

Tracking Aliens

Using Project Noah to Compare Native and Invasive Species in Your Back Yard

Rationale

Invasive species are so familiar in our environment that many people don't realize how many common plants and animals are actually not native to their area. Project Noah tools provide an easy way to assess the biodiversity of the local environment and explore the relationships between the organisms that live there. By focusing on identifying and observing both native and non-native organisms in a small area, students can better understand basic ecological concepts and the impacts that invasive species can have on the environment.

Objectives

- To develop observation and communication skills.
 - To learn the basic process for identifying an unknown organism.
 - To gain an understanding of native vs non-native and invasive organisms.
 - To develop an appreciation for the interdependence of organisms.
 - To better understand how humans can impact the environment.
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Materials

- string, cut to length and marked in 1-meter increments
- measuring tape
- 1-meter-square PVC quadrat frames
- rulers
- markers
- small sheets of paper
- notebook paper with large squares for use as quadrat maps
- digital camera and/or mobile device with Project Noah app
- notebook or clipboard and paper
- computer(s) with access to www.projectnoah.org
- list of local invasive species
- list of local threatened native species
- list of top ten invasive plants/animals
- markers/flags (optional)
- collecting equipment (optional)
- field guides (optional)

Preparation

Before getting started counting natives and invasives in the field, it's important to get students thinking about what native, non-native and invasive species are. Introduce the definitions below in the context of one of the more dramatic stories of environments impacted by invasive species. A short reading about African brown tree snakes in Guam, Asian mongoose in Hawaii, venomous lionfish off the Florida coast or American bullfrogs in Great Britain can help explain the impacts of invasive species and get students excited about the field project.

Native species: An organism whose presence in an area is due to natural processes and has been in that area for a long period of time.

Non-native: A species that has been accidentally or intentionally introduced to an area where they are not naturally found (also called introduced or alien species.)

Invasive species: A non-native species whose presence is viewed as particularly harmful, or that has become very common in its new environment.

The instructor may wish to survey potential field sites in order to find one that has an established population of invasive species. While most environments have at least a few invaders, the lesson works best in an area that has been disturbed by humans and contains one or more invasive species that have established a foothold in the environment.

Unless an existing mission has been identified that fits with the objectives of the project, the instructor should create a Project Noah mission for the students to contribute their sightings to. The mission may be a general biodiversity survey of the school campus, an invasive-specific survey, or something else.

Register as a teacher, set up student accounts, and create classroom missions on Project Noah via the educational portal at www.projectnoah.org/education.

Introduction

Explain to students that they will be creating a survey of the species found in a local area to determine if invasive species are present, and, if so, what impacts they are having on the environment. Review the terms above, and encourage students to brainstorm about how a new species of plant or animal in their local area might effect native plants and animals, the physical environment and the human population.

Review the concept of biodiversity and discuss whether the arrival of an invasive species is good or bad for the area's biodiversity.

Procedures

In the classroom:

The instructor should have the students log into their Project Noah accounts and share with them the list of native threatened species in their local area. Students should search for these organisms using the organisms search feature on Project Noah. Are any of the spottings listed near their home or school? Have they seen any of these organisms in the wild? What might be happening that caused these organisms to become so rare?

Now have the students research species from the local invasives list on the site. Are there more spottings of these organisms than the threatened species? Are any of these spottings near their home or school?

Finally, have them check out the organisms on the top ten invasives list for their region or country. What might make these organisms such good competitors in their new environments? Can you find spottings of these organisms in their home range (where they are found naturally?)

For next class:

Explain to the students that they will be identifying native, non-native and invasive species in a defined area using a research technique called a plot study. They will use tape measures and string to outline a rectangular plot of land as their sample area and investigate the area in detail by dividing it further into 1 meter x 1 meter quadrats (defined below) that students will study in pairs.

Quadrat: A square or rectangular plot of land (usually one square meter) used to define a random sample area in which the plants and animals present can be observed, measured and recorded.

Depending on the available field time, the complexity of the study site and the students' previous experience in identifying local wildlife, it may be necessary to spend some class time reviewing classification systems, the use of field guides and other identification tools and perhaps a short list of the most common native and invasive organisms likely to be encountered in the study site. Reviewing methods for posting a spotting on Project Noah and basic photography techniques may be useful as well.

Remind students to come prepared for a field activity (proper shoes, clothing etc) next class.

In the field:

Upon arrival at the field site, students should determine the best location in which to outline a sample plot. Using pre-cut string, students should create a square (suggested 5 x 5 meters for a typical class) by holding the strings together at the corners.

After carefully laying down the string, students should work in pairs or small groups with the PVC quadrat squares, aligning the squares with the one-meter marks on the string to systematically survey the entire plot. Groups should begin at opposite corners to minimize crowding.

In each quadrat, students should photograph the organisms found and include detailed descriptions of the organism and its habitat on their mobile device or in their notebooks for posting later.

Digital photos of individual organisms should be accompanied by numbers that identify the quadrat location in which the organism was discovered. For example, a photo of a dandelion located in the quadrat located in row B in the fourth column should be followed in the photo sequence by a photo of a piece of paper that clearly reads B-4. (The class may choose to include the date as well.

A number representing the sequence in which the photo was taken should be included in on the quadrat sketch for mapping purposes. For example, if the organism was located in the top, right corner of the 4th quadrat and its photo was taken third in the photo sequence, a 3 should be written in the top, right corner of the Quadrat 4 map.

Students should estimate the number of each organism present in each quadrat as closely as possible. An estimate of the percentage of the quadrat covered by the organism may be preferred, depending on the density of the organisms and the groups' objectives. A sketch of the area covered by each on the quadrat outline should be included with the photo number.

A clear description of the organism and the physical features of the habitat in which it was found should be entered into Project Noah on the mobile device or otherwise recorded and labelled with the location ID described above. If the Project Noah mobile app is being used, the location ID should be recorded in the notes section for each spotting before it is uploaded.

When key native or invasive species are first identified in the field, it may be a good idea to have the students who identified it share their discovery with the rest of the class.

Photos of the entire quadrat, labelled with a location ID, can be taken to provide a record of each section of the plot surveyed. Quadrat photos can also be used later to identify additional species, determine counts and percentages, define habitat transitions etc, if time in the field is limited. Quadrat photos should always be oriented in the same direction to minimize confusion.

Once the plot study is complete, students should make sure that all of the quadrats have been properly described and labelled and attempt to correct any missing or inaccurate information.

Once the data was been reviewed by the instructor, students should retrieve the string, collect all equipment and make sure that the habitat is left as close to its natural state as possible (pick up trash, gently replace disturbed rocks and logs, etc.)

Back in the classroom:

Digital photos can be transferred directly to student computers upon return to the classroom. Depending on the equipment available and other classroom considerations, the instructor may wish to download all photos or groups of photos to a shared file that students can access through the network to select photos for posting.

Digital photos that were not posted from the field should be posted to Project Noah as individual spottings with the associated data recorded in the field. Spottings are often best organized and posted by students working in pairs.

Students should include as much field data as possible in each spotting, making sure to thoroughly describe the organisms and habitat and include a location ID in the notes section.

Unknown species can be examined further and identified using field guides or other means, or posted on the site as unidentified. Links to sites used to help identify the organism should be included in the spotting.

Students should make sure to assign each spotting to the appropriate mission if the instructor has chosen or created a mission to contribute to.

Suggested ID's provided by the Project Noah community should be discussed by the students in small groups for accuracy, and spottings should be updated with new ID's, links or other information as soon as possible.

Analysis

Students should compare all the data collected from the spottings, the quadrat photos and the quadrat maps to determine a list of native and invasive plants found in the survey plot. Using a color key to represent native and invasive species, students should use a mapping program on the computer or create a drawing on poster paper that represents the survey plot and the species found there.

Discussion Points

Based on the data collected, the students should write a short interpretation of the data.

Were invasive species present in the plot?

What percentage of the area was inhabited by invasives?

What was the relationship between the native and invasive species? Were they found together?

What roles have humans played in creating the habitat where the survey was conducted?

Could humans have played a role in introducing the invasives? How?

What could be done to minimize the impact of invasive species in the area and encourage native species?

Assessment

The following rubric points may be used as a guideline for assessment for this activity. A numeric scale may be applied according to the instructor's classroom objectives.

The student demonstrates an understanding of invasive, native and non-native species.

The student demonstrates an understanding of biodiversity.

The student demonstrates an understanding of sampling methods.

The student worked well in his/her group.

The student participated in the field activity.

The student made detailed observations.

The student demonstrated the proper use of equipment in the field.

The student demonstrated the ability to effectively use Project Noah to record and organize data.

The student participated in data analysis.

The student participated in the creation of the map.

The student addressed the discussion points in his/her paper.

Extensions

Design and promote an invasive species assessment mission for the area that uses Project Noah to draw together invasive species observations from other classes, government agencies, community members and others. How widespread are invasives in your community?

Revisit the plot area at another time of year to determine if different species are found at different times. Are there new natives or invasives that were not seen before?

Compare the results of the first survey with a plot survey of a different type of habitat (field vs woods, lawn vs meadow etc.) Which had more invasives? Why?