

What is Urban Ecology?

Overview: Using examples from their own environment, students develop a working definition of ecology in the urban context.

Key words: ecology, abiotic factors, biotic factors, environment

Purpose: Students understand the basic concepts of ecology and relate them to their own experiences in the urban environment.

Objectives (Students will):

- ❑ Define ecology and environment
- ❑ Describe abiotic factors in the urban ecosystem
- ❑ Describe biotic factors in the urban ecosystem
- ❑ Give examples of ecological processes (how biotic and abiotic factors interact) in the urban environment

Prior Knowledge of Students

None assumed. Any knowledge of plants and animals found in the urban environment would be useful for this activity.

State Curriculum Frameworks

Biology

Explain how biotic and abiotic factors cycle in an ecosystem

Frameworks addressed:

Life Science (Biology), Grades 6-8, Learning Standard # 17

Biology, Grades 9-10, Learning Standards #6.1-6.5

Time for Activity

One field visit or classroom session (optional)

Location: outdoor would be ideal

Materials Checklist

- ❑ Portable dry erase board with markers
- ❑ Laminated photos of living and non-living things found in an urban ecosystem

How to Do It...

At the Field Site

1. Begin by asking students what "environment" means to them? This can be an open discussion or you may ask students to work in small groups trying to come up with an understanding of the idea and a definition to share.

DEFINITIONS FOR ENVIRONMENT (from www.hyperdictionary.com)

i: the area in which something exists or lives; "the country--the flat agricultural surround"

ii: the totality of surrounding conditions; "he longed for the comfortable environment of his living room"

iii: the complex of climatic, edaphic and biotic factors that act upon an organism or an ecological community and ultimately determine its form and survival.

iv: California state law definition: "the physical conditions which exist within the area which will be affected by a proposed project, including land, air, water, mineral, flora, fauna, noise, and objects of historic or aesthetic significance."

2. Allow students the opportunity (5-10 minutes) to do a quick visual inventory of all the things they can name that make up the environment. Provide them with no further information. Students can record their lists in their field journals or on the handout below.
3. Gather students around in a circle. Have them report two or three examples of things in the environment that they identified.
4. Write the word, "ENVIRONMENT" across the top of the board. As students report their findings, write each item on the board, placing them in two unlabeled columns according to whether they are living (biotic) or non-living (abiotic) things. (See example below).
5. Ask students to figure out why you have arranged the items in these two categories - what are the similarities within the column and the differences between the two columns? Label the columns according to student responses (most likely, they will say some things are "Living" and some are "Non-Living").
6. Allow students some time to arrange their own list into biotic and abiotic categories.
7. Challenge the students to describe ways in which things in one column affect things in the other column. (e.g., Animals drink water; plants need the sun to make food; soil provides nutrients to trees).
8. Pose an additional thought question: How do the items *within* each category interact with each other? (e.g., fish eat aquatic insects, rainwater causes soil erosion, solar radiation changes air temperature, trees provide homes for animals).
9. What are all these interactions called? ECOLOGY!

10. Some students may be ready to discuss things they can't see but that they understand are happening through inference. Ecological processes are an important part of ecological studies, and they include things like the hydrologic cycle, nutrient cycling, photosynthesis, decomposition. Ask your students if they can discuss any ecological processes that happen within their urban environment.

DEFINITIONS FOR ECOLOGY: Etymology: German Ökologie, from öko- eco- (house) + -logie -logy (study of)

i : a branch of science concerned with the interrelationship of organisms and their environments

ii : the totality or pattern of relations between organisms and their environment

According to the Ecological Society of America, "Ecology is the scientific discipline that is concerned with the relationships between organisms and their past, present and future environments. These relationships include physiological responses of individuals, structure and dynamics of populations, interactions among species, organization of biological communities, and processing of energy and matter in ecosystems."

11. Lead a discussion on how ecology, or ecological processes, can be observed in the urban environment.
 1. What makes "urban ecology" unique or different from just "ecology?"
 2. How do humans fit in to the urban ecosystem?
 3. Why should we study ecology in the urban environment?
12. Describe the Urban Ecological Field Studies you and your students will be carrying out together - location, time lines, expectations, safety, etc.

Classroom Variation

1. Ask students (in teams) to brainstorm all the things they can name that make up the environment. Provide them with no further information.
2. Laminated photos, representing possible student responses (mammals, water, plants, sunlight, cars, people, buildings, etc.), will help students visualize items found in the environment.
3. Make two columns on the board. Write the word, "ENVIRONMENT" across the top. Tell students to pick photos of things that make up the environment and either have arrange photos in the two columns according to criteria they choose, or help them by placing photos in the two columns (living & non-living). (Use tape or magnets to hold pictures up on the board).
4. Continue by following Steps 4-9 in the "FIELD" example above.

What to Expect

- Students may need some probing to generate answers, but should come up with a pretty comprehensive list.
- As many student-generated examples derived from the urban environment will help make ecology have personal meaning to the students.

Going Further

1. Ask students to find examples of urban ecology issues in their community by looking through community newspapers or watching the local news. Some examples are listed below and can be used to guide students or stimulate discussion:

- water quality concerns that cause restricted water activity
- restrictions or limitations on watering lawns during certain times of year
- pest outbreaks
- diseases in neighborhood trees
- development of gardens using native plants
- accidental chemical spills from industrial or neighborhood locales
- city plans to create wetland or riparian habitat along urban waterways

2. Ask students to compare urban ecology with traditional ecology. Some subdisciplines of ecology include **animal ecology, conservation biology, aquatic ecology, climate change, range management**. Within each of these fields scientists ask questions that can have some relevance to urban ecology. Think of the relationships between urban and "wild" or "natural" systems and how ecological studies of each can inform the other. Some questions that students might consider are listed below:

- What are some things an ecologist might study in a "natural" or "wild" system?
- Is there any connection between traditional ecology and urban ecology?
- Does the information that scientists gather from "natural" systems have any significance or importance for our world that is increasingly urban? If so, what?

Web Resources

http://www.esa.org/education/education_section/whateco.php

The Ecological Society of America Website

3. After you have talked with your teacher about the class list of things in your environment, try to arrange your list in a similar way using the space below.

4. How are some of the different things on your list related to one-another?

5. Go back to your list on the other page. Draw lines connecting things on one list that are related to things on the other list.

6. What makes "urban ecology" unique or different from just "ecology?"

7. How do humans fit in to the urban ecosystem?

8. Why should we study ecology in the urban environment?