

6.7 The Circle of Life

Story Extension for This Lesson:

This is an interactive lesson where students are required to connect how biotic and abiotic factors rely on each other to form a healthy ecosystem in the arctic. The text passage that links this lesson is found at the beginning of the junior story. Here is the direct passage:

"So he was a doctor, an explorer, a master snowshoer and he knew how to live off the land like Survivorman?" Sam asks excitedly.

"Pretty much!" the teacher says. "But he wasn't perfect. They didn't know a lot about plants, animals, and ecosystems like we do now. I'll tell you about his first attempt to discover the fate of Franklin's expedition."

Grade: 6

Strand: Biodiversity

Experts (suggested):

- Karen Drake, Email: kdrake@lakeheadu.ca
- Dr. Douglas West, Email: doug.west@lakeheadu.ca

Big Ideas:

- Biodiversity includes diversity of individuals, species, and ecosystems. (Overall expectations 2 and 3)
- Classification of the components within a diverse system is a beginning point for understanding the interrelationships among the components. (Overall expectations 2 and 3)
- Because all living things are connected, maintaining diversity is

critical to the health of the planet.
(Overall expectations 1 and 3)

- Humans make choices that can have an impact on biodiversity. (Overall expectation 1)

Overall Expectations:

1. assess human impacts on biodiversity, and identify ways of preserving biodiversity
2. investigate the characteristics of living things, and classify diverse organisms according to specific characteristics
3. demonstrate an understanding of biodiversity, its contributions to the stability of natural systems, and its benefits to humans

Specific Expectations:

1.2 assess the benefits that human

societies derive from biodiversity and the problems that occur when biodiversity is diminished
2.4 use appropriate science and

technology vocabulary, including classification, biodiversity, natural community, interrelationships, vertebrate, invertebrate, stability, characteristics, and organism, in oral and written communication

2.5 use a variety of forms to communicate with different audiences and for a variety of purposes

3.2 demonstrate an understanding of biodiversity as the variety of life on earth, including variety within each species of plant and animal, among species of plants and animals in communities, and among communities

and the physical landscapes that support them

3.4 describe ways in which biodiversity within and among communities is important for maintaining the resilience of these communities

3.5 describe interrelationships within species, between species, and between species and their environment, and explain how these interrelationships sustain biodiversity

3.6 identify everyday products that come from a diversity of organisms

Inquiry Skills:

Comparing, Contrasting, Discussing

Instructions:

To survive in the arctic, John Rae learned the ways of the Indigenous people. He adapted his diet and ate what the Indigenous ate. Rae also learned that all materials scavenged and hunted were used where little to no waste was left behind. Alex and Sam would need to adapt these same principles if there were to live in the arctic while searching for Franklin's lost expedition. This activity will help students demonstrate how interactions among many living things helps strengthen the ecosystem.

Procedure:

1. Each coloured card represents one element in a biodiverse ecosystem:
 - Blue represents non-living elements in an ecosystem (e.g., sunlight, water, air)
 - Green represents producers (e.g., grasses, lichens)
 - Yellow represents herbivores (e.g., arctic hare)
 - Red represents carnivores (e.g., polar bear)
 - Orange represents omnivores (e.g., arctic fox)
 - Brown represents decomposers and scavengers (e.g., fungi and arctic fox)
2. Divide your class into six groups: producers, herbivores, carnivores, omnivores, and decomposers/scavengers. Each group is responsible for finding as many living and non living things that live in the arctic based on the coloured cards they are given. For example, a group that is given a stack of red cards are responsible for writing on each card their carnivore and a brief description (on the back of the card) of what the animal needs to live for survival. This step will take 100 minutes to complete.
3. Collect all completed cards in a basket.

4. As a class, form a large circle. Make sure you distribute different coloured cards to your students. Avoid having students with the same coloured card stand beside each other.
5. The student with the "Sunlight" blue card begins the game. Give this student a ball of yarn or string. This student begins the game by saying "I am sunlight. I provide energy for the grasses to make food." The student passes the ball of yarn or string to the student who has the "Grasses" green card making sure he/she is holding to other of the strong.
6. The second student then names another card and states what his or her's connection to it. The second student passes the yarn or string to the third student.
7. Continue to string connections together and pass the ball of yarn or string. There may be several connections to any one card.
8. Once all of the connections have been made, gently tug on the yarn or string you are holding. Count how many people feel the tug on their yarn or string. Repeat this step for each member of the circle.
9. Determine which component of the web is deemed "less important." Remove it from the web by having the person drop their card and yarn/string. Tug on the yarn and note any differences.

Guided Questions:

- What happens when the web becomes less complex? Are the changes dramatic as fewer elements remain in the web? Explain.
- Which cards had the most impact on the web? Which cards had the least impact on the web?
- What would happen if more cards (species) were added to the circle?

Inquiry Question:

- Would adding humans into the circle affect the web positively, negatively, or both?
- Have students research how Sam and Alex can live in the arctic with minimal impacts to the environment. What are some things they can do to help the arctic environment?

HINT: This is a perfect opportunity for students to investigate how the Indigenous peoples of the North used all resources provided by the animals they hunted and the plants they eat are used for their survival.

Materials List:

- coloured cards: blue, green, yellow, red, orange, brown
- tape
- string or yarn
- markers

Connections:

This lesson can be used in conjunction with the Language curriculum under the reading, writing, and communication

strands. To complete this activity, students are required to produce a multimedia report of what they have learned.

Subject Area:

Environmental, English

Connects to:

Grade 6

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.

- Process-Skill-Comparing-20
- Process-Skill-Contrasting-18
- Process-Skill-Discussing-9

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: