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Turn Your Schoolyard into a Biodiversity Study Plot!

Goals

1. Students will have the opportunity to collect data and contribute to community science.
2. Students will learn about different flora and fauna by taking photos, drawing, and trying to identify living things.
3. Students will be able to explain why biodiversity is important for a healthy ecosystem.
4. Students will have the opportunity to work in groups to practice teamwork and communication skills.
5. Students will be able to define taxonomy, biodiversity and inventory.
6. Students will have positive experiences outside, learning in nature.

Vocabulary:

Biodiversity: the variety of life in the world or in a particular habitat or ecosystem.

Taxonomy: the practice and science of categorization or classification.

Inventory: to make a complete list of

Getting Started: How to introduce iNaturalist

First, get familiar with it yourself...make at least 20-30 observations to learn how to use the app before introducing it to students. There are several, short video tutorials [here](#)

1. Don't introduce the iNaturalist application first. Start by introducing the students to the website on a white board or projector. Start by asking the students to name an animal that they would like to see, anywhere in the world and enter it in the search bar at the top of the page. Look at where some of the observations were made and any information you can learn about the animal on the website.
2. Then, use the filter to list all observations in your state. What is the most common bird? Flower? Frog? What other living things?
3. Next, ask the students if they would like to add observations to this website? What types of things would they like to see?
4. See "FAQs" on pages 5 & 6 of this document.

Other resources for planning a bioblitz/community science projects:

iNaturalist.org

[iNaturalist Teacher's Guide](#)

[iNaturalist Video Tutorials](#)

[City Nature Challenge Educator Toolkit](#)

[National Geographic Society](#)

[Bumble Bee Watch](#)

[North American Butterfly Association](#)

[Audubon Society Christmas Bird Count](#)

[Great Backyard Bird Count](#)

Let's Get Outside!

If you are using iNaturalist, set up a account with login details. Anyone with a cell phone, like students with tablets or phones (if they are permitted to use), TA or parent chaperone can log into the account and make observations to help out or use their own. **Teachers working with younger kids need to keep in mind that the [Children's Online Privacy Protection Act](#) of 1998 means iNaturalist can't allow people under the age of 13 in the United States to create accounts without parental approval.*

Planning for Outside Activities:

Schoolyard:

- You don't need an outdoor classroom or a large green space...any space with a few plants or trees can work.
- Are there different habitats? Do you want to set up different exploration days for each one? Or have students explore different habitats to compare?
- How do you want to study each area? Set up measured plots or just document anywhere within the boundaries of the schoolyard?
- Do you want to do a bioblitz of all living things or focus on specific taxonomic groups?
- What questions do you and the students have about life in the schoolyard to focus on?

Great Website on making insect collecting tools [here](#)

What to bring:

- Worksheets or data collection sheets
- Nets
- Leaf beaters
- Leaf litter boxes
- Clipboards
- Backpack w/supplies

Backpack supplies:

- Speciman jars/vials or other containers to observe insects and other organisms
- Forceps so that insects can be gently picked up and examined, if necessary
- hand-lens/es
- Field guides
- iPad or Tablet
- First-aid Kit
- Notebook/pencil

Safety:

- Make sure to scout the area in the morning or before the program to look for any hazards, like hanging tree limbs, yellow jacket nests, slippery areas and poison ivy.
- Set boundaries and time limits. I've found that it works well to let them explore for 15-20 minutes at a time and re-group to compare findings, depending on the age level and the students' ages and abilities. If you have time, you can repeat the process.
- Ask students to repeat the directions and how they should (and should not) use the tools.

Introduction: What is one of the first things you usually learn about someone? Their Name! What does that tell us about them? It doesn't tell us much about them, like what they like to do or their favorite food. So, how do we get to know other people? Spend time with them and ask them questions, right?...Nature is just the same! We are exploring to document as many different living things as possible. We want to learn as much about the plants, animals and other living things we find— learning their name is how we recognize them but there is so much more to learn about them!

Helpful Tip: One of the first things that I do when starting a biodiversity study, is point out poison ivy to practice using the iNaturalist app. Obviously, make sure they don't touch it! It is a plant that will be in almost everyone's schoolyard and green spaces. Once they learn how to identify and recognize poison ivy, they will be able to avoid it and feel more comfortable exploring.

Outside Exploration:

- Split students into groups of 2-3 with a clipboard, writing utensils, collecting tools and worksheets. You might want to have them assign jobs—like, someone keeping notes, someone getting photos and someone using the collecting tools.
- Once again, establish boundaries and time limits.
- Walk around with the tablet to help groups of students get photos. Don't get hung up on having to know what everything is in the data gathering field work. You can always spend more time learning about each thing you find at a later time. Focus on letting them practice taking good photos or writing/drawing details of their findings...you can miss a lot of things by focusing too much on the app or looking in the field guides!
- Encourage questions from the students. They often come up with observations and questions that we haven't thought about. What do you think is important to remember about this plant? Do you think there is something unique about this flower? What parts of this insect do you think we should try to capture in a photo? Have them compare tree bark, tree leaves, etc to see what parts of the tree we should get in our observation photos. Exploring and documenting are an important part of the process as it will help us to make sure that we can accurately share our findings later on! The students might not have very many "usable" photos or observations the first time. Have them make a list of what they have learned for next time they make a visit to the schoolyard!

Conclusion for Outdoor Study:

- To conclude the field exploration, ask each group to share their favorite "findings" and something they learned. Make sure that all groups are back and tools are collected to put away.

- Spend time in the classroom looking at the observations and uploading the photos, if it's not already done. This is a great time to have students write a list of what they learned to change about collecting data. What would they do differently?

Follow-up Activities:

- Have students design an experiment, with a hypothesis, something they can look for or “prove” in the schoolyard, based on what they have learned.
- After the students develop a list of findings, can they create a chart or graph of an average of how many different living things they found per square foot or yard of the area? (Canva has some great and easy ways to do this!)
- Can the students create a pie chart of the different taxa they found (Canva has some great and easy ways to do this!)
- Nature Journaling capture details of what they see, hear and feel
- Creating a mural on butcher paper of all the things you found
- Assign each student an observation to create a field guide page and combine to make a field guide for the schoolyard
- Did they find invasive species? Can they make a plan/strategy for removal?
- Find reading level appropriate articles on the living things that they found—it makes them feel like their findings are important and helps to incorporate literacy.
- Find an article about one of the species or genus of living things that they found.
- Find community science projects on iNaturalist or in your area to participate in! (See Resources on page 1)

TN Middle School Science Standards that can be incorporated in biodiversity studies:

5.LS3: Heredity: Inheritance and Variation of Traits

- 1) Distinguish between inherited characteristics and those characteristics that result from a direct interaction with the environment. Apply this concept by giving examples of characteristics of living organisms that are influenced by both inheritance and the environment.
- 2) Provide evidence and analyze data that plants and animals have traits inherited from parents and that variations of these traits exist in a group of similar organisms.

5.LS4: Biological Change: Unity and Diversity

- 1) Analyze and interpret data from fossils to describe types of organisms and their environments that existed long ago. Compare similarities and differences of those to living organisms and their environments. Recognize that most kinds of animals (and plants) that once lived on Earth are now extinct.
- 2) Use evidence to construct an explanation for how variations in characteristics among individuals within the same species may provide advantages to these individuals in their survival and reproduction.

5.ETS2: Links Among Engineering, Technology, Science, and Society

1) Use appropriate measuring tools, simple hand tools, and fasteners to construct a prototype of a new or improved technology.

6.LS2: Ecosystems: Interactions, Energy, and Dynamics

- 1) Evaluate and communicate the impact of environmental variables on population size.
- 2) Determine the impact of competitive, symbiotic, and predatory interactions in an ecosystem.
- 3) Draw conclusions about the transfer of energy through a food web and energy pyramid in an ecosystem.
- 4) Using evidence from climate data, draw conclusions about the patterns of abiotic and biotic factors in different biomes, specifically the tundra, taiga, deciduous forest, desert, grasslands, rainforest, marine, and freshwater ecosystems.
- 5) Analyze existing evidence about the effect of a specific invasive species on native populations in Tennessee and design a solution to mitigate its impact.
- 6) Research the ways in which an ecosystem has changed over time in response to changes in physical conditions, population balances, human interactions, and natural catastrophes.
- 7) Compare and contrast auditory and visual methods of communication among organisms in relation to survival strategies of a population.

6.LS4: Biological Change: Unity and Diversity

- 1) Explain how changes in biodiversity would impact ecosystem stability and natural resources.
- 2) Design a possible solution for maintaining biodiversity of ecosystems while still providing necessary human resources without disrupting environmental equilibrium.

6.ESS3: Earth and Human Activity

- 3) Assess the impacts of human activities on the biosphere including conservation, habitat management, species endangerment, and extinction.

7.LS1: From Molecules to Organisms: Structures and Processes

- 6) Develop an argument based on empirical evidence and scientific reasoning to explain how behavioral and structural adaptations in animals and plants affect the probability of survival and reproductive success.
- 7) Evaluate and communicate evidence that compares and contrasts the advantages and disadvantages of sexual and asexual reproduction.

iNat FAQ's

Do students need their own iNaturalist account? No, you can create a classroom account with a login and password to share...that way it is not sharing a location that tied to their names or email addresses.

Can't I just use seek?

Seek does not capture location, so does not go towards any community science projects. Location is an important part of collecting and using data.

What if there's no service?

You can still use the app, take photos and the location will be saved when you share the observation. You just need to open the app when you get back to wifi or cellular service.

What if we can't ID something?

Keep in mind that there are many insects, invertebrates and plants that you will not ID to species and that's okay! Many experts cannot identify some living things like mushrooms and invertebrates to species by a photo. However, with a good photo, many experts on iNaturalist can help identify your observations.

So, what's the goal, if we aren't identifying everything we find to species?

Documenting local flora and fauna in the schoolyard gives students an opportunity to directly observe life around them. As they take photos on iNaturalist or create a drawing in a journal to identify living things,, they will learn through their experiences what parts of the plant, insect, mushroom, etc that they need to include. They will develop more questions and that should be encouraged!

What if we don't have wifi or service outside?

No signal, no problem! As long as you allow the location to be used on the app, iNaturalist saves the location of the observation to be uploaded later.