

7.4 What's the Matter with the Carbon Cycle?

Story Extension for This Lesson:

This lesson is one of a series of three lessons that deal specifically with matter cycles in an ecosystem. The direct link from the intermediate story to this lesson is found at the end of the story. Here is the passage link from the intermediate story:

Sam and Alex sit on a large cool rock and recall the long journey they have been on. They still have so many questions about water systems and cycles that impact the cleanliness of the water, animals that live near the lakes and rivers, and their ecosystems. They know exactly which questions to ask the wolf on their journey back home.

Grade: 7

Strand: Interactions in the Environment

and abiotic elements 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)

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

Specific Expectations:

- 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 (e.g., oral, written, graphic, multimedia) to communicate with different audiences and for a variety of purposes
- 3.5 describe how matter is cycled within the environment and explain how it promotes sustainability
- 3.8 describe ways in which human activities and technologies alter balances and interactions in the environment

Inquiry Skills:

Searching, Inferring, Comparing, Reporting

Instructions:

This lesson is one of a series of lessons involving matter cycles.

The carbon cycle is important as it keeps the earth warm and helps plants make their own food. Sadly, our consumption of fossil fuel has drastically altered the carbon cycle.

An Introduction to the Carbon Cycle

Show video from the University of Toledo called **The Carbon Cycle**.

- The Carbon Cycle video: <https://www.YouTube.com/watch?v=nzImo8kSXiU>

Quickly go over content discussed in the video. At this time, distribute *BLM - The Carbon Cycle*. Students are to draw a diagram of the carbon cycle using words from the word box to label their diagram. It is advised to show the video one more time.

Inquiry: The Carbon Challenge - Climate Change

Show Symphony of Science video on Climate Change called '**Our Biggest Challenge**'.

- Our Biggest Challenge video: <https://www.YouTube.com/watch?v=HHP9Rh-ooh0>

How are you going to change the world?

Climate change affects everyone and everything. The increase in carbon in our water system has altered aquatic ecosystems. How has climate change affect Alex and Sam's community?

For this inquiry challenge, students will create a report on how climate change has affected Sam and Alex's community and what solutions are needed to reverse and prevent further damage.

Reports can be presented in a variety of methods:

- written report
- PowerPoint or Keynote presentation
- a skit
- a Mercer-style rant
- an investigative news report

Materials List:

- Video link: "The Carbon Cycle": <https://www.YouTube.com/watch?v=nzImo8kSXiU>
- Video link: "Our Biggest Challenge": <https://www.YouTube.com/watch?v=HHP9Rh-ooh0>

Connections:

This lesson has links to the Language and the Arts curriculum depending on the type of report format students choose to use.

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.

It is suggested you use the provided rubric when assessing student drawings. Be sure to have students complete a self-assessment before submission.

Assessment Files:

- Rubric-Scientific-Drawings-1
- Process-Skill-Comparing-15
- Process-Skill-Reporting-5
- Process-Skill-Infering-11
- Process-Skill-Searching-8

Handouts:

- The Carbon Cycle

Subject Area:

Environmental, English , Art

Connects to:

Grade 7, Grade 8

The Carbon Cycle

Draw and label your diagram of the Carbon Cycle using the words provided for you in the Word Box.

Word Box

photosynthesis, plants, animals, vehicles, manufacturing, sun, fossil fuels, decomposers, carbon dioxide in the atmosphere

Bonus: greenhouse gas

Name: _____

A Rubric for Scientific Drawings

Performance Criteria	Level 1	Level 2	Level 3	Level 4
Conventions Drawings are: • clear • labelled using science vocabulary • completed in pencil • accurate • detailed	My drawing is: • too small or too large • not labelled • completed in pen • lacking in detail	My drawing is: • too small or too large • labelled using some of the words from the Word Box • fairly accurate but requires relevant details • completed in pen or pencil	My drawing is: • at the correct size for the page • labelled using all words from the Word Box • mostly accurate but required a few more relevant details • completed in pencil	My drawing is: • at the correct size for the page • Labelled using all the words from the Word Box including the Bonus Word • accurate • detailed • completed in pencil

Student self-assessment:

Teacher assessment:

Process Skill - Reporting

Process Skill	Students	Teachers	What This Skill Should Lead To
Reporting	☐ sharing ideas, based on facts and evidence, with others ☐ using creative and original presentation formats ☐ using an extensive vocabulary, yet writing or speaking succinctly ☐ giving others the opportunity to understand the world as the reporter does	☐ encouraging connections, inferences, and predictions ☐ promoting the sharing of ideas and evidence in a logical and concise manner ☐ encouraging creativity and the use of technology ☐ differentiated. Permitting and encouraging different presentation formats allows all students to successfully communicate their findings. ☐ scaffolding the process for students. Students can start by using a structured report format which evolves into a more sophisticated self-structured format. ☐ a natural literacy link	Students acquire research, speaking, and presenting skills through reporting. It is this step in an inquiry that establishes the factual and investigative background that informs their investigation. They gain an improved sense of logical sequences and often improve their ability to use vocabulary. A skilled reporter knows how to summarize background information and present it in a manner that piques the audience's interest.

Teacher Notes:

Process Skill - Inferring

Process Skill	Students	Teachers	What This Skill Should Lead To
Inferring	☐ deducing information from incomplete evidence using reasoning or logic. The information does not need to be factual or correct. (For example, “The grass is wet in the morning, so I infer that it rained overnight.” This is a valid inference, but not necessarily a correct one— the wet grass could be from morning dew or a sprinkler system.) ☐ clarifying observations as evidence ☐ making a connection between what is known and what is unknown ☐ creating a tentative understanding of the situation without knowing or being given the “answer”	☐ guiding students to make logical connections from available evidence ☐ encouraging students to consider alternative inferences ☐ scaffolded and deliberate ☐ using a modified K-W-L chart to show the process of making an inference: replace “What I know,” “What I want to learn,” and “What I learned” with “What I know,” “What I observed,” and “What I infer”	☐ improved observation and deduction skills ☐ the ability to identify and analyze available evidence ☐ improved literacy skills as inferencing skills are applied to make meaning of written texts

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 - 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: