**PRELIMINARY ACTIVITY FOR**

# Biodiversity in Ecosystems

Biodiversity is critical in any self-sustaining environment. Complex and diverse ecological systems are made up of many organisms and a huge variety of interactions. Simple ecosystems have few organisms, few interactions, and are often fragile. All ecosystems, whether diverse or sparse, involve an intimate interaction of living things with their abiotic environment. Biodiversity implies variety, and variety in an ecosystem often ensures a greater chance of survival in a changing world.

The Earth is losing its biodiversity at a worrisome rate. Humans simplify ecosystems for many reasons: to increase the agricultural base, to make way for cities and industrial zones, or for aesthetic reasons, such as making lawns and gardens. This practice has direct effects upon many abiotic factors within an environment. The air temperatures found in cities, for instance, are usually significantly higher than that in surrounding, non-urbanized areas. Such cities are said to produce *heat islands*. An area's biodiversity has profound effects upon the physical and biological makeup of an ecosystem.

In this experiment, you will learn how biodiversity affects an environment's physical factors such as temperature, relative humidity, light, and soil temperature. You will learn how animal diversity varies in different environments, and, with your classmates, you will compare biodiversity in areas with different plant patch sizes.

In the Preliminary Activity, you will learn technique for determining diversity as well as technique for measuring light. Note: Technique similar to the light-measuring technique can be used later as you measure relative humidity and/or temperature in the Carrying out the Plan part of this experiment. After completing the Preliminary Activity, you will first use reference sources to find out more about biodiversity in ecosystems before you choose and investigate a researchable question. Some topics to consider in your reference search are:

- Biodiversity (Biological diversity)
- Ecosystems
- Ecosystem diversity
- Ecosystem services
- Habitat destruction
- Habitat degradation

## PROCEDURE

**Identifying organisms**

1.  Measure out a one-square meter area. Mark the area with string.

2.  Examine this area closely. Your group will need to make several decisions:

    - How will we identify an organism? What is a grass organism? One blade? A group from one set of roots? A patch of grass?
    - How will we count similar organisms? If there are thousands of one type of organism in your area, do you count each one, or find ways of estimating? What ways of estimating are reasonably accurate? Since many animals and birds move in and out of an area, over what time period will you count organisms?
    - How will we identify a plant patch? A patch of one type of plant is an area of similar plants that are physically separate from another area of similar plants. Patches need not be the same size. You will need to distinguish one patch from another.

3. Now, record information about the different living organisms in your area. Include estimates of the following:

- the type of organism. The actual name is not important. You might write something like:
  - a maple tree
  - tall (20-30 cm) grass with wide blades
  - cut grass, 3 cm long
  - beetle #1 (0.5 cm long, black)
  - bee #1 (yellow and black stripes about 1 cm long)
  - a fly flew in and out of the area

- the approximate number of each type of organism.
- the number of plant patches in the 1 m$^2$ area.

4. Using a soil borer or a trowel, examine a small sample of soil. Record the depth of the humus in your soil. Humus is made of decaying organic matter and is usually darker in color than the non-organic soil. Note any animals in your sample.

5. Examine your data from Steps 3 and 4 and record the number of different animals, the number of different plants, and the number of plant patches in your area.

**Identifying physical factors**

6. Vertically position a meter stick in your area.

7. Set the switch on the Light Sensor to 0_6000 lux. Start the data-collection program.

8. With the Light Sensor pointing down toward the ground, use the Events with Entry data collection mode to measure light at heights of 100, 90, 80, 70, 60, 50, 40, 30, 20, 10, and 0 cm.

## QUESTIONS

1. How many different plants did you find at your site in the Preliminary Activity? How many different animals did you find?

2. What was the relationship between light and height?

3. How do your results compare to those of other student groups?

4. List at least one researchable question for this experiment.