

Ecosystem Explorers: What it Means to Be a Naturalist (Gr. 3-5)

DESCRIPTION

Calling all junior naturalists – there is always something new to learn! Let's practice looking *very* closely for any evidence that living things have left behind to let us know they were here and go on a site visit to measure the diversity of life. How can practicing close observation of the natural world make us better citizen scientists?

OBJECTIVES

- By completing a short scavenger hunt, students will practice close observation to see what evidence of life can be found without seeing any actual animals themselves.
- By spotting colored toothpicks within a defined area, students learn how organisms use camouflage to protect themselves.
- By conducting a thorough site visit of a Biocube site, students will learn to categorize organisms within a defined (1 cubic foot) area, calculate certain measures of biodiversity, and describe the basics of energy transfer within a food chain.

OHIO'S LEARNING STANDARDS

Grade 3

Life Science: Behavior, Growth, and Change

- Individuals of the same kind of organism differ in their inherited traits. These differences give some individuals an advantage in surviving and/or reproducing.
- Plants and animals have life cycles that are part of their adaptations for survival in their natural environments.

Grade 4

Life Science: Earth's Living History

- Changes in an organism's environment are sometimes beneficial to its survival and sometimes harmful.

Grade 5

Life Science: Interactions within Ecosystems

- Organisms perform a variety of roles in an ecosystem.
- All of the processes that take place within organisms require energy.

Before your Program & How to Set Your Class Up for Success

Please note that, under normal circumstances, this program takes place outside. Students will need to be prepared & dressed for the weather. An adapted indoor version of this program is available in case of inclement weather or space (un)availability, assuming that weather does not prevent your Museum Educator from transporting kit materials to the program location.

OUTDOOR set-up requirements and notes:

- Please ensure that a safe, suitable outdoor location is available for students to rotate between multiple activities. Examples include a school courtyard, garden, or lawn space. Note that all stations will be visible from all other stations for safety reasons.
- Be prepared to split each class into even groups to rotate through the activity stations.
- This program includes three activity stations with one central meeting location. Any tables or chairs present in your chosen outdoor location may need to be temporarily moved to the side to make room for these stations.
- If it has rained recently and the ground is muddy, please ensure that your students have a way to clean off their shoes before returning inside. Students will not need to sit for any part of the program unless desired/required for accessibility reasons.

INDOOR set-up requirements and notes:

- Please have student desks clear before the program begins.
- Please provide an empty desk or small table for the Museum Educator to set up display items.
- Please provide at least 2 empty desks/tables for the activity stations.
- Be prepared to split each class into even groups to rotate through the activity stations.
- Use the vocabulary and additional resources provided in this Teacher Guide to preview or review program content with your class.
- If booking multiple programs, transitions will be easier if Museum staff sets up in only one location.

VOCABULARY

Abiotic factors: the non-living parts of an ecosystem that influence the environment and the organisms living there

Adaptation: the evolutionary process whereby an organism becomes better suited to living in its environment. Adaptations can include physical traits, genetic characteristics, behaviors, etc.



Bioblitz: a community-based event that focuses on finding and identifying as many species as possible within a short period of time

Biocube: a one-cubic-foot frame that is placed in a particular (typically outdoor) area for the purpose of documenting the variety of life found within that space

Biodiversity: the variety of life on Earth, including genes, species, ecosystems, etc. Biodiversity can be measured by assessing species richness, species evenness, and genetic diversity.

Biotic factors: the living parts of an ecosystem that influence the environment and the organisms living there

Camouflage: an adaptation used by organisms to blend into their environment by making them hard to see or by disguising them as something else

Citizen science: the collection and analysis of data relating to the natural world by members of the general public, typically as part of a collaborative project with professional scientists

Community: all the populations of *different* species that live together and interact with each other in an environment

Community science: a newer term that, for the most part, refers to the same type of scientific exploration as citizen science. This term may also be used to further specify a citizen science project that is more place-based rather than one that involves a wider subset of 'general public' participants.

Consumer: an organism that cannot produce its own food and, therefore, must eat other plants and/or animals to gain energy

Decomposer: an organism that breaks down dead plants and animals, waste products, etc. to return essential nutrients to the ecosystem

Ecosystem: an area where organisms of all types interact with each other as well as with their physical environment

Food chain: the sequence of transfers of matter and energy in the form of food from organism to organism. A food chain outlines who eats whom.

Food web: all of the food chains that are present and intertwine with one another in an ecosystem

Naturalist: any person who studies the natural world, making observations of the relationships between organisms and their environments

Observation: using all of the senses, as appropriate, to find out about the characteristics of organisms, objects, places, and events

Organism: any living thing

Population: a group of individuals of the *same* species

Producer: an organism that produces its own food (ex. plants)

Species: a group of organisms that can successfully breed with one another to produce fertile offspring



Species richness: a measure of biodiversity that takes into account the number of different species represented in an ecological community, landscape, or region

EXTENSION ACTIVITIES

BUILD A BIOCUBE

- Materials:
 - 12 aluminum tubes (1/4in diameter, 12in length, 0.014in wall)
 - 24 6-in pieces of solid THHN wire (14 AWG)
 - Alcohol-based quick-drying spray paint.
- How to build your Biocube:
 - Bend pieces of wire in half so they are L-shaped.
 - Hold three L-shaped pieces of wire together and insert into a tube to make a 3-way corner joint.
 - Repeat this step for each corner until you have a cube.
 - Use spray paint to paint your Biocube so that you can easily separate it from the surrounding area.
- What to do with your Biocube:
 - Observe quietly from a short distance away. Do any birds, small mammals, or large insects visit your cube?
 - Observe close up. Gently look under plants or other cover.
 - Take a photo of your undisturbed Biocube.
 - Pick out one species at a time, take a picture of it, and upload that picture to iNaturalist to share with other scientists around the world.
 - Keep your Biocube in the same location at your school, returning to make observations once a day, week, month, or any other regular time interval that works for you and your class. At the end of the school year, look back at all the data you've gathered and analyze how the life within your Biocube has changed with the seasons.
- Notes:
 - The link above will lead you to further resources, videos, and suggestions of where to purchase supplies. Depending on budget constraints, you may be able to find tubes and wire of different materials to be used in the same manner.
 - The list of activities to do with your Biocube presented in this document is not exhaustive; the link above also includes plenty of other suggestions.

CITY NATURE CHALLENGE



- *What is the City Nature Challenge (CNC)? “[T]he CNC is an annual four-day global bioblitz at the end of April, where cities are in a collaboration-meets-friendly-competition to see what can be accomplished when we all work toward a common goal.”*
- Following the link above, first read the educator guide for tips on facilitating, managing, and supporting your students’ outdoor learning experience.
- Read the educator guide for tips on using iNaturalist with students. This is a free online observation platform that allows people to record observations in nature, interact with other nature enthusiasts, and learn new things about organisms. Scientists and the public alike can freely access and use iNaturalist data points to address their research questions.
- View the “Educator Basecamp” recommended progressions for short classroom and field activities for both formal and informal settings.
- Whether you’re participating in the formal challenge or just taking your students out in nature on any day, follow these three simple steps: **find any wildlife, take a picture of it, and share it on iNaturalist!**

ONLINE RESOURCES FOR TEACHERS AND STUDENTS

Click the links below to find additional online resources for teachers and students. These websites are recommended by our Museum Educators and provide additional content information and some fun, interactive activities to share with your class.

CMNH Educators regularly review these links for quality. Web addresses often change so please notify us if any links have issues.

[Cleveland Museum of Natural History](#)

[City Nature Challenge: Education Toolkit](#)

[Seneca Park Zoo: Biosurveys and Citizen Science](#)

[National Museum of Natural History: Biocubes -- Exploring Biodiversity](#)

[iNaturalist](#)

[BEETLES Project: Leading Classroom and Schoolyard Experiences](#)

