

## LEARNING EXPERIENCE ONE

### Guiding Question: How are natural and agricultural ecosystems connected?

This **Learning Source** and accompanying **Build Competencies** activities can set the stage for exploration of other guiding questions in this topic that are focused on the concepts of ecosystems and interactions. Students can be encouraged to consider how what they have previously learned about natural ecosystem processes and interactions can apply to agricultural ecosystems and the benefits that these processes provide for farming and the food system.

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| <p>This <b>Learning Source</b> provides starting points and information to investigate:</p> <ul style="list-style-type: none"> <li>• Agricultural and natural ecosystems</li> <li>• Meeting needs in ecosystems</li> <li>• Ecosystem cycles</li> <li>• Farms in Alberta grassland ecosystems</li> </ul> <p>Review what students have learned about ecosystems and natural processes that maintain them – encouraging them to make connections between these processes and the concept of sustainability. Sustainability in agricultural ecosystems can be described as the ability to maintain the natural ecological processes – or ecosystem services – upon which agriculture depends. Ask students to look for examples in which farming practices “mirror” processes found in natural ecosystems. Use a <b>digital or paper poster</b> to identify and make note of connections and interactions they see between crop farming and the atmosphere, soil, water and natural vegetation and wildlife.</p> | <p><b>Build Competencies: Making Ecosystem and Agriculture Connections</b></p> <p>Students explore how and why farms are ecosystems, apply the processes of natural ecosystems to create an illustrated flowchart of a crop-based agricultural ecosystem.</p> <p>This handout includes activities that support competencies and weblinks to online resources that students can explore.</p>  |  <p><b>Assess</b></p> <p>Look for evidence of understanding of the following concepts:</p> <ul style="list-style-type: none"> <li>• Natural and agricultural ecosystems</li> <li>• Biomes</li> <li>• Grassland and wetland ecosystems</li> <li>• Interactions</li> <li>• Ecosystem services</li> <li>• Water cycle</li> <li>• Nutrient cycle</li> <li>• Food chain</li> <li>• Food system</li> </ul> <p>For a formative assessment, use the <b>illustrated agricultural ecosystem flowcharts</b> that students complete in the <b>Build Competencies</b> handout to assess their understandings of the characteristics of ecosystems and the similarities and differences between natural and agricultural ecosystems.</p> |
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### Additional Research or Background Sources

Consult teacher or student background sources such as the examples that follow to further explore, enrich or expand activities for this guiding question. Student research sources are also provided in **Build Competencies** handouts.

Information on ecosystem processes, suitable as both additional teacher background and activity support as well as student learning support, can be found on the Let's Talk Science website:

- Understanding the Nitrogen Cycle at <https://letstalkscience.ca/educational-resources/stem-in-context/understanding-nitrogen-cycle>
- The Water Cycle at <https://letstalkscience.ca/educational-resources/picture-collections/water-cycle> and What is the Water Cycle at <https://letstalkscience.ca/educational-resources/lessons/what-water-cycle>



Additional information and discussion questions are provided in the carousel slide for this guiding question in the **sustainable PRACTICES** section of the LEARN webpage.

Click on the carousel slide to open and explore the following content.

- Finding crop ecosystems
- Finding sustainability in crop diversity
- Ecosystems and Alberta crop diversity



Find **Science 7** learning outcomes supported by this learning experience on the following page.

Use this activity to introduce students to the connections between natural and agricultural ecosystems, encouraging students to build understandings of the cycles and processes that apply to both.

After completing activities in this learning experience, have students write or discuss their thinking about the extent to which farmers apply understandings of natural ecosystem processes to growing crops.



Look on the **MEET A FARMER** webpage for video interviews with Alberta farmers. As students watch the videos, ask them to identify perspectives shared by farmers.

- The Carbon Cycle at <https://letstalkscience.ca/c4c/resource/carbon-cycle>

Agriculture and Agri-Food Canada provides links to several topics related to the connection between ecosystem cycles and processes and agriculture in Agriculture and the Environment at <https://agriculture.canada.ca/en/agriculture-and-environment>.

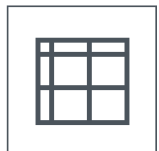
Today's Modern Grain Farm: A Harvest Across Canada is a 20-minute video provided by the Grain Growers of Canada at [www.youtube.com/watch?v=XxtIRvYI7g8](https://www.youtube.com/watch?v=XxtIRvYI7g8). Preview and select some segments to share with students as an overview of what grain farming today "looks like." Note that this video can also be used with other learning sources in this topic, as there are references to technology/innovation and sustainability.

Alberta Pulse Growers provides information on pulses and their growing zones, needs and crop characteristics at <https://albertapulse.com/growing-pulses/>.

Alberta Canola provides additional resources about the relationship between bees and canola at [www.canolacouncil.org/about-canola/sustainability/bees/](http://www.canolacouncil.org/about-canola/sustainability/bees/). Students may be encouraged to identify interactions and interdependencies between natural and farm ecosystems using this example.

### > ACCOMMODATE AND/OR EXTEND LEARNING

**Comparison charts** are an effective way for students to develop research skills in both collecting and organizing research data. Comparison charts can encourage the collection of information from multiple sources and the consideration of multiple perspectives. A **Retrieval Chart** template can be used to organize and collect data.



1. Have students work with a partner to identify other resources that they can use to research and find out more about different types of ecosystems in which agricultural activities take place, including wetlands, grassland and forest ecosystems.
2. Have students use these resources to collect and organize data they can use to compare these ecosystems – focusing on examples of agricultural activities, types of

| Type of ecosystem | Characteristics of the ecosystem | Examples of agricultural activities in the ecosystem | Human needs met through these activities |
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crops or livestock farming that can be found in or around these natural environments and the needs that are met through agricultural activities.

Encourage students to consider which agricultural activities are best suited to different ecosystems.



## LEARNING EXPERIENCE ONE: LEARNING OUTCOMES AND COMPETENCY MAP

| <b>project</b><br><b>AGRICULTURE</b><br><b>Activity</b>                                                                                                                                                                                                                         | <b>GRADE 7 SCIENCE</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
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|                                                                                                                                                                                                                                                                                 | <b>CONCEPTUAL KNOWLEDGE</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>PROCEDURAL KNOWLEDGE</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <p><b>LEARNING SOURCES</b></p> <p>How are natural ecosystems and agricultural ecosystems connected?</p> <p><b>BUILD COMPETENCIES</b></p> <p>Making Ecosystem and Agriculture Connections</p>  | <p><b>Grade 7 Science Unit A: Interactions and Ecosystems</b></p> <p>1. Investigate and describe relationships between humans and their environments, and identify related issues and scientific questions</p> <ul style="list-style-type: none"> <li>illustrate how life-supporting environments meet the needs of living things for nutrients, energy sources, moisture, suitable habitat, and exchange of gases</li> <li>describe examples of interaction and interdependency within an ecosystem (e.g., identify examples of dependency between species, and describe adaptations involved; identify changing relationships between humans and their environments, over time and in different cultures—as, for example, in aboriginal cultures)</li> <li>identify examples of human impacts on ecosystems, and investigate and analyze the link between these impacts and the human wants and needs that give rise to them (e.g., identify impacts of the use of plants and animals as sources of food, fibre and other materials; identify potential impacts of waste products on environments)</li> </ul> <p>2. Trace and interpret the flow of energy and materials within an ecosystem</p> <ul style="list-style-type: none"> <li>analyze an ecosystem to identify biotic and abiotic components, and describe interactions among these components</li> <li>analyze ecosystems to identify producers, consumers and decomposers; and describe how energy is supplied to and flows through a food web, by: – describing and giving examples of energy and nutrient storage in plants and animals – describing how matter is recycled in an ecosystem through interactions among plants, animals, fungi, bacteria and other microorganisms – interpreting food webs, and predicting the effects of changes to any part of a web</li> <li>describe the process of cycling carbon and water through an ecosystem</li> </ul> <p>3. Monitor a local environment, and assess the impacts of environmental factors on the growth, health and reproduction of organisms in that environment</p> <ul style="list-style-type: none"> <li>investigate a variety of habitats, and describe and interpret distribution patterns of living things found in those habitats (e.g., describe and compare two areas within the school grounds—a relatively undisturbed site and a site that has been affected by heavy use; describe and compare a wetland and a dryland area in a local parkland)</li> </ul> | <p><b>Grade 7 Science Unit A: Interactions and Ecosystems</b></p> <p>Ask questions about the relationships between and among observable variables, and plan investigations to address those questions</p> <ul style="list-style-type: none"> <li>state a prediction and a hypothesis based on background information or an observed pattern of events (e.g., predict changes in the population of an organism if factor X were increased, or if a species were introduced or removed from the ecosystem; propose factors that will affect the population of a given animal species)</li> </ul> <p>Conduct investigations into the relationships between and among observations, and gather and record qualitative and quantitative data</p> <ul style="list-style-type: none"> <li>research information relevant to a given problem or issue</li> <li>select and integrate information from various print and electronic sources or from several parts of the same source (e.g., compile information on a global environmental issue from books, magazines, pamphlets and Internet sites, as well as from conversations with experts)</li> </ul> <p>Analyze qualitative and quantitative data, and develop and assess possible explanations</p> <ul style="list-style-type: none"> <li>compile and display data, by hand or computer, in a variety of formats, including diagrams, flow charts, tables, bar graphs and line graphs (e.g., illustrate a food web, based on observations made within a given environment)</li> </ul> |