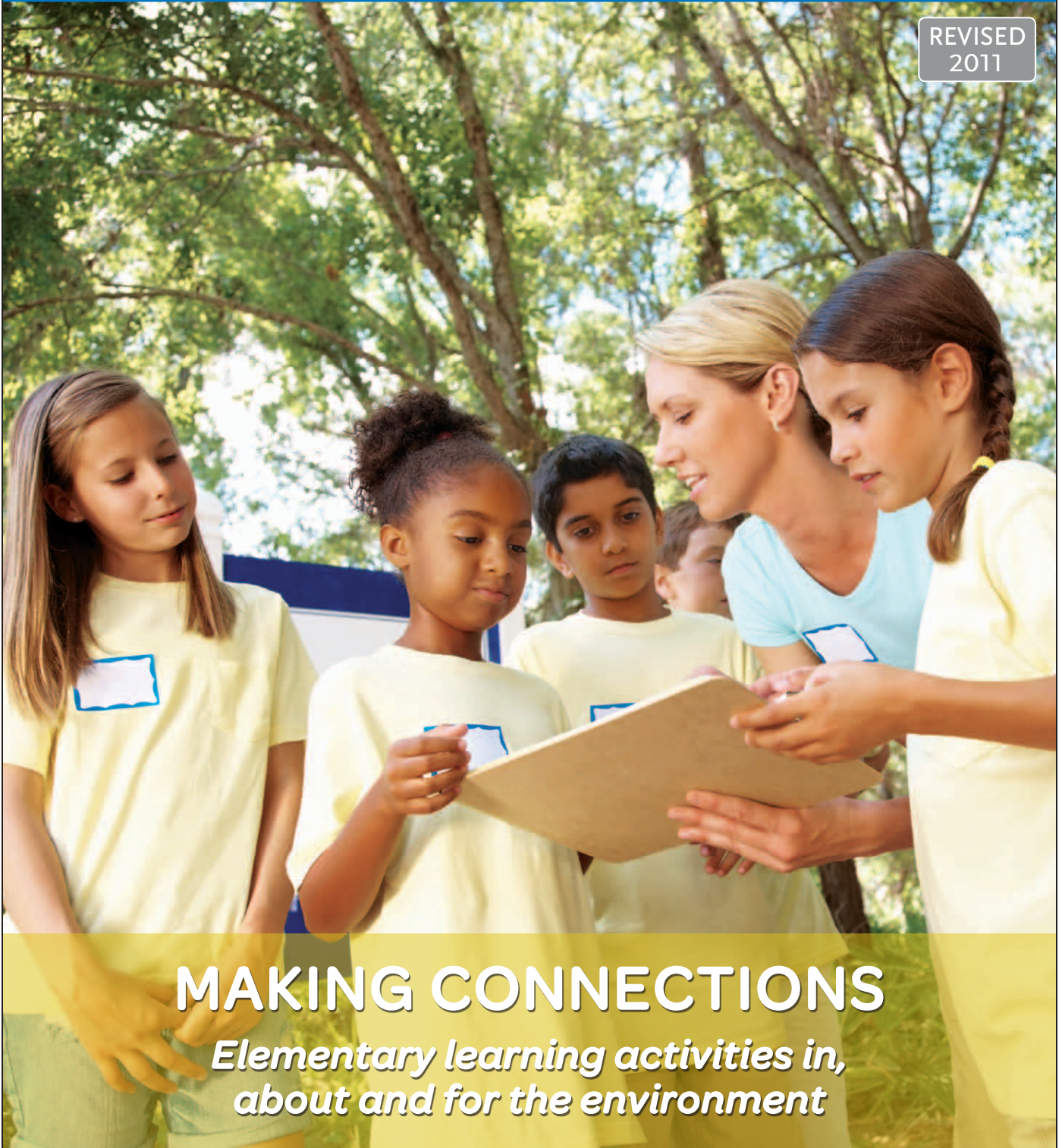


Ontario

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2011



MAKING CONNECTIONS

*Elementary learning activities in,
about and for the environment*



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Acknowledgements

This guide is an adaptation of *EcoSchools: Celebrating EcoSchools Festival Ideas (elementary)* developed by the City of Toronto and the Toronto District School Board (TDSB). The City of Toronto and the TDSB have donated this resource to the Ontario EcoSchools Program as part of an in-kind contribution to the project.

Ontario EcoSchools: Making Connections: Elementary learning activities in, about and for the environment

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“Never doubt that a small group
of thoughtful, committed citizens
can change the world; indeed,
it is the only thing that ever has.”

–Margaret Mead

RESOURCE OVERVIEW

Making Connections: Elementary learning activities in, about and for the environment is a collection of environmental learning classroom activities that help prepare students “with the knowledge, skills, perspectives, and practices they need to be environmentally responsible citizens”.¹ These ideas can be part of Step 5 - Celebrate Success - of the five-step process in implementing the Ontario EcoSchools program.

While each activity can stand alone, it is hoped that an entire school will take an afternoon to celebrate with an environmental learning adventure, focusing on the theme of making connections. Developing students’ understanding about the connections between the Earth and their everyday lives is never out of season, so teachers are encouraged to use these activities whenever they have the opportunity to include them in their classroom teaching.

The activities outlined in *Making Connections*

- ▶ provide an opportunity to contribute to the development of our students’ ecological literacy as they learn about ecosystems and environmental issues
- ▶ engage students in student-centered cooperative activities
- ▶ encourage students to identify their connections to the Earth
- ▶ provide an opportunity for students to go outside
- ▶ solicit cognitive and emotional responses to activities
- ▶ allow students an opportunity to reflect on their learning through discussion and journal-writing

Archived Internet resources, professional development materials and current information about Ontario EcoSchools may be found on the website: www.ontarioecoschools.org

Ecological Literacy

Learning about the relationships between humans and the rest of our natural world is at the heart of ecological literacy. Through classroom learning and active participation in the way the school operates, students can explore the impacts of their choices regarding energy use, waste creation and other environmental issues. Ecological *inquiry* reveals our dependence on the healthy functioning of the Earth’s living systems which give us clean air, water, soil, food, and all the other resources we depend on. As our understanding of the inter-relatedness of all life increases, we can become literate in the ways to care for the Earth that consider the wellbeing of future generations. Ecological *literacy* allows us to understand the urgency of developing protective, sustainable, and restorative relationships with the natural systems that are affected by our daily activities.

¹ Ontario Ministry of Education, *Shaping Our Schools, Shaping Our Future* (2007) p.4

► Planning for an Environmental Learning Adventure

Classroom Introduction

Each teacher is asked to introduce the EcoSchools celebration in her/his class before students begin the adventure. Survey general environmental awareness in the class, then discuss Earth Day and why we celebrate it. Stress the idea of making personal connections to environmental issues through knowledge and actions.

Environmental Activities

All activities in this collection are recommended by environmental educators from across Ontario. In the spirit of experiential environmental education, each activity has allotted time for reflective discussion, with questions listed in the activity outline. The number of activities each school chooses to prepare is optional. One idea is to mount the same number of activities as you have rotations.

Follow-up Discussion Questions

At the end of the Environmental Learning Adventure each class needs the opportunity to discuss and reflect upon its adventure. Encourage students to relate how these activities might inform their future decisions and habits.

Extensions

All learning needs to be integrated and reinforced over time. The activities in this collection make suggestions for future classroom projects/activities. Teachers are asked to consider incorporating these extensions into their classroom work.

Curriculum Connections

The relevant Science and Technology and Social Studies curriculum expectations are identified in each activity. Often activities may be easily modified to cover additional expectations.

The table of the facing page summarizes the curriculum expectations covered in the various activities detailed in this document. Additional expectations in other subject areas may also be addressed in the activity; see the *Environmental education opportunities throughout the elementary curriculum* section on page 6.

Activity	Curriculum Expectations							
	Gr 1	Gr 2	Gr 3	Gr 4	Gr 5	Gr 6	Gr 7	Gr 8
1. Connecting with our Actions: A Million Year Picnic	X							
2. Building bird feeders with recycled materials	X							
3. Food Chains: The Sun Powers All!	X	X	X				X	
4. Connecting with Habitats: Home Sweet Home	X	X	X					
5. Creating a Mini-forest	X	X	X					
6. Water Water Everywhere		X		X	X			X
7. Ecosystems in Action: Web of Life				X			X	
8. Ecological Footprints: Human Wants and Needs affecting the Earth				X	X		X	
9. Embodied Energy: The Life of Fruits and Vegetables			X	X	X		X	
10. Interpretive Hikes	Dependent on type of hike, location, etc.							
11. Connecting to the Everyday Things in Our Lives							X	X
12. Connecting School Issues and Action Opportunities							X	
13. Stakeholders and Perspectives: Force Field Analysis							X	

► Environmental education opportunities throughout the elementary curriculum

Environmental education is...a content area that can be taught. It is an approach to critical thinking, citizenship and personal responsibility, and can be modeled. It is a context that can enrich and enliven education in all subject areas, and offer students the opportunity to develop a deeper connection with themselves, their role in society, and their interdependence on one another and the Earth's natural systems.

Shaping our Schools, Shaping our Future: Environmental Education in Ontario Schools,
Report of the Working Group on Environmental Education (Toronto: June 2007), p. 10

To identify environmental education opportunities throughout the curriculum the Ministry of Education has produced a resource document, *Environmental Education: Scope and Sequence of Expectations* (Toronto: June 2008). This document lists expectations that explicitly connect to environmental education in science and technology, social studies, history and geography. It also outlines suggestions for environmental topics to be connected to other subject areas where the environment can be used as the context for learning.

The activities found in *Making Connections* identify specific expectations in science and technology, social studies, history and geography. Often additional curriculum expectations from other subject areas may also be covered in the course of the activity, using the environment as the context for learning as in the suggestions below.

Language (2006)

...in each of the strands the learning context (e.g., a topic or thematic unit related to the environment) and/or learning materials (e.g., books, websites, media) could be used to foster in students the development of environmental understanding. Also, in each of the strands, there are some expectations that can provide opportunities for exploring environmental education – for example, expectations on making inferences, making connections, analysing and evaluating texts, developing a point of view, and doing research.

Mathematics (2005)

...in each of the strands the learning context could be used to foster in students the development of environmental understanding (e.g. problems relating to climate or waste management could be the focus of student learning). In addition, the mathematical processes (e.g. problem solving, connecting) address skills that can be used to support the development of environmental literacy.

The Arts (1998)

...in each strand of the arts curriculum the learning context and/or learning materials could be used to foster in students the development of environmental understanding. Through music, the visual arts, drama, and dance, students can represent their thoughts, feelings, and ideas about the environment and their understandings of issues related to the environment.

Some ways in which elementary students can make connections with environmental education through the arts include:

- ▶ creating sculptures made of recycled and found materials;
- ▶ composing or accompanying music that reflects nature and/or human interaction with the natural environment;
- ▶ performing site-specific dance works that integrate the natural environment in which they are performed;
- ▶ dramatizing legends, stories, or tales about the environment.

Health and Physical Education (1998)

HEALTHY LIVING: The healthy Eating and Growth and Development components of the Healthy Living strand lend themselves to aspects of environmental education inasmuch as they provide students with opportunities to use higher-order thinking skills.

ACTIVE PARTICIPATION: As students acquire living skills through physical activities, they can develop an appreciation of the natural environment, gain an experiential knowledge of the environment and develop the problem-solving skills necessary for an environmentally aware citizen.

Native Languages (2001)

...in each of the strands the learning context (e.g., a topic or thematic unit related to the environment) and/or learning materials (e.g., books, websites, media) could be used to foster in students the development of environmental understanding. Learning about aspects of Native culture and communities may provide for students opportunities to make connections with local places.

French as a Second Language – Extended French, French Immersion (2001); Core French (1998) [where applicable]

...in each of the strands the learning context (e.g., a topic or thematic unit related to the environment) and/or learning materials (e.g., books, websites, media) could be used to foster in students the development of environmental understanding.

Excerpted from *Environmental Education: Scope and Sequence of Expectations* (Toronto: June 2008).

▶ Scheduling an Environmental Learning Adventure

- ▶ Set aside a half day, or if possible, an entire day.
- ▶ Set up one activity station for each class that is participating.
- ▶ Repeat a single activity several times in the same room/area as students rotate moving from activity to activity
- ▶ Have students from the EcoTeam, other student leaders and parent volunteers conduct students to various activities inside and outside the school.

Tips And Ideas

- *Use Earth Day to foster leadership within your school. Older students can master some of the primary activities before Earth Day and then come to the younger class and help lead an activity!*
- *Plan for Activity One to be in students' home classroom to save rotation time.*
- *Consider sending a letter home before your environmental learning adventure to inform parents and to spark environmental discussions at home as well as at school.*
- *Plan to have one teacher or administrator in your school act as the floater during your EcoSchools Festival. Any unexpected problems can be dealt with if one person has the opportunity to oversee the event.*

1. Connecting with Our Actions: A Million Year Picnic

Source: Adapted from “A Million Year Picnic” by Jim Petrie from *Green Teacher*, Issue #46

Description

Chris Van Allsburg’s book *Just a Dream* is a wonderful vehicle to introduce young children to the concept of waste minimization. The central character is Walter and the story focuses on Walter’s dream of the future. In this activity, children examine how long it takes certain items to decompose and, based on that information, they have an opportunity to make their own choices about what is best to take on a picnic.

Background Information

There is no place on Earth called “away.” All the items we throw away must go somewhere, and usually end up in the soil, air, streams and oceans. By changing our habits, reducing our waste and reusing whenever possible, we can minimize the amount of garbage going into landfill.

Note: *Just a Dream* can be hard to find. It is a very special book and well worth the effort to track it down. If you cannot reserve a copy through the school/public library system, order through your school librarian or a bookstore (delivery takes up to 4 weeks).

Materials

- ▶ one copy of *Just a Dream* by Chris Van Allsburg (ISBN: 0-395-53308-2)
- ▶ 4 “picnic blankets”
- ▶ 4 picnic baskets (small cardboard boxes work well)
- ▶ collection of disposable items: wax paper, store-bought lunch packaging, tin foil containers, juice boxes, tin foil, pop cans, paper, glass, etc.
- ▶ collection of reusable alternatives items: thermos, reusable sandwich and juice containers, etc. and unpackaged items such as fruit

Time Allotment

Story and Introduction: 15 minutes

Timeline and Discussion: 5 minutes

Picnic: 10 minutes

Student Presentations: 10 minutes (optional)

Discussion: 5 minutes

Teaching/Learning Strategies

1. Survey the class about their dreams. Ask students if they dream, what they dream about, how real their dreams are, and if their dreams have ever come true.
2. Explain that in the book *Just a Dream* Walter is a character who dreams a lot too! He dreams of the future of the Earth.
3. Read to discover Walter's dream. Was this a happy dream or a sad dream? Could this dream come true? How did Walter change his dream?
4. After reading the book, create a timeline of events in the story. What was the major change that Walter made to alter these events?
5. Discuss the importance of recycling and introduce the first two "Rs" - reducing and reusing.
6. Break the class up into 4 groups. Each group should sit at a picnic blanket.
7. Distribute materials to each group - items that are highly packaged and disposable as well as environmentally-friendly alternatives.
8. Each group must choose what it will take on the picnic, keeping in mind Walter's dream of the future.
9. Groups can present their picnic baskets to each other, explaining why they made the choice of certain items.

Follow-up Discussion Questions

- ▶ From what we have learned, are there ways that we can affect the landfills of the future? How?
- ▶ Can one person make a difference?
- ▶ Can one person do it all alone?

Extensions for additional classroom projects/activities

- ▶ Engage the students in a waste-free lunch campaign for a week; challenge them not to send anything to the landfill from their lunches.
- ▶ Create posters for the lunchroom to help other students learn about living "more lightly" on the Earth. See the Ontario EcoSchools *Waste Minimization Guide* for additional information about waste-free lunch campaigns.
- ▶ Set up a Waste Relay Race: collect items, or pictures of items, that are reusable, recyclable, compostable and garbage. Set up recycling bins, a reuse box, garbage container and a composter. Using the format of a relay race, test your students' ability to decide what goes where.
- ▶ If your school has a composter, or any of your students have composters at home, consider adding composting to this lesson as yet another way to divert garbage from landfills.

Curriculum Connections: Clustering of Expectations

GRADE 1: SOCIAL STUDIES (2005)

- 1z2 • use a variety of resources and tools to gather, process, and communicate information about the rules people follow in daily life and the responsibilities of family members and other people in their school and community
- 1z5 • explain why rules and responsibilities have been established (e.g., for protection and safety, for fair division of work)
- 1z7 • describe significant people and places in their lives (e.g., parents, sports figures; bedroom, park, playground, community centre) and the rules associated with them
- 1z9 • describe how they follow the rules about respecting the rights and property of other people and about using the shared environment responsibly (e.g., by sharing, being courteous, cooperating, not littering)
- 1z16 • identify an area of concern (e.g., littering, sharing, conflicts), and suggest changes in rules or responsibilities to provide possible solutions

GRADE 1: SCIENCE & TECHNOLOGY—Needs and Characteristics of Living Things (2007)

- 1.1 identify personal action that they themselves can take to help maintain a healthy environment for living things, including humans
- 3.5 describe how showing care and respect for all living things help to maintain a healthy environment (*e.g., ...caring for the school and the schoolyard as an environment*)
- 3.6 identify what living things provide for other living things (*e.g., trees produce the oxygen that other living things breathe; plants such as tomatoes and apple trees and animals such as cows and fish provide food for humans and for other animals...*)

GRADE 1: SCIENCE & TECHNOLOGY—Materials, Objects and Everyday Structures (2007)

- 1.1 identify the kinds of waste produced in the classroom, and plan and carryout a classroom course of action for minimizing waste, explaining why each action is important

2. Building Bird Feeders With Recycled Materials

Source: Adapted from *The Junior Environment Club Manual*, Waterloo Region District School Board and Youth Services Canada

Description

Students will use recycled materials to make a bird feeder, reinforcing the idea that by reusing objects, rather than buying new ones, we can generate less garbage.

Background Information

There is no place on Earth called “away.” All the items we throw away must go somewhere, and usually end up in the soil, air, streams and oceans. By reducing our consumption and reusing everything we can, we will minimize the amount of garbage going to landfill.

There are many birds found in the city over the winter/early spring. To survive, birds either migrate or they have made adaptations to deal with Ontario’s winters. Through the winter in the city, birds survive on insects and seeds that are not covered by snow. Many songbirds use bird feeders as a source of food throughout the winter. However, the bird feeder is only a minor food source, contributing less than 20% of their total diet. Common birds that may be seen around bird feeders during Ontario winters are:

- ▶ White Breasted Nuthatch
- ▶ Black Capped Chickadee
- ▶ House Sparrow
- ▶ Northern Cardinal
- ▶ Blue Jay
- ▶ American Goldfinch
- ▶ Downy and Hairy Woodpecker
- ▶ Tree Sparrow
- ▶ Mourning Dove
- ▶ Dark-eyed Junco

See Appendix A for details.

A bird feeder should be hung near trees, bushes or a treed area and away from windows. This gives birds easy access to the food without becoming vulnerable to predators. The bird feeder should be filled regularly with seed to ensure that it is a constant source of food for the birds that are using it.

Materials

- ▶ one 2-litre pop bottle/milk carton for each student
- ▶ scissors
- ▶ bird seed (be cautious of nut allergies)
- ▶ one stick or small twig per student
- ▶ glue/tape
- ▶ string
- ▶ diagram of bird feeder (Appendix B)

Time Allotment

Introduction: 5 minutes

Craft Time: 30 minutes

Discussion: 5 minutes

Note: It is essential to have 1-2 other adults in the classroom to help with scissors!

Teaching/Learning Strategies

1. Begin the session by being a 'garbage-picker' - select an item from the garbage (only something safe to handle please!) and discuss with students the concept of throwing something "away." Where will this piece of garbage go? What types of problems are associated with continuing to throw things away?
2. Introduce/reinforce the idea that there is no place on Earth called "away." What are the alternatives?
3. Reusing items helps to keep things from going to landfill. Reusing items by making bird feeders allows students to connect to the wildlife in the area.
4. Draw a sample bird feeder on the board (Appendix B), or show students one you have made. Outline the three criteria for constructing a birdfeeder that will work: it a) needs to hang, b) have an opening big enough for a bird to eat from, and c) have a perch for the bird to sit on while eating.
5. Ask students to select either a pop bottle or a milk carton.
6. Instruct students to outline where they would like their perch and feeding hole.
7. With the help of parent volunteers or older students, have students cut out the feeding hole (ideally a square hole 5 cm from the bottom of the pop bottle or milk carton, 10-15 cm high and 10 cm wide).
8. Again with the help of adults, students make a small cut below the feeding hole. Then push the stick or twig into the hole. Use glue/tape to hold the stick in place (if you make a small hole you probably will not require glue/tape).
9. Tie a string around the top of the pop bottle or milk carton.
10. Decorate the bird feeder.
11. Birdseed should be put in the bottom of the feeder.

Follow-up Discussion Questions

- ▶ Brainstorm a list of other items that can be reused instead of being thrown away or recycled.
- ▶ How can you help others realize that there is no place on Earth called “away”?
- ▶ How are our actions connected to what we find in the landfill?

Extensions for additional classroom projects/activities

- ▶ Maintain a reusable materials art centre in your classroom, and encourage students to bring in items to stock it. Have the centre available for creating ‘functional art’ during free time.

Curriculum Connections: Clustering of Expectations

GRADE 1: SCIENCE & TECHNOLOGY—Needs and Characteristics of Living Things (2007)

- 2.2 investigate and compare the basic needs of humans and other living things, including the need for air, water, food, warmth, and space, using a variety of methods and resources (*e.g., prior knowledge, personal experience, discussions, books, videos/DVDs, CD-ROMs*)
- OE 3 demonstrate an understanding of the basic needs and characteristics of plants and animals, including humans
- 3.5 describe how showing care and respect for all living things helps to maintain a healthy environment (*e.g., ...feeding birds during cold winter months...*)

Appendix A Common Ontario Birds

White-breasted nuthatch

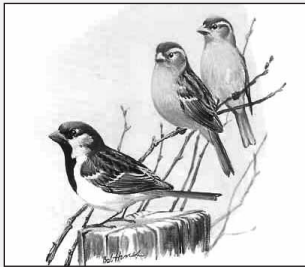


Identification Tips:

- Length: 13 cm
- Straight gray bill
- Black crown and nape
- White face and underparts
- Blue-gray upperparts

- Rusty undertail coverts
- Short tail
- Sexes similar but female duller
- Feeds by hopping along tree trunks and branches often hanging upside down

House sparrow



Identification Tips:

- Length: 11 cm
- Small, seed-eating bird
- Thick, conical bill
- Pink legs
- Extremely common in urban and agricultural areas

Adult male:

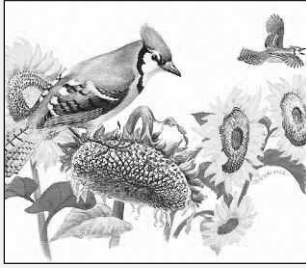
- Gray crown
- Black throat, upper breast, and small mask; less black on throat in winter
- Grayish side of neck and underparts
- Rusty-brown nape and upperparts
- Black streaks on back

- White patch in wing
- Gray rump
- Black bill in summer; yellowish in winter

Female and immature:

- Gray-brown crown
- Buffy line extends rearward from eye bordered below by gray-brown line
- Grayish-white underparts
- Black and tawny streaks on back
- Black wing feathers with wide tawny edges
- White patch on wing
- Yellow bill
- Immature males lack full throat patch of adults

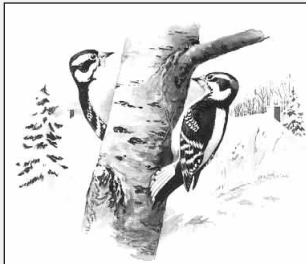
Blue Jay



Identification Tips:

- ▶ Length: 25 cm
- ▶ Black sturdy bill
- ▶ Blue crest and upperparts
- ▶ Black eyeline and breastband
- ▶ Grayish-white throat and underparts
- ▶ Bright blue wings with black bars and white patches
- ▶ Long blue tail with black bars and white corners
- ▶ Dark legs
- ▶ Migrates during the day in small flocks

Downy woodpecker



Identification Tips:

- ▶ Length: 14 cm
 - ▶ Very small black and white woodpecker
 - ▶ Very short bill
 - ▶ Mostly black head set off by broad white supercilium and lower border to auriculars
 - ▶ Black nape
 - ▶ White back
 - ▶ Black wings with white spotting on coverts and flight feathers
 - ▶ White underparts
 - ▶ Black rump
 - ▶ Black tail with white outer tail feathers barred with black
- Adult male:**
- ▶ Red spot at rear of head

Hairy woodpecker



Identification Tips:

- ▶ Length: 19 cm
 - ▶ Medium-sized black and white woodpecker
 - ▶ Fairly long bill
 - ▶ Mostly black head set off by broad white supercilium and lower border to auriculars
 - ▶ Black nape
 - ▶ White back
 - ▶ Black wings with white spotting on coverts and flight feathers
 - ▶ White underparts
 - ▶ Black rump
 - ▶ Black tail with white outer tail feathers
 - ▶ Significant racial variation can result in juveniles with barred outer tail feathers (Queen Charlotte Islands), juveniles with barred backs and flanks (Maritime provinces) and birds with brown feathering replacing the black (Pacific Northwest).
- Adult male:**
- ▶ Red spot at rear of head

Mourning dove



Identification Tips:

- ▶ Length: 27 cm
- ▶ Sexes similar
- ▶ Medium-sized, somewhat slender dove with very thin neck
- ▶ Black bill

Adult:

- ▶ Pale buff-brown head, neck, breast, and belly
- ▶ Purple and green iridescence on neck
- ▶ Small black mark on lower neck
- ▶ Medium brown back and

upperwings, with large black spots on coverts

- ▶ Long tail is pointed at tip
- ▶ Dark brown tail with white tips to outer four tail feathers

Juvenile:

- ▶ Dark brown mottled head neck and breast
- ▶ Scaly neck and upperwings with numerous black spots on coverts and scapulars
- ▶ Pale belly
- ▶ Medium length tail is pointed at tip

Black-capped chickadee



Identification Tips:

- ▶ Length: 12 cm
- ▶ Short bill
- ▶ Black crown and throat
- ▶ White face
- ▶ Pale gray upperparts

- ▶ White edges to wing coverts
- ▶ Grayish-white underparts
- ▶ Rusty flanks
- ▶ Sexes similar
- ▶ Often found in small flocks

Northern cardinal



Identification Tips:

- ▶ Length: 19 cm
- ▶ Large, conical bill
- ▶ Crest
- ▶ Long tail

Adult male:

- ▶ Bright red plumage, dullest on back and wings
- ▶ Black around base of bill
- ▶ Red bill

Adult female:

- ▶ Reddish crest, wings and tail
- ▶ Brownish-gray upperparts
- ▶ Buffy underparts
- ▶ Red bill
- ▶ Juvenile like adult female but has dark bill and crest

American goldfinch



Identification Tips:

- Length: 11 cm
- Small, seed-eating bird
- Short, conical bill
- Short, forked tail

Male alternate:

- Plumage held in Spring and Summer
- Black forehead
- Yellow head, back, breast and belly
- Black wings and tail
- White wing bars and tertial edges

- White rump and undertail coverts
- Pale bill and legs

Female alternate:

- Greenish upperparts
- Yellow underparts
- Pale bill and legs

Basic:

- Plumage held in Fall and Winter
- Yellow face
- Brownish-olive upperparts
- Whitish underparts
- Blackish wings with pale wing bars

American tree sparrow

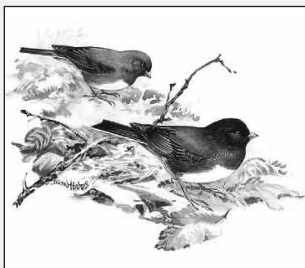


Identification Tips:

- Length: 14 cm
- Dark, conical bill with yellow lower mandible
- Rusty crown and eyeline
- Gray supercilium and face
- Gray breast with black spot
- Rust patch at side of breast
- White belly and

- undertail coverts
- Buffy flanks
- Tan back with dark streaks
- Brown wings with wing bars
- Slim, forked tail
- Sexes similar
- Juvenile plumage (Summer) similar to immature but duller with streaked breast

Dark-eyed junco



Identification Tips:

- Length: 14-16 cm
- Pink, conical bill
- White outer tail feathers

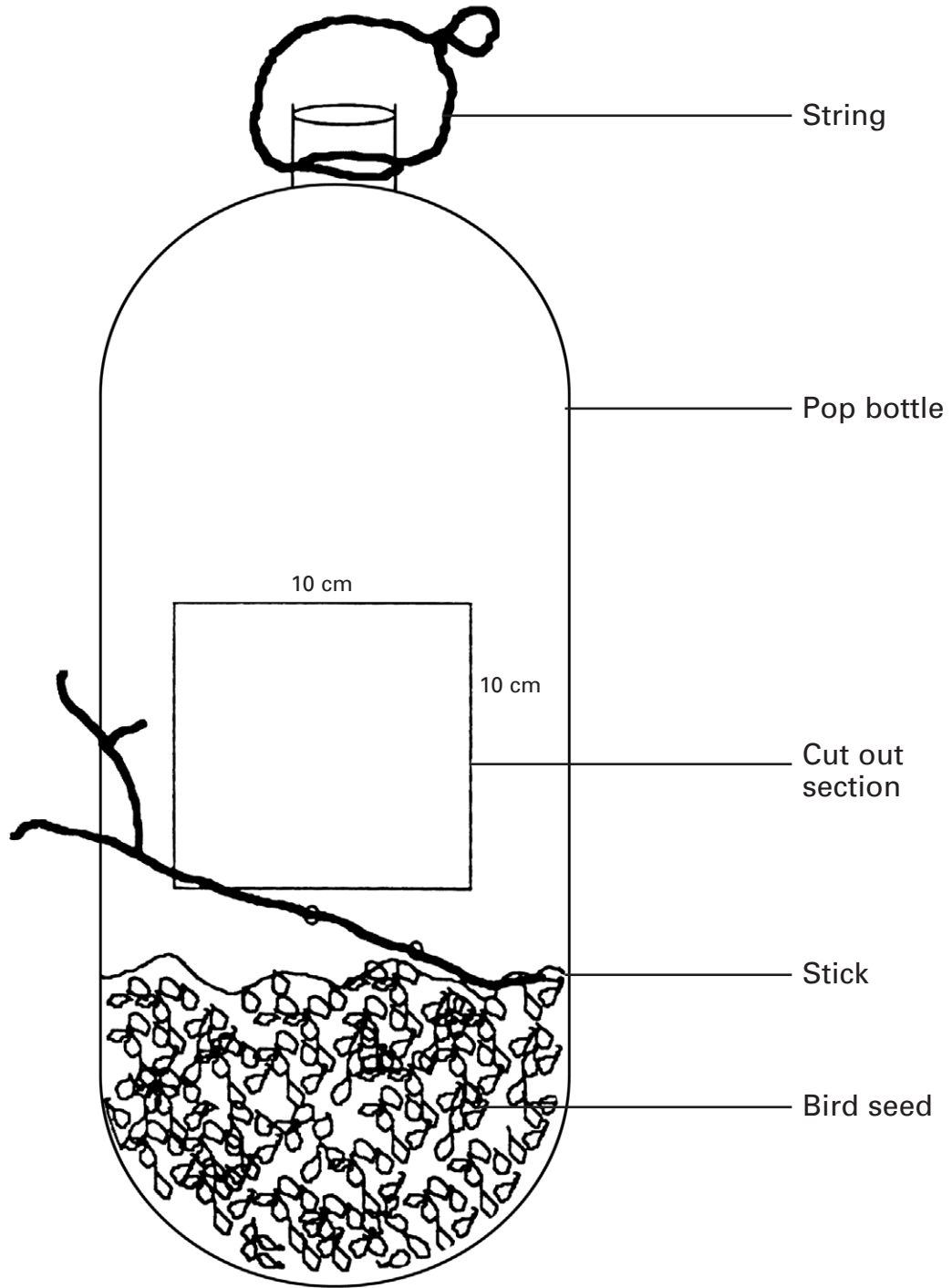
- Considerable geographic variation in plumage
- Various forms were formerly considered separate species

Sources:

<http://www.mbr-pwrc.usgs.gov/id/framlst/i5930id.html>

<http://www.yankeegardener.com/birds/>

Appendix B *Bird Feeder*



3. Food Chains: The Sun Powers All!

Source: Adapted from *Earth Child: Games, Stories, Activities, Experiments & Ideas About Living Lightly on Planet Earth*. See Resources.

Description

Through acting and singing the students will understand the connections between the components of a food chain and realize that all energy originates with the sun.

Background Information

Energy comes from the sun. Wind, solar, oil and food energy all originate from the sun and are converted into usable forms by nature and technology. Food chains are a simple way to connect the movement of energy from the sun to ourselves. Each chain begins with the sun, followed by *producers* - plants that can produce food energy from the sun's energy. The next step in all food chains is *consumers* that consume producers to obtain energy, and then finally *decomposers* that feed on the decaying matter of plants and animals to obtain energy.



Food chains can be used to understand how energy flows through ecosystems and how species are dependent upon each other in those systems. If these chains are disrupted or unhealthy as a result of environmental degradation, the effects are felt all along the chain. Food chains are only as strong as their weakest link and human actions, through consumption and pollution, often threaten these weak links.

Materials

- ▶ one copy of “We Are Sun-Powered” from *Earth Child* (see below)
- ▶ one copy of lyrics to “The Sun Powers All” (see below)
- ▶ music for “The Farmer in the Dell” (optional)
- ▶ 2 sets of name tags representing steps in the food chain as spelled out in the song (sun, plant, insect, animal, meat eater) to hang around students’ necks (Appendix C)

Time Allotment

Introduction: 5 minutes

“We Are Sun-Powered” movement exercise and discussion: 10 minutes

Song and food chain: 20 minutes

Discussion: 5 minutes

Teaching/Learning Strategies

1. Ask students to stand in a circle and make their favourite movement for 30 seconds while staying in their spot within the circle. What power source makes that movement possible? Have class offer suggestions.
2. It is the sun! Ask class to try to figure out how the sun provides the energy for them to make their favourite movement.
3. Introduce the first activity that will explain how the sun provides them with energy.
4. Have the students spread out, to ensure that they have room to move freely.
5. Read “We Are Sun-Powered!” to the students as they silently act out what you are reading.
6. Following the story ask the students to sum up and discuss the path the sunlight took. Describe this path as a food chain.
7. Ask the students to make a circle again to learn a new song about food chains called “The Sun Powers All.”
8. Choose two students to be the sun and ask them to stand in the middle of the circle (hang sun name tags around their necks). Sing the first verse as the children move in a circle around the ‘sun.’
9. Before the second verse the ‘suns’ should choose one classmate each to be ‘plants.’ The ‘plants’ will join hands with the sun who chooses them (see sequence listed below) and be given name tags to hang around their necks (forming a chain of students holding hands).
10. During the successive verses the child on the end of the food chain selects another child from the circle to join the food chain (as would happen in “The Farmer in the Dell”; you will have 10 students wearing tags in the middle of the circle).
Meat Eater – Animal – Insect – Plant – SUN/SUN – Plant – Insect – Animal – Meat Eater
11. When you have finished the game, take a roll call of the food chain created, asking each child to identify which plant, insect or animal he or she is pretending to be.
12. Then ask students to brainstorm (individually, in pairs or as a group depending on timing and comprehension) the food chain that describes the breakfast they had that morning.

Follow-up Discussion Questions

- What is an example of a food chain?
- How are humans connected to the food chain? What role do we play?
- Are there any foods we eat that don’t get their energy from the sun?
- What would happen if any one part of the food chain disappeared?
- What can we do to help keep food chains, and ecosystems, healthy?

Extensions for additional classroom projects/activities

- ▶ Have the students illustrate a food chain that they were a part of.
- ▶ Look at different ecosystems (e.g., wetland: see the Junior Division “Ecosystems in Action” activity), identify food chains that are present.
- ▶ Have the children write their own story to be acted out (e.g., starting at the sun, then as a seed, to hay, to a cow, to humans).

Curriculum Connections: Clustering of Expectations

GRADE 1: SCIENCE & TECHNOLOGY—Needs And Characteristics of Living Things (2007)

OE 1 assess the role of humans in maintaining a healthy environment

- 1.1 identify personal action that they themselves can take to help maintain a healthy environment for living things, including humans (*e.g., be careful what they put down a drain at home; show care and concern for all living things*)
- 1.2 describe changes or problems that could result from the loss of some kinds of living things that are part of everyday life (*e.g., if we lost all the cows, all the insects, all the bats, all the trees, all the grasses*), taking different points of view into consideration
- 2.2 investigate and compare the basic needs of humans and other living things, including the need for air, water, food, warmth, and space, using a variety of methods and resources (*e.g., prior knowledge, personal experience, discussions, books, videos/DVDs, CD-ROMs*)

OE 3 demonstrate an understanding of the basic needs and characteristics of plants and animals, including humans

- 3.5 describe how showing care and respect for all living things help to maintain a healthy environment (*e.g., ...caring for the school and the schoolyard as an environment*)

GRADE 1: SCIENCE & TECHNOLOGY—Energy in our Lives (2007)

- 2.6 investigate how the sun’s energy allows humans to meet their basic needs, including the need for food
- 3.2 demonstrate an understanding that the sun, as the earth’s principal source of energy, warms the air, land, and water; is a source of light for the earth; and makes it possible to grow food
- 3.3 identify food as a source of energy for themselves and other living things
- 3.5 demonstrate an understanding that humans get the energy resources they need from the world around them and that the supply of many of these resources is limited so care needs to be taken in how we use them

GRADE 2: SCIENCE & TECHNOLOGY—Growth and Changes in Animals (2007)

- 1.2 identify positive and negative impacts that different kinds of human activity have on animals and where they live (*e.g., actions of animals lovers and groups that protect animals and their rights, the home owner who wants a nice lawn, people who visit zoos and wildlife parks, pet owners*), form an opinion about one of them, and suggest ways in which the impact can be minimized or enhanced

GRADE 3: SCIENCE & TECHNOLOGY—Growth and Changes in Plants (2007)

- 1.1 assess ways in which plants are important to humans and other living things, taking different points of view into consideration, and suggest ways in which humans can protect plants
- 1.2 assess the impact of different human activities on plants, and list personal action they can take to minimize harmful effects and enhance good effects
- 3.6 describe ways in which plants and animals depend on each other

GRADE 7: SCIENCE & TECHNOLOGY—Interactions in the Environment (2007)

OE 2 investigate interactions within the environment and identify factors that affect the balance between different components of an ecosystem

3.1 demonstrate an understanding of an ecosystem (*e.g., a log, a pond, a forest*) as a system of interactions between living organisms and their environment

3.3 describe roles and interactions of producers, consumers, and decomposers within an ecosystem

3.8 describe ways in which human activities and technologies alter balances and interactions in the environment (*e.g., clear-cutting a forest, overusing motorized water vehicles, managing wolf-killings in Yukon*)

We Are Sun-Powered!

Curl into a ball and imagine that you are a tiny seed buried in the rich soil. The energy from the sun is stored inside your seedpod and nourishes you as you begin to grow. Soon you burst open and your roots grow downward, sucking in particles of sunlight energy and water that have waited hundreds of years for you. Your grasses grow tall as they use the sun’s energy to make food out of water and air. A bug crawls through your grassy top, nibbling on the green blades. Now the bug has absorbed the particles of sunlight (pretend to be the bug because the particles of sunlight are now part of it). The bug crawls high on a blade of grass. A sudden burst of wind shakes the grass, the bug loses his grip...and splash! The bug has fallen into a stream. Under the water a fish notices the rippling surface...and snap! A big fish has eaten the bug (become the fish because the particles of sunlight are now part of the fish). Wading along the edge of the stream is a bear. He slaps his huge paw into the water and the fish lands on the ground. Then, gulp! The bear has swallowed the fish (pretend to be the bear). Quietly creeping through the woods is a hunter. The hunter silently sets an arrow in his bow and lets it fly. The hunter has killed the bear. The bear meat is made into a stew for the hunter’s family (pretend to be the hunter). Now the particles of sunlight are part of you. Where will they go from here?

The Sun Powers All *Tune: Farmer in the Dell*

<i>The sun shines on the Earth,</i>	<i>An insect chews a plant,</i>	<i>A meat-eater hunts for food,</i>
<i>The sun shines on the Earth,</i>	<i>An insect chews a plant,</i>	<i>A meat-eater hunts for food,</i>
<i>The sun shines down and powers all,</i>	<i>One-by-one they’re linked to the sun,</i>	<i>One-by-one they’re linked to the sun,</i>
<i>The sun shines on the Earth.</i>	<i>An insect chews a plant.</i>	<i>A meat-eater hunts for food.</i>

<i>A plant munches the sun,</i>	<i>An animal eats a bug,</i>	<i>The food chain is complete,</i>
<i>A plant munches the sun,</i>	<i>An animal eats a bug,</i>	<i>The food chain is complete,</i>
<i>One-by-one they’re linked to the sun,</i>	<i>One-by-one they’re linked to the sun,</i>	<i>One-by-one they’re linked to the sun,</i>
<i>A plant munches the sun.</i>	<i>An animal eats a bug.</i>	<i>The food chain is complete.¹</i>

¹ Both “We Are Sun-Powered” and “The Sun Powers All” are adapted very slightly from their source, Katherine Sheehan and Mary Waidner’s *Earth Child: Games, Stories, Activities, Experiments & Ideas about Living Lightly on Planet Earth*. Revised edition (1994), 29

► **Appendix C** *Food Chain Name Tags*

Sun

Sun

Plant
(PRODUCER)

Plant
(PRODUCER)

Insect
(CONSUMER)

Insect
(CONSUMER)

Animal
(CONSUMER)

Animal
(CONSUMER)

Meat Eater
(CONSUMER)

Meat Eater
(CONSUMER)

4. Connecting with Habitats: Home Sweet Home

(easily adapted for Junior Grades)

Source: All activities adapted from *Project Wild*. See Resources.

Description

The activities in this session will, in combination, give students an understanding of the concept of habitat, what animals need to survive, and the importance of preserving habitat. The first activity is a quick game of Animal Charades to spark students' knowledge of animals and where those animals live. "What's that, habitat?" will introduce students to the basic needs of all animals. Finally, a round of Habitat Lap Sit will illustrate the connections among all of the components (air, food, water and space) that together make up a healthy habitat.

Note: This activity is best for older primary and younger junior students

Background Information

Humans and other animals share some basic needs. Every animal needs a home – a place in which to live. The environment in which an animal lives is called its "habitat." An animal's habitat includes the food, water, shelter, air and space needed to meet an animal's needs. In ecosystems all things are interrelated and if any of these components of habitat are missing or are unhealthy it has an impact on the animals living in that habitat. The impact will not necessarily be catastrophic but can be and usually is widespread because of the numerous connections and interdependencies among plants and plants, plants and animals, and animals and animals within ecosystems. As a result, as we learn about animals we also need to learn about their habitats.

Materials

- ▶ an open space (in classroom or outdoors)
- ▶ habitat riddles (provided below)
- ▶ drawing paper and pencils/markers

Time Allotment

Introduction and Animal Charades: 15 minutes

"What's that, habitat?" (using habitat riddles as clues): 5-10 minutes

Habitat Lap Sit: 10-15 minutes

Discussion: 5 minutes

Teaching/Learning Strategies

1. *Animal Charades*

a) This introduction involves a quick game of charades to get children thinking about animals and where they live. Explain to the children that during the session they will be talking about animals. This game helps

students to remember, and remind each other of, all the animals they know. Some students will have a chance to silently act out an animal while the others guess.

b) Have children come to the front to act out the animal they have chosen. This game is played exactly like charades.

- c) As each animal is acted out, list the animals on the board and have the students identify where the particular animal lives (forest, jungle, house, farm etc.).

2. “What’s that, habitat?”

- a) Identify humans as animals too, if not previously acted out as part of the introduction. Where do humans live? Talk about the idea that everybody needs a home, but that home is not just a ‘house’ such as people live in. An animal’s home, for many animals, is a much bigger place - and it’s outdoors. An animal’s home is more like a neighborhood that has everything in it that is needed for survival.
- b) Begin a discussion of what humans need to survive (food, water, air, shelter, space). Use the habitat riddles at the end of this section to act as prompts. Ask children to give specific examples of each from their own lives (e.g., house, grocery store, water, clean air, and a park to run and play).
- c) Discuss the fact that although the basic needs are the same for all animals, the arrangement of the necessary parts might be different - moose need more space than mice, wolves eat different things than deer, etc. The arrangement has to be right for each animal in order for it to be healthy and content.

3. *Habitat Lap Sit*

- a) Illustrate the importance of these different parts through “Habitat Lap Sit,” a quick game with high impact. Have the class form a circle; number the students off 1-5. Assign each number a category as follows: number ones - food, number twos - water, number threes – shelter, number fours – space, and number fives - air.

- b) Students should be standing shoulder to shoulder, facing the centre of the circle. Now ask the students to turn to their right and take a step toward the centre. Students should be standing close together, facing the back of the student in front of them.
- c) Everyone then places their hands on the shoulders of the person in front of them. On the count of three students slowly sit down on the knees of the person behind them, keeping their own knees together to support the person in front of them.
- d) You should then say, “food, water, air, space and shelter” in the proper arrangement (as represented by the intact ‘lap-sit’ circle), are what is needed to have a healthy habitat.”
- e) At this point the students may either fall down or stand up. When their laughter has subsided, discuss the necessary components of suitable habitat for people and wildlife.
- f) After students understand the major point - that food water, shelter, space and air are necessary for animals’ survival - let the students try the activity again!
- g) This time, connect some human actions and the weather to the health of the habitat. For example (adapt language as needed):
 - ▶ Drought: there hasn’t been enough rain and the earth is very dry (ask one or two ‘water’ students to leave the circle).
 - ▶ Urban sprawl: the forest is being cut down to make room to build more houses (ask one or two ‘space’ students to leave the circle)
 - ▶ Soil erosion: the soil is being blown away and there isn’t enough to grow lots of food (ask one or two ‘food’ students to leave the circle)

- Dam-building: the new dam flooded the marsh (ask one or two ‘shelter’ students to leave the circle)
 - Increasing vehicle use: there are too many SUVs on the road, causing major pollution problems (ask one or two ‘air’ students to leave the circle)
- h) Have students observe what happens when people leave the circle. The circle collapsing or suffering some major disruption represents the effect on animals when their habitats are disrupted. Discuss with students how all areas are interconnected.
- i) If time permits, have students draw a healthy habitat for one of the animals discussed earlier. Their drawing should show all the components necessary to provide a healthy habitat.

Follow-up Discussion Questions

- Ask students to describe their own “habitats.” What, in addition to their home, might be part of the students’ habitat?
- How are their habitats connected to the habitats of other animals in the area?
- Discuss what actions the students can take to help maintain healthy habitats, for themselves and other animals.

Extensions for additional classroom projects/activities

- Study the habitat in your local park or back yard - What animals live there? How are all their basic needs met in this habitat? What, if any, are the threats to their habitat?
- What can you do to help keep their habitat a healthy place for the animals to live?
- Create a habitat in your classroom by building a terrarium or aquarium.

Curriculum Connections: Clustering of Expectations

GRADE 1: SCIENCE & TECHNOLOGY—Needs and Characteristics of Living Things (2007)

- 1.1 identify personal action that they themselves can take to help maintain a healthy environment for living things, including humans
- 2.2 investigate and compare the basic needs of humans and other living things, including the need for air, water, food, warmth, and space, using a variety of methods and resources (*e.g., prior knowledge, personal experience, discussions, books, videos/DVDs, CD-ROMs*)
- OE 3 demonstrate an understanding of the basic needs and characteristics of plants and animals, including humans
- 3.4 describe the characteristics of a healthy environment, including clean air and water and nutritious food and explain why it is important for all living things to have a healthy environment
- 3.5 describe how showing care and respect for all living things help to maintain a healthy environment (*e.g., ...caring for the school and the schoolyard as an environment*)

GRADE 1: SCIENCE & TECHNOLOGY—Energy in our Lives (2007)

- 3.5 demonstrate an understanding that humans get the energy resources they need from the world around them and that the supply of many of these resources is limited so care needs to be taken in how we use them

GRADE 1: SOCIAL STUDIES (2004)

- 1z7 significant people and places in their lives (*e.g., parents, sports figures, bedroom, park, playground, community centre*) and the rules associated with them

GRADE 2: SCIENCE & TECHNOLOGY—Growth and Changes in Animals (2007)

- 1.2 identify positive and negative impacts that different kinds of human activity have on animals and where they live (*e.g., actions of animals lovers and groups that protect animals and their rights, the home owner who wants a nice lawn, people who visit zoos and wildlife parks, pet owners*), form an opinion about one of them, and suggest ways in which the impact can be minimized or enhanced

GRADE 2: SCIENCE & TECHNOLOGY—Air and Water in the Environment (2007)

- 3.3 describe ways in which living things, including humans depend on air and water (*e.g., most animals, including humans breathe air to stay alive; wind generates energy, disperses seeds; all living things need to drink or absorb water to stay alive; water is used for washing and bathing, transportation, energy generation*)

GRADE 3: SCIENCE & TECHNOLOGY—Growth and Changes in Plants (2007)

- OE 1 assess ways in which plants have an impact on society and the environment and ways in which human activity has an impact on plants and plant habitats
- 1.1 assess ways in which plants are important to humans and other living things, taking different points of view into consideration, and suggest ways in which humans can protect plants
- 3.6 describe ways in which plants and animals depend on each other

Habitat Riddles (*from Earth Child*)

1. I'm something you need each day, especially after you run and play.
I fill you up as you drink me down; the tap is a place where I can be found.
— *water*
2. Your empty stomach can wiggle and pull; I fill it up until it's full. Sometimes
I'm eaten hot or cold. I'm kept in the kitchen in most households.
— *food*
3. Although I'm all around you, I can't be seen; to keep your body healthy I must
be clean. You breathe me in through your nose, but try to grab me and away I go.
— *air*
4. From wind and rain I keep you safe; I'm very necessary in this place. Look all
around you, for I'm sturdy and tall; you'll probably find me upon some wall.
— *shelter*
5. Take me away and you'd be cramped; no place to play and no place to stand.
To find me you'll need a rocket, you might presume. What I'm talking about
is elbow room!
— *space*

5. Creating a Mini-forest

(easily adapted for Junior Grades)

Source: Adapted from *One World, One Earth*. See Resources.

Description

Children work together in small groups to create a large classroom mural of a forest, thus becoming familiar with the components of a forest ecosystem. Through this activity and the follow-up discussion the connections within an ecosystem should be emphasized — nothing exists in isolation.

Background Information

Two centuries ago, almost all of southern Ontario was forested. Mature forest ecosystems of maple, beech, oak and pine dominated the landscape. Today, 94% of the original forest is gone, and with it the complexity of forest ecosystems and the tranquility that a large forested expanse could offer. Ecosystems are made up of interacting living and non-living parts that are dependent upon each other. Most students living in the city have little first-hand experience of exploring forests and all the pieces within the forest ecosystem puzzle.

Materials

- ▶ large mural paper
- ▶ pre-cut shapes of trees, butterflies, nests, birds, small green plants, deer, fox, squirrels, rocks, raindrops, rabbits, raccoons, beehives, frogs, ponds, rivers,
- ▶ clouds, sun, rainbows (older students could design their own shapes)
- ▶ leaves, sticks, pine cones previously collected from outside (by the teacher or the children)

Time Allotment

Introduction and mural: 25 minutes

Drama extension: 10 minutes

Discussion: 5 minutes

Teaching/Learning Strategies

1. Introduce the concept of forests to the students. What are forests? Where do we find them? What do we find in them? Discuss individuals' experiences in forests (camping, hiking etc.).
2. To help facilitate this activity, older students can help with the murals, in particular to pre-cut shapes.
3. For older primary/junior students, instead of pre-cutting shapes simply write the name of an appropriate forest component (tree, shrub, wildflower, birds, fox, deer, mosquito, sunlight, clouds, raindrops, etc.), on a piece of paper and give each student one or two specific things to draw before they are added to the mural.

4. Brainstorm a list of animals, plants and other elements (*rocks, water, soil, light*) that may be found in a forest.
5. In what ways do the elements of the forest depend on one another (*animals need the plants for food, birds live in the trees, the trees need sunshine to grow, etc.*)?
6. For older students introduce the term ecosystem and discuss how a forest is a system of natural parts working together.
7. Split the class up into 3 or 4 working groups.
8. Their goal is the cooperative creation of a mini-forest.
9. Each group will receive a selection of pre-cut forest shapes (to colour, if time permits) as well as some leaves and sticks.
10. The students will paste these items onto the large mural backdrop to create a forest scene. Teachers may help the students in placing the items so that they illustrate the connections between the parts of the ecosystem.
11. If time allows, ask student groups to make small skits for their mural, highlighting the interactions between the species, to present to the class.

Follow-up Discussion Questions:

- How many connections can we count in each mural?
- How are we connected to forests?
- Imagine the trees in this forest were cut down. How would the forest change?
- If we put a road through the middle of the forest, how would the forest change?

Extensions for additional classroom projects/activities

- Take a field trip to a local forest for observation and exploration.
- Engage in additional studies on deforestation and other problems facing forests.
- Build the forest dramatization into a larger drama activity. Children can develop scripts and act out how the different parts of the ecosystem are connected to one another, or how they could help the forest stay healthy.

Curriculum Connections: Clustering of Expectations

GRADE 1: SCIENCE & TECHNOLOGY—Needs and Characteristics of Living Things (2007)

- 1.1 identify personal action that they themselves can take to help maintain a healthy environment for living things, including humans
- OE 2 investigate needs and characteristics of plants and animals, including humans
- 2.2 investigate and compare the basic needs of humans and other living things, including the need for air, water, food, warmth, and space, using a variety of methods and resources (*e.g., prior knowledge, personal experience, discussions, books, videos/DVDs, CD-ROMs*)
- OE 3 demonstrate an understanding of the basic needs and characteristics of plants and animals, including humans

- 3.5 describe how showing care and respect for all living things help to maintain a healthy environment (*e.g., ...caring for the school and the schoolyard as an environment*)
- 3.6 identify what living things provide for other living things (*e.g., trees produce the oxygen that other living things breathe; plants such as tomatoes and apple trees and animals such as cows and fish provide food for humans and for other animals...*)

GRADE 1: SCIENCE & TECHNOLOGY—Materials, Objects, and Everyday Structures (2007)

- 3.6 distinguish between objects (including structures) and materials found in nature (*e.g., tree: sap*) and those made by humans (*e.g., toy: plastic*)

GRADE 1: SCIENCE & TECHNOLOGY—Energy in our Lives (2007)

- 3.5 demonstrate an understanding that humans get the energy resources they need from the world around them and that the supply of many of these resources is limited so care needs to be taken in how we use them

GRADE 2: SCIENCE & TECHNOLOGY—Growth and Changes in Animals (2007)

- OE 1 assess ways in which animals have an impact on society and the environment, and ways in which humans have an impact upon animals and the place where they live
- 1.2 identify positive and negative impacts that different kinds of human activity have on animals and where they live (*e.g., actions of animals lovers and groups that protect animals and their rights, the home owner who wants a nice lawn, people who visit zoos and wildlife parks, pet owners*), form an opinion about one of them, and suggest ways in which the impact can be minimized or enhanced
- 2.5 investigate the ways in which a variety of animals adapt to their environment and/or to changes in their environment, using various methods

GRADE 3: SCIENCE & TECHNOLOGY—Growth and Changes in Plants (2007)

- 1.1 assess ways in which plants are important to humans and other living things, taking different points of view into consideration, and suggest ways in which humans can protect plants
- 3.8 identify examples of environmental conditions that may threaten plant and animal survival (*e.g., ...changes in habitat because of human activities such as construction*)

6. Water Water Everywhere

Source: “Earth’s Water to Go,” adapted from *The Outward Bound Earth Book*
“Now that we have it, how do we use it?” adapted from *Every Drop Counts*. See Resources.

Description

These activities combine to help students understand that there is a finite amount of water available for human use, learn about how much water is needed for everyday activities, and communicate ideas for conserving water.

Background Information

All the water we have on Earth right now is all we will ever have - it exists in a limited quantity, and gets moved through the water cycle again and again. We all have water in us that may once have been part of dinosaurs, saber tooth tigers, and ancient oceans. However, most of the water on the Earth is unusable (salt water, glacial ice) or polluted. This leaves a very small amount of drinkable water that we rely on and some of this is hard to access. This activity focuses on groundwater which is the source of drinking water for most people in the world. Groundwater is the term used for water that is stored in rocks under the earth. A well is a simple example of groundwater.

Groundwater is a very important source of fresh water. Water taken from groundwater reserves will not return to this system anytime soon. Shallow groundwater has a renewal rate of about 300 years; deep groundwater, over 1000 metres deep, may renew itself in about 4600 years. Currently there is an increasing drain on the groundwater supply: as groundwater dries up, streams’ flows are reduced, ponds and marshes dry up and plant and animal species suffer.

Materials

- ▶ 19 litres (5 gallon) pail of water
- ▶ clear glass bowl
- ▶ metric measuring cups
- ▶ list of estimated litres of water used (Appendix D)
- ▶ metric measuring spoons
- ▶ eyedropper
- ▶ 1-litre milk or juice carton or 2-litre pop bottle for each student

Time Allotment

Introduction: 10 minutes

Brainstorming and discussion: 10 minutes

Conservation commercials: 15 minutes

Discussion: 5 minutes

This can be a great outdoor activity.

Teaching/Learning Strategies

1. “*Earth’s Water to Go!*”

- a) This demonstration activity illustrates why water conservation is important.
- b) Fill the 19 litre (5-gallon) pail with water, and place in clear view for the students.
- c) Explain that this represents ALL of the water on the Earth.
- d) With student participation, take out 500 ml of water from the bucket and put it in the bowl — this represents all the fresh water in the world; the water remaining in the bucket is salt water.
- e) Have a student remove 375 ml of water from the bowl — this represents the freshwater that is frozen in the polar ice caps and glaciers. The remaining 125 ml represents all of the accessible fresh water on Earth.
- f) Have a student take out 1ml of water from the bowl — this represents all the water in the Earth’s fresh water lakes (including our own Lake Ontario!).
- g) Have a student take 1/2 drop of water from the 1 ml — this represents all the fresh water in streams and rivers. The water remaining in the bowl is groundwater found beneath the Earth’s surface.

2. “*Now that we have it, how do we use it?*”

- a) Discuss with the students their reactions to this demonstration. Do they feel that water is a valuable resource? Can any life survive without water?
- b) Brainstorm students’ daily water use.
- c) Introduce the concept of *invisible water use*. Huge amounts of water are being used to produce the things that we use everyday,

yet we don’t link these items to water use (e.g., making one new car, including the tires, uses 148,000 litres of water; to produce one kilogram of beef requires 12,000 litres of water).

- d) Give each student a 1-litre juice or milk carton or 2-litre pop bottle full of water. Use the list “Estimated Litres of Water Used” (Appendix D) to give students an idea of the volume of water used in daily activities. For each item that uses water, ask students to guess how much water that item uses. Then reveal the answer and get that number of students to stand up with their filled carton or bottle. If having the containers filled with water seems impractical, the container itself can represent the volume, though it will be a less vivid demonstration.

3. *Communicate Conservation*

- a) Brainstorm a list of ways that students can conserve water.
- b) At this point, based on the list generated, break the students up into small groups and ask each group to choose one conservation idea that interests them. Give them 10 minutes to generate a 30 second to 1 minute commercial to share their chosen conservation message with the other students. Key points for the commercial:
 - ▶ everyone must be involved
 - ▶ ensure that the message is very clear
 - ▶ humour or ‘gimmicks’ are very effective
- c) Each group should have the opportunity to present its commercial, and the audience will try to identify the particular water conservation message being conveyed.

Follow-up Discussion Questions

- ▶ Why is it important to conserve water? What are the benefits?
- ▶ Why do people waste water?
- ▶ How can you help others learn about ways to save water?
- ▶ What change can you make in your life that will have the biggest impact on water conservation?

Extensions for additional classroom projects/ activities

- ▶ With the help of the school custodian, locate the school's water meter. Track the water use of the school for one week. Launch a water conservation campaign by sharing your commercials at a school assembly or creating posters on water conservation.
- ▶ Do a month-long home or school water use study. Set a goal to decrease water use each week for a month through new water conservation habits. Share successes and challenges with the class.

Curriculum Connections: Clustering of Expectations

GRADE 2: SCIENCE & TECHNOLOGY—Air and Water in the Environment (2007)

- 1.2 assess personal and family uses of water as responsible/efficient or wasteful, and create a plan to reduce the amount of water used, where possible
- 3.4 identify sources of water in the natural and built environment (*e.g., natural: oceans, lakes, ponds, streams, springs, water tables; human-made: wells, sewers, water-supply systems, reservoirs, water towers*)
- 3.6 state reasons why clean water is an increasingly scarce resource in many parts of the world

GRADE 4: SCIENCE & TECHNOLOGY—Habitats and Communities (2007)

- 1.1 analyse the positive and negative impacts of human interactions with natural habitats and communities (*e.g., human dependence on natural materials*), taking different perspectives into account (*e.g., the perspectives of a housing developer, a family in need of housing, an ecologist*), and evaluate the ways of minimizing the negative impacts
- 3.10 describe ways in which humans are dependent on natural habitats and communities (*e.g., for water, medicine, flood control in wetlands, leisure activities*)

GRADE 5: SCIENCE & TECHNOLOGY—Conservation of Energy and Resources (2007)

- 1.1 analyse the long-term impacts on society and the environment of human uses of energy and natural resources and suggest ways to reduce these impacts (*e.g., turning off the faucet while brushing teeth or washing and rinsing dishes conserves water...*)

GRADE 8: SCIENCE & TECHNOLOGY—Water Systems (2007)

- OE 1 assess the impact of human activities and technologies on the sustainability of water resources
 - 1.1 evaluate personal water consumption, compare it with personal water consumption in other countries, and propose a plan of action to reduce personal water consumption to help address water sustainability issues
 - 3.1 identify the various states of water on the earth's surface, their distribution, relative amounts, and circulation, and conditions under which they exist (*e.g., water is a solid in glaciers, snow and polar ice-caps; a liquid in oceans, lakes, rivers, and aquifers; and a gas in the atmosphere*)

Appendix D Estimate Litres Of Water Used

Source: *Every Drop Counts*, City of Toronto

<i>Toilet</i>	Regular tank – 13 litres per flush or more Water efficient model – 6 litres per flush
<i>Shower</i>	Regular head – 100 litres per five minutes Low-flow head – 55 litres per five minutes
<i>Bath</i>	“Full” tub – 200 litres “Quarter” tub – 70 litres
<i>Brushing Teeth</i>	Tap on one minute – 11 litres Tap turned off while brushing – 2 litres
<i>Hand/Face Washing</i>	Tap on one minute – 11 litres Partially filled basin – 3 litres
<i>Food Preparation</i>	Tap on five minutes – 55 litres Basin or pot method – 5 litres
<i>Washing Dishes by Hand</i>	Tap on 10 minutes- 110 litres Basin method for wash and rinse – 10 litres
<i>Dishwasher</i>	Full cycle – 47 litres Short cycle – 32 litres
<i>Drinking 1 Glass</i>	Tap on 30 seconds – 5.5 litres From jug in fridge – 1/4 litre
<i>Laundry</i>	Average 105 litres per full load
<i>Car Washing</i>	Hose on 15 minutes – 165 litres Bucket or shut-off nozzle – 20 litres
<i>Lawn Watering</i>	Sprinkler on one hour – 660 litres Sprinkler on 1/2 hour – 330 litres

Canadians and Water Around the World

- *Canadians are the second highest water users in the world.*
- *The average Canadian uses approximately 350 litres of water a day.*
- *Canadians use more water than people in dry countries such as Spain or Italy.*
- *Canadians use 2 times the amount of water that people in Britain use.*
- *People who live in areas with set water rates (charges for the exact amount of water used) use 40% less water than those who pay a flat rate for water (regardless of how much they use).*

7. Ecosystems in Action: Web of Life

Source: Adapted from “Energy Web (Web of Life)” by Gareth Thompson in *Green Teacher*, Issue #44, and Diane Lawrence, Faculty of Education, Queen’s University

Description

Within an ecosystem everything is interconnected and organisms are continuously affected by elements in their environment. Loss or disturbance of any plant, animal, or natural element will have a negative impact on the other components of the ecosystem. The activities below will describe these basic concepts to the students. It is hoped that students will understand that human activities can cause habitat destruction and pollution and have serious consequences for the ecosystem as a whole.

Background Information

Your ‘habitat’ is where your home is! Greek words meaning “the study of the home” have given us the term ‘ecology’ to describe the relationship between living things and their non-living environment or habitat. A wetland, for example, is very different from a desert or mountain ecosystem. In each case, the plants and animals – from the tiniest algae to the largest mammal – are adapted to the conditions found there. These conditions are created by such non-living factors as the nature and availability of water, air, light, wind, temperature, soil and bedrock, but are modified by the interrelationships with the plants and animals themselves.

Materials

- ▶ large ball of twine or yarn
- ▶ ecosystem tags for students to wear on their back, and then on their front (reused paper with a string works well). The examples below are from a wetland ecosystem:

water	heron	raccoon	loon
rock	air	catfish	worm
dragonfly	fish	black fly	willow tree
muskrat	turtle	beaver	water spider
pond snail	cattail	fungi	leech
soil	trout	cray fish	tamarack tree
mallard duck	bull rush	water lily	sun
Canada goose	algae	mosquito	
frog	snake	water beetle	

Time Allotment

Introduction and 20 Questions Game: 15 minutes

Web of Life: 20 minutes

Human Ecosystem Sculptures (if time allows): 10 minutes

Discussion: 5 minutes

This can be a great outdoor activity.

Teaching/Learning Strategies

To prepare for the first activity, introduce the concept of an ecosystem to the group.

Brainstorm the specific living (biotic) and non-living (abiotic) components of a wetland ecosystem.

1. 20 Questions

- a) Hand out ecosystem name tags that can be hung, pinned or taped to the back of each student. Each tag should name a biotic (mammal, bird, fish, insect or other invertebrate, plant, tree, moss, lichen, algae) or abiotic (physical feature of an ecosystem — water, air, sun, soil) component that can be found in a wetland ecosystem. Depending on the age/experience of the students use general names (turtle) or specific names (snapping turtle). Tell students that they are part of a wetland ecosystem.
- b) The students' task is to discover their new identity. They do this by mingling through the room asking only "yes" or "no" questions and guessing.
- c) Allow approximately 10 minutes for students to determine their identity (you may need to assist some students in discovering their identity by helping with framing questions).

2. Web of Life

- a) Once students have discovered their identity ask them to sit in a circle. Based on their identity ask the students to think about:
 - ▶ what their ecosystem component eats?
 - ▶ what they need to survive?
 - ▶ who eats their character?

- ▶ what provides them with nutrients?
 - ▶ what keeps them from becoming dehydrated?
 - ▶ what is the source of their energy?
- b) Choose one student to begin. Hand her/him the ball of twine. Ask the student to roll the ball of twine to an ecosystem component that he/she gives energy to (that is, who eats it) or who gives energy to it (who it eats — unless it is a green plant, in which case it would be the sun). The second student receives the twine, holds onto a piece, and sends the ball to another ecosystem component in the circle that he/she is connected to. As more connections are made, a web will begin to form (use guiding questions above to make these connections).
 - c) An ecosystem is a set of interactions among living (biotic) and non-living (abiotic) components in a particular place.
 - d) Once all students are connected by the web, ask "What has been formed? What things could affect this ecosystem?"
 - e) From students' suggestions, begin to show how changes to one part of the ecosystem affect the other parts. For example, pretend that humans have come into the forest and hunted almost all of one species of animal. To reflect this, first have the students take up all the slack in the string; then have the hunted animal drop its string, and ask the other participants if they felt a change in the tension. Have affected ecosystem components in turn drop their string, and observe how the change in one element rapidly spreads throughout the ecosystem.

- f) Ask students to suggest other factors that could influence the web of life - e.g., pollution, habitat destruction, pesticide use, drought, etc. The web of life will fall apart, leaving only the sun remaining. Discuss why the sun is not affected.
- ecosystem components to each other visually (e.g., a tree would stand with its arms outstretched; a leaf-eating insect might be crouched pretending to eat one of the tree's leaves, while an insect-eating bird would be preparing to seize the insect in its beak).
3. ***Human Ecosystem Sculptures***
- a) This activity is designed to immediately follow the Web of Life activity if time allows.
- b) Divide students into groups of 5 or 6 that represent a mixture of living and non-living components.
- c) The students' task is to create a group sculpture, using only their bodies, to represent the relationships of these
- d) They should form 2 sculptures - one of a healthy ecosystem, and the second where there has been a negative impact. They will only have 5 - 10 minutes to develop their sculptures.
- e) If time permits have the groups present their sculptures to the class; students in the audience should try to interpret the sculptures and identify what the source(s) of the negative impacts is (are) in the second sculpture.

Follow-up Discussion Questions

- ▶ How are humans connected to the ecosystem that each group created?
- ▶ How are students' individual actions connected to ecosystems?
- ▶ How can ecosystems be protected?

Extensions for additional classroom projects/activities

- ▶ Research other ecosystems in small groups and develop ecosystem tags for the new ecosystems.
- ▶ Study local ecosystems – What animals live there? What plants live there? What are the non-living components? How are they all connected? What, if any, are the threats to their ecosystems? What can each of us do to help keep ecosystems healthy places for the animals to live?
- ▶ Create an ecosystem in your classroom by building a terrarium or aquarium.

Curriculum Connections: Clustering of Expectations

GRADE 4: SCIENCE & TECHNOLOGY—Habitats and Communities (2007)

OE 1 analyse the effects of human activities on habitats and communities

1.1 analyze the positive and negative impacts of human interactions with natural habitats and communities (*e.g., human dependence on natural materials*), taking different perspectives into account (*e.g., the perspectives of a housing developer, a family in need of housing, an ecologist*), and evaluate the ways of minimizing the negative impacts

OE 2 investigate the interdependence of plants and animals within specific habitats and communities

2.2 build food chains consisting of different plants and animals, including humans

2.5 use appropriate science and technology vocabulary, including habitat, population, community, adaptation, and food chain, in oral and written communication

OE 3 demonstrate an understanding of habitats and communities and the relationships among the plants and animals that live in them

3.1 demonstrate an understanding of habitats and communities and the relationships among the plants and animals that live in them

3.2 demonstrate an understanding of food chains as systems in which energy from the sun is transferred to producers (plants) and then to consumers (animals)

3.3 identify factors (*e.g., availability of water or food, amount of light, type of weather*) that affect the ability of plants and animals to survive in a specific habitat

3.10 describe ways in which humans are dependent on natural habitats and communities (*e.g., for water, medicine, flood control in wetlands, leisure activities*)

GRADE 7: SCIENCE & TECHNOLOGY—Interactions in the Environment (2007)

OE 1 assess the impacts of human activities and technologies on the environment and evaluate ways of controlling these impacts

1.1 assess the impact of selected technologies on the environment

OE 3 demonstrate an understanding of interactions between and among biotic and abiotic elements in the environment

3.1 demonstrate an understanding of an ecosystem (*e.g., a log, a pond, a forest*) as a system of interactions between living organisms and their environment

3.2 identify biotic and abiotic elements in an ecosystem and describe the interactions between them (*e.g., ... between the soil, plants and animals in a forest*)

3.8 describe ways in which human activities and technologies alter balances and interactions in the environment

8. Ecological Footprints: Human Wants and Needs affecting the Earth

Sources: *The Junior Environment Club Manual*, Waterloo Region District School Board and Youth Services Canada. Reprint of “The World in an Apple” by Jim Petrie from *Green Teacher*, Issue #46

Description

All species on the Earth need resources to survive. Animals have basic needs for survival, including food, water, shelter and space. All of these needs are fulfilled by the Earth’s resources and connect animals to the environment they live in. Most humans in Western society live beyond their needs. By fulfilling needs and wants humans consume a lot of the Earth’s resources. This activity allows students to explore their own personal needs for survival, and to draw connections to objects they own, have access to, or want, and the Earth’s resources that provide those products.

Background Information

Human activity has large impacts on the health of our natural environment. But humans are not the only species that affect their environment. All living things have an Ecological Footprint that varies in size. An Ecological Footprint is the amount of land necessary to support an individual life. Most species’ footprints are based solely on what they need to survive: food, water, shelter and space. A human being’s “footprint” includes not only needs, but also wants, or extras, that make our lives more comfortable or convenient (several cars, private swimming pools, disposable single-use products). As a result, humans’ footprint on the planet is very large. An understanding of our Ecological Footprint is a striking way to see our connections to and dependence on the Earth and can also highlight how we can reduce our impact on it.

Materials

- ▶ paper cut into the shape of a foot (lefts and rights)
- ▶ magazines
- ▶ writing materials
- ▶ glue
- ▶ scissors
- ▶ apple
- ▶ knife

Time Allotment

Introduction: “The World in An Apple” - 5-10 minutes

Student art work: 20 minutes

Assessing and comparing impacts: 5 minutes

Student sharing (if time allows): 5 minutes

Discussion: 5 minutes

Teaching/Learning Strategies

“The World in an Apple”

Tell students that the apple you are holding represents the Earth. Brainstorm and list on the blackboard ways that students are dependent on the Earth. Highlight food and shelter as two fundamental ways that we depend on the Earth. Then slice the apple in quarters to explore how much of the Earth’s resources are available to support our lives. Set aside the three-quarters that represent the oceans. Slice the remaining quarter into two pieces. Dispose of one piece: it represents the land that is inhospitable for humans. The remaining $1/8$ represents the land where people live or find shelter (use the term from the brainstorming session that most closely relates to shelter). Slice the remaining $1/8$ into four sections and set aside three of the sections. They represent areas too rocky, too steep or too cold to produce food. Carefully peel the remaining $1/32$ slice of the Earth. This peel represents the very thin skin of the Earth’s crust or soil that grows the food we need to live. This layer is less than five feet deep, and is capable of producing a relatively fixed amount of food. In addition, this thin layer of apple peel - which represents the soil – supports the world’s entire population which is currently six billion people and growing. Ask (rhetorically) if any of the students can divide this peel into six billion pieces!

Discuss the concept of an Ecological Footprint with students. Highlight the fact that all species use resources and need a share of the $1/32$ apple slice. The amount of the $1/32$ slice that each person uses to support her/his life is referred to as an Ecological Footprint.

1. Divide students into pairs. Hand out one set of footprints per pair of student.
2. Ask one member of the pair to go through the magazines and cut out pictures of things he/she wants or has at home (i.e. Nintendo, TV, bike, running shoes, toaster), and glue them on to the right footprint.
3. Have the other person cut out pictures or things that he/she needs to live (i.e. food, shelter, clean water) and glue them on to the left footprint. If students can’t find pictures, suggest that they draw what they need.
4. Ask student pairs to compare the two footprints in terms of what resources are needed to produce what is in each footprint. Ask what the impacts are of consuming those resources (show an example on the board).
5. If time permits, ask partners to join another set of partners and share their thoughts.

Follow-up Discussion Questions

- Discuss the collages and how the items in their pictures are connected to resources from the Earth.
- From what the students have created ask, “How large is our Ecological Footprint? How could the size be reduced?”
- Brainstorm ways that we can reduce waste or conserve resources every day.

Extensions for additional classroom projects/activities

- ▶ Explore ways students can conserve resources and challenge them to make these changes for two weeks. Monitor student progress and explore the process of becoming a conservator, not a consumer.
- ▶ Challenge other classes to do the same and reward them for the changes they have made.
- ▶ Have students calculate their Ecological Footprints.

<http://www.rco.on.ca/ecofootprint.html>

<http://www.bestfootforward.com/footprintlife.htm>

<http://www.ecofoot.org>

- ▶ Attempt to calculate the school's Ecological Footprint. For guidance and ideas, see Julie Sawchuk and Tim Cameron's article, "Measuring Your School's Ecological Footprint" in *Green Teacher* #61, Spring 2000.

Curriculum Connections: Clustering of Expectations

GRADE 4: SOCIAL STUDIES (2004)

- 4z32 • identify the natural resources necessary to create Canadian products and the provinces and territories from which they originate (*e.g. trees/furniture/Ontario*)
- 4z50 • identify and describe a cause-and-effect relationship between the environment and the economy in a province or territory (*e.g. overfishing on the Grand Banks; changes to landscape resulting from open-pit mining or clear-cut logging*)

GRADE 4: SCIENCE & TECHNOLOGY—Habitats and Communities (2007)

- 1.1 analyse the positive and negative impacts of human interactions with natural habitats and communities (*e.g., human dependence on natural materials*), taking different perspectives into account (*e.g., the perspectives of a housing developer, a family in need of housing, an ecologist*), and evaluate the ways of minimizing the negative impacts
- 3.10 describe ways in which humans are dependent on natural habitats and communities (*e.g., for water, medicine, flood control in wetlands, leisure activities*)

GRADE 5: SCIENCE & TECHNOLOGY— Conservation of Energy and Resources (2007)

- OE 1 analyse the immediate and long-term effects of energy and resource use on society and the environment and evaluate options for conserving energy and resources
- 1.1 analyse the long-term impacts on society and the natural environment of human uses of energy and natural resources, and suggests ways to reduce these impacts (*e.g., turning off the faucet while brushing teeth or washing and rinsing dishes, conserves water; reusing or recycling products, or using fewer products, conserves natural resources and energy*)
- 3.1 identify a variety of forms of energy (*e.g., electrical, chemical, mechanical, heat, light, kinetic*) and give examples from everyday life of how that energy is used (*e.g., electrical energy for cooking; chemical/electrical energy to run our cars; mechanical energy to hit a baseball; light energy for managing traffic on the roads; heat energy to warm homes and schools*)
- 3.2 identify renewable and non-renewable sources of energy (*i.e., renewable: sun, wind, ocean, waves and tides, wood; non-renewable; fossil fuels such as coal and natural gas*)

GRADE 7: SCIENCE & TECHNOLOGY—Interactions in the Environment (2007)

- OE 1 assess the impacts of human activities and technologies on the environment and evaluate ways of controlling these impacts
- 1.1 assess the impact of selected technologies on the environment

9. Embodied Energy: The Life of Fruits and Vegetables

Source: Written by Carol Yorkden-Chamberlain, inspired by conversations with and the work of Eric Krause. (adapt for Intermediate grades)

Description

Energy is embodied in everything around us, from the food we eat to the clothes we wear. Energy - be it from the sun or from fossil fuels - goes into the production, consumption, transportation and disposal of almost everything we come into contact with on an everyday basis. This activity allows students to begin to understand how energy is embodied, or hidden, in food they eat every day.

Background Information

The *embodied energy* of a product is the energy that is used during the product's entire life cycle, from production to disposal. This activity, for the sake of simplicity, will deal only with the transportation aspect of embodied energy. The focus is on how most foods need to be transported from farms to our grocery stores and then to our homes. This transportation, assuming it is by car or truck, requires the burning of fossil fuels, a limited energy resource that also pollutes our air. Recognizing this, we can see how, from an energy and pollution perspective, buying and eating fruits and vegetables grown on local farms is much more environmentally responsible.

Materials

- ▶ two apples, one grown locally, the other not
- ▶ large map of the world (and smaller photocopies for each student)
- ▶ different coloured markers or pencil crayons
- ▶ pictures from a magazine of a truck, boat, car and plane
- ▶ pictures from a magazine of fruits and vegetables from all over the world
- ▶ magazines (or grocery store advertisements) with pictures of fruits and vegetables in them
- ▶ bags/wrappers/stickers from fruit and vegetables (optional)
- ▶ a chart or other source of information showing distances between different countries (optional)

Time Allotment

Introduction: Embodied Energy: 5-10 minutes

Student Activity: 20 minutes

Discussion: 5-10 minutes

Teaching/Learning Strategies

1. Tell students that everything around us has “embodied” or “hidden” energy and that we are going to use the example of an apple to demonstrate/explore this. Ask students where they think the apple came from (*the grocery store, and before that the farm*). Then ask them how they think the apple got from the farm to the store (*via truck*).
2. Explain how the gasoline used to fuel trucks and cars comes from fossil fuels, that fossil fuels are a limited energy resource, and that the emissions from the gasoline cause air pollution and contribute to climate change.
3. Often the same product can have different amounts of embodied energy, depending on where it came from. Use two apples to demonstrate (e.g. one from Ontario and one from British Columbia). Show the approximate location of an Ontario farm and a BC farm on a map. (Assume that the two apples are essentially the same, just from different locations, and that both travel by truck from the farm to the grocery store).
4. Draw a line showing the distance of each farm to your community. Because the BC apple has further to travel, it uses more gas to get it from the farm to the store. Therefore, it has more “embodied” energy than the Ontario apple does. As a result, the BC apple is responsible for using more valuable energy resources and for polluting the air more than the Ontario apple.
5. Based on this information, what are some things we can do (when local fruits and vegetables are in season) to help reduce our impact on the environment?
6. Have students brainstorm other fruits and vegetables that come from all over the world (e.g., oranges, mangos, kiwi, grapes etc.). Make a list of produce and where it is from and put that list on the blackboard.
7. Have students cut out pictures of these fruits and vegetables from the magazines and glue them onto their map (they could also draw a picture on the map directly, or draw a picture and cut it out).
8. Next, have them draw a line (a different colour for each fruit/vegetable) from where the item originates to their hometown.
 - ▶ Optional: have students calculate how many kilometres the food for a fruit salad or for a garden salad had to travel before it got to their grocery store.

It is important to stress that local foods are not always in season. Therefore, it is often necessary to buy foods from far away, especially during the winter. Also, note that not all foods can be grown in Ontario (e.g., oranges, kiwis) and therefore if we want to eat them, we have to get them from their native countries. This is normal and not bad. However, knowing that you can make a difference environmentally by buying local fruits and vegetables when they are in season, why not try to do your part? The concept of a product’s “embodied” energy illustrates one part of the Ecological Footprint and can provide a focus for discussions about reducing our impact on the Earth.

Follow-up Discussion Questions

- ▶ What other ways of reducing our impact on the Earth can you think of?
- ▶ Where are different foods grown all over the world? (Students from different parts of the world can talk about fruits/vegetables from the country they or their parents were born in. Students born in Canada can talk about the fruits/vegetables that come from the region of Canada they or their parents were born in.)
- ▶ What is the growing season is for different fruits and vegetables in different parts of Canada? How and where do they grow?

Extensions for additional classroom projects/activities

- ▶ Ask students to ask their parents where the fruits and vegetables in their house are from and have students report back the next day.
- ▶ Invite students to encourage their parents to buy locally (when the foods are in season).

Recommended Resources

- ▶ Redefining Progress.org website (lots of information about climate change, the Ecological Footprint and sustainability) <http://www.redefiningprogress.org/programs/sustainability/ef/>
- ▶ Wackernagel, Mathis and William Rees. *Our Ecological Footprint: Reducing Human Impact on the Earth*. New Society Publisher: British Columbia, 1996.

Curriculum Connections: Clustering of Expectations

GRADE 3: SCIENCE & TECHNOLOGY—Growth and Change in Plants (2007)

- 3.7 describe the different ways in which plants are grown for food (*e.g., on farms, in orchards, greenhouses, home gardens*) and explain the advantages and disadvantages of locally grown and organically produced food, including environmental benefits

GRADE 4: SCIENCE & TECHNOLOGY—Habitats and Communities (2007)

- 1.1 analyze the positive and negative impacts of human interactions with natural habitats and communities (*e.g., human dependence on natural materials*), taking different perspectives into account (*e.g., the perspectives of a housing developer, a family in need of housing, an ecologist*), and evaluate the ways of minimizing the negative impacts
- 3.10 describe ways in which humans are dependent on natural habitats and communities (*e.g., for water, medicine, flood control in wetlands, leisure activities*)

GRADE 5: SCIENCE & TECHNOLOGY—Conservation of Energy and Resources (2007)

OE 1 analyse the immediate and long-term effects of energy and resource use on society and the environment and evaluate options for conserving energy and resources

- 1.1 analyse the long-term impacts on society and the natural environment of human uses of energy and natural resources, and suggests ways to reduce these impacts (*e.g., turning off the faucet while brushing teeth or washing and rinsing dishes, conserves water; reusing or recycling products, or using fewer products, conserves natural resources and energy*)
- 3.1 identify a variety of forms of energy (*e.g., electrical, chemical, mechanical, heat, light, kinetic*) and give examples from everyday life of how that energy is used (*e.g., electrical energy for cooking; chemical/electrical energy to run our cars; mechanical energy to hit a baseball; light energy for managing traffic on the roads; heat energy to warm homes and schools*)
- 3.2 identify renewable and non-renewable sources of energy (*i.e., renewable: sun, wind, ocean, waves and tides, wood; non-renewable; fossil fuels such as coal and natural gas*)

GRADE 7: SCIENCE & TECHNOLOGY—Interactions in the Environment (2007)

OE 1 assess the impacts of human activities and technologies on the environment and evaluate ways of controlling these impacts

- 1.1 assess the impact of selected technologies on the environment

GRADE 7 : GEOGRAPHY (2004)

- 7g40 • describe positive and negative ways in which human activity can affect resource sustainability and the health of the environment
- 7g41 • describe a variety of ways in which people use and manage renewable, non-renewable, and flow resources to meet their needs

10. Interpretive Hikes

Sources: Adapted from *The Junior Environmental Club Manual*, Halton District School Board and Youth Services Canada; *Outdoor and Environmental Education: Starter Package*, Halton District School Board; and Diane Lawrence, Queen’s University. (adapt for Intermediate grades)

Description

Exploring local places can help students to feel a connection to the natural world and develop a “sense of place.” This exposure can sensitize students and help to lay the foundation for an ethic of care and stewardship for the natural world. Through the use of their senses and a variety of trailside activities, students will gain an appreciation for wildlife and its natural settings.

*All school grounds or local parks, even those in urban areas,
have the ability to be a playground for interpretive hikes.
Never underestimate the imagination and playfulness of students.*

Background Information

As our daily lives move further and further away from the natural world, children no longer develop a sense of their place or a connection to the land around them. This creates a separation from the Earth that leads to individuals being oblivious to the large environmental impacts of their actions. When possible, environmental education should take place in natural settings. To understand our impact on the Earth and why it matters, children need opportunities to reconnect with “the outdoors” and develop a familiarity with it that is often no longer a part of their lives.

Hints for success

Guided hikes need to have structure and set themes (e.g., exploring our senses, outdoor detective). If a walk does not have a clear purpose, students will quickly lose interest. A wide range of activities for your hike are supplied in pages 49–55. Your choice of hike will be dependent upon the age and experience of your class, the type of natural space you will be exploring (schoolyard, park, conservation area, etc.), the duration of the hike and your specific learning goals for the session.

Taking all of these variables into consideration, you should make an enjoyable experience in the outdoors the main focus for any hike. Children must learn to appreciate and love the outdoors, and ultimately the Earth, before they are likely to become its advocate. If there are any variables that may hinder the success of the hike (cold, rain etc.), consider adjusting the activities you have selected or postpone your hike. If it is wet, bring extra raincoats and plastic bags as ‘sit-upons.’

Set up

First, check your Board policy on field trip teacher-student ratios. The utopian hiking situation would include a teacher and an 8:1 ratio of students to adult volunteers. If you have enough capable individuals, the most effective way to organize the hike is to divide the class into three groups with three different hike leaders. Only do this if individuals are comfortable and/or experienced with leading youth on hikes.

Materials

Dependent upon specific activities chosen and the area you hike in:

- ▶ small first aid kits for scrapes and minor cuts
- ▶ communication device if you are far away in the schoolyard (school radio) or off school property (cell phone)
- ▶ whistle

Time Allotment

Hike: 40 minutes

Teaching/Learning Strategies

1. Ask students to form a circle and introduce the hike as a special opportunity to explore the environment. Expect that students will be somewhat distracted because of the change in setting from the typical classroom.
2. Setting an adventurous tone will make the hike compelling for your students. The more excitement, anticipation and engagement you model, the more they will feel.
3. Once this tone is established (one great technique is to crouch and talk in a whisper, which helps students to settle down and focus on your voice), clearly present your expectations for the hike and the consequences for inappropriate behaviour.
4. Include safety expectations (staying away from streams, etc.).

Follow-up Discussion Questions

- ▶ After certain activities, especially those that ask students to use their senses to explore the natural world, ask students to share their thoughts and insights.

Extensions for additional classroom projects/activities

- ▶ Students could have an opportunity to design their own interpretive hike to share what interests them most about the particular setting with a group of fellow students.
- ▶ Create a curriculum-based outdoor scavenger hunt if your class enjoys these activities.

INTERPRETIVE HIKE ACTIVITIES

A. Focus On Nature!

- ▶ Can be used to focus the attention of children (in the school yard; on a field trip; waiting for the bus!)
- ▶ Uses skills of observation; assessing similarities and differences; finding patterns; classifying; seriating

1. LET'S GET STARTED

Materials: Nil (optional: small personal blackboard and chalk or pencil and paper)

Instructions: Ask students what they already know about the natural world or what they expect to find during their exploration. If you have a small blackboard write the name of the student who suggests each brainstormed item beside that item. Ask two students to take the chalkboard and keep an eye out for the items listed. As they see an item on the list stop the group and point out the item that you see. Invite the student who brainstormed the item to comment. Continue this throughout the hike.

2. ALPHABET TRAIL

Materials: A piece of paper on which each letter of the alphabet has been written; pencils (per student or group)

Instructions: In groups or as individuals, challenge children to find something in nature that starts with each letter of the alphabet. Based on the capabilities of the group, the facilitator can decide whether or not items must be written in order (i.e. the item for “g” must be found before they can move on to looking for an item for “h”). The facilitator should also decide how specific the item names should be (i.e. will you allow “tree” or does it need to be “maple tree?”). Children should be instructed to leave natural objects in their place and record the name only.

3. DESCRIBE IT

Materials: Nil

Instructions: Have children go and find an object that exhibits a characteristic that you name (e.g., “please find something that is bumpy”). Be sure to indicate whether the object must be a natural one (if you don’t, children may bring litter - a teaching opportunity if you wish it). Caution children to not damage natural (usually living) items - (i.e. don’t pick leaves or other living parts of a plant etc.). Based on the capabilities of the group, the facilitator can suggest that children work with a partner (great discussions possible!). When children come back with their items, celebrate and share their finds. Repeat the procedure with other single descriptors.

Work up to the challenge of finding one item matching two descriptors (e.g., “please find something that is thin AND dull”).

If this is a favorite activity you can add more descriptors as the year progresses and children advance their skills (e.g., “please find something that is round AND sharp AND bumpy”).

4. COUNT ME IN

Materials: A piece of paper on which numbers (beginning with 1) can be written; pencils (per student or group)

Instructions: As individuals or in partners or groups, have children find something in nature that regularly occurs in similar numbers (or patterns). For example grass blades occur singly (in 1s); tree branches fork (in 2s); clover leaves (in 3s) etc. Remind children that they do not need to collect the items — just record them. Celebrate their findings!

5. DUPLICATION

Materials: Nil

Instructions: Divide children into groups of 4 to 10, depending on their age/ability. Ask each child to go and find some natural object that is special and bring it back (remind them not to pick live objects if they will be damaged - e.g., leaves from plants; you may also have to give size limitations!). When they return to their group have children sit in a circle and share all objects in the middle. Designate one person as captain. Have all children close their eyes except the captains. Captains should then remove one object (not necessarily their own) from the circle and hide it from view. Children should then be instructed to open their eyes. The captain should ask individual children in their circle to tell what the missing item is until it has been guessed. The child with the correct answer then becomes the captain. The item is returned to the middle of the circle and the game can begin again. You may wish to play this in teams within each group; you may wish to increase the number of objects hidden in each round until they all can be hidden and then identified!

Variation: Have each child find a partner; then send each child to find a special natural item. When they return, have partners exchange items which they then must go and duplicate.

Variation: As above, have groups of children go and gather special items and share them in the center of their circle. Blindfold all the children except the captain, who passes around half of the objects for the children to feel, then places them back with the other objects. When complete, the children remove their blindfolds and the captain has the children identify which objects they touched.

In all cases have the children return their natural objects to their original place when the game is over.

6. MISPLACED OBJECTS

Materials: A collection of objects (try 10!) that don't belong in the area where you will be walking (they could be natural objects from a different habitat but try it first with 10 human-made objects - e.g. a pencil, old key, shoe lace, bottle cap, eraser, old mitten...you get the idea!); a piece of paper and pencil for each individual or group

Instructions: Prior to the arrival of the children and without being observed, place the 10 objects along a walkway or trail so that they vary from easily spotted (!!) to well camouflaged (not buried however!). Don't forget to vary the location from the right to left side of the walk, and vary the height at which you hide objects (consider safety first though!). Gather the children together at the beginning of the trail/walkway and indicate that there are 10 objects that don't belong along the path and that their task is to find them. Indicate that they should walk silently and not reveal objects they spot to other individuals/teams. Give a time limit for their walk on the trail. When completed discuss the objects spotted - which ones were easy to spot? Why? If some children have found objects that others have not, or if some objects were not found at all, walk the trail again and discuss again. A final walk should be held to gather the misplaced objects. Why were some objects hard to spot? This is a great opportunity to discuss camouflage, angle of view, how other senses can help.

7. COLOUR ME

Materials: Paint chips in a variety of hues, one or two per student

Instructions: Distribute the paint chips to each child and ask children to find something in nature that matches the colour of the paint chip they have been given. Instruct the children that nothing live should be removed from its place. Re-assemble the group and share and celebrate the matches they have found.

8. BIG, BIGGER, BIGGEST

Materials: Nil

Instructions: Instruct children to find the smallest object they can. Indicate to the children that nothing live should be removed from its place. When the children return, celebrate their findings. Now give a second challenge - find the biggest object they can find - but it must be the same type of object they found before (i.e., if they brought a small fallen leaf, now they find the largest fallen leaf). A third challenge can be to find three of the same objects that fit in size between the smallest and largest object. Have the children put them in order from smallest to largest.

9. SOLO SPOTS

Materials: Journal (optional)

Instructions: Create a circle with students and discuss the peacefulness of the natural world and the value of solitude. Instruct students to find their very own spot in the forest to explore the peaceful solitude of nature. If students have journals suggest that students write if they wish while at their solo spot. Encourage them to explore the spot by sitting still and exploring what is at their feet. Allow students

to sit quietly for 5 minutes (lengthen the time as students become familiar with the outside world). When students leave their solo spots ask them to share things they heard, thought and felt. The key to this activity is to model experiencing your own solo spot.

10. QUESTIONS

Materials: Nil

Instructions: Only ask questions on the hike. The only “answer” allowed to any question is another question. Questions must also only be about things on the hike. Continue this until it gets out of control or students start to become frustrated.

11. COIN-FLIP HIKE

Materials: Any coin

Instructions: To start the hike, flip a coin: heads go right, tails go left. Hike on and look for an unusual or interesting object. At each stopping point, flip the coin to determine a new direction.

12. CHANGES

Materials: Nil

Instructions: Ask students to find evidence of changes taking place. You may not see the actual changes, but feel free to infer from observable evidence.

13. FRISBEE TOUR

Materials: Frisbee

Instructions: Take a Frisbee out on a walk. Throw the Frisbee and explore and discuss what is found under the Frisbee after it lands. Allow students to take turns throwing the Frisbee.

B. Learning To Look; Looking To See

- ▶ activities that encourage children to look at the environment from a different perspective

1. TAKE A PICTURE

Materials: Empty slide frames, one per child (can be purchased at a camera store or ask a photography club to save you its throw-aways and re-use the frames)

Instructions: Give every child a slide frame and have each of them go and take a close up view of something natural. Have them return and share what they saw (no collecting is necessary!). Send them off again to take their favorite scenic shot of their surroundings; an upside down shot; vertical shot vs. horizontal shot.

2. BINOCULARS

Materials: 2 empty toilet paper tubes and one elastic band per child

Instructions: Instruct the children to make a pair of binoculars with their toilet paper tubes. Have them spot interesting natural phenomena and report back to the group. (Did you know that if you look through one end of actual binoculars you can see far away and if you look through the lenses at the other, you can see close up?)

3. “ANT” TRAIL

Materials: One length of string or yarn per child (about 50 cm each should do)

Instructions: Indicate to the children that they have been hired as park naturalists and must build a new nature trail. However, the park is for ants! Give each child a string and indicate that

they should choose a “habitat” and lay the string out so that it includes several scenic features for ants. When they have completed their trail they should be instructed to take one of their classmates along it. Follow up with a language arts/journal writing activity in the classroom!

4. CAMOUFLAGE

Materials: A large number of toothpicks (at least 200) of different colours. You can purchase coloured toothpicks but the only ones I could find were plastic. **DON'T USE THESE IF YOU ARE PLAYING OUTDOORS** (they don't decompose).

- ▶ Paper cups or re-usable plastic bags
- ▶ Chart paper; marker

Instructions: In a defined grassy playing area, randomly scatter the toothpicks when the children are not in view (all except one toothpick, to use as an example). Gather the children outside the playing area and give each a container (cup, bag). Indicate that their challenge is to find and collect as many toothpicks as they can within the playing time. Show children what they are looking for (they may not know what a toothpick is!). Show the children the game boundaries and release them into the playing area. When the designated time is up (gauge this by the age of the children – 3 minutes is an average) call the children together and have them sit in a circle and sort their toothpicks into colour groups. Discuss which colours of toothpick were most found and least found by the children. Collectively graph the results of the colours of toothpicks found by the children. Discuss the results. Discuss how animals use camouflage to protect themselves or to prey on others. Discuss how seasons might affect camouflage. Have children think of “habitats” where the red or yellow toothpicks might have been the hardest to spot.

5. COLOURS

Materials: Nil.

Instructions: Form a circle with students and ask them to face outwards. Going around the circle, list as many colours as they can spot from that one location. Also try picking a colour and trying to find as many objects of the colour as possible.

C. Sensory Awareness

- ▶ activities that highlight a sense other than sight!

1. MAGIC (FEELY) BAGS

Materials: 5 (or more!) bags with draw strings - cloth bags work the best since they are “quiet,” but plastic bags will work. Make sure you don’t use plastic bags that an unsupervised child could fit over his/her head. If you don’t sew or have a friend who does, watch out at the holiday season - cloth gift bags are becoming popular - and it doesn’t matter what is on the outside of the bag; it will be the inside that counts!

- ▶ A number of natural objects (same number as the bags) - relate the objects to the theme you are working on or wish to introduce. If you are in a natural area you may wish the objects to relate to the habitat you are in (e.g., a pinecone when you are in a white pine grove - then you’ll have an opportunity to talk about coniferous trees, seeds etc.).
- ▶ Vary the objects - some might be prickly (but not hurtful); some might be soft; some might need the sense of smell, not touch

Instructions: In a predetermined location (on a nature trail; around the schoolyard) put the bags in the most opportune place. They should not be completely hidden but could require

children to move slowly and carefully so as to not miss them. Do this without the observation of the children (and warn the custodians, park naturalists etc. ahead of time so that they are not removed by others!). At the time of your adventure with the students indicate that you are going to go on a walk to see what you can discover about your chosen theme. If you have an extra, show children a magic bag and indicate that they should be on the look-out for them along the trail because they contain clues for the day. Instruct that the bags should not be grabbed or removed. Start off on your walk, strolling slowly and quietly. As the children spot a bag gather them around and take the bag from its place. Indicate that there is an object inside - can anyone identify it without using their eyes? All children will want to do this - ask children not to speak out or give clues as to the identity of the object until all have had a chance to reach their hand inside the bag without looking. Ask for the object to be identified; discuss the relevance of the object to the surrounding habitat or to your theme. Continue on your walk choosing new groups of children to be at the head of the group. When at the end of the trail, and therefore when all bags have been collected, discuss the relevance of the objects to your theme, but also bring attention to the use of ALL our senses when observing nature.

2. FIND YOUR TERRITORY

Materials: Black film canisters (they are often given away at photo shops!) - one per child plus half that number again (i.e., if you have 30 children, get 45 canisters). Each canister needs to have a small hole punctured in the bottom.

- ▶ Lengths of yarn (about 50 cm each) - one for every three canisters (in the example above you’d need 15 strings)

- ▶ Cotton or toilet paper and common items which can be used as a source of scent - a different smell for every two children (i.e., in the example above you'd need 15 smells, fill 3 canisters with each scent, 1 to hang in the forest, 2 for students to use)

Make sure that children playing do not have allergies - stay away from peanut butter, and in warm weather don't choose scents that can attract wasps. Number the canisters and create a reference key to indicate which scent is in each canister. (I used the following items when we played: shampoo, lemon extract, almond extract, vanilla extract, lavender extract, toothpaste, cinnamon, cloves, coffee, tea, air (nil), almond extract, vinegar, motor oil.)

Instructions: Prior to the arrival of the children hang one of each of the canisters containing different smells along a designated pathway or trail (inform the custodian, or park naturalists of what you are doing so that the canisters are not removed). The canisters should be in sight and not immediately next to each other. Use the yarn, one end tucked in the snap-on lid to hang the canisters. Assemble the children and give each a canister. Indicate that their task is to find the matching territorial marker for their "species" along the trail - essentially they must use their sense of smell to match the scent in their canister with one hanging along the trail. Show children the boundaries of the playing area (i.e., all markers can be found within this section of trail) and send them off. When ALL children think they have found their marker, have them return to you with it (but not when they first discover it since other children may still be investigating). Open the containers to discover success. Discuss how other animals depend on their sense of smell much more than

we do. Would animals be interested in other animals' scents as well as their own? Could some animals' territories be in the same area? Lots to investigate back in class!

3. FIND YOUR KIND

Materials: Slips of paper with the noise of an animal written upon it - you will need two of each, times half your class (i.e., if you have 30 students, you will need 15 animal calls, each written out twice).

- ▶ I used the following birdcalls:

White Breasted Nuthatch

"*Neep, Neeep, Neeep*"

Yellow-Throated Warbler

"*tew, tew, tew, tew, tew, tew*"

White-Throated Sparrow

"*Sam Peabody, Peabody, Peabody*"

Barred Owl "*Who cooks, whoo cooks, who cooks for you all*"

Canada Goose "*honk, honk, honk*"

Bobolink "*bobolink, bobolink, bobolink*"

Mallard Duck "*quack, quack, quack*"

Killdeer "*killdeer, killdeer, killdeer*"

Chickadee "*chickadee dee dee*"

Crow "*caw, caw, caw, caw*"

Bluejay "*JAY, JAY, JAY, JAY*"

Mourning Dove "*Coo, coo, coo,*"

Yellow Warbler "*Sweet, sweet, sweet, so sweet*"

Eastern Wood Pewee "*Peewee, Peewee*"

Red-winged Blackbird "*Okrakree, okrakree*"

Ovenbird "*Teacher, teacher, teacher*"

Instructions: After gathering the children together in an open playing area (no hurtful obstacles), give each a secret identity. Have them silently memorize the call and put the paper in their pocket. Have children get on their hands and knees and tell them that their

task is to find another of their species. As an added challenge you may wish to blindfold the children. When all have found their kind, or the time available is exhausted, have children share their call. Discuss how the animal may have got its name; discuss how animals use their calls (and how other species listen to them too!).

4. INSECT COLLECTORS

Materials: Send a note home to parents and start collecting used margarine tubs or other small plastic containers with lids. You will also need nylon screening (available at a hardware store) and some craft/florists' wire (narrow gauge).

Lids will need a circle drawn on them and cut out so a template is needed (the bottom of a mug) and a pair of sharp scissors. Small holes need to be poked around the hole in the remaining part of the lid - a big darning needle or compass point works. Ask a parent volunteer to cut the big holes and poke the small holes on all the lids - not safe tasks for young children.

Instructions: Give each child a tub, lid, piece of screen (just larger than the hole) and a length of wire. Showing a pre-made example, have children thread the wire onto the underside of the lid, twisting together the two wire ends when they meet.

Enjoy carefully collecting terrestrial insects on your next outdoor excursion - no need to handle them - you can see them through the lid. Don't forget to release them back into their habitat!

5. SILENT HIKE

Materials: Nil

Instructions: Tell students about some of the amazing sounds you have heard while hiking. Walk quietly, without speaking and making as little noise as possible to discover as many sounds as you can.

6. BLIND DATE

Materials: Blindfolds

Instructions: Put students in pairs and blindfold one partner. Ask the sighted partner to carefully lead the blindfolded individual to a tree and ask her/him to use her/his sense to explore the tree. Then ask the pair to return to the spot the blindfold was attached. Remove blindfold and have the student identify the tree she/he explored. Switch roles.

11. Connecting to the Everyday Things in Our Lives

Source: Adapted from *Stuff: the secret lives of everyday things* and a workshop resource written by Elise Houghton. See Resources.

Description

Students should be encouraged to recognize the economic, social and environmental costs and benefits of the goods they consume. This activity provides students with a perspective from which to explore the connections between certain products that they use or have and their social and environmental impacts. Following this exploration, students can create skits to demonstrate the true impacts of items used in their daily lives and suggest possible alternatives. Or they may want to create a board game that highlights the invisible impacts of consuming certain goods and makes visible some positive alternatives that they as students can choose.

Background Information

The materials we consume are produced from the Earth's limited resources. Few realize the true extent of the impacts of consumption because they are invisible to the consumer. Since we are disconnected from the production of the goods we use in our everyday lives, we don't realize the social and environmental costs of our consumption. Before any products get to us, energy is used, fossil fuels are burned, pollution and waste are created. By examining the "secret lives" of products before they get to the consumer, we can expose the often complex and wasteful processes that bring us the things that we buy.

Materials

- ▶ "Stuff" resource sheets (coffee, T-shirt, french fries, running shoes, and newspaper: Appendix E)
- ▶ blackboard
- ▶ cue cards (for Jeopardy game)

Time Allotment

Introduction: 5 minutes

Initial group work: 15-20 minutes

Option A (research and Jeopardy game): 30 minutes

Option B (practice and performances): 30 minutes

Discussion: 5 minutes

Teaching/Learning Strategies

1. Brainstorm with students the secret life of something in the classroom (e.g., a piece of paper). Attempt to list all the stages of production and the ingredients that go into a product and pinpoint as many of the environmental and social benefits and costs of each stage as you can. The object of this brainstorming session is not to prove how much the class knows, but rather to highlight the things we don't know, or think about. Encourage students to guess – since none of us is likely to have much knowledge, we need to pool and share the bits we may have!
2. Tell students they will become experts on the secret lives of five 'consumables' in their daily lives. Their goal is to make connections between the production of these objects and their social and environmental costs and benefits.
3. Break students into ten groups and hand out information sheets on the objects from our everyday lives for each group (two groups for each of the five items).
4. Ask students to read about and discuss the costs and benefits of their object and identify the most unexpected costs and benefits. What are the alternatives?

Option A

1. Explain the rules of Jeopardy (each category has questions of increasing difficulty, and the questions are actually answers; however, consider using the Jeopardy format for multiple choice questions to increase the chances that students can answer questions).
2. Ask students to take their findings and create a category for a class-wide Jeopardy game for their object. On cue cards create 5 answers under the title of your item. Assign each question a value (100, 200, 300, 400, 500) which relates to its difficulty. Each group can create a bonus question that addresses environmentally-friendly alternatives.

Option B

1. Ask students to take their findings and create commercials that uncover the secret lives of their objects. Encourage students to also include environmentally-friendly alternatives.
2. Allow each group to perform its commercial for the class and take questions about its object.

Follow-up Discussion Questions

- ▶ How do our daily decisions connect with social and environmental impacts?
- ▶ What choices do we have to avoid these impacts?
- ▶ Why would anyone choose more environmentally-friendly alternatives?
- ▶ Why don't more people make environmentally-friendly decisions in their lives?

Extensions for additional classroom projects/activities

- ▶ Develop a research project to map the secret lives of everyday school items and favourite foods. What went into producing them? Where did all the ingredients come from?
- ▶ Create an information campaign within your school to inform students about the secret lives of everyday things.
- ▶ Write to local politicians to inform them of the secret day lives of everyday things.

Curriculum Connections: Clustering of Expectations

GRADE 7 : GEOGRAPHY (2004)

- 7g40 • describe positive and negative ways in which human activity can affect resource sustainability and the health of the environment
- 7g41 • describe a variety of ways in which people use and manage renewable, non-renewable, and flow resources to meet their needs

GRADE 7: SCIENCE & TECHNOLOGY—Interactions in the Environment (2007)

- OE 1 assess the impacts of human activities and technologies on the environment, and evaluate ways of controlling these impacts
- 1.1 assess the impact of selected technologies on the environment

GRADE 8: SCIENCE & TECHNOLOGY—Systems in Action (2007)

- OE 1 assess the personal, social and/or environmental impacts of a system and evaluate improvements to a system and/or alternative ways of meeting the same needs
- 1.2 assess the impact on individuals, society and the environment of alternative ways of meeting needs that are currently met by existing systems, taking different points of view into consideration

GRADE 8: SCIENCE & TECHNOLOGY—Fluids (2007)

- 1.1 Assess the social, economic and environmental impacts of selected technologies that are based on the properties of fluids

Appendix E *Stuff Resource Sheets: Coffee* (from Colombia)

Source: Adapted from *Stuff: the secret lives of everyday things*. See Resources section.

All figures are 1997 (or earlier) statistics.

- ▶ Colombia occupies 1% of the Earth's surface, but has 18% of the Earth's species and more bird types than any other nation.
- ▶ Coffee formerly grew in the shade under a canopy of fruit and hardwood trees. But in the 1980s high-yield varieties of seed were introduced. Farmers cut down the trees to grow these varieties. The results:
 - ▶ increased coffee yields
 - ▶ increased soil erosion
 - ▶ large decrease in bird populations
 - ▶ increase in pests that birds formerly ate
 - ▶ increased use of pesticides.
- ▶ Two pounds of coffee berry pulp are dumped in rivers for every pound of beans gathered.
- ▶ Beans are shipped to the US for roasting and packing (CO₂).
- ▶ Beans are roasted for 13 minutes at 400 °F. (using natural gas from Texas - more CO₂).
- ▶ Coffee packaging is made of polyethylene, nylon, aluminum foil and polyester (not recycled, difficult to biodegrade).
- ▶ Shipped to wholesalers in trucks which get 3 km. to a litre of gas (more CO₂)
- ▶ Bringing coffee home: driving, plastic bag (more CO₂)
- ▶ Making coffee involves: grinding, water, heating water, washing, coffee filter (paper, trees, bleaching, transportation)
- ▶ **Sugar fact:** sugar cane in Florida is grown in fields that were marshes. Since draining these marshes, populations of all vertebrates, from turtles to storks, have fallen 75 to 95% in Everglades National Park. In 1995, the state of Florida voted against taxing sugar growers as an income source to help restore the Everglades.
- ▶ **Cream:** impact on land (grain farms) and water resources resulting from raising cattle

What Are Some Environmentally-Friendly Choices?

- ▶ Consider shade grown coffee (preserves local trees and habitat), organic coffee (avoids use of chemicals), fair trade coffee that pays coffee workers well, use organic milk from cows fed on organic grain (no chemicals used)
- ▶ Ask your favourite coffee shop if it knows about organic coffee, or fair-trade coffee. Customers can have a huge influence on the companies they buy from – *if they choose to exert it through where they spend their money.*

Stuff Resource Sheets: Running Shoes

Source: Adapted from *Stuff: the secret lives of everyday things*. See Resources section. All figures are 1997 (or earlier) statistics.

- ▶ A quote from an L.A. Gear executive: “If you’re talking performance shoes, you only need one or two pairs. If you’re talking fashion, you need endless pairs.”
- ▶ Americans spend twice as much on children’s shoes as they do on books.
- ▶ Brand name running shoes are manufactured under contract in unknown factories in third-world countries.
- ▶ All the pieces that are put together to make the shoe are manufactured elsewhere.
- ▶ Only the design and the marketing are done by the branded companies we all recognize.
- ▶ Shoe companies move their operations to favour countries with lowest-paid employees and least-enforced (or non-existent) environmental regulations (governments there comply with this).
- ▶ Running shoes are made of:
 - ▶ cow leather from the US, tanned using 20 chemical processes. Some of these processes use petroleum-based chemicals: including ethylene, a toxic gas, produced from Saudi petroleum in Korea
 - ▶ rubber: synthetic rubber made of Saudi petroleum and benzene made from coal in a factory in Taiwan
- ▶ Working conditions in countries favoured by American shoe marketers tend to have low labour standards. Indonesian workers are paid US \$.23 a day to make \$75 dollar running shoes which can cost the manufacturer as little as \$4.25 a pair to make.
- ▶ Shoebox production has improved in both cardboard quality and content (more recycled materials) and elimination of glue from box design. Boxes are shipped to Asia for packing.
- ▶ Shoes are shipped back to the US: the trip takes 3 weeks!
- ▶ Many products are designed and made to last only a short time to encourage frequent consumption.

What Are Some Environmentally-Friendly Choices?

- ▶ Favour manufacturing of items from countries where workers are fairly paid (better-paid people are often able to take better care of their own environments)
- ▶ Look for anything manufactured locally – note the prices!
- ▶ Buy sturdy shoes that last rather than many pairs of running shoes: buying longer-lasting good-quality items less often saves resources, and is an environmental investment

Stuff Resource Sheets: A T-Shirt

Source: Adapted from *Stuff: the secret lives of everyday things*. See Resources section. All figures are 1997 (or earlier) statistics.

- ▶ A half-cotton, half-polyester T-shirt weighs about 4 ounces. Cotton is grown in the United States; polyester is made from petrochemicals that come from oil.
- ▶ Oil refining: Crude oil is heated to 750° F. Heavy tars evaporate, heavy hydrocarbons are drawn off to become waxes and lubricants, and after several more rounds of processing lighter compounds become raw materials for petrochemicals – which polyester is made of (CO₂ emissions from all these processes contribute to climate change).
- ▶ Making the polyester for a T-shirt releases carbon dioxide, nitrogen and sulfur oxides, hydrocarbons, particulates (fine particles), carbon monoxide and heavy metals.
- ▶ Oil refining pumps more tons of pollution into the air than any other US industry except steelmaking.
- ▶ Cotton grown in Mississippi requires that soil be treated with aldicarb, one of the most toxic pesticides used in the US. Some goes into the soil, some into the water. Cotton seed is dipped in fungicides before it is planted in the ground.
- ▶ Cotton accounts for 10% of the world's annual pesticide consumption.
- ▶ It takes five years of rest from pesticides before healthy populations of earthworms return to soil used for growing cotton.
- ▶ Cotton is among the world's most heavily irrigated crops (heavy water consumption).
- ▶ Cotton is picked by a large mechanical cotton “stripper” that burns diesel fuel.
- ▶ Cotton fibres are cleaned, carded, blended with the polyester fibres, and spun into yarn.
- ▶ Fabric is spun and dyed and then washed with industrial chemicals including chlorine, chromium and formaldehyde. One-third of cotton dye washes into local waterways. Textile dyes are regulated by the US Environmental Protection Agency as hazardous substances.
- ▶ Sewing: Fabric is shipped to countries such as Honduras, where women make \$.30 US an hour making garments. It might be packed onto a sheet of pinewood cardboard, wrapped in a polyethylene bag from Mexico and packed in a corrugated box from Maine.
- ▶ Other resource use: detergent, electricity for washing machines, chlorine bleach for stain removal, waste water into local water systems, electricity for drying.
- ▶ The greatest environmental impacts of your T-shirt happen in doing your laundry: washing and drying the shirt uses 1/10 of the energy of manufacturing it. The majority of solid waste in the shirt's life is sewage sludge and detergent packaging.

What Are Some Environmentally-Friendly Choices?

- ▶ Look for organic cotton (it's hard to find, and it's expensive!)
- ▶ If you can't afford organic, buy things thoughtfully and only what you need: everything you buy has an effect on the environment (which has an effect on YOU!)
- ▶ Wash only full loads of clothes to save water, hydro
- ▶ Support groups making agriculture more sustainable by buying their products

Stuff Resource Sheets: Newspaper

Source: Adapted from *Stuff: the secret lives of everyday things*. See Resources section. All figures are 1997 (or earlier) statistics.

- ▶ An average (weekday) paper is 220 grams of newsprint covered with 2 grams of petroleum and soybean-based inks.
- ▶ Half of newsprint is made of recycled paper, half from new trees
- ▶ Canada is the world's leading newsprint producer; BC alone produces 5% of the world total!
- ▶ A lot of newsprint is made from 150 year-old spruce and pine trees.
- ▶ Although logging companies often complain about environmentalists causing unemployment in the logging industry, it is increased efficiency in cutting and processing equipment which has made the number of timber industry jobs in BC fall by 1/3 as the volume of wood cut increased 16%.
- ▶ Clearcutting of wildlands (removing every tree) accounts for 90% of logging in British Columbia. Some clearcuts are so large they can be seen from space.
- ▶ The Fraser River in BC is the world's largest producer of salmon, but logging, road building and other disturbances in the watershed have contributed to an 80% decline in salmon in the past century.
- ▶ Half of each log is converted into lumber: the rest becomes wood chips and sawdust
- ▶ To prevent yellowing, the pulp is now bleached with hydrogen peroxide.
- (This is preferable to chlorine which produces toxic by-products in waterways)
- ▶ Five percent of the paper in newsprint is kraft paper, with longer, stronger fibers. Kraft paper is made from 300-year-old western red cedar and hemlock trees. (Kraft means "strong" in German.)
- ▶ Woodchips are cooked in a soup of caustic soda and sodium sulphide (not especially toxic, but smelly!) for 12 hours.
- ▶ Kraft paper is bleached with chlorine dioxide, which creates dangerous by-products. Pulp mills have made efforts to reduce their use of chlorine, and they have reduced their emissions by 85% from 1990 to 1993 (consumers and environmentalists have helped by demanding chlorine-free products!).
- ▶ European demand for Canadian chlorine-free paper has led to chlorine-free paper production in Canadian mills. But they still produce chlorine-bleached paper for US markets where consumers are less informed or more indifferent.
- ▶ Replanting trees helps, but not if they are logged again in 60 years; they do not replace the carbon-capturing function of 300-year-old trees.
- ▶ Black ink is made from petroleum-based resins and oil, and some carbon from oil; coloured ink is made from soybean oil with some petrochemical pigments added.

What Are Some Environmentally-Friendly Choices?

- ▶ Share newspapers
- ▶ Insist on chlorine bleach-free paper products

Stuff Resource Sheets: French Fries

Source: Adapted from *Stuff: the secret lives of everyday things*. See Resources section.
All figures are 1997 (or earlier) statistics.

- ▶ One serving of french fries takes about one 10-ounce potato, sliced into uniform strips.
- ▶ In a 150-day growing season, potatoes require over 30 litres of water to a 12 cm plot of ground
- ▶ In BC, the Snake River valley and the Columbia River basin produce potatoes for 80% of US french fries. (Huge amount of water taken for irrigation.)
- ▶ 80% of the Snake River’s streamside habitat is gone, replaced by reservoirs and irrigation systems.
- ▶ Potatoes are treated with fertilizers and pesticides to ensure that their shape and quality are consistent. The chemicals account for 38% of a farmer’s expenses.
- ▶ Much of the nitrogen from fertilizer sinks into the groundwater; combined with concentrated salts from irrigation water, it can make water unfit even for irrigation.
- ▶ Pesticides include Telone II (toxic to mammals and probably birds) and Sevin XLR Plus (highly toxic to fish). The US Environmental Protection Agency found contaminants in every tributary of the Columbia River Basin.
- ▶ Potatoes are dug up with diesel-fueled harvesters (producing the greenhouse gas carbon dioxide) and trucked to a processing plant.
- ▶ Processing one potato used 2/3 of a gallon (about 3 litres) of waste-water.
- ▶ French fries are frozen after processing: freezing foods can require more than 10 times as much energy as their fresh equivalents.
- ▶ In 1960 Americans ate 92% of their potatoes fresh; by 1990 Americans ate more frozen potatoes (mostly fries) than fresh ones.
- ▶ An improvement: refrigerators now use hydrofluorocarbons for coolants instead of the chlorofluorocarbons (CFCs) which destroy the ozone layer. But escaped hydrofluorocarbons still contribute to the “greenhouse effect.”
- ▶ Refrigerated trucks (producing carbon dioxide and using hydrofluorocarbons) carry frozen potatoes to distributors and to retail outlets.

What Are Some Environmentally-Friendly Choices?

- ▶ At home: buy fresh potatoes instead of frozen ones – they use less energy during their product lives.
- ▶ Learn more about North American agriculture and make purchases based on what you think is most environmentally-friendly (look for Canadian food products – the more local the better!)
- ▶ Look for – and invest in – organic potatoes sometime when you food shop: you’ll be encouraging a much healthier form of agriculture.

12. Connecting School Issues and Action Opportunities

Source: Adapted from a workshop resource written by MJ Barrett, Learning for a Sustainable Future

Description

Empowering students to make change can create positive learning opportunities. This activity will inspire students to consider opportunities for taking action on issues that concern them. Students will examine different types of actions and their effectiveness, and create an action plan to address an issue of concern.

Background Information

North America is a consumer society. This consumer lifestyle, reinforced daily through advertisements, is slowly depleting our finite natural resources and polluting the Earth systems we rely on for sustaining life. Connecting the choices we make in our lives to their environmental impacts is a key step in creating the motivation for positive environmental change. Once these connections have been made, the ability to create change and the tools to do so need to be explored. Students need to know that they have the ability to lessen their impact on the natural world. Exploring different actions that can lead to change is a vital skill for students wishing to work towards a sustainable and healthy future.

Materials

For each group of 3 - 5 students

- Types of Action title cards (see Appendix F)

- 7 - 10 Action Project examples (see Appendix G)

- Action Planning Sheet (see Appendix H)

Time Allotment

Introduction: 10 minutes

Initial group work: 10 minutes

Successful action discussion: 10 minutes

Mini-action plans: 10 - 15 minutes

Sharing of action plans: 10 - 15 minutes

Discussion: 5 minutes

Teaching/Learning Strategies

1. Introduce different types of actions that can create change by writing them on the board (see Appendix F). For each action provide a brief description. Ask students to discuss any action projects that they or the school have been involved in.

2. Have students work in groups of 3 to 5. Distribute a set of Types of Action cards, Action Project examples and the Action Planning Sheet to each group. Have students lay out Types of Action cards, then read through the Action Project examples and categorize them under the appropriate headings.

3. If any student, or the school, has been involved in an action project, create a card and include that project as an example.
4. Ask students to pick the action that seems the most successful to them.
5. Ask students to share their opinions about successful actions and decide upon a school or environmental issue that students are concerned about.
6. Using the Action Planning Sheet (or note paper with the sheet's outline written on the board), ask students in their groups to create mini-action plans. These plans will require students to summarize the issue, examine their connection to it and pick what types of actions they feel are appropriate in response to the issues they have chosen. Finally, students are asked to explore what actions they could organize.
7. Allow each group to discuss its action plan and compare and contrast the differences.

Follow-up Discussion Questions

- ▶ What motivates some individuals to take action on some issues?
- ▶ What are some of the pros and cons of different actions?
- ▶ What are the barriers to making changes in the school?
- ▶ Where are the opportunities to make changes in the school?
- ▶ Why is it important to take action?

Extensions for additional classroom projects/activities

- ▶ Take on a school issue as a research project for your class.
- ▶ Collect newspaper articles or items from another media source and chronicle a specific issue and the actions being taken. Evaluate their effectiveness.

Curriculum Connections: Clustering of Expectations

GRADE 7 GEOGRAPHY (2004)

- 7g15 • choose an environmental issue that illustrates one of the themes of geographic inquiry and explain why various individuals and groups have different opinions on the issue (e.g., *theme of interaction*: wilderness conservationists versus loggers)
- 7g40 • describe positive and negative ways in which human activity can affect resource sustainability and the health of the environment
- 7g41 • describe a variety of ways in which people use and manage renewable, non-renewable, and flow resources to meet their needs

Appendix F *Types of Action*

<p>Educate & Inform</p> <p>This can involve peers, younger students, community education programs, newspaper articles, plays, poems, posters, advertisements, conducting workshops etc.</p>	<p>Make Consumer Choices</p> <p>This includes personal decisions such as refusing to buy items with more than one layer of packaging, buying Canadian made and locally grown products, buying organic, boycotting products produced by known operators of sweatshops, buying used items, reducing consumption etc.</p>	<p>Persuade Others To...</p> <p>Similar to educate and inform, this approach attempts to convince people to make change. Letters to the editor, PA announcements, advertisements (or anti-ads – see Adbuster’s website, www.adbusters.org), pamphlets, street theatre etc. are all useful persuasion tools.</p>
<p>Raise Funds</p> <p>This can refer either to fundraising for an external cause or raising funds to implement your own project.</p>	<p>Initiate Legislative Action</p> <p>This approach is important and usually involves a longer-term process. Short-term contributions, such as making a presentation at City Hall or to the Town Council can help initiate or support a legislative change – e.g. making a presentation to support the creation of an anti-idling bylaw or a law to reduce pesticide use in the community.</p>	<p>Engage in Political Action</p> <p>This has some crossover with legal action and can include meeting with elected officials, speaking at public meetings and hearings, circulating petitions, supporting political candidates, writing letters to the editor etc.</p>
<p>Eco-management Projects</p> <p>These projects make physical changes to the environment including schoolyard naturalization, tree planting, riverbank stabilization etc. Be careful to distinguish their ecological value from projects that are simply for “beautification.”</p>	<p>Make Lifestyle Choices</p> <p>In addition to consumer choices, this also includes such decisions as walking, riding a bike or taking public transportation, choosing low-impact entertainment, and generally conducting one’s life in ways which have less impact on the planet and are more sustainable in the long term.</p>	<p>Other...</p> <p>Your call – anything that doesn’t fit into the above categories.</p>

Appendix G *Action Projects*

What about those Mosquitoes?

In response to a high mosquito population and concerns about the town's spraying program, Grade 6 students researched and presented a variety of solutions to community council. As a result, the council members struck a committee to examine the issue and eventually transferred from spraying to an integrated pest management system. (Alberta)

Cafeteria Recycling

Concerned that their peers were not recycling pop cans and bottles, high school students did a traffic flow survey of the school cafeteria. Survey data in hand, they lobbied the school custodians to alter cafeteria seating arrangements and add more recycling containers. (Caledon)

Taking the Water Board to Task

Concerned about water quality in a popular windsurfing area, high school students conducted water quality tests and discovered a high coliform bacteria count in local waters. In the face of the local water utility's resistance to act, students went to the press with their data and the water treatment plant was forced to upgrade its facility. (Australia)

From Barren to Beautiful

With funding assistance from the Evergreen Foundation, high school students purchased and planted large native trees and turned a barren landscape into a naturalized one. (Hamilton)

Clean-up and Pair-up

Bothered by the air, noise and visual pollution created by a neighbouring aluminum factory, students convinced factory owners to invest \$1.5 million in cleanup, make changes in manufacturing processes, and give ongoing support for future student projects. (Quebec)

Yellow Fish Road

As a way to inform residents that what flows into the storm sewers goes directly into local streams, high school students painted yellow fish beside storm sewer entrances and hung yellow fish-shaped information pamphlets on neighbourhood door handles. (Woodbridge)

Teaching Grade 5s

Concerned about the lack of environmental education in the schools, high school students prepared a series of workshops highlighting local environmental concerns, then delivered them to a grade 5 class. (Woodbridge)

Drinking Water Distribution Shifts

Students were concerned about the amount of wasted drinking water in their school, so after monitoring their own consumption patterns, they shared their data with their whole school and with neighbouring schools. After hearing their presentation and suggestions about how to reduce water waste, the School Commission made changes to school procedures for distribution of drinking water. (Quebec)

Action Projects (CONTINUED)

A Fish Hatchery for Black Creek

High school students are participating in the Black Creek Restoration Project. They have a fish hatchery, release trout annually, run planting and clean-up events and are currently applying to get funding for a feasibility study to try and remove a concrete channel that makes up a section of the waterway. The school has received charitable status and is currently applying for its own funding grant for future projects. (North York)

Here's to the Paintbrush Plant

After learning about the threats to the survival of the Mendocino Coast Indian paintbrush, elementary students launched a habitat restoration project at Jughandle Creek Preserve. Youngsters pulled up non-native, invasive plants, then designed and posted interpretive signs to educate the public. Finally, they conducted an extensive outreach program featuring songs, stories, bumper stickers, and skits—all designed to raise citizen awareness of the plight of the Indian paintbrush plant. (California)

It's a Rat's Life

Concerned about continued threats from housing development and construction, grade 8 students created a puppet show, accompanied by an informative study sheet, to inform others of the plight of the Stephens kangaroo rat. They also sponsored a K-Rat art contest, wrote songs, poems and essays about various threats facing kangaroo rats, and designed a trail guide for the San Jacinto Wildlife Area which preserves Kangaroo Rat habitat. (California)

Getting in the News

A partnership between the local newspaper and high school technology centre supports a 'young adult' news page in the local paper. (Guelph)

Let's Talk Tortoise

After hearing that their state reptile, the desert tortoise, was endangered because of loss of habitat and respiratory problems, grade 6 students launched a major public education campaign. They designed posters for display at area businesses, submitted articles to the local newspaper and developed a video. They also raised funds through t-shirt sales. Finally, the class developed a proposal for the Bureau of Land Management suggesting an "open-use area" for off-highway vehicles so that those vehicles would not further damage the desert tortoise's habitat. (California)

Plant Power

Elementary students provided critical information to add to the county's data bank on the endangered Mesa Mint plant. After raising community awareness by creating and distributing flyers about the species and its habitat, students conducted field surveys and mapping expeditions to document the locations of Spring water sources (vernal pools) critical to the mint's survival. The information they collected had never before been recorded on county planning maps. Thanks to the students' work, the county now includes the vernal pools on its map and considers development plans in light of the mint's status. (California)

Action Projects (CONTINUED)

SOS – Save Our Salmon!

Since 1987, elementary students have been raising and releasing salmon from a hatch box. In the process, they learn a great deal about the salmon's life cycle and have spent many days caring for salmon eggs, monitoring water quality, and keeping careful records. More than 40,000 salmon are now raised and released each year. (Oregon)

Creating a Learning Schoolyard

Elementary students transformed a grassy courtyard into a sanctuary for both wildlife and humans. Bird populations have increased, while over half the school grounds are now used for curriculum-based activities. (Toronto)

A Pond at the School

As part of a five-year plan, grade 9 and OAC students worked to transform an enclosed patio and lawn space into a mini-habitat for many wildlife species. The project has had numerous positive effects: the school is more colourful and alive, it has become less difficult to encourage volunteerism, more classes are using eco-visits as a curricular component. Students have learned responsibility and citizenship and are suggesting ideas for future projects, including ways in which the technical shops and art department can join in. (Niagara Falls)

Where Edges Meet: Community Wildflower Garden

By teaming with the Evergreen Foundation, community members, government, schools, clubs, local services and professional organizations, the community transformed a

grassed field into a beautiful mixed habitat including a wildflower garden and burgeoning forest. (Toronto)

Kevin Wells Memorial Gardens

Inspired by the vision of former principal Kevin Wells, students and staff at Holy Family Elementary School have “dug in” to create an outdoor habitat/environment area in their schoolyard. First plantings began in May, 2001. (Kingston)

EcoPerth First Class

Inspired by EcoPerth's staff presentations in their school, grade 4 students take home checklists to record monthly actions they take to reduce climate change. “Kilometres” are awarded to each student based on actions taken. The first class that accumulates enough kilometres to cross Canada wins a prize. (Perth)

Measuring Our Ecological Footprint

High school and elementary students are using Bill Reese's Ecological Footprint to measure and then decrease their impact on the planet. (Caledon)

Supplies to Bosnia

In partnership with the Community Action Centre, elementary school students are raising funds to send school supplies to children in Bosnia. The supplies will be sent in “Waste Works” tote bags – bags made from material that has been diverted from the local landfill. In conjunction with this project, the school is also supporting a focus on developing students' conflict resolution skills. (Eganville)

Action Projects (CONTINUED)

Waterlinks

Through a partnership with the Community Action Centre, students are developing several projects related to water. They are organizing watershed workshops for their own and other schools and developing a permanent art work display in their school. (Eganville)

Waste Consolidation Project

Through a one-day blitz, the Guelph Waste Consolidation Project plans to reduce the number of stops the garbage truck needs to make. This model program consolidates household waste collection, changes community behaviour and improves air quality. Students distributed information flyers and measured house participation rate on collection day. (Guelph)

Guelph Water Conservation Project

An initiative of the Guelph International Resource Centre, the River Water Field Day brought together students from 10 high schools to take part in a water ecology tour, household water audit, tree planting and future action planning. (Guelph)

Energy Audits in the School

All schools within the Catholic School Board are participating in Destination Conservation, an energy audit and retrofitting project. Students help complete energy audits and monitor reduced use as a result of retrofitting. Curriculum expectations will be integrated across all subject areas. (Sudbury)

Super Sleuths Track Marine Debris

Since 1992, high school students have been studying current patterns and “fingerprinting”

the debris that washes up on their shores. They’ve written more than 100 letters to sources they were able to “fingerprint” and have received 30 responses indicating that companies will change their products and practices to reduce litter. Inspired by their initiative, various organizations have donated resources and funding to support the students’ work. (Texas)

Senior Citizen’s Social

For over ten years, high school students have hosted an annual senior citizen’s social to celebrate the winter holiday season. Students throughout the school bake and donate gifts, while others serve the seniors and provide dramatic and musical entertainment. (Caledon)

Let’s Talk Kilowatt Hours

Grade 5 students got lots of help with their “Energy Patrol.” The local utility company provided a digital counter, which hangs in a central spot in the school, letting all students know how much energy was being used. The Energy Extension Centre at a local university helped them calculate their energy savings on a computer donated by the local telephone company. Their efforts have expanded beyond the school and now even the local post office makes sure unneeded lights are turned off. (California)

Sharing Wisdom

Concerned about how many elderly were living alone in their community, students conducted a survey, then developed a plan to visit and share stories with elderly community members. (Quebec)

Action Projects (CONTINUED)

From Drought to Good Sense

Grade 8 students lobbied the Senate Governmental Organization Committee for approval of their resolution urging the state to use drought-resistant plants in landscaping around new buildings. In their presentations, the students demonstrated that landscaping with drought-resistant plants not only saves water, but also money, energy, labour, and fertilizer. As a result of the students' lobbying and educational efforts, legislation was passed in 1988 and is still in effect. (California)

Advising Town Planners

Grade 11 students examined local sustainability issues and planning documents using GIS software. Through a multimedia presentation to the Town Plan Review and Update Committee, they made recommendations for incorporation into the town's Official Plan. (Sutton)

Personal Choices!

Each week the high school class chooses to take on one personal challenge to decrease their impact on the planet (e.g. limit showers to 5 minutes; use a cloth napkin instead of a paper towel). After committing to making a change for one week, some students chose to continue with their new habit on an ongoing basis. (Caledon)

Vehicle Idling Reduction

Students are learning about the effects of idling vehicles, surveying the number of idling vehicles outside their school, then creating a banner to mount outside the school

designating the student drop-off area as an "idle-free zone." (Mississippi Mills/Almonte)

Wells in Africa

Grade 7 students have raised money to build a well in Africa, providing clean drinking water to a whole village of 500 adults and children. (Ottawa).

Willow Street Angels

A group of children and youth from 3 to 16 have been donating their spare time to cleaning up their inner city neighbourhood, planting perennials and bulbs, weeding and watering gardens and sharing goodwill and cheer. Links with the local school and businesses have helped make their ongoing project a huge success. (Ottawa)

Safe and Active Routes to School

Partnering with the City Hall, high school students will create a "walking school bus" to escort elementary students to school. This project reduces greenhouse gases, increases fitness, and helps develop a sense of community. (Guelph)

Organics at the Market

A partnership between Sulyn Organic Catering and the local school supports a student to host an organic food booth at the local farmers market. (Eganville)

Junction Creek Restoration Project

High school students joined an existing community creek restoration project in their ongoing work to clean up and restore Junction Creek as a healthy coldwater stream. (Sudbury)

Appendix H *Action Planning Sheet*

Issue Summary
How are we connected to/ involved in this issue?
What change would we like to see?
What type of action would be appropriate to create the change we want?
What specific events would we plan?

13. Stakeholders and Perspectives: Force Field Analysis

Source: Adapted from a workshop resource written by MJ Barrett, Learning for a Sustainable Future

Description

Being able to see issues from all perspectives is a valuable life skill. This activity introduces students to the concept of stakeholders. Stakeholders are groups of individuals who have a vested interest or involvement in particular issues being explored. Once students identify an issue of interest, stakeholders and their different positions on the issue are explored. The activity concludes with a mock debate as students are separated into stakeholder groups and debate the issue at hand.

Background Information

As governmental decision-making processes evolve towards consensus and working with multi-stakeholders, identifying and understanding the position of various stakeholders is essential to strengthen the basis of one's opinions. Environmental issues are never simple, and one way to deal with their complexity is to use tools such as a force field analysis. A force field analysis helps you to determine not only where to start when analyzing an issue and developing an action plan, but also to determine whether you have sufficient resources and allies to tackle the issue successfully.

Materials

- ▶ blackboard or white board for 1-2 squares per stakeholder
- ▶ thick markers (approximately 8cm x 8cm)
- ▶ small squares of paper; enough
- ▶ masking tape
- ▶ name tags for students

Time Allotment

Introduction: 10 minutes

Stakeholders' discussion: 10 -15 minutes

Stakeholders' group work: 10 -15 minutes

Debate: 15-20 minutes

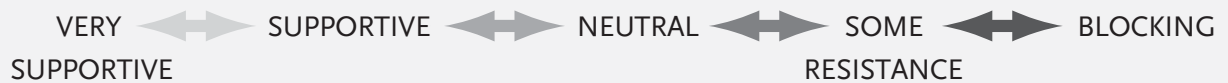
Discussion: 5 minutes

Teaching/Learning Strategies

1. Brainstorm areas in need of positive environmental change within the school as well as noting areas where improvements have already been made. List ideas in as much detail as possible on the blackboard. Democratically select one issue for the class to address.
 2. Make a stakeholders' chart. Set up the blackboard by writing headings in a continuous line across the top – see diagram below.
 3. After selecting a school issue, name the players (stakeholders) who may be involved and write their names on the small squares of paper provided (e.g., a class wants to explore a request that there be no idling of engines in front of the school building). The force field may include: the participating class members, other students, teachers, administration, caretakers, cafeteria and office staff, the school board, parents, other community members, environmental groups, municipal officials, and possibly the provincial government or other communities who have attempted a similar project. Consider both individuals and organizations, as well
- as different levels of power and scope of influence: local, regional, provincial, national and global. *You might want to write some stakeholders down twice since they may fit under two (or more) headings.*
4. Using masking tape, place the stakeholders' names under the appropriate headings on the chart (this will require some discussion, highlighting possible stereotypes and areas where further research is needed).
 5. Divide students into the different stakeholder groups and challenge them to develop a position on the issue.
 6. Agree on class rules for debating and conduct a debate on the issue, allowing each stakeholder group to present its opinion and challenge each other through appropriate questioning.

Note: Doing this activity on a blackboard/whiteboard and using 'sticky notes' or pieces of paper and tape to place the stakeholders on the chart allows them to be moved around as further discussion or research might suggest.

Stakeholder Chart



Follow-up Discussion Questions

- ▶ Which of the stakeholders have the most power or ability to create change?
- ▶ What are the possibilities for students to create change?
- ▶ What factors would influence a stakeholder's position on the scale above (from "very supportive" to "blocking")?
- ▶ How can this analysis allow you to create more effective change?
- ▶ Why would it be beneficial to identify stakeholders when examining environmental issues?
- ▶ Why is it important to include all stakeholders when you are trying to create positive environmental change?

Extensions for additional classroom projects/activities

- ▶ Use this analysis for action projects that the class is currently involved in.
- ▶ Monitor current issues and analyze the stakeholders' positions over time to see if they change.

Curriculum Connections: Clustering of Expectations

GRADE 7: GEOGRAPHY (2004)

- 7g15 • choose an environmental issue that illustrates one of the themes of geographic inquiry and explain why various individuals and groups have different opinions on the issue (e.g., *theme of interaction*: wilderness conservationists versus loggers)
- 7g40 • describe positive and negative ways in which human activity can affect resource sustainability and the health of the environment
- 7g41 • describe a variety of ways in which people use and manage renewable, non-renewable, and flow resources to meet their needs

RESOURCES

Environmental Learning Adventures

Green Teacher, Issue 44, October-November 1995 and Issue 46, February-March 1996.

Subscriptions are \$30 (includes GST) for 4 issues from *Green Teacher*, 95 Robert Street, Toronto, ON, M5S 2K5. 416-960-1244. www.greenteacher.com

Hammond, Merryl and Rob Collins. *One World, One Earth: Educating Children for Social Responsibility*. Philadelphia: New Society Publishers, 1993. ISBN CAN 1-55092-189-4

The Junior Environment Club Manual. Waterloo: Waterloo Board of Education and Youth Services Canada, 2000

Our Changing Climate: Learning How to Take Charge of Climate Change at School, Home and in the Community – Junior Level Curriculum Unit. Toronto: Toronto Environmental Alliance, 1997. (<http://www.torontoenvironment.org/>)

Outdoor and Environmental Education: Starter Package. Halton District School Board, 1999.

Pike, Graham and David Selby. *Global Teacher, Global Learner*. London: Hodder & Stoughton, 1988. ISBN 0-34040261

Project Wild, Ottawa: Council for Environmental Education, 1999. ISBN 1-55029-082-7

Ryan, John C. *Stuff: the secret lives of everyday things*. Vancouver: Northwest Environment Watch, 1997. ISBN 1-886093-04-0

Sheehan, Katherine and Mary Waidner. *Earth Child: Games, Stories, Activities, Experiments & Ideas about Living Lightly on Planet Earth*. Oklahoma: Council Oak Books, 1994 (rev. ed.). ISBN 0-933031-93-9

Wonderwalks: Primary Outdoor and Environmental Education. Halton District School Board, 2000.

Youth Organizations

Sierra Youth Coalition (SYC) is the youth arm of the Sierra Club of Canada. SYC connects young activists to the oldest, largest and most influential organization for environmental protection on the North American continent. It works on environmental campaigns (both local and national) and builds networks for young people, linking social justice and environmental issues, working with and through the Sierra Club of Canada. SYC also sponsored a cross-Canada trip for youth to promote climate change awareness called the Climate Change Caravan. www.sierraclub.ca

Youth Action Network (YAN) is a national non-profit youth-for-youth organization that seeks to motivate and empower youth to take action on environmental and social justice issues. YAN publishes *Forum*, a quarterly newsletter written and produced entirely by youth, and annually sponsors International Youth Week. Projects are ongoing throughout the year. Tel: 416-368-2277.

Websites

Climate Change
www.climatechange.gc.ca

This Government of Canada site provides information on the background science of climate change and what Canada is doing to mitigate climate change. Resources for teachers are available.

Climate Change Calculator
www.climcalc.net

Developed for Canadians, this tool helps people to connect their daily actions to the production of greenhouse gas emissions. A simple questionnaire calculates your personal contribution to climate change and makes suggestions about how to reduce your emissions.

Climate Change Solutions
www.climatechangesolutions.com

A “how to” site for individuals, schools and families interested in taking positive action on climate change.

David Suzuki Foundation www.davidsuzuki.org/climate_change/

Within the climate change section of this web page, many useful explanations can be found on the science, impacts, politics of and solutions to climate change. There is also an opportunity to send your thoughts about climate change to the Prime Minister by fax.

Re Energy
www.re-energy.ca

This practical yet inspiring web page has detailed plans for renewable energy projects for high school students. Solar, wind, water and biomass energy sources are addressed with background information, plans for projects and links to other useful sites.

Sierra Club of Canada www.sierraclub.ca/national/climate/index.html

This page links you to the Sierra Club's climate change campaign. Lots of background information, especially on the political background to climate change. Includes a very useful links page.

World Health Organization
www.who.int

The World Health Organization makes the connection between environmental and human health. This page links to many websites which focus on the health impacts associated with climate change.

Environmental Organizations

Canadian Wildlife Federation
www.wildeducation.org

Citizen's Environment Watch
www.citizensenvironmentwatch.org

Clean Air
www.cleanair.web.net

Ducks Unlimited Canada
www.ducks.ca

Earth Day Canada
www.earthday.ca

Evergreen Foundation
www.evergreen.ca

Federation of Ontario Naturalists
www.ontarionature.org

Friends of the Rouge Watershed
www.frw.ca

Foodshare
www.foodshare.net

Greenpeace
www.greenpeacecanada.org

Ontario Environmental Network
www.oen.ca

Pollution Probe
www.pollutionprobe.org

The David Suzuki Foundation
www.davidsuzuki.org

The Nature Conservancy of Canada
www.natureconservancy.ca

Toronto Environmental Alliance
www.torontoenvironment.org

Toronto Regional Conservation Authority
www.trca.on.ca

World Wildlife Fund
www.wwf.ca

Books

Plant and Ecosystem Resources

Allaby, Michael. *Dictionary of Ecology*, Oxford University Press, 1998.
Reference for ecology terms

Chambers, Brenda et.al. *Forest Plants of Central Ontario*, Lone Pine Publishing, 1996.
General plant field guide for Central Ontario

Hickman, Pamela and Heather Collins. *Kids Canadian Tree Book*, Kids Can Press Ltd., 1995.
Facts, projects and activities, including detailed illustrations

Hickman, Pamela and Heather Collins. *Kids Canadian Plant Book*, Kids Can Press Ltd., 1995.
Facts, projects and activities, including detailed illustrations

- Kricher, John. *Eastern Forests: A field guide to birds, mammals, trees, flowers and more*. Houghton Mifflin Co., 1998.
General forest field guide for eastern region
- Mitchell, Alan. *The Pocket Guide to Trees of North America*, Parkgate Books, Ltd., 1998.
Colour illustrate tree guide
- Peterson, Lee Allen. *Edible Wild Plants: Eastern/Central North America*, Houghton Mifflin Co., 1977.
Illustrated guide to edible wild plants, some photos
- Peterson, Roger Troy and John Kricher. *Peterson Field Guide Colouring Books: Forests*, Houghton Mifflin Co., 1983.
Black and white illustrations of plants and animals with colour charts
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