Connecting With Nature:

An educational guide for grades four to six

David Suzuki Foundation

SOLUTIONS ARE IN OUR NATURE

Acknowlegements

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Visit davidsuzuki.org/youthandnature

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Introduction

Two common requests we get at the David Suzuki Foundation are for David Suzuki to speak to schools and for ideas on what young people can do to help protect nature. Science hasn't figured out how to clone 1,000 different David Suzukis to meet all of those speaking requests. But we have crafted this educator's resource to help children explore their profound connection to nature and experience the power of collective action.

The eminent Harvard biologist E.O. Wilson coined the term *biophilia*, referring to our need to affiliate with other species (*bio* = life; *philia* = love). He believes this need is built into our genes, a reflection of our evolutionary roots.

You can see biophilia in young children and their curiosity about the natural world around them. Connecting children with nature in thei everyday lives is the first step in an environmental education. That's why this guide encourages students to get outside in every lesson and capitalize on that curiosity.

Studies have shown that spending time in nature helps with recall and memory, problem solving, and creativity. Children (and adults) who spend more time outside are also physically healthier.

> Our children have exchanged the experience of outdoors and nature with the enclosed world of electronics. This is disturbing because a person for whom nature is a stranger will not notice, let alone care about, environmental degradation.
>
> — *David Suzuki*

Each day we face a barrage of stories about environmental risks and disasters, vanishing wilderness, and endangered species. This resource explores many of those issues and helps students understand how they are connected with nature, the impact of their actions on nature, and how they can take action to bring about positive change.

If we want to protect the natural world on which our survival depends, we must learn that we are a part of it, and we must encourage our children to appreciate its wonders. As you work through the lesson plans with your students, encourage creativity and act as a role model by being as engaged as possible in the outdoor activities and sharing your own personal experiences with nature.

The David Suzuki Foundation is a science-based organization committed to helping Canadians act on the understanding that we are all interconnected and interdependent with nature — and each other. Helping young people develop a love of nature is key to achieving that vision.

Quick start guide

Connecting With Nature is aligned with *Acting Today, Shaping Tomorrow,* the Ontario Ministry of Education's policy framework for environmental education. It is designed to help students understand how their daily choices affect nature. There are 16 cross-curricular lessons in the educational resource, each comprising idea/activity-based learning that inspires environmental stewardship in both the classroom and beyond, culminating in a celebration of all they have learned. In addition, students have the opportunity, through inquiry-based learning, to create their own "class foundation" focused on their collective interests and actions. For more information on the class foundation, see p. 18.

The introductory lessons establish clarity around students' existing knowledge and the idea that everything is connected to nature. The core lessons explore more specific topics and ideas and the value of nature. Overall, this resource helps students become more aware of how to live within the limits of nature.

These lessons are suitable for children in grades four through six. There is an indoor and outdoor component to each lesson. Teacher tips are provided as well as technology suggestions that offer alternative approaches for different grade levels or learning styles. The technology components may be used to enhance students' learning and foster a deeper connection with nature. Every lesson includes a guiding question and a set of reflection questions that help bring the ideas together and allow students to consolidate their learning.

Throughout the resource, students are encouraged to question information and sources in their search for meaning and form their own conclusions and justify their perspectives.

In designing the lessons, preference was given to activities that are fun, hands-on, and thought provoking. We encourage you to combine the information in this guide with other resources that you find relevant to the needs of your students, including other activities, guides, books, magazine articles, newspapers, and Internet posts. A list of resources accompanies each lesson to assist you with this research.

To reduce the footprint of this resource, please use LCD/overhead projectors and Smart Boards to share the background information in each lesson with your students.

Connecting With Nature will help your students discover that, collectively, they can make a difference by taking a conscious and active role in protecting nature. Through their participation in the activities, they will have opportunities to share what they are learning with their fellow students, family, and community members.

Key concepts

Connect with nature.

Children will feel compelled to protect what they understand and feel connected to. Because we learn best by experiencing and doing, spending time outside is the best way to begin to foster children's relationship with nature.

Everything in nature is connected.

As biological creatures, humans depend on clean air, clean water, clean soil, and clean energy, as well as a variety of plants and animals (called *biodiversity*) for our well-being and survival. We are linked to nature by what we buy, how we get around, what we eat, and where we live.

Nature is valuable.

Although many Canadians recognize the importance of the environment to their well-being, the services that nature provides are often not accounted for. For example, trees clean our air and forests, and wetlands filter our water. Green urban spaces absorb carbon, cool our cities, and protect us from storms. It would be expensive to develop and build facilities to replace these ecosystem services.

Live within the limits of nature.

Everything we do has an impact on nature. Air, water, and land are finite resources, and we cannot create a bigger planet to accommodate our growing population. Therefore, we must begin to live within the limits of nature or face consequences like climate change and resource scarcities.

Change is all about personal decisions and collective action.

We all play a part in making change. There are little everyday actions and choices we can make that can have a profound impact on nature.

It is also important to take collective action when tackling our most pressing environmental challenges. Joining together to achieve a common goal can be a powerful force for change.

Good discussion can be controversial.

We have a right to have our voices heard. We must also respect the opinions of others, even when we disagree. By sharing our views with people in positions of influence, from parents to neighbourhood committees to governments, we can change the way things are done.

Lessons

A consistent format has been maintained for the lessons with most, if not all, of the following sections:

Guiding question

An all-encompassing question that students should be able to answer after completing the lesson. It also provides an opportunity to take an inquiry-based approach to the lesson.

What's the point?

The overall message and a summary of the ideas that may emerge during discussions.

Suggested strategies for assessment

Strategies to assist teachers in evaluating the students as they complete the lessons. Assessments evaluate either the students' learning skills or their comprehension of content. Each strategy is paired with an assessment tool found in the Lesson Resources section.

Hook

Designed to engage students and introduce them to the topic that will be covered during the lesson.

Time

How much time you will need for the activity and for discussions.

What you need

A list of materials needed for the lesson.

Resources

A list of handouts or other resources. This section may include an appendix of additional information about the topic for teacher reference or student use. The background appendices are relatively short and get across the main points introduced in the lesson while adding some facts. It may also include student pages, worksheets to assist students with data collection and small group tasks.

What you do

The main portion of each lesson and a guide for educators using a step-by-step approach. This section includes the hook, what you do, and reflection questions. Each lesson has an outdoor and indoor component.

Reflection questions

To guide class discussions. These questions draw out student perspectives and understanding about the connection to nature discovered during the lesson.

Taking it further

This section describes different activities that you can do to extend the activity.

Smart board, mobile phones, LCD/overhead projectors

Descriptions ofvand appeal to students' diverse learning styles.

Most lessons provide background information that you may want to share with your students. To reduce the footprint of this resource, please use LCD/overhead projectors and Smart Boards to share that information.

Community/home engagement activities

Specific to each lesson and can be completed in the community or at home. They allow students to engage in the topic outside of the classroom and extend their knowledge about nature with those around them.

Optional class activities

Additional activities that can be completed in class to enhance the lesson, provide opportunity for assessment, and further opportunities for environmental stewardship. These activities are unique to each lesson and relate to the main idea/topic. Optional activities may be substituted for the main portion of the lesson.

Additional resources and websites

A list of resources that can be explored by the teacher and the students to gather more information related to the main topic of the lesson and the actions you can take.

Teacher tip

Advice based on our experience field-testing the lesson.

Lessons described

	Title	Guiding question	Activity	Subject areas		
				Grade 4	Grade 5	Grade 6
A	**Walkabout**	What does the term nature mean to you and how are you connected to it?	Create a collaborative definition of nature with a class mind map	S habitat and communities H&PE living skills, healthy living L oral communication, reading, writing	H&PE living skills, healthy living L oral communication, reading, writing	S biodiversity H&PE living skills, healthy living L oral communication, reading, writing
B	**Barnyard in my classroom**	What relationships do humans have with nature?	Play games and create lists to explore how natural resources are used in everyday objects with class mural	S habitat and communities, rocks and minerals H&PE living skills, healthy living L oral communication, reading, writing A visual	S conservation of energy and resources, human organ systems H&PE living skills, healthy living L oral communication, reading, writing A visual	S biodiversity H&PE living skills, healthy living L oral communication, reading, writing A visual
C	**Who is David Suzuki?**	Why has David Suzuki inspired so many Canadians to work together to protect nature?	Research David Suzuki and his personal inspirations	S habitat and communities, rocks and minerals H&PE living skills, healthy living L oral communication, reading, media literacy	H&PE living skills, healthy living L oral communication, reading, media literacy	H&PE living skills, healthy living L oral communication, reading, media literacy SS Canada's link to the world
D	**Living within the limits of nature**	What happens to nature if you always pursue your wants and never consider living within your needs?	Take a class hike with student worksheet	S habitat and communities H&PE living skills, healthy living L oral communication, reading, writing	S conservation of energy and resources, human organ systems H&PE living skills, healthy living L oral communication, reading, writing	H&PE living skills, healthy living L oral communication, reading, writing

A The arts | H&PE Health and physical education | L Language | M Math | S Science | SS Social science

	Title	Guiding question	Activity	Subject areas		
				Grade 4	Grade 5	Grade 6
E	**Classroom landfill**	What effect does all the garbage and waste we create have on nature?	Create a classroom landfill to discover the effects of litter with class worksheet	M data management and probability S habitat and communities H&PE living skills, healthy living L oral communication, reading	M data management and probability S conservation of energy and resources, human organ systems H&PE living skills, healthy living L oral communication, reading SS aspects of citizenship and government in Canada	M data management and probability S biodiversity H&PE living skills, healthy living L oral communication, reading
F	**The powerful pollinators**	What are pollinators and how do we depend on them?	Research pollination and pollinators with student worksheet	S habitat and communities, rocks and minerals H&PE living skills, healthy living L oral communication, reading, writing, media literacy A drama	S human organ systems H&PE living skills, healthy living L oral communication, reading, writing, media literacy A drama	S biodiversity H&PE living skills, healthy living L oral communication, reading, writing, media literacy A drama
G	**Celebrating biodiversity**	Why is biodiversity important to the natural balance of life?	Create an informational mobile	M data management and probability S habitat and communities L oral communication, reading, writing, media literacy SS Canadian territories, provinces, and regions A visual	M data management and probability S conservation of energy and resources L oral communication, reading, writing, media literacy A visual	M data management and probability S electricity and electrical devices, biodiversity L oral communication, reading, writing, media literacy A visual

A The arts | H&PE Health and physical education | L Language | M Math | S Science | SS Social science

	Title	Guiding question	Activity	Subject areas		
				Grade 4	Grade 5	Grade 6
H	**Classroom landfill**	How does reducing the amount of energy you use to heat your home or school help nature?	Build draft detectors with student worksheet	M data management and probability S habitat and communities H&PE living skills, healthy living L oral communication, reading	M data management and probability S conservation of energy and resources H&PE living skills, healthy living L oral communication, reading	M data management and probability S electricity and electrical devices H&PE living skills, healthy living L oral communication, reading
I	**In limbo**	What can we do to reduce energy use in our homes to help us live within the limits of nature?	Do the limbo game using scenario cards	S habitat and communities, rocks and minerals H&PE living skills, healthy living L oral communication, reading	S conservation of energy and resources H&PE living skills, healthy living L oral communication, reading	S electricity and electrical devices H&PE living skills, healthy living L oral communication, reading
J	**Down the drain**	How does the water you use every day affect the rest of the planet?	Do water conservation and hand-washing activity with student worksheet	M data management and probability S habitat and communities H&PE living skills, healthy living L oral communication, reading, writing	M data management and probability S conservation of energy and resources, human organ systems H&PE living skills, healthy living L oral communication, reading, writing	M data management and probability S living skills, healthy living L oral communication, reading, writing SS Canada's link to the world
K	**Getting there**	What are the positives and negatives of leaving your car at home and finding another way to get around?	Brainstorm appropriate methods of transportation using scenario cards with group worksheet	M data management and probability, measurement S habitat and communities H&PE living skills, active living, healthy living L oral communication	M data management and probability, measurement S conservation of energy and resources, human organ systems H&PE living skills, active living, healthy living L oral communication, reading	M data management and probability, measurement S electricity and electrical devices H&PE living skills, healthy living, active living L oral communication, reading

A The arts | H&PE Health and physical education | L Language | M Math | S Science | SS Social science

	Title	Guiding question	Activity	Subject areas		
				Grade 4	Grade 5	Grade 6
L	**What's inside your personal care products?**	What's inside your personal care products?	Make moisturizer or toothpaste with student worksheet	M data management and probability S habitat and communities H&PE living skills, healthy living L oral communication, reading, media literacy SS Canadian territories, provinces, and regions	M data management and probability, human organ systems H&PE living skills, healthy living L oral communication, reading, media literacy SS aspects of citizenship and government in Canada	M data management and probability H&PE living skills, healthy living L oral communication, reading, media literacy
M	**Round the year**	What are the benefits of buying foods grown in-season, naturally and locally?	Play an outdoor game identifying seasonal foods and class mural	S habitat and communities, rocks and minerals H&PE living skills, healthy living L oral communication	S conservation of energy and resources, human organ systems H&PE living skills, healthy living L oral communication, reading	H&PE living skills, healthy living L oral communication, reading SS Canada's link to the world
N	**Where's the beef?**	In what ways does eating less meat promote healthy, sustainable living?	Create a display comparing the energy used to produce a variety of foods	M data management and probability S habitat and communities H&PE living skills, healthy living L oral communication, reading, writing, media literacy	S conservation of energy and resources, human organ systems H&PE living skills, healthy living L oral communication, reading, writing, media literacy	M data management and probability S biodiversity H&PE living skills, healthy living L oral communication, reading, writing, media literacy

A The arts | H&PE Health and physical education | L Language | M Math | S Science | SS Social science

	Title	Guiding question	Activity	Subject areas		
				Grade 4	Grade 5	Grade 6
O	Greenbelt game show	What benefits do greenbelts provide and why is it important to protect greenbelts?	Play a game show to learn about Canada's greenbelt	S habitat and communities, rocks and minerals H&PE living skills, active living L oral communication, reading SS Canadian territories, provinces, and regions A visual	S conservation of energy and resources H&PE living skills, active living, healthy living L oral communication, reading A visual	S biodiversity H&PE living skills, healthy living, active living L oral communication, reading A visual
P	A celebration of nature!	What have I learned about my connection with nature and what I can do to protect it?	Have a class party to celebrate learning			

A The arts | H&PE Health and physical education | L Language | M Math | S Science | SS Social science

Choosing lessons

We think your students will enjoy doing all the activities in this book. But we know time is limited. To help you select suitable activities, here's a menu of suggestions:

If you have time for eight activities:

- Lesson A: Walkabout
- Lesson C: Who is David Suzuki?
- Lesson D: Living within the limits of nature
- Lesson F: The powerful pollinators
- Lesson H: Gone with the wind
- Lesson K: Getting there
- Lesson O: Greenbelt game show
- Class foundation

If you have time for five activities:

- Lesson B: Barnyard in my bedroom
- Lesson D: Living within the limits of nature
- Lesson F: The powerful pollinators
- Lesson H: Gone with the wind
- Lesson O: Greenbelt game show

If you have time for three activities:

- Lesson B: Barnyard in my bedroom
- Lesson D: Living within the limits of nature
- Lesson O: Greenbelt game show

The power of collective action through a class foundation

It is important that students come away from the activities understanding the concepts, connections, and impacts of daily choices and knowing that their actions make a difference. This resource explores many ways for students to take individual action to protect nature. Through the class foundation exercise, students also have an opportunity to participate in the power of collective action.

Creating a class foundation is an opportunity to encourage students to discover which environmental issues they feel passionately about and to inspire them to take ownership of their actions. This opportunity may lead students to collectively act on their concerns and passions through various forms of environmental stewardship both inside and beyond the classroom. Creating a class foundation gives students the opportunity to display their talents, develop new skills, and form new interests. They can also experiment with ways of bringing the rest of their school or their entire community into their initiative.

Dealing with controversy

Challenging questions arise throughout this resource and students may not agree on the issues. The activities in this guide support students in developing their own ideas and opinions. Through a process of posing and exploring questions, students can decide for themselves before taking action. It is important that throughout these lessons, students are invited to make personal decisions about actions they wish to take, and respect the choices and opinions of others.

Discussing our relationship with nature can feel overwhelming. To help students feel more positive, focus on the wonder of nature, what has been achieved, and what students can do to protect nature. Seek out success stories in your community that highlight innovation and dedication.

Taking it home

To help your students apply what they learn in these lessons to their everyday lives outside the classroom, encourage them to continue discussions at home. The Community/Home Engagement section offers ideas on how students can review what they've learned and engage with their community and families through additional activities and discussions.

Included with this guide is a sample parent letter to help families understand the basic concepts that students will be introduced to throughout the lessons. It also invites families to participate in their children's learning through the family activities.

Making changes at home can help protect nature and help us live within the limits of nature. One of the most significant ways students can contribute is by sharing what they learn with their loved ones.

Some other ideas

- Encourage students to repeat experiments or activities at home with their families.
- Ask students to discuss one of the reflection questions at home.
- Email pertinent background information to families along with relevant website addresses featured in this resource.
- Invite family members to participate in your class foundation project to encourage even greater collective action.

Parent letter

Dear Parents/Guardians,

Over the next few months, your child will be introduced to activities and concepts found in the David Suzuki Foundation's educational resource *Connecting With Nature*. A variety of lessons will be conducted in both the classroom and surrounding community. These lessons demonstrate that we are connected with nature in everything we do: we are linked to nature by what we buy, how we get around, what we eat, and where we live.

The *Connecting With Nature* guide consists of 16 activity-based lessons that have both indoor and outdoor components. They are designed to motivate youth to make healthier choices for both themselves and the environment while helping them understand the value nature provides in their daily lives. With lessons on topics ranging from a basic introduction to what nature is, to preserving species, eating locally grown food, and learning about products we use every day, students will come to understand the concept of what we do to nature, we do to ourselves.

This guide is aligned with the Ontario curriculum and includes experiential and interactive learning. As stated in the Ontario Ministry of Education's document *Acting Today, Shaping Tomorrow*, "It is a growing recognition that Education has a key role to play as it gives students the knowledge and capacity to take appropriate actions while countries around the world are facing complex environmental and social issues." Students will have the opportunity to demonstrate environmental stewardship through collective actions.

Each lesson in *Connecting With Nature* contains a section of community and home activities. Join us by engaging in these activities and taking part in making more sustainable choices as a family.

Further reading

To learn more about the fundamental connections between people and nature, we recommend reading *The Sacred Balance* (Greystone, 2007). In the book, authors Dr. David Suzuki, Adrienne Mason, and Amanda McConnell explore many of the key ideas behind this educational resource and offer adult readers the seeds of a new direction in which we can rediscover our place in nature and live in balance with our surroundings.

You Are the Earth (Greystone, 2010) by David Suzuki and Kathy Vanderlinden, is a book for elementary school students. It's based on the principles found within *The Sacred Balance* and through amazing scientific facts, fun activities, and ancient myths, shows how we are all connected to nature.

For more ideas on how you can integrate inquiry-based learning into your teaching, we recommend the resource *Natural Curiosity*. Developed by the Laboratory School at the Dr. Eric Jackman Institute of Child Study, this resource introduces the concept of environmental inquiry and provides strategies on how to further engage your students' curiosity about the world around them. For more information, visit davidsuzuki.org/youthandnature/intro.

Class foundation

Creating a class foundation is an opportunity to encourage students to discover which environmental issues they feel passionately about and to inspire them to take ownership of their actions. This opportunity may lead students to collectively act on their concerns and passions through various forms of environmental stewardship both inside and beyond the classroom. Creating a class foundation will give students the opportunity to display their talents, develop new skills, and form new interests.

Instructions

In establishing a class foundation, consider student leadership and development. It is important for teachers to give students the chance to develop the framework of their foundation. Students who are allowed to create their own definition of a foundation and to decide how to run it are more likely to actively participate in and connect with the initiative.

The following five steps can be implemented at your own pace. Adjust the timing to your students' needs and responses.

I. Introducing a class foundation

Reflect on Lesson C: Who Is David Suzuki? Also have students investigate and answer the following questions:

- What is a foundation?
- Why is it important?
- How/why would it be established?

This initial step can be completed individually or as a class. Classroom discussion is highly encouraged.

II. Determining students' environmental interests/concerns

Students' interests will ultimately determine which issues the class foundation will concentrate and act on. Allow the foundation's focus to develop organically. Depending on when you choose to establish your class foundation, students may have a broad range of knowledge of different topics or issues. The following are suggestions for how to establish the focus of the class foundation.

I. Hang an anchor chart in the classroom.
    - Have students contribute their ideas and environmental interests to the chart.
    - Each lesson includes a Reflection Question that prompts the class to think about what they have learned in relation to a class foundation project. The answers or ideas raised during that discussion can be added to the chart as you work through Connecting With Nature.

- Once students have put their ideas on paper in a visible area of the classroom, have them brainstorm questions they may have about certain issues.
- Give students time to research specific issues and answer both their own and others' questions about topics they find interesting.
- Allow time for students to share their research with classmates, design experiments, and have classroom discussions on their findings.
- Consider planning field trips or inviting guest speakers to learn more about these issues.

II. The research component is an essential process. If students do not discover on their own what issues they would like to learn more about, they will not be inspired to act.

III. Selecting the foundation's focus and name

It is important for students to narrow the focus of their foundation. Though they can have more than one issue or topic they feel passionately about as a group, for the purpose of productivity students should choose a single issue or activity to focus on.

In some cases, it will not be easy to determine what the class would like to focus on. If so, develop a system of voting and ensure that the students know that the results are the final decision.

Some of the issues students present could fall under the same umbrella. For instance, if one student feels passionately about water pollution and another about air pollution, the issues can be grouped together and labelled pollution. Look over the list of issues and topics that the students have identified and place them in categories accordingly.

To help students agree on their foundation's focus, use the system of dot voting. This system gives each student three votes. They can distribute their votes evenly among topics or place all their votes on one topic they feel strongly about. The topic that receives the most votes is the topic they will concentrate on first.

Once the class has decided on the focus of the foundation, they can go through a similar process to create a foundation name that best reflects the class and the focus of their work.

IV. Signing up for roles and responsibilities

- Provide students with a description of the different foundation roles (see Foundation Role Descriptions on page 21).
- Talk about the responsibilities each team might have.
- Post the sign-up sheet and allow students to choose which team interests them the most (see Foundation Role Sign-up Sheet on page 22).
- Encourage students to choose the teams in which they feel they could make the strongest contribution rather than following their friends.

V. Creating a school-wide campaign

Now that the framework for your foundation has been set up, the next step is deciding how you will organize to make your project a reality. You may need to have different kinds of meetings, but the class will have to decide as a whole how they will organize their work. Each team will have a unique set of strategies and tasks to complete, and they will also have to coordinate their work into a single project. The teacher must decide how much class time will be devoted to the foundation project, and whether any of these meetings should take place outside class time. Students should also be encouraged to have their meetings or brainstorming sessions outside as much as possible.

Foundation role descriptions

Communications/outreach team: This team will work together to advertise the events your foundation will hold. The initial task will include writing a school announcement about the creation of the Class Foundation. This group makes other students and staff aware of the action your foundation is taking. These students may create morning announcements, give presentations to other classes, or write in the monthly school or classroom newsletter.

Finance/fundraising team: Your Class Foundation may or may not decide to include a fundraising component to their project. If you do, you will need to create a Finance/Fundraising Team. This team will brainstorm ideas and organize and implement fundraising events to support your initiatives (for example, purchase composters, create a vegetable garden, or purchase a fruit tree). They will design a fundraising request aimed at students, parents, and teachers that explains the foundation's goal, how much it will cost, and when it will be achieved. This team is encouraged to work with the Creative Team, Communications Team, and Spirit Team to find ways of making sure that their intended audiences know about the fundraising events.

Creative team: This team is responsible for promoting the foundation and fundraising events through posters, skits, videos, photos, and social networking. They may also create a logo for the foundation and come up with a foundation rap, theme song, or chant.

Spirit team: This team will get the class and the school excited about why this project is important and why other students should be connected to this project. They will create team-building activities and celebrate milestones and accomplishments. They will also make sure that each team stays aligned with the overarching vision of the Class Foundation and of David Suzuki. This team will attract and organize volunteers to help make projects happen, ensuring that all volunteers are assigned roles during events.

Science/policy team: This team will research and investigate environmental facts, issues, and policies related to your Class Foundation project. They will help determine what actions need to be taken, what letters may need to be written, and who may be in positions of power to help the foundation achieve its goal. This team will keep the class updated on new environmental actions taking place locally, nationally, and globally.

Facilitator role: The teacher will act as facilitator and keep track of each team to ensure the Class Foundation is operating smoothly. The teacher will assess the needs of bringing the teams together for a foundation-wide meeting. It is recommended that these foundation-wide meetings take place outside of class time as much as possible.

Foundation role sign-up sheet

Please sign your name under the team you would like to work with.

Communications/outreach team

Finance/fundraising team

Creative team

Spirit team

Science/policy team

A

Science, health and physical education, language

TIME REQUIRED

30–45 min + discussion

WHAT YOU NEED

Dictionary definition of nature

One letter-sized sheet of paper for each student

One wide-tip felt marker for each student

Optional: mobile device camera phones

Optional: nature items collected from the walkabout

RESOURCES

Appendix A1: Mind map template

Walkabout:
What we do to nature, we do to ourselves

What's the point?

In this lesson, students experience nature first-hand by spending time in their schoolyard or nearby park, and sharing with each other their observations, collections, and ideas about nature. Their discussions lead to an understanding that we are a part of nature. Once we realize that everything is connected, and that nature is all around us (even in the city), we begin to understand that we all have a role to play in ensuring that nature is protected and nurtured.

Guiding question

What does the word "nature" mean to you and how are you connected to it?

Suggested strategies for assessment

Assess students using the Learning Skills Checklist (see the Assessment Appendix, p. 145).

Assess student ideas using the Anecdotal Notes Organizer (see the Assessment Appendix, p. 171) and the observation question.

Hook

Read the book *The Lorax* by Dr. Seuss. What is the author saying about nature? How did the author make these ideas easy to understand?

What you do

Part A: Outdoors

Note: The activity can be completed rain or shine.

1. Supply each student with a writing tool and paper. (Alternatively, they can use mobile device camera phones.) Plan ahead and take students to the schoolyard or nearby park and draw attention to a cool tree, small stream, or a great natural space. Express joy and interest toward it. Tell students why it is your favourite natural spot/place/tree, modelling what they will do in their walkabout.

> **Teacher Tip**
>
> Remind students the day before to dress appropriately for the outdoor activity.

2. Send students on an individual walkabout (not in groups) around the schoolyard or nearby park to observe nature around them. Ask them to think about what they see, hear, smell, and touch.
3. Ask students to focus on one observation and record it on paper or on their mobile device. They can use words or pictures. Observations should respond to the question "What is nature?"
4. Circulate and share pictures, words, and/or photos with each other.
5. Observe differences and similarities.
6. Debrief using Reflection Questions: Part A.

Optional: Collect "nature items" during the walkabout and bring them to a large area (outdoors or indoors) where the students can create a collage of their experiences.

Part B: Classroom

1. Use the opposite side of the paper used in the outdoor activity and ask students, using only one word, to answer the question "What is nature?" Their answers may be derived from the walkabout observations or from the nature collections.
2. Have the students print their one word large enough to fill the page. Students using mobile phones may type the word on their device.
3. Instruct the students to stand holding their papers in front of them so others can read them.
4. Have everyone circulate around the room for a minute or two, silently looking at the other students' ideas. Younger students can circulate sharing their word orally.
5. Signal for students to stop and find the nearest person to form pairs.

6. Ask the pairs to spend one minute explaining their word and their reasons for choosing it to their partner.
7. Have everyone circulate again and ask students with similar words to stand together in groupings.
8. Observe the different nature groupings. Create a list of observations on a mural/wall display so students can refer back to it. (You may use Appendix A1: Mind Map Template.) Refer back to this list as students learn more about nature, and use it to develop the class foundation described in Lesson C.
9. Debrief using Reflection Questions: Part B.

> We humans are but one of thirty million species weaving the thin layer of life enveloping the world...Linked in that web, we are interconnected — using, cleansing, sharing and replenishing the fundamental elements of life.
>
> *— Excerpt from the Declaration of Interdependence, David Suzuki Foundation*

Reflection questions

Part A: Outdoor

- What did you see, feel, smell and touch? Do you feel differently when you are outside instead of inside? How?
- What kinds of nature did you see on your walk?
- What was missing? What would make your schoolyard more natural?
- Why is nature important?
- What is our connection to nature? How are we connected to nature?
- Nature collage: What do you notice about the collage? Can the objects be sorted into groupings? Do the items connect to each other? How?

Part B: Classroom

- What kinds of groups did you make?
- How were they different from each other? How were they similar?
- How are the groups connected to each other?
- How do the ideas of the class compare to a dictionary definition of nature?
- Are any ideas about nature more right than others? Explain.
- How do we affect nature and vice versa?
- What does it mean to live within the limits of nature? What does the term sustainable living mean?

Taking it further

Smart Board

- Create a collage or poster board based on Part A. Save the file and expand on it as you learn more through the lessons in *Connecting With Nature*.

Camera/mobile device

- Encourage the use of mobile devices to record images when the students are outdoors.

Community/home engagement activities

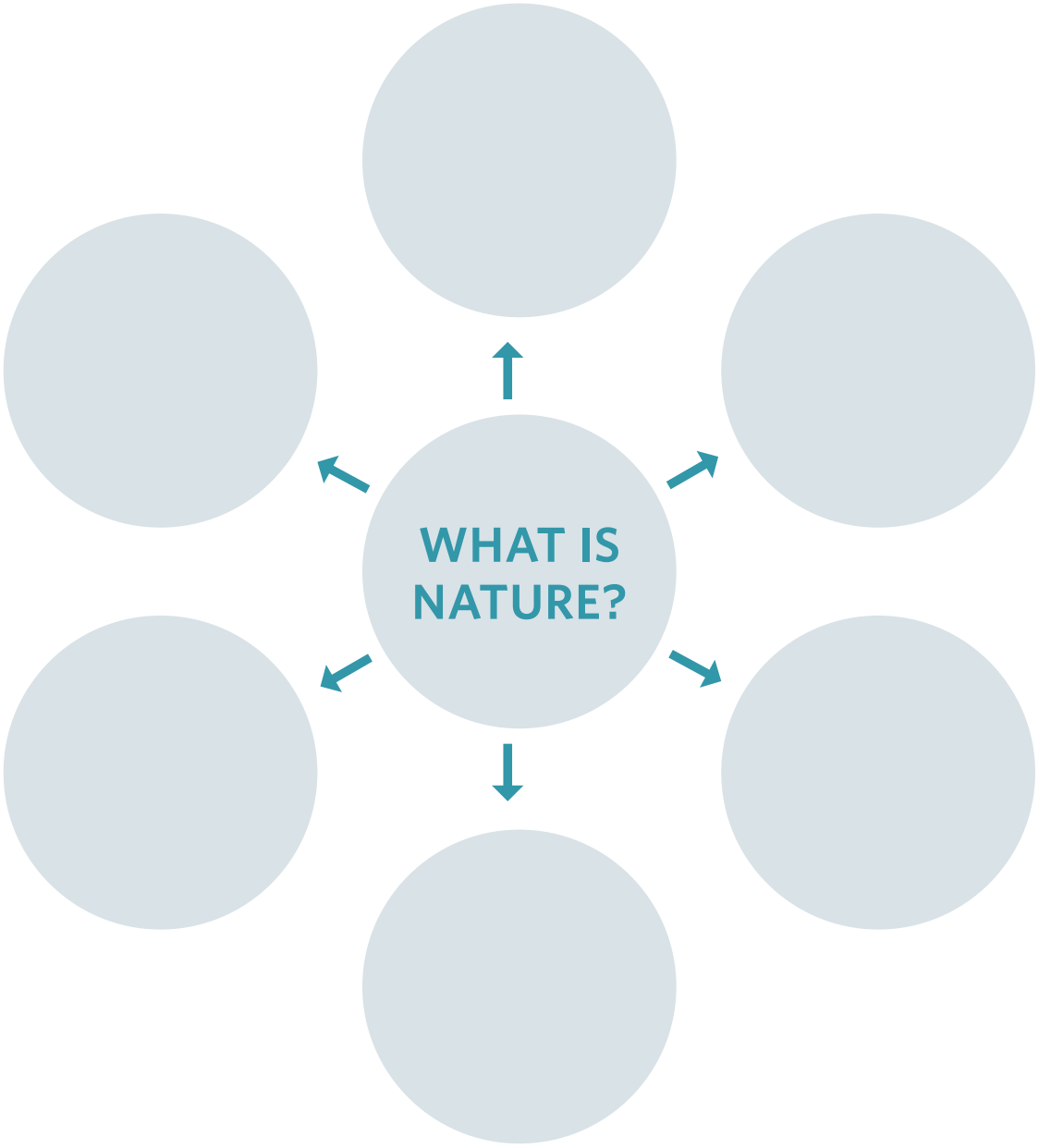
- Encourage students to invite their families to go on nature walks.

Optional class activities

- Make your schoolyard a more natural space to Connect With Nature. Create a vegetable garden, make some birdhouses, or add more trees, mulch, rocks, and bushes. Get started today by going to davidsuzuki.org/youthandnature/a.
- Create a class poster mural with your nature observations. Have students contribute "nature items" found on their walkabouts to a class collage. Collect student photos to create a bulletin board or an electronic slideshow. Keep all of the ideas the students come up with so they can be referred back to. Leave room to expand as you move through the lessons and learn more about nature and what we can do to nurture a healthy relationship with it.
- Ask students to create a journal response to the question "What is nature?" Encourage them to include their past experiences.

Appendix A1

Mind map



Science, health and physical education, language, arts

Barnyard in my classroom: Exploring our connection to nature

TIME REQUIRED

50–60 min + discussion

WHAT YOU NEED

David Suzuki's *There's A Barnyard In My Bedroom* (Greystone Books, 2008)

A large ball of yarn

What's the point?

In this lesson, students gain an understanding that many of the things they use in their everyday lives come from nature. Their discussion leads to an appreciation that we are dependent on nature and what we do to nature, we do to ourselves. Once we realize everything is connected, we can see that what we do every day affects not only animals and plants, but ultimately ourselves.

Guiding question

What relationships do humans have with nature?

Suggested strategies for assessment

Assess students using the Anecdotal Notes Organizer (see the Assessment Appendix, p. 171) and the observation question.

Observation question: Do students understand how everything his connected in the sense that what we do to nature we do to ourselves?

Choose an Optional Class Activity and assess students using a tool from the Assessment Appendix.

Hook

Read *There's a Barnyard in my Bedroom — A Rainy Day Hike* (pp. 1–17) in class. Discuss Question 1 on p. 56. Answers are on p. 58.

What you do

Part A: Outdoors

1. Have students walk around the schoolyard or a park. Instruct them to pick up an object from nature (for example, a stick, leaf, or rock) and then discuss how their objects are connected to each other and to the things in their daily lives.
2. Play a game to reinforce the interconnectedness of nature. Have everyone form a circle and assign each student a different aspect of nature (for example, air, water, sun, earth, tree, animal, or humans). Toss around a ball of yarn to make a web, highlighting connections (for example, the animal breathes the air; the air is filtered by the tree, the tree shades the human, and so on). Continue until every student is connected.

Part B: Classroom

1. In groups, have students make a list of as many classroom objects as possible and identify which natural resources were used to make each object.
2. Optional: for older students, incorporate a competitive element into the activity — the group with the most objects or most diverse list of natural resources wins. Students can also specify if the resource is renewable or non-renewable.
3. Ask students to draw their classroom (in groups or in one large mural if they have a large enough piece of paper), using the same concept as in the book (a tree is made into a table and so on).
4. Use the Reflection Questions to assess student understanding.

Reflection questions

- What did you learn about the things you found outside in nature and the things you found in your classroom?
- What would be different in your classroom or house if things in nature were no longer available?
- Can you think of things in your classroom that can be recycled, reused, or returned to nature? What things can't? What happens to them?
- Why is it important to understand that everything comes from nature?

Taking it further

Community/home engagement activities

As a family, discuss how items in homes are connected to nature. Which natural resources were used to make these products?

Optional class activities

- Have students write a haiku poem about their connections to nature. (For assessment, use the Achievement Chart on p. 165.)
- Ask your students to draw a picture or create a chart that explores what the following quote is telling us. Is there a possibility of a problem? (For assessment, use the Achievement Chart on p. 165.)

> "One hundred trout are needed to support one man for a year. The trout, in turn, must consume 90,000 frogs, that must consume 27 million grasshoppers that live off of 1,000 tons of grass."
>
> *— G. Tyler Miller Jr., author and environmentalist*

Additional resources and websites

- Read David Suzuki and Kathy Vanderlinden's *You Are the Earth* (Greystone, 2010).
- See davidsuzuki.org/youthandnature/b to learn more about our connection to nature.

C

Science, health and physical education, language, social science

TIME REQUIRED

60 min + discussion

WHAT YOU NEED

Paper for note taking

RESOURCES

Appendix C1: Who is David Suzuki?

Appendix C2: The David Suzuki Foundation

Who is David Suzuki?
Inspiration for action

Guiding question

Why has David Suzuki inspired so many Canadians to work together to protect nature?

What's the point?

In this lesson, students learn about David Suzuki and his organization, the David Suzuki Foundation. Students connect their own experiences with nature to David Suzuki's motivations and goals. At the end of the lesson, the class is introduced to the idea of creating their own Class Foundation, a foundation that may be started during or after completing *Connecting With Nature*.

Suggested strategies for assessment

Assess student participation using the Learning Skills Checklist (see the Assessment Appendix, p. 145).

Hook

To introduce David Suzuki and his passion for nature, show students the trailer for *Force of Nature: The David Suzuki Movie*.

View the trailer at davidsuzuki.org/youthandnature/c.

What you do

Part A: Classroom

1. With your class, read over Appendix C1: Who Is David Suzuki? As a scientist, broadcaster, and environmentalist, David Suzuki has inspired many Canadians to take action to protect nature. Ask students to conduct research on one aspect of his life they are curious about (for example, his early life, his life as a scientist, or his work as a broadcaster) and to find out more about the David Suzuki Foundation.
2. Discuss what they learned through their research. Encourage students to share what they learned about why David Suzuki created the foundation.
3. Show students the David Suzuki Foundation's Declaration of Interdependence video to help them understand why David Suzuki created a foundation. This video demonstrates the importance of environmental stewardship. View the video at davidsuzuki.org/youthandnature/c.
4. Discuss what a foundation is and the purpose of creating a foundation. For background information, see Appendix C2: The David Suzuki Foundation.

Part B: Outdoors

1. Take students outside and sit under a tree.
2. As a class, discuss how a group can be more effective than an individual.
3. Introduce the idea of creating a Class Foundation as the students work through *Connecting With Nature* or after you have completed it. (The Class Foundation is explained on p. 18.)
4. Debrief using the Reflection Questions.

Reflection questions

- What do you find interesting about David Suzuki's life?
- Why do you think he has inspired so many people?
- David Suzuki says that spending time in a swamp as a teenager inspired him to become a scientist. How did your outdoor experience in the Walkabout lesson inspire you? What moments outdoors were meaningful to you?
- How can you connect your experience with nature in the Walkabout lesson to what you have learned about the David Suzuki Foundation?
- Have you, or anyone you know, ever taken some personal action that made a difference? Did it inspire others to take action as well?

- What information on the David Suzuki Foundation website did you find meaningful or inspiring?
- How can a group of people, like a foundation, accomplish more than one person?

Taking it further

Computer lab/LCD projector/smartboard

- Use the Internet to review the David Suzuki website.

Community/home engagement activities

- If your class decides to set up its own foundation, encourage families to support and become involved in the class initiatives.
- Encourage families to sign the Declaration of Interdependence on the Foundation website.

Teacher Tip

Ensure the library / computer lab is booked for this lesson.

Optional class activities

- Using sidewalk chalk, have students create a mural that incorporates their goals for protecting and connecting with nature.
- Encourage students to bring to class images or articles they found of individuals or celebrities who are making a difference to nature. For example, read about people who are making a difference to nature in the book *The Sacred Balance* by David Suzuki with Amanda McConnell and Adrienne Mason (Greystone Books, 2007). Choose one story and share it with others.

Additional resources and websites

See davidsuzuki.org/youthandnature/c to learn more about how to take action for nature.

Appendix C1

Who is David Suzuki?

David Takayoshi Suzuki was born in Vancouver, BC on March 24th, 1936. His grandparents had come to Canada from Japan in the early 1900s, making him a third generation Canadian.

But the fact that David was born in Canada meant sadly little when Canada went to war against Japan in 1941. The Canadian government insisted that people of Japanese descent — even those born in Canada — be shipped off to internment camps, ghost towns in the Rockies, and plantations. David and his family were sent to a camp in interior BC.

After the war, the Japanese were freed, and the Suzukis moved east to Ontario. In Leamington, they were the only non-white family in the neighbourhood. Life was lonely for David, and he began spending hours exploring the swamp near his home. He now recalls this swamp as his inspiration to protect nature.

After high school, David studied zoology and genetics in university. He earned his PhD and became a professor at the University of British Columbia, where he ended up teaching for 40 years. His teaching skills transferred well to tv and radio, and he hosted his first tv show for kids (called Suzuki on Science) in 1970. In 1979, he began hosting a popular CBC science show called *The Nature of Things*, which he still hosts today.

Then, in 1989, David had a new idea. His radio series, *It's a Matter of Survival*, had called people's attention to the serious state of the planet, and thousands of listeners were writing to him, asking what they could do to help the environment. So David and his wife Tara Cullis, a professor at Harvard University, created the David Suzuki Foundation, an organization dedicated to finding solutions for environmental problems.

They began by focusing on projects in other countries, such as protecting indigenous people in Colombia and salmon in Japan. When environmentalists from all over the world gathered in Brazil for the Rio Earth Summit in 1992, they created the Declaration of Interdependence, to remind everyone that we are one with the Earth.

Today, the David Suzuki Foundation focuses on protecting oceans, freshwater, and terrestrial wildlife in Canada, and finding climate change solutions.

Now his seventies, David still volunteers for the foundation he created in Vancouver. When he's not in the office, he's usually sharing this knowledge through speaking presentations, recording episodes of *The Nature of Things*, and spending precious time with his children and grandchildren.

David Suzuki is one of our biggest volunteers

Appendix C2

The David Suzuki Foundation

David Suzuki Foundation

SOLUTIONS ARE IN OUR NATURE

About us

Over 60 staff in offices across Canada work to help further the foundation's goals. We work with government, business, and individuals to conserve our environment by providing science-based education, advocacy, and policy work, and act as a catalyst for the social change that today's situation demands.

Our mission and vision

Our mission is to protect the diversity of nature and our quality of life, now and for the future.

Our vision is that within a generation, Canadians act on the understanding that we are all interconnected and interdependent with nature.

Our top goals

Protecting our climate — ensure that Canada is doing its fair share to avoid dangerous climate change and is on track to achieve a safe level of greenhouse gas emissions.

Transforming the economy — make certain that Canadians can maintain a high quality of life within the finite limits of nature through efficient resource use.

Protecting nature — work to protect the diversity and health of Canada's marine, freshwater, and terrestrial creatures and ecosystems.

Reconnecting with nature — ensure that Canadians, especially youth, learn about their dependence on a healthy environment through outdoor education.

Building community — engage Canadians to live healthier, more fulfilled, and just lives with tips on building Earth-friendly infrastructure, making smart energy choices, using efficient transportation, and being mindful of the products, food, and water we use.

Visit of davidsuzuki.org/about for more information.

Science, health and physical education, language

Living within the limits of nature: Needs versus wants

TIME REQUIRED

120 min + discussion

WHAT YOU NEED

Felt markers

Chart paper

Tape

Appendix D2: Needs and wants (for each group)

Appendix D3: Change of plans (for each group)

RESOURCES

Appendix D1: Living within the limits of nature

Appendix D2: Needs and wants

Appendix D3: Change of plans

Appendix D4: Two world visions

Guiding question

What happens to nature if you always pursue your wants and never consider living within your needs?

What's the point?

In this lesson, students pack a backpack in preparation for a nature hike. As the hike progresses, students are asked to sort through what they packed to determine what they really needed for the hike and what they didn't. They will begin to see the impact of consumerism and that the desire for things we don't really need is driving us to live beyond the limits of nature. Only when we stop and think about what we are buying and using, and the impact it has on the Earth, can we make the conscious effort to live sustainably.

Suggested strategies for assessment

Assess students during group work using the Learning Skills Checklist (see the Assessment Appendix, p. 145).

Evaluate student answers on the handouts provided using the Achievement Chart (see the Assessment Appendix, p. 165).

Have students reflect on the activity and further explain their choices and the importance of choosing needs over wants by completing a Self-Assessment (see the Assessment Appendix, p. 165). Choose an Optional Class Activity and assess students using a tool from the Assessment Appendix.

Hook

Read the book *The Rag Coat* by Lauren Mills (Little, Brown, 1991). Before you start reading, ask the students to look out for how people in the story have lives different or similar from their own. Afterwards, discuss needs and wants in different places in the world and in different cultures.

What you do

Part A: Outdoors

1. Tell students they are going on an outdoor hike and need to pack a bag with things they think they will need. Warm weather is not necessary as cold weather may help students focus on bringing what they actually need.
2. Halfway through or at the end of the hike, break into groups and compare what they packed. Have students sort the objects into two piles: what they needed and what they wanted.
3. Ask the students to analyze their needs and wants on this hike. Take it a step further and look at their needs and wants at the grocery store or the mall. Discuss how their desire for things they don't need affects nature. Continue this discussion during the hike.
4. Debrief using Reflection Questions in Part A.

> **Teacher Tip**
>
> In this activity, students share their ideas about needs and wants. Try holding an object (such as a ball) that symbolizes your capacity to speak while others listen. The students can take turns holding the object and sharing their opinions. A student holding the object has the right to say "pass" if he or she does not wish to speak.

Part B: Classroom

1. With your class, go over Appendix D1: Living Within the Limits of Nature. Ask them to consider this information as they work on the next activity.
2. Divide the class into small groups.
3. Give each group a copy of the student pages. Make sure that the groups complete Appendix D2: Needs and Wants before starting Appendix D3: Change of Plans.
4. Have groups display their lists on the wall and compare their lists with those of other groups.
5. Read the quotation on Appendix D4 aloud. Ask students to draw the diagrams David Suzuki describes and help them understand that the economy, as a human construct, is contained within the biosphere.
6. Discuss using Reflection Questions Part B.

Reflection questions

Part A: Outdoors

- What is the difference between a need and a want?
- How many of the things you packed did you actually need for the hike? What did you need that you didn't pack? Why did you pack some of the things you didn't need?
- How did your hike help you learn about needs and wants?
- When you go on you next hike, how will you pack differently? Why?

Part B: Classroom

- What did your group agree on easily? What was harder to agree on?
- How did it feel to be limited to a set number of things to bring along?
- How did you decide if something was a need or a want?
- "Human beings do not live by bread alone." Once we have enough food and water and air to survive, what are some of our other needs?
- Are the following needs or wants? Love, friends, laughter, spirituality, community, learning, imagination, dance, song, play, and curiosity.
- What happens when our want list gets really big?
- Why is it important to understand the difference between a want and a need when we consider the fact that nature has limits?
- Think of three things that human beings sometimes want that are hard on the natural world. Why do you think humans continue to want them?
- When you look at your home and possessions, do you see things that are wants? Or things that are needs? Discuss what you think with your family.
- How can you apply some of these ideas to your Class Foundation project?

Taking it further

Smart Notebook

- Using a Smart Notebook, create a categorizing activity where students can sort objects into needs and wants.

Community/Home engagement activities

- Have students and their families decide to give up one of their "wants" that has a high impact on the environment for one week (or month) and have the students and family journal about it. At the end of the exercise, they can decide if their "want" is really something they need, or if they are willing to give it up to help the environment.

Optional class activities

- Have Skype presentations with a park ranger. Show the park ranger the list of needs and wants from the class. Ask for his or her opinion. Compile a list of questions before the meeting. Topics may include: What do campers often bring with them onto the campsites? What gets left behind? Which equipment is necessary and which equipment is unnecessary?
- Split the class into groups and assign each group a country, era, or cultural group (for example, medieval times). Ask the students to conduct research using supplementary materials (computers, encyclopedias, and so on) to come up with needs and wants of their chosen country, era, or cultural group. Then bring the class together as a large group. Collect student feedback on the assignment. Then discuss what it means when basic human needs are not met and how basic human needs relate to human rights. (For assessment, use the Achievement Chart on p. 165.)
- Ask each student to pick an animal and compare the animal's needs to his or her own needs. Using chart paper, draw two large circles that intersect in the middle. The animal and student each get seven needs. Place the needs in the circles where they belong. Which ones intersect? Which ones belong just to the animal and which ones belong just to the student? How does respecting the needs of other parts of nature play an important part in living in balance?

Additional resources and websites

See davidsuzuki.org/youthandnature/d to learn more about living within the limits of nature.

Appendix D1 (1 of 2)

Living within the limits of nature

How does nature keep us alive?

All life exists in the biosphere, the zone of air, water, and land that surrounds the planet. As biological creatures, humans depend on clean air, clean water, clean soil, and clean energy as well as on a variety of plants and animals (called biodiversity) for our well-being and survival.

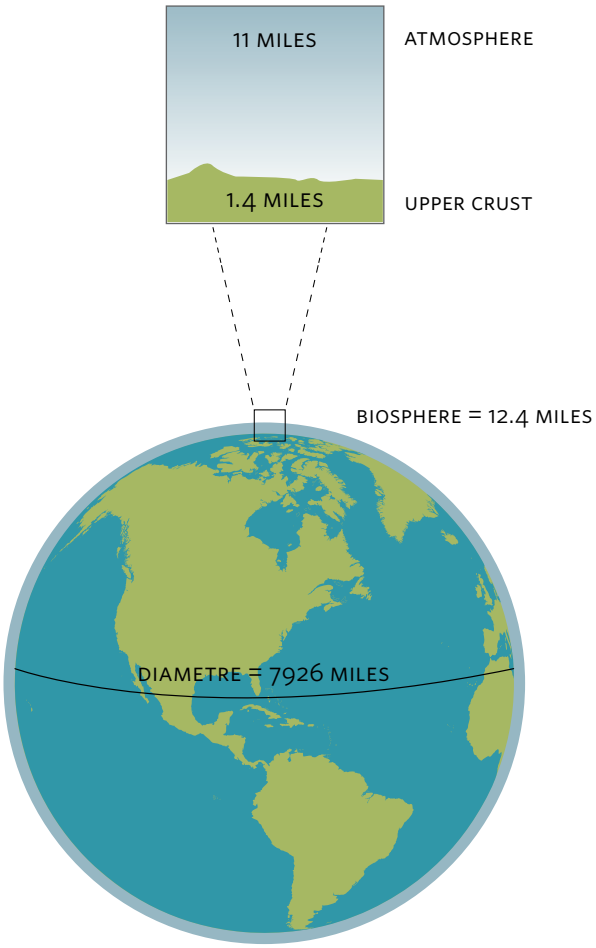
We often think of the atmosphere as extending far out into space when, in fact, it is only about 10 kilometres thick. The biosphere, astronomer Carl Sagan used to say, is as thick as a layer of varnish painted on a basketball. That is where all life flourishes. Beyond it, there is only space.

Nature provides all kinds of services without which life on this planet could not exist. For example, nature creates topsoil, the thin skin that supports all agriculture. Nature removes carbon dioxide from the atmosphere and returns oxygen. Nature takes nitrogen from the air and fixes it to enrich soil. Nature filters water as it percolates through soil. Nature transforms sunlight into molecules that we need for energy in our bodies. Nature degrades the carcasses of dead plants and animals and incorporates them back into the biosphere, replenishing and fertilizing soil. Nature pollinates flowering plants that help create the food we eat.

Nature has limits

Humans have become so numerous and powerful that we are now altering the balance of the biosphere. Everything we do has consequences because everything is connected. If, for example, we pour toxins into air, water, or soil, those same toxins may end up in us.

Our home is that thin layer of varnish on a basketball. And that's it. It can't grow and get bigger to accommodate our increasing population and our desire for more goods and services.



All life exists in the zone of air, water, and land that surrounds the planet.

Appendix D2 (2 of 2)

Living within the limits of nature

We know how much carbon dioxide can be reabsorbed by all the green things in the oceans and on land, and we know we are going beyond those limits. That's why carbon is building up in the atmosphere. This change in the atmosphere is leading to changes in our oceans and lands and their ability to sustain us. This change is the basis for climate change.

Nature, the global economy, and you

We live in a "global economy" where we buy and sell goods and services from anywhere in the world on a daily basis (food, clothing, electronic gadgets, cars, and so on). The economy is measured as successful if it continues to grow as people buy and sell more and more things. As a result, we often end up buying things we don't need because we are pressured to get rid of old things and buy new things to keep the economy growing.

This consumption is a problem for nature. That's because our economic system is built on the limited resources and materials we find in the biosphere. Then, we dump our waste back into the land, air, and water that we need to keep the planet a safe and comfortable place to live. We don't take into account the limits of nature when we decide to manufacture more and more goods, and so we go beyond those limits. The global economy also makes it harder for us to understand where our goods come from and how they are all interconnected with nature.

The next time you buy a new shirt or ask for a new electronic gadget, you need to ask yourself what natural materials and resources were used to create it. Where was it made? Do you really need what you want?

As long as the economy is considered more important than nature, we will never work our way out of the problems we've created.

Do you really need more clothes?

Appendix D2

Needs and wants

What you do

Your group is going on a camping trip.

1. Make a list on chart paper with your group of what you will take with you for three days.
2. Choose one item from your list that you think every group will have on their list. Put a star beside it.
3. Choose one item from your list that you think some of the other groups may have forgotten to list.
4. Display your list on the wall.
5. Compare your list with other group lists.
6. Read the *Change of Plans* on the next page and complete the activity again.

What would you bring on a camping trip?

Appendix D3

Change of plans

1. How would this list be different if you had to carry everything 5 km to your campsite?

2. With your answers from question 1 in mind, list the things that you would take instead.

Questions

1. Did you all agree on the items to take? If not, why?

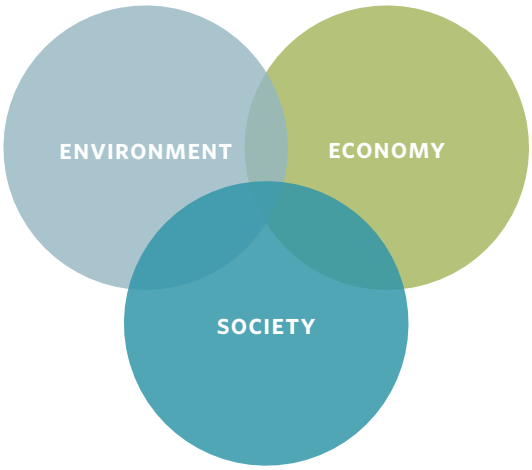
2. How did you separate your needs from the wants?

Appendix D4

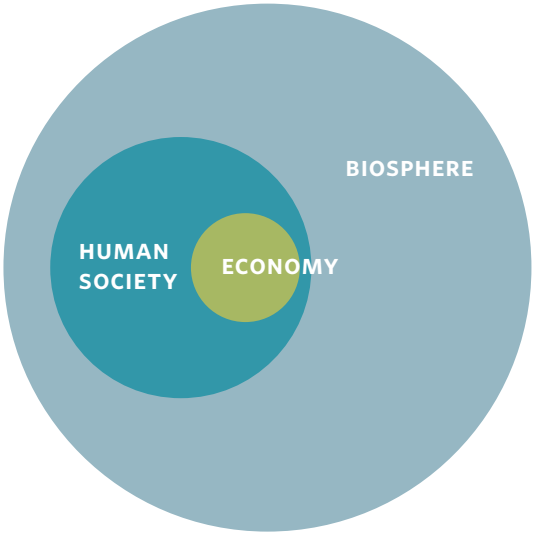
Two world visions

"We often describe the triple bottom line — society, economy, and environment — as three intersecting circles of equal size. This is nonsense. The reality is that the largest circle should represent the biosphere. Within that, we have 30 million species, including us, that depend on it. Within the biosphere circle should be a much smaller circle, which is human society, and within that should be an even smaller circle, the economy. Neither of the inner circles should grow large enough to intersect with the bigger ones, but that's what's happening now as human societies and the economy hit their limits."

— David Suzuki, Science Matters



The "triple bottom line" vision of the world.



A world vision to help us live within nature's limits.

E

Math, science, health and physical education, language, social science

Classroom landfill: Breaking down pollution

TIME REQUIRED

45 min + 2–3 months for the experiment

WHAT YOU NEED

Images of different types of pollution

Gloves (for each student)

Samples of garbage & leftover food

Garbage bags (one for every four or five students)

A clear plastic bin & soil to fill it

Popsicle sticks and markers

Blank scrap paper & chart paper

Plastic wrap (or a lid for container)

Appendix E3: What's happening in the landfill? (For each student)

RESOURCES

Appendix E1: Rethinking our approach to nature

Appendix E2: Images of waste and pollution

Appendix E3: What's happening in the landfill?

David Suzuki Foundation

Guiding question

What effect does all the garbage and waste we create have on nature?

What's the point?

In this lesson, students learn that waste is a natural by-product of life and nature; however, too much unnecessary waste, especially waste that is not biodegradable, creates serious pollution issues on land, in water, and in air. When we pollute our environment, we pollute ourselves. Students create a mini-landfill to discover what happens to the different kinds of waste and how waste helps or hurts nature.

Suggested strategies for assessment

Assess students using the Learning Skills Checklist (see the Assessment Appendix, p. 145).

Hook

Create a sign that reads "landfill" and tape it above the garbage can in the classroom. Discuss how garbage will be taken to a landfill site and sit there for years to come. This discussion reinforces the idea that some of our waste is never really gone, even when we throw it away. Refer to the lesson plan quotation about the effects garbage has on nature.

What you do

Part A: Outdoors

1. Take students outside for a five-minute garbage collection walk around the school.

Part B: Classroom

1. Bring the bags of garbage back into the classroom and place them where students can see them.
2. Show students Appendix E2: Images of Pollution, and discuss the effects of pollution on the land, water, and air.
3. Write the word "pollution" in the middle of a board and put a circle around it. Create a web diagram by asking the class to brainstorm words that describe "pollution," and drawing lines connecting the various ideas.
4. Explain to the class that today they are going to begin an experiment by creating a landfill. Emphasize that waste is a natural by-product of life and that nature needs organic waste to keep the cycle of life going. Unfortunately, we also have a lot of unnecessary garbage that is not organic and doesn't easily break down. That garbage can pollute our soils and our water. Ask the class:
   - What happens to our waste?
   - Where does it go?
   - When we throw away garbage, does it really go "away?"

Landfill experiment

1. Wearing plastic gloves, fill the clear plastic bin half-full with soil.
2. Take six to eight samples from the playground cleanup and bury them about 15 cm (6 inches) deep in soil. Make sure that you include a few biodegradable items (for example, apple cores and banana peels). Place the samples near the side of the bin so that students can observe them from outside the bin. Mark each spot with a labelled Popsicle stick.

> **Teacher Tip**
>
> This experiment will take two to three months. Ensure you leave enough time throughout the year to complete the activity. Partway through the experiment, vermicompost worms or various bugs could be added to the landfill to speed up decomposition.

3. Put the container in a warm, sunny place and water it lightly (or place it outside on a rainy day for a short time). Keep the soil moist but not soaked. Cover the landfill with plastic wrap or a lid.

4. Carefully check your samples every week or so. You may dig them up but wear plastic gloves. You can use a magnifying glass to inspect the samples. Notice how the landfill smells when you take the plastic wrap or lid off the top. Keep checking for two to three months.
5. As a class, keep a record of ongoing observations using Appendix E3: What's Happening in the Landfill?
6. Discuss using Reflection Questions.

Did you know?

When people throw out food, all the resources to grow, ship, and produce it get chucked too, including massive volumes of water. In the U.S. alone, the amount of water loss from food waste is like leaving the tap running and pouring 40 trillion litres of water down the drain.

Reflection questions

- How did the garbage collection make you feel about waste and pollution?
- How much of the garbage could have been reused or recycled?
- Which items in our classroom landfill do you predict will break down quickly?
- Which items do you predict will take a long time to break down?
- Are there some items that look as if they'll never break down?
- Imagine this experiment on a much larger scale. Do you think the Earth can handle all of this garbage?
- How do landfills affect air? How do they affect water?
- What can we do to reduce the amount of garbage we create in order to help nature?
- How can you apply some of these ideas to your Class Foundation project?

After two to three months, ask the class:

- Are there any results you found surprising in this experiment?
- What is the difference between a landfill and a composter?
- What are the advantages of recycling, reusing, and composting?
- What does this experiment tell us about the way nature works?

Taking it further

Smart Board/LCD/overhead projector

- Display images of the three types of pollution (land, water, and air).
- Create a web diagram with words to describe "pollution."

Mobile device

- To record the changes in the landfill, have students take pictures of the landfill over the two to three months. Post the pictures in the classroom or create a slide show to illustrate the changes in decomposition.

Community/home engagement activities

- Encourage students to participate in community cleanups.
- Challenge families to reduce their waste by doing a "waste audit" in their homes. For example, they could separate out the kinds of garbage they throw away and come up ways to create less waste by recycling electronics, composting organic waste, and purchasing biodegradable products.

Optional class activities

- Visit a local garbage dump, water treatment plant, or recycling plant so students can witness the scale of the problem in your community and the technologies that have been created to help it.
- Challenge students to bring litterless lunches to school and encourage the school to use a composter. Have students collect organic waste for composting after every lunch period.
- Do a waste audit for your school. See davidsuzuki.org/youthandnature/e to download instructions.
- After two to three months, try to grow seeds in the class landfill. Discuss how the quality of the soil in the landfill may be affecting seed germination.

Additional resources and websites

Visit davidsuzuki.org/youthandnature/e to learn more about waste and pollution.

Appendix E1 (1 of 2)

Rethinking our approach to nature

The world is a complex interaction of air, water, land and living things that are all interconnected and interdependent. When we pollute the air, water, and land, we are polluting ourselves.

Too much stuff

One of the most important functions of nature is to take organic waste and break it down to create fertile soil for new plants to grow. Bacteria, fungi, and worms break down or "biodegrade" organic material like dead plants and animals, to create healthy new soil.

But humans are producing too much garbage. Much of the waste we produce now is not organic and does not easily break down. Materials that are not found in nature, such as plastics and glass, will never biodegrade. A pop can tossed on the ground will take 300 years to be crushed and worn away by rocks; a glass bottle will take a million years. The waste produced is polluting our planet by leaching into our soil and water through the release of methane gas, a major contributor to climate change.

Adapted from *Eco-Fun* by David Suzuki and Kathy Vanderlinden (Greystone Books, 2001)

We need to do more than recycle

Most urban Canadians dutifully put their paper, plastic, bottles, and cans into recycling bins. And that's great — good recycling programs reduce our need for landfills. But ultimately, we want to cut down on all our waste, even the kind that can be recycled.

Recycling helps to reduce waste that usually ends up in landfill.

Appendix E1 (2 of 2)

Rethinking our approach to garbage

Landfills make greenhouse gases

Beyond the waste problem itself, landfills produce about one-fifth of Canada's methane emissions — and methane is a greenhouse gas more potent than carbon dioxide. Landfills are a significant source of greenhouse gas emissions. They also create odours that can affect the quality of the air we breathe.

Eat local fruit to help reduce transport emissions.

Some cities are now capturing methane to burn for energy rather than allowing it to escape into the atmosphere. This process can also help reduce the amount of energy we have to find from non-renewable sources.

Reduce! It's the best thing to do

The most important thing we can do to help nature is reduce the amount of garbage and pollution we produce in the first place. Not only does that mean sending less waste to the landfill, it also means using fewer resources and less energy, because it takes energy to produce and transport packaging and disposable items.

Every day, more people, stores, companies, and cities are finding ways to cut down on disposable plastic bags, but we still create a lot of unnecessary packaging and products. Planned obsolescence — producing goods that won't last so that people have to buy more — is still reality. We can all avoid buying products that are over-packaged or "disposable," and encourage producers to be more responsible. When something breaks, we can also take greater responsibility by fixing it rather simply throwing it out and buying a new one. When we take the time to let stores, businesses, and governments know that we want less packaging and goods that last, we will make a difference. Our changing attitude about plastic bags is a perfect example.

Appendix E2

Images of waste and pollution

Appendix E3

What's happening in the landfill?

1. Make notes about the items in our classroom landfill.

   Here are some good questions to think about:

   - Which items look like they are breaking down quickly?
   - Which items look like they will take a long time to break down?
   - Are there some things that look as if they'll never break down?
   - Can you see bugs working in the garbage to break it down?

Date	What does it look like?	What does it smell like?	Other observations

F

Language arts, outdoors art

The powerful pollinators: Wonders of the natural world

TIME REQUIRED

65 min + discussion

WHAT YOU NEED

Appendix F1 (for each student)

Appendix F2 (for each student)

Appendix F3 (overhead projector to display)

Books, articles, or Internet access

RESOURCES

Appendix F1: What's the buzz?

Appendix F2: Pollinators fact sheet

Appendix F3: How we depend on pollinators

Guiding question

What are pollinators and how do we depend on them?

What's the point?

In this lesson, students discover how we depend on pollinators to produce 75 per cent of the food we eat. Unfortunately, pollinator populations are decreasing rapidly, mainly due to habitat loss. Students learn about actions they can take to protect pollinators and are asked to create bee baths at home.

Suggested strategies for assessment

Assess students' Appendix F2: Pollinators Fact Sheet using the Achievement Chart (see the Assessment Appendix, p. 165) and the Arts Rubric (see the Assessment Appendix, p. 167).

Hook

Bring in an array of foods that pollinators help to produce (for example, honey, apple, chocolate, mustard, coffee, and canola oil). Ask students to identify what these items have in common. Hint: Who is responsible for naturally making all of these foods?

What you do

Part A: Outdoors

1. Take your class outside to search for pollinators and the foods they like to eat. Ask your students these questions: What are pollinators? Why are they important in nature? How do we depend on them?
2. Ask the students to think of a pollinator they would like to be. Have them silently mimic and act like their pollinator. Then, look around and try to find other students who are acting like their pollinator.

   Ask the students to form groups with similar pollinators. Once all the students have found a group, they can see if they are all the same pollinator and discuss why they chose that particular one, what role they play in the food cycle, and how they are different from other pollinators.

Part B: Classroom

1. Distribute copies of Appendix F1: What's the Buzz? and Appendix F2: Pollinators Fact Sheet to each student. Students fill out the sheet using independent research. Allow approximately 20 to 25 minutes to answer the seven questions in the Pollinators Fact Sheet. Then gather the students and share their answers. Allow them to fill in any information they may have missed.
2. Review Appendix F1: What's the Buzz? Ask students to continue to add information to their Pollinators Fact Sheet. To further assist students with their research, show the video *David Suzuki's Queen of Green: Bees, Baths, and Beyond* listed in additional resources and websites.
3. On an overhead or Smart Board, display Appendix F3: How We Depend on Pollinators. Ask students to consider all the things pollinators do for us. Have them identify and consider which elements of everyday life depend on pollinators.
4. Discuss using Reflection Questions below.

Reflection questions

- How did observing weeds, flowers, pollen, insects, and animals affect your understanding of the importance of pollinators?
- How would everyday life be different if we didn't have pollinators?
- How does your knowledge of pollinators contribute to your understanding of the importance of living within the limits of nature?
- How can you apply some of these ideas to your Class Foundation project?

Taking it further

Smart Board

- Create a sorting activity using Smart Technology. Include images or names of bugs that students would find in the garden. Have students sort the bugs according to whether they are pollinators or not.

Community/home engagement activities

- Invite a local beekeeper to your class to talk about pollinators and the important role they play in your community.
- Create a bee bath in the family garden. Go to davidsuzuki.org/youthandnature/f for more details.
- Make bee-friendly gardens using native flowers. Choose a variety of plants that flower at different times so there's always a snack available for bees. (Native plants attract native bees and exotic plants attract honeybees.) Here are some points to keep in mind:
- Bees eat two things: nectar (which is loaded with sugar and is their main source of energy) and pollen (which provides proteins and fats).
- Flowers bred to please the human eye (for things like size and complexity) are sometimes sterile and of little use to pollinators. Native plants or heirloom varieties are best.
- Bees have good colour vision. That's why flowers are so showy! Bees especially like blue, purple, violet, white, and yellow. To help the bees find the flower, plant flowers of a single species in clumps about four feet in diameter instead of in scatterings.
- Bee species all have different tongue lengths. This diversity is an adaptation to different flowers, so a variety of flower shapes will benefit a diversity of bees.
- The following plants, organized by when they bloom, are just a few of the species native to Canada that attract bees:
- Early bloomers: blueberry, cotoneaster, crabapple, cranberry, crocus, foxglove, heliotrope, hazelnut, heather, primrose, willow
- Mid-season bloomers: blackberry, cat mint, catnip, chives, dahlia, hyssop, lavender, raspberry, sunflower, yarrow
- Late bloomers: aster (perennial), beggar's tricks, borage, coneflower, cornflower, cosmos, goldenrod, pumpkin, sedum, squash

Optional class activities

- To show the beauty and wonder of pollinators, watch the TED talk video of Louis Schwartzberg, which includes clips from his film Wings of Life, at davidsuzuki.org/youthandnature/f.
- Take a trip to a grocery store. Imagine what the store would look like in a world without pollinators. Which products would remain? Would there still be a way to eat a balanced diet and remain healthy?
- Visit Pollination Canada to get more information about pollinators and learn how to be a pollinator observer. Download an observation kit and submit class results at davidsuzuki.org/youthandnature/f.
- Use microscope bug-catchers to get a close-up look at the insects found in the schoolyard.

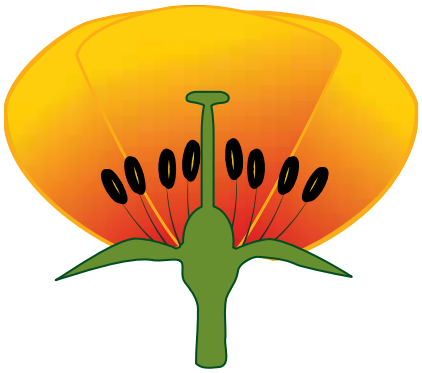
Additional resources and websites

See davidsuzuki.org/youthandnature/f to learn more about pollinators.

Appendix F1 (1 of 2)

What's the buzz?

Pollination happens when pollen, the yellow powder in the middle of flowers, is moved to another part of the flower. Pollen comes from the male part of the flower, called the anther, and it is moved to the female part of the plant, called the stigma. When this happens, the flower is fertilized and can make fruit and seeds.



Cross section of a flower.
Source: openclipart.org

Pollinators are the insects that pollinate flowers. Examples of pollinators include bees, moths, butterflies, hummingbirds, and bats. Almost 90 per cent of flowering plants rely on these animal pollinators for fertilization, and about 200,000 species of animals act as pollinators. Their daily work is essential for over a billion dollars of apples, pears, cucumbers, melons, berries, and many other kinds of Canadian farm produce. Beyond providing food, plants anchor soil to prevent erosion and fuel the nutrient cycle by decomposing and absorbing nutrients.

Adapted from pollinationcanada.ca.

Luckily for us, pollinators are still here, but they need help to stay healthy. You can help them by telling others about pollination, planting flowers that bees and butterflies like, not hurting insects, and caring for the environment. Every little bit of help counts!

What is happening to pollinators?

Everything in nature is interconnected. Bees (the most common pollinator) are a crucial part of this interconnection. If bees start to disappear, all life, including humans, will be affected. We must do everything we can to ensure that bees survive and flourish. Our own survival depends on it. European honeybees, which are now used for pollination around the world, are declining in number, as are native North American bees. We know some, but not all, of the causes. The biggest threat is habitat loss and destruction, as natural areas are increasingly developed for housing, shopping centres, and lawns.

What can we do to protect pollinators?

One of the most fun ways we can all work to keep bees healthy is to create homes and habitat for them. If you have a garden, even a small one on your balcony, you can fill it with plants and flowers that attract bees and other pollinators. And because bees are easy to please, almost any garden will attract them — but remember that native plants (ones that have been in your area for thousands of years) will attract native bees while exotic plants will attract honeybees.

Appendix F1 (1 of 2)

What's the buzz?

A couple of bees drinking water.

A bee collecting pollen.

Choosing a variety of plants that bloom throughout the season will keep bees buzzing from spring through fall.

Make a bee bath at home

Bees and other beneficial insects — ladybugs, butterflies, and predatory wasps — all need fresh water to drink, but most can't land in a conventional bird bath without crashing. "They're like tanks with wings," says bee master Brian Campbell. "They need islands in the water to touch down on."

Instructions:

1. Line a shallow bowl or plate with rocks.
2. Add water, but leave the rocks dry to serve as landing pads.
3. Place the bath at ground level in your garden. (Put it near "problem plants" — those that get aphids, for example — and the beneficial insects that come to drink will look after them.)
4. Refresh the water daily, adding just enough to evaporate by day's end.

Other ways to protect pollinators

- Encourage your local government to implement rules that protect pollinators and create habitat for them. If your province does not currently have one, support a ban on the use of pesticides and lawns and gardens.
- Encourage local clubs of school groups to build pollinator habitats such as butterfly gardens.
- Support farms and food growers who use few or no pesticides.
- And, most importantly, remember that change begins with you.

Appendix F2

Pollinators fact sheet

Pollinators

Who are the pollinators?

What do they pollinate?

What is pollination?

What do they pollinate?

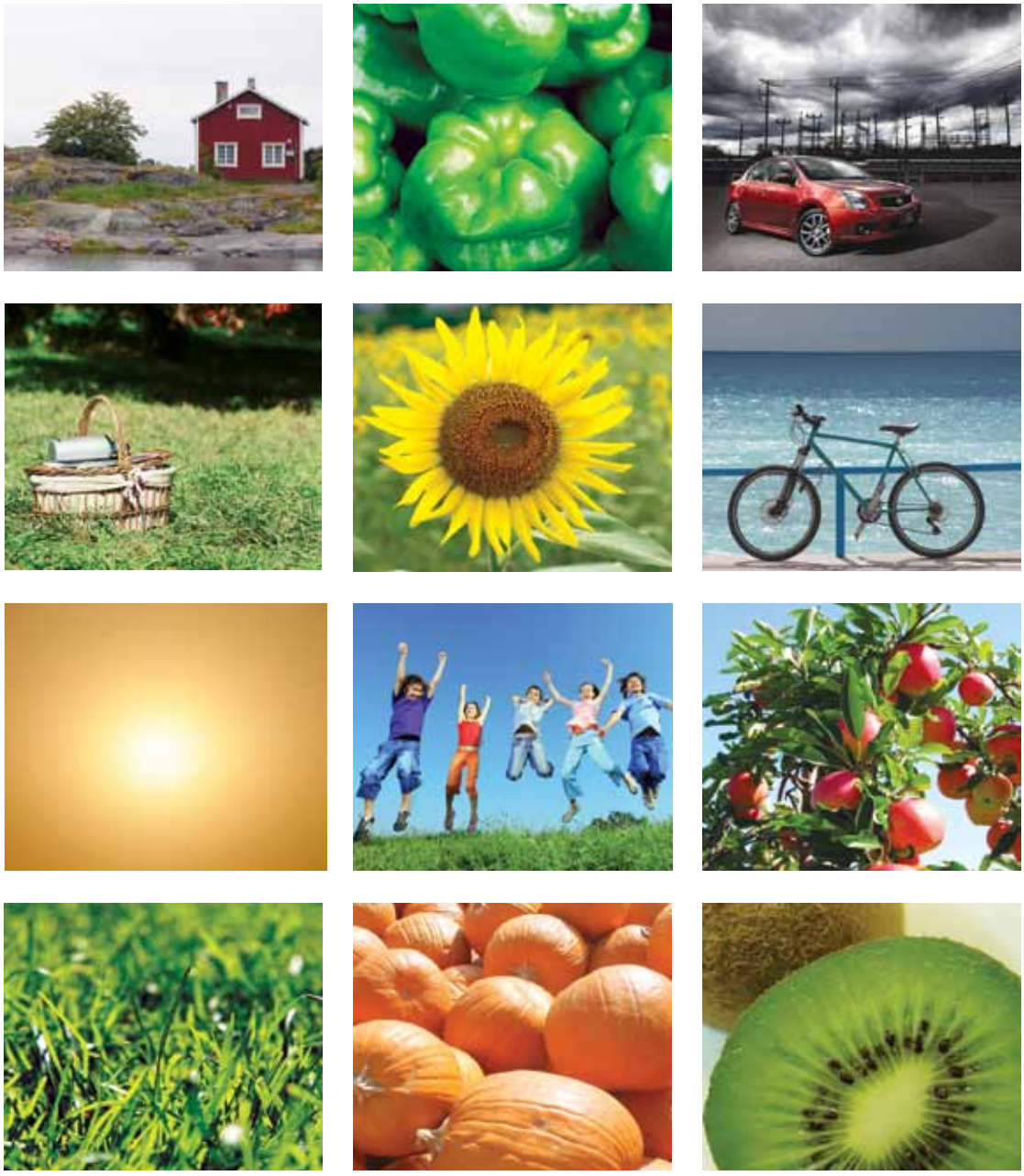
How do we depend on pollinators?

Why is the population of pollinators declining?

What can we do to help pollinators?

Appendix F3

How we depend on pollinators



Photos (clockwise): Jani Hailen, Alice Henneman, Eric Malette, Ian Britton, Cindy, Addison Berry, Martina Yach, Jeremy Brooks, Jalal Bhatti, Kaitlyn Rose, Nyamuru Kamome and Ruth

G

Math, science, language, social science, arts

Celebrating biodiversity: Maintaining the natural balance

TIME REQUIRED

120 mins + discussion and project work

WHAT YOU NEED

A coat hanger (for each student)

White paper & construction paper

String & scissors

Single-hole punch

Markers and crayons

Appendix, p. 170 Peer assessment/self-assessment (for each student)

RESOURCES

Appendix G1: What is biodiversity? What is a species at risk?

Books, articles, and Internet access

Guiding question

Why is biodiversity important to the natural balance of life?

What's the point?

In this lesson, students research a plant or animal that lives in their province and make a hanging mobile to present to the class. The Earth contains an incredible diversity of wildlife that creates a complicated web of interdependence. It is important to remember that we share the planet with hundreds of thousands of other life forms and that our activities can have a positive or negative effect on them. By observing living things, we can become more connected with, and protective towards, the natural balance on which all life depends.

Suggested strategies for assessment

Assess student mobiles using the Achievement Chart (see the Assessment Appendix, p. 165).

Assess students' presentation of their mobiles using the Oral Communication Rubric (see the Assessment Appendix, p. 169) and the Arts Rubric (see the Assessment Appendix, p. 167).

Ask students to complete the Peer Assessment/Self-Assessment for their mobiles (see the Assessment Appendix, p. 170).

Hook

View David Suzuki's video *Why Biodiversity Matters* at davidsuzuki.org/youthandnature/g.

What you do

Part A: Outdoors

1. Have students conduct a survey of the variety of species (trees, plants, animals) in their schoolyard or surroundings. Discuss their findings. Use identification resources to help name species that are unknown to the students.

> **Teacher Tip**
>
> To reinforce their connection to nature, ask students choose to a species that lives, or lived, in their community. To emphasize biodiversity, ask them to choose different species.

2. Have the students imagine what the area looked like before the school and surrounding community were built. For example, what variety and/or number of plants, trees, and water do they think existed? What animals may have inhabited the original landscape? What animals are still present and why?
3. Option: discuss the students' ideas or create a mural on the school asphalt using sidewalk chalk.

Part B: Classroom

1. Ask students what they know about biodiversity.
2. Review Appendix G1: What is biodiversity? What is a species at risk?
3. Use the Internet, non-fiction books, or other materials to research animal and plant species in their province. Ask students to choose one animal or native plant species that interests them and create a mobile to teach others about it. Potential pieces of the mobile include:
    - A picture of the species
    - A description of the characteristics of the species
    - Where the species lives or can be found
    - The role of the species in the ecosystem (for example, what does it eat, who eats it, how does it affect the ecosystem, what other species interact with it?)
    - The status of the species (at risk, threatened, least concern, or thriving)
4. Have the students create each mobile piece on white or coloured construction paper. Punch holes at the top of each mobile piece and attach different lengths of string. Attach the pieces to a coat hanger. Hang the mobile from the ceiling or walls in the classroom or school.
5. Ask students to present their mobiles to the class and make a short oral presentation on what they learned about their species. Then categorize the species as at risk, threatened, least concern, or thriving.
6. Discuss the diversity of the species studied and how they are connected.
7. Discuss further using the Reflection Questions.

Reflection questions

- How did going outside to imagine what lived here before there was a school or city affect your understanding of biodiversity and how we share the planet with hundreds of thousands of other living things?
- What benefits do humans receive from biodiversity?
- What impact does urban development (for example, houses, buildings, roads) have on biodiversity and nature?
- What was the most interesting thing you saw or experienced? Did you feel more connected to nature?
- How can living within nature's limits help protect species? Why is this goal important?
- Is this issue a local or global concern? Why?
- How can you apply what you learned about biodiversity to your Class Foundation project?

Taking it further

Computer/Internet

- Use computers to research the species of choice.
- Have students type up their information on the computer.

Community/Home engagement activities

- To learn about species at risk and what to do to help, go to davidsuzuki.org/youthandnature/g.
- Go into the backyard and ask family members to imagine what the area looked like before the house was there. Talk about having done a similar exercise at school.

Optional class activities

- Create a website instead of making a mobile.
- Make a private social website for your class, go to davidsuzuki.org/youthandnature/g to find out how. Students can post information about and pictures of their species.
- Take a trip to a local park or protected area and ask a guest speaker to explain the biodiversity of the local plants and animals still living there.

Additional resources and websites

See davidsuzuki.org/youthandnature/g to learn more about biodiversity.

Appendix G1 (1 of 2)

What is biodiversity? What is a species at risk?

What is biodiversity?

Biodiversity is a word for the variety of life on Earth. Biodiversity is all around us — from the tiniest insect to the vast northern forest and the coastal oceans.

There are different kinds of diversity:

- **Species diversity** is the number of species found in a certain habitat, region, or ecosystem. There are more than 30,000 species in Ontario alone.
- **Genetic diversity** is the diversity of genes within a species. Genes are the building blocks of life. They determine things like eye and hair colour. A high genetic diversity makes a species stronger, healthier, and more dynamic.
- **Ecosystem diversity** is the number of different ecosystems in a region. Ontario has many different ecosystems, such as forests, prairies, grasslands, lakes, streams, wetlands, and tundra.

Why is biodiversity important?

- **We're all connected.** Imagine all the maple trees disappeared. Not only would we miss their leafy shade, fall colours, and maple syrup, but we'd lose all the valuable oxygen, homes for birds and animals, and wood for buildings and furniture that maple trees provide. The look of our backyards, forests, and province would change forever. Every species on Earth, including human, is connected. We all rely on each other to survive.

Wild fungi growing in Ontario.
Photo: Eric Parker

- **It's valuable.** Many medicines are made from natural sources. If we destroy biodiversity, we could also be destroying life-saving medicines, many of which have not yet been discovered. We also rely on biodiversity for clean air and water, food, tourism, and outdoor experiences like hiking, fishing, and canoeing.
- **It needs protecting.** We have a responsibility to protect biodiversity for its own sake. The incredible variety of species in Ontario is a product of thousands of years of evolution. We need to protect biodiversity for future generations of Ontarians.

Adapted from Ontario Ministry of Natural Resources.

Appendix G1 (2 of 2)

What is biodiversity? What is a species at risk?

What is a species at risk?

Any naturally occurring plant or animal in danger of extinction or of disappearing from the province is called a species at risk. Once a species is classified as at risk, it is added to the Species at Risk Public Registry. There are four categories, or classes, of species at risk:

- **Extirpated:** a native species that no longer exists in the wild in Ontario but still exists elsewhere (for example, Greater Prairie Chicken)
- **Endangered:** a native species that faces extinction or extirpation (for example, Cucumber Tree)
- **Threatened:** a native species at risk that is in becoming endangered in Ontario (for example, Fowler's Toad)
- **Special concern:** a native species sensitive to human activities or natural events that may cause it to become endangered or threatened (for example, Monarch Butterfly)

Monarch butterflies are a species of special concern.

Species can become at risk because of habitat loss, pollution, climate change, and land development, as well as the spread of invasive species. By learning more about biodiversity and why we need to preserve and protect it, we can all work to maintain and restore the natural balance that all life needs to survive.

Adapted from Ontario Ministry of Natural Resources.

Math, science, health and physical education, language

Gone with the wind: Find ways to reduce home heating and electricity

TIME REQUIRED

90 min + homework and reporting

WHAT YOU NEED

Toilet paper

Scissors & tape

Pencils & a thermometer

Appendix H3: Gone with the wind (at home)

Appendix H4: Gone with the wind — what's the connection? (for each student)

RESOURCES

Appendix H1: All about energy

Appendix H2: Where energy comes from

Appendix H3: Gone with the wind — at home

Appendix H4: Gone with the wind — what's the connection?

Guiding question

How does reducing the amount of energy you use to heat your home or school help nature?

What's the point?

In this lesson, students make simple draft detectors to find drafts coming in through doors and windows in their home or school. Understanding how energy is wasted through inefficient buildings gets students thinking about energy conservation and the connection to the Earth's precious resources. Students are introduced to the ideas that not all sources of energy are sustainable, and that non-renewable resources need to be conserved so that we can begin to live within the limits of nature.

Suggested strategies for assessment

Assess students on responsibility, collaboration, and independent work using the Learning Skills Checklist (see the Assessment Appendix, p. 145).

Choose an Optional Class Activity and assess students using a tool from the Assessment Appendix.

Hook

In colder weather, open windows before students arrive to chill the classroom and simulate a draft. Discuss how drafts make it colder in the room, prompting people to turn up the heat. Make the connection between turning up the heat and the increased consumption of natural resources.

What you do

Part A: Outdoors

1. Take students outside. Compare the temperature outside to the temperature inside.
2. Investigate exterior gaps, cracks, or damage to the doors and windows of the building. In winter, talk about how the gaps, cracks, and damage could allow cold air to come inside and heated air to go outdoors. In summer, talk about how air conditioning works overtime to cool the hot air that is coming through the cracks. Discuss the impact on nature of this unnecessary heating and cooling loss. Explain that the increased consumption of Earth's resources contributes to the burning of harmful fossil fuels and climate change.
3. Visit the furnace room to try to figure out how the school is heated and/or cooled. Find out how much energy is used every month to heat or cool your school.

Part B: Classroom

1. Begin a discussion of where energy comes from and why a lot of the energy we use is called non-renewable. Explain that there are also sources of renewable energy. (Show the pictures in Appendix H2: Where Energy Comes From.) We use energy to heat and cool our homes. We also use energy to run factories and drive our cars, buses, trains, and airplanes. Using non-renewable energy from fossil fuels such as coal, oil, and natural gas produces greenhouse gas emissions, which contribute to climate change. Refer to Appendix H1: All About Energy.
2. Ask students why we should reduce the amount of energy we consume. Explain that using all of the Earth's non-renewable energy is not sustainable because eventually there will be none left. Instead, we need to find a way to live within the limits of nature. We can start by ensuring that the energy we do consume is used as efficiently as possible.
3. Connect this discussion to the students' trip outside and visit to the furnace room.
4. Ask students where they think heat loss occurs in buildings.
5. Ask each student to make a draft detector to use at school and at home. To make one, tape a piece of toilet paper about 12 centimetres by five centimetres to the side of a pencil.
6. Encourage students to notice how easily the toilet paper moves when they blow on it.
7. Using the draft detector, have each group explore key spots in the school (windows, lobby doors, gym doors, exhaust fans, and mail slots).

> **Teacher Tip**
>
> Ask the school for its energy bill (electricity and natural gas) and compare how much energy is used in the summer versus the winter.

8. Have students share their findings and what they think can be done to stop drafts. For simple ways to increase the energy efficiency of your school or home, refer to Appendix H1: All About Energy.
9. Give each student a copy of Appendix H3: Gone With the Wind — At Home and Appendix H4: Gone With the Wind — What's the Connection? Review the handouts and assign them to be completed at home.
10. Discuss using the Reflection Questions.

> *One way to think about the sun, every time you see it at dawn, is to think of it as an act of cosmic generosity.*
> *— Brian Swimme, physicist and mathematical cosmologist*

Reflection questions

- How did going outside to compare the temperature indoors and outdoors change the way you think about using energy?
- If drafts bring cold air from the outside, where is the warm air inside going?
- How is your school heated and how much energy is needed to keep it warm? What could be done to use less energy?
- What are some things we can do to keep our homes warm when it's cold outside?
- How is your energy use today important for tomorrow?
- What are the benefits and challenges of renewable energy? (Renewable energy examples include wind, solar, and geothermal.)
- List three places you can use your draft detector at home.
- How does the way we use energy in our homes affect the rest of the world and nature?
- How can you apply some of these ideas to your Class Foundation project?

Taking it further

Mobile device

- Ask students to take pictures of areas in their homes or school where energy is being wasted. Have them display the pictures on a bristol board with a written explanation of ways to reduce the energy loss in those areas.

Community/home engagement activities

- With the help of family members, complete Appendix H3: Gone with the wind — At home and Appendix H4: Gone with the wind — What's the connection?

Optional class activities

- Teach students how to make a draft sock. For instructions, check out davidsuzuki.org/youthandnature/h.
- Have students explore the concept of insulation by conducting an experiment on different ways to keep something warm (for example, a bottle of warm water, freshly boiled egg, or a baked potato).
- Have them identify the best materials and ways to reduce heat loss by using things like polar fleece, an electric blanket, tin foil, a sunny window, a hot water bottle, newspaper, cardboard, and an emergency reflective blanket. With the following questions, make the connection between how we heat our homes and how we can reduce energy use: Why did some materials work better than others? Why might results vary between groups? What does this finding tell us about heat loss? Where did the heat go? How does this finding relate to your use of energy at home? Do a similar experiment with the challenge of keeping something cold.
- Encourage students to design an energy-efficient home of the future. Ask them to consider heating, cooling, appliances, lights, trees, and anything else you can think of. (For assessment, use the Achievement Chart in the Assessment Appendix, p. 165, or Arts Rubric, in the Assessment Appendix, p. 167.)
- Develop a math activity to determine how much energy the school could save by lowering the thermostat by two degrees. Multiply that energy use over a day, a week, a month, and a school year. Then discuss how the students could wear sweaters and their energy consumption would decrease.

Additional resources and websites

See davidsuzuki.org/youthandnature/h to learn more about reducing home heating and electricity.

Appendix H1 (1 of 2)

All about energy

Energy is in everything. We use it for everything we do, from playing basketball to baking cookies to sending astronauts into space. Energy comes from nature and in different forms.

When we use electricity in our home, the electrical power may have been generated by burning coal, a nuclear reaction, or a hydroelectric dam. When we fuel up our vehicles, the source might be petroleum or ethanol. Ethanol is made by growing and processing corn.

When we burn fossil fuels to produce energy we release carbon dioxide and other chemicals into the air. This process contributes to climate change and air pollution.

Renewable versus non-renewable energy

Energy sources are divided into two groups:

Renewable energy comes from sources that can be used again and again, and they will never run out. As a result they are called sustainable. Examples include energy from sunlight, wind, running water, and tides; from the biomass of things like trees or corn; and from geothermal heat generated deep within the Earth.

Non-renewable energy comes from sources we are using up and cannot easily replace in a short time. These sources of energy are considered unsustainable. Non-renewable energy resources come from fossil fuels and nuclear power. Coal, petroleum, natural gas, and propane are all considered fossil fuels because they were formed from the buried remains of plants and animals that lived millions of years ago. Uranium ore, a solid, is mined and converted to a fuel used at nuclear power plants. Uranium is not a fossil fuel. It's a non-renewable fuel.

Adapted from the U.S. Energy Administration's Energy Kids.

Energy use at home

The majority of homes in Canada are heated and cooled using non-renewable sources.

Home heating in Canada accounts for nearly 60 per cent of the energy used in the home. As homes get bigger, the demand for energy increases. Bigger homes use more energy because there's more space to heat, cool, and light. There are also more windows that can increase heat loss.

A few simple actions can help you save energy and nature.

Here are a few tips:

Reduce the amount of energy you use to heat and cool your home. By quickly closing your door when you enter a building or turning down your thermostat and putting on a sweater. Opening your curtains on a sunny winter day and closing them on a sunny summer day.

Install a programmable thermostat.

This little gizmo turns the heat up and down automatically. It can lower the temperature when you are sleeping and raise it just before you get up in the morning. It only costs about $50 and you can find one at a

Appendix H1 (2 of 2)

All about energy

hardware store. By installing one in your home, your family can save 10 per cent or more of its heating costs.

A programmable thermostat.
Photo: David Francis

Keep your furnace clean and tuned.

This job calls for professional help, and it's worth it. A properly tuned furnace burns cleaner and saves energy. Check with your family to see how often the furnace gets cleaned and the filter gets changed.

Install proper weather stripping and caulking.

If all the air leaks in an average Canadian home were combined, they would form a hole as big as a basketball. No wonder houses can feel drafty. Find out how your family can put proper weatherstripping in your house where it leaks. Then learn how to caulk your doors and windows. By doing just this step, you can reduce your heating bills by a whopping 25 per cent.

Get an energy audit done on your home.

An energy audit will tell you where you are wasting the most energy and money, and give you tips on how to reduce both energy loss and costs. An energy audit costs about $200 to $300, but it will easily pay for itself in no time because of lower energy bills. Many provinces also have programs to reimburse homeowners for some of the costs of making their homes more energy efficient.

Keep looking for ways to save energy

Not all improvements work for all homes, but here are a few more ideas that might apply to yours:

- Use drapes or blinds to completely cover your windows at night, in winter, and during the day in summer.
- Use plants near patio doors and large windows to insulate and shade your home.

By ensuring that you are heating your house and not the outdoors, you can make a real difference. Encourage your family to look at the money they can save, as well as the impact they can have on nature by doing just a few simple things.

Appendix H2

Where energy comes from

Sources of energy

Oil rig

Oil sands

Coal mine

Natural gas plant

Solar panel

Windmill

Photos (clockwise): Tsuda, Kris Krüg, Jackson Carson, Emily, Andrew Freese

Appendix H3 (1 of 2)

Gone with the wind — at home

What you do

1. Find out how your home is heated. Identify the types of fuel and how heat gets to the rooms. Record what you find (your data) using the chart below. Come to school ready to discuss what you've learned.

Make sure your parent/guardian signs the bottom of this page to let your teacher know that you completed your homework.

How is your home heated? (For example — sunlight, wood, hydroelectric power, or fossil fuels)	**What types of fuel are used to heat your home?** (For example — wood, coal, petroleum, or natural gas)	**How does the heat get into the rooms in your home?** (For example — fireplace, furnace, baseboard heaters, or radiators)

2. Use the draft detector you made at school to find drafts in your home. Try to find up to 10 drafts in different places in your home. Record what you find (your data) using the chart below. Rate the draft using a number from 0 (no draft) to very big (10). Bring the sheet back to school with you.

Test No.	**Location** (For example — windows, doors, fans, fireplace, porches, steps)	**How is the area heated?**	**How big is the draft?** 0 = no draft 10 = very big
1			
2			
3			

Appendix H3 (2 of 2)

Gone with the wind — at home

Test No.	**Location** (For example — windows, doors, fans, fireplace, porches, steps)	**How is the area heated?**	**How big is the draft?** 0 = no draft 10 = very big
4			
5			
6			
7			
8			
9			
10			

3. Now list three ways you could use renewable energy in your own home.
(For example, install solar panels on your roof)

1
2
3

Parent/Guardian's Signature: _____

Appendix H4

Gone with the wind — what's the connection

1. Were you surprised by anything you found? Explain.

2. List three ways we make heat in our homes. What are the pros and cons of these methods?

3. The size of houses has been growing steadily since the 1950s. How does this affect nature?

4. List six ideas your family has about how you can work together to save energy at home.

5. Animals don't need to heat their homes the same way we do. How do they stay warm?

Science, health and physical education, language

In limbo:
Decrease your energy consumption

TIME REQUIRED

35–40 min + discussion

WHAT YOU NEED

Energy use cards

Limbo bar or rope

Space for the class to move

RESOURCES

Appendix I1: In limbo

Appendix I2: Energy use cards

Appendix I3: Energy source images

Guiding question

What can we do to reduce energy use in our homes to help us live within the limits of nature?

What's the point?

In this lesson, students learn where energy comes from and gain a better understanding of how efficient their home appliances are and how to decrease their energy consumption. This awareness helps students understand that their energy use choices can help us live within the limits of nature.

Suggested strategies for assessment

Assess student participation using the Learning Skills Checklist (see the Assessment Appendix, p. 145).

Assess students using the Anecdotal Notes Organizer (see the Assessment Appendix, p. 171) and the observation question.

- Observation question: Do students understand how appliances can waste energy or save energy, as well as how energy use relates to math?

Hook

Have the class brainstorm to create a list of household appliances. Write this list on the board and decide which appliance they think uses the most energy.

What You Do

Part A: Outdoors

1. Take students on a "green energy hunt" to find where green energy is being used in the community (for example, solar panels, windmills, and hybrid vehicles).
2. Challenge them to find other places where green energy could be used.

> **Did you know?**
>
> The average home in North American causes more than twice the greenhouse gas emissions of the average vehicle.
>
> *Source: David Suzuki's Green Guide (Greystone, 2008)*

Part B: Classroom

1. Ask students to discuss where electricity comes from.
2. Have students brainstorm to create a list of different renewable sources of electricity (for example, solar, wind, and hydroelectric) and non-renewable sources of electricity (for example, coal mines, oil sands, natural gas, and nuclear power). Show students images of different sources of electricity (see Appendix I3: Energy Source Images) and ask students the following questions:
3. What impact does each source have on nature?
4. Which sources of energy are sustainable and help us live within the limits of nature?
5. Ask students to brainstorm to create a list of how we waste electricity. Introduce the idea of time-of-day usage (see Appendix I1: In limbo) and discuss when people use the most electricity and when they use the least.
6. Ask students to brainstorm to create a list of the electrical appliances used around the home.
7. Explain that the next activity will focus on five appliances: the microwave, clothes dryer, clothes washer, television, and dishwasher.
8. Ask students to rank these appliances according to how much energy they think each uses in one hour.
9. Ask the class which appliance they think is the biggest energy user.

Reveal the actual ranking as follows:

Appliance	Watts (per hour)
Aquarium	50–1,210
Clothes dryer	1,800–5,000
Clothes iron	1,000–1,800

Appliance	Watts (per hour)
Clothes washer	350–500
Computer monitor (asleep/awake)	less than 30/150
Dishwasher	1,200–2,400
Hair dryer	1,200–1,875
Laptop computer	50
Microwave	750–1,100
Refrigerator	725 (but it's always on!)
Television	65–170
Toaster	800–1,400
Vacuum cleaner	1,000-1,440

For more information regarding energy usage in the home, refer to Appendix I1: In limbo. Point out the following:

- All the numbers are average ranges. The ranking will vary depending on how much the appliance is used. This list only indicates the amount of energy used each hour.
- Energy use can vary because of make, model, and year of the appliance.
- Results can be different between standard appliances and those appliances qualified as Energy Star.

Source: US Department of Energy

Limbo game (outdoors)

1. Set up a horizontal limbo bar with volunteers holding each end of the bar.
2. Demonstrate the limbo dance. (That's a dance where a person bends backwards to pass under a horizontal bar which is raised or lowered.)
3. Have students line up in front of the limbo bar.
4. Select a card from Appendix I2: Energy Use Cards.
5. Have students listen as you read the card.
6. As a group, decide whether the bar should be raised or lowered. Raise the bar for an efficient energy use. Lower the bar for an inefficient energy use.
7. Begin with one student passing under the limbo bar.
8. Repeat until all students have had a turn.
9. Discuss using Reflection Questions.

Reflection questions

- What kinds of green energy sources did you find on your hunt? Is your community using enough green energy? Why or why not?
- Why does the fridge use so much energy compared to other appliances when it uses such a low amount of energy each hour?
- What did the energy wasters have in common? The energy savers?

> "A citizen of an advanced industrialized nation consumes in six months the energy that has to last the citizen of a developing country his entire life."
>
> *— Maurice Strong, senior adviser of the United Nations and World Bank*

- Now that you understand how much energy different appliances use, how will it affect how you use them? What impact could that have on nature?
- What will you do to help your family to understand the information that you've learned?
- What other questions do you have about the energy you use every day? Could you try to answer one of them through your Class Foundation project?

Taking it further:

Community/home engagement activities

- Read about how an appliance qualifies for the Energy Star program. Visit davidsuzuki.org/youthandnature/i.
- Ask students to look around at home and list any appliances with the Energy Star label.

Optional class activities

- Ask students to brainstorm to create a list of the top 10 ways they waste energy at home. Then identify the top 10 ways they could save energy.
- Take students on a field trip to a hydro plant or hydroelectric dam if there is one nearby.
- Evaluate your school's energy efficiency. Have the custodian come in and take the class for a walk around the school to discuss the appliances your school uses. Do any of the appliances have an Energy Star label?
- The Hydro One Appliance Calculator can help approximate electricity usage based on minutes, hours, and days. Get students to experiment with the calculator in class or at home at davidsuzuki.org/youthandnature/i.

Additional resources and websites

See davidsuzuki.org/youthandnature/i to learn more about decreasing energy consumption.

Appendix I1 (1 of 2)

In limbo

In Canada, appliances and electronics account for about 13 per cent of household energy use. Have a look around your house. You may be surprised how many appliances you find. Appliances use a lot of energy, so it's best to make sure the ones you use are energy efficient. Less manufacturing is required to make them, which means less pollution. Plus, they lower your family's energy bills.

If your family needs to replace any of its appliances, they should look for the Energy Star label to ensure they're buying the most efficient appliance they can afford.

Refrigerators

These appliances use the most energy of any home appliance because they are on all the time. Here are some tips to make the best use of your fridge:

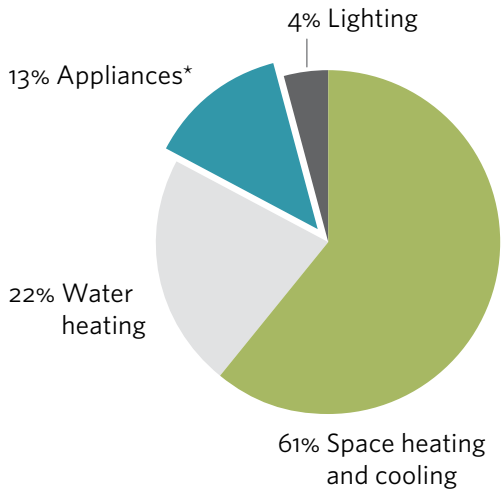
- Make sure the fridge isn't sitting in direct sunlight. That way, it doesn't need to compete with the extra heat while trying to keep the inside temperature cold.
- Place the fridge away from any heat sources. If you buy a new fridge, unplug your old one. By replacing 10-year-old refrigerators with new Energy Star models, you could save $40 or more a year. Unplug and recycle an old second fridge or freezer and save $85 to $125 a year.

Dishwashers

Is it better to use a dishwasher or to wash dishes by hand? It depends on how you use the dishwasher, what kind you buy, and how you wash dishes by hand. If you use a dishwasher (one with an Energy Star label), make sure it's full when you run it.

Use the air-dry feature or dry the dishes by hand.

ENERGY USE IN THE HOME



*30–40 per cent. More savings can be made by using Energy Star qualified appliances

Washers and dryers

Energy Star front-loading washing machines use 45 per cent less water and 65 per cent less energy than older machines. They also use less detergent and extract more water from clothes during the spin cycle, reducing drying time and wear-and-tear on your clothes.

Appendix I1 (2 of 2)

In limbo

An electric clothes-dryer can generate more than six pounds of greenhouse gases with every load. A clothesline generates zero. Hang-drying helps clothes last longer and smell better. It can save the average household about $100 a year in energy costs. Sunshine is also anti-bacterial and kills dust mites, so use an outdoor clothesline in summer and a drying rack in winter. If you do use a dryer, be sure to keep the lint filter clean to improve efficiency, and vacuum out the hose once a year.

Beware of vampire power! Unplug your devices when you are not using them.

Get rid of vampire power

Look around your home. Do you need all your appliances and electrical devices plugged in all the time? Many appliances use power even when they are switched off, and some of them use as much power as when they are turned on. A large number of electrical products — from air conditioners to DVD players — need to be unplugged to be completely switched off. What can your family do? At home, get someone to plug these devices into power bars, and turn the power bar off when they're not in use.

Adapted from Natural Resources Canada: nrcan.gc.ca

Two costs to consider

Once you know which appliances use the most and the least energy, you can make better choices for your home. When shopping for a new appliance, there are two costs to consider. There's the cost at the store and there's the cost to run it for years to come. A smart consumer will consider both costs before he or she buys any appliance.

Time-of-use-pricing and smart meters

When we're all using a lot of electricity at the same time, we create a peak demand period. In Ontario, peak demand happens in the afternoon in the summer, when air conditioners are cooling buildings at the hottest time of the day. Electricity usage is lower in the winter because most people heat their homes with natural gas, not electricity. But peak demand each day in the winter occurs after everyone has woken up in the morning (until about 10 a.m.) and when people get home to make dinner in the evening.

A primary consideration for any electricity system is being able to deliver enough electricity when it is most in demand. Electricity doesn't just flow from the wires in your home like water does from a tap. Instead, think of the electrical grid like a road system. Most of the time roads aren't very

Appendix I1 (3 of 3)

In limbo

busy and cars easily move along them. But during rush hour, the roads fill up. If there are too many cars, everyone is forced to slow down or even stop.

The electrical grid also works this way, so during peak demand periods, the system can fill up and make it hard to meet all of the electrical demands.

Too much demand can cause brownouts or blackouts where the system is forced to shut down. In the same way that many roads and highways are built to accommodate peak travel times, electricity systems are built to ensure enough electricity during peak demand. This capacity can be hard on nature because of all the additional electricity plants that must be built just to meet peak demand.

In many communities with conventional electricity meters, electricity rates are based on averaging the more expensive (daytime) and the cheaper (nighttime) prices of electricity, simply because our older meters can't report when it was used.

Smart metes are able to report when and how much electricity is used by your house every day. This reporting allows electricity companies to charge more for electricity during peak demand and less for electricity at other times of the day. As a result, there is an incentive for people to do things like their laundry later in the evening rather than during peak demand. Smart meters will lead to lower electricity consumption and reduced use of non-renewable energy.

Appendix I3 (1 of 2)

Energy use cards

Dry the washing on the clothesline.	Turn the oven on to heat up a slice of pizza.
Run the dishwasher half-full.	Use a slow cooker to cook dinner.
Put a hot dinner directly into the refrigerator.	Use solar lights on your garden pathway.
Fill the freezer up with food.	Use a programmable thermostat.
Run an empty freezer.	Put on a sweater when it is chilly.
Leave the lights on when you leave the room.	Leave your computer monitor on all night.
Draw the drapes at night in the winter.	Buy an Energy Star dishwasher.
Put a sensor in your classroom that will turn off the lights if there's no one in the room.	Take a long, hot shower.
Keep the drapes drawn on a sunny day in winter.	Cook a baked potato in a small toaster oven.
Insulate the hot water heater.	Unplug electrical appliances when not in use.

Appendix I3 (2 of 2)

Energy use cards

Leave the TV on when you leave the room.	Use 100-watt incandescent light bulbs.
Use a hot water bottle to heat up your bed.	Use a large fridge with only a few items in it.
Take a shower instead of bath.	Dry all of your clothes in the dryer for 90 minutes.
Replace your old dishwasher with a new Energy Star model.	Turn your computer monitor off at night.
Run your washing machine using cooler water.	Let the lint build up in the dryer filter.
Take a good long look in the fridge before deciding what you need.	Use compact florescent light bulbs.
Open the oven door every 10 minutes to make sure the cookies you're baking aren't burning.	Use the dishwasher, washer, and dryer in the late evening or at night.
Put a sensor in your classroom that will turn off the lights if there's no one in the room.	Take a long, hot shower.
Unplug appliances you don't need running constantly.	Use an on-demand hot water tank in your home.

Appendix I4

Energy source images

Sources of energy

Oil rig

Oil sands

Coal mine

Natural gas plant

Solar panel

Windmill

Photos (clockwise): Tsuda, Kris Krüg, Jackson Carson, Emily, Andrew Freese

Math, science, health and physical education, language, social science

Down the drain:
Learn how to conserve water

TIME REQUIRED

60–90 min + discussion

WHAT YOU NEED

Appendix J2: The ways we rely on water

Two two-litre empty pop bottles

Water

Liquid soap

Two large clear plastic tubs

RESOURCES

Appendix J1: Down the drain

Appendix J2: The ways we depend on water

Appendix J3: The world supply of water

David Suzuki Foundation

Guiding question

How does the water you use every day affect the rest of the planet?

What's the point?

In this lesson, students explore their dependence on water through a brainstorming activity. They consider how they waste clean water every day and think about changes they can make to live within the limits of nature. By understanding that clean water is a precious resource, students begin to appreciate the importance of conserving water to sustain the Earth's freshwater supply.

Suggested strategies for assessment

Assess students' overall performance using the Learning Skills Checklist (see the Assessment Appendix, p. 145).

Choose an Optional Class Activity and assess students using a tool from the Assessment Appendix.

Hook

1. To demonstrate the world water supply, fill a two-litre container with water. Explain to the class that this water represents all the water on Earth.
2. Pour 60 millilitres of this water into another container. Explain that the remaining water in the container represents all the salt water on Earth, so it can't be used for drinking.
3. Take the other 60 millilitres of water and pour 40 millilitres into another container. This 40 millilitres represents all the water that is frozen on Earth. We can't use that for drinking either. Only the 20 millilitres remaining can be used for drinking.

4. Discuss the importance of conserving water so that we can continue to use it for all our day-to-day activities.
5. Ask students what they think they can do in their own homes to conserve water.

What you do

Part A: Classroom

1. Give each student a copy of Appendix J2: The Ways We Depend on Water.
2. Divide the class into four groups. Assign each group one of the following areas:
   - At home (indoors)
   - At home (outdoors)
   - At school
   - At play
3. Have each group brainstorm five ways they use water in their area. Have each student list his or her group's ideas on the worksheet.
4. Ask a representative from each group to share the group's ideas. List the ideas on the board and have the rest of the class fill out the remainder of their worksheets.
5. Begin a discussion of our dependency on water in our day-to-day lives.

> Between earth and earth's atmosphere, the amount of water remains constant; there is never a drop more, never a drop less. This is a story of circular infinity, of a planet birthing itself.
>
> *— Linda Hogan, author*

Explore how much water we use

1. Ask for two volunteers. Provide a two-litre pop bottle full of water to represent a faucet, one squirt of liquid soap, and one clear plastic tub to catch the water.
2. Select one volunteer to be the hand washer and one volunteer to be the water pourer. Have the rest of the class observe.
3. Provide the washer with one squirt of liquid soap. Have the student wash his or her hands over top of the plastic tub. Tell the pourer to flow the water over the washer's hands until the bottle is empty. (The hand washer may not be able to finish washing his or her hands.)
4. Using a second clear tub, repeat steps one to three by having the pourer provide water only for wetting and rinsing hands (not free flowing).
5. Compare the amount of water in both tubs and discuss how much water was conserved in the second attempt. Discuss the effectiveness of both methods and how students can change their hand-washing habits to conserve water.

Part B: Outdoors

1. Go on a walk around your community to find sources of water (for example, puddles, sewers, rain barrels, rivers, and sprinklers). Discuss how the water is being used.
2. If you visit a nearby stream, river, or pond, have the students look for different creatures in and around the water source. What do they see? How do the creatures they see depend on the water? Where does the water come from and where does it go?
3. Discuss the differences between the types of water you see. What sources of water could the students drink? Is any water being wasted? What are some ways that water could be conserved (for example, collecting rainwater in barrels to water plants rather than using a hose)?

Home follow-up activity

1. Ask students to brush their teeth at home that evening and the following morning in two ways:
   - As they normally would with the faucet running (evening)
   - Turning the faucet on and off as needed (morning)
2. In both scenarios, ask students to keep the drain plugged so they can compare their water usage.
3. Discuss the students' findings and share using the Reflection Questions.

Reflection Questions

- During your walk outside, what did you discover about the way water is used in your community? How can we change our water use to have a positive impact on nature?
- In what ways do you depend on water? Do you think you could use less water in your daily lives in order to live within the limits of nature? How?
- Do you think all regions of the world have the same access to freshwater as we do in Canada?
- What will happen if humans in developed countries continue to use water at the present rate?
- Why is it important to conserve freshwater?
- What impact does our use of fresh water have on nature?
- How can you apply some of these ideas to your Class Foundation project?

Taking it further

Community/home engagement activities

- Challenge family members to take action by cutting back on their daily water consumption. Have students sit down with their family and look at the water consumption on their utility bill, then draw up a plan to conserve water. Have students chart their water usage over six months to see if the changes they make have a difference on their overall consumption. Visit your local water treatment plant. Find out where your community's water comes from and how the water is cleaned before and after it comes out of the tap.

Optional class activities

- Have students write a song about the importance of conserving water, using the tune of a familiar childhood song. Visit davidsuzuki.org/youthandnature/j for examples of water conservation songs.
- Have students sing their songs over the school PA system. (For assessment, use the Peer Assessment in the Assessment Appendix, p. 170.)
- We depend on water for our survival. Have students choose a developing country and research its water use. Compare that country's water use to Canada's. Have students write a reflection about the differences in the amount of water used in the two countries. (*See You Are the Earth* by David Suzuki and Kathy Vanderlinden, p. 47.) Start a discussion about how we can inspire others to be aware of the water they use. (For assessment, use the Achievement Chart in the Assessment Appendix, p. 165.)
- Place a rain barrel in the schoolyard. At the end of the week, go outside and look at the water the barrel has collected. Use the collected water to water the plants around the schoolyard. Have a class discussion about how the class has helped nature.

Additional resources and websites

See davidsuzuki.org/youthandnature/j to learn more about water conservation.

Appendix J1

Down the drain

Water is crucial to human survival. We use water for many daily activities like cooking, cleaning, washing, and drinking.

Here are a few tips that will help you save water:

Reduce the amount of time you spend in the shower. By minimizing the duration of your showers, you'll also reduce the amount of energy used to keep that water nice and hot.

Water your lawn in the evening. And use a soaker hose instead of a sprinkler. If a particular plant needs more water, give the plant what it needs but don't water the whole lawn. Half of the water used on lawns is lost to evaporation or runoff caused by overwatering.

Wash your car with a bucket and sponge. Environment Canada estimates that using a running hose to wash your car can waste about 400 litres of water. To stop all that beautiful drinking water from washing down the street, fill a bucket and use a sponge before quickly rinsing your car with a hose. If you use a trigger nozzle on the hose as well, you can save about 300 litres of water every time you wash your car.

Source: Environment Canada

Repair leaky faucets and replace water-inefficient devices. Repair all leaky faucets and toilets. A leak of one drop every second results in about 10,000 litres of water lost over a year. That's the equivalent of 70 baths. Retrofit by adapting or replacing older water-using appliances and devices with newer ones that are more efficient:

- Installing a low-flow showerhead costs as little as $20 and reduces water flow by half.
- Replace your toilet with an ultra-low volume (ULV) model. Standard toilets in Canada use 18 litres of water every flush, while ULV toilets reduce the amount of water flushed to 6 litres. That means you'll reduce your water consumption by 66 per cent every time you flush.

  Source: Natural Resources Canada
- Check out dual-flush models that allow you to control the water required to flush. And see if your local water authority provides rebates for replacing your old toilets with water-efficient models.
- If you're thinking of purchasing or replacing a washing machine, buy a model with the Energy Star label. These washers use half the water and 37 per cent less energy than a regular washer. You'll save money on water and energy bills.

  Source: Energy Star

Appendix J2 (1 of 2)

The ways we depend on water

What you do

1. In your group, brainstorm five ways humans use water in your assigned area.
2. List your five ideas in the space beside your assigned area.
3. After you hear your classmates' ideas about their areas, fill in the rest of this worksheet.

At home (indoors)	1
	2
	3
	4
	5
At home (outdoors)	1
	2
	3

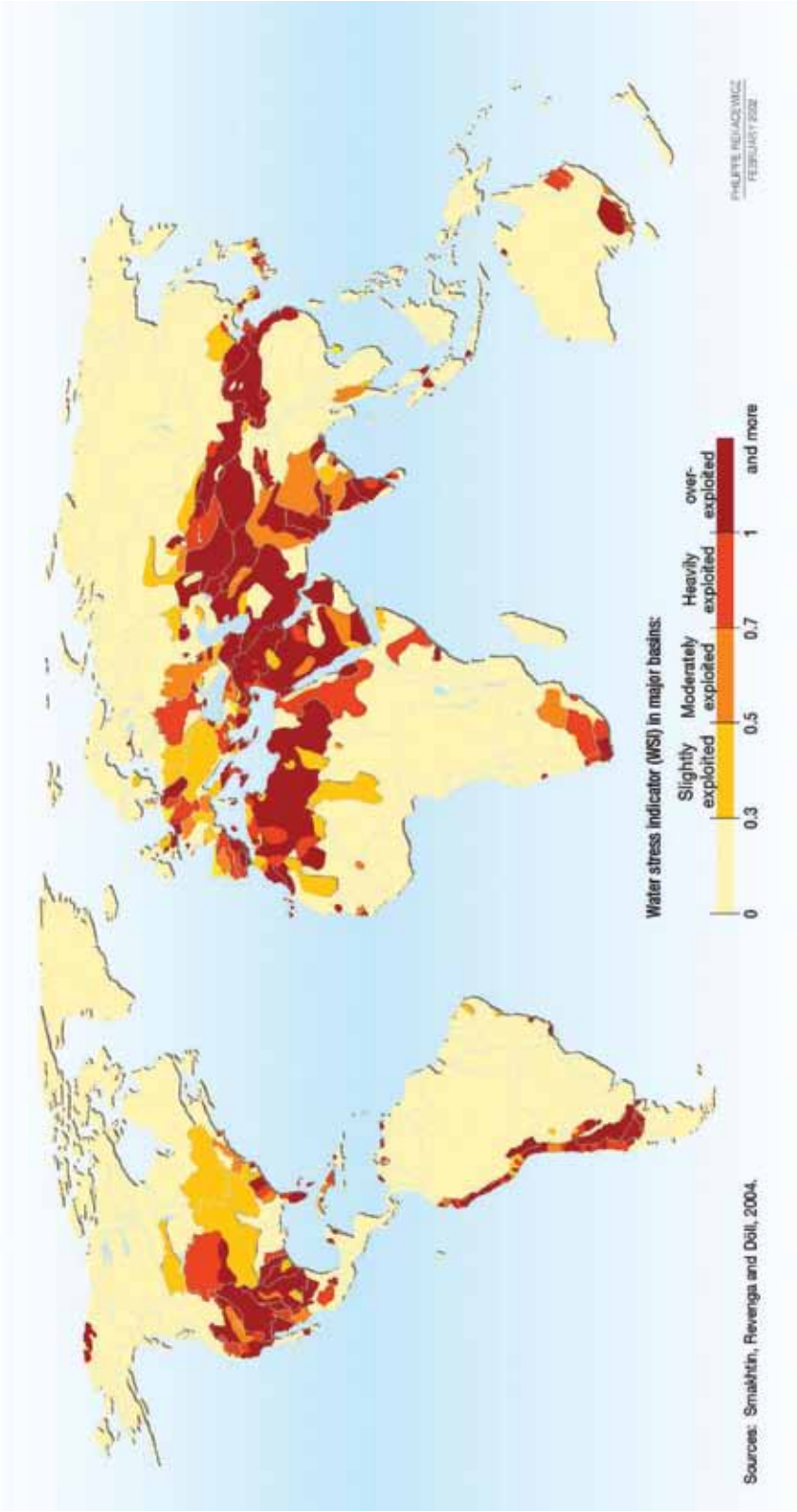
Appendix J2 (2 of 2)

The ways we depend on water

At school	1
	2
	3
	4
	5
At play	1
	2
	3
	4
	5

Appendix J3

The world supply of water



Math, science, health and physical education, language

Getting there:
Alternatives to the car

TIME REQUIRED

30–45 min + discussion

WHAT YOU NEED

Appendix K3: Scenario cards

Appendix K4: Choice cards

Scissors

Appendix K2: Getting there (for each group)

A transit map of your area (for each group)

RESOURCES

Appendix K1: Alternatives to the car

Appendix K2: Getting there

Appendix K3: Scenario and choice cards

Guiding question

What are the positives and negatives of leaving your car at home and finding another way to get around?

What's the point?

In this lesson, students are given different travel scenarios and asked to determine the most appropriate mode of transportation based on environmental and health impacts. As a result, students learn how to make lifestyle choices that can have a more positive impact on nature.

Suggested strategies for assessment

Assess group work using the Learning Skills Checklist (see the Assessment Appendix, p 145).

Choose an Optional Class Activity and assess students using a tool from the Assessment Appendix.

Hook

Write the following four transportation options on the board: walk, carpool, bus, and drive. Ask students to think about the environmental and health impacts of each method of transportation. Rank the methods of transportation according to their impact. At the end of the lesson, revisit the initial ranking to see if your choices have changed.

What you do

Part A: Classroom

> **Did you know?**
>
> Road transportation is the single largest source of greenhouse gas emissions and air pollution in Canada.

1. Introduce students to units of distance measurements, with an emphasis on kilometres.
2. Begin a conversation about the typical trips they take with their families. Have students brainstorm a list of common destinations and the average time required to get to those places in a car.
3. Ask students: What kind of energy does a car use? How does using this energy to run a car affect nature? See Appendix K1: Alternatives to the Car.
4. Now ask students to imagine that cars are no longer available. How else can they get to where they need to go? Record their ideas on the board.
5. Divide the class into small groups.
6. Give each group a scenario card and a choice card.
7. Have the students figure out how to make the scenario and choice work together and then ask them to complete Appendix K2: Getting There. Here is a completed example:
   - Scenario: Go to your music lesson 3 kilometres away (1-hour walk).
   - Choice: Rollerblade.
   - How: You would need to own rollerblades and have a safe route to take to your class, like a bike path.
   - Positive outcomes: You get to exercise and spend time outdoors.
   - Negative outcomes: Depending on the weather, you may not always be able to rollerblade, and you couldn't take a really big instrument along like a tuba!
8. As a class, review and compare each group's conclusions. Discuss similarities and differences. Challenge students to come up with their own scenario cards and choice cards.

Part B: Outdoors

1. Go on a walk around your school and have students keep a tally of the number of cars, buses, trucks, trains, bikes, and pedestrians they see. Also look for bus stops, bike racks, and parking lots.
2. Discuss the students' findings. Ask students: Why is a large number of motorized vehicles such a concern? How many bus stops are nearby? Are there bike racks in the schoolyard?
3. Share using the Reflection Questions.

Reflection questions

- Based on your walk outside, would you say more people drive or walk when they need to get around? What effect does that have on nature and your health?
- Why do you think we usually use cars to go places? Could this preference be changed? How?
- Imagine how your life could be different if your family got rid of its car. Imagine your family only had one car. How would this help nature?
- What are the ways other species get around?
- If your family were moving, what advice would you give them on where to live?
- What are some stories in your community about people who have changed the way they get around? How are they helping nature?
- How can you share these stories with others?
- What kind of project could you do through your Class Foundation to help encourage yourself and others to use alternatives to the car?

Taking it further

Community/Home engagement activities

- Encourage students to participate in a walk- or bike-to-school day. Use carbon calculators to measure the emissions they could save by choosing alternative transportation between their home and school. Find links to carbon calculators at davidsuzuki.org/youthandnature/k.
- Provide each student with a set of scenario and choice cards to take home so they can try the activity with parents or siblings.
- At least once a week, make a commitment with family to walk, bike, rollerblade, or skateboard to nearby locations instead of driving.
- Ask students to find elders in the community to talk about the modes of transportation when they were young. How was life different then? How common was it to fly or drive long distances? What were the advantages of not moving around as quickly as we do today?

Teacher Tip

On their walk, ask students to take pictures of alternative modes of transportation using cameras or mobile devices, and to display their photos in various formats (for example, a slide show or on a bulletin board).

Optional class activities

- Decorate a bulletin board with the title "Alternative Means of Transportation." Encourage students to bring in photos or magazine images of different methods of transportation.
- Have students create a map of their area or find a map and select 10 locations they regularly visit (for example, a grocery store, their school, or a mall). Have students locate their home and use a highlighter to trace the route from their home to each of the locations. For each route, ask students to choose which unit of measurement to use (centimetres, metres, or kilometres) to describe the route and to explain why this unit of measurement is most appropriate. Then have students label the map, using words or pictures, describing the type of transportation they would use for each route. (For assessment, use the Achievement Chart in the Assessment Appendix, p. 165).
- Alternatively, students could use Google Maps at maps.google.ca. This program allows users to map their journeys by car, bus, bike, or on foot. Have students type in their home address and their destination, and the transportation options will appear.
- Write letters to people in positions of authority (for example, the principal, city councillor, or member of parliament) about a transportation issue that the students would like to see change. Some examples include requesting more bike racks so that more students can bike to school or creating a carpool lane at the school drop-off zone. Encourage students to request things that will get more students walking or biking to school: more sidewalks, bike lanes, pedestrian-friendly intersections, and a walking school-bus program.

Additional resources and websites

See davidsuzuki.org/youthandnature/k to learn more about alternatives to the car.

Appendix K1

Alternatives to the car

Every time we find a way to get around that doesn't involve the car, we score one for nature. Depending on where you live, there are all kinds of alternatives to the car, like public transit, carpooling, and car sharing. Even if your family already owns a vehicle, you can reduce air pollution impacts by doing one less trip.

Use public transit

Public transit keeps people moving. Transit can involve buses, streetcars, subways, light-rail transit, commuter trains, or even city ferries. It is publicly funded and can be used by anyone in the community for a fee.

The next time you are on a bus, count the number of people inside. Each public bus takes about 40 vehicles off the road during rush hour, saving about 70,000 litres of fuel and reducing air pollutants by nine tonnes a year. Trams, subways, and other public trains have similar positive effects on the environment. Public transit helps make our air cleaner and ensures more people are getting exercise as they walk to and from their bus stop.

Share the ride

Carpooling or ride-sharing reduces pollution. If four neighbours who each commute 20 kilometres a day travel together, they will reduce their carbon dioxide emissions by 75 per cent

Sharing also reduces cost. Beyond the price of the car, insurance, repairs and gasoline add up. By ride sharing, people can save up to $360 a person each year.

Share a car

Transportation is the third largest household expense in Canada after taxes and shelter. A private vehicle is expensive to fuel, insure, and maintain. And the average car spends about 90 per cent of the time just taking up space. Car sharing has become very popular in communities across Canada. Instead of everyone owning a car, people share cars that are owned by an organization. You can have a whole fleet at your disposal for a fraction of the cost of owning a car. Every car shared replaces six to eight private vehicles on the road.

People join the car-sharing organization for a monthly or annual fee. Whenever they need a car, they simply reserve one. For example, if someone needs to attend a course on Thursday nights, he or she can book the car at that time every week. Everyone shares in the costs and no one has all the responsibility of owning the car.

There are many alternatives to owning your own car. Talk it over with family members and see what other ideas they can come up with.

Get active

Active methods of transportation include walking, biking, rollerblading, and skateboarding. These activities do not require the use of fossil fuels, have less impact on the air we breathe, and promote a healthy lifestyle.

Appendix K2 (1 of 2)

Getting there

How do vehicles affect nature?

Vehicles have a big impact on nature. They create air pollution and climate change, increase water pollution, produce solid waste, and use non-renewable energy.

Air pollution and climate change

- Cars contribute to the production of greenhouse gases and climate change.
- Climate change causes habitat loss for wildlife, with warmer temperatures affecting weather patterns, food sources, and available land.
- Cars also fill the air with exhaust, which leads to health problems for people.
- Air pollution can make it difficult for some people to breath, particularly on smoggy, hot days. Some people can have minor reactions to air pollution, and others can react by coughing, wheezing, or having difficulty breathing

Water pollution

- Rainwater on the road washes oils, gas, and pollutants off the road into storm sewers.
- Storm sewers lead to streams and rivers.
- The chemicals end up damaging the plants and animals in various water habitats

Solid waste

- Many parts of old cars are not recycled and instead pile up in landfills.
- Leaking oil and gasoline gets into soil, damaging plants and animals that live underground.

Energy use

- Auto production plants use up a large amount of energy, water, and steel to produce cars.
- Manufacturing oil and gasoline requires energy from sources that cause pollution.

Appendix K2 (2 of 2)

Alternatives to the car

What you do

1. In your small groups, you will be given two cards: one scenario card and one choice card.
2. Using the form below, find out if the two can go together to make a trip possible.
3. After you have worked through the task, list the positives and the negatives of such a trip.

Scenario:

Choice:

How would we do it?

Time required:

Impacts	Positive	Negative
Health		
Environmental		

Appendix K3

Getting there

Scenario cards

Pick up a snack at the store. 0.5 km away (7 minute walk)	Go to the movies. 10km away (2.5 hour walk)
Visit a friend's place. 1 km away (15 minute walk)	Go with your team to a soccer tournament. 50km away (12.5 hour walk)
Go shopping downtown. 5 km away (1 hour walk)	Go to school on a daily basis. 1km away (15 minute walk)
Take grandma to an appointment. 17 km away (4 hour walk)	Visit a local park/conservation area. 15km away (4 hour walk)
Go camping. 40 km away (10 hour walk)	Go to your music lesson. 50km away (45 minute walk)

Choice cards

Use rapid transit (GO train, monorail)	Take a school bus
Ride a bicycle	Use rapid transit (city bus, street car)
Carpool	Rollerblade
Walk	Take the subway
Skateboard	Drive

Math, science, health and physical education, language. social science

TIME REQUIRED

60 min + discussion

WHAT YOU NEED

Appendix L2: The dirty dozen (for each group)

Appendix L3: Cosmetic bottles checklist (for each group)

Appendix L4: Make your cosmetics (for each student)

Bowls and spoons for the students to mix their moisturizer and toothpaste

RESOURCES

Appendix L1: Know more about your cosmetics

Appendix L2: The dirty dozen

Appendix L3: Cosmetic bottles checklist

Appendix L4: Make your own cosmetics

David Suzuki Foundation

What's inside your personal care products?
Hunting down the dirty dozen

Guiding question

Why does understanding what's inside everyday products like cosmetics and toothpaste help protect our health and nature?

What's the point?

In this lesson, students bring personal care products to class and work in groups to analyze what's inside the products using the ingredients lists. Students then make their own moisturizer and toothpaste to take home. They learn that some chemicals commonly used as ingredients in everyday products can harm humans and nature. By learning to read labels and adopting healthier lifestyle choices, students and their families can reduce exposure to dangerous chemicals.

Suggested strategies for assessment

Assess students using the Anecdotal Notes Organizer (see the Assessment Appendix, p. 171) and the observation question.

- Observation question: Do students understand how some chemicals used as ingredients in everyday products can harm them and nature?

Assess students' group work using the Learning Skills Checklist (see the Assessment Appendix, p. 145).

Choose an Optional Class Activity and assess students using a tool from the Assessment Appendix.

Hook

Show students the video *Are Your Cosmetics Guilty of Causing Bodily Harm* at davidsuzuki.org/youthandnature/l. Afterward, ask, "What is a cosmetic?"

What students should bring to class

Ask each student to bring to class:

- Three cosmetic bottles or packages (for example, shampoo, body wash, deodorant, makeup, and fragrances) that have an ingredient list
- An assigned ingredient (for example, three teaspoons of honey) to make moisturizer and toothpaste
- Two small jars to take home their samples

Teacher Tip

This lesson could leave students feeling isolated or insecure because of the topic. If students do not purchase their own personal care products, they may feel powerless to bring about change. The outdoor component where students are in small groups discussing how they feel after doing the activity will be important for them to express any fears or concerns they have and to be supported by their peers.

What you do

Part A: Classroom

1. Ask students how many personal care products they use every day. Remind them to consider things like soap, toothpaste, deodorant, and shampoo. Ask for a show of hands of those who use one product, two products, and so on, up to 10 products daily. End by asking how many use more than 10 products daily.
2. Tell students that the U.S. Environmental Working group estimates that Americans use on average 10 products a day. Explain to students that we use these products directly on or in our bodies and then rinse them down the drain and into our rivers and oceans.

Cosmetic products analysis

1. Arrange the class into groups of three to conduct a cosmetic products analysis.
2. Make a master list on the board of the different types of personal care products students brought to class (for example, toothpaste, deodorant, shampoo, and lip balm). Ask each group to add one item to the list until you have good range of products.
3. Ask: Which type of personal care products do you think people use the most? When you, or members of your family, are shopping for these things, how do you choose which product to buy? What is the most important thing to consider when purchasing products?
4. Refocus attention by reading aloud Appendix L1: Know More About What's Inside Your Cosmetic Products. If you want to provide your class with more information, show the video Story of Stuff: Cosmetics. Find it at davidsuzuki.org/youthandnature/l.

5. Give each group a copy of Appendix L3: Cosmetic Bottles Checklist. Ask students to take turns recording the names of their groups' products on the checklist. Ask each group to elect one person to begin. (The first student selects one product and records its name. Then the checklist is passed to the next group member. The second student selects another product and records its name. Continue this process until all products are recorded.) Have the students work collectively to help the recorder identify the names of each of their products.
6. Give each group a copy of Appendix L2: The Dirty Dozen. As a class, read over the handout to familiarize students with the chemicals they will be searching for.
7. Remind students that it is important to read labels when they buy products. Have them locate the ingredient list on their bottles and use Appendix L2: The Dirty Dozen to identify which of the 12 most dangerous chemicals are contained in their products. Ask them to calculate the total number of dirty dozen chemicals used in each of their products. Tell the students that parfum is often the last ingredient in the list. (Cosmetic ingredients are listed in order of the quantity contained in the product.) Can't find the ingredient list? Ingredients must be listed on the package of all cosmetics sold in Canada unless the product is classified as a drug or "therapeutic product." This loophole allows many sunscreens, anti-aging lotions, hand sanitizers, and other products to avoid listing non-medicinal ingredients. Also, if the product is very small (for example, a lipstick or eyeliner), the ingredients may have been listed on an accompanying box, tag, tape, or card.
8. Have the groups share their findings with the class. Ask each group: What surprised you most while completing this activity? How many products contained no dirty dozen chemicals? Which product had the most? How many did it have? Did you analyze ingredients in organic products? What did you find?

Make your own moisturizer and toothpaste

1. Tell students that there are other ways to reduce their exposure to toxic chemicals. Provide each group of students with a moisturizer recipe and a toothpaste recipe, along with the tools they will need. Have students take out the ingredient they brought from home. Display the following recipes for students to follow. Multiply the quantity by the number of students in each group.

Teacher Tip

Encourage students to print and cut out their own Sustainable Shopper's Guide (see Additional Resources and Websites). This wallet-sized shopper's guide lists the dirty dozen chemicals to avoid when shopping for cosmetics. Students may use the guide to check the ingredient list on personal care products before they make a purchase.

Provide students with the recipe handout to take home and make with their family.

Moisturizer Recipe

Mix ingredients together in a bowl:

- 1 tsp tea with honey
- 1 tsp vegetable oil
- 1 tsp lemon juice

Toothpaste Recipe

Mix ingredients together in a bowl:

- 3 tbsp baking soda
- 1/2 tsp table salt
- 1 tbsp vegetable glycerin
- 10–15 drops essential oil (for example, peppermint, spearmint or cinnamon)

Did you know?

The largest organ of the human body is the skin.

2. Have students work in groups to make their moisturizer and toothpaste. Each student should have some moisturizer and toothpaste to take home and sample. Students may need to remix the toothpaste each time they use it.

Part B: Outdoors

1. Take the students outside to sit in small groups to discuss how they are feeling after completing this lesson.
2. Bring the students all together. Use reflection questions to explore their understanding.

Reflection questions

- What were some of the common feelings you discussed in your small groups?
- How do harmful chemicals in things like your shampoo affect you and nature?
- What are some things you can do to help limit the amount of chemicals you are exposed to in your personal care products?
- What kinds of things do you think the companies that make these products should do to help you make better choices? What can you do to encourage them to take those actions?
- How is this information going to affect your understanding of living within nature's limits? What will you do differently now? What are some ways you can share this information with your family?
- What could companies and governments do to better protect the health of consumers? How can you apply some of these ideas to your Class Foundation project?

Taking it further

Community/Home engagement activities

- Take home a copy of Appendix L4: Make your own two-ingredient cosmetics. Encourage your students to use these easy recipes as an alternative to store-bought products to reduce their exposure to harmful chemicals.
- Challenge your students to reduce the number of cosmetics they use each day. The average teenager uses 17 personal care products a day, the average woman uses 12, and the average man uses six.
- Be active in promoting positive change. Invite students to share the Campaign for Safe Cosmetics with family, friends, and other members of the community

Optional class activities

- Contact cosmetic companies, celebrities, or members of parliament to encourage them to begin the movement toward safe personal care products and open sharing of ingredients so consumers can make informed choices. Students can write letters or emails to see what response they get to their concerns.
- Design posters or a display board to inform the school community about the dirty dozen and to share the cosmetic recipes, helping others to avoid using harmful chemicals. Put up the posters and display board in the school. (For assessment, see the Achievement Chart in the Assessment Appendix, p. 165.)
- Have students enter their cosmetics in the EWG Skin Deep Cosmetics database and look at the results at davidsuzuki.org/youthandnature/l.

Additional resources and websites

See davidsuzuki.org/youthandnature/l to learn more about toxins in cosmetics.

Appendix L1

Know more about your cosmetics

What comes to mind when you think of pollution? Probably not your shampoo, soap, or toothpaste. But some of the chemicals found in personal care products aren't that pretty.

In 2010, the David Suzuki Foundation invited Canadians to pull back the shower curtain and participate in an online survey about toxic ingredients in cosmetics. We asked participants to check ingredient lists for 12 sets of chemicals — a dirty dozen ingredients linked to health and environmental concerns

The results are disturbing:

- Almost 80 per cent of products reportedly contained at least one of the dirty dozen ingredients.
- More than half of all products reportedly contained multiple dirty dozen ingredients.
- Participants were unable to locate ingredient lists on more than 1,000 products.

Consumers can try to avoid at least some toxic chemicals in their toiletries by checking the ingredient list before buying personal care products. But our survey results show how difficult it can be to avoid unhealthy chemicals because they are in so many different products.

Buyer beware is not enough when it comes to protecting human health and the environment from unnecessary toxic chemicals. The Canadian government needs to make companies have ingredient lists that are easier to read, and keep harmful chemicals out of our products in the first place. Ninety-eight per cent of survey participants agreed that Canada's cosmetic laws should be strengthened.

Appendix L2 (1 of 2)

The dirty dozen

1. BHA and BHT

These ingredients are used mainly in moisturizers and makeup as antioxidants and preservatives. They are also a hidden ingredient in some fragrances. BHT may be harmful to humans. Both chemicals can cause allergic reactions and other health problems. They also are harmful to fish and other wildlife.

2. Coal tar dyes

Look for the ingredient P-Phenylenediamine, colours identified as "C.I." followed by a five-digit number, or "FD&C" or "D&C" followed by a colour name and number.

Phenylenediamine is used in hair dyes. Other coal tar–derived colours are used in cosmetics. Colours may be contaminated with low levels of heavy metals, some of which are harmful to humans. This ingredient is of particular concern when used in cosmetics that may end up in our mouths, like lipstick.

3. DEA, Cocamide DEA, and Lauramide DEA

DEA and DEA compounds are used to make cosmetics creamy or sudsy. They can also make your skin and eyes itchy or sore and cause other health problems. They are harmful to fish and other animals.

4. Dibutyl Phthalate

This ingredient (pronounced thal-ate) is used mainly in nail polishes. In many other cosmetics, it can be hidden under the term parfum or fragrance. Dibutyl phthalate is absorbed through the skin. It can cause a variety of health problems in humans. It is proven to be very harmful to fish and other animals. It is banned in cosmetics in the European Union, but not in Canada.

5. Siloxanes

How do you find siloxanes? Look for Cyclomethicone, Cyclotetrasiloxane, Cyclopentasiloxane, or Cyclohexasiloxane.

Siloxanes soften, smooth, and moisten skin. However, they may hurt the skin, eyes, and lungs. They don't easily decompose and can remain in the environment long after they are rinsed down the shower drain. They are dangerous to fish and other animal species.

6. Formaldehyde-Releasing Preservatives

Look for DMDM Hydantoin, Diazolidinyl Urea, Imidazolidinyl Urea, Methenamine, Quarternium-15, or Sodium Hydroxymethylglycinate.

All of these ingredients are used to make cosmetics last longer. Formaldehyde can make your skin and eyes itchy and sore. It can also cause allergies and other health problems in humans. These preservatives are also toxic to fish and other animals.

Appendix L2 (2 of 2)

The dirty dozen

7. Parabens

Look for Paraben, Methylparaben, Butylparaben, or Propylparaben.

Parabens are widely used in cosmetics to make them last longer. They easily penetrate the skin and are suspected of causing health problems for humans.

8. Parfum

The term fragrance or parfum on a cosmetic ingredients list can actually be a mixture of dozens of chemicals. Companies want their fragrance recipes to be a secret, so they are not required to share those chemicals in the list of ingredients. Of the thousands of chemicals used in fragrances, most have not been tested for toxicity. Many of these hidden ingredients are irritants and can trigger allergic reactions and other health problems.

9. PEG compounds

Look for PEG and other chemicals usually including the letters -eth.

PEG compounds are widely used to make cosmetics "creamy." PEG makes your skin absorb products like moisturizers. These chemicals may be harmful to humans. They do not decompose easily, and they can stay in nature long after they are rinsed down the shower drain.

10. Petrolatum

This ingredient (mineral oil jelly) is used in a variety of moisturizers to keep moisture in the skin. It is also used in hair care products to make hair shine. It can be contaminated with harmful chemicals. The European Union restricts its use in cosmetics.

11. Sodium Laureth Sulfate

Look for sodium laureth sulfate and other chemicals usually including the letters -eth.

This ingredient is used in cosmetics as a cleansing agent and also to make products bubble and foam. It may be harmful to humans. It doesn't easily decompose and can remain in nature long after the product is rinsed down the shower drain.

12. Triclosan

This ingredient is used mainly in antiperspirants/deodorants, cleansers, and hand sanitizers to make them last longer and as an antibacterial agent. It can pass through skin and is suspected of being harmful to humans. Environment Canada has proven that triclosan is dangerous to fish and other animals because it doesn't easily decompose and can build up in nature after it has been rinsed down the shower drain. Because it is used so much, it may contribute to antibiotic-resistant bacteria. The Canadian Medical Association has called for a ban on antibacterial consumer products, including ones containing triclosan.

Appendix L3 (1 of 3)

Cosmetics bottle checklist

Product name	Toxic chemical			
	BHA and BHT	**Coal Tar Dyes** • Phenylenediamine • C.I. • FD&C • D&C	**DEA related ingredients** • DEA • Cocamide DEA • Lauramide DEA	**Dibutyl phthalate**
Example product		X	X	

Appendix L3 (2 of 3)

Cosmetics bottle checklist

Toxic chemical (continued)				
Formaldehyde-releasing preservatives • DMDM hydantoin • Diazolidinyl urea • Imidazolidinyl urea • Methenamine • Quarternium-15 • Sodium hydroxymethyglycinate	**Parabens** • Paraben • Methylparaben • Butylparaben • Propylparaben	**Parfum** (a.k.a. fragrance)	**PEG compounds** • PEG • Letters "eth"	**Petrolatum**
	×	×		×

Appendix L3 (3 of 3)

Cosmetics bottle checklist

Toxic chemical (continued)				
Siloxanes • Cyclomethicone • Cyclotetrasiloxane • Cyclopentasiloxane • Cyclohexasiloxane	**Sodium laureth sulfate** • Sodium laureth sulfate • Letters "eth"	**Triclosan**	**Total number of chemicals**	**Notes**
		X	6/12	
			/12	
			/12	
			/12	
			/12	
			/12	
			/12	
			/12	
			/12	
			/12	
			/12	

Appendix L4 (1 of 2)

Make your own cosmetics

Toothpaste

This all natural toothpaste is easy to make and lasts indefinitely!

3 tbsp	baking soda
½ tsp	table salt
1 tbsp	vegetable glycerin (found at health food stores or organic grocery stores)
3 drops	(optional) essential oil like peppermint or spearmint (start with small amounts as each of us react differently to essential oils)

Mix all ingredients together in small bowl until it makes a paste. Store it in a covered container.

Shampoo

Use once a week or as often as you like.

¾ cup	distilled water
2 bags	peppermint, chamomile, or black tea

Boil water and make tea. Steep for 5 minutes. Set aside to cool.

In another bowl, add:

¼ cup	liquid castile soap (comes in many varieties, including lavender, orange, and unscented)
½ tsp	salt
1 tbsp	(optional) witch hazel or aloe gel

Add tea to soap and salt. Stir. Store in pump or squeeze-bottle.

TIP: the mixture will want to separate, so mix again before each use.

Appendix L4 (2 of 2)

Make your own cosmetics

Lip balm

Ask an adult to help set up the double boiler, or heat the ingredients in a microwave for 1 to 2 minutes

½ cup	sweet almond oil (use avocado or olive oil if you have a nut allergy)
2 tbsp	grated beeswax
½ tsp	local liquid honey (antiseptic, astringent, and moisturizing properties)
5 drops	(optional) essential oil like peppermint, grapefruit, lemon, or lime

Add first 3 ingredients to the top bowl of the double boiler. Bring water to a boil. Once the beeswax is melted, remove bowl from heat. If you're using an essential oil, add it now. Let mixture cool. Store in a covered container.

NOTE: depending on your desired consistency, you may need to play with the amount of beeswax.

Dog shampoo

Pets need chemical-free products, too!

¾ cup	distilled water
¼ cup	liquid castile soap (comes in many varieties, including lavender, orange, and unscented). Or you can use vegetable glycerin.
1 tbsp	aloe gel
1 drop	anti-flea essential oils, like rosemary, lavender, peppermint, eucalyptus, spearmint, and citronella. Add a drop of each or purchase an anti-flea essential oil blend from a local herbalist or health food store.

Add all ingredients into an old squirt bottle. Shake before each use. Rinse well and avoid the area around your pet's eyes.

M

Science, health and physical education, language, social science

Round the year: Where and how is your food produced?

TIME REQUIRED

45–60 min + discussion

WHAT YOU NEED

Large diagram of the four seasons for posting on a bulletin board

A piece of scrap paper and a felt marker (for each student)

Tape

Grocery flyers and/or pictures of food

Pylons (plastic cones, usually orange, used to mark off areas)

Optional: Music

Optional: World map to examine the distance foods may travel

RESOURCES

Appendix M1: Seasonal foods

Appendix M2: Pumpkin patch

Guiding question

What are the benefits of buying foods grown in-season, naturally and locally?

What's the point?

In this lesson, students categorize produce grown in each season. By determining which crops belong in which season, students consider the benefits of eating seasonal, locally grown foods. Eating seasonal, locally grown foods cuts down on the resources used to produce and transport our food and allows us to eat healthier.

Suggested strategies for assessment

Assess student performance using the Learning Skills Checklist (see the Assessment Appendix, p. 145).

Assess student awareness using the Anecdotal Notes Organizer (see the Assessment Appendix, p. 171) and the observation question.

- Observation question: Are students able to identify which crops naturally grow in each season and the benefits of buying locally, naturally produced food?

Hook

Display a picture that shows local food being grown (for example, see Appendix M2: Pumpkin patch). Ask students to describe what is happening in the picture and identify the season. Invite them to share their own experiences picking or growing local produce.

What you do

Part A: Classroom

1. Post the large diagram of the four seasons on a bulletin board.
2. Discuss the kinds of foods grown in your community. Do any of the students' families have their own gardens? Does the school have a garden? What grows in the gardens? List some of the produce on the board.

> **Teacher Tip**
>
> Point out that some foods are available in more than one season and that different crops ripen at different times throughout the province. With your students, explore the concept of bio-region.

3. Assign one food to each child and ask that student to draw the food on large paper, or cut out pictures of the food from grocery flyers.
4. As a class, discuss when the foods needs to be planted, when they can be harvested, what is involved in harvesting them, whether they need to be processed, and where the food can be purchased. See Appendix M1: Seasonal Foods.
5. Have the students tape their food drawings to the relevant section of the diagram of the four seasons. Post the display in the school. You may also wish to create a section of the diagram for foods from outside the province or country.

Part B: Outdoors

1. Play the musical seasons game:
   - Take students out to the schoolyard.
   - Using pylons with a picture or colour representing each season, mark out four areas to represent spring, winter, summer, and fall.
   - Have students walk around the perimeter of the pylons (as in the game musical chairs).
   - Call out the name of a fruit or vegetable. The students jump into the area representing the season in which it is harvested. Students who go to the wrong seasonal area are eliminated from the game.
   - For reference, see Appendix M1: Seasonal Foods.
2. Take a class walk:
   - Walk through the community to view fruit trees and gardens. Identify the seasonal produce that you see during the walk.
   - Share observations under a tree at the end of your walk using the Reflection Questions.

Reflection Questions

- Did you see any seasonal fruit trees or vegetable gardens on our walk? Should we incorporate these types of plants into our schoolyard? What would be the benefits to our community? Which of the foods on your seasonal display do you eat regularly?
- Why is it better to eat local crops grown in season rather than local crops grown out of season in a greenhouse or from far away?
- What are some other important things to consider when you buy food?
- Where are some of the other places in the world that provide us with fresh produce? What are the impacts on nature from eating those foods instead of local and naturally produced foods?
- What do you think would be the biggest benefit to you and your family if you ate seasonal, organic foods?
- What kind of action could you take through your Class Foundation to help raise awareness in your community about the benefits of eating seasonal, locally grown foods?

Taking it further

Computer/LCD projector or overhead projector/Smart Board

- Display photos of locally grown produce. Ask students to categorize the produce into the appropriate season.
- Sort foods into their appropriate seasonal category using a Smart Notebook.
- Display Appendix M1: Seasonal Foods on a Smart Board or overhead projector. Ask students if they're familiar with the foods on the list.
- Display a map of the world and a map of the local area. Compare how far foods from other places and from the local area must travel.
- Visit Foodland Ontario to find out when seasonal produce is available in Ontario. Go to davidsuzuki.org/youthandnature/m.

Community/Home engagement activities

- Have parents assist students in documenting the foods they consume at home. Consider where the food came from and when they were grown. If they don't know, they can do the research as a family.
- As a family, visit a farm, greenhouse, or farmers market. Ask where the various foods are grown or sold. This activity can be combined with Lesson Plan N: Where's the Beef?

Optional class activities

- Help students understand the amount of time it takes to grow different kinds of foods. If you have a window in your classroom, germinate a variety of vegetables and herbs. Have the students record their growth and care. Once the vegetables are ready for planting, create a school garden or have students take the seedlings home to plant in their own yards. For herbs, continue to grow them in the classroom and offer taste tests or have students take them home to cook with.
- Create a rap, poem, or jingle. Challenge students to develop a creative way to remember which foods are grown in each season.
- Have students select one food grown in another country. Compare the journey of that food to their table and the journey of the same food grown in Ontario.

Additional resources and websites

Visit davidsuzuki.org/youthandnature/m learn more about food production.

Appendix M1 (1 of 2)

Seasonal foods

Seasonal foods

Depending on where and how your food is produced, there can be a big price to pay. And we don't mean just money. Here are some things to consider when buying food to eat. By choosing locally, naturally grown food, you help nature by reducing fossil fuel use and air pollution, including greenhouse gas emissions.

Imagine an apple. Where did it come from? Sometimes our apples come from close by. Sometimes they come from far away, like New Zealand. As you can imagine, when an apple comes from farther away, the transportation required to get it here causes air pollution and uses non-renewable fuel.

Did you know that there is a word for this?

Food-miles refers to how far food has travelled. An average meal in North American travels about 1,200 kilometres from the farm to the table. That's a long way. Imagine how much air pollution this journey creates from burning fossil fuels.

But how your food is produced can be even more important than where it is grown. Food-miles make up about 11 per cent of the overall carbon footprint of food, whereas how the food is grown makes up over 80 per cent.

For example, one study showed that lamb raised in New Zealand and shipped 18,000 kilometres to the United Kingdom still produced less than one-quarter of the greenhouse gases than local British lamb. Why? Because the British flocks were fed grains, which take a lot of energy to grow, while the New Zealand flocks were grazed on grass.

Another problem is the way food is packaged when it's shipped a long way. Producers don't want it to go bad, so they pack it unripe to ensure it will be ready when it gets to you. That can cause the fruit to be less nutritious than if it was picked in your area. The excessive packaging also uses more energy and creates more waste.

Sometimes, harmful chemicals are added to the food so that it won't get mouldy or go rotten on its journey. Using a lot of fertilizer or chemicals to help plants grow can also add significantly to how much energy is used to produce your food.

So what can you and your family do to help?

- Start by growing food in your own backyard. If you don't have your own garden, your family can join a community garden or find an allotment to rent some land. Your family can also join a food co-operative that shares the harvest from a large local garden, farm, or orchard. Or you can ask someone if you can grow food in their garden and share the harvest. Make sure to avoid using chemical fertilizers and pesticides.
- When possible, choose to buy food that is organic, or grown more naturally.

Appendix M1 (2 of 2)

Seasonal foods

- Buy your food from a local organic farmer. Your family can go to farmers markets or can ask your grocer to bring in more local and organic produce.
- Every time you choose fresh fruits or vegetables, take a moment to consider how and where it was grown. Many grocers now post where the individual produce they sell comes from. When your family buys food, try to choose food that has travelled the shortest distance.
- Eat at restaurants that buy as much of their ingredients as possible from local, organic producers. Don't be afraid to ask where your food comes from.

A girl picks some seasonal carrots from the garden.

Seasonal vegetables + fruits in Ontario

Spring: asparagus, beets, cabbage, carrots, mushrooms, onions, parsnips, radishes, rutabaga, spinach, sprouts, squash, and sweet potatoes + apples, rhubarb, and strawberries

Summer: artichoke, Asian vegetables, beans (green or wax), beets, bok choy, broccoli, cabbage, carrots, cauliflower, celery, corn, cucumber, eggplant, garlics, leeks, lettuce, mushrooms, onions, parsnips, peas (green or snow), peppers, potatoes, radicchio, radishes, rapini, spinach, sprouts, squash, sweet potatoes, tomatoes, and zucchini + apples, apricots, blueberries, cherries, currants, gooseberries, grapes, muskmelon, nectarines, peaches, pears, plums, raspberries, strawberries, and watermelon

Fall: artichoke, Asian vegetables, beans, beets, bok choy, broccoli, Brussels sprouts, cabbage, carrots, cauliflower, celery, corn, cucumber, eggplant, garlic, leeks, lettuce, mushrooms, onions, parsnips, peas (snow), peppers, potatoes, radishes, rapini, rutabaga, spinach, sprouts, squash, sweet potatoes, tomatoes, and zucchini + apples, blueberries, crabapples, cranberries, grapes, muskmelon, nectarines, peaches, pears, plums, raspberries, strawberries, and watermelon

Winter: beets, cabbage, carrots, garlic, leeks, mushrooms, onions, parsnips, potatoes, rutabaga, sprouts, squash, and sweet potatoes + apples and pears

Source: Foodland Ontario Availability Guide

N

Math, science, health and physical education, language

Where's the beef?
How can you help nature by eating less meat?

TIME REQUIRED

40–60 min + discussion and class trip

WHAT YOU NEED

11 clear containers

Small cotton balls (about 400)

Poster paper and writing tools

Small table for an information booth

RESOURCES

Appendix N1: How meat production and consumption affect nature

Guiding question

In what ways does eating less meat promote healthy, sustainable living?

What's the point?

In this lesson, students begin to understand how eating meat affects nature. They also showcase their learning by preparing an information booth for the school. Meat is one of the most resource-intensive (land, water, and energy) and waste-producing sources of nutrition. By choosing to eat less meat, we can live more sustainably and within the limits of nature. Eating less meat is also a healthier lifestyle choice.

Suggested strategies for assessment

Assess students using the Anecdotal Notes Organizer (see the Assessment Appendix, p. 171) and the observation question.

- Observation question: Are students able to identify the benefits of eating less meat and apply their knowledge to scenarios in their everyday lives?

Choose an Optional Class Activity and assess students using a tool from the Assessment Appendix.

Hook

Have students view a seven-minute video on the environmental impacts of consuming ground beef at davidsuzuki.org/youthandnature/n.

Ask the class: What do you think of the video? What are the connections between eating meat and living within the limits of nature?

David Suzuki Foundation

What you do

Part A: Classroom

1. With the class, review Appendix N1: How meat production and consumption affects nature.
2. With the class, review the table on page 125 How much water is required to produce various foods? Discuss the implications of where all the water goes in food production.

> **Did you know?**
>
> Canadians are meat lovers. Along with Americans and Australians, Canadians are among the top three meat consumers. We eat more than twice the global average. Meat production is the world's largest user of land, for pastures and through the use of arable land for fodder crops.

3. Have students create a visual interpretation of the chart by placing small cotton balls in different clear containers and labelling the containers. Let one cotton ball represent 100 litres of water used in food production. For example, to represent an apple, you would need only one cotton ball, but beef would need 155 cotton balls.
4. Create an information booth outside the classroom. Display the clear containers with information posters about the amount of water needed in the production of meat and its impact on nature. To create the information posters, have the students use Appendix N1: How meat production and consumption affects nature. Title the information booth "Where's the beef? How you can help nature by eating less meat."
5. Discuss using the Reflection Questions.

Part B: Outdoors

1. Visit a local livestock farm, factory farm, or a butcher shop. The purpose of the visit is to help kids understand how food gets from the farm to the table.
2. Help students prepare for the visit to the farm or butcher shop by reviewing Appendix N1: How meat production and consumption affects nature. Ask them to come up with questions for the farmer or the butcher. For example, they might ask about how the livestock is raised, what happens to the animals once they leave the farm, and how the beef is sourced. Discuss using the Reflection Questions.

Reflection questions

- What have you learned about water usage in the production of foods that we purchase and eat? Why does the level of water usage matter?
- What can you do to change the way you eat so that you live more within the limits of nature?
- Why is it important to figure out different ways to encourage people to eat meat-free meals?
- How could you get this message across to others in your school? To your family?

- How did the visit to a local farm help you feel more connected to the food you eat and to nature?
- What did you discover about where your local butcher gets his meat? How much control do customers have on where their meat comes from?
- How can you take what you've learned about the impact of eating meat on nature and apply it to your Class Foundation project?

Taking it further

Community/Home engagement activities

- Encourage students and parents to try limiting their intake of meat. Families could remove one meat product from one of their meals every week.
- Have parents bring in meatless dishes from different cultures.
- Have students record what they eat for two weeks and calculate their own ecological footprint based on their consumption of meat. At the end of this activity, students could write about their findings.

Teacher Tip

Students may have cultural or religious reasons for not eating meat. Include those reasons in your class discussion and ensure your students are open-minded about all the reasons for eating less or no meat.

Optional class activities

- Take a research challenge. Have students compare the average intake of meat products in countries around the world. Which country consumes the most meat products? How much does that country contribute to global pollution?
- Try a meat-free Monday. Encourage students to bring meat-free lunches every Monday for one month. Have students talk with their parents to help adjust their diet around these changes so they are still getting all the nutrients they need.
- Have students create a public service announcement (PSA) campaign to promote reducing meat in their diets. The campaign can express the benefits of lower meat consumption for individual health and well-being, family finances, and nature. Distribute the PSAs throughout the school (for example, with morning announcements).

Additional resources and websites

Visit davidsuzuki.org/youthandnature/n to learn more about meat consumption and eating for the Earth.

Appendix N1 (1 of 2)

How meat production and consumption affect nature

How meat production and consumption affects nature

Think back over all the suppers you ate this week. Was there meat at every meal? Take a look at your dinner table and ask yourself where all this food comes from. Every time you eat something, you make a choice that affects the Earth.

Raising animals has quite an impact on nature. It affects how we use the land and the water. In Canada, we are used to having meat at our meals. But have you ever thought about eating no-meat meals just one day a week? You don't have to become a vegetarian to help the Earth. Just try to change your daily eating habits a little bit.

How producing meat affects the land

All over the world we use about twice as much land for raising animals as we do for growing crops. That turns into a problem because we turn cropland into grazing land and destroy the homes of plants and animals.

How producing meat affects the water

Meat production uses a lot of water. Imagine a big steak. Now imagine a baked potato about the same size. It takes 85 times more water to produce that steak than it does the potato. Global freshwater supplies are very limited; only about 2.5 per cent of the water in the world is fresh, and we have access to less than one per cent of it. By eating less meat, more fresh water can be conserved.

How producing meat affects the air

A 2006 report by the United Nations Food and Agriculture Organization (FAO) found that food production accounts for more greenhouse emissions that contribute to climate change than transportation or industry. Meat production alone contributes between 14 and 22 per cent of all greenhouse gases released every year. Raising livestock requires a lot of resources like feed, chemical fertilizers, pesticides and water.

Source: Scientific American

What else can I eat?

Although it's true that the production of any food uses energy, water, and land, many choices don't use as much as meat. But, if you take meat away from a meal, what will you eat instead? You can start with vegetables and fruit. You have over 380,000 different kinds of plants to choose from, though we generally only eat about 100 of them. You don't have to eat meat to get protein. Instead think about beans, soy, and nuts. Look at this list for some ideas.

- Nuts and seeds: almonds, Brazil nuts, cashews, hazelnuts, walnuts, and pumpkin seeds, sesame seeds, and sunflower seeds
- Legumes: beans (black, chickpeas, kidney, lima, navy, and soy), groundnuts (such as peanuts), lentils (green and red), and peas (black-eyed, green, and yellow)

Appendix N1 (2 of 2)

How meat production and consumption affect nature

- Grains and cereals: amaranth, barley, buckwheat, corn, kamut, millet, oats, quinoa, rice, rye, spelt, teff, and wheat

How many of the foods in this list have you tried in your home? Maybe it's time to try something new.

Remember that some raw vegetables are required for good health and digestion. Sea vegetables like alaria, dulse, and kelp are especially nutritious. To best preserve nutrient content, vegetables can be lightly steamed, sautéed, or baked.

I like meat. What can I eat?

It is good to understand that some meat is better for the environment than others. The greenest meat may be poultry (like chicken) because of the way poultry is produced and distributed. (For example, a calorie of chicken protein requires only 5.6 calories of fossil fuel to produce. A calorie of beef protein, on the other hand, requires 20 to 40 calories of fossil fuel to produce.) Pork is also more environmentally friendly than beef, because pigs produce less methane gas and they breed more offspring than cows do. Lamb has the greatest impact.

Source: The Environmental Working Group

How much water is required to produce various foods?

Food	Water Required (in litres)
Apple	70 for one apple
Beef (boneless)	15,500 for one kilogram
Bread	40 for one slice
Cheese	5,000 for one kilogram
Chicken	3,900 for one kilogram
Eggs	200 for one egg
Hamburger	2,400 for one hamburger
Milk	1,000 for one litre
Pork	4,800 for one kilogram
Rice	3,400 for one kilogram
Soybeans	1,800 for one kilogram

Eat food. Not too much. Mostly plants.

— Michael Pollan, In Defense of Food: An Eater's Manifesto (Penguin, 2008)

Science, health and physical education, language, social sciences, arts

Greenbelt game show:
Our urban support systems

TIME REQUIRED

60 min + discussion

WHAT YOU NEED

Appendix O1: Ontario's Greenbelt (for each group)

Appendix O2: Greenbelt questions (for each student)

Appendix O3: Greenbelt Facts (for each student)

Appendix O4: Map of Ontario's Greenbelt

Appendix O5: Scavenger hunt (for each team)

Markers/materials for making flags

RESOURCES

Appendix O1: Ontario's Greenbelt

Appendix O2: Greenbelt questions

Appendix O3: Greenbelt facts

Appendix O4: Map of Ontario's Greenbelt

Appendix O5: Scavenger hunt

David Suzuki Foundation

Guiding question

What benefits do greenbelts provide and why is it important to protect greenbelts?

What's the point?

In this lesson, students play a game involving three rounds of question and answer activities and a final round of group problem-solving challenges to learn about Greenbelts. Greenbelts are protected natural expanses that wrap around urban areas. Students learn how greenbelts help protect ecosystems and limit urban sprawl, ensuring our access to clean air and water and sustaining our quality of life for generations to come.

Suggested strategies for assessment

Assess student participation using the Learning Skills Checklist (see Assessment Appendix, p. 145).

Hook

Read Peter Brown's *The Curious Garden* (Hachette, 2009). For a teacher's guide to the book, visit davidsuzuki.org/youthandnature/o.

Ask students to explain the message of the book. Ask them if they know what a greenbelt is and whether or not they live near one. Where is the closest one? Explain that greenbelts are natural expanses that wrap around urban areas and are essential in providing people with drinking water, food, and clean air. Greenbelts also provide homes for wild animals and plants critical to our survival.

Another option is to show a short video about the Ontario Greenbelt. Younger grades can watch *What Is It Worth to You* and older grades can watch *Celebrating Five Years of Ontario's Greenbelt* at davidsuzuki.org/youthandnature/o.

What You Do

Part A: Classroom

> **Teacher Tip**
>
> Set up the learning environment like a game show.

1. Show the class Appendix O4: Map of Ontario's Greenbelt. Discuss the locations of the different greenbelts and point out the closest greenbelt in your local area. Introduce the four components that make up a greenbelt: farmland, watershed, forests, and natural green space. With the class, review Appendix O1: Ontario's Greenbelt, which provides the answers for the game show questions.
2. Divide the class into four teams. Number students one to four to correspond with the four components of the greenbelt:
   - **Team Farm** represents the farms and all agricultural production that occurs in the greenbelts. This team is essential to providing food for millions of people.
   - **Team Water** represents the watersheds and natural filtration provided by wetlands in the greenbelts. This team is essential to ensuring clean water at a low cost and to help us avoid building huge water treatment plants to complete the same task.
   - **Team Trees** represents the forests and trees within the greenbelts. This team is essential to absorbing harmful emissions like carbon and carbon dioxide.
   - **Team Fun** represents the recreational opportunities that greenbelts offer. This team is essential for fun things like camping, hiking, and biking.
3. Tell the teams they will be given time to create a communal flag and team call. (The flag should express the attributes of the team and be a gathering point on display throughout the competition. For example the team call for the Farm Team might be "Moo!") Distribute Appendix O3: Greenbelt Facts to each student and remind students that all the answers they will need for the game can be found in Appendix O1: Ontario's Greenbelt and Appendix O3: Greenbelt Facts. They read the information over as a group.
4. After the teams have had time to discuss, instruct the students that they will be competing against each other for greenbelt points. Each correct answer equals five greenbelt points for the team. Whichever student(s) makes the team call first is allowed to answer the question. If the answer is incorrect, the other team may then have a chance to answer the question. Reuse questions to emphasize the information.
5. For Round One Questions (Introduction the Greenbelt), students compete in groups.
   - Students remain at their seats and are encouraged to have group discussion to form consensus.
   - Choose three to five questions from the Group section of the Greenbelt Questions.

6. For Round Two Questions (Discuss the Greenbelt), students compete in pairs.
    - Two students from two teams come to the front of the class.
    - Remind students that they may bring Appendix O3: Greenbelt Facts along with them.
    - Have students answer a question from the Individual/Pair Questions in Appendix O2: Greenbelt Questions.
    - Repeat for the next two teams.
    - Repeat until all team members have participated.
7. For round three questions (Apply Greenbelt Facts), students compete individually and may use Appendix O3: Greenbelt Facts as a resource.
    - Individual team members come to the front of the class.
    - Each student answers an Individual Question.
    - Repeat until all students have participated.

Part B: Outdoors

1. For Round Four, students participate in the Outdoor Group Challenge.
    - Before going outside, brainstorm the similarities between the outdoors and greenbelts.
2. Do a scavenger hunt. Challenge teams to search in the schoolyard for the items in Appendix O5: Scavenger Hunt List (feel free to add your own items to the list). Have students report their findings and award greenbelt points appropriately.
3. Discuss using Reflection Questions.

Reflection questions

- How did the scavenger hunt relate to what you've learned about the Ontario Greenbelt?
- Can you think of any other ways your outdoor experience relates to greenbelts? (For example, running outdoors may involve running along greenbelt trails.)
- Why is it so important to have greenbelts? What would happen if land was not protected from development?
- How do greenbelts help us live within the limits of nature?
- What are some of the benefits of greenbelts? What did you learn about the greenbelt that you didn't know before?
- Do you live near a greenbelt? How can you use your Class Foundation project to support or develop a greenbelt in your community?

Taking it further

LCD projector/computer/Smart Board

- Create an overhead copy of Appendix O3: Greenbelt Facts.
- Display Appendix O4: Map of Ontario's Greenbelt.
- Use the Smart Board to display Appendix O2: Greenbelt Questions.

Mobile device

- Encourage students to use mobile devices to photograph the items on the scavenger hunt.

Community/home engagement activities

- Encourage families to explore a greenbelt if they live near one.
- Encourage families to buy local produce from local farmers to support the greenbelt agriculture economy.

Optional class activities

- Plant and take care of a tree in the community. Ensure the tree receives the necessary support and care to flourish.
- Research the greenbelt areas closest to your community. Take students on a guided nature tour in the greenbelt or along a local trail. Lead a discussion asking students why they value spending time in nature and why preserving the natural space around them is more valuable than building more houses and roads. Complete the lesson in a greenbelt or go on a hike and have a lunch at a local farm.
- Explore some of the listed Additional Resources and Websites. Then create brochures or public service announcements that communicate information about greenbelts and Ontario's greenbelts.
- Using sidewalk chalk, create a Greenbelt Game Show mural, illustrating for others the four naturally protected areas found within a greenbelt: farmlands, watersheds, forests, and natural green spaces.

Additional resources and websites

Visit davidsuzuki.org/youthandnature/o to learn more about greenbelts.

Appendix O1

Ontario's Greenbelt

Ontario's Greenbelt

What would happen if our towns and cities kept growing and growing without any limits? When is a city too big, and what does it take to sustain a large population? How do large urban areas affect nature?

Environmental organizations like the David Suzuki Foundation have worked with governments to determine that the size of cities and urban growth must be limited because it leads to the disappearance of natural spaces and habitat. As we know, we need these places to sustain ourselves and live within the limits of nature.

To ensure the growth of cities is controlled, provinces have created greenbelts. Greenbelts are natural expanses that wrap around cities or large areas of urban development, forming a protective natural "belt" to ensure the continued supply of food, water, and other natural services we rely on for survival.

Greenbelts also protect environmentally sensitive land, such as wetlands, forests, and farmland, from urban development. They provide clean air and clean water for cities; their trees act as "lungs" and filter air pollution, while rivers and streams feed sources of drinking water for millions of people. Greenbelts demonstrate respect toward nature and an understanding that we need to reduce urban sprawl and protect natural spaces to preserve important ecosystems.

As a result, greenbelts are being created all over the country. One of the largest greenbelts is in Ontario. It has been created around the area known as the Greater Golden Horseshoe/Greater Toronto Area. This area is one of the fastest-growing regions in North America and has a population that is expected to increase from almost eight million to 11 million over the next 30 years. The Ontario Greenbelt covers 325 kilometres and is home to 762 plant species, 225 bird species, 55 fish species, 27 mammal species, 19 reptile and amphibian species, and about 66 endangered species. All this wildlife is protected and can flourish in the forests, wetlands, rivers, valleys, and lakes that make up the greenbelt.

Kayakers enjoy the scenery in Rouge Park, what we hope will become Canada's first urban national park.

Appendix O2 (1 of 4)

Greenbelt questions

Group questions

Question	Answer
Open natural spaces in the Greenbelt are used for tourism and recreation. Over 50 per cent of people living in central Ontario will take advantage of the recreation possibilities. As a group, devise a list of recreational activities that can be done in the Greenbelt.	Hiking, camping, skiing, snowshoeing, fruit picking, canoeing, kayaking, birdwatching.
There are approximately 7,000 farms in the Greenbelt, which preserves some of the most valuable agricultural lands in Canada. List foods that are provided from the farmlands in the Greenbelt.	Fresh fruits and vegetables, dairy, beef, pork and poultry products, and grapes.
Define wetlands.	Wetlands are natural areas where water and land meet. They provide food, habitat, and shelter for many species of wildlife such as deer, moose, ducks, beavers, insects, frogs, and birds. Wetlands are a critical part of much larger systems known as watersheds that move water across the land. Examples of wetlands include bogs, marshes, ponds, and swamps.
What are some vegetables that are grown in the Greenbelt?	Asparagus, beans, broccoli, cucumbers, mushrooms, peppers, potatoes, tomatoes, and zucchinis.
How do trees help the environment?	Trees improve air and water quality, they lower temperatures by providing shade, and they supply habitats for birds, insects, and small animals like squirrels.

Appendix O2 (2 of 4)

Greenbelt questions

Individual and pair questions (1 of 3)

Question	Answer
True or false? Half of landowners in the Greenbelt are farmers.	True
Forests and trees provide improvements in air quality. They remove air pollution and provide oxygen. How many trees does it take to provide enough oxygen for a family of four? A) Two trees B) No trees C) 1 million trees	A) Two trees
What plant from the list below is not listed as endangered in the Greenbelt? A) Lakeside daisy B) Perennials C) Cucumber tree/Cucumber Magnolia D) Red mulberry	B) Perennials
What are some vegetables that are grown in the Greenbelt?	Asparagus, beans, broccoli, cucumbers, mushrooms, peppers, potatoes, tomatoes, and zucchinis.
What are two endangered insects that are found in the Greenbelt? A) Monarch and West Virginia White Butterfly B) mosquitoes and bees C) grasshoppers and ants	A) Monarch and the West Virginia White Butterfly
Greenbelts protect areas such as green spaces, wetlands, and forests. What other area do they protect? A) Mountains B) Factories C) Farmland	C) Farmland
True or false? You can continuously hike from Rice Lake, south of Peterborough, to Queenston in Niagara, and up to Tobermory on Georgian Bay — all within the Greenbelt.	True

Appendix O2 (3 of 4)

Greenbelt questions

Individual and pair questions (2 of 3)

Question	Answer
Complete the sentence: Greenbelts are an example of people respecting nature, understanding that nature has limits, and realizing that we need to reduce urban sprawl and... A) Destroy more ecosystems B) Protect green spaces around cities C) The amount of litter from cities	B) protect green spaces around cities
What helps to reduce noise and ultraviolet radiation in cities? A) Trees B) Grass C) Both trees and grass	A) Trees
In the city, a hot summer day can be even hotter because of the heat reflected off pavement and concrete. That same hot summer day can be cooler in parks or other natural settings. What is the difference in temperature on the same hot summer day between an urban setting, like a city, and a natural setting, like a park in the Greenbelt? A) 10 degrees B) No difference — it's the same temperature C) 5 degrees	C) 5 degrees
By protecting the Greenbelt, we ensure the continuation of natural services for generations to come. Destroying natural areas can have a massive impact on which of the following areas? A) Health B) Food production C) Climate stability D) Clean water E) All the above	E) All of the above
What area, found in the Greenbelt, is effective for the treatment of human waste and agricultural waste? A) Forest B) Wetland C) Farms	B) Wetland
What will happen if the world's population increases and we do not protect natural areas? A) We will not be able to feed and support all the people on the planet. B) We will invent new types of plants and animals to make food. C) We will move to another planet	A) We will not be able to feed and support all the people on the planet

Appendix O2 (4 of 4)

Greenbelt questions

Individual and pair questions (3 of 3)

Question	Answer
What is the name of the fastest-growing area in North America and the area the Greenbelt surrounds? A) Southern Ontario B) Muskoka C) Southern Ontario's Golden Horseshoe/The Greater Toronto Area and Hamilton	C) Southern Ontario's Golden Horseshoe/ The Greater Toronto Area and Hamilton
What are four services the Greenbelt provides? A) Agriculture B) Water filtration/watersheds C) Trees/carbon storage D) Recreation/personal benefits/enjoyment E) Both a) and c) F) All of the above	F) All of the above
How many fish species can be found in the Greenbelt? A) Two species B) 55 species C) A million species	B) 55 fish species
The bald eagle, barn owl, and the red-headed woodpecker are examples of what? A) Invasive species B) Endangered birds in the Greenbelt C) Flying predators	B) Endangered birds in the Greenbelt
How much of the sour cherry crop is produced in Ontario's Greenbelt? A) None B) One-quarter C) One-half	C) One-half
What endangered mammals can be found in the Greenbelt? A) Cougar B) Grey fox C) Southern flying squirrel D) All of the above	D) All of the above
True or false? There are 7,000 farms in the Greenbelt.	True

Adapted from Ontario's Wealth, Canada's Future: Appreciating the Value of the Greenbelt's Eco-Services (The David Suzuki Foundation, 2008)

Appendix O3 (1 of 2)

Greenbelt facts

General facts

- The Ontario Greenbelt surrounds the fastest-growing area in North America, known as The Greater Golden Horseshoe/Greater Toronto Area and Hamilton (GTAH).
- Four services provided by greenbelts are farming and food production, water filtration/watersheds, trees and air filtration, and recreation and personal enjoyment.
- Open natural spaces in the Greenbelt are used for tourism and recreation. Over 50 per cent of people living in central Ontario will take advantage of the recreation possibilities, including hiking, camping, skiing, snowshoeing, fruit picking, canoeing, kayaking, and birdwatching.
- In the Greenbelt, it is possible to hike continuously from Rice Lake, south of Peterborough, to Queenston in Niagara, and up to Tobermory on Georgian Bay.
- By protecting the Greenbelt, we ensure generations to come will continue to be supplied with the benefits nature provides, like food, clean air, and clean water. If the Greenbelt were destroyed, it would affect our health, food production, the climate, and our access to clean water and air.
- The Greenbelt protects areas such as farmlands, watersheds, forests, and natural green spaces.

Wetlands

- A wetland is a natural area where water and land meet. It provides food, habitat, and shelter for many species of wildlife such as deer, moose, ducks, beavers, insects, frogs, and birds. Wetlands are a critical part of much larger systems known as watersheds that move water across the land. Examples of wetlands include bogs, marshes, ponds, and swamps.
- Wetland plants and soil such as peat and certain grasses act like sponges, absorbing rain and controlling how quickly it gets into the soil, preventing floods. The roots bind the soil together, keeping it from being eroded by wind and waves. In coastal areas, tidal wetlands slow down destructive storm surges. Wetlands also absorb and store enormous amounts of carbon dioxide from the atmosphere, thereby helping us to fight climate change.
- Wetlands are home to a great richness of biodiversity — including wild flowers, birds, turtles, and frogs and insects. Many wetland plants take up and store nutrients for other creatures to consume. Others absorb and store toxins, such as heavy metals like iron and copper.

Source: the Ramsar Convention on Wetlands

Appendix O3 (2 of 2)

Greenbelt facts

Farms

- There are approximately 7,000 farms in the Ontario Greenbelt.
- Half of landowners in the Greenbelt are farmers.
- Farms in the Greenbelt protect the most valuable farming lands in Canada and provide foods such as fresh fruits and vegetables, dairy, beef, pork, poultry products, and grapes.
- The Greenbelt produces 25 per cent of Ontario's apples, almost 90 per cent of Ontario peaches, 50 per cent of Ontario's sour cherries, and over 85 per cent of Ontario's grapes and raspberries.
- There are many vegetables grown in the Greenbelt such as asparagus, beans, broccoli, cucumbers, mushrooms, peppers, potatoes, tomatoes, and zucchinis.

Forests

- Forest and trees are important for human health, but they are also great for nature. Trees improve the air and water quality. They lower temperatures by providing shade, and they supply habitats for birds, insects, and small animals like squirrels.
- Fun Fact: It only takes two trees to provide enough oxygen for a family of four!
- Trees are important in cities to help block out UV radiation and noise.
- Hot summer days can feel even hotter in a city because of the heat reflected off pavement and concrete. But in parks and natural green spaces, the temperatures can be five degrees lower, making that hot day more bearable.

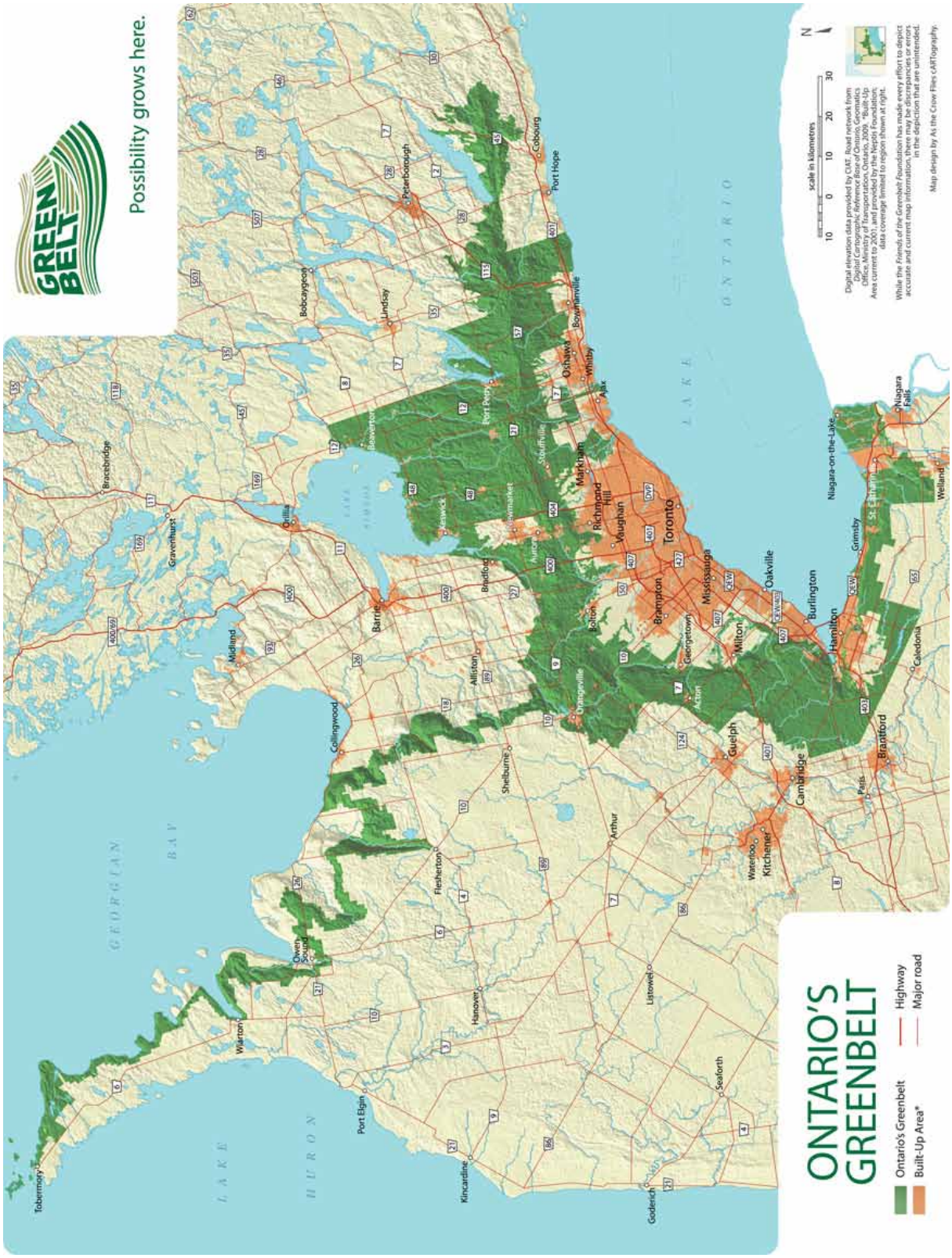
Species in the Greenbelt

- In the Greenbelt, there are 55 fish species, 27 mammal species, 19 reptile and amphibian species, and 66 endangered species.
- Endangered plants in the Greenbelt include the lakeside daisy, cucumber tree/cucumber magnolia, and red mulberry.
- Endangered insects in the Greenbelt include the Monarch butterfly and the West Virginia white butterfly.
- Endangered mammals in the Greenbelt include the eastern cougar/mountain lion, grey fox, and southern flying squirrel.
- Endangered fish in the Greenbelt include river redhorse, silver shiner, and northern brook lamprey.
- Endangered reptiles/amphibians in the Greenbelt include spring salamander, Blanding's turtle, and the eastern ribbon snake.
- Endangered birds in the Greenbelt include the bald eagle, barn owl, and the red-headed woodpecker.

Source: The Greenbelt Foundation and Ontario's Greenbelt: A Resource for Teachers

Appendix 04

Map of Ontario's Greenbelt



Appendix 05

Scavenger hunt

Nature scavenger hunt list

Let's go out and find:

1. A spider's web
2. A bird's nest
3. A groundhog hole
4. A squirrel
5. The number of gardens around the schoolyard
6. At least three different types of trees
7. A frog
8. At least four kinds of insects
9. One kind of fungus

A celebration of nature: Look what we have learned!

TIME REQUIRED
From 30 min to a full day

Guiding question

What have I learned about my connection with nature and what I can do to protect it?

What's the point?

In this culminating activity, students celebrate what they have learned about environmental conservation and stewardship. They appreciate and value their connection to nature and spend time together enjoying what nature has to offer.

What you do

Ask your students to help plan a celebration party. How would they like to celebrate all they've learned? What fun things can they do to celebrate their connection to nature?

Here are some suggested activities, which can be enjoyed individually or combined:

- Have a class picnic in the schoolyard or local park where students dine on as many local foods as possible.
- Hold a scavenger hunt or a contest that challenges students to identify all the different trees, birds, and flowers they see.
- Take a class trip to a local conservation area or greenbelt. Contact your local conservation authority for information about nature programs or guided hikes.
- Take a nature appreciation walk around your school's neighborhood and have students try to identify the birds, trees, and flowers they see.

- Write a letter or email to the David Suzuki Foundation and send information and photos of your class activities.
- Plant a school garden with native plants, vegetables, flowers, and fruit trees.
- Take a class bike ride to a local park and have a picnic.

> "Young people ask me all the time how they can become an "environmentalist." My reply is that we all need to be environmentalists and it shouldn't be seen as a separate job. So go out and be an engineer, or a doctor, or a teacher, but also do what you can to help protect nature by making it a part of everything you do."
>
> *— David Suzuki*

You can also plan a bigger celebration:

- For Family Nature Day, have families prepare food with local produce for a class potluck. Invite parents to attend and encourage them to share recipes. Find the good things that grow in Ontario at davidsuzuki.org/youthandnature/p.
- For school nature day, include all the classes in the school.

For community nature day, include partners like community centres, local organizations, and businesses.

Glossary

A

Acid rain: Rain, snow, hail, sleet, and fog polluted by chemicals in the air.

Agriculture: The cultivation of soil, plants, animals, fungi, and other products to sustain life.

Air quality: The measure of purity of invisible, odourless, and tasteless gases that surround the Earth.

B

Biodegradable: Able to be broken down by bacteria or other living organisms.

Biodiversity: The variety of plants, animals, and ecosystems in the world.

C

Carbon dioxide: A colourless, odourless gas that is a normal part of the air. It is released through animal respiration and the decay of organic matter, and absorbed by plants in photosynthesis. It is a greenhouse gas that traps radiation and contributes to climate change.

Climate: The average weather (usually taken over a 30-year period) for a particular region and time period. Weather describes the short-term state of the atmosphere. Climatic elements include precipitation, temperature, humidity, sunshine, wind velocity, phenomena such as fog, frost, and hailstorms, and other measures of the weather.

Climate change: Changes in long-term weather patterns caused by natural phenomena and human activities that alter the chemical composition of the atmosphere through the buildup of greenhouse gases, which trap heat and reflect it back to the Earth's surface. Also referred to as global warming.

Compost: A natural fertilizer that provides plants with nutrients and increases water retention in soil.

Composting: The practice of collecting organic wastes such as grass clippings, leaves, and food wastes, allowing them to break down to produce soil-like humus or compost that can be used to nourish new plant growth.

Conservation: The preservation and efficient use of water, forests, and other natural resources so they will not be unnecessarily damaged or wasted.

Conserve: To reduce or save.

Consume: To use or buy.

Consumer: A person who buys and uses goods; a plant or animal that requires complex organic compounds for food, which it obtains by preying on other living things or eating particles of organic matter.

Cosmetics: Products used to improve or restore a person's appearance or odour.

D

Deforestation: When many trees are cleared from a large area.

Draft: A current of air coming into or out of a confined space. For example, a house may lose warm air through a draft out the window.

E

Ecological footprint: Measures human impact on the environment; how much space or productive land is needed to support an individual's lifestyle. The larger the footprint, the more impact the individual has on the Earth.

Ecology: The study of the relationships between organisms and their environment.

Ecosystem: A community of animals and plants and their relationships with each other and their environment.

Electricity or electric current: A form of energy found in nature which can be artificially produced by rubbing together two unlike things, by the action of chemicals, or by means of a generator.

Emissions: Pollutants sent out into the air, water, or soil.

Energy: The ability to do work. Energy is in everything we do. It is never created or lost but only changed from one form to another.

Energy efficiency: Reducing the amount of energy we consume to support our lifestyles.

Environment: The physical surroundings, conditions, and circumstances that affect the survival of all life on Earth.

Extinction: The disappearance of a type (species) of plant or animal from Earth. Some species — like the dinosaurs — become extinct because of non-human forces, but many others are becoming endangered or threatened with extinction because of human activities.

F

Food chain: The way each living creature depends on other living things as sources of food. The relationship between plants and animals that shows who eats what. Energy is transferred from one organism to another.

Fossil fuel: The non-renewable remains of plant and animal life that can be burned to produce energy. Fossil fuels include coal, oil, and natural gas.

Foundation: An organization that works toward a common goal.

Fresh water: Contains little or no salt; normally found in glaciers, ice caps, ponds, lakes, rivers, groundwater, and streams.

G

Greenbelt: A natural area that wraps around cities and is essential in providing the population with drinking water, clean air, and foods. It ensures the protection of native species.

Green energy: Energy that reduces emissions and is created from renewable resources.

Greenhouse effect: Produced when greenhouse gases allow incoming solar radiation to pass through the Earth's atmosphere, and as those gases prevent most of the infrared radiation of the surface and lower atmosphere from escaping into outer space. This process occurs naturally and has kept the Earth's temperature about 60 degrees Fahrenheit warmer than it would otherwise be. Current life on Earth could not be sustained without the natural greenhouse effect.

Greenhouse gases: Some gases, such as carbon dioxide, methane, nitrous oxide, and CFCs, trap heat in the atmosphere by absorbing long-wave radiation while letting the sun's energy pass through. Because these gases work in the atmosphere, just as transparent greenhouse roofs and walls allow sunlight in while trapping heat, they are called greenhouse gases.

Groundwater: Water in the ground that flows in the spaces between soil particles and rocks. Groundwater supplies water for wells and springs.

H

Habitat: The place where an animal or plant naturally lives, grows, eats, and drinks.

Household hazardous waste: A product that is discarded from a home that is ignitable, corrosive, reactive, or toxic (for example, used motor oil, oil-based paint, auto batteries, gasoline, and pesticides).

L

Landfill: A carefully designed structure built in or on top of the ground in which trash is isolated from the surrounding environment such as groundwater, air, and rain.

Limits of nature: The finite capacity the planet has to support life on Earth.

Litter: Waste that is improperly disposed of in the street, sidewalk, bodies of water, and the general environment.

M

Methane: Second only to carbon dioxide as a contributor to climate change. Methane emissions are created in society through agriculture, energy, and decomposition of organic matter (that is, trash in the landfill).

N

Nature: All of the physical power creating all of the phenomena — plants, animals, landscape, and climate — that make up the material world.

Nitrous oxide: A greenhouse gas with emissions created by industrial production such as the production of nylon.

Non-biodegradable: An object that cannot be broken down by bacteria or other living organisms.

Non-renewable: Energy or resources that come from sources we are using up and cannot be easily replaced in a short period of time. These resources are considered unsustainable and once depleted are no longer available. Non-renewable resources are things like fossil fuels, nuclear power, and wild fish stocks.

O

Organic: From plants or animals and generally pertaining to compounds formed by living organisms.

Ozone layer: A thin layer in the atmosphere surrounding the Earth that shields us from most of the sun's ultraviolet light rays.

P

Pesticide: Chemicals used for killing unwanted insects.

Pollinate: The process of fertilizing with pollen.

Pollinators: An organism that fertilizes with pollen.

Pollutant: A substance that doesn't normally belong somewhere that may have harmful or unwanted effects.

Pollute: To contaminate or defile the environment.

Pollution: Environmental contamination with human-made waste.

Preserve: To protect and keep in existence.

R

Recycle: To use again; to crush, melt down, or change something that has already been used to make a new item instead of throwing the used item away. For example, glass bottles can be crushed and made into pavement, and old paper can be used to make more paper.

Recycled: Material that has been separated from garbage waste, reprocessed into a new product, and then bought back to the consumer as a new item.

Reduce: To use less material in the production of an item. It also refers to consuming less energy and generating less waste in making, using, and disposing of products ranging from automobiles to milk jugs.

Reforestation: Planting and growing new trees where other trees have been cut down.

Renewable: Energy or resources that come from sources that can be used again and again, and will never run out. As a result they are called sustainable. Examples include energy from sunlight, wind, running water, and trees.

Reuse: To find a new function for an item that has outgrown its original use; use again (for example, wash and reuse dishes).

S

Soil erosion: The washing or blowing away of topsoil. Trees and other plants hold the soil in place and help reduce the force of wind or water. Soil erosion happens when trees and plants are cut down.

Species at risk: Any naturally occurring plant or animal in danger of extinction or disappearing.

T

Toxic: Poisonous.

U

Urban development: Also known as urbanization. The construction of towns and cities that converts a rural area into an urban one.

V

Vermicomposting: The process whereby worms feed on slowly decomposing materials such as vegetable scraps in a controlled environment to produce a nutrient-rich soil.

W

Watershed: The area drained by a single lake or river and its tributaries; a drainage basin.

Web of life: The extraordinary variety of living creatures and ecological communities growing and interacting with each other all over the world. It is the richness and complexity of species and ecosystems throughout the planet.

Wetland: A marsh, swamp, bog, or other stretch of land that that is frequently saturated with water.

Grade 4 curriculum — Ontario expectations

* Expectations are related to only the "What You Do" section of each lesson | O overall expectation S specific expectation

Subject	Unit	Students will...	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Math	Measurement	Describe, through investigation, the relationship between various units of length (i.e., millimetre, centimetre, decimetre, metre, kilometre) S																
	Data management and probability	Read, interpret, and draw conclusions from primary data and from secondary data presented in charts, tables, and graph S																
Science	Habitats and communities	Analyze the effects of human activities on habitats and communities O																
		Investigate the interdependence of plants and animals within specific habitats and communities O																
		Demonstrate an understanding of habitats and communities and the relationships among the plants and animals that live in them O																
		Analyze the positive and negative impacts of human interactions with natural habitats and communities, taking different perspectives into account, and evaluate the ways of minimizing the negative impact S																
		Identify reasons for the depletion or extinction of a plant or animal species, evaluate the impacts on the rest of the natural community, and propose possible actions for preventing such depletions or extinctions from happening S																

Grade 4 curriculum — Ontario expectations

* Expectations are related to only the "What You Do" section of each lesson | O overall expectation S specific expectation

Subject	Unit	Students will...	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Science	Habitats and communities	Follow established safety procedures for working with soils and natural materials S																
		Use scientific inquiry/research skills to investigate ways in which plants and animals in a community depend on features of their habitat to meet important needs S																
		Use appropriate science and technology vocabulary, including habitat, population, community, adaptation, and food chain, in oral and written communication S																
		Demonstrate an understanding of habitats as areas that provide plants and animals with the necessities of life S																
		Identify factors that affect the ability of plants and animals to survive in a specific habitat S																
		Identify, through observation, various factors that affect plants and animals in a specific habitat S																
		Demonstrate an understanding of a community as a group of interacting species sharing a common habitat S																
		Describe ways in which humans are dependent on natural habitat and communities S																

Grade 4 curriculum — Ontario expectations

* Expectations are related to only the "What You Do" section of each lesson | O overall expectation S specific expectation

Subject	Unit	Students will...	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Science	Light and sound	Assess the impacts on society and the environment of light and/or sound energy produced by different technologies, taking different perspectives into account S																
	Rock and minerals	Assess the social and environmental impact of human uses of rocks and minerals O																
		Assess the social and environmental costs and benefits of using objects in the built environment that are made from rocks and minerals S																
		Analyze the impact on society and the environment of extracting and refining rocks and minerals for human use, taking different perspectives into account S																
Health and physical education	Living skills	Use a range of critical and creative thinking processes to assist them in making connections, planning and setting goals, analyzing and solving problems, making decisions, and evaluating their choices in connection with learning in health and physical education S																
	Active living	Identify factors that motivate participation in physical activity every day at school, at home, or in their communities S																

Grade 4 curriculum — Ontario expectations

* Expectations are related to only the "What You Do" section of each lesson | O overall expectation S specific expectation

Subject	Unit	Students will...	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Health and physical education	Healthy living	Demonstrate an understanding of factors that contribute to healthy development O																
		Demonstrate the ability to apply health knowledge and living skills to make reasoned decisions and take appropriate actions relating to their personal health and well-being O																
		Demonstrate the ability to make connections that relate to health and well-being: how their choices and behaviours affect both themselves and others, and how factors in the world around them affect their own and others' health and well-being O																
		Identify ways of promoting healthier food choices in a variety of settings and situations S																
Language	Oral communication	Listen in order to understand and respond appropriately in a variety of situations for a variety of purposes O																
		Use speaking skills and strategies appropriately to communicate with different audiences for a variety of purposes O																
		Demonstrate an understanding of appropriate listening behaviour by adapting active listening strategies to suit a wide variety of situations including work in groups S																

Grade 4 curriculum — Ontario expectations

* Expectations are related to only the "What You Do" section of each lesson | O overall expectation S specific expectation

Subject	Unit	Students will...	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Language	Oral communication	Extend understanding of oral texts by connecting the ideas in them to their own knowledge, experience, and insights; to other texts including print and visual texts; and to the world around them S																
		Demonstrate an understanding of appropriate speaking behaviour in a variety of situations, including paired sharing and small and large group discussions S																
		Communicate in a clear, coherent manner, presenting ideas, opinions, and information in a readily understandable form S																
	Reading	Read and demonstrate an understanding of a variety of literary, graphic, and informational texts, using a range of strategies to construct meaning O																
		Extend understanding of texts by connecting the ideas in them to their own knowledge, experience, and insights, to other familiar texts, and to the world around them S																
	Writing	Generate, gather, and organize ideas and information to write for an intended purpose and audience O																
		Generate ideas about a potential topic using a variety of strategies and resources S																
		Generate ideas about a potential topic using a variety of strategies and resources S																

Grade 4 curriculum — Ontario expectations

* Expectations are related to only the "What You Do" section of each lesson | O overall expectation S specific expectation

Subject	Unit	Students will...	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Language	Media literacy	Demonstrate an understanding of a variety of media texts O																
		Create a variety of media texts for different purposes and audiences, using appropriate forms, conventions, and techniques O																
		Produce a variety of media texts for specific purposes and audiences, using appropriate forms, conventions, and techniques S																
Social studies	Canada's provinces, territories, and regions	Relate the physical environment to economic and cultural activities in the various provinces and territories S																
		Formulate questions to guide research S																
		Identify and describe a cause-and-effect relationship between the environment and the economy in a province or territory S																
The arts	Drama	Apply the creative process to dramatic play and process drama, using the elements and conventions of drama to communicate feelings, ideas, and stories O																
		Apply the critical analysis process to communicate feelings, ideas, and understandings in response to a variety of drama works and experiences O																

Grade 4 curriculum — Ontario expectations

* Expectations are related to only the "What You Do" section of each lesson | O overall expectation S specific expectation

Subject	Unit	Students will...	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
The arts	Visual	Apply the creative process to produce a variety of two- and three-dimensional art works, using elements, principles, and techniques of visual arts to communicate feelings, ideas, and understandings O																
		Create two- and three-dimensional works of art that express feelings and ideas inspired by their interests and experiences S																
Math	Measurement	Select and justify the most appropriate standard unit to measure length, height,width, and distance, and to measure the perimeter of various polygons S																
	Data management and probability	Collect data by conducting a survey or an experiment to do with themselves, their environment, issues in their school or community, or content from another subject, and record observations for measurements S																
		Read, interpret, and draw conclusions from primary data and from secondary data presented in charts, tables, and graphs S																
Science	Human organ systems	Analyze the impact of human activities and technological innovations on human health O																
		Assess the effects of social and environmental factors on human health, and propose ways in which individuals can reduce the harmful effects of these factors and take advantage of those that are beneficial S																

Grade 5 curriculum — Ontario expectations

* Expectations are related to only the "What You Do" section of each lesson | O overall expectation S specific expectation

Subject	Unit	Students will...	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Science	Human organ systems	Evaluate the effects, both beneficial and harmful, of various technologies on human body systems, taking different perspectives into account S																
	The properties of and changes in matter	Evaluate the social and environmental impacts of processes used to make everyday products O																
		Conduct investigations that explore the properties of matter and changes in matter O																
		Use scientific inquiry/experimentation skills to investigate changes of state and changes in matter S																
	Conservation of energy and resources	Analyze the immediate and long-term effects of energy and resources use on society and the environment, and evaluate options for conserving energy and resources O																
		Demonstrate an understanding of the various forms and sources of energy and the ways in which energy can be transformed and conserved O																
		Analyze the long-term impacts on society and the environment of human uses of energy and natural resources, and suggest ways to reduce these impacts S																
		Evaluate the effects of various technologies on energy consumption, and propose ways in which individuals can improve energy conservation S																

Grade 5 curriculum — Ontario expectations

* Expectations are related to only the "What You Do" section of each lesson | O overall expectation S specific expectation																	
Subject	**Unit**	**Students will...**	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**	**N**	**O**	**P**
Science	Conservation of energy and resources	Evaluate the effects, both beneficial and harmful, of various technologies on human body systems, taking different perspectives into account S																
		Identify a variety of forms of energy and give examples from everyday life of how that energy is used S																
Health and physical education	Living skills	Use a range of critical and creative thinking skills and processes to assist in making connections, planning and setting goals, analyzing and solving problems, making decisions, and evaluating choices in connection with learning in health and physical education S																
	Active living	Identify factors that can either motivate or make it difficult for people to be physically active every day and describe ways of overcoming obstacles to staying active S																
	Healthy living	Demonstrate an understanding of factors that contribute to healthy development S																
		Demonstrate the ability to apply health knowledge and living skills to make reasoned decisions and take appropriate actions relating to their personal health and well-being O																
		Demonstrate the ability to make connections that relate to health and well-being: how their choices and behaviours affect both themselves and others, and how factors in the world around them affect their own and others' health and well-being O																

Grade 5 curriculum — Ontario expectations

* Expectations are related to only the "What You Do" section of each lesson | O overall expectation S specific expectation

Subject	Unit	Students will...	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Science	Healthy living	Demonstrate the ability to make connections that relate to health and well-being: how their choices and behaviours affect both themselves and others, and how factors in the world around them affect their own and others' health and well-being O																
Language	Oral communication	Listen in order to understand and respond appropriately in a variety of situations for a variety of purposes O																
		Use speaking skills and strategies appropriately to communicate with different audiences for a variety of purposes O																
		Demonstrate an understanding of appropriate listening behaviour by adapting active listening strategies to suit a range of situations, including work in groups S																
		Extend understanding of oral texts by connecting the ideas in them to their own knowledge, experience, and insights; to other texts, including print and visual texts; and to the world around them S																
		Demonstrate an understanding of appropriate speaking behaviour in a variety of situations including paired sharing, dialogue, small-and-large-group discussions S																
		Communicate orally in a clear, coherent manner, presenting ideas, opinions, and information in a readily understandable form S																

Grade 5 curriculum — Ontario expectations

* Expectations are related to only the "What You Do" section of each lesson | O overall expectation S specific expectation

Subject	Unit	Students will...	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Language	Reading	Read and demonstrate an understanding of a variety of literary, graphic, and informational texts, using a range of strategies to construct meaning O																
		Extend understanding of texts by connecting the ideas in them to their own knowledge, experience, and insights, to other familiar texts, and to the world around them S																
	Writing	Generate, gather, and organize ideas and information to write for an intended purpose and audience O																
		Generate ideas about a potential topic using a variety of strategies and resources S																
	Media literacy	Demonstrate an understand of a variety of media texts O																
		Create a variety of media texts for different purposes and audiences, using appropriate forms, conventions, & techniques O																
Social studies	Aspects of citizenship and government in Canada	Identify concrete examples of how government plays a role in contemporary society and of how the rights of groups and individuals and the responsibilities of citizenship apply to their own lives O																
		Model activities and processes of responsible citizenship S																

Grade 5 curriculum — Ontario expectations

* Expectations are related to only the "What You Do" section of each lesson | O overall expectation S specific expectation																		
Subject	**Unit**	**Students will...**	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**	**N**	**O**	**P**
The arts	Drama	Apply the creative process to process drama and the development of drama works, using the elements and conventions of drama to communicate feelings, ideas, and stories O																
		Apply the critical analysis process to communicate feelings, ideas, and understandings in response to a variety of drama works and experiences O																
	Visual	Apply the creative process to produce a variety of two- and three-dimensional art works, using elements, principles,and techniques of visual arts to communicate feelings, ideas, and understandings O																
		Create two-and three-dimensional art works that express feelings and ideas inspired by their own and others' points of view S																

Grade 6 curriculum — Ontario expectations

* Expectations are related to only the "What You Do" section of each lesson | O overall expectation S specific expectation

Subject	Unit	Students will...	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Math	Measurement	Select and justify the appropriate metric unit (i.e., millimetre, centimetre, decimetre, metre, decametre, kilometre) to measure length or distance in a given real-life situation S																
	Data management and probability	Read, interpret, and draw conclusions from primary data and from secondary data presented in charts, tables, and graphs S																
Science	Biodiversity	Assess human impacts on biodiversity, and identify ways of preserving biodiversity O																
		Investigate the characteristics of living things, and classify diverse organisms according to specific characteristics O																
		Demonstrate an understanding of biodiversity, its contributions to the stability of natural systems, and its benefits to humans O																
		Analyze a local issue related to biodiversity, taking different points of view into consideration, propose action that can be taken to preserve biodiversity, and act on the proposal S																
		Assess the benefits that human societies derive from biodiversity and the problems that occur when biodiversity is diminished S																
		Follow established safety procedures for outdoor activities and fieldwork S																

Grade 6 curriculum — Ontario expectations

* Expectations are related to only the "What You Do" section of each lesson | O overall expectation S specific expectation

Subject	Unit	Students will...	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Science	Biodiversity	Use appropriate science and technology vocabulary, including classification, biodiversity, natural community, interrelationships, inevertebrate, inervertebrate, stability, characteristics, and an organism, in written and oral communication S																
		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 S																
		Describe ways in which biodiversity within and among communities is important for maintaining the resilience of these communities S																
		Explain how invasive species reduce biodiversity in local environments S																
		Assess opportunities for reducing electricity consumption at home or at school that could affect the use of non-renewable resources in a positive way or reduce the impact of electricity generation on the environment S																
		Use appropriate science and technology vocabulary, including current, battery, circuit, transform, static, electrostatic, and energy, in oral and written communication S																

Grade 6 curriculum — Ontario expectations

* Expectations are related to only the "What You Do" section of each lesson | O overall expectation S specific expectation

Subject	Unit	Students will...	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Health and physical education	Living skills	Use a range of critical and creative thinking skills and processes to assist in making connections, planning and setting goals, analyzing and solving problems, making decisions, and evaluating choices in connection with learning in health and physical education S																
	Active living	Describe the factors that motivate participation in daily physical activity and connect them to various activities S																
	Healthy living	Demonstrate an understanding of factors that contribute to healthy development O																
		Demonstrate the ability to apply health knowledge and living skills to make reasoned decisions and take appropriate actions relating to their personal health and well-being O																
		Demonstrate the ability to make connections that relate to health and well-being: how their choices and behaviours affect both themselves and others, and how factors in the world around them affect their own and others' health and well-being O																
Language	Oral communication	Listen in order to understand and respond appropriately in a variety of situations for a variety of different purposes O																
		Use speaking skills and strategies appropriately to communicate with different audiences for a variety of purposes O																

Grade 6 curriculum — Ontario expectations

* Expectations are related to only the "What You Do" section of each lesson | O overall expectation S specific expectation

Subject	Unit	Students will...	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Language	Oral communication	Demonstrate an understanding of appropriate listening behaviour by adapting active listening strategies to suit a variety of situations including work in groups S																
		Interpret oral texts by using stated and implied ideas from the texts S																
		Extend understanding of oral texts by connecting, comparing, and contrasting ideas and information in them to their own knowledge, experience, and insights; to other texts, including print and visual texts; and to the world around them S																
		Demonstrate an increasingly sophisticated understanding of appropriate speaking behaviour in a variety of situations including paired sharing, dialogue, and small and large group discussions S																
		Communicate orally in a clear, coherent manner, using appropriate organizing strategies and formats to link and sequence ideas and information S																
Oral	Reading	Read and demonstrate an understanding of a variety of literary, graphic, and informational texts, using a range of strategies to construct meaning O																
		Extend understanding of texts by connecting the ideas in them to their own knowledge, experience, and insights, to other familiar texts, and to the world around them S																

Grade 6 curriculum — Ontario expectations

* Expectations are related to only the "What You Do" section of each lesson | O overall expectation S specific expectation																		
Subject	**Unit**	**Students will...**	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**	**N**	**O**	**P**
Oral	Writing	Generate, gather, and organize ideas and information to write for an intended purpose and audience O																
		Generate ideas about a potential topic using a variety of strategies and resources S																
	Media literacy	Demonstrate an understanding of a variety of media texts O																
		Create a variety of media texts for different purposes and audiences, using appropriate forms, conventions, and techniques O																
		Produce a variety of media texts for specific purposes and audiences, using appropriate forms, conventions, and techniques S																
Social science	Canada and world connections — Canada's link to the world	Explain the relevance of Canada to current global issues and influences O																
		Describe some of the connections Canada shares with the rest of the world S																
		Identify products that Canada imports and exports S																
The arts	Drama	Apply the critical analysis process to communicate feelings, ideas, and understandings in response to a variety of drama works and experiences O																
		Apply the creative process to process drama and the development of drama works, using the elements and conventions of drama to communicate feelings, ideas, and multiple perspectives O																

Grade 6 curriculum — Ontario expectations

* Expectations are related to only the "What You Do" section of each lesson | O overall expectation S specific expectation

Subject	Unit	Students will...	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
The arts	Visual	Produce two- and three-dimensional works of art that communicate ideas (thoughts, feelings, experiences) for specific purposes and to specific audiences O																
		Produce two- and three-dimensional works of art (i.e., works involving media and techniques used in drawing, painting, sculpting, printmaking) that communicate thoughts, feelings, and ideas for specific purposes and to specific audiences S																
		Create two-dimensional, three-dimensional, and multimedia art works that explore feelings, ideas, and issues from a variety of points of view S																

Assessment overview

	Anecdotal notes organizer	Learning skills checklist	Achievement chart	Peer assessment/ Self-assessment	Arts rubric	Oral communication rubric	Lessons with optional activity assessment
A							
B							
C							
D							
E							
F							
G							
H							
I							
J							
K							
L							
M							
N							
O							
P							

Technology overview

	Computer	Internet	Smart board	LCD projector	Mobile device	Overhead
A						
B						
C						
D						
E						
F						
G						
H						
I						
J						
K						
L						
M						
N						
O						
P						

Note: Additional technology may be required to conduct certain optional class activities, and/or the "Hook" for the lesson. Consult individual lessons for guidance.

Student achievement chart

Categories	Level 1	Level 2	Level 3	Level 4
Knowledge/Understanding Subject-specific content acquired in each grade (knowledge), and the comprehension of its meaning and significance (understanding)	The student demonstrates the specified knowledge and skills with limited effectiveness	The student demonstrates the specified knowledge and skills with some effectiveness	The student demonstrates the specified knowledge and skills with considerable effectiveness	The student demonstrates the specified knowledge and skills with a high degree of effectiveness

Expectations being assessed:

Thinking/Inquiry The use of critical and creative thinking skills and/or processes	The student demonstrates the specified knowledge and skills with limited effectiveness	The student demonstrates the specified knowledge and skills with some effectiveness	The student demonstrates the specified knowledge and skills with considerable effectiveness	The student demonstrates the specified knowledge and skills with a high degree of effectiveness

Expectations being assessed:

Categories	Level 1	Level 2	Level 3	Level 4
Communication The conveying of meaning through various forms	The student demonstrates the specified knowledge and skills with limited effectiveness	The student demonstrates the specified knowledge and skills with some effectiveness	The student demonstrates the specified knowledge and skills with considerable effectiveness	The student demonstrates the specified knowledge and skills with a high degree of effectiveness

Expectations being assessed:

Application/making connections The use of knowledge and skills to make connections within and between various contexts	The student demonstrates the specified knowledge and skills with limited effectiveness	The student demonstrates the specified knowledge and skills with some effectiveness	The student demonstrates the specified knowledge and skills with considerable effectiveness	The student demonstrates the specified knowledge and skills with a high degree of effectiveness

Expectations being assessed:

Arts rubric

Lesson: **Student name:**

Expectations:

Communication

Criteria	Level 1	Level 2	Level 3	Level 4
Expression and organization of ideas and understandings in art forms (dance, drama, music, and the visual arts), including media/multimedia Forms and in oral and written forms (e.g., clear expression and logical organization in critical responses to art works and informed opinion pieces)	Expresses and organizes ideas and understandings with limited effectiveness	Expresses and organizes ideas and understandings with some effectiveness	Expresses and organizes ideas and understandings with considerable effectiveness	Expresses and organizes ideas and understandings with a high degree of effectiveness
Communication for different audiences and purposes through the arts (e.g., Drama presentations, visual arts exhibitions, dance and music performances) and in oral and written forms.	Communicates for different audiences and purposes with limited effectiveness	Communicates for different audiences and purposes with some effectiveness	Communicates for different audiences and purposes with considerable effectiveness	Communicates for different audiences and purposes with a high degree of effectiveness
Use of conventions in dance, drama, music, and the visual arts (e.g., Allegory, narrative or symbolic representation, style, articulation, drama conventions, choreographic forms, movement vocabulary) and arts vocabulary and terminology in oral and written forms	Uses conventions, vocabulary, and terminology of the arts with limited effectiveness	Uses conventions, vocabulary, and terminology of the arts with some effectiveness	Uses conventions, vocabulary, and terminology of the arts with considerable effectiveness	Uses conventions, vocabulary, and terminology of the arts with a high degree of effectiveness

Expectation(s):

Application

Criteria	Level 1	Level 2	Level 3	Level 4
Application of knowledge and skills (e.g., performance skills, composition, elements, principles, processes, technologies, techniques,strategies) in familiar contexts	Applies knowledge and skills in familiar contexts with limited effectiveness	Applies knowledge and skills in familiar contexts with some effectiveness	Applies knowledge and skills in familiar contexts with considerable effectiveness	Applies knowledge and skills in familiar contexts with a high degree of effectiveness
Transfer of knowledge and skills (e.g., concepts, strategies, processes, techniques) to new contexts (e.g., a work requiring stylistic variation, an original composition, or student-led choreography)	transfers knowledge and skills to new contexts with limited effectiveness	transfers knowledge and skills to new contexts with some effectiveness	transfers knowledge and skills to new contexts with considerable effectiveness	transfers knowledge and skills to new contexts with a high degree of effectiveness
Making connections within and between various contexts (e.g., between the arts; between the arts and personal experiences and the world outside the school; between cultural and historical, global, social, and/or environmental contexts; between the arts and other subjects)	makes connections within and between various contexts with limited effectiveness	makes connections within and between various contexts with some effectiveness	makes connections within and between various contexts with considerable effectiveness	makes connections within and between various contexts with a high degree of effectiveness

Expectation(s):

Oral communication rubric

Lesson: **Student name:**

Criteria	Level 1	Level 2	Level 3	Level 4
• Knowledge and understanding • Use of vocabulary • Understanding of assignment criteria	• Simple vocabulary • Does not meet assignment criteria	• Appropriate vocabulary • Shows an effort to meet assignment criteria	• Appropriate and effective vocabulary • Meets assignment criteria	• Confident use of subject-specific vocabulary • Demonstrates a thorough understanding of assignment criteria
• Thinking and inquiry • Resources and strategies incorporated in presentation • Organization of ideas	• Lack of resources and strategies • Focus and intent unclear	• A few appropriate resources and strategies • Focus is evident, but intent is unclear	• Appropriate use of resources and strategies • Focus and intent are clearly indicated	• Effective use of resources and strategies • Focus and intent are presented in a clear and effective manner
• Communication • Audience awareness and intended purpose • Fluency • Cohesion	• Limited and unclear • Frequent pronunciation errors and hesitant delivery • Limited effectiveness and clarity	• Some awareness and clarity • Some pronunciation errors and hesitant delivery • Moderate degree of effectiveness and clarity	• Strong sense of audience and a clear message • Very few pronunciation errors and smooth delivery • Considerable degree of effectiveness and clarity	• Thorough awareness of audience and a clear and effective message • Excellent pronunciation and natural delivery • Highly effective and clear
• Application • Connecting classroom learning to external applications	• No recognition of relevance	• Some recognition of relevance with some degree of authenticity	• Considerable recognition of relevance and authenticity	• A thorough recognition of relevance and authenticity with clear connections

Adapted from Nelson Education Modern Languages Assessment Rubric

Peer assessment/self-assessment

My name: **Peer's name:**

Glow **Two things done well:**

Grow **One things to improve:**

My name: Peer's name:

Glow **Two things done well:**

Grow **One things to improve:**

Anecdotal notes organizer

Lesson: **Guiding question:**

Student Names	Notes

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Connecting With Nature:

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