Searching for Clues in Pictures: Factors that Help Create Our Environment

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Overview

What do students understand about the factors interacting within an ecosystem? Begin by asking students to "describe the park in our city or town." From this discussion you can move into the first activity that is to characterize one specific environment. A variety of answers are proposed. Students brainstorm about characteristics. This is the starting point for their studies of a local environment. When students present their characteristics to the class, a variety of sorting categories become evident. By placing the different characteristics presented by the students on individual index cards, the characteristics can be re-sorted using various categories. To help the students get started, use the Biotic (living) and Abiotic (non-living) categories. Through this activity students can practice identifying various aspects of an environment and sorting these environmental factors into two scientific categories, biotic and abiotic.

Learning Objectives

- ✓ Identify <u>TEN</u> characteristics representative of various **environments**;
- ✓ Collect initial **data** characterizing one specific environment;
- ✓ Define the terms **abiotic** and **biotic**;
- ✓ Identify **abiotic** and **biotic** factors in an environment;

Relevance

The different environments found around the globe are essential to producing the food we eat and the water we drink. They store atmospheric carbon that is a vital element in keeping the Earth's temperature habitable. Because varied environments exist around the globe, our planet supports a variety of life and natural processes. This biodiversity is seen in the various types of plants, animals and microorganisms that exist, as well as in our Earth's land surfaces such as deserts, forests, wetlands, mountains, lakes, rivers, and agricultural landscapes. Earth is a uniquely habitable place for humans due to this diversity and interactions among life forms. Knowing what factors contribute to these different environments can help us keep these environments stable. A stable ecosystem is one that behaves in a general way that we have come to expect. By understanding ecosystem characteristics we can also learn many things about a place, including what types of jobs are likely to employ people, clothes to wear, recreational and tourist activities, and conditions that can influence our health and safety.

a) Gather the materials listed below. The images of Central Park that are to be placed in the picture packet are found at the following website: http://icp.giss.nasa.gov/education/modules/carbon/ Look under Topic A, *Data and Tools*.

b) Review all documents to be sure you have downloaded all that you need.

c) Work through the activity yourself in-depth before having students try the activity themselves.

Materials

Sample pictures of: Water, air, grass, oak tree, soil, earthworm, fire, air, and heat. Web Reference: Central Park Picture Packet (includes Map of Central Park). Presentation Materials (depends on type of presentations students will prepare).

Period 1 – Observing & Describing Central Park's Environment

Engagement – Preliminary Activity

The teacher asks the class how they would describe a particular environment near school with which all of the students are familiar. Photographs can help to elicit the different characteristics of the environment. After a variety of responses, ask students how the different characteristics can be sorted into different groupings. From this discussion emphasize that characteristics of different environments can be classified as either living of non-living.

Have students classify the following as either living or non-living: Water, air, grass, oak tree, soil, earthworm, fire, air, heat. Stress to students that they will need to justify their answer. Providing physical samples or pictures of the items can facilitate the discussion.

Methods

Divide the students into 6 different groups. Each group studies a different area of New York's Central Park (Harlem Meer Upland, Harlem Meer, Waterfall, Lawn, Beach, and Rock Area).

1. Students will study the different areas by reviewing photographs for each site. Access the pictures on the web page at http://icp.giss.nasa.gov/education/modules/carbon/ under *Data and Tools*. You can download and print them for each group. Alternatively, if you have Internet access your students can view the pictures on the web.

2. Students should be instructed to look for the different objects they see in the pictures of their site. After listing the different objects students should determine how each of the different objects affects the environment of the site.

3. Instruct the students to identify objects that they may not be able to actually see in the photographs but can infer their presence. Again they should determine how the objects affect the environment.

4. Students classify the characteristics as either living (biotic) or non-living (abiotic).

5. After identifying the abiotic and biotic characteristics students should look for other characteristics that they may have missed. The example of a flat site collecting more water when it rains than a sloped site is provided as an illustration of characteristics that students may have overlooked.

6. Instruct students to place their data on the data sheet that has been included in their guide.

7. At the conclusion of this part of Activity A have students complete the Investigation Questions in their guide.

Period 2 – Sharing Observations

In this portion of Activity A, students will present their findings to the rest of the class. In this way students are able to gather data on many of the areas of Central Park. By looking at the data from all of the sites, students will have better understanding of the different conditions that make up the Central Park environment.

1. Students begin by reviewing Data Sheet 1: Observing and Describing Central Park's Environment. Students should discuss which objects were most important in characterizing their site.

2. Students rewrite their data sheet by listing the objects in order of what they consider to be the most important characteristic to describe the site. While all are important, some characteristics seem to play a more prominent role in characterizing the site. These should be listed first.

3. Provide students with materials for presenting their site to the class. These materials can include poster board and markers or overhead transparencies and markers. If students are well versed in the use of PowerPoint and you have available adequate computing resources, students can make PowerPoint presentations. Be sure that each presentation includes the following information:

   ✓ Where the site is located in Central Park

   ✓ The land and water features found at your site

   ✓ The different forms of life present at your site

   ✓ How the **biotic** and **abiotic** factors seem to be interacting at your site

4. Have students present their observations to the entire class. Be sure that you have given each group a time limit for their presentation. The amount of time will vary depending on how many groups you have and on how much time you have allotted to this activity.

5. As each group presents, all students need to keep a running list of all objects that affect the environment at the different Central Park sites.

An important part of any scientific endeavor is making sense of all of the data. Synthesis of data and building consensus about findings is a difficult, yet critical part of the research process. While each investigation group started this process by presenting the observations made at their individual sites, we now have a larger view of many separate sites within Central Park. By looking at all of this data as a whole, we are able to gain a better understanding of the factors and interactions within the larger Central Park environment.

1. Have students write the name of each condition that affects the environment of Central Park. This information can be taken from the list compiled by each student as the different groups were presenting their data.

2. Have the students practice classifying each condition as either **biotic** or **abiotic**.

3. After the groups have classified the objects one way (as **biotic** or **abiotic**) have the students try to classify the objects using other categories. Students may have difficulty in finding other categories. If you need to, provide them with an example such as dry or wet characteristics. Again, there are many ways to classify the data. Encourage the students to be creative.

4. Have the students present their classifications to the class. Be sure to provide the students with a time limit for their presentations.

5. Have students record their results on Data Sheet 2: Classifying and Describing Environmental Conditions.

6. At the conclusion of Activity A, students complete Individual Assessment Questions.