GO WILD IN NEW YORK CITY

Inquiry project: Young Naturalists at Work!

In this lesson students will choose a local animal, propose a set of questions about it to be responded through direct observation, and engage in field work in order to answer them, working like naturalists.

Learning Goals

At the end of this project, students will be able to:

- Know about the life and habits of a local animal
- Pose questions that can be answered through direct observation
- Design a field protocol to answer their questions
- Propose hypothesis that might response their questions
- Interpret their observations and draw conclusions based on their initial hypothesis
- Create a poster summarizing a research study
- Present their conclusions to their peers and other members of the school community

Background Information

New York City holds a diversity of wildlife that students can learn to appreciate and enjoy. In extensive green areas such as Central Park or Jamaica Bay Wildlife Refuge, for example, multiple bird and fish species have been recorded, as well a variety of butterfly and other invertebrate species. Mammals such as opossums, muskrats and chipmunks are also neighbors that can be frequently found in city parks, marshes and open fields (see Go Wild in New York City, page 58 and 59). More information about New York City animals can be found at the "Urban Neighbors: Images of New York City Wildlife" website (http://urbanneighbors.nypl.org/home.html), an exhibition developed by the New York Public Library.

It is not always easy to scout for wild animals in order to conduct a field research. For that reason, it is important to know which animals can be found in the local parks and when they can be seen. To obtain that information, visit the "Urban Neighbors" website and look for the Sighting Log, which provides information on the animals (amphibians, birds, insects, reptiles and mammals) that have been found in the five boroughs.

Development of the activity

1. Warming-up

Ask students about the animals they have seen in their neighborhoods and local parks. What do they know about them? Is there anything about these animals that they are curious about? What questions do they have about them? Include other local animals that students have not mentioned as well. List all students' questions about animals on the board and discuss which of those questions can be answered through field research, by going to the local park to observe the animals' behavior or habitat.

Talk about how to conduct field work, such as the need of taking notes and photographs, or to find a way to observe the animals without disturbing them in order to analyze their natural behavior. Ask students to think of other issues that may arise when conducting field work (for such as, what would they do if they cannot find any of the animals they are looking for?) and how to solve them (for example, by relating the same question to another kind of animal they find).

2. Designing the research study

In small groups, have students select one of their questions, which they believe it can be answered through direct observation. Examples of questions that students can research are:

- Are squirrels solitary or they move in groups?
- What kind of food do raccoons eat?
- Do house finches always nest on the same kind of trees?
- How long can turtles remain under water?

Each group of students will then present their research question to their peers, and talk about the possible results they might obtain (in the first question, for example, the possible results could be: *squirrels are always solitary*, *squirrels always move in groups* –then students could research how many squirrels usually form a group- or *squirrels are sometimes solitary and sometimes move in groups*). Thinking of the possible results in advance (i.e. proposing hypothesis that can answer the question posed) will help students analyze their observations later and refine their questions, if necessary.

Then, student groups will design a way to answer their question through direct observation. For example, if they want to know how long turtles can remain under water they can go to the pond, find some turtles and measure the time each of them remains under water, pooling the results for different turtles later in order to arrive to a reliable conclusion. The teacher should scaffold students in their experimental design process in order to make the design both feasible and helpful to answer the question. Before going to the field, students must record their question, their possible answers and their experimental design on their journals.

3. Field work

Select a local park that students have easy access to. Ideally, students should be able to continue their research work after school in order to go further with their

investigation, if they want to. Make sure that the animals that students are going to research about can be easily seen there (look for information about that on the "Urban Neighbors" website, http://urbanneighbors.nypl.org/home.html, or go to the park yourself before starting the project, which we highly recommend).

You might need all or some of the following materials, depending on the characteristics of students' projects:

- Students' journals
- Photographic cameras
- Magnifying glasses
- Bird book
- Binoculars
- Chronometer

Students will conduct their designed research study working in their groups. Ask them to record data on their journals and take notes of all other observations that might be related to their questions.

4. Analysis and presentation of results

Back in class, students will analyze their results in terms of their original questions and try to reach conclusions based on what they have measured or observed. In order to present their findings to their peers, students will create a poster stating their question, their experimental design, the data they recorded and their conclusions, in a way similar to scientists' presentations in conferences. They can include in the posters additional resources such as drawings, pictures, feathers, etc.

Besides that, students will research, either in the school library or using the Internet, other features about the animals they have investigated, such as their habitats, general behavior, reproduction, food, etc. and include them in their posters in a Background section. If available, students can research the answers to their research questions as well, and compare them to their own experimental results.

Finally, the class will organize a "mock scientific conference" in which students will invite students from other classes, teachers and administrators to see their work present their research posters to them.

Assessment

This project provides various opportunities to assess students' learning (see Learning Goals) in formative and summative ways. Student's skills and conceptual understanding can be assessed through:

-Students' research questions (formative)

-Students' experimental design (formative)
-Students' performance in conducting the field work (formative)
-Students' posters (summative)
-Students' poster presentation at the mock conference (summative)

Extensions

If video equipment and time are available, students can extend their field work by filming the animals they can find in the park. They can use their videotaped material either to help them answer their research questions. Then, they can create a mini documentary of local wildlife including all the animals they have found in the park and describing their behaviors. That mini documentary can be presented to other students or to students' parents later.

As another follow up activity, students can engage in bird-watching and learn about New York City birds. Besides permanent bird residents such as pigeons, hawks and seagulls, New York City is one of the main rest stops for migrating birds that fly from breeding grounds in northeastern Canada to warmer places in the Caribbean and South America. A list of birds you can see in every season in the city is available at the Prospect Park Audubon Society website (see www.prospectparkaudubon.org). It is always helpful to engage in bird-watching with someone who has done it before (see Go Wild in New York City, page 64 and 65, for more details on bird-watching). Therefore, if available, a parent with some experience in bird-watching can be invited to guide students, or the class can participate in a school program at the local park.

Finally, students can share their observations with the public by adding a Log Entry about the animals they have seen and the location where they have observed them at the Urban Neighbors website, http://urbanneighbors.nypl.org/logmain.html

Connection to New York City Standards

This activity addresses the following NYC Performance Standards for Middle School Science:

S2c, d and e Life Sciences Concepts: The student produces evidence that demonstrates understanding of:

c. Regulation and behavior in response to environmental stimuli
d. Populations and ecosystems
e. Evolution, diversity and adaptation of organisms

S5a to f Scientific Thinking: The student:

a. Frames questions to distinguish cause and effect, and identifies or controls variables

b. Uses concepts from Science Standards 1 to 4 to explain a variety of observations and phenomena
c. Uses evidence from reliable sources to develop descriptions, explanations and models
d. Proposes, recognizes, analyzes, considers, and critiques alternative explanations; and distinguishes between fact and opinion
e. Identifies problems, proposes and implements solutions, and evaluates the accuracy, design and outcomes of investigations
f. Works individually and in teams to collect and share information and ideas

S6a to d Scientific Tools and Technologies: The student:

a. Uses technology and tools to observe and measure objects, organisms and phenomena
b. Records and storage data using a variety of formats
c. Collects and analyzes data using concepts and techniques in Mathematics Standards 4
d. Acquires information of multiple sources

S7a, b, d and f Scientific Communication: The student:

a. Represents data an results in multiple ways
b. Argues from evidence
d. Explains a scientific concept or procedure to other students
f. Communicates in a form suited to the purpose and the audience

S8b and c: Scientific Investigation: The student demonstrates competence in investigations that integrate:

b. Field work
c. Design