

7.6 Human Invasion

Story Extension for This Lesson:

This lesson investigates how urbanization has impacted ecosystems. Here are the passages that link the intermediate story to this lesson:

Passage 1: Sam and Alex paddle slowly through the canal, looking at all the powerboats that zoom past them, and the smattering of families picnicking on the banks. Cars fly by on the road paralleling the canal, and sometimes, plumes of light grey smoke trail behind them.

They finally reach the end of straight waterway, and they paddle until they reach what the wolf tells them is the expansive main body of Lake Ontario. They keep moving forward, but not straying out of sight of the shore.

Passage 2: Alex and Sam pull more and more water under the boat and move further and further from the shore populated by urbanization. They glide under birds circling the water in search of prey, they slide over water full of fish searching for greens to chomp on, and they even spot a beaver dam off in the distance on the edge of the approaching shore. Sam and Alex wonder how the water systems and pollution impact the animals.

Grade: 7

Strand: Interactions in the Environment

Big Ideas:

- Ecosystems are made up of biotic (living) and abiotic (non-living) elements, which depend on each

- other to survive. (Overall expectations 2 and 3)
- Ecosystems are in a constant state of change. The changes may be caused by nature or by human intervention. (Overall expectations 1 and 2)
- Human activities have the potential to alter the environment. Humans must be aware of these impacts and try to control them. (Overall expectation 1)

Overall Expectations:

1. assess the impacts of human activities and technologies on the environment, and evaluate ways of controlling these impacts
2. investigate interactions within the environment, and identify factors that affect the balance between different components of an ecosystem
3. demonstrate an understanding of interactions between and among biotic and abiotic elements in the environment

Specific Expectations:

- 2.3** use scientific inquiry/research skills to investigate occurrences that affect the balance within a local ecosystem
- 2.4** use appropriate science and technology vocabulary, including sustainability, biotic, ecosystem, community, population, and producer, in oral and written communication
- 2.5** use a variety of forms to communicate with different audiences and for a variety of purposes
- 3.4** describe the transfer of energy in a food chain and explain the effects of the elimination of any part of the chain
- 3.5** describe how matter is cycled within the environment and explain how it promotes sustainability

Inquiry Skills:

Searching, Comparing, Contrasting Discussing

Instructions:

The Invasive Species Game:

The origins of this game was created by Dr. Carol Stepien, Principal Investigator for the GK-12 Program from the University of Toledo. This game is also found in the Grade 6 lesson, entitled **Invasion Crustacean**.

Students will experience first hand the effects of humans invading an established ecosystem. To begin, there are four animals: one with a plastic spoon (RABBIT), one with a pair of chopsticks (BEAR), one with a fork (DEER), and one with two forks in one hand (WOLF). The HUMAN will have a big binder clip.

Eating Habits:

- RABBIT eats only white pom-poms
- BEAR eats only white and red pom-poms
- DEER eats only blue pom-poms
- WOLF eats blue and red pom-poms
- HUMAN eats white, red, and blue pom-poms.

Instructions:

Randomly distribute as many white, red, pink, and blue pom-poms on a piece of felt. Each of the four native animals have 30 seconds per round to collect as many pom poms using one hand. Play three rounds before the HUMAN arrives. Continue to play three more rounds with the HUMAN eating all coloured pom-poms.

Scoring:

Each animal starts off with three lives represented by counters. At the end of each round, each animal needs five pom-poms to survive. For every three pom-poms beyond the first five, the animal produces an offspring. One offspring equals one additional life. Once the animal is out of lives, he/she becomes extinct and joins the HUMAN by collecting pom-poms with a binder clip.

Guiding Questions:

- Were you able to compete with the other animals for food?
- Were you able to compete with the human for food?
- What were the consequences of having humans entering an ecosystem?

Inquiry Topic: Energy Pyramids

The game is representative of the amount of energy humans consume in a finite world.

- Is it possible to reduce how much energy we consume?
- If all humans were to switch from being omnivores to vegetarians or vegans, would that benefit our global ecosystems? Would it benefit human health?
- At what point would altering human diet be a detriment to human health?
- Is it better to eat locally? Would it be beneficial to buy our produce at Farmer's Markets or Co-op stores?

This line of inquiry can be a sensitive issue so tread carefully. The purpose is not to create a scenario where one is better than the other. Instead, this line of inquiry will have students think about what we can do to create a balance where humans can live in a sustainable manner.

Students will create a written report on this topic. A graphic organizer has been provided to help students organize their information.

Materials List:

Materials for the game (for groups of five):

- 5 cups
- 1 pair of chopsticks
- 1 plastic spoon
- 3 plastic forks
- 1 large binder clip
- 10 white pom-poms

- 10 red pom-poms
- 12 blue pom-poms
- 3 X 4 piece of felt
- 25 counters
- 1 timer

Materials for the Inquiry Topic:

- Research Graphic Organizer

Connections:

This lesson requires skill acquired from the Language curriculum. Students will be creating a report.

Subject Area:

English

Assessment Strategy:

It is recommended you focus your assessment on process skills. To help get you started on this path, a series of charts have been provided for you. Information provided in the charts are from Smarter Science: Introducing the Framework. For more information about Smarter Science, go to www.smarterscience.ca.

Handouts/Assessments:

- Research Graphic Organizer 1
- Process-Skill-Searching-2
- Process-Skill-Comparing-13
- Process-Skill-Contrasting-13
- Process-Skill-Discussing-8

Connects to:

Grade 7

Name: _____

Topic: Energy Requirements of Humans in Local and Global Ecosystems

Research Question: _____

Source:	Source:	Source:	Source:
Facts:	Facts:	Facts:	Facts:

Process Skill - Searching

Process Skill	Students	Teachers	What This Skill Should Lead To
Searching	☐ locating their own sources of information based on their own questions ☐ re-framing their current understanding in light of new evidence ☐ evaluating the reliability of sources of information ☐ identifying potential sources of error and/or bias ☐ developing and using criteria to establish relevance, accuracy, and reliability of information ☐ discussing research with peers and teachers to gain additional perspective and construct new meaning ☐ developing and using strategies to collect, organize, and communicate relevant research ☐ developing and using strategies to interpret scientific vocabulary	☐ giving students sufficient time and resources for research ☐ giving students guidance and activities to develop research skills ☐ developing criteria for reliability ☐ giving students opportunities to discuss and question their research ☐ guiding the development of strategies to interpret scientific text	☐ critical literacy skills that enable assessment of information for accuracy, reliability, and relevance ☐ strategies for interpreting and understanding scientific text ☐ cooperative learning (through discussion of research with peers)

Teacher Notes:

Process Skill - Comparing

Process Skill	Students	Teachers	What This Skill Should Lead To
Comparing	☐ carefully examining two or more samples (objects, events, behaviours, or data) ☐ utilizing all five senses, as appropriate, to find similarities ☐ paying attention to finer details ☐ may involve graphic organizers to sort ideas ☐ may be influenced by prior knowledge, schema, or cultural perspective	☐ done by students, though you may need to provide prompts depending on their ages and abilities ☐ personal and individual to each student (consider previous experiences and cultural perspectives) ☐ differentiated for each student	Students will become better able to find patterns and commonalities, and thus become better and more keen observers of the natural world.

Teacher Notes:

Process Skill - Contrasting

Process Skill	Students	Teachers	What This Skill Should Lead To
Contrasting	☐ carefully examining and determining differences between two or more samples (objects, events, behaviours, or data) ☐ sorting samples in multiple ways ☐ using graphic organizers (e.g., T-chart, Venn diagram, fishbone diagram) with headings to help sort or using the Frayer Model (focusing on differences) to help organize thinking and improve understanding of scientific content and concepts ☐ using differences in data to analyze and interpret results	☐ giving students many opportunities to distinguish samples based on their differences ☐ using instructional strategies (e.g., gallery walk) so students can share their contrasting with other students ☐ allowing students to select samples and data that they can contrast. It is best if these come from student-directed inquiries ☐ differentiated for every student	Students will become better able to find subtle differences in samples and thus become better at making quality observations. They will also generate better conclusions based on differences found in their inquiries. Through contrasting, students will learn useful descriptive vocabulary as well as develop higher-order thinking skills, such as the use of similes and metaphors, to communicate their understanding.

Teacher Notes:

Process Skill - Discussing

Process Skill	Students	Teachers	What This Skill Should Lead To
Discussing	☐ sharing and interpreting collected data to make sense of it; analyzing whether the data supports or disproves their hypothesis ☐ listening carefully to what others say ☐ talking about problems that may have influenced the results and possible ways to correct them in the future ☐ making connections between their results, previous research, and existing theories ☐ debating or exchanging views about a concept ☐ evaluating the impact of the results and their applications in the real world ☐ generating new questions that may lead to further investigation	☐ prompting students to be clear and precise, and to use the appropriate scientific vocabulary ☐ prompting students to choose the best facts to support their ideas ☐ ensuring that discussions in written form (e.g., comments on blogs or social networks such as Ning) have structure and flow	Discussion allows students to expand their knowledge about a topic and understand different points of view. They learn to express themselves precisely and to explain their reasoning (e.g., how they arrived at their conclusion). Debate is a healthy part of the scientific enterprise, and discussions are an effective way to explore opposition and skepticism.

Teacher Notes: