

TEACHING KIT

CANADA'S FORESTS AND WETLANDS

Our Natural Water Filters

Volume 6: Forests and Water

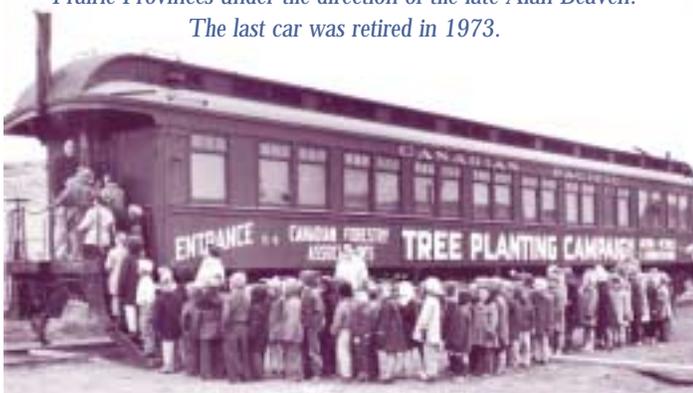


Manitoba to Host Envirothon 2006

Water Stewardship in a Changing Climate

The Manitoba Forestry Association will host the 2006 Canon North American Envirothon in Winnipeg MB, from July 23 to 29. Canon Envirothon is a weeklong competition among winning provincial/state teams from across North America. The competition tests five general themes including: Soils and Land Use, Aquatic Ecology, Forestry, Wildlife and a current Environmental Study issue, which for 2006 is: Water Stewardship in a Changing Climate.

Established in 1919 as the Manitoba arm of the CFA, the Manitoba Forestry Association has a long history in innovative forest education. For over fifty years, the CFA Railroad Classroom and Conservation cars toured across the Prairie Provinces under the direction of the late Alan Beaven. The last car was retired in 1973.



For more information about the Canon Envirothon near you, visit:
www.envirothon.org

For more information about the Canon North American Envirothon 2006:
jpotton@mts.net



At least 30% of the fibre used in manufacturing the paperboard for this cover comes from well-managed forests independently certified in accordance with the rules of the Forest Stewardship Council.



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Contents

Canada's Forests and Wetlands – Our Natural Water Filters explores forest, wetland and water issues in Canada and around the world. These lessons are designed to provide young Canadians with a wide variety of learning opportunities suitable for all age levels in every classroom, from special needs to gifted and ESL. Curriculum topics encompass Science, World Issues, Geography, Career Studies, Civics, Visual Arts, English and Drama. This kit also features a poster promoting the next CFA teaching kit: *The Boreal Forest – A Global Legacy*.

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The CFA is dedicated to the wise use and conservation of Canada's forest, water and wildlife resources through enhanced public awareness and education programs. The CFA Teaching Kit Series provides educators with the tools to help young people better understand the value of forests and the importance of protecting and conserving them.

Canada's forests play a vital role in maintaining and protecting our freshwater resources. Effective policies and management practices for our forests and wetlands are key.

The CFA has made every effort to provide a balanced perspective on the interests and activities of forest professionals, biologists, landowners, Aboriginal people, rural and urban citizens, environmental groups, agriculture and industry focusing on a common goal: the thoughtful use and management of Canada's precious freshwater, wetland and forest resources.

These people, who tend to be dedicated conservationists by nature, are not often featured in the media or recognized for their efforts. However, they are responsible for a tremendous amount of valuable ground-level work including tree planting, habitat conservation, management planning, and public outreach and education. The CFA dedicates this kit to them.

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Using This Teaching Kit

This teaching kit, the sixth in the Canada's Forest teaching kit series, is recommended for nationwide use by classroom educators and youth leaders. It is designed to help teachers and students explore the important role of Canada's forests in sustaining our freshwater resources.

The background information contains answers to common questions about forests and freshwater, as well as many useful and current statistics. Numerous teaching resources are also included for your convenience.

Target Audience

Since Canada's provinces and territories use various grade specifications and terminologies (such as primary and intermediate) we have indicated only the broad age groups and commonly used levels for each lesson. Some activities can be used with several age groups.

Key

-  group activity
-  presentation/performance activity
-  writing/recording activity
-  research-based activity
-  extensions
-  hook

 While the CFA grants permission for the photocopying of this entire publication, the pages marked with the photocopier icon are designed specifically as student worksheets.

Curriculum Links

The lessons in this kit are designed to meet the curricula of many different grades and courses across Canada, including Science, World Issues, Geography, Career Studies, Civics, Visual Arts, English and Drama. Each lesson includes one broad Learning Outcomes describing what students will demonstrate during the activity. Outcomes can be easily expanded to fit curriculum needs.

Flexible and Easy-To-Use Activities

To stimulate teacher and student creativity and engagement in the learning process, this kit includes various hooks – attention-grabbing lesson openers – and extension options.

Web Resources

Visit the Canadian Forestry Association Web site, www.canadianforestry.com, for supplementary lessons featuring Canada's forests and freshwater. While online, download lessons from previous teaching kits on a wide variety of forest topics including forest heritage, climate change and species at risk.

In particular, please note the water filtering activity from Volume 4 on Sustainable Forests: *Water, Water Everywhere!* This lesson has students using household materials to create their own experimental filtering models to demonstrate how trees and other plants filter water and slow sedimentation.

Contact Us

To order teaching kits or provide feedback, please contact the Canadian Forestry Association at www.canadianforestry.com/html/education/cfa_kits_e.html. We look forward to hearing from you.

Canada's Forests, Wetlands and Freshwater

Why is Freshwater Important?

All living things depend on water. Wet habitats provide a permanent home for dozens of species of fish, insects, reptiles, amphibians, birds and mammals. Others use them frequently for feeding, reproduction, migration stops and more. Trees and other vegetation found in the water and near the water's edge – *riparian zones* – provide wildlife with necessary shade, shelter, nourishment and hiding places.

People cannot live more than a few days without water. We need it to drink, cook and clean, manufacture and transport goods, farm crops, raise livestock, and enjoy in a variety of recreational pursuits.

How Are Canada's Forests Important in Sustaining Freshwater?

Trees and other vegetation are very important for minimizing and preventing erosion and sedimentation around our streams, rivers, lakes and wetlands because their extensive root systems hold the soil in place. Roots also counter the effects of soil compaction in that they constantly push through and aerate the soil, allowing rain and melt-water to penetrate the earth and be filtered by microorganisms before reaching the water table below.

By retaining toxins and nutrients such as mercury and phosphorus, forest soils prevent a portion of these substances from entering streams and groundwater. They also regulate water taste, clarity and colour, and water chemistry factors such as acidity.

Wetlands play an even greater role in water filtering because they contain many more microorganisms than are found in forest soils. As well, they remove or trap sediments, harmful bacteria and excess nitrogen.

Many Canadian organizations and corporations are currently using constructed wetlands to cleanse wastewater and sewage. These include the University of Ottawa and The Body Shoppe in Toronto ON, the city of Humbolt SK, and the Oak Hammock Marsh Interpretive Centre in Stonewall MB.

Forests and wetlands also play a role in maintaining steady water table levels by absorbing excess run-off. As part of the water cycle, trees and other plants filter water by absorbing it from the soil then expelling some into the air through transpiration. Plants use water during photosynthesis, the process of creating energy from using the sun's light, and emit oxygen to the atmosphere, which animals use to process the food energy they consume. Photosynthesis in forests involves the absorption of great amounts of carbon dioxide, a greenhouse gas involved in climate change. Forests thus comprise a vast and important carbon *sink*.

Freshwater Statistics

World population: 6 billion+

Number of people currently without access to clean drinking water: 1 billion+

Year this number will most likely reach four billion people: 2025

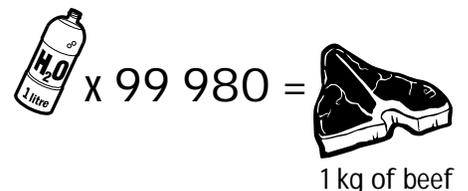
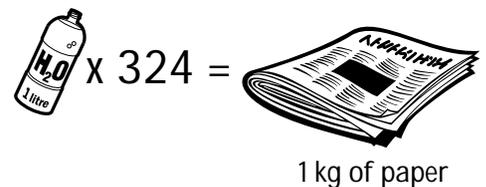
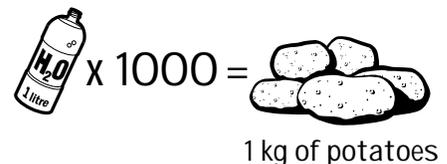
Increase in amount of water used per person compared to a century ago: 6 times

Amount of water needed to replenish our bodies every day through drinking and eating: 2.4 litres

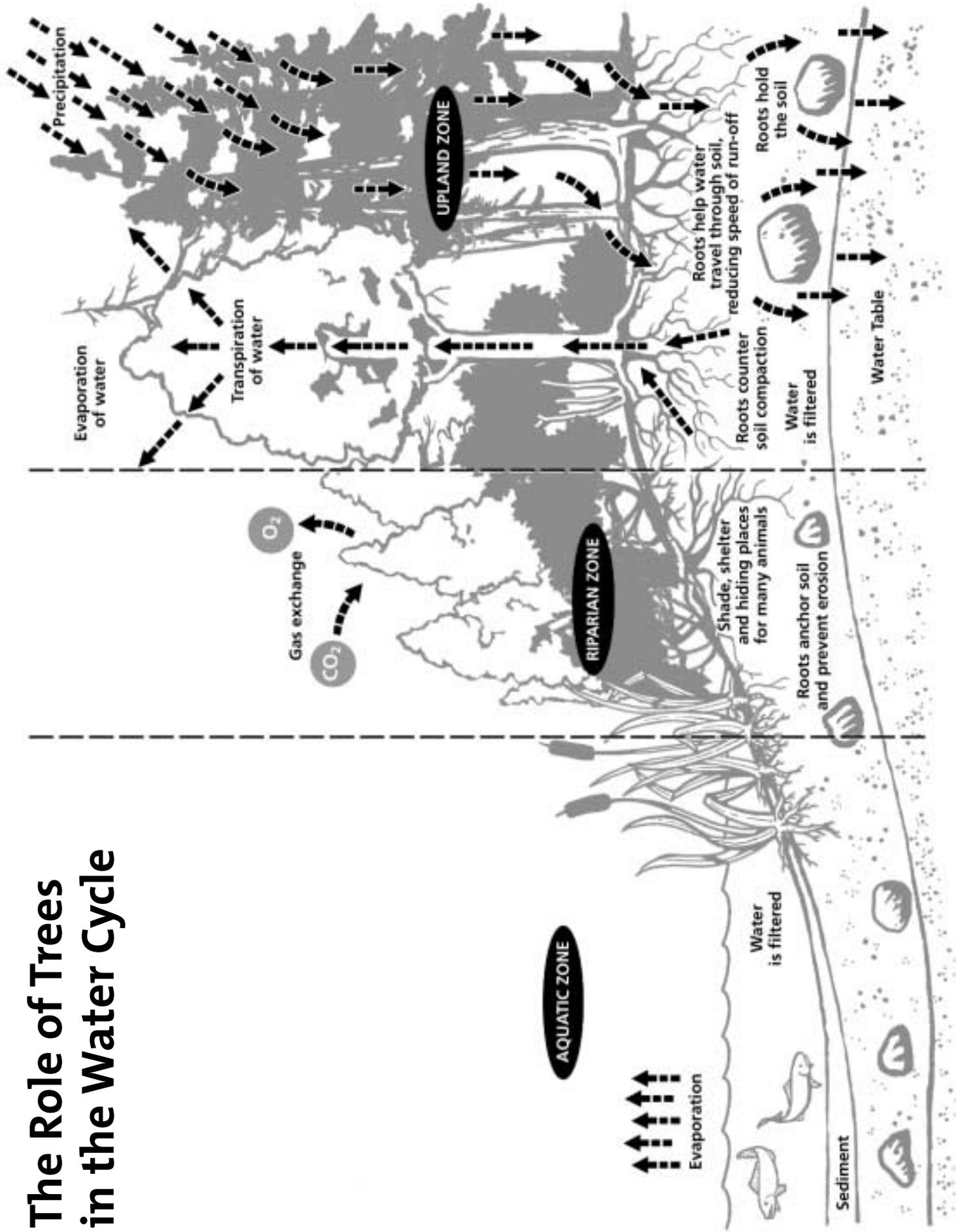
Number of people who die each year from diseases caused by unsafe drinking water, lack of sanitation and insufficient water for hygiene: about 3.4 million

Portion of water-related illnesses in developing countries: 80%

How Much Water is Required to Produce:



The Role of Trees in the Water Cycle



How is Water Used in Canada?

Who Cares for Canada's Forests and Wetlands?

The majority of Canada's forests and wetlands are located on Crown land: 77 per cent are held by a province or territory, 16 per cent are federally held, and 7 per cent are privately owned. In most other countries, the vast majority of forests and wetlands are privately owned. In this respect, all Canadians have a unique privilege and responsibility to act as stewards for our forests and freshwater. We vote for governments at municipal/band council, provincial/territorial and federal levels to make decisions about Canada's natural resources on our behalf, but we are also free to express our views and participate in government decision-making at any time.

How Does Canada's Water Use Compare?

Canada ranks 28 among the 29 member nations of the Organisation for Economic Co-operation and Development (OECD) in terms of per capita water consumption, and 26 in terms of total consumption. Canada uses 1600 cubic metres of water per person per year. This is more than twice as much water as the average French citizen, three times as much as the average German, and almost four times as much as the average Swede.

What Does Clean Water Cost?

Canadians pay little for our water compared to people in other countries. In 1999, the average cost of municipal water was \$0.96 per cubic metre and the monthly water and sewage bill for the average Canadian household was \$28.56. This is at the low end of OECD countries.

Citizens of British Columbia and Newfoundland/Labrador enjoy the lowest water costs in Canada. Both provinces have abundant supplies, many gravity-fed systems, and generally good water quality, requiring less treatment. The highest priced water is on the Prairies where water shortages can occur, and in the Territories where permafrost and other climate conditions negatively impact water supplies.

How Much Water Does a Tree Absorb vs. Release?

This process is dependent on many factors, such as tree species, the amount of water available in the soil, and most of all, the weather. On a hot, dry day, a tree will transpire the greatest amount, but will stop the process by shutting its tiny stomata (spaces between leaf and/or stem surface cells) to halt water loss if soil moisture drops too low. Various tree species have adapted over millions of years to thrive in conditions ranging from constantly saturated to very dry soil.

What is the Extent of Canada's Freshwater and Wetlands?

Portion of the world's freshwater found within Canada's borders: 20%

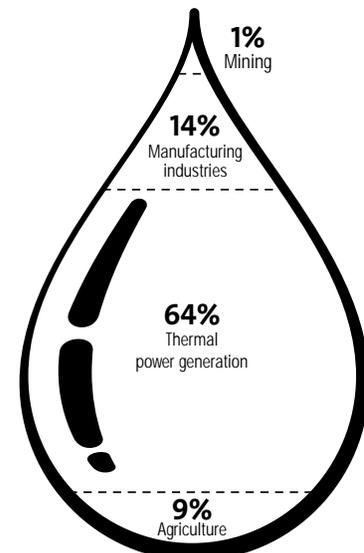
Portion of the world's renewable freshwater (water that is not retained in lakes, underground aquifers and glaciers) in Canada: 7%

Portion of Canada's total area covered by freshwater: almost 9% or 891 163 square km

Country with the most wetlands: Canada

Canada's share of the world's wetlands: 25%

Industrial Water Use in Canada?



How is Water Used in Our Home?

On average, Canadians use 343 litres of water per person per day in the home:

- Bathing 35%
- Toilet 30%
- Laundry 20%
- Kitchen/drinking 10%
- Cleaning 5%

How Can We Help?

Threats

Many types of pollution affect our forest filtering system and the quality of water in our lakes, rivers, streams, wetlands and aquifers. Canada's forests and wetlands must also be protected from erosion, dredging, filling, outdated cropping, forest harvesting and fossil fuel exploration practices. Additional threats include:

- removal of surrounding vegetation,
- dumping of any kind,
- draining for the creation of farm land,
- harvesting peat moss,
- shoreline destruction,
- climate change, and
- invasive construction of transportation and energy transmission corridors.

Is Our Freshwater For Sale?

Canada is very fortunate to have an abundance of freshwater; as a result, many Canadian companies sell bottled water nationally and abroad. However, opinions vary as to whether or not we should permit selling our freshwater in great quantities. Currently there is no law, nor has there ever been one, that would prevent the federal government from deciding to sell Canadian freshwater in bulk.

To learn more visit the Canadian Bottled Water Association Web site:
www.cbwa-bottledwater.org/en/industry.htm

We Can Each Do Our Part

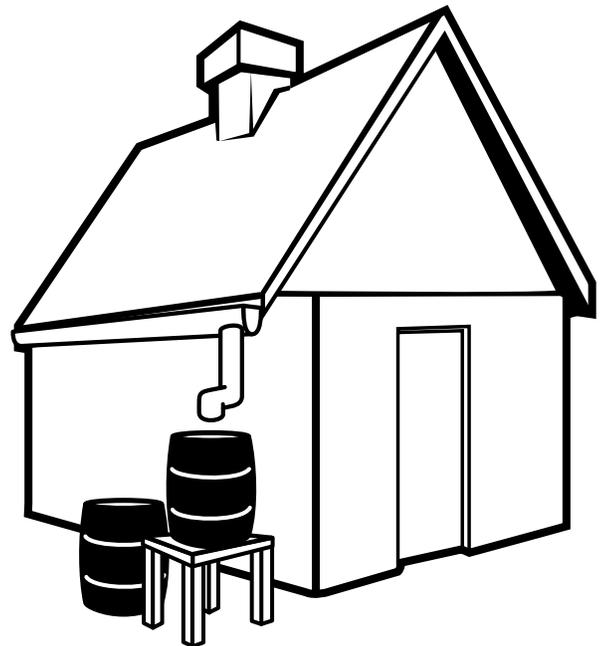
We can all help to conserve and protect Canada's forest and water resources:

- plant more trees
- garden with drought-tolerant and/or native plants
- collect rainwater for watering
- protect riparian zones
- use canoes, kayaks and other people-powered watercrafts rather than motorized watercraft
- buy from environmentally-friendly companies
- use a small amount of water in a glass to brush your teeth rather than running the tap
- limit yourself to taking three-minute showers.

For more water conservation tips visit:

www.frugalfun.com/lowerwaterbills.html

www.innerself.com/Environmental/world.htm.



Teaching Resources

www.wetkit.net

North American Wetland Conservation Council

Select *Tools*, then *Sector*, and then *Education*. At the right, under *For More Information*, choose the province/territory of your choice. *Bog Ho!* is an example of an international Web-based learning project that brings together primary schools from several countries to explore the importance and fragility of wetland habitats. This 2001 project engaged schools in Calgary, New York State and England, enabling students to share data, ask questions of experts, and participate in discussions. Visit the site to see the students' work, or to find out how your school can get involved.

www.swa.ca

Project WET (Water Education for Teachers)

Discover a wide variety of activities for grades K-12, produced by the Saskatchewan Water Authority; select *Education*.

www.livingbywater.ca

Information on all things related to freshwater and marine shorelines, including a handbook, impact assessment worksheets, links to educational resources and more.

www.ducks.ca

Ducks Unlimited Canada

Includes maps, diagrams and lessons. The *Resources for You* section includes:

- *Ask the Expert*: post your wetland questions
- *How Does a Wetland Work?*: explanation and great diagram of a wetland: aquatic, riparian and upland zones labeled with many plant species
- *How Wetlands Keep Our Water Clean*: explanation and watershed diagram
- *Interactive North American Duck Migration Maps*: by province, with statistics.

Also includes free teacher resources and student kits in English and French to order, recommendations about Natural Capital and Ecological Goods and Services, and information on classroom programs.

www.epals.com

An online classroom community that invites you to link with classrooms throughout Canada and the world.

www.nationalgeographic.com

National Geographic

This site includes a wide variety of maps and lessons; under *Map Machine*, see map *Global Agricultural Threats to the Environment*. Select *Educators Homepage* for lessons on the importance of forests and wetlands.

www.tbs-sct.gc.ca/

Treasury Board of Canada

To search for contaminated land and water sites by province/territory or electoral district, select *Navigate by Topic A-Z* and then *Contamination*.

www.microbeworld.org

The American Society for Microbiology

Hands-on activities designed for junior/intermediate students on bacterial activity in soils from ponds, forests, gardens, etc.; can be adapted to any age group. Select *More About Microbes*, then *MicrobeWorld Activities*, then *Biosphere in a Bottle*.

www.cbc.ca/news//background/water

www.cbc.ca/fifth/deadinthewater

Canadian Broadcasting Corporation

Extensive water facts and statistics including residential water use, global water supplies, drinking water treatment and the contamination of Walkerton's water system.

Comparison of Canada's forestry and water resources management practices versus those of other countries.

www.ec.gc.ca/water/e_main.html

Environment Canada

Over 150 freshwater facts for Canada and the world; select *Informational Resources and Services* on the main menu, then *Teacher's Corner*, then *Freshwater Facts for Canada*; you can download:

- *Every Drop Counts: A Speaker's Kit on Water Conservation and Efficiency*: a PowerPoint presentation
- *Explore Water With Holly Heron* and *From the Mountains to the Sea: A Journey in Environmental Citizenship*: activity books for primary/junior students
- *Let's Not Take Water for Granted: Kids WaterFest at the Museum of Industry, Stellarton NS*: resource kit with teaching suggestions, reading material and activities
- *A Primer on Fresh Water: Questions and Answers*: for senior students, explores a wide range of facts on various aspects of water
- *Water and Canada: Preserving a Legacy for People and the Environment*: booklet prepared in connection with The Third World Water Forum held in Japan, 2003.

Also visit *Quickfacts* in the sidebar.

http://atlas.gc.ca/site/index.html

The Atlas of Canada, Natural Resources Canada

This site provides learning resources and maps including data on coastlines, lakes, rivers, waterfalls, land and freshwater areas; select *Facts about Canada* in the left margin. There are sections on *Freshwater* (maps showing drainage, wetlands, groundwater), *Environment* (forests, hydrology, sea ice,) as well as lesson plans and facts. A search for maps using keyword "rivers" produced 71 maps!

www.careercruising.com

Career Cruising

Information on jobs in forestry, wetland and water management.

www.jobfutures.ca

Government of Canada

A career planning tool with information about 226 occupational groups and descriptions of work experiences.

www.canadianforestry.com

Canadian Forestry Association

Information on careers in resource management; select *Forest Education*, then *The Profession*.

www.canadian-forests.com/job.html

Canadian Forests

A Web site on forests and forestry in Canada including links to all federal and provincial governments, the forest industries, service and supply companies, associations and NGOs, consultants, education and research, forestry news, and employment opportunities.

www.cif-ifc.org

Canadian Institute of Forestry

Information about forestry policy, practices and career opportunities; for career information select *Professional Development*, then *Employment Opportunities*.

www.atl.cfs.nrcan.gc.ca/index-e/index-e.html

Natural Resources Canada – Canadian Forest Service

Information about careers in science including research, forestry, biology, GIS specialist and communications; in the sidebar select *Science*, then *Careers in Science*.

www.envirothon.org

Canon Envirothon

An annual competition among state/provincial teams of students grades 9 to 12 for recognition and scholarships. Teams demonstrate knowledge of environmental science and natural resource management through hands-on problem-solving activities. There are four testing categories (soils/land use, aquatic ecology, forestry, and wildlife) in addition to a current environmental issue. The site provides history about the competition, how to enter a team, training resources, etc. Recent results are posted on the Canadian Forestry Association Web site: www.canadianforestry.com.

www.modelforests.net

Canadian Model Forest Network

A program of the Canadian Forest Service, this site has information on conservation projects, international model forest partnerships, Aboriginal initiatives, and Local Level Indicators, which are the heart of the model forests' emphasis on sustainability. These indicators "provide the framework for monitoring on-the-ground changes and assessing their influence on the many components of sustainable forest management."

www.waterontheweb.org

Water on the Web

A research site for senior students and their teachers including how to study a water problem, design experiments, analyze and present data; independent modules. In the main menu select *Curricula*, then *Teaching* for advanced lessons on topics such as heat budgets of lakes, water conductivity, thermal stratification.

www.nrcan-rncan.gc.ca/kids/index_e.html

Natural Resources Canada Scratching Post for teachers, parents and kids.

Students can send e-card tips, play games and complete four quizzes (*The Great Canadian Forest Challenge*). For teachers/parents: many links and an upcoming teaching kit.

www.green-street.ca

Green Street

Numerous all-Canadian teaching kits, activities, and games for grades K-12, funded by the J.W. McConnell Foundation, a private grant-making organization with a mission "to enhance the ability of Canadians to understand, adapt and respond creatively to the underlying forces that are transforming Canadian society and the world."

www.on.ec.gc.ca/greatlakeskids/intro.html

Great Lakes Kids

This site features video clips, a colouring book, quizzes, games and activities.

www.great-lakes.net

Great Lakes Information Network

For information on Great Lakes water level fluctuations (effects, historical levels, how levels/flow are measured) fish and native flora, GIS maps, economic benefits; select *Education*.

Also check out Environment Canada's Our Great Lakes Web site: www.on.ec.gc.ca/water/greatlakes/intro-e.html.

www.eman-rese.ca

Ecological Monitoring and Assessment Network

Who's monitoring Canada's forests and water? Environment Canada's Ecological Monitoring and Assessment Network is a blanket organization for groups such as Icewatch, Frogwatch, Plantwatch and yes, even Wormwatch. To find out what's going on in Canada, select *Topics*, then *Ecosystems* (Great Lakes, coastal, Fraser and St. Lawrence rivers, etc.), *Water* (floods, ground-water, bulk water removal, etc.), *Nature and Wildlife*, *Recreation*, *Waste Management*, *Climate Change* and others.

www.gemswater.org

Global Environmental Monitoring System (GEMS)

Who's monitoring our planet? This United Nations water program "provides scientifically-sound data and information on the state and trends of global inland water quality required as a basis for the sustainable management of the world's freshwater to support global environmental assessments and decision-making processes."

www.aquaculture.ca

Canadian Aquaculture Industry Alliance

For information about aquaculture practices and environmental impacts select *Info About Aquaculture*; links to provincial associations also provided.

www.cfa-fca.ca

Canadian Federation of Agriculture

For graphs on soil conservation, pesticide and fertilizer use select *Agriculture in Canada*, then *Agriculture and the Environment*.

www.nwri.ca

National Water Research Institute of Environment Canada

Provides contacts, updates and FAQs; select *What's New*.

www.iath.virginia.edu/waters

Aquae Urbis Romae: Investigating the Waters of the City of Rome

On this highly interactive site, students can examine how natural elements such as rain, spring water and the Tiber River interact with aqueducts, fountains and sewers in Rome 753 BC to present; you can also make your own map of water features.

VIDEOS

Water Under Fire (2004/2005)

Canadian Water Network

www.waterunderfire.com

A seven-part TV series hosted by CBC radio's Bob McDonald and produced by the University of Lethbridge AB, and Gallant Productions. Viewers will learn how water systems in Canada and around the globe affect the long-term quality of the environment and our lives.

WestLand Television

www.westlandtv.com

T: 250-353-2697

Approximately 50 detailed videos on watershed restoration, the impacts of logging, spawning, etc. in British Columbia; produced by Back On Track Productions. \$89 per video; some deals possible for multiple orders.

Dr. Don Waite

Earth Songs

T: 306-522-5237

don.waite@accesscomm.ca

Video (10 songs) and CD (12 songs) created by musician and Environment Canada researcher Dr. Don Waite, and featuring Aboriginal musician Lea Bill. The songs cover topics such as the water cycle and are suitable for grades K-6. Fit Science curricula; words are included. \$10 plus shipping.

Ducks Unlimited Canada

www.ducks.ca

If You Build It (1991); 21 minutes (junior level)

Alberta teens meet a wizard who takes them to three nearby wetlands to witness conservation in action (special effects).

Planned Grazing (1994); 21 minutes

Ranchers and Ducks Unlimited Canada work together across the Northern Great Plains to develop grazing systems that increase beef production, improve wildlife habitat and stop soil degradation.

Reflections on a Prairie Slough (1991); 27 minutes

Potholes or sloughs formed by glaciers are some of the earth's most productive waterfowl habitats, but loss of these vital wetlands continues.

The Right Direction (1994); 23 minutes

A family learns about Ducks Unlimited Canada's native plant program. Economical, low-maintenance and diverse native plants can stabilize fragile agricultural lands, re-vegetate disturbed areas and provide excellent wildlife habitat.

The Shores of Life (1991); 27 minutes

Between New Brunswick, Prince Edward Island and Nova Scotia and the Atlantic Ocean, there is a vital band of wetland habitats, more diverse and productive than either land or sea – from the microbes of salt marsh tidal pools and beachcombing sandpipers to bald eagles, fish and waterfowl.

Many others are available but not listed here. All are loaned to schools for free; most cost \$15 to buy.

Dead in the Water (2004)

the fifth estate

www.cbc.ca/fifth

T: 1-800-363-1281

This video provides a detailed look at efforts to privatize the global water supply in various countries. \$70. Contact Bowdens MediaSource for *the fifth estate* episodes up to a year old at www.bowdens.com.

The Education of Shannon (2003)

A look at the effects of groundwater pollutant trichloroethylene (TCE) on the community of Shannon QC, and provincial/federal policy on allowable levels in drinking water. Contact CBC at 1-866-306-4636 for older videos such as this.

National Geographic

www.nationalgeographic.com

Select *School Publishing Teacher Store* in the *Teachers and Students* box. Search for a wide variety of videos on forestry and water from a global perspective.

Forests

Bill Nye, The Science Guy

<http://dep.disney.go.com/educational/billnye>

Available in VHS and DVD; \$40US.

A Civil Action (1998)

Starring John Travolta; the story of contaminated water in Woburn MA.

Check out www.northshoreonline.com/woburn for background information.

Erin Brockovich (2000)

Julia Roberts stars in this story of California water contamination.

Homage to Frédéric Back

http://secure.dep.ca/en/produit_details.asp?ID=1612

4 DVD Box Set; \$45.98

Produced in homage to the exceptional work of Frédéric Back, a master of film animation renowned worldwide. Includes *The Man Who Planted Trees* animated video and an exclusive interview with its author, Jean Giono.

BOOKS

Reviewed by Educational Liaisons Jeannie Steele (retired, Riverside Forest Products Ltd.) and Deb Sluggett (Bell Pole Co., Tolko Industries, Louisiana Pacific-Canada, Downie Timber Ltd., Revelstoke Community Forest Corporation)

I Took a Walk

Henry Cole (Greenwillow Books) ISBN 0-688-15115-9

A fabulous picture book for 5 to 8-year-old children who will enjoy hunting for the animals found in the bushes, trees and streams; a good introduction to looking carefully at your environment and all life that exists there.

A Mountain Alphabet

Margriet Ruurs (Tundra Books) ISBN 0-88776-374-X

A beautifully illustrated book for grades K-3 highlighting North American mountains; a wonderful introduction to forest uses (including recreational, commercial, and aesthetic). There is a picture search on each page: children are requested to look for other things beginning with the alphabet letter on the page (good opportunity for vocabulary extension).

A Rain Forest Tree

Lorien Kite (Crabtree Publishing Company) ISBN 0-7787-0146-8

This book presents plants and animals, such as sloths, monkeys, parrots, tree frogs, and orchids living together in the same South American rain forest tree (for children 8 to 10).

In the Woods (See, Make and Do)

Pamela Hickman (Formac Publishing) ISBN 0-88780-412-8

An excellent introduction to forest ecology: nature study activities, information on woodland animals, craft ideas using forest materials, plus safety and conservation tips for hiking in the woods.

Plants

Adrienne Mason and Deborah Hodge (Kids Can Press) ISBN 1-55074-395-3

Thirteen simple hands-on experiments that children 5 to 12 can complete on their own while learning about plant biology.

Plants

David Alderton (Ladybird/Discovery) ISBN 0-7214-1819-8

A biology book for beginners with excellent pictures that looks at the origin of plants, definition of a plant, the world's forests and the life cycle. Includes a foldout cutaway tree with labeled parts.

There's Dirt in the Forest

Kip Anastasiou (Pacific Educational Press) ISBN 1-8957-6642-7

This is a great resource book about soil and the forest for children 9 to 12; includes experiments.

Trees

Linda Gamlin (An Eyewitness Explorers Book) ISBN 0-7894-1679-4

A pocket-sized book packed with information and projects to help students learn about tree parts and functions, tree ID, uses of wood and tree pests.



Forest Flora and Fauna

Age range: 5 to 9 (primary)

Time: 90 minutes

Subjects: Science, Visual Arts

Resources: coloured paper, scissors, glue, white paper strips, markers, crayons, pencils and *Mural Matrix* worksheet (see page 13).

Learning Outcomes

Students will identify non-living (abiotic) and living (biotic) features that commonly occur in forest zones and create a forest mural.

Note: Students need to be familiar with the zones of the forest, such as upland (canopy, understorey), riparian and aquatic (see *Glossary on page 37*); features found at ground level (e.g., leaf litter, rotting logs, mushrooms and salamanders) and below ground (roots, worms, microbes); the diversity of mammals, fish, insects, and birds as well as non-living features (rocks, sun, sky, soil, water).

Hook: The Forest and Wetland Alphabet



Ask the class to name a forest and/or wetland feature for each letter in the alphabet as you call them out/hold them up. Prompt them by reminding them of categories such as plants, animals, birds, non-living components, watery areas and soil. Make sounds to prompt them as well! Examples:

- A alder, ants, air, animals, aphid, algae
- B bulrush, bullfrog, butterfly, bog, beaver
- C cedar, chickadee, caterpillar, catfish, cattail
- D deer, duck, dam (beaver)
- E eggs, elk, earth, earwig, evergreen
- F fawn, fish, frogs, fox, flycatcher
- G groundhog, geese, grass
- H heron, honeybee, hornet
- I icicles, ice, insects
- J jackrabbit, juniper, jay
- K kingfisher, killdeer, knot
- L light, lily pad, leaf, logs, lake
- M muskrat, minnow, maple, mushroom, marsh
- N nuthatch, nest, nettle
- O oak, ovenbird, owl, otter
- P pine, poplar, pond, porcupine
- Q quacking ducks, quail
- R rock, rain, river, roots, robin
- S stream, sun, salamander, snake, sap, sedge
- T trees, thrush, toad, trout
- U ungulate, underwater
- V vole, valley, vine, vixen, vultures,
- W water, wind, worms, woodpeckers, web, wrens, waxwings
- X xylem, xeric, xerophyte
- Y yellow warbler
- Z zebra mussel, zoobenthos, zones

Procedure

- 1 Create a forest and water habitat by making a giant mural.** Each student will make individual features, glue them on, and label them.
Tape enough mural paper to the wall so that students can comfortably fit plants, animals and other features onto an aquatic, riparian and upland zone (see Forest Zones and the Water Cycle *diagram on page 4*). Recap what is found in the different zones and have students direct you in drawing their surface outlines on the mural (stream, banks, forest floor).
- 2 Make a chart identical to the *Mural Matrix* worksheet** (see page 13) on display paper/chalkboard. Brainstorm and record a list of the various names for each feature that could be found in each area. Older students could brainstorm in small groups and record their ideas on copies of the *Mural Matrix* worksheet.
- 3 Each student selects/is assigned a feature from the *Mural Matrix*** (such as rock, frog, sun, otter, cloud, hawk) and creates it. First, they should draw it in rough, have you check it for accuracy, cut out different parts from various colours of construction paper, then glue it together. Demonstrate by making an item; be certain to discuss the appropriate scale of the various features by outlining a few on the mural paper.
- 4 Students should label their features** by using a strip of white paper and gluing it on the feature. See Extensions for more to do with labels. Quick students can make more than one feature.
- 5 Once features and labels are ready,** have students tack them in different locations before everyone glues them into final position. Near completion, stop the activity and have students analyze the mural. Discuss if anything from the list is not represented or under-represented, and observe the great variety of life displayed.
- 6 Complete the mural.** Decide on a title together, and have students assist in labeling it appropriately.

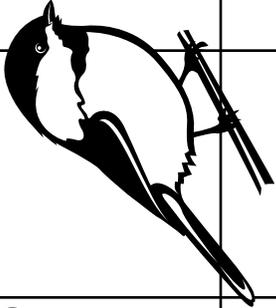
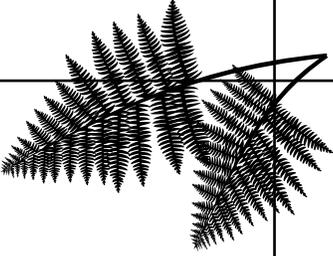
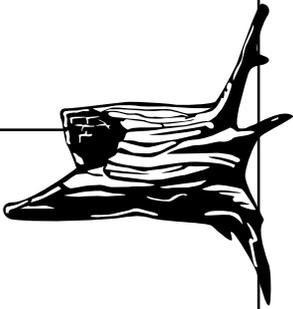


Extensions

- Divide class into three groups and have each group create a part of the mural: aquatic, riparian and upland zones.
- Once the mural is finished, choose brightly coloured markers and highlight the labels of creatures that use two of the three zones (e.g., deer use upland and riparian, beaver use aquatic and riparian) or all three zones (e.g., toad, many birds).
- Use brightly coloured markers or yarn to connect consumers, producers and decomposers in a food web.
- Buddy with a younger class; have older students explain forest connections and/or help with the creation and placement of features.



Forest Flora and Fauna Mural Matrix

Plants and Trees			
Sky			
Canopy			
Understorey			
Riparian			
Aquatic			
Forest Floor			
Underground			





All Systems Go!

In our school beside the wood, A grade _ student by the win-dow stood. Saw a rabbit running by, Knocking at my door.

Help me! Help me! Help me! he said, There's a thundercloud overhead. Come little rab-bit, in with me! Safe and dry we'll be.

Age range: 5 to 9 (primary)

Time: 75 minutes

Subjects: Science, Drama

Resources: teacher song sheet, handout puzzle: *Forests: Mother Nature's Water Filter* (see page 16), scissors, glue, blue crayons.

Learning Outcomes

Students will identify and understand the basic definition of a system and apply this to trees and forests as fresh water filters.

Hook: Action Song



Students stand in a circle and sing the action song "In Our School Beside the Wood" (see above) with hand gestures. Each gesture lasts four beats or one line of lyrics. Demonstrate how to keep the beat by tapping your foot.

- In our school beside the wood,** ~ draw a box in the air with index fingers.
- A grade _ student by the win-dow stood.** ~ make binoculars with hands.
- Saw a rab-bit run-ning by,** ~ make rabbit ears with two fingers; wiggle (4 times).
- Knoc-king at the door.** ~ knock in the air (4 times).
- Help me! help me! help me! he said,** ~ big wave to get attention (4 times).
- There's a thundercloud overhead.** ~ wiggle fingers overhead and bring down.
- Come lit-tle rab-bit in with me,** ~ make a beckoning motion (4 times).
- Safe and dry we'll be!** ~ pet the back of your hand with the other (4 times).

Sing the song once through with hand gestures, then repeat the song. Continue repeating the song, dropping the singing line by line until you are doing hand gestures only; keep the beat with your feet. Then explain to the class that they have just demonstrated a system because:

- 1) there were individual parts,
- 2) the parts made up a whole,
- 3) the parts worked together,
- 4) they followed a pattern, and
- 5) they repeated a pattern.

The students repeat these five criteria for a system, perhaps copying them down. Discuss other systems such as machines, cars or DVD players.

Procedure

The students will dramatize various systems: a cuckoo clock, a tree, a forest filter and then reinforce their learning with a cut and paste sheet.

1 Demonstrate a cuckoo clock. Begin by having students push the desks to the side and divide into groups of three, standing side by side. Call “Number One!” and the students on the left raise their hands, “Number Two!” and the middle students raise their hands, and “Number Three!” and the students on the right raise their hands.

- Number Ones: clasp their fists, hold their arms straight down and swing them left and right like a pendulum.
- Number Twos: hold both their arms in the air, straight over their heads, like the hands of a clock, then move one arm slowly around. When it comes back to the twelve o’clock position the other hand will move to the one o’clock position, and so on.
- Number Threes: repeatedly say, “Tick tock, tick tock”. When the hand gets to one o’clock, they will stick out their tongues and call “Cuckoo!” once, and then keep ticking. Repeat the actions for two o’clock, calling “Cuckoo!” twice, and for three o’clock calling “Cuckoo!” three times. Repeat entire sequence.

Discuss how the clock fits the five criteria of a system on chalkboard/display paper.

2 Demonstrate a tree. Illustrate the motions for each stage as you explain the action:

- Your branches sway in the breeze and your leaves flutter as they sway: hands flutter, sway.
- Your trunk stands tall and straight and strong on the ground: stand with arms up like branches.
- Your roots spread out firmly, wiggling around the particles of soil: spread feet, wiggle toes.
- Your leaves fall off and you are bare: shake “leaves” off hands.
- You are cold standing in the snow: shiver.
- But then you feel the warmth of the sun in the spring: stretch a little.
- Your roots drink up water and nutrients from the soil and send them to your crown: wiggles toes.
- Your buds open and begin to grow: wiggle fingers.
- Your buds are now leaves: spread out fingers and arms.
- They spread out all over as you get taller and wider: spread arms further.

Discuss how trees fit the five criteria of a system on chalkboard/display paper.

3 Demonstrate the forest water filter. Explain that the parts of a forest, much like a water filter on a fridge or on a tap, filter our water of pollutants and make it much cleaner. Illustrate the motions for each as you explain:

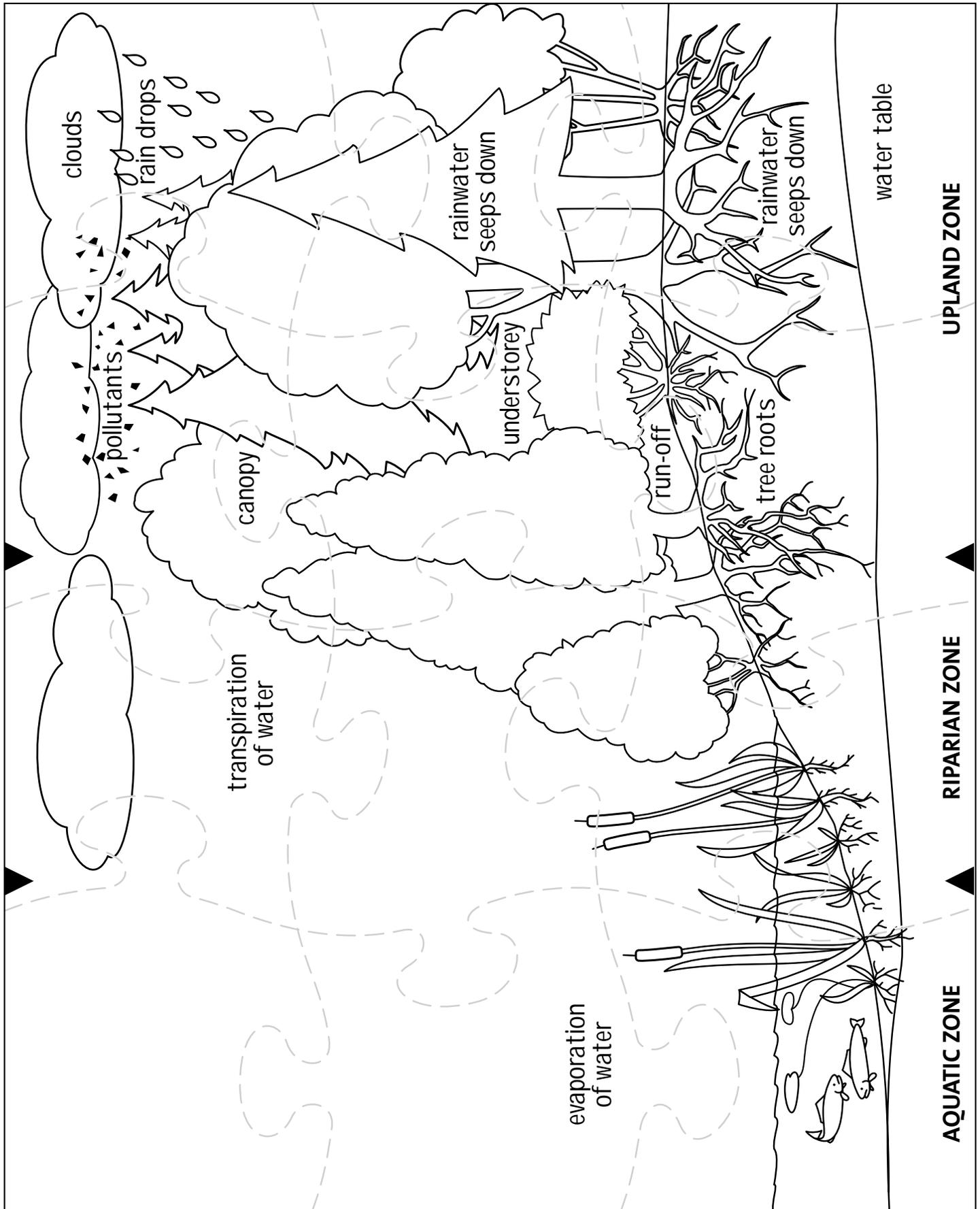
- Clouds form in the sky: arms and fingers outstretched to represent a wispy cloud.
- Rain forms in the cloud: arms and fingers brought close to body to become a rain drop.
- And mixes with pollution in the air: spin on the spot.
- Rains falls on the forest: lie flat or bend over to the side to become a rain drop spattering.
- Rain slides over the leaves and branches through the canopy and understorey to the ground: wiggle around.
- Some rainwater flows along the forest floor to the stream: run on the spot.
- The water is filtered by wetland plants and bacteria: make brushing off motions.
- The tree roots keep the banks of the stream strong so that the water stays clear: grab soil with your arms and legs (roots).
- Tree roots help some rainwater to go down into the soil (forward diving motion) to be filtered by bacteria in the earth before reaching the water table below (brushing off motions).
- Trees suck up the water with their roots and transpire it back through their leaves into the air as clean vapour: suck and swoosh noises.

Discuss how the forest filter fits the five criteria of a system.

4 Ask the students to cut out the pieces of *Mother Nature’s Water Filter* puzzle handout (see page 16). Assemble and glue onto a separate sheet. Using blue crayon, they should add arrows to show direction of water flow.



Forests: Mother Nature's Water Filter





What's Your Perspective?

Age range: 10 to 13 (junior)

Time: 75 minutes

Subjects: Science, Geography, Civics

Resources: *What's Your Perspective?* handout (see page 18), pencils.

Learning Outcomes

Students will understand the perspectives of different groups as they relate to activities that affect our forests and freshwater.

Hook: How Do You See It?



Ask the students to raise their hands to the following questions. How many of you have a baby brother or sister? Did you like the idea of getting one? How did other members of the family (siblings, parents, grandparents, new baby) feel? Point out how we all view events from different perspectives. What might be really liked by one person is disliked by another, but we all must try to live in harmony. Discuss other examples, such as Hallowe'en. It's fun for children, but can be a lot of work for adults. Parents must prepare costumes, candy and decorations. Police are usually kept busy supervising the streets and patrolling for vandalism. Do dentists like Hallowe'en?

In the business world, a new store in town may be good for customers but bad for the neighbouring stores that have more competition. When the Canadian dollar rises, it is good from the perspective of some industries and corporations, but not for others.

Procedure

The students will examine a list of activities that relate directly or indirectly to forests and water and prioritize them from a given viewpoint/group.

1

Place students in small groups. Give each student the *What's Your Perspective?* worksheet (see page 18) and have them read it over.

2

Assign, or have each group choose, a perspective from the top row of the chart (e.g., frogs). From that viewpoint, groups prioritize the activities listed in the left column of the chart in order of importance. A ranking of 1 means "most important"; a ranking of 13 for an activity means it is "least important and/or most harmful".

3

Select one student to record the rankings for their group. Recorders should use pencils since the group may change its priorities as the discussion progresses. Once a group is firm on its priorities, each student should record their group's final rankings on their individual worksheet. Then, at the bottom of the same worksheet, each student should describe the point of view – or perspective – of their group.

4

Once all groups have compiled their priorities, each group presents their perspective for the class to record. They should clearly explain their rankings. Discuss the different points of view. All groups should realize clean drinking water comes first!!



What's Your Perspective?

	FROGS	HUNTERS	FURNITURE MAKERS	CAMPERS	GOLFERS	FARMERS	MALL OWNERS	LANDSCAPERS
Cut down trees								
Spray chemicals on lawns								
Have lots of deer, moose								
Fill swamp to use land in other ways								
Swim in clean water								
Dump polluted water in drain								
Drink clean water								
Create conservation group to protect local wetlands								
Clear the forest to create cropland								
Have lots of ducks and geese								
Build roads to new campsites along river banks								
Create wildlife sanctuary with no camping, hunting, etc.								
Have lots of mosquitoes and other insects								

Describe several things that are important to YOUR group. Explain why?





Changes and Choices

Age range: 10 to 15 (junior/intermediate)

Time: 90 to 150 minutes

Subjects: Geography, Science, Civics, Drama

Resources: Department of Highways letter, role cards, background information (*on following pages*).

Learning Outcomes

Using role play, students will come to understand the complex set of positive and negative impacts involved in developing versus preserving forest and water habitats.

Hook: Persuasion



The students are asked to find a partner. Have each attempt to convince the other to change their mind about their favourite rock band, type of music, make of snowmobile. Students can use appropriate verbal persuasion techniques such as flattery, bribery, whining, nagging, trickery, or even soft yelling; no touching. Each student has three minutes, then switches roles. Discuss the various persuasion techniques:

What works best?

What didn't work at all?

To which type of persuasion are you more likely to pay attention?

Have students form another partnership. One student stands before a seated partner and tries to convince him/her to give up their chair. Each student has three minutes, then switches roles. Again, discuss the different points of view and persuasion techniques

Alternatively, use the Hook from Lesson Three (*see page 17*).

Procedure

Students will absorb scenario information and defend the perspective of a given role. See the Extensions (*on page 20*) for additional activities.

Scenario

Students imagine they are neighbours living in a small community called Ourtown, in a river valley in the Greenplace Forest. The forest stretches along the Oftenflow River and up the valley walls. A few houses are located on the side of the valley but most are in town. The townsfolk enjoy skiing and hiking in the forest and wetlands, and fishing in the river. A number of businesses, including the furniture maker, riding academy and private lumber company also rely on the forest's resources.

The town council has just received a letter from the provincial/territorial government informing them of a proposed highway development that will impact the townsfolk – both positively and negatively.

Note: It is important that before, during and after this role-play activity, students understand the complexity of balancing the positive and negative socio-economic impacts of such a development. Students should also be told that a conclusion of either “No highway is good” or “A highway is good” is both simplistic and inaccurate. Also, sometimes it is appropriate for a community, province/territory or country to keep things as they are, while at other times change is necessary.

1 **Explain the scenario**, read the Department of Highways letter and discuss the complexities of decision-making as above. Distribute role cards as outlined below, giving either one or two roles to each student, as class size dictates. As well, all students should receive a *Rules of Discussion* card.

Supportive of the highway, but also may have some objections:

1. Commuter
2. Road Worker
3. Forest Worker
4. Land Developer
5. Department of Highways Official
6. Gas Station Owner
7. Drive-thru Restaurant Owner

Mostly against the highway, but may also see some benefits:

8. Local Homeowner
9. Artist
10. Biologist
11. Small Fish Farm Owner
12. Riding Academy Trainer
13. Local Cabinet Maker
14. Ecotourism Operator

Neutral

15. Environmental Assessment Chairperson

2 **Students use role cards and their own ideas** to create a thorough argument that expresses personal points of view and gives the reasons why. They must look at themselves in terms of their jobs and/or industries, but also as private citizens who may need to look out for family members such as children, and/or older relatives who may need the new highway as an accessibility resource.

3 **Assign older students a personality but ask them to create** their own role description reflecting reasons for or against the project and a list of questions they would like to ask others at the meeting.

4 **Have students rehearse their role presentations with a buddy.** They can incorporate techniques of persuasion (see *Hook on page 19*). The Environmental Assessment Chairperson team or individual reviews the Rules of Discussion and rehearses procedures. Move class desks into a circle.

5 **Ask students to present their viewpoints during a town meeting.**



Extensions

The Chairperson holds a vote at the end of the meeting.

Students conduct self and peer assessments of role-play performance.

Students attend another meeting, this time assuming that the highway development has been approved. The focus must shift to exploring how it could be built in a manner that minimizes negative impacts on the community as a whole.

Students write letters to the Department of Highways, explaining the perspectives of all people who are on their side – pro or con.

Background Information

- The Oftenflow Valley is part of a migration corridor for birds.
- Its river, the Oftenflow, provides habitat for several varieties of fish.
- Greenplace Forest is a source of food and habitat for wildlife.
- The forest, wildlife and fish are the community's economic and recreational base.
- Oftenflow River provides the community's water source.
- Forests and wetlands border the riverbank.
- The river valley walls are thick with stands of cedar, oak and pine; several log homes are located here.
- Ourtown lies on the bottomlands or floodplain tucked away in Greenplace Forest and east of the Oftenflow River.
- Ourtown is a small community with twelve east-west streets and ten north-south streets. People moving west during a land rush settled it about 150 years ago.
- A small two-lane road connects Ourtown to Big City and Upnorth.
- Big City and Upnorth are also located along the river.
- Big City has shown the most growth, and now has a population of 1 million people (potential customers).

Letter to the Council of Ourtown From the Department of Highways

Re: Notice of Application #448
Construction of a Four-Lane Highway in the Oftenflow Valley

Dear Mayor and Council,

On January third of this year, the city of Big City submitted an application for the construction of a new four-lane highway along the forested lands that border the eastern boundary of the Oftenflow River. This highway will extend from Big City to Upnorth, with a bypass connecting to the west side of Ourtown.

Approval of the new four-lane highway will require clearing a 100-metre wide stretch of land through the Greenplace Forest.

We are beginning our study to explore this matter and are accepting input from potential stakeholders. Comments or opinions must be submitted to us in writing within thirty days.

Sincerely,

I. M. Interested

I. M. Interested
Clerk
Department of Highways

Commuter

1

You live in town but you work in Upnorth. It takes you an hour to get to work each day. The new highway will mean that you can get to work ten minutes sooner.

Perspective: Supportive of highway, but may also have objections.

Road Worker

2

You live in town and have been out of work for a long time. You would love to have work again.

Perspective: Supportive of highway, but may also have objections.

Forest Worker

3

You live in town and realize that the highway will reduce the amount of forest, but you also know that in order to construct the highway the lumber company is going to hire loggers, and you'll most likely be one of them.

Perspective: Supportive of highway, but may also have objections.

Land Developer

4

You live in town and have been waiting for a new road to open so that more people will want to live here, allowing you to build a new housing development.

Perspective: Supportive of highway, but may also have objections

Department of Highways Official

5

You live in town and are concerned about how the highway development will affect drinking water quality. The highway will reduce the amount of forest, this means less natural filtering of rain and meltwater.

Perspective: Against the highway, but may also see benefits.

Gas Station Owner

6

You live in town and run your own gas station adjacent to the new highway development. The highway will be great for business.

Perspective: Supportive of highway, but may also have objections.

Drive-thru Restaurant Owner

7

You live in town and own a drive-thru restaurant in Big City. The highway project will provide you with a good location for another restaurant close to a ready supply of potential teenage employees. More business will increase your profits.

Perspective: Supportive of highway, but may also have objections.

Local Homeowner

8

You like the view from your house, and enjoy the peace and quiet. The highway will spoil the view, add noise and pollution, reduce the amount of forest and could negatively affect watersheds.

Perspective: Against the highway, but may also see benefits.



Artist

9

You go into the valley and paint the scenery. You have sold many of your paintings to people in the city. The highway means damage and reduction of the forest and stream habitats for many living things – and your business.

Perspective: Against the highway, but may also see benefits.

Biologist

10

You live in town and worry about destruction of the forest, that local water will not be filtered as much and salt runoff from the highway will go into the streams and river. You are also concerned about diminished biodiversity.

Perspective: Against the highway, but may also see benefits.

Small Fish Farm Owner

11

You live in town but own a small trout farm on a nearby lake, downstream of the river. You feel the reduction of the forest will mean less water filtering, and that highway salt run-off will flow into the streams and river.

Perspective: Against the highway, but may also see benefits.

Riding Academy Owner

12

You live outside of town and take local citizens and tourists into the valley and forest on horseback. The highway will mean more noise, dust and pollution, and the scenery will also be diminished to some extent. This will harm your business.

Perspective: Against the highway, but may also see benefits.

Local Cabinetmaker

13

You live in town and make beautiful cabinets from local wood. The highway will reduce the amount of forest from where you can harvest wood. The image of your furniture coming from an unspoiled wilderness area will be lost.

Perspective: Against the highway, but may also see benefits.

Ecotourism Operator

14

You live in town and use the forest as the ideal place to take your customers for viewing and photographing creatures in their natural habitat. The highway will destroy much of this habitat.

Perspective: Against the highway, but may also see benefits.

Environmental Assessment Chairperson

15

You are running the meeting and must ensure that all people follow the rules of discussion.

Perspective: Neutral

Rules of Discussion

Chair welcomes everyone and outlines reason for the meeting.

Chair advises team members that each must speak for at least one minute, presenting their points of view.

Speakers indicate that they would like to speak by raising their hands.

If more than one speaker raises their hand, the Chair will call their names in the order in which they will speak.

Class cannot interrupt while someone is speaking.

Speakers must stand to address the group.

Chair calls time at the end of one minute and thanks the speaker.

Chair asks for the next speaker.

Chair calls an adjournment at the end of the meeting.





Creating a Forest Code of Conduct

Age range: 12 and up (junior, intermediate, senior)

Time: 60 to 120 minutes

Subjects: Civics, Science, Geography, World Issues

Resources: depends on product; may require large paper, scissors, old magazines, glue, colouring utensils.

Learning Outcomes

Students will demonstrate an understanding of the importance of forests and freshwater by drawing connections between their behaviour and its impact on the environment.

Hook: Why We Need Codes of Conduct



Have the class list several well-known codes of conduct, such as classroom, library and cafeteria rules, Canada's Charter of Rights and Freedoms, religious codes of conduct, and personal ethics (what we do when no one is looking).

Ask one or two students to go to the chalkboard or paper easel. Have the class call out phrases for a Code of Conduct for Hallways (10 rules for hallway behaviour). Ask the class to explain why we need rules for our behaviour.

Discuss why we need rules for how we treat our valuable shared natural resources.

Procedure

This activity can be used as an introduction to the topic of forests and water. It can also be given as a unit wrap-up to students who already know quite a bit about the importance of forests, freshwater and the factors affecting them.

1

Introduce the activity by saying, "You have been hired to write a Code of Conduct by which humans will abide in order to protect our system of forests and freshwater."

In pairs or groups, ask the students to create a Code of Conduct for one of the following:

- all citizens of Earth,
- all Canadians,
- groups such as farmers, forestry companies, cottagers, shipping lines, factory owners, professional foresters, or visitors to provincial and national parks,
- people in your home or school,
- political leaders of different countries.

Students should include an introduction to the Code of Conduct they create. Each Code of Conduct should contain from 10 to 30 items (*see sample on the following page*).

2

Ask the students to present their Codes of Conduct. They should explain why each item is included and why items are ranked as they are. You may want to print out the code of ethics for a professional forester association and/or the Canadian Institute of Forestry at: www.cif-ifc.org/english/e-ethics.shtml

 **Extensions**

Send the Code of Conduct with a letter to the Prime Minister.

Send the Code of Conduct with a letter to the United Nations.

Make the Code of Conduct a centre-piece of a poster/collage, with water and forest images drawn or cut from magazines.

Place a household or school Code of Conduct on an 8.5" x 11" sheet of paper, along with images, to be posted in each student's home or in the school for everyone to read and remember.

Make the Code of Conduct part of a message for citizens of Earth, future Canadians, or political leaders who will be living 100 years from now.

Have students critique each other's Codes of Conduct before the final version is created.

Sample Code of Conduct for Sport Fishers of Great Slave Lake

As sports fishers who care about the environment and what we leave for future generations, we solemnly swear to:

- Use human powered craft (canoes, kayaks) or fish from the bank as much as possible, instead of using motorized craft.
- Avoid disruption of spawning beds.
- Participate in stream and river clean-up programs whenever possible.
- Avoid contact with the animals and birds who share our water resources.
- Plant trees and vegetation near shorelines, when appropriate, to discourage erosion and sedimentation.
- Assist in fighting invasive species by learning how you can make a difference and taking recommended actions.
- Plant trees back from shorelines, where appropriate, to add to our forests' capacity to filter water.
- Avoid using live bait.
- Fill gas tanks away from water sources.
- Keep noise to a minimum.
- Work to have regulations put in place that protect forests, wetlands and water.
- Protect and respect vegetation and trees near to water.
- Never pollute the water with garbage, soap or other substances.
- Respect fishing and safety regulations; catch and release carefully to ensure the health of fish populations.
- Conserve water at all times.
- Educate others about the Code of Conduct.
- Peacefully encourage others to respect the Code.





Trees, Water and Peace

Age range: 16 to 18 (senior)

Time: 60 to 120 minutes

Subjects: Science, World Issues, Geography, English, Civics

Resources: copies of Wangari Maathai's acceptance speech for each pair or group of students (*available at www.nobel.no; select Laureates, then Speeches and Lectures*). Other resources depend on the final product.

Learning Outcomes

Students will understand the connections between sustainable forestry and sustainable freshwater, ecological health, and quality of life.

Hook: We're All Connected



Have a student record on the chalkboard as the class names 20 things we share with people in Africa on a physical, social and spiritual level:

- the water we drink is shared through the global water cycle,
- the air we breathe travels all over the planet,
- global disease threats,
- weather, pollution, climate change, the changing seasons,
- war,
- family and friends, religion, special celebrations,
- the need for income, shelter, clean water and food,
- social problems such as drugs, poverty and violence.

Go to www.nobel.no; select *Laureates* and then print and make copies of the brief two-page List of Laureates. Discuss former Peace Prize winners and why they won. What criteria are used to award the Nobel Peace Prize? Leave your students with the question: How could someone win a Peace Prize for planting trees?

The famous story by Jean Giono (free to the public domain), *The Man Who Planted Trees*, makes an excellent addition to this lesson, as it contains the same concepts in a well-written narrative set in France. It can be found on many Web sites, including www.perso.ch/arboretum/Man_Tree.htm. Read it to the students on a day following this activity, or watch the animated video by Frédéric Back available at http://secure.dep.ca/en/produit_details.asp?ID=1612.

Procedure



1 Individually, in pairs or small groups, have students read and analyze the acceptance speech made by Wangari Maathai.



Extensions

Students create a flow chart/thought web diagram on the handout *How Sustainable Practices Affect Society* (see page 28). Key phrases/concepts from Ms. Maathai's speech are placed in random order at the bottom of sheet. The teacher's example represents one possible way that a student could connect the concepts. Students could also construct larger flow charts/thought webs, adding pertinent quotes cut directly from the speech. These could be enhanced by hand-drawn or cut-out pictures illustrating the concepts.

Using the phrases at the bottom of the handout, students write a poem/ballad in honour of Ms. Maathai's accomplishment, explaining fully why she won the Nobel Peace Prize.

Students construct a chart with two columns. In column one list several criteria for awarding the Nobel Peace Prize, and in column two list how Ms. Maathai met those criteria. Turn the chart into a paragraph.

This award and acceptance speech clearly explains why sustainable forestry practices, such as those used in Canada, are so important. Sustainable forestry is a complex process of managing with clear objectives that pertain to the present as well as the future, allowing for controlled consumption of wood so that this renewable resource remains at a consistent level. It includes selective and well-planned harvesting, replanting and many other activities that allow for the ongoing use of wood products we all depend on – sustainable freshwater resources, wildlife habitat and a wide variety of recreational activities.

Non-sustainable forestry, which has been practiced in many parts of Africa and other countries for extended periods of time, includes widespread deforestation leading to many of the terrible circumstances described by Ms. Maathai. The power of sustainable resource use is not to be underestimated in its scope of influencing every part of our lives.



“Many human activities... are devastating to the environment and societies. These include widespread destruction of ecosystems, especially through deforestation, climatic

instability, and contamination in the soils and waters that all contribute to excruciating poverty...”

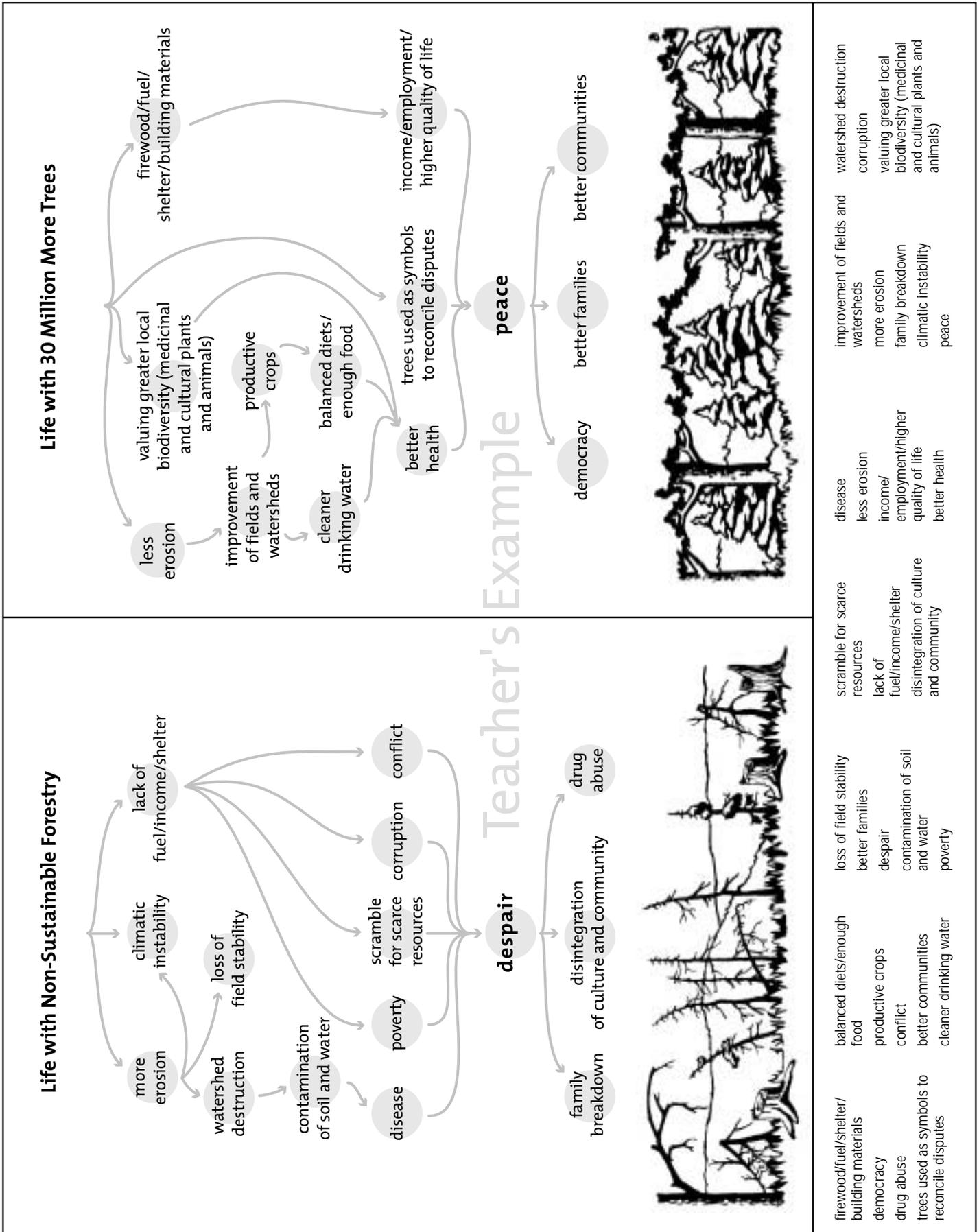
“As I was growing up, I witnessed forests being cleared and replaced by commercial plantations, which destroyed local biodiversity and the capacity of the forests to conserve water...”

“So, together, we have planted over 30 million trees that provide fuel, food, shelter, and income to support their children’s education and household needs. The activity also creates employment and improves soils and watersheds...”

Excerpt from Wangari Maathai’s acceptance speech, December 2004.

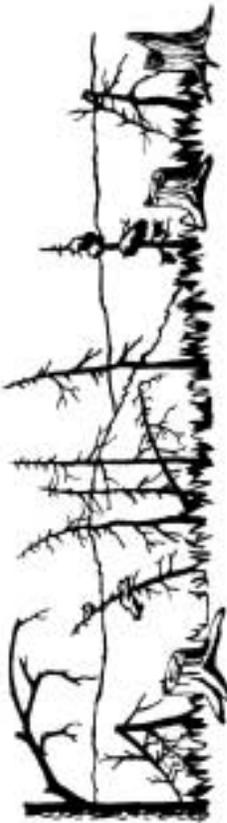


How Sustainable Practices Affect Society





How Sustainable Practices Affect Society

<p>Life with Non-Sustainable Forestry</p> 	<p>Life with 30 Million More Trees</p> 					
<p>firewood/fuel/shelter/ building materials democracy drug abuse trees used as symbols to reconcile disputes</p>	<p>balanced diets/enough food productive crops conflict better communities cleaner drinking water</p>	<p>scramble for scarce resources lack of fuel/income/shelter disintegration of culture and community</p>	<p>loss of field stability better families despair contamination of soil and water poverty</p>	<p>disease less erosion income/ employment/higher quality of life better health</p>	<p>improvement of fields and watersheds more erosion family breakdown climatic instability peace</p>	<p>watershed destruction corruption valuing greater local biodiversity (medicinal and cultural plants and animals)</p>





What Water Source is Best?

Age range: 16 to 18 (senior)

Time: 2 to 3 hours

Subjects: Geography, Science

Resources: *Planning the Town of Daxima* handout and *Comparing Water Sources* chart; Internet access.

Learning Outcomes

Students will compare two or more communities with different water sources, analyzing the advantages and disadvantages of each source. Students will then recommend a water source for a new community, based on their analysis. Examples include:

- London ON: wells and groundwater
- Donnacona QC: Jacques-Cartier River
- Winnipeg MB: aqueduct
- Vancouver BC: aquifer, surface and groundwater

Hook: Towns and Cities in Your Area



As a class, examine one or more copies of a map of your area. Why are places located where they are...usually because of the water! Discuss other factors affecting where communities are located (e.g., location of other resources). Ask students how many communities on the map get their water from aquifers, from rivers or lakes, from wells?

Point out that regardless of where a community gets its water, it is filtered and purified by Canada's forests and wetlands. Have students hypothesize about what type of water source is the best in terms of inherent water quality, fairly constant water levels? Which is the most secure from natural and terrorist threats?

Procedure

1

Organize students in groups or pairs. Distribute the *Planning the Town of Daxima* worksheet (on page 31) and read together.

2

Distribute and review the *Comparing Water Sources* chart (on page 32). Discuss your specific requirements for the Report of Recommendation that students will write after they finish researching and completing their charts. One set of groups could focus on the topic of aquifers, others on wells and rivers/lakes. Once all research is complete, each group can share what they have learned with the rest of the class.



Extensions

Have students draw and label diagrams of aquifers, rivers, lakes and wells, adding information they gathered on their chart, including factors affecting water levels and other unique issues.

Planning the Town of Daxima

The general area in which to place a brand new Canadian community called Daxima has been chosen, but the town planners are uncertain where exactly in this area it should be located. Their choice must be based on detailed research of the three water sources in the area. They could place the town:

1. on a hillside near an aquifer,
2. near a river/lake or shoreline,
3. away from the river and hills in a location where the aquifer is easily accessed by wells.

Assume that all three water sources can easily meet the town's needs, and that the costs of accessing the sources are similar.

You and your team of engineers have been hired to investigate these three types of water sources, using the Comparing Water Sources chart that the town planners have provided.

After you have finished your investigation, you will use the information from your chart to write a Report of Recommendation for presentation to the town planners regarding the best source of water for Daxima.

Online Resources

For information on all sources of water, including groundwater wells, groundwater aquifers, lakes and rivers, visit Environment Canada's Freshwater Web site: www.ec.gc.ca/water and select The Nature of Water.

For information on aquifers in British Columbia, go to:
<http://wlapwww.gov.bc.ca/wat/aquifers>.

For information on Vancouver BC, which draws its water from the Seymour Reservoir, go to: <http://www.gvrd.bc.ca/water/sources-and-supply.htm>

For more information visit Groundwater Education of Canada Inc:
www.geocities.com/RainForest/Vines/2246.

For groundwater use in London ON, go to:
www.london.ca/Cityhall/EnvServices.

For information on the town of Donnacona QC and its surrounding forest on the Jacques-Cartier River, visit Canadian Heritage Rivers:
www.chrs.ca.

For information on the Winnipeg MB water source and the pipeline from Shoal Lake, go to: www.winnipeg.ca/waterandwaste/water/waterfront/todayswater.htm.





Comparing Water Sources

Water Source 1:	Water Source 2:
Type of water source:	Type of water source:
Location of water source:	Location of water source:
Factors that could affect water levels:	Factors that could affect water levels:
	
Possible pollutants and degree of terrorist threat:	Possible pollutants and degree of terrorist threat:
	
Amount of surrounding forest/wetlands:	Amount of surrounding forest/wetlands:
	
Ongoing conservation activities:	Ongoing conservation activities:
Other unique issues:	Other unique issues:



Tell Me a Story



Lesson Eight

Age range: 12 and up (intermediate to senior)

Time: 2.5 to 3 hours research; 4 to 5 hours for finished product

Subject: Science, Civics, World Issues, Geography, English

Learning Outcomes

Students will research a forest or water topic and present the information to a younger audience in story/picture book form. Other presentation ideas for various audiences are included in the Extensions.

Hook: Teaching Younger Students About Forests and Water



As a class, read *The Lorax* by Dr. Seuss, or another children's book with a conservation theme. Discuss what makes a children's book effective or ineffective. The best books will:

- be based on a plot and main character(s) with whom children can identify,
- incorporate a rhyming pattern,
- be of appropriate length,
- contain appropriate vocabulary and reading level,
- be enhanced by illustrations.

OR

Are all research sources equal?

To prepare, visit the Dihydrogen monoxide research site (www.dhmo.org) which – in a very serious and convincing manner – presents alarming information on a *deadly* chemical found *everywhere* (you guessed it... WATER!). Print several pages for groups of students to examine.

Hand out these information sheets to your students at the start of class, telling them it's from a Web site about a deadly pollutant. Ask them questions about this chemical, until one or more of the students realize that it is a prank, designed to challenge their thinking on the reliability of Internet research material. Discuss criteria for reliable sources (e.g., recent, up-to-date, associated with an academic and/or well-known organization, balanced). As well, stress the importance of tracking information sources.

Procedure



1 Ask students, individually, in pairs, or small groups, to research a topic related to Canada's forests and freshwater and create an illustrated children's book (see Plot Ideas *handout on page 34*). Once complete, the students could read their books to groups of younger children.



Extensions

Write a class letter to someone involved in conservation, describing what the students have learned about them and the impact of their actions.

Prepare a presentation to the class on that person/conservation activity.

Have each student or group contribute their research findings to a large wall chart.

Ask groups of students to create a short video for the entire school on the importance of forests and wetlands in sustaining freshwater.

Write and perform a short play, incorporating music and interactive songs, for younger students in the same school, or at an adjacent school.

Tell Me a Story: Plot Ideas

1 Freddy the Frog, Austin the Otter and friends are affected by negative changes to their wetland/pond/river. Together, using their unique abilities, they discover the source of the changes (possibly some type of pollution), and fight to restore their home.

See Topic 4: Researching Forest and Freshwater Threats.

2 Walter the Water Droplet experiences various adventures and overcomes many obstacles as he does his duty to travel through the water cycle while being filtered by Canada's forests. Obstacles could include pollutants, heavy run-off, dense soils, and lack of trees.

See Topic 4: Researching Forest and Freshwater Threats.

3 Lena, a city child, and Pierre, a country child, team up to fight threats to their local forests, wetlands and water. They discover sustainable forestry practices that work to meet the needs of everyone.

See Topic 4: Researching Forest and Freshwater Threats.

Local issues can also be researched.

4 An African community is devastated by deforestation. A woman named Wangari Maathai (2004 Nobel Peace Prize Winner) convinces everyone in the village to plant numerous trees in order to reap an enormous variety of benefits. The story could be told from the perspective of a child living in the village, or of the village itself.

See Lesson 6: Trees, Water and Peace on page 26.

5 Create a brief life story of someone who has made a difference in the field of conservation or sustainable management practices.

See Topic 1: People Who Have Made a Difference in Conservation.

6 The story of a Canadian Heritage River, told from the river's perspective, from the time of traditional Aboriginal communities through to present day. The names by which the river has been called could also be included, as well as the different uses, threats and conservation actions/sustainable forestry practices the river has experienced over time.

See Topic 3: Canadian Heritage Rivers and Marshes.

7 Members of the Waters family do not seem to care much about forests and freshwater. Then one day something serious happens to make the family more aware (a flood, water shortage or a pollution incident). After this they begin to conserve water in and around their home, plant trees and participate in other forest and water conservation activities and sustainable practices.

See Topic 2: Forest and Water Conservation Activities.



Tell Me a Story: Topic Ideas

People Who Have Made a Difference in Conservation

1 Most foresters and conservationists do not receive recognition from the media or general public. Unlike many of the people listed below, they get little or no attention for their tremendous ground-level work towards the sustainable use of our forest resources. For a better understanding of these people and their accomplishments, contact your provincial Registered Professional Forester Association for a list of foresters in your area. Also visit www.cfs.nrcan.gc.ca for a list of regional scientists and their conservation projects.

The following people are well known for their dedication towards conservation projects in Canada and around the world:

Ryan Hreljac, Ryan's Well Foundation

Dave Brand, Canada's Model Forest Program

Anita Roddick, The Body Shoppe

Rick Mercer, One-Tonne Challenge

David Suzuki, Scientist, Author and Journalist

Rachel Carson, *Silent Spring*

Jack Miner

James W. Fyles

Aldo Leopold

Father Goose, Bill Lishman

Simon Jackson, Spirit Bear Youth Group

Jane Goodall

Patrick Moore, co-founder, GreenPeace

Elizabeth May, Sierra Club of Canada

Dianne Fossey

Bill Mason

Grey Owl

Frank Dottori, CEO Tembec

Hamish Kimmins, Professor of Forest Ecology at the University of British Columbia.

Use the inter-library loan program at your local library to access the hardcover book *Biographical Dictionary of American and Canadian Naturalists and Environmentalists* (ISBN: 0-313-23047-1, 960 pages, Greenwood Press, 1997, \$220.95)

The First Nations Environmental Network, www.fnen.org, lists individuals as well as groups.

Forest and Water Conservation Activities

2 Canada's Water and Wastewater Association maintains a Water Efficiency Experience Database where you can search for water efficiency initiatives across Canada. Search by province/territory or by topic area: Community Activities, Indoor, Outdoor and Legislative. If your students start a school-wide or community initiative, you can post it here! www.cwwa.ca/WEED/Index_e.asp

The Canadian Model Forest Network Web site, www.modelforest.net, is an online guide to the events, projects and activities conducted by the Network. For information on Model Forest conservation programs, select *Project Showcase* in the left sidebar. Explore the Fundy Model Forest watershed protection program details, including background information, the stakeholders, and the project's objectives. Also check out the Western Newfoundland Model Forest project located near Gros Morne National Park, designed to provide sustainable forest management training for front line forest workers. Another interesting project is the Eastern Ontario Model Forest *Bog to Bog* program in Kemptville ON; select *Canadian Model Forests* from the sidebar menu, then *Eastern Ontario*.

For information on a stream enhancement project shared by the Black River First Nations and the Manitoba Model Forest near Pine River visit www.black-river.ca/BioMonitoring.htm and select *Projects*.

The North American Wetland Conservation Council's www.wetkit.net Web site provides great information about programs across Canada. Select *Tools*, then *Sector*, and then *Education*. At the right, in the *For More Information* box, select the province/territory of your choice.



Visit FORWARD, the Forest Watershed and Riparian Disturbance Project Web site at <http://forward.lakeheadu.ca/>. This huge project involves many experiments that focus on the transfer of substances to surface water from soils in disturbed and undisturbed watersheds, linked with a set of models that can work with spatially-based planning tools of the land managers. Using a combination of intensive state-of-the-art experimental research at the watershed scale and the application of modeling and decision support tools, the FORWARD project will deliver recommendations and models on approaches for watershed management in multi-user forests on the Boreal Plain of Western Canada.

There is also a wide variety of water projects and environmental education resources for teachers on the Ducks Unlimited Canada Web site: www.ducks.ca.

Canada's Heritage Rivers and Marshes

3 The Canadian Heritage Rivers System (CHRS) is Canada's national river conservation program. It was designed to promote, protect and enhance Canada's river heritage, and ensure that Canada's rivers are managed in a sustainable manner; visit www.chrs.ca. Information on the CHRS can also be found on the Atlas of Canada Web site, <http://atlas.gc.ca>. In the *Search Our Site* box input *Heritage Rivers*. Search results are generated in two formats: maps and text.

At present, Canada has 36 designated Wetlands of International Importance (marshes). The Ramsar Web site, www.ramsar.org/profiles_canada.htm, provides a brief description of each and links to Canada's national wetland policy.

Researching Forest and Freshwater Threats

4 Researching the effects and possible remedies of one or more threats to a water source (consider animals, plants and people) is a great learning opportunity for students. Threats include:

- deforestation
- removal of vegetation from the water's edge
- sources of pollution including industry and excess fertilizers and pesticides from farming
- recreational activities such as oil residue from small boat motors, lead fishing lures and lead shot from small game hunting
- all-terrain vehicles
- transfer of exotic species
- urban storm sewers
- lawn pesticide run-off
- erosion
- dredging
- filling
- improper logging
- cropping and fossil fuel exploration practices
- dumping of any kind
- draining for farm land creation
- harvesting of peat moss
- invasive construction of transportation and energy transmission corridors.

Glossary

aquifer: A formation of underground permeable rock or loose material that produces useful quantities of water when tapped by a well; may range in size from a few hectares to thousands of square kilometres, and in thickness, from a few metres to hundreds of metres.

bog: A peat accumulating wetland that traps precipitation as its only source of water. Acidic, low in plant nutrients and often covered by sphagnum mosses. Common plant species include black spruce, tamarack, shrubs and sedges; most common in northern latitudes.

bud: A small, immature flower or leaf attached to the stem of the plant.

canopy: More or less continuous cover of branches and foliage formed by the crowns of trees.

carbon sink: A place where carbon accumulates, such as a forest (which converts carbon dioxide from the air into carbon-containing sugars and plant fibre).

climate change: An ongoing process of large-scale and long-term weather changes due to planetary warming or cooling, which may involve many unpredictable effects.

conservation: The study, protection, sustainable utilization, restoration and enhancement of natural resources, with a long-term perspective.

deforestation: Clearing an area of forest for another long-term use, such as golf courses, parking lots, buildings and roads.

fen: A peat-accumulating wetland that generally receives water from groundwater sources, surface runoff and direct precipitation. Has higher plant nutrient levels than bogs and is usually alkaline or slightly acidic. Characteristic plant species include sedges and grasses.

filtration: A process in the water cycle by which groundwater flows through soil particles and root systems; microbial action, plants and soil particles filter out pollutants.

groundwater: Water that is found almost everywhere underground in the spaces between soil particles and in cracks in the rock.

habitat: The arrangement of food, water, shelter and space.

invasive species: A species that has moved into an area and reproduced so aggressively that it has replaced some of the original species.

litter: Uppermost, slightly decayed layer of organic matter on the forest floor.

marsh: A tract of soft, wet, low-lying land characterized by grassy vegetation. Tends to develop in zones that include riparian areas, areas of dense emergent plant growth, and open water; generally neutral or slightly alkaline and rich in nutrients and species diversity.

native species: An indigenous species that is normally found in Canada.

natural resources: Naturally occurring assets such as trees, minerals and water.

photosynthesis: The light-driven process in green plants that converts water and carbon dioxide into sugar, water and oxygen.

riparian zone: A distinct area between land and water (excluding ocean) featuring specific vegetation types; these trees and plants are important for wildlife habitat and food, sediment control and erosion prevention.

sediment: Fine particles of solid matter suspended in water or settled on the bottom of a pond, lake, river or stream.

species-at-risk: A species identified by COSEWIC that is of special concern, threatened, endangered (facing imminent extinction) or extirpated (extinct in certain areas of previous inhabitation).

stakeholder: A person or organization that has an investment and concern in a particular item or endeavour; stakeholders wish to be included in the sharing of information and contribute to decision-making.

sustainable: Describes practices that allow for controlled consumption so that a renewable resource remains at basically the same level.

swamp: A wetland dominated by shrubs and trees including red maple, cedar, alder and willow; soils are saturated and may be periodically inundated; often neutral and slightly acidic.

transpiration: The process used by plants wherein water is absorbed by the roots and pulled up through the stem/trunk and shoots/branches by evaporation from the leaves/stem (water is used by the plant in photosynthesis and other cellular processes).

understorey: The middle layer of smaller trees and shrubs located under the forest canopy (e.g., dogwood, sumac).

watershed: The region or area bounded peripherally by a divide and draining ultimately to a particular watercourse or body of water; regardless of where you are, you are in a watershed.

watershed restoration: The process of returning a watershed area to a more productive and natural state; may involve planting vegetation and re-introduction of species.

water table: The level below which the ground is saturated with water.

wetland: A distinct wet area of habitat featuring varying degrees of water and specific types of vegetation and soil; includes swamps, bogs, fens and marshes.

CFA Programs

National Forest Week

National Forest Week is sponsored across Canada by the CFA and regionally by various provincial forestry agencies, corporations, agencies and individuals. Established circa 1920 as Forest Fire Prevention Week, the intention was to encourage greater public awareness towards Canada's forests. At the time, there was no apparent shortage of trees for industrial expansion – the greatest threat came from forest fires, due mainly to human causes.

Since then National Forest Week, as it was renamed in 1967, has evolved to encompass the many and varied human and environmental aspects of Canada's forest resources.

Although special activities are promoted across Canada, National Forest Week remains first and foremost a challenge to individual Canadians to learn more about their forest heritage and support greater recognition of this valuable resource.

National Forest Week is observed annually during the first full week of May, Sunday through Saturday.

How to Participate

- Arrange a tree planting activity at your school; contact: www.treecanada.ca
- Take a walk in a forested area near the school; learn about a forest, close up!
- Identify all the things in your classroom that come from the forest.
- Learn about forest related organizations that demonstrate excellence in sustainable forest management.
- Have students adopt a tree: care for a newly planted or a neglected tree, and learn about the species.
- Contact your provincial forestry association for more teaching activities and ideas.

Forest Capital of Canada – Celebrating Forest Communities

Established in 1979, the Forest Capital of Canada program highlights the valuable role forests play in the socio-economic and environmental health of our communities – past, present and future.

Each year the CFA designates a community or region to host a celebration of its forest resources. Traditionally, the various forestry agencies invite proposals from communities or regions in their province/territory that demonstrate the capacity to mount a successful 12 to 24-month celebration. Interested communities may also submit proposals directly to the CFA.

Envirothon Canada



The CFA is the national agency for Envirothon Canada, which works in partnership with conservation groups, forestry associations, educators and cooperating natural resource agencies to organize and conduct competitions at the local, regional and provincial levels. Winning teams at the provincial levels compete at the Canon Envirothon.

The Canon Envirothon is North America's largest high school environmental education competition. Reaching more than 500 000 students across North America annually, Envirothon succeeds in its mission to develop knowledgeable, skilled and dedicated citizens who are willing and prepared to work towards achieving a balance between quality of life and quality of the environment.

Program

- promotes environmental education based on teamwork, collaboration and competition
- school-based learning guided by a set of expectations and key references
- combines in-class curriculum and hands-on field experiences
- supplements environmental education inside and outside the traditional classroom

Benefits

- secondary students explore environmental issues with peers, natural resource professionals and community leaders
- students gain valuable knowledge and training in ecology and natural resource management principles and practices
- students get excited about pursuing careers in environmental studies, environmental law, natural sciences and natural resource management
- communities benefit from the involvement of young people in local environmental issues
- society benefits from a citizenry educated in the principles of environmental stewardship.

**For more information about these and other CFA Programs visit:
www.canadianforestry.com**

CFA Partner Agencies

Newfoundland & Labrador Forest Protection Association

Box 500
Grand Falls-Windsor NL A2A 2K1
T: (709) 292-3167 F: (709) 489-7493
jim_evans@abitibiconsolidated.com
www.nlfpa.nfol.ca

Nova Scotia Forestry Association

Box 6901
Port Hawkesbury NS B9A 2W2
T: (902) 625-2935
contact@nsfa.ca www.nsfa.ca

PEI Forest Improvement Association

Covehead Road, RR1, York
Covehead PE C0A 1P0
T/F: (902) 672-2114
fia@pei.sympatico.ca
www.forestimprovement.ca

The Tree House / Canadian Forestry Association of New Brunswick

1350 Regent Street
Maritime College of Forest Technology, Rm 248
Fredericton NB E3C 2G6
Toll Free: (866) 405-7000
T: (506) 452-1339 F: (506) 452-7950
treehouse@nb.aibn.com

Regroupement des associations forestières régionales du Québec

138, rue Wellington Nord - bureau 100
Sherbrooke QC J1H 5C5
T: (819) 562-3388 F: (819) 562-2433
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Ontario Ministry of Natural Resources

Suite 400, 70 Foster Drive
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T: (705) 945-5854 F: (705) 945-6667
erik.wainio@mnr.gov.on.ca

Ontario Forestry Association

200 Consumers Road, Suite 107
North York ON M2J 4R4
T: (416) 493-4565 F: (416) 493-4608
forestry@oforest.on.ca
www.oforest.on.ca

Manitoba Forestry Association

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mfainc@mts.net

Saskatchewan Forestry Association

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Prince Albert SK S6V 4V4
T: (306) 763-2189 F: (306) 764-7463
info@whitebirch.ca www.whitebirch.ca

Inside Education (formerly FEESA)

600, 10707 - 100 Avenue
Edmonton AB T5J 3M1
T: (780) 421-1497 F: (780) 425-4506
info@insideeducation.ca

FORED BC Society

Suite 213, 4438 West 10th Avenue
Vancouver BC V6R 4R8
T: (604) 737-8555 F: (604) 737-8598
info@foredbc.org www.landscapesmag.com

Yukon Forestry Training Trust Fund

Greg Cowman
c/o Forest Management Fund
Government of the Yukon
Box 2703 (K918)
Whitehorse YK Y1A 2C6
T: (867) 456-3805

Canadian Model Forest Network



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T: (613) 992-5874
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www.modelforest.net

Western Newfoundland Model Forest

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Fundy Model Forest

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Nova Forest Alliance

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www.novaforestalliance.com

Bas-Saint-Laurent Model Forest

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Rimouski QC G5L 3A1
T: (418) 722-7211 F: (418) 721-5630
foretmodele@fmodbsl.qc.ca
http://www.foret.fmodbsl.qc.ca/

Waswanipi Cree Model Forest

Waswanipi Model Forest
Waswanipi QC J0Y 3C0
T: (819) 753-2900 F: (819) 753-2904
www.modelforest.net/e/home/_cana_/waswanie.html

Eastern Ontario Model Forest

10 Campus Drive
Kemptville ON K0G 1J0
T: (613) 258-8241 F: (613) 258-8363
modelforest@eomf.on.ca
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Lake Abitibi Model Forest

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T: (705) 272-7800 F: (705) 272-2744
wally@lamf.net www.lamf.net

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www.manitobamodelforest.net

Prince Albert Model Forest

Box 2406
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T: (306) 922-1944 F: (306) 763-6456
pamf@sasktel.net
www.pamodelforest.sk.ca

Foothills Model Forest

Box 6330
Hinton AB T7V 1X6
T: (780) 865-8330 F: (780) 865-8331
fmf@fmf.ab.ca www.fmf.ca

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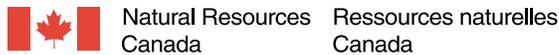
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