

Development Proposal for Educational Material to be in conjunction with the Study Abroad program in Belize

Please include as much of the following information in your proposal. After you have done a “Dry run” in Belize the rest of the information needs to be completed.

- 1. Course name (content area)**
- 2. Course Objectives**
- 3. Student Outcomes**
- 4. Activity title / description**
- 5. Educational objective of the activity**
- 6. Materials required**
- 7. Methods**
- 8. Location for activity (please include directions, mode of transportation, travel time, etc.)**
- 9. Assessment method for activity**
- 10. Resources to supplement activity**

Developer: Dave Cox (Lincoln Land Community College)

1. Content area (Course Name and description)

Biology (Biological Field Studies, Biology 209)

A travel-study course providing students an introduction to Biological field studies. Course destination may vary. This summer emphasis will be placed on tropical rain forests of Belize. This course will emphasize basic ecological principles, experimental design, field sampling techniques, human impact on the ecological systems being studied, and scientific communication. Students will spend a great portion of each day in the field and should be in good physical condition. When traveling to foreign countries, cultural and historical perspectives will also be emphasized. This course will involve working with local Belizeans, offering LLCC students the opportunity to meet people from diverse backgrounds.

2. Course Objectives

1. Show how human activity affects all life forms.
2. Understand the principles of ecology including ecosystem organization, ecological interactions and environmental issues.
3. Exhibit knowledge of ways in which organisms interact with their environment and implications of these interactions.
4. Identify major features and life cycles in the groups of organisms studied in their natural environment.
5. Identify and classify various organisms in their natural habitats.
6. Compare and contrast the kingdoms of life.
7. Demonstrate biological concepts through design and implementation of individual and group field experiments.
8. Be capable of communicating experimental results through presentation.
9. Generalize the importance of ethics in scientific research and application.
10. Understand the importance of stewardship.
11. Demonstrate knowledge on the care and collection of living organisms and the importance of public education.

3. Student Outcomes

1. Develop and run a research project in the field.
2. Describe the relationships that exist within the terrestrial communities being investigated.
3. Correctly identify various native species.
4. Collect, keep alive and return to their natural habitats various native specimens.
5. Inform the public about biological issues.
6. Make conscious, educated decisions about how to treat natural ecosystems.
7. Demonstrate the proper use of a taxonomic key.

4. Activity title / description

Baiting for Ants

Ants are amazingly abundant, not only in the tropics, but in almost any habitat in the world, that isn't too cold. They are also amazingly diverse—both in terms of the number of species and what they do in the environment. Thus ants can be used to illustrate a wide variety of ecological concepts, from biodiversity to behavior. Because ants are abundant, they are easy to find, and because they are constantly out foraging, they are easy to bait.

5. Educational objective of the activity

- a. Teach students the basic skills to conduct a simple field study.
- b. To introduce students to the variety of ants found in the tropics.

- c. Correct identification of various ant families.
- d. Teach students about social behaviors of colony insects.

6. Materials required

- a. Ant baits (sugar, honey, tuna fish, etc.
- b. Notecards
- c. Elmers glue
- d. Taxonomic key to ants of the tropics
- e. Forceps

7. Methods

Baits: ants are attracted to sugar (of course), tuna fish, and even baby food peas. One way to bait for them is to place the bait on a 3X5 card cut in half (a 3" x 2.5" card). Sugar water (25% solution) or honey is easier to handle than granular sugar. Put a small blob (0.5 cm diameter) in the center of the card, then wait for ants to come.

Another method is to soak strips of fabric in sugar solution, then drape the strip over vegetation—this will attract ants foraging on the vegetation.

Transects: set the baits out about 10 meters apart (10 paces). I usually set them in a circle, simply because it is easier to “run” a circular transect.

Ant identification: ants differ in color, size, and shape. Although formal taxonomy requires the use of obscure characters, it is possible to distinguish among most species at a given site by characters such as “long, skinny red” or “tiny black and orange” or “chunky square head”. You can make a “field guide” by capturing a single individual of each species and embedding it in a drop of Elmer’s glue (Elmer’s glue dries clear) on a 5 x 8 card. Write the description next to the drop. This can be carried out in the field.

Estimating ant abundance: since ant foragers are “everywhere”, they will find the baits quickly—in some cases in less than a minute! A reasonable estimate of ant abundance is to measure the length of time for the baits to be discovered. Although this does not give an absolute value, it can be used to compare different habitats or sites.

Recruitment: Many ant species recruit their nest mates to an especially rich food source. It is possible to observe this by counting the number of individuals at the bait over time.

Competition: Some ants are more aggressive than others, and will chase the poorer competitors off the bait. Competitors may not be ants—bees and wasps will come to sugar baits, and daddy-longlegs will come to tuna baits.

8. Location for activity (please include directions, mode of transportation, travel time, etc.)

This experiment can be conducted anywhere in the tropics.

Suggested sample sites: Outside of the dorm rooms at Sibun, 100 meters in the rainforest, on the gravel road next to the main building, in the citrus nursery, etc.

There is minimal travel time due to all locations being on the grounds of Sibun.

9. Assessment method for activity

Have students collect data about ant abundance / diversity. This data is included in their field journals as well as including specific questions on the final exam about the results of their study.

10. Resources to supplement activity

Field guide of Neotropical ants. I don't know of any "official" guide so one would have to be developed by the instructor / class. Students could use general taxonomic features to classify the ants to the family level and still have a great amount of diversity.