



Comparative Study of Biodiversity Using iNaturalist

Grades 6 – 12

OBJECTIVES

- Explore why it is vital to measure biodiversity in cities and how it contributes to efforts to support species like the monarch butterfly.
- Recognize that observation is an essential first step in the process of science.
- Design a comparative study to measure species richness and evenness.
- Practice data analysis and visualization skills.

VOCABULARY

- A **comparative study** is research that compares and contrasts two subjects.
- An **urban ecologist** explores the interactions of nature and the human-built environment.
- **Built environments** are human-made structures, features, and facilities viewed collectively as environments in which people live and work.

INSTRUCTIONS

Step 1: Let's Prepare!

Watch the following videos:

1. [Why is biodiversity so important?](#)
2. [Science Forward: Urban Ecology](#)
3. [Citizen Science Story: Monarch Larva Monitoring Project](#)

Answer the following questions:

- Q1. In your own words, describe what biodiversity means.
- Q2. What are the benefits of having high biodiversity at your school?
- Q3. How have you and your peers increased biodiversity at your school or in your community?
- Q4. How do citizen scientists help professional scientists with their studies (research)?
- Q5. How have you been involved in citizen science, or how could you get involved if you have not?



Step 2: iNaturalist

Install the [iNaturalist](#) app on your mobile device and create a user account (must be age 13 or older). This app is used to record your observations while giving you access to millions of observations to use in this activity.

Identifying organisms in the field is a skill that requires practice. iNaturalist will help you identify plants, animals, and fungi using your mobile device's camera and the app's image recognition technology –choose the “What did you see?” box to see iNaturalist's suggestions. If you are still unable to identify what you have seen, identify it as closely as you are able. For example, choose to identify it as a plant instead of leaving it as an unknown, or choose to identify it as a grass, even if you are unsure of what kind it is. Identifying your observations as best as possible will increase the chances that other citizen scientists will comment and give you their suggestions on what you have seen. Give it a try! Attempt to observe and identify three organisms. **Share your three observations with a partner.**

Step 3: Conduct a Comparative Study

Now that you have had some experience with iNaturalist, it is time to harness the power of citizen science by conducting a comparative study looking at two sites – a *City Site* and a *Natural Site*. To get started, you will assume the role of an urban ecologist. An [urban ecologist](#) explores the interactions of nature and the human-built environment. As you explore the data in iNaturalist using the instructions below, look for questions you might want to answer about biodiversity. You will be presenting your findings to your local school community in a format of your choosing.

Keep in mind the following questions, which will be included in your final presentation after completing both Part 1 and Part 2 below.

1. Identify your *City Site* (the name of your school or neighborhood) and describe what you discovered about this site.
2. What kinds of organisms did you and iNaturalist citizen scientists see at your *City Site* (include a screenshot of your 15 observations)?
3. What questions arose for you about your *City Site*?
4. Identify your *Natural Site* (the name of your chosen park or natural area) and why you decided to compare this site to your *City Site*.
5. Describe what you discovered about your *Natural Site*.
6. What kinds of organisms were observed by you and iNaturalist citizen scientists at your *Natural Site*?
7. As an urban ecologist, what differences and similarities do you see between the *City Site* and your chosen *Natural Site*? How does the built environment seem to affect the species you see? How would you propose making your *City Site* more like your *Natural Site* while maintaining the spaces humans need to live, work, and play?



COMPARATIVE STUDY INSTRUCTIONS

Part 1

1. Use the iNaturalist app at your school or in your neighborhood to make at least 15 different observations of any organisms you can find – try to include a variety like plants, insects, fungi, mammals, and reptiles.
2. Take photos and submit your observations to [iNaturalist](#).
3. When you complete the 15 observations, take a screenshot(s) of the “Your Observations” tab of your iNaturalist profile. Use these images in your presentation.

Part 2

1. At home, visit the [iNaturalist](#) webpage and click on the “Explore” tab on the top banner.
2. Watch this [narrated video walkthrough](#) that is a visual example of the instructions below, using the University of Texas at Austin as the proposed *City Site*.
3. Select the “Filters” option in the *Observations* banner.
 - Use the options in this menu to refine results to **only** show research-grade observations.
 - Click on “More Filters” and type in the name of the school or neighborhood you visited in Part 1. This will be your *City Site*. If your chosen area has less than 100 research-grade observations, you will need to expand your area to be larger (try clicking on “Places of interest” to expand your location by a small amount).
 - This will show you all of the research-grade observations for all species at all times at your chosen site.
 - Further refine your search to a **category of species** that you would like to study and **optionally select a range of time** you would like to include in this study (after applying your filters, you should have, at minimum, 50 observations to analyze).
 - Categories of species on iNaturalist are: Birds, Amphibians, Reptiles, Mammals, Ray-Finned Fishes, Mollusks, Arachnids, Insects, Plants, Fungi (including Lichens), Protozoans, and Unknown
4. After you have refined your search to your selected category of species and optional time range, download an exported copy of your dataset and determine the following:
 - **Richness:** the number of different species in your selected category.
 - **Evenness:** the number of individual observations of each different species in your selected category.
5. Review the data from your *City Site*. What patterns do you see? Write/note questions you have.
6. Select another location of roughly the same size as your school or neighborhood, but this location will be your *Natural Site* and should be a park or natural area (city parks or state parks are great options). Repeat steps 3-5 to get a similar data set to compare this *Natural Site* to your *City Site*.
7. Create a graph, chart, or infographic showing the richness and evenness of your **selected category** for both locations: 1) *City Site* (school or neighborhood) and 2) *Natural Site* (park or natural area). You are to decide how best to represent the data that you collect but make sure to label any axes and create a key or legend if needed.



RESOURCES

The following are projects that you can explore for inspiration and even join if you would like to contribute:

- [National Wildlife Federation Monarch Heroes Schools](#)
- [Texas Milkweeds and Monarchs](#)
- [The Lost Ladybug Project](#)
- [Black Velvet Leatherleaf Slug Tracking by the Texas Invasive Species Institute](#)
- [Texas Pollinator BioBlitz](#)
- [Austin City Nature Challenge 2020](#)

With gratitude and special thanks to Karen Bishop and Michael Hyndman for the development of this lesson for Eco-Schools USA, *Comparative Study of Biodiversity Using iNaturalist*.