



Educator Basecamp: Ages 14-18 (U.S. Grades 9-12)

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Introduction

The City Nature Challenge offers an excellent opportunity for students to explore ecology and other life science concepts more deeply, contribute to a global science endeavor, and even explore possible career paths by meeting scientists, educators, and others involved in City Nature Challenge activities.

As a part of the CNC education toolkit, a group of educators at institutions around the world has gathered and reviewed hundreds of resources about biodiversity and citizen science that are relevant to the City Nature Challenge. These resources are our recommended activities for ages 14-18.

This progression of activities is designed to introduce the concept of biodiversity and build observation and other field skills for the City Nature Challenge. These activities highlight the community aspect of science by exploring citizen science and open science and preparing students to participate in the City Nature Challenge. At least some activities include outdoor and field components. See 'modifications' section below for ideas on how to make these activities work for you, whether you work with students in a formal classroom or a museum, nature center, after school program, homeschool, or other informal environments. See standards at the bottom for how these activities connect to Next Generation Science Standards (U.S.). You can search through the [full set of age 14-18 resources](#) for educator guides, classroom and field activities, media, and more!

New to taking students outside? Be sure to read through our [Guide to Teaching Students Outside](#) for tips on outdoor group management and teaching strategies. Some activities also involve using iNaturalist to practice making observations. Read the [Guide to using iNaturalist with Students](#) for links to tutorial videos and more.

Objectives:

- Students will explore how the public can participate in the scientific process through citizen science and open science pathways
- Students will address misconceptions about science and who can “do” science
- Students will explore the features of iNaturalist
- Students will identify local examples of different taxa

Activities

Activity 1: [The Crowd and The Cloud](#)

- **Type:** Media
- **Activity Times:** Episodes are 60 minutes, segments are 10-15 minutes long
- **Recommended Use:** A good introduction to Citizen Science projects around the world. This media could be a beginning point to get High School Students interested and enthused about the City Nature Challenge and about Citizen Science projects in the future. Episodes are varied in how people can get involved; at home or in the field. Show a great way technology gets everyone involved and how a “Village can solve a problem.”

Activity 2: [Encyclopedia of Life: Citizen Science + Open Science Guided Presentation](#)

- **Type:** Lesson Plan
- **Activity Times:** 45 Minutes
- **Focal Science Practices:**
- **Recommended Use:** A great way to combine activity 1 and 2 to illustrate who can “do” science. Another great way to get students excited about the City Nature Challenge. A useful activity especially in countries where there is a tendency to view science as a black-and-white discipline (quite strictly the domain of the "scientist"), and where citizen/open science is a new concept.

Activity 3: [Encyclopedia of Life: Introduction to iNaturalist](#)

- **Type:** Lesson Plan
- **Activity Times:** 45 minutes
- **Focal Science Practices:**
- **Recommended Use:** Teachers and students can take this brief lesson as a preliminary measure to participating in the City Nature Challenge. The Lesson addresses questions, objectives, and the technology of iNaturalist itself. Teachers and students are walked through setting up an account, finding iNaturalist projects and where to go next. The iNaturalist [Teacher’s Guide](#) includes further guidelines on recommended observations to include, and what not to (e.g. wild vs. cultivated).

Activity 4: [Encyclopedia of Life: iNaturalist Data Exploration](#)

- **Type:** Lesson Plan
- **Activity Times:** 60 minutes
- **Focal Science Practices:**
- **Recommended Use:** This lesson focuses more on the City Nature Challenge and poses questions and objectives based on the challenge. Students can look at the data collected over the years and look at scientific questions that could be answered based on the data collected. This lesson give students the opportunity to see the resolute before starting the challenge. They can then have a better understanding before they start their own City Nature Challenge. Finally, given

that the CNC is going global this year, it would be interesting to compare results (in vastly different environments) across the globe!

Modifications

- If you have time for an additional activity and want to explore global knowledge of biodiversity, try the [Encyclopedia of Life Introduction to Biodiversity](#) before or after watching “The Crowd and the Cloud.” In this activity, students explore local and global biodiversity by the numbers, then compare and contrast biodiversity graphs representing scientifically described species vs. those observed on iNaturalist.org, an online observation platform.
- All activities can be modified for informal settings.
- If you do not have access to a green outdoor space or do not have a schoolyard with grass, consider putting window boxes outside your classroom or if possible building a small raised bed garden.

Extensions

- [Encyclopedia of Life Species Cards](#)
 - Explore the characteristics and behaviors of species using EOL’s free species cards. Both premade species cards and template for participants to make new species cards from their own observations. Includes links and resources to multiple games and lessons/activities using the cards.
 - If you have access to a color printer, print cards and laminate (optional) to play games and or bring into the field as a guide. If you do not have a color printer, print the blank species card templates and have students draw real species they observe outside or even create their own species.
- Extend exploration throughout the year:
 - Begin the observations early to draw comparisons between seasons.
 - Encourage students to explore with their families at home.
 - Build a class bird feeder to increase the biodiversity you can see from the window.
- Explore the [full set of resources for age 14-18 here](#).

Relevant Science Standards

Next Generation Science Standards (U.S.)

Performance Expectations

- HS-LS2-1. Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales
 - HS-LS2-2. Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.
 - HS-LS2-6. Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.
 - HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
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- HS-ESS3-3. Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.

Science and Engineering Practices

- Asking Questions and Defining Problems
- Planning and Carrying Out Investigations
- Analyzing and interpreting Data
- Using Mathematics and Computational Thinking
- Constructing Explanations and Designing Solutions
- Engaging in Argument from Evidence
- Obtaining, Evaluating and Communicating Information

Relevant Nature of Science Principles (Appendix H)

- Scientific Investigations Use a Variety of Methods
- Scientific Knowledge is Based on Empirical Evidence
- Scientific Knowledge is Open to Revision in Light of New Evidence
- Science is a Way of Knowing
- Scientific Knowledge Assumes an Order and Consistency in Natural Systems
- Science is a Human Endeavor
- Science Addresses Questions About the Natural and Material World