Wild Wisdom

curriculum-infused outdoor learning ideas

Grade 6

by Rebecca Seiling

LEARNING TOGETHER NOC ON THE LAND

Species invaders

Season: Spring 

Curriculum Expectations:

Science and Technology, Life Systems

B2.5 describe interrelationships within species, between species, and between species and their natural environment, and explain how these interrelationships sustain biodiversity

B2.6 explain how invasive species reduce biodiversity in local environments

Materials needed:

- Index cards
- Music (on a phone), Portable speaker, or a shaker instrument
- Rubber mats (you need half of the total number of your group)

Introduction

Talk about invasive species that affect this area: gypsy moths, emerald ash borers, periwinkle, garlic mustard, etc. By their name, invasive species have a bad reputation. Introduce some nuance to grade 6 students by expanding this vocabulary to include introduced species, species indigenous to an area, non-native, etc. Humans are the most invasive species of all! Some habitats have grown to include non-native species in helpful ways - these are often referred to as “novel ecosystems”. Local parks sometimes manage plants - planting more native species ground cover plants, and weeding out groundcover introduced species such as periwinkle, which has often spread into forests from people’s yards. These plants impact the biodiversity of a forest, as they choke out native plants, which are eaten by native fauna.

Species invaders, cont'd

Set Up

To play the Invasive Species game, set out rubber mats in a circle. There should be a bit more than half the number of mats as people in your class to start the game (ie, with a class of 24, have about 15 mats). Students will pretend to be plants. Explain that this game is like musical chairs, and that the mats represent everything you need to survive as a plant: sun, soil, water. As long as they have a place to sit, they will be in the game. Have all students sit on mats, and pass out index cards randomly. Half will say "native" and half will say "introduced."

Play

For round #1, ask all of the introduced species to simply watch this round of the game - they have not been introduced to this habitat yet. Four of the students who have native species cards will start a round of musical "mats". Play music or shake a rattle, while students with "native" cards move around the area. When the music stops, students find a mat to sit on. There are plenty of mats this round - plenty of habitat.

Introduce 4 more students to join the game who have native species cards (8 students total) - this represents a growing season/year, and added growth in the forest. Play "musical mats" again. More of the habitat will be taken up this round, but everyone will still have more than enough. Keep adding a few more native species until all of the students with those cards have joined the game. Debrief this round - species are multiplying, but there is still enough habitat for all.

For round #2, several species have been introduced to the forest (coming by boat or on shoes or by the wind from other places - brainstorm as a group how they may have been introduced) invade the habitat and take it from native species. Play musical mats again. All of the students can play the game this time, competing for a small habitat. Some species will be "out" this round because there is not enough room for all.

Species invaders cont'd

For round #3, introduced species start to have an advantage because their root and seed dispersal systems guarantee their ongoing success in taking over habitat. Turn mats over to indicate that they are reserved for introduced species only (you could also use stickers to make them more visible).

Play musical mats again, and notice how many did not get habitat because there was not enough space, or because there was space taken over by introduced species. If there are any empty mats, call in introduced species who got "out" in a previous round to join again, representing the seeding and growth of the introduced species population. Once again, turn a few more mats over, and play musical mats again. See what happens to your numbers this time. If you wish, this information (native/introduced) could be charted or graphed for each round.

Debrief this round, noticing the lack of habitat for native species. Talk about what impact this has on the overall forest ecosystem. Talk about carrying capacity - that the forest can only hold so many plants at ground level - there is limited habitat that can be used.

Optional: In order to extend the learning, specific names of native/introduced species could be written onto the index cards. Some examples follow.

- **Native:** wild strawberry, butterfly milkweed, mayapple, zigzag goldenrod
- **Introduced/invasive:** garlic mustard, periwinkle, buckthorn, lily of the valley, dog-strangling vine

NOTE: Some introduced species have not become invasive, but are considered "**naturalized**." These help the ecosystem in various ways, and don't choke out native species like invasives do. Some examples include: broadleaf plantain, dandelion, burdock.

Taxonomy exploration

Season: Spring 

Curriculum Expectations:

Science and Technology, Life Systems

B2.1 describe the distinguishing characteristics of different groups of organisms, and use these characteristics to further classify these organisms using a classification system

Mathematics, Measurement

E2.1 measure length, area, mass, and capacity using the appropriate metric units, and solve problems that require converting smaller units to larger ones and vice versa

Materials needed:

- Camera
- Clipboards, paper and pencils
- String or yarn, 4m long, one per group
- Measuring tape, one per group

This activity involves students making predictions regarding what they will observe about the diversity in an outdoor area. Before going outside, predict how many different plants or creatures you will see in a 1m2 area on the school sports field. Measure 4m of yarn or string in small groups - they will be taking this with them outdoors.

Outside, have students work in small groups to create a 1m2 area using their measured string or yarn. On clipboards, have them record the plants that they find in that area. If they don't know the common name, have them create their own name and describe the plant or creatures using colour and measurement. Students make note of everything they see within the frame.

Taxonomy exploration cont'd

Guided Reflection

Based on these findings, can the students make predictions for the larger field? What predications could be made re: biodiversity?

Take the information gained from the measured space to make a school yard taxonomy. How would they classify these plants or creatures? Their way of classifying doesn't have to be the same as anyone else's - just give reasoning for why they sorted them the way they did. Try to make categories as specific as possible when dividing. These can be shared together with the class. Talk about how different groups and cultures have classified plants and creatures in different ways - there is not one right way to do it.

Biomimicry

Season: Fall

Curriculum Expectations:

Science and Technology, Life Systems

B1.2 analyse a local issue related to biodiversity while considering different perspectives; plan a course of action in response to the issue; and act on their plan

Language, Listening

1.1 identify a range of purposes for listening in a variety of situations, formal and informal, and set goals related to specific listening tasks

Writing

1.4 sort and classify information for their writing in a variety of ways that allow them to view information from different perspectives and make connections between ideas

Materials needed:

- Nature journals
- Pencils
- Field guides (U of G Biodiversity Mats)

Introduction

At the beginning of the year, introduce the term “biomimicry.” To bridge their understanding of biomimicry, provide them with examples that they would already know, such as Velcro (hooked barbs on burdock seeds). Watch a video (see above for examples) or read a book about biomimicry together.

Biomimicry cont'd

Take time each week to have students take their Nature Journal, (and maybe binoculars or a magnifying glass), go outside, use their senses, and document everything in words and/or drawings on a graphic organizer. It could be in the form of a chart, where on the left is “observation” and the right hand side of the chart is “application of this design or system.”

Example documentation chart

Observation	Application

Guided Reflection

- What ideas do they have related to biomimicry?
- When their observation time is over, share their discoveries. Bring field guides in order to discover more about their findings.

Greenhouse effect game

Season: Fall/Spring 

Curriculum Expectations:

Science and Technology, Matter and Energy

C1.1 assess the short- and long-term impacts of electrical energy generation technologies in Canada on society and the environment, including impacts on First Nations, Métis, and Inuit communities, and on climate change

C1.2 assess choices that reduce personal use of electrical energy from both renewable and non-renewable sources, and advocate for the responsible use of electrical energy by the school community

Life Systems

B2.7 explain how climate change contributes to a loss of biodiversity, and describe the impact of this loss

Materials needed:

- Human Impacts Cards (print): https://curriculum.climategen.org/2017/NGC/NGC2017-2-1-Human-Impact-Cards.pdf
- Sidewalk chalk or two large ropes
- Student journals, or paper and pencils
- Index cards, 2 for each student (they will label one “HEAT” and one “LIGHT”)

Introduction - *The Fog*

Read the picture book *The Fog* and talk about how this could relate to climate change. This book helps a group to talk about the idea of climate change in a non-threatening and hopeful way. It can help to open up a discussion on what we already know about climate change, as well as hopeful actions. In the book, the fog can be a metaphor for climate change - that only a young girl and a yellow warbler notice (at first).

Greenhouse effect game

They wonder if they are the only ones who will notice it, and if it is here to stay. The more the fog is ignored, the more it spreads. This idea could be used to speak about awareness and testing the information that comes our way - and not ignoring it. It's about noticing, paying attention, caring, and doing something about it - a powerful message for any age!

Outdoor Game

[This game is taken from https://www.climategen.org/ and is part of a free, downloadable lesson package called "Next Generation Climate: Grades 3-8".]

This activity will help students make a model of the atmosphere and will facilitate discussion. Students will illustrate a diagram of the greenhouse effect throughout the game. In the student's drawings there will need to be arrows representing where light, heat, energy, etc. are coming from. As a teacher, these are things you should not instruct your students to do, but highlight as you review their work and as they improve their diagrams after each round of game play. "How did you show movement? Heat? Light? Amount?" Encourage them, "I like how you used arrows to show direction/amount/etc." The game will work best with 15-30 students.

Print Human Impacts Cards (see link above under Materials needed) and create 'What do humans do?' bag to put these cards in.
Find a large, open area for game play, preferably outside. Draw two concentric circles on the ground, one about 4 feet in diameter, and a larger one about 30 feet in diameter. The smaller circle represents the Earth and the larger one represents Earth's atmosphere (for 15-30 students to play).

Game cont'd

Set Up

1. Have students each make two notecards. One says HEAT and the other LIGHT, and have them bring these cards outside with them.
2. Before going outside, have students draw a diagram of the greenhouse effect in their journals. Be sure they label what they draw, even if it is only a few things. They need to bring their journals outside to draw after each round of the game.
3. Take students outside to play the game. Explain that the smaller circle represents the Earth and the larger one represents Earth's atmosphere. Have students place their 'heat' cards in a pile on the Earth.

Misconception Alert: Explain to students that the size to atmosphere is not to scale. In real life the Earth's diameter is 7,917 miles and the atmosphere reaches about 800 miles above the Earth. A good analogy would be a peach. The flesh would represent the earth and the skin would represent the atmosphere.

Play - *Round 1*: Natural greenhouse effect

- Choose two students to be CO_2 molecules, and place them anywhere in the Earth's "atmosphere." Once they are in the atmosphere they cannot move their feet. The other students are sunlight (energy) from the sun — standing outside of the atmosphere.
- The object of the game is for the sunlight to enter the atmosphere, tag the Earth, exchange their 'light' card for a 'heat' card, and then escape the atmosphere without getting tagged by a CO_2 molecule. Students can only be tagged once they become heat (after they tag the earth and exchange their cards). This simulation recreates the greenhouse effect: energy from the sun is trapped as heat by CO_2 and other gases in the atmosphere. Sunlight who are tagged must stay standing still in the atmosphere. Those who avoid being tagged bounce back out of the atmosphere into space. The round lasts approximately 30 seconds.

Game cont'd

- After the first round, have the escaped sunlight form a circle around the atmosphere to check how much heat has been trapped by greenhouse gases. During the first round, most of the energy will have escaped the atmosphere because CO_2 levels are low. Discuss how this may affect the temperature of the planet. Remind students that a certain amount of CO_2 is necessary to keep the planet consistently warm enough to support life. Before continuing the game, clear all the trapped sunlight (heat) out of the atmosphere.
- After round one, give students several minutes to add or change their diagrams and give them time to journal about what they learned about the greenhouse effect. What would they change about their initial diagram?

Round 2: Human enhanced greenhouse effect

- Increase the number of CO_2 molecules in the atmosphere. Do this by reaching into the "What do humans do?" bag and pulling out a card (for this round, include only cards that add CO_2 to the atmosphere). Follow the directions on the card and play again. Give time to journal and draw after round 2.

Round 3: Slowing down the greenhouse effect

- Put all of the action cards in the bag so that CO_2 levels will increase and decrease based on the actions taken. Discuss what happens with each draw (2-3 cards). Some cards will not increase or decrease CO_2 levels. Riding your bike instead of driving will not add CO_2, but it won't take away CO_2 either.
- Give time to journal and draw after round 3. How did students' idea of the greenhouse effect change throughout the game? What conclusions can be drawn?

Game cont'd

Guided Reflection

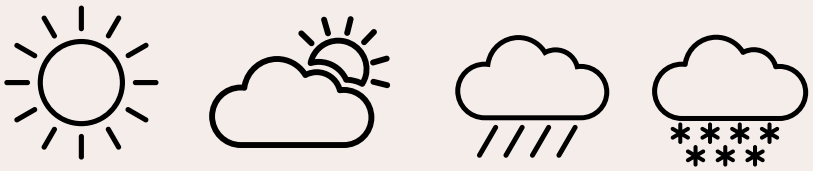
Have a discussion about how energy from the sun gets trapped in the Earth's atmosphere. Discuss how human actions, particularly burning fossil fuels, can enhance the greenhouse effect by putting more CO_2 into the atmosphere. This increase in CO_2 which is increasing global temperature is referred to as climate change. The game should demonstrate that when you increase the amount of CO2, more heat gets trapped (illustrated by the students that were tagged in the atmosphere) and the Earth's temperature increases. The action cards demonstrate how even small-scale actions can affect the amount of greenhouse gas that we emit to the atmosphere. The game can be a springboard into a variety of other explorations such as researching alternative energy sources, discussing sustainable lifestyles, and examining the various solutions humans can take part in.

Use the following questions for a wrap-up discussion:

- How was this game like the atmosphere/not like the atmosphere?
- What makes the game an accurate or inaccurate model of the atmosphere?
- How did your diagram change throughout the game? What did you learn during the game?
- How did you show things moving around? How did you show quantity? How did you show that light changes to heat?

Log it!

Date: _____

Weather: 

Wind: 

Temperature: _____

I notice...

Log it!

I wonder...

This reminds me of...

what do you sense?

Date:



Imagination space

Date: