Topic 1.5
How do human activities affect ecosystems?

Overview

In this topic, students will examine the consequences of human activities on ecosystems and determine the effects of both introduced species and pollutants on the health of any ecosystem. Both literacy and inquiry skills are highlighted in this topic.

Common Misconceptions

- **Students may get the impression that introduced species always have negative effects.** Although some plants and animal become pests when introduced to a new region, many food crops and exotic pets are examples of introduced species that many people would agree can have a positive affect. Mention species such as apples to students. Apples were introduced to Ontario, and provide many benefits without seriously interfering with native species.
- **Students may believe that ecosystems change little over time.** Students should now realize that ecosystems are not static but are constantly evolving. Ecosystems are always adapting to change, often due to human activity, but also due to the activities of other species. For example, few plants can grow on rock, but those that do decompose and create soil. Then larger plants can grow. Eventually sun-loving trees such as birch will grow, which provide shade for the seedlings of other trees to grow. When these trees get taller, there is no longer enough sunlight for the birch, and the forest changes.
- **Students may believe that populations on the top of a food chain increase as those below them in the chain decrease.** Taken to its natural conclusion, this model would collapse when the consumers eat all the producers. Plants and animals lower on a food chain continue to reproduce to maintain their populations. In a healthy ecosystem, all species in a food chain are in balance.

Background Knowledge

Ecosystems are dynamic and have the ability to respond to change while maintaining an ecological balance. People have the responsibility and the ethical duty to ensure that their impact on the environment will not affect its sustainability. Examples of human activities that alter ecosystems are building dams (influences the water cycle and habitats), burning fossil fuels (alters the carbon cycle), and building major highways (takes away farmland and animal habitats). Freshwater ecosystems are threatened by motor boats, sewage, docks, boat wakes, beaches, and overfishing. Many lakes in Ontario have been damaged by acidic precipitation caused by industrial pollutants and the burning of fossil fuels. Urban sprawl in both the Niagara Peninsula and the Greater Toronto area have altered forever the pristine landscapes. Our boreal forests are being overlogged as the demand for wood products never ceases. Students must recognize their roles as stewards of the environment if they hope to be able to enjoy what they now may take for granted. As educators we must instill some sense of values and appreciation for the environment that they are about to inherit.

Specific Expectations

- **B1.1** analyze, on the basis of research, how a human activity threatens the sustainability of a terrestrial or aquatic ecosystem
- **B1.2** assess the effectiveness of a local initiative of personal interest that seeks to ensure the sustainability of a terrestrial or aquatic ecosystem, and explain why the initiative is important to the sustainability of the ecosystem
- **B2.1** use appropriate terminology related to sustainable ecosystems and human activity, including, but not limited to: biodiversity, biotic, ecosystem, equilibrium, species diversity, sustainability, and watershed
- **B2.4** plan and conduct an inquiry into how a factor related to human activity affects a terrestrial or aquatic ecosystem, and describe the consequences that this factor has for the sustainability of the ecosystem
- **B2.5** analyze the effect of factors related to human activity on terrestrial or aquatic ecosystems by interpreting data and generating graphs
- **B3.5** identify some factors related to human activity that have an impact on ecosystems, and explain how these factors affect the equilibrium and survival of populations in terrestrial and aquatic ecosystems

Skills

- select, organize, and record information on research topics
- locate resources that are relevant to research questions
- analyze information for reliability and bias
- communicate in a variety of formats

Materials

Please see the teaching notes for each activity for a list of the materials required. Please see page TR-38 for a summary of the materials required in this topic.

Literacy Strategies

Before Reading

- Students can use **BLM G-29 K-W-L Chart** to organize what they Know, Want to Know, and Learned in this Topic. Have students fill in any background information they already possess about the topic or the keywords.
- Develop a large concept map with students now to connect to prior knowledge students have about the complex interactions in ecosystems and how human activities can impact those interactions. The concept map can be left on display and added to after students have read this topic.

During Reading

- Have students use the GIST method to complete a summary statement about their role as stewards of their environment. Students should read the topic title, pose Who, What, When, Where, Why, How questions about the topic, gather information from the topic to help them answer their questions, then use their answers to write a 20-word summary of the answers.

After Reading

- Have students use graphical organizers such as Concept Map (use **BLM G-33 Concept Map**) to show how the water cycle is affected by human interventions.
- Ask students to reflect upon the role of human activities and watersheds. They can summarize their learning by creating a poster including a diagram of a watershed that features positive and negative human activities.

Assessment FOR Learning

Tool	Evidence of Student Understanding	Supporting Learners
Activity 1.12, page 52 Learning Check, page 53	Students identify some factors related to human activity that have an impact on ecosystems.	• Encourage creative thinking and brainstorming as students speculate on some potential problems of a given human activity. • Have students list biotic and abiotic factors of an ecosystem, then methodically go through the list determining how they are changed by the human activity. • English language learners could use sketches to record ideas. Make available **BLM G-32 Cause and Effect Map** for students to organize their ideas.
Learning Check, page 55 Activity 1.13, page 55	Students describe the consequences introducing a new species has for an ecosystem.	• Have students imagine the niches a few species occupy in their ecosystem, then introduce a new species to the ecosystem and consider how it would affect the native species. • Use the example of dodos, whose nests were plundered by the new animals brought to Mauritius by Europeans, as a native species that could not survive the introduction of new species (including humans). • Create a list together of what would be useful to include on a "Wanted" poster and have students refer to the list as they research and develop their poster.
Learning Check question 3, page 57 Activity 1.14, page 57	Students describe how human activities can affect distant ecosystems.	• Work together to draw a flowchart to show where bleach or another chemical poured down the drain goes. Use **BLM G-34 Flowchart**, or create a larger version. • Have students refer to the diagram in Activity 1.14, a local map, or their mind map to describe how human activities can affect distant aquatic ecosystems. • If possible, go outside to explore where runoff goes in your community.

Topic 1.5 (Student textbook pages 50–61)

Using the Topic Opener (Student textbook pages 50–51)

- As populations increase in a region, the landscape changes. Ask students how they think their neighbourhood has changed from 10 years, 100 years, and 1000 years ago. They should pay attention to deforestation, new roads and buildings, and possible changes to the water supply (dams will change the amount of water on a river and landfill or construction can change the coastline). Allow students to draw approximate maps of the region at the various times.
- Have students use the Think-Pair-Share strategy to discuss some of the impacts human activities have had on the environment in your community. They can use examples from page 50 of the student textbook and brainstorm additional ways human activities might affect ecosystems.

Starting Point Activity

Pedagogical Purpose

Using the example of cutting down trees, students begin to consider the changes to the environment that occur as human populations increase due to the need for space, food, materials, and fuel.

Planning	
Materials	**BLM G-30 Summarizing** (optional)
Time	15 min in class

Activity Notes and Troubleshooting

- Introduce the activity by holding up something made of wood and asking students where it came from and what was involved in getting it to you. Make a list of all the steps that occurred that may have had an impact on the environment.
- Have students explain the phrase "Think globally, act locally." Ask what they think it means and if they can come up with any examples. Examples could relate to the information about timber and how students can act from home to reduce the amount of trees being cut down (for example, economize their paper usage, recycle, choose reusable rags or towels instead of wasting paper towels).
- Have students work in pairs to answer question 4, then lead a discussion of the ideas they came up with.

Additional Support

- ELL Have English language learners use the GIST strategy to produce a summary statement about human use of trees after completing the activity. Have them pose what, why, when, where, who, and how questions about the topic, jot down responses, then turn them into a brief statement. Allow them to do their preliminary work in their first language, if that allows them to express scientific ideas more fluently. They can use **BLM G-30 Summarizing**.
- Encourage students to use an ecological or carbon footprint calculator to determine their impact globally. For useful Web sites about ecological footprints, go to **www.scienceontario.ca**.

- Enrichment—Have students investigate the changes to ecosystems by various human activities. For a recent example of environmental damage caused by construction, investigate the opening of the Three Gorges Dam in China. An example of changing ecosystems due to the introduction of a new plant species, investigate purple loosestrife in Ontario. For useful Web sites about these topics, go to **www.scienceontario.ca**.

Answers

1. Answers may vary. For example, construction of homes, making paper, burning for heat, making furniture, and making facial tissues.
2. Answers may vary. For example: farmland or tree planting.
3. Loss of shelter (nest), food source, and protection from the weather.
4. Answers may vary. For example: Reuse or recycle materials instead of requiring new ones and reduce the amount you require.

Instructional Strategies for Topic 1.5

We cannot always accurately predict the consequences of our actions.

(Student textbook pages 52–53)

- Together, create a chain of events. List one human activity on a piece of paper and a consequence of that activity on another piece. Use a long piece of masking tape to join the two pieces of paper (like a chain). With students, continue to list consequences of each consequence, and join each one to the chain. After modelling, this could be done in small groups. Challenge students to connect as many linked consequences as possible in their chain.
- Have students construct a Picture Glossary using key terms as they are introduced. Recommendations for creating a Picture Glossary can be found in the Unit 1 Review, question 4 on page 84.
- Have students look at newspapers or magazines at home to identify stories about human activities changing a local ecosystem (positive or negative changes are both acceptable). They can present these to the class or put them on display. These articles can be used in Investigation 1C at the end of the Topic.
- Have students identify some local environmental concern they would like to see addressed.
- Ask students to list some of the consequences of a human population increase. Then ask how those consequences change if the human population in the area is decreasing.
- Use **BLM 1-20 Development Pros and Cons** to assess students ability to analyze the ways human activity, in this case building a new shopping mall, will affect local ecosystems.
- ELL Provide English language learners with **BLM 1-21 Development Pros and Cons (Alternative Format)** for a scaffolded approach to the activity.

Introduced species can affect the health of ecosystems.

(Student textbook pages 54–55)

- Ask students what animals or plants they can think of that live in Ontario now but did not always live here. Examples include dandelions, starlings, the Norway rat, and most farm crops.
- Have students describe or sketch the niche of European starlings and purple loosestrife in their ecosystems. Then, have them show where those niches overlap or interfere with those of native organisms.

- Use examples of extinctions caused by introduced species to add weight to the importance of the topic. For example, when the Nile Perch was introduced into Lake Victoria, in Africa, over 100 native fish species were wiped out. Native bird and small animal species on several islands have been decimated by introduced housecats.
- ELL Use photographs of purple loosestrife or dandelions in Ontario to consider how an introduced species can take over native species' places in an ecosystem.
- Topic 1.6 will expand on the idea of species diversity and biodiversity in general. Ask students to consider how having a greater number and variety of different species in an ecosystem might be beneficial.
- Use **BLM 1-22 The Impact of Destructive Introduced Species** to examine different ways an introduced species can disrupt an ecosystem.

Pollutants from human activities can travel within and between ecosystems.
(Student textbook pages 56–57)

- Refer to the water cycle on page 29 to review how water moves from higher to lower altitudes and is returned as precipitation.
- Have students consider how some of the human activities they covered earlier in the Topic can change a watershed. Remind them that some consequences are direct, and others follow a long chain.
- Examine a map or atlas to determine approximately how far a pollutant put down the drain at the school can travel before it gets to the ocean.
- Enrichment—Have students research the build-up of garbage in oceans. There is an area of the Pacific Ocean larger than Ontario that is made up of floating garbage. More than half of this trash is believed to be the result of land pollution that has been swept out to sea and brought there by currents. Other students could research the effects of drugs, hormones, and chemicals that make their way from bathrooms to bodies of water. For example, there has been research into gender changes in some fish due to the amount of estrogen entering their ecosystem.
- DI Spatial-kinesthetic learners may benefit from tracing the path of an urban or rural pollutant by passing a plastic water bottle from person to person. Each group member in turn describes one part of the path the pollutant would follow, then tosses or passes the bottle to the next person.

Activity 1.12 Predict the Consequences (Student textbook page 52)

Pedagogical Purpose

Students brainstorm the consequences of a human activity then research some of these consequences.

Planning	
Materials	library or Internet materials **BLM G-13 Citing Sources** (optional) **BLM G-14 Research Worksheet** (optional) **BLM G-16 Decision-Making Organizer** (optional) **BLM G-32 Cause and Effect Map** (optional) **BLM G-33 Concept Map** (optional) **BLM G-35 Main Idea Web** (optional)
Time	60 min in class 5 min preparation (have multiple copies of pictures of the three scenarios available)

Skills Focus

- locate resources that are relevant to research questions
- communicate ideas and conclusions

Activity Notes and Troubleshooting

- Find and show some images of logging, farming, and outdoor recreation events to help students visualize how they affect ecosystems.
- The third activity (outdoor recreation) is open to the students' interpretation. Examples of outdoor recreation events are fishing, hunting, camping (especially consider bonfires), hiking, riding in a motorboat, and larger events such as fairs or festivals.
- DI Divide the class into small groups for the activity. You can assign activities to each group so that no topic is covered twice. Include students with a variety of intelligences, including interpersonal intelligence, in each group to support one another.
- Check the students' proposed consequences and their plan for research before they start their research to make sure they have chosen appropriate ideas and to make recommendations about where they might find information.
- Make sure students keep records or a bibliography of any websites they use. Distribute **BLM G-13 Citing Sources** and review the different formats it includes with students.
- Students will use graphic organizers to organize what they learn in question 4. Distribute Blackline masters such as **BLM G-33 Concept Map** and **BLM G-35 Main Idea Web** for students to choose from.
- Distribute **BLM G-32 Cause and Effect Map** for question 5.

Additional Support

- Allow students to research other human activities for this activity if they wish. For example, mining, building a nuclear power station, and oil exploration in the Alberta Tar Sands might be interesting scenarios. Avoid the activities in Table 1.2 since some of the information is already given in the textbook.
- Consider having students use **BLM G-16 Decision-Making Organizer** to help them decide when such activities are worthwhile.

- ELL Place English language learners in groups that include a student who would be good at explaining the concepts.
- Use this activity to test various research skills such as library research versus Internet research.
- Groups can present their conclusions to the class after completing the activity. Encourage groups to make sure that every group member has a role in the presentation.

Activity 1.12 Answers

Answers may vary. Three possible consequences of logging are lack of habitat for birds, loss of micro-organisms dependent upon tree roots, and reduced oxygen production.

Three possible consequences of farming are soil contamination, algal blooms in surrounding ponds due to fertilizer run-off, and disruption of indigenous species habitat.

Three possible consequences of outdoor recreation are decreased availability of farmland, encroachment on habitat of flora and fauna, and habitat destruction.

Learning Check Answers (Student textbook page 53)

1. Students should show that animals living in and around the tree lose their habitat and previously shaded soil is now exposed to sun and dries out more quickly.
2. Answers may vary. For example: forestry, over fertilizing fields, and placing garbage in landfills.
3. Answers may vary. Students should organize points from one of the rows in Table 1.2 into abiotic and biotic consequences.
4. Answers may vary. For example: Organisms in the soil no longer have a home (biotic), plants were killed to make space for the construction (biotic), and the shape or slope of the land was changed, affecting drainage of rainwater (abiotic).

Activity 1.13 Ontario's Most Wanted–Not! (Student textbook page 55)

Pedagogical Purpose
Students will examine the characteristics and impact of an introduced species in Ontario.

Planning	
Materials	Large scale pictures of each of the introduced species library or Internet materials **BLM A-10 Poster Checklist** (optional)
Time	60 min in class 10 min preparation (obtain large scale pictures of each organism)

Background Knowledge
Introduced species can be a threat to species diversity. Like the European starling and purple loosestrife discussed in the textbook, these four species are out-competing local species and destroying ecosystems.

Asian long-horned beetles, native to China and now found in regulated areas of the GTA, cause widespread mortality of poplar, willow, elm, and maple. Eurasian watermilfoil grows quickly and densely fill a lake bed, choking other plants and fish and making recreational use difficult or impossible. Sea lamprey are blood-suckers like leaches that usually kill their prey. Zebra mussels, native to the Caspian Sea, help filter lake water, but also reproduce so quickly that they overpower native mussels in the Great Lakes, cover the bottoms of boats, and block water pipes.

Skills Focus
- locate resources that are relevant to research questions
- analyze information for reliability and bias

Activity Notes and Troubleshooting
- Before students begin to research, work with them to create a list of helpful information to include on a "Wanted" poster. For example, physical characteristics, habits, why the plant or animal is wanted, and where it might be found.
- For useful websites about these introduced species, go to **www.scienceontario.ca**.
- Students may have recently seen warnings against moving firewood from one area of Ontario to another because Asian long-horned beetles are known to spread to new ecosystems in dead wood.
- Have information about these and other invasive species available from the Ministry of the Environment, the Ministry of Natural Resources, and the Ministry of Health.
- Research skills and Internet use are required to organize relevant information. Analyze some search engine results and websites with students, modeling what to look for and how to decide if a cite and the information on it is reliable or biased. For example, Can you tell from the address what organization created the site?, What do you know about them?, Is anything being sold or advertised on the site?, Is reasonable evidence given to support any claims?, Do you notice any factual or spelling errors?, Does the information sound reasonable?, Can you find other sites that include similar information?
- Students can use **BLM A-10 Poster Checklist** to help them develop and assess their presentation.
- Praise students for thorough and creative presentation, and choose a few posters to display for a wider audience.

Additional Support

- ELL Find some images of the introduced species or their effects to help students visualize. This will be especially helpful to English language learners and others who are not familiar with Ontario ecosystems.
- Students may encounter new vocabulary while researching the species or their impact on an ecosystem. Have them use contextual clues to determine meaning and include definitions of any new terms in their poster.
- DI Musical learners and others could write a song or a radio spot to summarize their topic species.
- Enrichment—Have students present a case of unreliable or biased data that they encountered while researching, and explain how they determined that it was not reliable.

Activity 1.13 Answers

Answers will vary. Students should include useful identifying information about the introduced species and how it is affecting native species and ecosystems in Ontario.

Learning Check Answers (Student textbook page 55)

1. Students should explain in words and/or pictures that an introduced species is any species that has been brought into and lives in an ecosystem where it is not found naturally. Species diversity is the number and variety of different species of living organisms in a defined area.
2. Corn and apples can be controlled when introduced into a new ecosystem. They would not outcompete the native plants. The European starling was able to reproduce and spread freely.
3. Answers may vary. Graphic organizer should include the fact that purple loosestrife out-competes native plants for food and space, causing a loss of nesting sites for waterfowl. It soaks up available water, turning aquatic ecosystems into terrestrial ones, causing a loss of habitat.

Learning Check Answers (Student textbook page 57)

1. A watershed is any artificial or natural area that drains into a body of water.
2. A watershed connects terrestrial and aquatic ecosystems because water, and anything in it, flows from the terrestrial ecosystem to the aquatic ecosystem through the watershed.
3. Anything that goes down the drain will head to the nearest body of water that the drains empty into, then to more distant bodies of water, and affect that ecosystem.

Activity 1.14 A Watershed Mind Map (Student textbook page 57)

Pedagogical Purpose

Students investigate the concept of a watershed by creating a mind map about watersheds using an image and their imagination.

Planning	
Materials	**BLM G-33 Concept Map** (optional)
Time	20 min in class

Background Knowledge

Most watersheds (any area of land, natural or human-made, that drains into a body of water) connect terrestrial and aquatic ecosystems. Any of our actions that affect the terrestrial ecosystem can affect aquatic ecosystems as well, thorough the watershed.

Activity Notes and Troubleshooting

- Remind students to identify factors related to human activities that have direct consequences on them and a direct impact on the ecosystem.
- Students can perform this task individually or in small groups.
- Have students or groups take a single sheet of paper and write "Watershed" in a circle in the middle. Fill the rest of the page with ways a watershed is used.
- Have students identify how at least three of these activities connect both terrestrial and aquatic ecosystems.

Additional Support

- ELL Before the activity, discuss what students see in the picture on page 57. Write key activities on the chalkboard and leave them on display so that English language learners can refer to them as they work. Allow English language learners to use diagrams to represent activities as well, then assist them to find the correct English words to describe each one.
- With the class, list students' ideas for other ways that watersheds are used that are not included in the diagram. Discuss their impacts.
- Enrichment—Have students reorganize their mind map so that it lists what happens upstream of what. Then ask how changes upstream or introduced pollutants would affect the rest of the watershed and the bodies of water it drains into.

Activity 1.14 Answers

Answers may vary. Students should identify at least twenty activities from the diagram, list a few of their own, and describe the impact on the ecosystem of at least three.

Using Making a Difference

Literacy Support

Before reading

- The Making a Difference feature examines how individuals can work on small or large scales to change how other people think or act. David Suzuki and Al Gore are both examples of people who have a tremendous impact because they can reach such a large audience. These students have started small, but are already leading changes and raising awareness in entire cities. Talk with students about people in your school or community have made a difference in some way.

During reading

- Invite volunteers to read each section aloud. As students read the first section, ask them how the changes in Sudbury would impact the watershed.
- As students read the second section, ask them to keep a list of the activities Rebekah ran to raise awareness about ecological issues.

After reading

- Ask students how they could use or modify Dayna and Rebekah's ideas in their own community.

Instructional Strategies

- DI Body-kinesthetic learners would benefit from a game of Pass It On to illustrate how quickly ideas can be spread. Start with one student who has an idea for limiting the affect of a human activity on an ecosystem. Have them tell three classmates. Have those three tell three more classmates each. Continue until everyone is aware of the plan. Point out how many steps it took until everyone had heard the idea. Repeat by telling greater numbers of classmates. Ask what this illustrates about the spread of ideas.
- ELL To assist with comprehension, after each profile has been read, work with students to summarize each one in two or three simple sentences. Write these on an overhead and read them aloud.
- Students can respond to the questions individually or discuss them as a class. Possible ideas for improving water quality and conserving energy include limiting lawn watering, limiting motor vehicle idling, or promoting better composting/recycling. Examples of ways to motivate people to help the environment include providing incentives for recycling, limiting the amount of garbage each household can produce each week, limit the use of gas-powered lawnmowers, and by promoting pesticide-free communities.
- Enrichment—Have students design a poster, campaign, or event to motivate people in the community to help the environment. Then have the students follow through by having an event or writing to local officials to ask for changes to support the community's efforts.

Investigation 1C Human Activity in a Local Ecosystem

Pedagogical Purpose

Students will explain how human activity might threaten the health of the local ecosystem. Information is analyzed for reliability and bias.

Planning	
Materials	Save local newspapers for at least one week. Have Canadian magazines available as well. **BLM 1-10 Investigation 1C** **BLM G-13 Citing Sources** (optional) **BLM G-14 Research Worksheet** (optional) **BLM G-15 Worksheet for Investigating Issues** (optional) **BLM G-35 Main Idea Web** (optional)
Time	60 min in class 10 min preparation (organize newspapers, magazines, and Internet resources)

Skills Focus

- select, organize, and record relevant information on research topics
- analyze information for reliability and bias
- communicate in a variety of formats

Activity Notes and Troubleshooting

- Employ local resources and check with the school librarian for information and any other useful materials. Ask students in advance to bring in any articles they have seen about changes to a local ecosystems because of human activities.
- Distribute **BLM 1-23 Investigation 1C** to students.
- If necessary, allow students to research an ecosystem outside their community. Issues of National concern might also be used as an alternative.
- Use the ecosystem check in question 3 as a chance to assess progress and direction.
- Circulate and talk to students as they are gathering and organizing their information to ensure that their discussions remain focused and productive.
- Check with your school policy on citing references before you decide how students will record their findings. Some examples are provided in **BLM G-13 Citing Sources**, which you can modify to suit your needs.
- Challenge groups to include every group member in some way in their presentations.

Additional Support

- Some students may benefit from using **BLM G-15 Worksheet for Investigating Issues**. Read through it together to illustrate how it can help analyze differing points of view.
- DI If students are researching a negative human affect in an ecosystem, have interpersonal learners suggest why humans might be acting in such a way.
- If students are having difficulty creating a presentation of their findings for question 6, distribute **BLM G-35 Main Idea Web** or a similar graphic organizer.
- Have students self-assess or assess group members after completing the Investigation.
- Enrichment—Have students identify and present a case of unreliable or biased data that they encountered while researching.

Answers

Answers will vary. Students should have an organized summary of their research into the local topic, including a references cited page. Presentations may be oral or written.

Activity 1.15 I Remember When... (Student textbook page 60)

Pedagogical Purpose

Students interview a senior or elder to determine the differences in the community that the individual remembers. Students gain a unique perspective about their community and the effects of human activities on any ecosystem as well as what the ecosystem has meant to an individual.

Planning	
Materials	writing materials Audio-visual materials such as a video camera, tape recorder, or camera (optional)
Time	30 min in class before interview 30 min in class after interview 60 min preparation (arrange for visit)

Skills Focus

- select, organize, and record relevant information from various sources
- communicate results and conclusions

Activity Notes and Troubleshooting

- This activity is an excellent opportunity to develop non-science interpersonal skills. Meet with students before the interview to talk about respectful listening, showing appreciation, honouring multiple viewpoints, and what you know about the person who will be speaking with them.
- This activity can be done either by having a guest speaker come in to discuss the changes in the community or by having students conduct the interview outside the school.
- If possible, find a volunteer who can come to the school to be the interviewee. Students may want to invite their own relatives.
- Choose an appropriate number of questions to be used in the interview.
- Have students organize themselves so that questions are asked in order and by specific students. Make sure there is an open-ended section so that the interviewee can speak about some important changes that students may not have anticipated.
- Have students create invitations and prepare thank you cards and/or appropriate gifts for the interviewees. Considering asking students to welcome and to thank the interviewees in person.
- Record the interview(s) for future reference.
- Have students present their results to the class or discuss what part of the research they found most surprising or interesting.
- Have students prepare a map of the community to help with any discussion of how it has changed. Have it on hand for the interview. Students can then present before and after maps to highlight the changes.

Additional Support

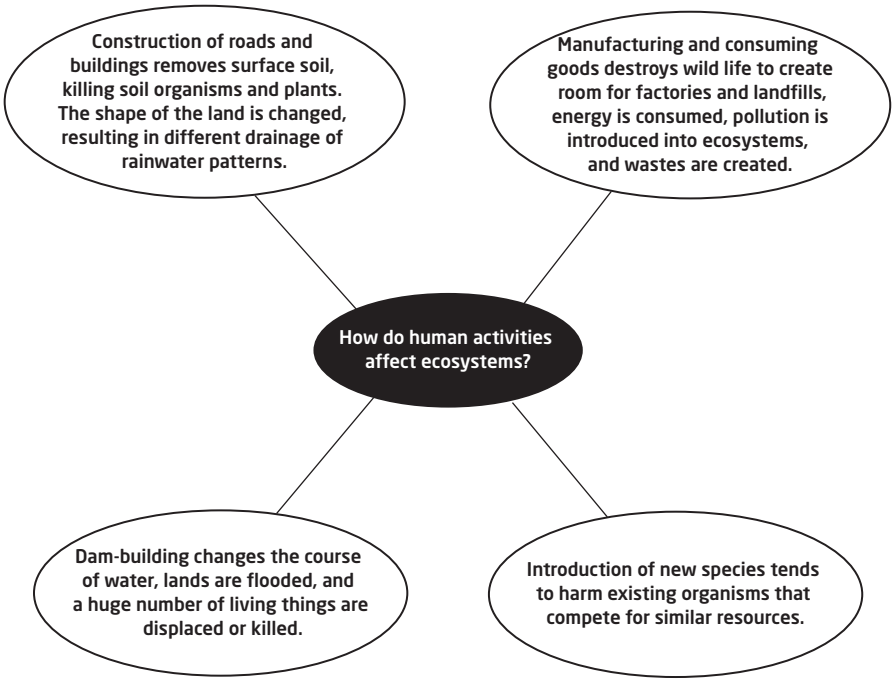
- ELL If working in groups, make sure that English language learners are teamed with more fluent English speakers for the interview.
- Have students record their favourite memory and explain why they choose that one in particular.

Topic 1.5 Review (Student textbook page 61)

Please also see **BLM 1-24 Topic 1.5 Review (Alternative Format)**.

Answers

1. Answers may vary. For example:



2. Soil and water flow patterns can be largely disturbed. Pollution and other contaminants can enter water sources. Many plants are killed during construction, which displaces or kills organisms living in that ecosystem.

3. Answers may vary. For example: Flowcharts could show:

- soil and plant life are removed to make space to build factories
- factories consume energy to make the water bottle
- the factories create pollution which enters the air, water, and soil
- the water bottles are transported, which releases more pollution in the air
- stores that sell water consume energy to operate
- soil and plant life are removed to make landfills to dispose of waste caused by water bottles

4. The introduction of a new species can decrease species diversity if there are too few limiting factors to keep their populations from growing too large. Soon, these species take all the resources that native plants and animals need to survive.

5. a) Answers may vary. Students should identify problems such as exotic diseases spreading around the native species, changes to the balance of predators and prey in the ecosystem, and competition with native species for resources.

b) Answers may vary. For example: Certain animal shelters will accept exotic pets and have the resources and experience to provide the care these pets may need.

6. Diagram should show a watershed taking water resources and/or waste from terrestrial ecosystems to the lake or ocean.

7. Some amount of the prescription drugs we ingest will end up in our waste. This waste is carried through pipes and will be introduced into a large body of water. This body of water must be home to certain shark populations and our waste is becoming absorbed by them.

8. Answers may vary. For example:

a) Farmers may divert water in a process called *irrigation* to bring water to dry areas. Locks for cargo ships divert water from difficult or impossible to navigate rivers.

b) The size of the ecosystem may change and habitats are lost. Fish may be unable to swim upstream.

c) Solution should summarize the findings in parts a) and b).