Small pictures may be included where appropriate. Two references (in addition to your text) must be included for each topic. Grades will be based on your command of the subject and the quality of the information provided in the fact sheet.

- **Participation (10%):** Students will be graded on participation in discussions and on their general effort and enthusiasm for learning under the occasionally strenuous field trip and living conditions.

- **Attendance Policy:** Students are expected to participate in all field trips and class gatherings. An unexcused absence will result in a letter grade reduction. (See Course Policies below for further information.)

GRADE SCALE

Grades will be assigned on the following scale: 92 – 100% = A, 90 – 91.9% = A-, 88 – 89.9% = B+, 82 – 87.9% = B, 80 – 81.9% = B-, 78 – 79.9% = C+, 72 – 77.9% = C, 70 – 71.9% = C-, 68 – 69.9% = D+, 62 – 67.9% = D, 60 – 61.9% = D-, < 60% = F

CLASS READINGS:

The following chapters from the Kircher text will be relevant to topics discussed during the course and will be helpful for your class presentations.

Chapter 1: Tropical Climates and Ecosystems (pp. 3 – 21):

- Key Points: definitions of the "tropics" and "neotropics"; key characteristics of climate; seasonal trends and their influence the flora and fauna; gaps and their influence "pioneer species"; the basic characteristics of each ecosystem.

Chapter 2: Rainforest Structure and Diversity (pp. 21 – 43):

- Key Points: the structural complexity of the forest and the characteristics of the trees present (tree forms, size, buttresses and prop roots, shape of crowns, drip tips); characteristics of flowers (pollinators) and fruits (consumers); the frequency and characteristics of palm trees; various vine forms (climbers, lianas, and stranglers); characteristics and common examples of epiphytes (especially bromeliads and orchids); the appearance of the forest floor and the frequency of gaps; the concept of richness and rarity of the flora and fauna.

Chapter 3: How a Rainforest Functions (pp. 44 – 50; 57 – 60; 69 – 74):

- Key Points rainforest "productivity" and explanations for high rates of productivity; the decomposer food web and its high rate; differences between temperate and tropical forests in soil fertility; the importance of gaps (a recurring theme) and their influence on forest heterogeneity, forest diversity, and light availability; the rapid growth rates of trees; gain general familiarity of *Heliconia*, *Cecropias*, and Kapok (be sure to examine figures, where available).

Chapter 7: Living off the Land in the Tropics (pp. 169 – 180):

- Key Points: gain a general understanding of the fascinating historical and current relationship between people and the land (from shrunken heads to slash-and-burn agriculture); pay particular attention to pages 178 – 179 since this describes Blue Creek Village, which is one of our stops.

Chapter 11: Coastal Ecosystems: Mangroves, Seagrass, and Coral Reefs (pp. 239 – 250):

- Key Points: the definition, characteristics, and location of mangroves (pay particular attention to the description of Man-o'-War Cay and its magnificent frigatebirds and brown boobies – we will visit this cay); understand how these habitats form and why they are important; location of grass beds; location (globally and ecologically) of coral reefs; basic characteristics of coral animals and their association with zooxanthellae; distinctions among fringing reefs vs. atolls, vs. barrier reefs; similarities between rainforests and coral reefs.

Chapter 14: Deforestation and Conservation of Biodiversity (pp. 334 – 340):

- Key Points: gain a general understanding of the extent of tropical deforestation, its causes, and consequences.

COURSE POLICIES

- Attendance - Attendance is required at all lectures and class activities (see Tentative Schedule below) unless there is an excused absence for a medical reason. If you do have a medical condition that prevents you from attending a lecture or class activity, you must notify the program director of the reason for your absence and notify the instructor (Dr. Tracy Livingston) that you will be missing the event. I will subtract 10% from your final grade for each unexcused absence from a lecture or class activity .
- Makeup Work - Makeup quizzes will be arranged for excused absences (see above). However, due to the nature of this field course, it may not be possible for students to make-up lectures or class activities that they missed.
- Late work – 5 percentage points will be subtracted from an assignment (presentation, quiz, or other written assignment) for each day that assignment is submitted late.
- All post-course assignments (the 2 reflection papers, journal, and species accounts) must be sent via email to my Georgetown College address (Tracy_Livingston@georgetowncollege.edu) Late work will be subject to the Late Work policy stated in the previous bullet.
- Academic dishonesty (including, but not limited to plagiarism, copying of answers, and improperly crediting or falsifying information) will incur a penalty for each assignment to which the violation pertains. The penalty for academic dishonesty will be a zero for the relevant assignment.

Students with disabilities:

Students with disabilities or special needs must contact the instructor and the CCSA office at least a month in advance of the program's beginning so that accommodations can be made, to the extent possible in a study abroad setting. Students seeking such accommodation must provide CCSA with a copy of the letter on file with their own Office of Disability Services, outlining what services they receive on their home campus.

Travel Dates: May 10 - 23, 2022

TENTATIVE SCHEDULE

Subject to revision, based on conditions and opportunities that may arise on site.

- Lectures and student presentations will be given on non-travel days.
- Quizzes are tentatively scheduled for May 15 and May 22.

DAY ONE – MAY 10

Arrive Belize International Airport After clearing immigration and customs, you will be greeted by a guide, Lilia Zetina who conduct a meet and greet. Lunch at Di Bruwry, Old Airport Road
Shuttle transfer from Belize International to Blue Creek Rainforest Preserve
Orientation / Dinner / Overnight at Blue Creek Rainforest Preserve

DAY TWO – MAY 11

Breakfast at Blue Creek

(2) ½ day activities

Lunch / Dinner / Overnight Blue Creek Rainforest Preserve

Upon arrival at Blue Creek Village you will begin you 1/3 mile trek along the Blue Creek to the Station. You may choose to use Mayan villagers as porters to carry your bags to the station. Upon arriving you will be given an orientation to the facilities, check into your lodging, and enjoy dinner. **BLD**

IZE's Blue Creek Field Station is located in one of the most beautiful expanses of primary rainforests in Belize. The site is situated on the banks of wild tropical river and is densely populated by many species of freshwater fish. Enormous bromeliads grip the towering hardwood and tenacious lianas entangle their way through the verdant landscape. Hundreds of species of birds, from the keel-billed toucan to the purple-crowned fairy abound here. One need not search hard to discover a myriad of unusual insects as well as a striking array of amphibians and reptiles. Large, spectacular limestone some with Mayan Hieroglyphics, are within walking distance from the field station.

During your stay you can enjoy some of the following activities (we will choose these as a group once we arrive since it will be weather and guide dependent as well as the group preferences):

Iguana Hike: 2-4 hour activity where you will swim and hike along the clear blue river as your Mayan guides look for iguanas in the overhanging trees. Can you identify which species, is it the spectacular dinosaur looking green iguana, spiny-tail, basilisks? Belize is home to 21 of the 700 species of lizards! Shorts, T-shirts, water shoes or sturdy hiking sandals are recommended. Bring along a dive mask if you are interested in helping the guides.

BirdWalk: 2-3 hour activity. Wake to the melodic sounds of the nightingale wren then head out at 6 AM to enjoy a dynamic diversity of birds with your local guide. Early morning and late afternoons are when you find most birds active and vocal. Over 300 species of ornate birds can be observed from the keel-billed toucan to the purple-crowned fairy. Don't forget to bring your binoculars. Shorts and long pants, T-shirts, hiking sandals or sneakers are recommended.

School Tour: A 2-3 hour activity where you will hike along the creek to the Village of Blue Creek to visit the local elementary school where you will have the chance to participate in classroom activities, exchange ideas and stories. Join in the fun during recess by participating in a game of soccer or softball. *Donations of books and school supplies are always most welcome. A little goes a long way to help the children of Blue Creek.*

Ethnobotany & Farming: 3-hour activity where you will explore the medicinal and culinary uses of the local herbs, plants and trees. The Mayans were masters at utilizing the jungle's natural resources for their medicinal needs. You will learn about the vines that store drinking water and other

remarkable remedies that nature offers. You will get a firsthand look at the crops Mayans harvest such as avocados, citrus, cocoa, mango, cashews, rice, beans, etc.

Arts & Crafts: 3-hour activity where you will work with local Mayan and Kekchi craftsman as they create colorful embroidery, jippi jappa weavings, slate carvings and pottery. You are welcome to participate in the production of these native arts & crafts. During this activity you will be entertained with fables and folklore that have been passed down through generations.

Cave Snorkel & Swim: A 3 hour activity that starts with a hike from IZE's field station that winds along the river to the mouth of the cave. You will have the opportunity to swim and snorkel in the interconnecting crystalline lagoons, majestic waterfalls and mineral pools teeming with exotic fish.

Jungle Climb: This 4 -5 hour adventure will have you trekking through the jungle and up the mountains behind IZE's Blue Creeks Field Station. As you follow the path along the river, you will experience wildlife, flora & fauna and the incredible sounds of the jungle. You will take in the magnificent views of the valley and enjoy a spectacular 360-degree view of the surrounding countryside and hills of Guatemala. The reward for your effort is waiting for you at the bottom as you dive into the clear blue pools at the mouth of Blue Creek Cave. **This adventure is recommended For those in very good physical condition**

Cave Tubing: On this 2 hour adventure you will trek along the river from IZE's lodge to Blue Creek Cave. Once at the mouth of the cave your guide will take you in inner tubes to explore the mysterious & mystical parts of Hokeb Ha Cave, (Mayan name meaning "where the water enters the earth").

Chocolate Farm Tour: This 3 hour adventure will have you tour a local cocoa farm, meet & interact with the farmers and their families and learn how the pods grow, are harvested and processed. Your group will even get to try their hand at processing the cocoa and sampling the local kukuk drink and chocolate! If timing is right you will be taken to Punta Gorda to visit the markets where the cocoa is sold.

You will participate in two of the above activities each day depending upon weather and other factors. Evenings will be spent on night walks to look for nocturnal animals. Students can snorkel in the river to observe many species of fresh water fish, crabs and shrimp.

Breakfast, lunch and dinner included each day of your stay.

DAY THREE – MAY 12

Breakfast at Blue Creek

(2) ½ day activities

Lunch / Dinner / Overnight Blue Creek Rainforest Preserve

DAY FOUR – MAY 13

Breakfast at Blue Creek

(2) ½ day activities

Lunch / Dinner / Overnight Blue Creek Rainforest Preserve

DAY FIVE – MAY 14

Breakfast at Blue Creek

Shuttle transfer to Hopkins

Lunch and drumming performance at the Lebaha Drumming Center

Transfer by boat to South Water Caye

(1) Guided snorkeling excursion

Orientation / Dinner

Overnight on South Water Caye

Your time on the island will be comprised of a number of activities. Our expert guides will provide you access to the many reef formations in the area of the South Water Caye Marine Reserve. You might also choose to conduct an island survey and mapping, exploration of the wrack line, a beachcomber's scavenger hunt, exploring the abundant grass beds and patch reefs located off shore, studies of marine plankton and encrusting communities. You can also conduct studies of the mangrove habitat, which are the nursery grounds for many of the species of fish that inhabit the barrier reef. A stop will be made at the Smithsonian Research Station on Carrie Bow Caye. Research scientists from all over the world uses this station and will be sharing their expertise.

DAY SIX – MAY 15

Breakfast on South Water Caye
(1) Guided snorkeling excursion
Lunch / Dinner / Overnight on South Water Caye

DAY SEVEN – MAY 16

Breakfast on South Water Caye
(1) Guided snorkeling excursion
Lunch / Dinner / Overnight on South Water Caye

DAY EIGHT – MAY 17

Breakfast on South Water Caye
(1) Guided snorkeling excursion
Lunch / Dinner / Overnight on South Water Caye

DAY NINE – MAY 18

Breakfast on South Water Caye
(1) Guided snorkeling excursion
Lunch / Dinner / Overnight on South Water Caye

DAY TEN – MAY 19

Breakfast on South Water Caye
(1) Guided snorkeling excursion
Lunch / Dinner / Overnight on South Water Caye

DAY ELEVEN – MAY 20

Breakfast at South Water Caye
Shuttle transfer to the Mayan ruins at Xunantunich
Packed Lunch
Shuttle transfer to Tropical Education Center
Dinner / Overnight at Tropical Education Center

DAY TWELVE – MAY 21

Breakfast at Tropical Education Center
Belize Zoo tour
Lunch
Dinner / Overnight at Tropical Education Center

DAY THIRTEEN – MAY 22

Breakfast at Tropical Education Center
COVID testing (Celso - connect about testing at TEC = prepaid)
Shuttle transfer to Crooked Tree
Packed lunch
Shuttle transfer to the Tropical Education Center
Dinner / Overnight at Tropical Education Center

DAY FOURTEEN – MAY 23

Breakfast at Tropical Education Center
Shuttle transfer to Belize International
International flight home

This Itinerary includes the following services:

- (4) Night accommodation at Blue Creek Rainforest Preserve
- (6) Night accommodation at South Water Caye Marine Reserve
- (3) Night accommodation at the Tropical Education Center

Upgraded accommodation for group leaders

All meals (including lunch on the day of arrival)

All shuttle transportation within Belize

All transfers by boat

(2) 1/2 day guided excursions daily at Blue Creek

Lunch and Garifuna drumming performance

(5/6) guided snorkeling excursions on South Water Caye

Xunantunich excursion with transportation and guide en route from SWC to TEC

Excursion to Crooked Creek with boat tour

Admission to the Belize Zoo tour

All Taxes (9 % Hotel, 12.5% GST)

All park entrance fees including \$15 US per person South Water Caye marine reserve fee

CHECKLIST OF ITEMS TO PACK:

We will be staying at field stations run by International Zoological Expeditions (IZE). They provided the following checklist of items to pack. Items marked by an * are an "absolute must".

The field stations are located in remote areas. There will be *no* opportunities to purchase personal items while at these field stations, and you should not count on opportunities to purchase items while in transit. Pack carefully!

CLOTHING:

- _____ Trousers: 1 or 2 pair (zip-out legs are best; (nylon is best since it dries rapidly)
- _____ Shorts: 5 to 7 pair (nylon best)
- _____ Underwear (cotton is best)
- _____ Shirts (at least one long-sleeve)
- _____ Socks (cotton best)
- _____ Sturdy hiking boots – NOT LEATHER
- _____ Sneakers for normal use (may get wet)
- _____ Sandals and/or water shoes
- _____ Poncho
- _____ Hat (for protection from sun)
- _____ Bandannas (optional)
- _____ Bathing suits: Minimum of 2
- _____ Lycra running pants or dive skins
(*if sensitive to the sun or cold*)
- _____ Towels: 4
- _____ Washcloth: 4

TOILETRIES:

- _____ Soap (liquid; biodegradable)
- _____ Shampoo and rinse
- _____ Toothbrush / paste / floss
- _____ Hair brush
- _____ Shave gear
- _____ Small mirror
- _____ Deodorant
- _____ Quick clean wipes
- _____ Swim ear drops (alcohol)
- _____ Prescription medicines
- _____ Necessary medication
- _____ Kleenex

Pack all toiletries in ziplock plastic bags.
No curling irons or blow dryers

EQUIPMENT:

- _____ Light sleeping bag or 2 sets of sheets and pillow case *
- _____ Underwater flashlight *
- _____ Plastic bags for wet clothes*
- _____ Mask, fins, and snorkel *
- _____ Sun block – Don't underestimate the danger!*
- _____ Canteen or water bottle (maybe 2) *
- _____ Sunglasses *
- _____ Flashlight or headlamp with extra batteries*
- _____ Photo equipment (optional)
- _____ Underwater camera (optional)
- _____ Mosquito netting (optional)
- _____ Leather gloves (optional)
- _____ Binoculars (optional)
- _____ Clothesline rope and clothes pins
- _____ Insect repellent
- _____ Dive gloves or cotton work gloves
- _____ Pocket knife (optional)
- _____ Mesh bag (to hang wet clothes in)
- _____ Day pack
- _____ Beach towel

OTHER STUFF:

- _____ Passport or Visa* (Pack copies and keep them separate)
- _____ Plane ticket (if paper)*
- _____ Snacks if desired (crackers, cookies, dried fruits, trail mix, etc.; avoid milk-based items since they spoil)
- _____ Money (around \$100-200 should cover tips and souvenirs; small bills are best)

FIRST AID: We will pack a very basic first aid kit. You should bring other items you consider to be necessary, such as the following.

- _____ Tylenol/NSAID
- _____ Benadryl
- _____ Steroid cream
- _____ Band-Aids
- _____ Anti-diarrheal medicine
- _____ Anti fungal medicine for athletes foot
- _____ Dramamine (if needed)

Comments on packing:

- Bring at least two large bottles of sunblock, and use them! You will come home with a tan. You don't want to be sent home with sun poisoning. To limit your exposure, it is a good idea to wear a t-shirt when snorkeling and to bring a hat and shirt on all snorkeling trips.
- There are no laundry facilities, so bring enough underwear & socks for two weeks. You might be able to do some washing in a sink if there's enough rainwater at South Water Caye, but don't count on it.
- Plan on wearing shirts, pants, and shorts at least twice, even after they get dirty. Keep a set of clean clothes that you can wear in the evenings instead of putting on a new set every morning. If insects are a problem, saturate a set of clothes with bug repellent and wear them several times.
- Be sure to bring several long-sleeve shirts made of light cotton fabric, instead of just short-sleeved shirts. You will want to protect your arms from poisonous plants and thorns on some of the hikes, and you will want to be able to protect your skin from the sun as much as possible.
- Be sure to bring a pair of shoes that are good for walking and can get wet (either old sneakers or water shoes). Several of the rainforest activities will involve a combination of hiking and swimming. Sandals will not be adequate for these activities.
- There are showers at all the field stations, but they are fed by rainfall tanks so we may have to ration water use. In general, use as little water as possible when showering.
- Men must bring a razor so you can shave your upper lip. Your snorkel mask won't seal properly if you have a moustache (we learned this one the hard way).
- No blow dryers, curling irons, or electric razors. All of the field stations generate their own electricity, and ask that we limit use of electricity to the essentials.
- There will be beds and mattresses at all the field stations, so you will not need to bring a sleeping bag. You do need to provide your own sheets and pillowcases. You won't want anything heavier than a sheet.
- Make sure you have a couple of underwater flashlights, because they will get wet on some of the activities (cave swims, night snorkeling). Bring a backup flashlight and extra batteries. Headlamps work well as regular flashlights because you can use the strap around your arm or neck to free your hands.
- Snorkel gear should be reasonably high-quality. Make sure you have a glass (instead of plastic) facemask, a valve on the snorkel to keep water out, and that the fins fit (they should be snug but not hurt).
- Bring several garbage bags for packing wet and dirty clothes. Wet clothes will probably stay wet as long as we're in the rainforest, although it should be possible to dry them on the island.
- Bring two pairs of sunglasses, in case one gets lost or damaged. Polarized lens are good for reducing glare at South Water Caye.
- Bring a binder that you can use to hold handouts from the lectures and student presentations.
- **If you bring a pocket knife, don't try to carry it on the plane! Pack it in your checked luggage.**
- Bring snacks that are individually packaged. They'll get soggy if they stay open for any length of time. Bring a couple of snacks per day, in case you get hungry during activities or in the evening.

OPTIONAL CONTRIBUTION TO THE MAYAN VILLAGE OF BLUE CREEK:

The Blue Creek field station is located near the Mayan village of Blue Creek. This is a very rural village with a small school and limited school supplies. You may wish to pack a children's book for their library.

Belize presentation topics

Reef Topic	Presenter
Varieties of coral	
Anemones & clownfish	
Nudibranchs & warning coloration (flamingo tongue)	
Squid (reef squid)	
Barracuda	
Rays (eagle ray, stingray)	
Seabirds (frigatebirds & boobies)	
Sea horses	
Schooling of fish: how and why?	
Bioluminescence in reef organisms (copepods, etc.)	
Formation of reefs & atolls	
Mangroves	
Reef polychaetes (Christmas-tree worm, magnificent feather duster)	
Parrotfish (stoplight parrotfish)	
Effects of hurricanes on reefs (& recovery)	
Manatees	
Sea turtles	
Plankton vertical migration	
Coral bleaching	

Rainforest topic	Presenter
Tarantulas	
Kinkajous	
Howler monkeys	
Fer-de-lance (snake)	
Leaf-cutter ants	
Neotropical palms	
Heliconias	
Strangler fig	
Toucans	
Effects of hurricanes & recovery	
Plant succession in Neotropical rainforests	
Acacia / ant symbiosis	
Iguanas	
Vampire bats	
Bromeliads	
Hummingbirds	
Rainforest frog diversity	
Deforestation	
Parks and land conservation in the Neotropics	