# Unit 1 Sustainable Ecosystems

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## BIG IDEAS

- Ecosystems consist of a variety of components, including, in many cases, human.
- The sustainability of ecosystems depends on balanced interactions between their components.
- Human activity can affect the sustainability of terrestrial and aquatic ecosystems.

### Overall Expectations

- **B1** analyze the impact of human activity on terrestrial or aquatic ecosystems, and assess the effectiveness of selected initiatives related to environmental sustainability
- **B2** investigate some factors related to human activity that affect terrestrial or aquatic ecosystems, and describe the consequences that these factors have for the sustainability of these ecosystems
- **B3** demonstrate an understanding of characteristics of terrestrial and aquatic ecosystems, the interdependence within and between ecosystems, and the impact humans have on the sustainability of these ecosystems

### Materials

Please see pages TR-32 to TR-36 for a list of the materials required for this unit and other units.

## Overview

In this unit, students will learn about the diverse links that interconnect organisms and the transfer of energy between organisms to ensure their survival. To maintain the sustainability of any ecosystem, the relationships between biotic and abiotic factors and between aquatic and terrestrial environments must be balanced and maintained. As students gain an appreciation for the various cycles of life and their role as stewards of the environment, they can apply what they learn to everyday activities in their communities that might threaten or sustain the local habitat. Multiple opportunities are provided for students to develop expertise in both analysis and organization of research materials and to realize that even small changes in our habits might make a big difference for the environment. Numerous provincial and federal initiatives are examined so that students are able to consider the whole picture and how they can take responsibility to ensure the health of the planet.

## Using the Unit Opener

- If possible, play a recording of Waiting for the World to Change, by John Mayer, as students follow along on page 3 and complete the activity.
- Have groups of students use a placemat activity, in which everyone records on the same sheet of paper, to share their impressions about what John Mayer is attempting to communicate in the song. Then have one member of each group stays in their seat while others move to different tables to see what other groups wrote. At the end, have all students return to their original group to share what they learned.
- Students can write their impressions of the song and add their own visuals, then discuss them with a partner. Encourage them to consider two questions: How does the songwriter feel about waiting for the world to change? and Do they agree?
- Ask the students what interested them most about this song. Clarify any parts of the song they did not understand. Determine what students impression of the change suggested in the song might be.
- Distribute **BLM 1-1 Unit 1 Anticipation Guide** to encourage students to examine their own attitudes and understandings about ecosystems. At the end of the unit, you can have them complete the anticipation guide again, to see how their ideas have changed.
- Invite volunteers to read aloud the topic titles in the concept map on pages 4 and 5. Clarify the general meanings of any terms that are unfamiliar to students. Ask students to predict how these topics might relate to change.

## Preparing for the Unit Projects

The unit projects feature two activities that involve making observations over a two-week period. Schedule these projects so that they begin and end during the period students are working on Unit 1.

The first project is an Inquiry Investigation requiring students to design and execute a laboratory experiment to determine if household waste can be used to grow plants. The subject matter is most closely related to Topic 1.3, which deals with nutrients, decomposers, and the cycling of matter in ecosystems. However, students have enough knowledge from previous grades to start the investigation before reaching Topic 1.3. If possible, avoid overlapping the schedule for this project and Investigation 1B at the end of Topic 1.4, which is a similar laboratory investigation requiring students to monitor test tubes over an extended period of time.

The second project is an issue analysis. Students choose two items from a list of 10 nature challenges recommended by David Suzuki, and keep a journal as they integrate these changes into their lives. The subject matter is most closely related to Topic 1.6, which deals with ways people can choose actions that benefit the environment. If possible, time the project so it ends at the same time as Topic 1.6.

As you begin the Unit, have students read both projects and choose the one that interests them the most. You might discuss each one briefly with students, asking them the main activities that might be involved in each. An Issue to Analyze is more language based. After choosing a project, students could meet in groups and discuss household biodegradable wastes or Dr. Suzuki's 10 changes, including the costs and merits of each. Remind students as they work through the Unit to keep a file of information that will help them complete their projects.

## Get Ready

- Students will correctly use key terms such as ecosystem, biotic, abiotic, producer, and consumer.
- Students will demonstrate a basic understanding of the process of photosynthesis.
- Students will describe in words or diagrams the relationships among different parts of an ecosystem.
- Students will think critically when analyzing data.

Students can review some of these skills using **BLM 1-2 Skills for Unit 1**.

## Get Ready Answers

**1.**

| Biotic Parts | Abiotic Parts |
|---|---|
| bear, maple tree, deer, puffball mushrooms, acorns, chipmunks, wolf, pine tree, berries, daisies, turkey vulture | air, water, rocks, soil, Sun, temperature |

**2. a)** A maple tree is a producer because it makes its own food.

**b)** A chipmunk is a consumer because it eats other living things for food.

**3.** Answers may vary. For example, the maple tree and daisies are producers and the bear, deer, wolf, and vulture are consumers.

**4.** Answers may vary. For example, plants use photosynthesis to create food and oxygen in their leaves.

**5.** Answers may vary. Concept map should demonstrate thoughtful consideration for how the event would affect the ecosystem and which parts would be significantly affected.

**6.** Answers may vary. For example, a wolf eats a deer that eats berries.

**7.** Spring and Fall. Explanations may vary. For example, animals are hibernating in the winter and stay away from the road during summer because the park is so busy.

**8.** Answers may vary. Students should justify their decision and demonstrate understanding of the benefits of the options they choose.

**9.** Answers may vary depending on the selection. Students should outline a reasonable and effective test strategy.

**10.** Ottawa, Simcoe County, Thunder Bay, Lanark County, Kenora

**11.** Answers may vary. Graph should neatly and accurately display the data for number of vehicle collisions with wildlife in 1997. Students may also incorporate human population data. Make sure that the graph is titled and axes are properly labelled.

**12.** Answers may vary. The poster should communicate some of the dangers of collisions with wildlife and use statistics from the table and include strategies for avoiding them.

| Assessment OF Learning for Unit 1 | | |
|---|---|---|
| **Activity** | **Evidence of Learning** | **Supporting Learners** |
| Unit Inquiry Investigation, page 82 | • Students design and execute a procedure that effectively illustrates a link between type of household waste and plant growth.<br>• Students draw appropriate conclusions and communicate them effectively. | • Review any vocabulary that might be impeding students' progress.<br>• Set predetermined dates to periodically check students' progress in the project and deal with any issues that arise before they become major roadblocks.<br>• Have students place one of their household wastes in the carbon cycle (or one of the other nutrient cycles) and ask what happens next in the process. Repeat with other nutrients. Students could use a flowchart or cause and effect map to do this.<br>• Encourage students to ask a classmate to review their finished product and make suggestions about any points on the assessment checklist that they may have missed. |
| Unit Issue Analysis Project, page 83 | • Students accurately predict the effects of human activity on the environment.<br>• Students demonstrate an understanding that the actions of an individual can help maintain sustainable ecosystems. | • Review any vocabulary that might be impeding students' progress.<br>• Set aside time in class for students to write in their journals.<br>• ELL Allow English language learners to write in their first language.<br>• Provide additional graphic organizers to help students organize research information. |

| Assessment FOR Learning | | |
|---|---|---|
| **Tool** | **Evidence of Learning** | **Supporting Learners** |
| Get Ready questions 1 and 2, page 6 | • Students use terms related to ecosystems correctly. | • Introduce students to the marginal definitions in the student textbook and the glossary.<br>• Create concept maps with students to explore word meanings.<br>• Start a word wall to help students learn the new words introduced in this Unit.<br>• Students can use **BLM G-31 English Word Study** to help them learn new words. |
| Get Ready questions 5 and 6, page 6 | • Students describe in words or diagrams some relationships among parts of an ecosystem. | • Reinforce the idea that an ecosystem is a whole that depends on all its parts.<br>• Remind students that predator and prey is only one type of relationship in an ecosystem. Parts also interact through competition and cooperation. List examples with students. |
| Get Ready questions 7 and 8, page 7 | • Students think critically when analyzing data. | • Work through the questions slowly, using a graphic organizer whenever necessary, for example **BLM G-32 Cause and Effect Map**.<br>• For each strategy in question 8, have students ask themselves how it would affect wildlife and how it would affect drivers.<br>• Students can review prerequisite skills using **BLM 1-2 Skills for Unit 1**. |