A TEACHING KIT

Canada's Forests

Source of Life

Volume Four: Sustainable Forests

Welcome to Canada's Forests Teaching Kit, published by the Canadian Forestry Association (CFA).

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

Healthy forest ecosystems depend on a complex relationship of soils, water, plant communities, wildlife and climate. We offer Canadians an opportunity to learn more about forest ecosystems and the important role that they play in the economic and environmental health of our country and the planet.

For more information on the CFA, see the list of our programs on page 47 or visit our web site:
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Forests, Source of Life

XII World Forestry Congress

The future of forests will be the focus of the XII World Forestry Congress from September 21 – 28, 2003 as the world's forestry community gathers in Quebec City. The first World Forestry Congress took place in Rome, Italy in 1926. Since 1949, the event has been held approximately every six years under the auspices of the Food and Agriculture Organization of United Nations (FAO).

Forests have always been crucial to human subsistence, food, security, economic development and supportive of cultural and spiritual values. As the most important terrestrial ecosystem, forests sustain life through biodiversity, climate regulation, water and soil conservation and more. This Congress will provide a forum for presenting ideas and projects with a direct impact on forest management, conservation and development.

9th National Forest Congress

The Canadian Forestry Association is in partnership with the National Forest Strategy Coalition to convene the 9th National Forest Congress.

The tradition of the Congress began when the CFA organized the first National Congress in 1906, which was presided over by Sir Wilfrid Laurier, Prime Minister of Canada. This year marks the first Congress of this Century and will be the stage for the signing of renewed National Forest Strategy.

http://nfc.forest.ca

These are the first national and international forestry meetings to be declared carbon neutral. A calculation of the fuel consumption for delegate travel, electrical energy and printing of Congress documents will be done by the Tree Canada Foundation. The total will represent the amount of CO_2 emissions incurred during both Congresses. This will be matched by a large scale tree planting initiative in Sudbury, Ontario, which is recognized by the United Nations and the David Suzuki Foundation.

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Canada's Forests – Source of Life examines how Canada manages its most important terrestrial ecosystem.

This kit will help show teachers and students how managing forests in a sustainable manner lets us meet our economic needs while protecting the forest's ability to fulfill its ecological roles – including biodiversity protection, regulating climate changes, water and soil conservation.

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ISBN 0-9688726-4-6

Content Developer: Jeffery & Associates

Designer/Illustrator: Wendy Mairs, Blue Heron Graphics

Editor/Publication Co-ordinator: Dave Lemkay

Cover Stock: Kalima Coated, donated by Tembec Inc.

Printed and Bound in Canada by: PSI Print Solutions Inc.

Using This Teaching Kit

This kit, the fourth in the Canada's Forest Teacher's Kit Series, is designed to help teachers explore Canada's forests with their students. It will help explain sustainable forest management and show why it is important to Canada, in terms of our economy, society and environment. The eight activity-based lessons focus on a series of ecological themes.

You will find web site addresses throughout the kit that will help you and your students explore forest sustainability in more detail.

Grade Levels

The activities focus on both general and specific learning outcomes for grades 4, 6, 7 and 8 but they can easily be adapted to fit almost any class and grade level in Canada.

Curriculum Links

This kit will allow your students to expand their knowledge of the economic, societal, ecological, spiritual and recreational values of Canada's forests, and how sustainable forest management aims to protect these key values.

The kit uses learning outcomes from the *Pan-Canadian Protocol for Collaboration on School Curriculum – The Common Framework of Science Learning Outcomes*. It is a nationally recognized science curriculum document on which many provincial and territorial curricula are based. Kit activities address the learning outcomes in this framework for student skills, knowledge and attitudes.

Although the activities were designed using science-based links, the lessons also allow exploration in language arts, social studies, drama, geography, visual arts and other curriculum opportunities.

Kit Organization

In each of the hands-on, interactive lessons you will find:

- **Summary** that introduces the topic or theme of the activity as well as the type of activity that you will be doing with your students;
- **Activity** information that provides the grade level, subject headings, estimated duration and suggested materials;
- **Learning** outcomes (expectations) that highlight key curriculum links;
- **Teacher background** with additional information for you on the lesson topic;
- **Procedure** with detailed instructions for you to teach the activity; and
- **Extensions** offering follow-up activities related to the activity.

Instruction Key

A group or discussion activity

A performing activity

A writing and recording activity

Field investigation

Extensions

Introduction to Sustainable Forests in Canada

Forests are the backbone of Canada's natural heritage, its national identity, and its economy. This reality has led to tension among forest users, which in turn gave birth to sustainable forest management. Today, professional forest managers know they must embrace all forest values in their planning; in other words, they must manage forests in a sustainable manner.

Today, forest management means protecting important values – cultural, recreational, spiritual, social and environmental – while at the same time recognizing the forest's economic contributions. It means that preventing soil erosion, protecting water quality, and enhancing biodiversity are critical management objectives.

In addition to providing all these readily observable values, forests also deliver specific, ecological benefits. They moderate climate, clean air and help regulate water flow. Their importance goes far beyond what they can offer humans.

http://mmsd1.mms.nrcan.gc.ca/cfs/default-e.html

According to Natural Resources Canada (NRCan), approximately 45 per cent of Canada's total land area is forested – or 417.6 million hectares. Of this forest land, 235.5 million hectares is considered productive forest land, which means it can produce trees that are commercially valuable. Of this productive forest land, 119.0 million hectares is actually managed – and one million hectares are logged every year.

What this means is that just one per cent of Canada's forest land is logged every year. In some areas, the trees being harvested are second growth – they regenerated after previous logging activity. Foresters in some regions are finding that the productivity from this second growth is higher than expected, which demonstrates the remarkable resiliency of the forest.

Sustainable forest activities are enhanced by the Canadian Forest Service, which has built partnerships and carried out research to help provide the forest resources Canadians value and need. At the same time, every province and territory in Canada has legislation, regulations, standards and programs that strive to manage for all the key values the forest provides. At a community scale, many municipalities have tree and environmental by-laws that provide local support to encourage sustainable forest management activities.

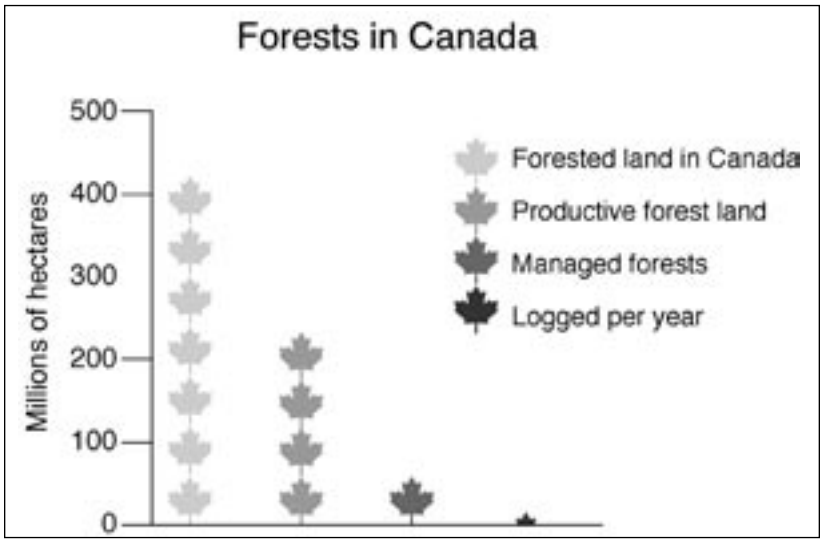
Sustainable Forest Management – A Closer Look

Sustainable forest management balances the economic demands for forest products, societal values and the need to preserve forest health and biodiversity.

It maintains and enhances the long-term health of forest ecosystems so they continue to benefit all living things, while providing environmental, economic, social and cultural opportunities for Canadians today and well into the future.

Sustainable forest management demands ecologically sound practices to maintain the integrity, productivity, resilience and biodiversity of a forest ecosystem. It forces us to resolve economic and environmental conflicts and make choices that will support healthy forest ecosystems.

Forests are essential to life on the planet (www.borealforest.org). They sustain a wide range of ecological processes through which plants, animals, microorganisms, soil, water and air interact.



data from: NRCan

We have learned over time just how important it is to manage forests as ecosystems. There was a time when the forest industry cared more about economics than ecosystems when it logged an area. Today, forest managers understand the importance of respecting the forest ecosystem. Their plans are more inclusive; for example, they set aside trees for wildlife habitat, they maintain stream buffers to protect fisheries and water quality, and they ensure different age classes of trees remain.

Why Sustainable Forest Management is Important

Most Canadians want their forests to meet social and environmental needs as well as offer economic stability. Sustainable forest management brings together the planning and forest management actions necessary to achieve these goals.

Sustainable forest management is critical to healthy forest ecosystems, and healthy forest ecosystems are critical to all living things, in Canada and around the globe. By managing forests in a sustainable way, we will continue to provide the ecological, social, cultural and economic opportunities that are so important for present and future generations.

The Canadian Council of Forest Ministers (CCFM) addressed this reality in 1998 when members signed the second Canada Forest Accord, a formal commitment to continue working co-operatively to address the collective goal of sustainable forest management.

The CCFM, made up of the 14 federal, provincial and territorial ministers responsible for forests, stimulates the development of policies and initiatives for strengthening the forest sector. It provides leadership, addresses national and international issues and sets the overall direction for stewardship and sustainable management of Canada's forests.

http://ccfm.org

Canada Forest Accord
http://nfsc.forest.ca/accord.html

Who is Responsible for Forest Sustainability?

Sustainable forest management starts with government policies and the resource professionals who must meet the objectives of these policies. It includes private woodlot owners, companies and the forest industry. But the responsibility extends to all of us, to forest workers, private land owners, First Nations, community leaders, hikers, teachers... every Canadian benefits from our forests and we all should take an interest in how they are managed.

Young Canadians, as the decision makers of the future, must understand how important it is to care for forest ecosystems by learning how sustainable forest management can help their future.

In most regions of Canada, forests are among the key resources addressed in strategic land use planning, which determines how public land will be used now and into the future.

Strategic land use planning is community-based and participatory. It helps to ensure that resource management decisions address the needs of communities, the economy and the environment. Through an open and community-based process, land use planning goes through a number of stages: consultation, planning, decision-making, implementation, monitoring, reporting and amendment.

Once strategic planning identifies areas available for harvesting, forest managers still must plan their activities to include other forest values, from scenic values to wildlife habitat.

Supporting Sustainable Forests in Canada

National Forest Strategy

Forests have always been important to Canada and to Canadians. Over the past few decades, our national forest strategies have shifted from a focus on the need to increase the supply of fibre for economic purposes to a wider set of sustainable forest principles.

As each strategy has evolved, more and more Canadians have become involved. The current strategy, Sustainable Forests: A

Canadian Commitment 1998-2003, aims to maintain and enhance the long-term health of forest ecosystems for the benefit of all living things, nationally and internationally, today and into the future.

http://nfsc.forest.ca/home.html

World Forestry Congress

The World Forestry Congress brings together the world forestry community, letting participants exchange views and experiences, discuss forestry issues and formulate broad regional or global recommendations. It is an opportunity to share forest-related initiatives, innovations and technologies.

The World Forestry Congress is not a meeting of governments nor does it have formal constituencies or country delegation. This means it can provide an unbiased overview of the state of forests and forestry, raising the awareness and understanding of decision-makers, the public and all concerned parties.

Canada is hosting the world as the XII World Forestry Congress comes to Quebec City in September 2003 – it is an opportunity to showcase what is happening in Canada and learn about achievements in other jurisdictions.

www.nrcan-rncan.gc.ca

Forest Certification – A Measured Approach

Forest management practices often draw strong opinions. So while it is fine to talk about what is being achieved through sustainable forest management, it is just as important to offer an objective measure of what is happening on the ground.

The CCFM established a set of criteria and associated indicators that help determine if a forest is being managed sustainably. These criteria and indicators provide a framework that can be used to assess progress in terms of sustainable forest management.

Many Canadian forest companies are turning to voluntary certification programs, which incorporate a set of standards based on these criteria and indicators, to determine whether they are indeed managing their forests sustainably. It is a means for them to measure and monitor their forest activities.

The Forest Products Association of Canada has described four forest certification programs used in Canada:

ISO 14001

The International Organization for Standardization is the most widely recognized standard for environmental management system in the world. It requires companies to set goals and objectives, have processes in place to meet or exceed all environmental regulations and continually improve their environmental performance.

http://www.iso.ch/iso/en/ISOOnline.openerpage.

CSA

The Canadian Standards Association (CSA) is an independent, non-profit association for the development of Canadian standards and product certification. Canada's National Sustainable Forest Management Standard is based on national and international criteria and indicators for sustainable forest management.

http://www.csa.ca

SFI

The American Forest and Paper Association has developed the Sustainable Forestry Initiative (SFI). It is a comprehensive systems and performance-based standard that integrates the regeneration and harvesting of trees with the protection of wildlife, soil and water quality, biodiversity and ecologically significant sites.

http://www.aboutsfb.org

FSC

Forest Stewardship Council (FSC) is an international body which endorses national or regional standards based on ten forest management principles and 56 criteria. The goal is to promote environmentally responsible,

socially beneficial and economically viable management of the world's forests.

http://www.fscoax.org/principal.htm

http://www.certificationcanada.org

Canadian Sustainable
Forestry Certification Coalition
http://www.sfms.com

Canada is on the road to sustainable forest management. Each of these certification programs is evolving as we learn more about forest sustainability and forest ecosystems.

Canadian Model Forest Network

Model forests act as hands-on laboratories where leading-edge techniques are researched, developed, applied and monitored. They are places where the best sustainable forest management practices are developed and shared. Most model forests began in 1992 as part of the federal government's Green Plan.

Model forests bring together a range of partners, often with conflicting views – including logging companies, First Nation communities, woodlot land holders, environmentalists, academics, government agencies, recreational groups, community associations, hunters, trappers and school groups. The partners share their knowledge and combine their expertise and resources to develop innovative, region-specific approaches to sustainable forest management.

Canada has 11 model forests, each run by a not-for-profit organization. They include the Waswanipi Cree Model Forest in northern Quebec where the management strategy is based in part on the traditional ecological knowledge of the Cree people.

Canadian Model Forest Network
http://www.modelforest.net

International Model Forest Network
http://www.idrc.ca/imfn/

Sustainable Forest Management Themes

This kit is organized into a series of themes on sustainable forest management, with lesson activities for each.

1. Biodiversity

Biodiversity refers to the variety and complexity of all living things and the way they interact within ecosystems. It is the totality of genes, species and ecosystems in a region and the interactions between those genes, species and ecosystems. We cannot maintain an assortment of species without ecosystem diversity. The ecosystem cannot function as well if it loses a species, and a broad genetic base is needed to help species adapt to changing conditions.

Sustainable forest management acknowledges the importance of maintaining this ecosystem diversity so forests can remain healthy, productive and resilient.

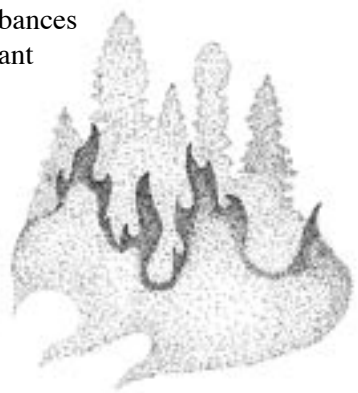
Canadian Biodiversity Information Network
http://www.cbin.ec.gc.ca/default_e.cfm

For more information on biodiversity see our 2002 Teaching Kit "All Things Big and Small". You can order a copy through the Canadian Forestry Association's web site at www.canadianforestry.com/html/education/cfa

2. Natural Disturbances (insects, fire, wind, flooding, herbivore browse)

As well as encouraging healthy forest growth, sustainable forest management means managing the many natural disturbances that can disrupt that forest growth such as forest

fires, landslides, insects, disease, flooding and windstorms.



Natural disturbances can cause significant impacts on forest ecosystems, leading to a change of habitat for hundreds of species of plants, animals and other species.

Let's consider fire as one example. Natural wildfires can act as beneficial agents of change in the forest ecosystem. They can lead to new growth and help control insect infestations. Some tree species such as jack pine, lodgepole pine and aspen depend on fire for regeneration.

Each year in Canada, twice as many hectares of forest are burned in wildfires than are logged. While fire is a natural ecosystem process, it often needs to be managed to protect human values including rural communities, recreational areas and commercial wood supply.

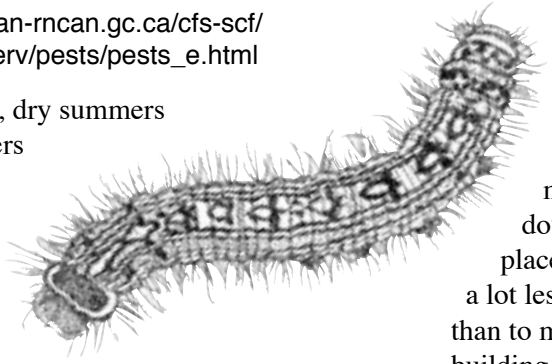
The Canadian Interagency Forest Fire Centre provides excellent information on forest fires, frequency and location.

http://www.ciffc.ca/

Pests

Infestations by insects also cause immense damage. Spruce budworm, forest tent caterpillar, mountain pine beetle and many others affect forests. Insects cause various forms of damage, whether they attack root structures, branches, bark, leaves or needles. They can also leave a forest vulnerable to forest fires.

http://www.nrcan-rncan.gc.ca/cfs-scf/science/prodserv/pests/pests_e.html

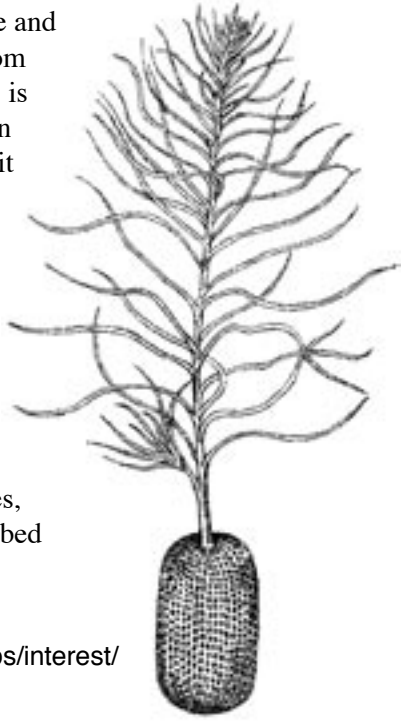


Recent hot, dry summers and mild winters in British Columbia's central interior have allowed mountain pine beetle populations to reach epidemic levels in mature forests. Their natural predators, such as woodpeckers, cannot contain the population and younger, apparently healthy trees are being killed. Left unchecked, the infestation could place the timber supply in jeopardy, having a disastrous effect on the local forest economy.

Managing a forest in a sustainable manner means accounting for natural disasters such as the mountain pine beetle infestation and responding to them in a way that protects both industry and the forest ecosystem.

Preventative measures such as logging and reforesting beetle-infested areas help reduce the rate of spread and ensure a healthy, long-term timber supply. This also protects other forest values such as recreation, biodiversity, scenic values, cultural heritage, range, fish and wildlife habitat and watersheds.

Animal Browse



Herbivores such as deer, moose and beaver eat shoots and new buds from trees, inhibiting growth. While this is not often a significant consideration in sustainable forest management, it does change the forest ecosystem over time so foresters must be aware of animal feeding areas when planning.

Some forest management techniques attempt to mimic natural disturbances in order to help maintain biodiversity. Although some natural disturbances, such as fire in the form of a prescribed burn, kill some trees, they can also encourage regrowth of others.

http://www.for.gov.bc.ca/hfp/pubs/interest/forharv/fnltext.htm

3. Building Green

When you think about it, wood is probably the greenest building material around. When a tree is cut down, another one can be grown in its place. It takes a lot less energy and causes a lot less pollution to produce wood products than to manufacture steel and concrete. And a building made of wood can be even greener if

its energy needs are reduced through low-energy lighting, passive ventilation and energy-efficient heating and cooling systems.

More builders and designers are turning to wood as they look to produce "green buildings" that reduce energy consumption and pollution and use more renewable materials.

Canadian Wood Council
http://www.cwc.ca

Wood is a more environmentally sound building product today because countries like Canada focus as much on the environmental values of their forests as they do economic values. This has not always been the case but times have changed and most countries listened when their forest management techniques were criticized.

As a result, wood products today are the greenest, most renewable building products on the face of the planet. Canada's forest industry produces high-quality products, taken from abundant, sustainably managed forests.

The Government of Canada and many provincial governments are working with forest industry representatives to explore non-traditional markets, such as Southeast Asia and China. This includes structures in non-traditional markets such as India where homes are still being built of brick and concrete because residents must first be convinced that wood can withstand earthquakes, humidity and termites.

BC Wood Specialties
http://www.bcwood.com/Prod/top.asp

Forest Innovation Investment
http://www.forestry-innovation.bc.ca/

4. Climate Change

Climate change has been called the most significant impact on the environment in the foreseeable future. Although climate changes have been a factor in determining the nature of forests over many thousands of years, the rate of change predicted for the immediate future holds many uncertainties.

Scientists predict that forests will likely be subjected to more frequent, extreme storms and wind damage, greater stress due to drought, and more frequent and severe fire and insect disturbances.

The Arctic Tundra zone will likely shrink in response to climate warming and the treeline will shift northward. The species composition of forests will probably change as will the habitat for wildlife. This trend will likely occur throughout all regions in Canada.

This may lead to a change in the distribution of wildlife species as well. Insects that we would find in southern Canada could move into northern Canada. Parasites and pests would also move northward and this could have harmful effects on plants and wildlife.

In British Columbia, some plant species may extend their ranges northward and to higher elevations. Drought-tolerant trees, such as Douglas-fir and Ponderosa pine, will be favoured over trees requiring more moisture, such as spruce. Dry grasslands may replace Douglas-fir forests in some areas, and trees will invade alpine meadows. Plants adapted to the new climate may appear first in areas disturbed by fire, logging, and extreme drought.

NRCan has developed a series of climate change posters that explore potential impacts of climate change throughout Canada. These posters serve as the basis for one of the lessons that follows. Visit the following web site to request or download information for your province or territory:

http://www.adaptation.nrcan.gc.ca/posters/home-accueil_en.asp

Effects of climate change by region
http://www.climatechange.gc.ca/english/issues/how_will/regional.shtml

http://www.climatechange.gc.ca

5. First Nations

Approximately 80 per cent of First Nation communities in Canada are found in forest regions. Forests offer First Nations people economic and social benefits; they provide jobs

and recreational opportunities. Forests provide sanctuaries for worship, traditional medicines and food, and materials for artistic expression.

First Nations have always had a spiritual connection and understanding of the earth. Today we refer to this connection as traditional ecological knowledge (TEK). TEK draws on knowledge and beliefs handed down through the generations, incorporating things like migratory patterns, calving sites, wintering sites, habitat boundary changes, plants, forest fires and other important geographic information.

Today, native and non-native people are beginning to work together to integrate this knowledge and understanding with western science approaches to sustainable forest management.

http://www.nafaforestry.org/

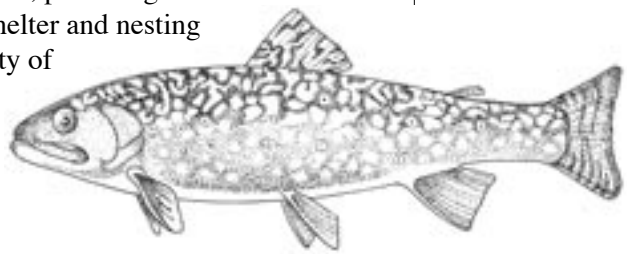
6. Water

Fresh water is essential for all life on earth, and forests are essential for fresh water. It is something we cannot afford to forget. Canada is blessed with abundant sources of fresh water and sustainable forest management plays a role in that.

Forests and water share a complex relationship. To begin, trees need water to survive. Their root systems allow them to pull water up from deep within the ground. That water is then used for photosynthesis, cooling and evaporation, along with other growth requirements of trees.

The forest cover alongside waterways, usually referred to as riparian zones, shades and cools the waterway. This improves habitat conditions for in-stream and streamside organisms such as fish, salamanders and frogs. It allows cold-water fish such as brook trout and salmon to spawn adjacent to stream banks.

The shade provides relief from extreme heat for terrestrial animals, and the forest buffers act as travel corridors, providing wildlife habitat, food, shelter and nesting sites for a variety of species.



The forest canopy also captures precipitation, cushioning heavy rainfall and reducing the potential for erosion. Sediments that could have been washed away are held in the forest environment, and nutrients are used for forest growth.

Forests slow flood waters and reduce the volume of water through root absorption. They improve water quality by filtering excess runoff. They also allow water to enter the ground and recharge the water table. The soil, shade and organic material under the trees hold the moisture in and maintain a healthy groundwater source.

http://www.ducks.ca/conserv/wbf

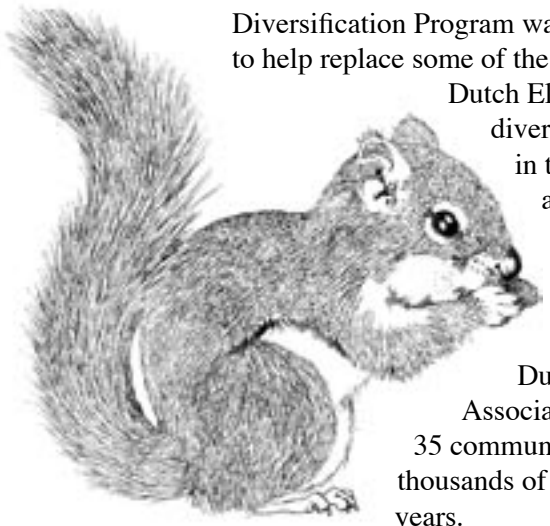
7. Urban Forests

Trees in the city are as important as trees in the forest. The urban forest is the green space of our communities. It is a mixture of publicly and privately owned native and non-native trees, woodlands, woody shrubs, ground vegetation and associated green space within the urban area.

Many urban dwellers take these trees for granted and often do not recognize their environmental significance.

Urban forests not only add beauty to a city or town but they also provide habitat for numerous species such as squirrels and blue jays, absorb carbon dioxide, shade homes to keep them cool in summer and buffer them from winter winds, reduce noise pollution and reduce airborne dust particles.

Urban forests face a variety of threats associated with their setting. In addition to natural insect and disease problems such as Dutch elm disease, urban trees can be damaged by road salt in winter, air and water pollution, soil compaction, construction damage and vandalism.



The Saskatchewan Urban Forest Diversification Program was launched in 2000 to help replace some of the elm trees lost to Dutch Elm Disease and to diversify the tree species in the province's urban and rural forests. With the help of the Tree Canada Foundation and other sponsors, the Saskatchewan Dutch Elm Disease Association, working with 35 communities, planted thousands of trees in the last few years.

What You and Your Students Can Do – Forests at a Local Level

You and your students can learn more about sustainable forests and become active in caring for Canada's forests.

Students do not need to feel overwhelmed by the responsibility to care for, or create new forest environments. Even on a small scale, students can make a difference . . .one tree at a time!

Both the Tree Canada Foundation and Evergreen have developed programs to help you naturalize your schoolyard or an urban area. *Green Teacher* magazine has an extremely useful compendium entitled "Greening School Grounds – Creating Habitats for Learning" that will give you activities and articles about greening your schoolyard.

The following are some web sites that will provide you with examples or opportunities for greening your schoolyard or other environmentally important activities:

EcoSchools
http://www.ecoschools.com/KeyOrgs/KeyOrgs_wSidebar.html

Canadian Ecology Centre
http://www.canadianecology.ca

Ducks Unlimited
http://www.ducks.ca/greenwing/index.html

Evergreen
http://www.evergreen.ca/en/lg/lg.html

Green Teacher
http://www.greenteacher.com

Greening School Grounds
http://www.greengrounds.org/

Tree Canada Foundation
http://www.treecanada.ca/programs/school/index.htm

Pre-Lesson Activities

We have provided two activities that you can use as an introduction to get your class interested and excited about sustainable forests in Canada:

- "Sustainable Forests – What's Involved?" A word search for sustainable forest management terms.
- "Searching for Signs of Sustainability!" Students look for signs of sustainable forest management activities or evidence that sustainable forest management has taken place.

Sustainable Forests, What's Involved?

S	F	M	D	D	A	E	R	A	D	E	T	C	E	T	O	R	P	R	A
N	I	L	H	D	F	I	R	S	T	N	A	T	I	O	N	S	T	R	F
Q	A	P	I	U	G	G	Z	F	E	E	E	G	C	A	D	E	G	G	C
W	R	T	C	E	R	T	I	F	I	C	A	T	I	O	N	K	T	H	J
E	N	F	U	H	G	D	G	J	J	O	B	D	S	B	J	G	T	D	C
F	R	O	G	R	C	S	Y	T	I	S	R	E	V	I	D	O	I	B	N
C	R	C	I	L	A	V	M	N	B	Y	K	N	L	R	S	H	B	J	H
H	D	N	A	T	S	L	V	O	V	S	O	A	F	Q	E	T	S	G	D
O	R	C	J	V	A	S	D	R	D	T	B	N	N	G	N	K	O	A	G
S	F	V	F	V	M	R	Q	I	G	E	F	U	N	N	N	R	F	S	N
F	L	O	R	A	F	H	E	J	S	M	L	A	G	J	S	A	T	C	I
O	W	F	H	C	N	J	J	N	V	T	H	F	S	B	A	T	W	B	T
R	M	M	G	S	F	F	S	V	E	C	U	A	O	A	F	T	O	N	T
E	P	U	F	B	J	K	H	S	E	G	D	R	D	R	V	J	O	J	U
S	I	L	V	I	C	U	L	T	U	R	E	A	B	G	E	C	D	O	C
T	D	H	J	F	H	S	A	V	N	S	J	R	K	A	K	S	C	L	R
F	K	T	S	S	G	M	J	B	D	M	D	D	D	D	N	K	T	P	A
I	G	T	Y	U	I	G	D	G	T	A	T	I	B	A	H	C	B	D	E
R	N	M	S	L	R	R	F	J	J	S	S	R	U	K	B	B	E	B	L
E	S	G	C	R	J	M	S	H	A	R	D	W	O	O	D	D	G	S	C

Find the Hidden Words

Biodiversity
Certification
CFA
Clear Cutting
Climate Change
Ecosystem
Fauna
First Nations
Flora
Forest Fire
Habitat
Hardwood
Model Forest
Natural Disturbances
Protected Area
Regeneration
SFM
Silviculture
Softwood
Stand

Searching for Signs of Sustainability

Search the picture to find the answers to fill in the blanks below:

1. Who's who in the forest?
   _____
2. Where the maple syrup for your pancakes starts.
   _____
3. A rotten home for forest insects.
   _____
4. An early stage of paper, books, chairs or toothpaste.
   _____
5. Forest gardening machine.
   _____
6. Does this tree measure up?
   _____
7. Planting for the future.
   _____
8. A human harvester.
   _____
9. A furry species at risk and its habitat.
   _____
10. Long-legged herbivore sharing the forest.
    _____
11. Forest floor biodiversity.
    _____
12. A lid on the forest.
    _____
13. A walk on the wild side.
    _____
14. Junior member of the forest.
    _____

The A's and Q's of Forest Biodiversity

Lesson 1

Summary

Students will create questions and corresponding answers about forest biodiversity and then play an interactive game.

Activity Information

Level: Grades 4, 6 and 7

Subject: Life Science: Habitats and Communities, Diversity of Life, Interactions Within Ecosystems; Language Arts; Drama

Estimated Duration: One 60 minute class period for initial discussion, and to develop the answers and questions; a second class period to play the game and debrief students about forest biodiversity.

Materials: Markers, index cards (5 x 7) or similar sized pieces of paper or cardboard, tape (or something to stick cards to the wall or floor)

Learning Outcomes

Students will:

- Demonstrate that specific terminology is used in science and technology context. Use appropriate terminology such as habitat, food chain, etc.
- Predict how the removal of a plant or animal population affects the rest of the community.
- Identify a variety of local and regional habitats and their associated populations of plants and animals.
- Describe how a variety of animals are able to meet their basic needs in their habitat.

Teacher Background

Biodiversity can be defined as: The variety of life on earth, different species, genetic variability within species and the variety of ecosystems in which they live. Put simply, it refers to the variety and complexity of all living things and the way they interact within ecosystems.

Biodiversity is found throughout all types of ecosystems: grasslands, wetlands, urban areas, and indeed, forests.

Today, forest managers, companies and woods workers are recognizing the importance of protecting biodiversity and they use sustainable forest management as a tool to do this. Forest managers are protecting habitat for various plant and animal species by leaving buffers along streams, not logging certain animal breeding grounds, and protecting areas that have scenic values to people.

Land use planning is an important function in sustainable forest management. Forest managers need to know everything about a forest – the environmental, economic and social features – so that they can make informed decisions about how it should be managed.

It's not just the trees that make a forest diverse, it's the soils, mosses, beetles, birds, squirrels, hawks . . .it's EVERYTHING and how everything interacts between and among one another! Every species, whether plant or animal is inextricably linked to another – biodiversity is everywhere.

NOTE: You might consider doing this activity at the end of the unit as an assessment tool, rather than giving a test.

Procedure

Step 1

Begin this activity with a brief introduction about biodiversity and forest ecosystems. Ask your students to describe the components of a forest ecosystem and how they relate to one another. How can careful management of a forest encourage biodiversity? Have students consider a variety of management activities – reforestation, harvesting, prescribed burns, etc. and determine how they each contribute to biodiversity. Ensure

that students understand that biodiversity is an important component of all sustainable forest management activities and many activities encourage biodiversity in the forest ecosystem.

Step 2

Explain to your students that they will be participating in an interactive game, but you want to go over a few concepts before they begin. Do a quick review of some of the words provided in the list in Step 3 to make sure students are familiar with each and understand what they mean. You could treat this as a question/answer activity or a simple teacher review.

Step 3

Introduce the "A's and Q's of Forest Biodiversity" activity. Let students know that this activity is similar to *Jeopardy*, but focuses on biodiversity concepts in a forest ecosystem. Explain that they are going to create their own classroom version of the game. They now have to identify six categories for the questions and answers, all of which must relate to sustainable forest management and biodiversity. Have students brainstorm a list of possible categories. You can use this list as a starting point for their brainstorming activities:

- Tree canopy
- Mammals
- Birds
- Soil
- Plants
- Understory
- Predator
- Food chain
- Water
- Hardwood forest
- Boreal forest
- Forest fire
- Habitats and communities
- Natural disturbances
- Protected areas
- Species at risk
- Sustainable Forest Management

Step 4

Have the class choose six categories, and write them on the board/flip chart. Divide the class into six groups (four to five students per group), and assign each group one of the categories. Each group will be responsible for developing the answers and questions for their category. Hand out the index cards so that each student has one card. Explain that they each must develop at least one question and answer for their particular category. You may assign more, particularly at the grade 7 level. Each question must relate to sustainable forest management and/or biodiversity. If the group needs more cards, they can ask for more. Each student should write his or her question on one side of the card, and then write the answer on the other side of the card.

Once everyone has completed his/her question(s)/answer(s), collect the cards. Make sure you keep each category separate. Select five A's and Q's from each category and you are ready to begin the game!

NOTE: You may have a few key questions/answers for each category that are specific to your local region/town/geography. Make sure to include these as one of the five A's and Q's. If students can answer these correctly, they can receive double points.

Step 5

Take the cards and tape them to the black board or to a flip chart, answer side out. (You and your students can change how the game is presented by putting the cards

answer up in the middle of the classroom floor, gym floor, or challenge your students to figure out how you can play the game outside!) Once all of the index cards are in position, you can begin the game. Ask your students to remain in their original groups.

Step 6

Playing the Game

You can now assume the role of "Game Show Host" or you can ask one of the students to take that role. Pick a group to go first. That group will select a category – but they cannot select the one for which they created the answers and questions! You (or whoever is Game Show Host) will read the first answer out loud. Then, turn the card over so you will know if the group provides a correct question. Groups will be given ten seconds to provide an answer. Use your discretion – if you need to give the students more time, do so. If they are answering quickly, shorten the time.

Encourage one student per group to answer at a time, rather than having everyone from their group answer at the same time.

If the group responds with a question correctly, they get to continue playing, either staying in the same category, or moving to a new category. If they are incorrect, they lose their turn. You can then allow any student from any group to reply with the correct question – they can put up their hands, ring a bell, etc. The game continues until all of the categories are covered and all answers/questions are posed.

If you choose to keep score (five points per correct question), whichever group gets the most correct questions wins the game. If you do not keep score, have the students de-brief the activity by talking about their favourite answers and questions.

Extensions

- Have your students create new categories and play the game again.
- Challenge students to create answers and questions relating to classification of plants and animals they have studied.
- Your class can organize an "A's and Q's of Forest Biodiversity" for other classes doing the same unit of study. You might consider setting up a "round robin" and chart the winners from around the school on a challenge sheet.

Diseases, Pests and Fires, Oh My!

Lesson 2

Summary

This active lesson simulates the effects of natural disturbances on forest communities and explores both the good and bad impacts of those disturbances.

Activity information

Levels: Grades 4 and 7

Subject: Life Science: Habitats and Communities, Interactions Within Ecosystems; Drama

Estimated duration: One 60 minute class period for discussion, activity, and wrap up. Time may vary depending on class size.

Materials: bread tags, poker chips, cardboard squares or other small items that will represent life tokens; bucket (or box or something to collect life tokens); "costumes" for each disturbance.

Learning Outcomes

Students will:

- State a prediction and a hypothesis based on an observed pattern of events.
- Compile and display data, by hand or computer, in a variety of formats.
- Describe interactions between biotic and abiotic factors in an ecosystem.

Teacher Background

"Natural disturbances." What does that mean to you? Those words most likely suggest things that disturb or damage the forest environment that occur naturally, without the help or assistance of people. In fact, it is difficult to walk through a forest anywhere in Canada and not see evidence of natural disturbances. Wind, disease, pests and fire are the four significant disturbances, although there are even more which impact the vitality and vigour of a forest community.

Sustainable forest management also considers natural disturbances and forest managers must always be conscious of various disturbances when they manage their forests. In British Columbia, there has been an ongoing mountain pine beetle epidemic, so drastic that it has increased by 50 per cent over last year. It covers an area of more than 9 million hectares and the forest damage is widespread. (http://www.mountainpinebeetle.com)

Wind is a common factor, causing some trees to actually change their shape as they are buffeted and blown. The Group of Seven painters in Algonquin Park created spectacular paintings of white pine with their branches shaped by the forces of the wind. Wind can also take down trees that are already attacked by disease or forest pests.

Disease and pests have a significant impact on the forest environment. Dutch elm disease may have been our first introduction to a disturbance that can wreck havoc on Canadian forests. More recently, the Gypsy moth, bark beetles and other long horned beetles have been introduced into Canada by non-manufactured or untreated wood packaging materials. Canada's "Least Wanted" forest pest list includes these and other pests that defoliate or otherwise infect forests, making them susceptible to fire.

Fire is a chemical reaction that includes air, heat and fuel. When all three are present in sufficient quantities, fire ignites. It can spread as a sub-surface fire in organic matter. A surface fire can spread through burning leaf litter, fallen branches and other ground-level fuels. Finally, a crown fire can burn across the tree tops, often becoming the most difficult to control.

Fire can destroy a forest. It can also revitalize a forest, bringing new growth and younger, more vigorous trees and new habitat for a wide variety of forest dwellers.

This activity will take your class outside and have them enact or model the effects of natural disturbances on forest ecosystems.

Teacher Preparation

This activity is one that can be carried out inside; however, it will be a lot more fun if you do it outside! The area can be any size – the larger the area, the more room for the students to move about comfortably. Consider using an area half the size of a soccer pitch. Use pylons, bean bags or something to mark out the boundaries of this forest community playing area. If you do this activity indoors, it can be in your classroom, but will be easier in a gym setting.

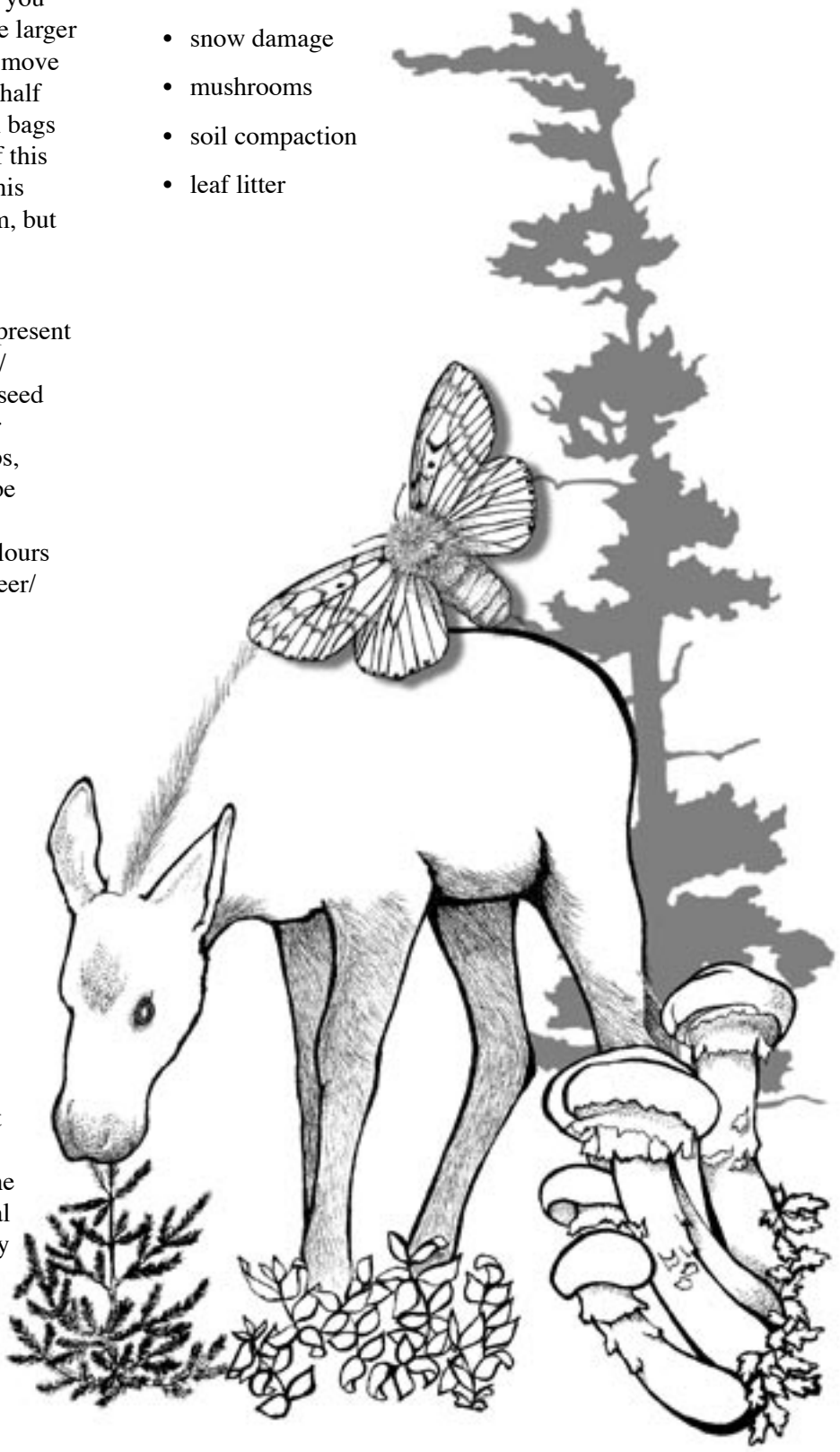
You will need to create approximately 500 "life tokens" – small items that will represent those things that trees need to survive: rain/water, shade, sunshine for photosynthesis, seed dispersal, etc. These can be pieces of paper or cardboard, plastic bread tabs, poker chips, coloured paper clips, or anything that can be easily carried but also cleaned up after the activity. If possible, make four different colours of life tokens. Each colour will represent deer/moose, wind, insects/disease or fire.

Procedure

Step 1

As a class, begin by discussing what a healthy forest community needs to survive: water, shelter, food, space. Discuss the different components of that community, and then focus in on their requirements: water for trees, photosynthesis, openings in the forest canopy for new growth, wind for seed dispersal, etc. Carry out a discussion about natural disturbances and their impacts on that healthy forest community. What are some of those disturbances, and what do they do to the forest? Has anyone heard of any natural disturbances in the news? Students may consider the following:

- wind damage
- insects
- disease
- browse by deer/moose, rabbits, etc.
- fire
- snow damage
- mushrooms
- soil compaction
- leaf litter



Disturbance	What happens to the forest community?
Deer/Moose (browse)	
Wind	
Insects/Disease	
Fire	

Explain that they need to identify the impacts of each of the disturbances. Have students predict what they think will happen in a forest ecosystem when each of the disturbances is introduced. Have them consider deer/moose, wind, insects and diseases and fire.

Use the chart above for students to copy and write down their predictions.

Step 2

Explain to your students that they will now be simulating a healthy forest ecosystem that will be visited by a series of natural disturbances. Divide the class in half, with the first half representing the forest community. Hand out 20 different coloured life tokens to each member of the forest. Explain to them that they will be representing individual trees that are growing in the forest. They need to find a place to grow and where they can be best protected.

Then, divide the remaining students into four groups. Each group will represent a different natural disturbance. Explain that they will create disturbances to the healthy forest community one category at a time. Their role will be to enter the forest and take a life token from as many trees as possible. The role of each disturbance is described below:

Deer/Moose: Walk into the forest, tag a tree, and then take a life token. Then return to the gathering area and drop the token into a communal bucket. Then go back out and tag another tree.

Wind: Walk into the forest, tag a tree, and then take a life token. Then return to the gathering area, and drop the life token in a communal bucket. Then go back out and tag another tree! (Same as the deer/moose.)

Insects/disease: Walk into the forest, tag a tree, and then take two life tokens. Then return to the gathering area and drop the life tokens in a communal bucket. Then go back out and tag another tree!

Fire: Walk into the forest, tag a tree, take the life token, tag another tree, take a token, etc. Fire does not need to return to the communal bucket in between gathering tokens. Students need to collect a maximum of ten tokens.

Step 3

Select one volunteer who will be the Chief Forester. This student will be responsible for recording the number of life tokens taken from the trees in the forest.

Move students to where the activity will be played. Explain that they are to stay within

the boundaries of the forest community. Have the students playing "trees" enter the area.

NOTE: If any tree loses all its life tokens, it simply sits down to represent a dead and decaying tree remaining in the forest.

Step 4

Doing the Activity

When the students are ready to begin, send in the deer/moose. Give the deer/moose two minutes to collect life tokens (one at a time) and then stop the activity. Have a brief all-class discussion about the impact of deer/moose on a forest. What is that impact? Did any trees die? Why or why not?

Each tree tells the Chief Forester how many life tokens they lost to the disturbance. The Chief Forester records this information on his or her tally sheet.

When discussions are completed for the deer/moose scenario, have forest community students go to the bucket and collect their original number of life tokens. Then have them return and prepare for the next disturbance.

NOTE: To make the next stage more interesting, the teacher can quietly select two student trees, and remove all but one of their life tokens. Make sure that the wind damage students do not know who these two trees are. They will simulate older, less strong or vigorous trees that could easily fall to wind impact. Have them stand on the edge of the boundary (the location in a forest that is most susceptible to wind damage).

Chief Forester Tally Sheet

Tree (name of student)	Deer/Moose Browse	Wind	Insect/Disease	Fire

Send in the wind! Give the wind 1 minute to collect life tokens and then stop the activity. Have a quick all class discussion about the impact of wind on a forest. What is that impact? How did it compare to the deer/moose impact? Did many trees die? Why or why not?

Each tree tells the Chief Forester how many life tokens they lost to the disturbance. The Chief Forester records this information on his or her tally sheet.

When discussions are completed for the wind scenario, have the "trees" go to the bucket and collect their original number of life tokens. Then have them return and prepare for the next disturbance.

Send in the insects/disease! Give them two minutes to collect life tokens (two at a time) and then stop the activity. Have a quick all-class discussion about the impact of insects/disease on a forest. What is that impact? How did it compare to the deer/moose and wind impact? Did many trees die? Why or why not?

Each tree tells the Chief Forester how many life tokens they lost to the disturbance. The Chief Forester records this information on his or her tally sheet.

When discussions are completed for the insect/disease scenario, have "trees" collect their original number of life tokens and prepare for the next disturbance.

Finally, send in the fire! Give the fire three minutes to collect life tokens. When each fire student obtains ten tokens they need to place them in the communal bucket – because they have now been extinguished. As each tree dies, they are permitted to return to the bucket and obtain a life token to regenerate as a seedling.

The Chief Forester will record the number of life tokens lost to fire.

Have a quick all-class discussion about the impact of fire on a forest. What is that impact? How did it compare to the deer/moose, wind and insect impact? Did many trees die? Why or why not? Why did new trees grow back?

Step 5

The Chief Forester will tally (with the help of the teacher and a calculator) and display each "tree's" numbers – the number of life tokens lost due to each natural disturbance (for each individual tree). As a class, you can then carry on a discussion about which natural disturbance has the greater impact. Then return to the students' Disturbance Prediction Chart, and compare their predictions with the actual outcomes of the activity.

For grade 7 – Each "tree" will partner with a student representing a natural disturbance to graph what happened to their life tokens during each natural disturbance. Based on their results, they will explain which natural disturbance has the greatest impact.

Extensions

- **Grade 4 –** Students use natural disturbance data to prepare their own graphs to hand in to teacher.
- **Grade 7 –** Using the data generated from their graphs, students will explain how natural disturbance affects forest biodiversity. They can create a poster, a PSA, a news report or other method of presentation.
- Students will select a particular forest pest and do a case study research project using the internet and other resource materials.
- Students can explore a recent forest fire in their region. They can visit the following web site about recent fire hotspots in Canada:

  http://atlas.gc.ca/site/english/maps/environment/forestfires/dailyhotspots2003

What Wood I See?

Lesson 3

Summary

Grade 4: Students carry out a Classroom Audit to determine what in their classroom originated from trees and describe what their classroom would look like if they removed all those tree-based materials.

Grade 7: Students carry out a detailed Home Audit to determine what is in their home that originated from trees. They will carry out research to explore the bio-economical costs of choosing wood or an alternative. They will defend their choices based on their research.

Activity Information

Level: Grades 4 and 7

Subject: Life Science: Habitats and Communities, Interactions Within Ecosystems; Geography; Math

Estimated duration: Grade 4, one 60 minute class period; Grade 7, one 60 minute class period to review and create Audit form, homework for research and drafting article.

Materials: Audit Inventory Sheet

Learning Outcomes

Students will:

- Make observations and collect information that is relevant to a given question or problem.
- Identify their own and their family's impact on natural resources.
- Describe examples, in the home and at school, of tools, techniques, and materials that can be used to respond to their needs (e.g. describe how different materials such as stone, brick and concrete are used to construct buildings).
- Defend a given position on an issue or problem, based on their findings.

Teacher Background

Did you know that the fiber from one average black spruce pulpwood log (eight feet in length and six inches in diameter) can produce enough paper for 175 large newspaper publications?

Look all around you. What do you see? There are things that are made of wood all around us. Is the chair you are sitting on made of wood? What about the bookshelf in your office? Look at all the paper: books, files, newspapers, reports – the list goes on. Do you use a wooden pencil or a mechanical pencil?

Buildings in North America are often times built differently than those in other parts of the world. Countries use different materials, sometimes because of availability and many times due to costs. An interesting fact is that British Columbia and the federal government are delivering training courses for South-East Asian countries so that they can develop building codes and train inspectors so wood can be used in construction.

Although you might think that building and using wood and wood-based products would harm the environment, it is important to recognize that forests regenerate and are a renewable resource. Trees grow back! If we can manage forests sustainably, we can maintain our use of forests and wood products at the same time as reducing air and water pollution. It is a win-win situation!

Procedure

Grade 4

Step 1

Begin an informal class discussion about forests and trees. Make a list on the board (or flip chart) of products, both natural and manufactured, that students think come from

the trees. Consider some of the following:

Classroom	Home
• paper	• coffee filter
• cardboard	• popsicle sticks
• rulers	• speakers
• pencils	• flooring
• clipboard	• egg carton
• chalkboard eraser	• baseball bat
• poster	• piano keys

Explain to your students that in order for us to use and enjoy these products, we need to cut down trees, shape them, mold them and turn them into other products. At the same time, sustainable forest management will help ensure that, with careful planting and tending, trees are renewable and will continue to provide us with all these resources.

Step 2

Divide the class into Audit Teams of three or four students each. Hand out the Audit Inventory Sheet to your students (found at the end of this activity). Explain that students will explore their entire classroom, both high and low, searching for everything that they believe originates from trees. You will see that the Audit Inventory Sheet is divided into two columns. The first column includes those items that are directly made from trees (e.g. wooden ruler, bookshelf). The second column includes those that are indirectly made of trees and not immediately obvious as wood products (e.g. book, vinyl folder, CD).

In some cases, there may be items that could be on either list! You and your students can determine where they belong. In some cases, students can debate their choices and rationalize them with you and the rest of the class.

Step 3

After the Audit Teams have completed the Audit, explain that each team needs to describe what their classroom would look like if all tree-based products were removed. After their description, they must also explain how this would/might impact their learning. Is there anything that could replace wood in their classroom?

They can present their information in a variety of forms:

- Write a story and/or do an illustration to describe what their new classroom would look like.
- Do a brief news presentation, announcing the wood-less situation in their classroom.
- Write a journal entry – the more creative, the better!

Step 4

Set up a display board in your classroom, hallway or resource area to share results.

Grade 7

Step 1

Elaborate on the grade 4 based discussion about the use of wood and explore how there are alternatives to wood, and that you can make a choice between using wood or using non-renewable products (e.g. steel and concrete).

Step 2

Explain to students that they will complete an audit of the wood that they see/know is in the structure of five rooms in their residence. They can create their own audit form by using the chart on page 23.

Step 3

Let students know that they need to research other building materials such as concrete and steel as alternatives to wood. This research must address the environmental and economic impacts of those choices. (Note: They can organize their research in the form of a Pro and Con list that looks at the use of alternatives.)

Rooms	Furniture	Parts of the House	Other
Kitchen	e.g. table	window frame	paper towel holder
Living room	rocking chair	stairs	atlas
Bedroom	blanket box	trim/molding	picture frame
Storage room	shelves	dry wall	canoe paddle
Bathroom	toilet seat	flooring	toilet paper

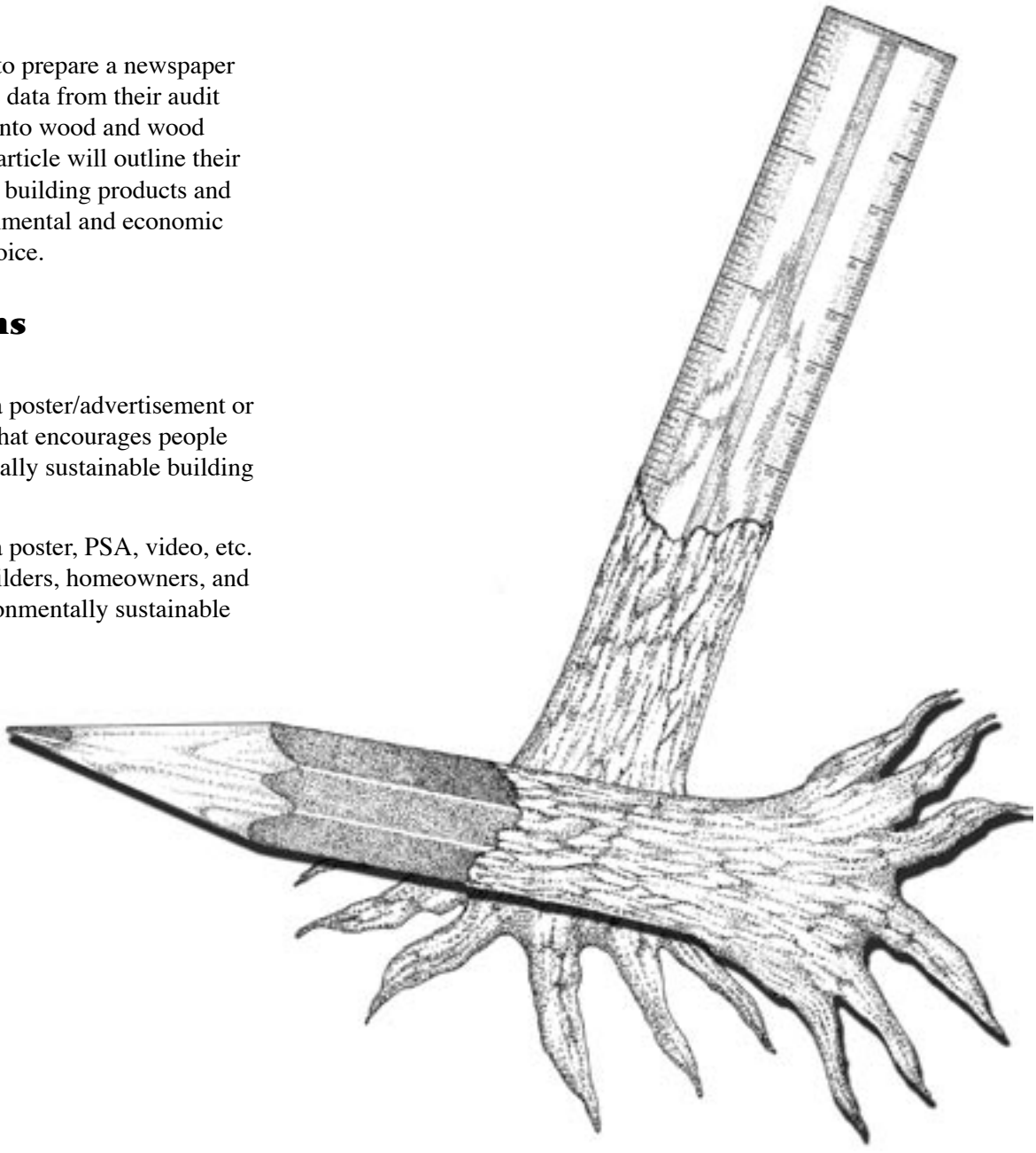
Step 4

Ask your students to prepare a newspaper article that uses the data from their audit and their research into wood and wood alternatives. Their article will outline their preferred choice of building products and explain the environmental and economic impacts of their choice.

Extensions

- **Grade 4 –** Create a poster/advertisement or newspaper article that encourages people to use environmentally sustainable building products.
- **Grade 7 –** Create a poster, PSA, video, etc. that encourages builders, homeowners, and others to use environmentally sustainable building products.

NOTE: For either of the above activities, why not offer bonus marks if your students use only recycled materials to complete their activity!



WHAT WOOD I SEE?
AUDIT INVENTORY SHEET

The tree-based things I see in the classroom are:

Directly made from trees	Indirectly made from trees
Name:	

Shifting Boundaries

Lesson 4

Summary

Students will assume the role of scientists to study and predict the effects of climate change on forest boundaries.

Activity Information

Level: Grade 7

Subject: Life Science: Interactions Within Ecosystems; Language Arts; Drama

Estimated Duration: One 60 minute class period for discussion and initial review of climate change map; homework including additional research, map design and presentation preparation, one 60 minute class period for presentations.

Materials: Climate Change map from NRCan (available on-line); black line master map of province/territory; markers or pencil crayons

Learning Outcomes

Students will:

- State a prediction and a hypothesis based on background information or an observed pattern of events (e.g. predict what an ecosystem will look like in 25 years based on characteristics of the area and the long term changes in similar sites).
- Defend a given position on an issue or problem based on their findings (e.g. defend their decision to increase or decrease hunting or fishing quotas for a particular animal).
- Identify and evaluate potential applications of findings (e.g. determine the maximum allowable number of visitors in a sensitive area such as an ecological reserve or a park).

Teacher Background

According to the United Nations Framework Convention on Climate Change (1992), climate change means "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods". In other words, it is the change in climate over decades to centuries as a result of human activity.

Human activities, predominantly the burning of fossil fuels, are increasing the atmospheric concentration of greenhouse gases, mainly carbon dioxide, nitrous oxide and methane. These gases serve to trap heat within the Earth's atmosphere. Scientists predict that these increases will lead to regional and global changes in climate and climate-related parameters, such as temperature, precipitation, soil moisture and sea level changes.

Although average global warming is expected to amount to 1 C to 3 C by the end of the next century, that warming will not be uniform across the globe or even within Canada. As a large northern landmass, Canada is being affected by climate change more than most other nations. Scientists predict that average temperatures in some regions of this country could be 5 C to 10 C hotter by the end of this century. Furthermore, because of Canada's size, diverse landscape and different ocean boundaries, climate change is expected to affect every region differently.

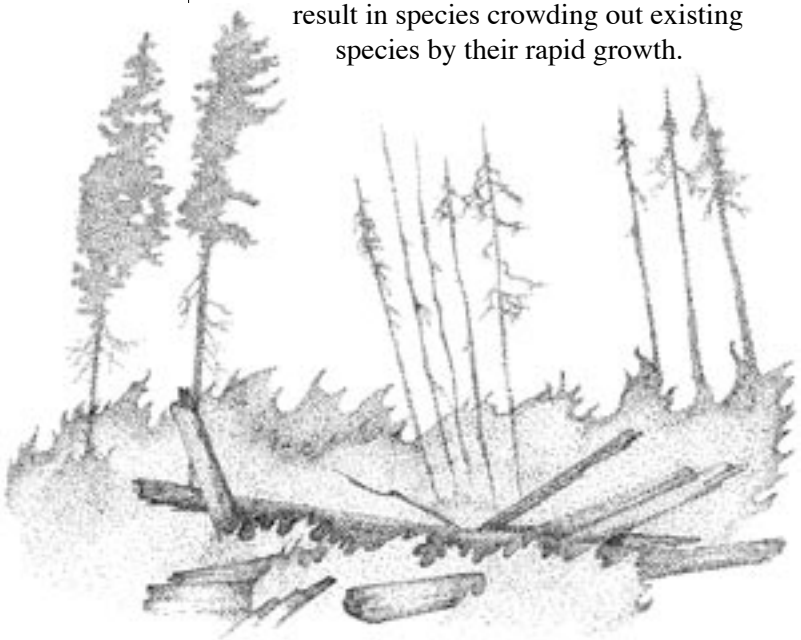
Other significant changes may include the following:

- Changes in temperature may help the survival of insect borne diseases, such as malaria or Lyme disease.
- Western mountain regions could have less late season runoff because of the accelerated retreat of the glaciers. This will threaten water supplies in small communities and have an affect on the cattle industry.
- In the north, loss of permafrost may cause excessive terrain slumping, drainage of small lakes and increased sediment loads in rivers, threatening northern wetlands.

- In the Great Lakes, water levels could change, threatening valuable shoreline and wetland habitats, disrupting navigation and impacting fisheries. It could also encourage foreign fish and aquatic birds (invasive species) which might strain the habitat and nesting areas for native species.
- Water level changes may impact wetlands across the country.

There are more anticipated changes and many relate directly to the forest community. Evidence shows that forest ecosystems have been responding to climate change and variability for the last 100 years. One major example is the obvious migration of tree species over short distances in mountain regions. Climate change could subject forests to more frequent and extreme storms and wind damage, particularly in coastal regions. The possibility of drought may impact greatly on forest regeneration and growth. The frequency of fire is expected to increase significantly along Canada's boreal forest zone west of Lake Superior, although some studies suggest a less severe fire climate in eastern Canada.

Climate change may result in changes in mineral availability in the soil. It could also result in the elimination of species which require wetter or drier soil. The availability of sunlight could result in species crowding out existing species by their rapid growth.



What our forests will look like in 50 to 100 years is uncertain. What is certain is that there will be an impact. This activity challenges students to predict what that impact might look like and describe some of the effects of climate change on their regional forests.

Teacher Preparation

NRCan has created a series of climate change maps of specific regions of Canada. These maps are available for free through the Geological Survey of Canada. You can contact NRCan directly to receive copies of your particular region that will complement this lesson or use the following web site:

http://adaptation.nrcan.gc.ca/posters/home-accueil_en.asp

Procedure

Step 1

Begin the activity with a discussion of climate change, outlining some of the uncertainties and irreversible consequences, so that your students can begin to understand the threats that climate change can bring to Canada's forests. Describe some of the potential changes to Canadian forests, focusing on those in your particular forest region. Explain how entirely new assemblages of species are expected because of the change in growing ranges and seasons. The greatest changes are expected in northern latitudes and higher altitudes because of the longer growing seasons, changes to competition among species, greater vulnerability of some forest species to insect infestations and disease and increased frequency and intensity of fire.

Step 2

Ask your students to think about the forest region in their area (or any area that you choose to study with your students).

- What does it look like now?
- What are the predominant species?
- How thick is the forest cover?

- How did this area appear 50, 100, 300 years ago?
- Was there a different distribution of species? Was this difference based/caused by climate change?
- What changes in the forest community might they anticipate if the climate continues to change?

Step 3

Introduce the climate change map of your particular region. Explain that there is a significant amount of data on the map, on the associated web site, and other research places. Explain that the class will be taking on the roles of scientists responsible for predicting future changes in the forest boundaries in their region.

Step 4

Divide students into teams of two or three. First, their challenge is to examine the climate change map and find the current forest boundaries. Then, assuming the role of forest scientists, each team will prepare a new map of their area, using a black line master of your province or territory. They will predict what their forests will look like in 100 years if climate change continues at the same rate. They can use the map data, as well as information on climate change on the Internet, or any other places that they can find information that will assist them in their forest predictions. They can make their maps as descriptive, creative and detailed as they wish. NOTE: It is important that students are prepared to justify the locations of the new forest boundaries and species to be found here based upon scientific reasons.

Canada's Forests – Ecozones of Canada
http://www.pfc.cfs.nrcan.gc.ca/canforest/canf/contents_e.html

Learning Resources – Boreal Forest
http://atlas.gc.ca/site/english/learning_resources/borealforest/boreal_descrip.html

Climate Change: Impacts & Adaptations, A Canadian Perspective
http://adaptation.nrcan.gc.ca/perspective.asp

Step 5

When the scientist teams have finished researching and designing their map, they will prepare a brief presentation of their anticipated changes to forest cover to be delivered at a (mock) International Science Conference on Climate Change. The rest of the class will assume the role of other scientists, listening to each presentation and asking questions regarding the scientific validity of the presented predictions.

The presentations should consider the following questions:

- What, if any, are the social implications of the forest boundary changes (e.g. parks, wildlife, depletion of "prairie" land)?
- What is the value of the new forest regime, which has taken over, in comparison to previously existing species?
- If the forest ecosystem boundaries have changed, how will this affect the existing wildlife populations and distributions?
- What is the affect of climate change on headwater streams and on the downstream rivers, lakes and communities? What will happen to aquatic species?

Extensions

- Students can design maps/illustrations of their immediate schoolyard, predicting anticipated changes to trees within its boundaries.

  NOTE: There is also a Teacher's Kit associated with the climate change posters available from NRCan. Please feel free to download that kit and adapt the lesson activity for use with your students.

  http://adaptation.nrcan.gc.ca/posters/teachers/guide_e.asp

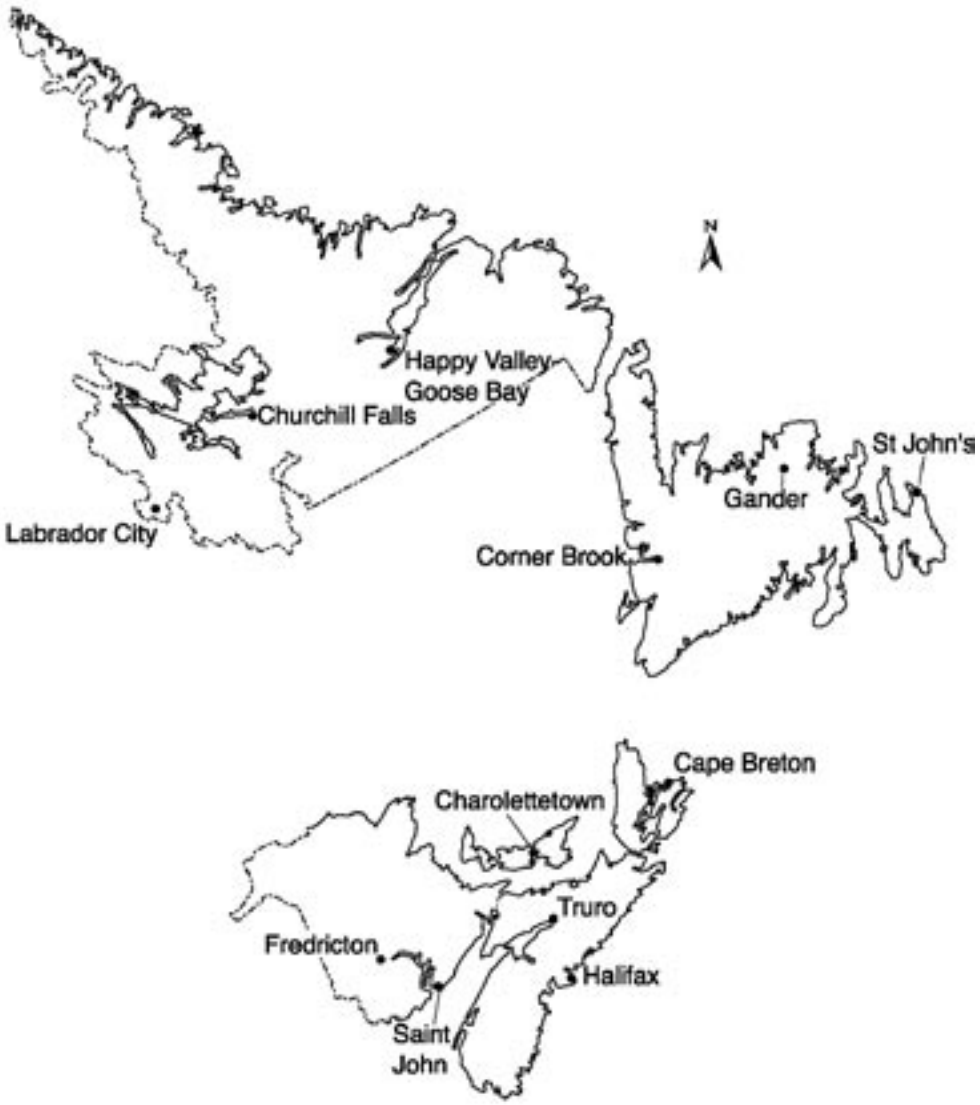
Yukon/Northwest Territories/Nunavut

Prairie Provinces

Québec
N
Chibougamau
Québec
Sherbrooke
Val-d'Or
Montreal
Ontario
N
Ottawa
Toronto
Moosonee
Sudbury
Thunder Bay

British Columbia

Atlantic Provinces



Forest Connections: First Nations and the Forest

Lesson 5

Summary

Students will research a First Nations tribe in Canada and explore their connection to forests.

Activity Information

Level: Grades 4, 6 and 7

Subject: Life Science: Habitats and Communities, Diversity of Life, Interactions Within Ecosystems; Social Studies; Drama

Estimated duration: Two 60 minute class periods for research; preparation, one 60 minute class period for presentation

Materials: props useful for individual presentations

Learning Outcomes

Students will:

- Describe how personal actions help conserve natural resources and protect the environment in their region.
- Describe the potential impact of the use by humans of regional natural resources.
- Identify scientific discoveries and technological innovations of people from different cultures (e.g. identify examples such as the use of tree bark by Aboriginals for headaches, which led to the development of a synthetic drug).
- Predict how the removal of a plant or animal population affects the rest of the community.

Teacher Background

Aboriginal peoples are the original inhabitants of North America. Because we often study their history and their significant role in Canada's history, we tend to forget that they live in sophisticated, organized, and self-sufficient societies. The First Nations constitute a cultural mosaic as rich and diverse as that of Western Europe, including a large cross section of cultural groups. In Canada alone, we find a rich variety of cultures, including Mi'Kmaq, Maliseet, Seneca, Cree, Ojibwa, Mohawk, and many, many more.

Over the centuries, Aboriginal peoples have acquired knowledge, invented technology and developed a way of life adapted to their specific environment. Their discoveries using traditional herbs and plants from the natural environment are profound. Today, many of the items we find in our medicine cabinets come from traditional Aboriginal healing methods and remedies. They have depended on nature for their survival and have a special relationship with it. For them, the Earth is sacred, something to be respected. They consider themselves a part of the Earth.

The forest plays an integral role in the social, spiritual and cultural lives of First Nations across Canada. It is the forest that provides homes for wildlife that has become the basis for narratives and stories describing tribal customs and culture. It is also the forest where ceremonies and cultural traditions are often based. The forest also offers a firm foundation upon which First Nations peoples and communities can develop an economic future,

Grandchild's Fondness

The time will soon be here when my grandchild will long for the cry of a loon, the flash of a salmon, the whisper of spruce needles, or the screech of an eagle. But he will not make friends with any of these creatures and when his heart aches with longing he will curse me.

Have I done all to keep the air fresh? Have I cared enough about the water? Have I left the eagle to soar in freedom? Have I done everything I could to earn my grandchild's fondness?

Chief Dan George

while maintaining their traditional connection with the land.

More than 80 per cent of Aboriginal communities lie within Canada's productive forest zones and many communities are developing forest-based enterprises such as sawmills, logging companies, eco-tourism activities, and non-timber product ventures. Aboriginal people have also developed a unique knowledge of the forest ecosystem through centuries of intimate contact with the land. With these traditional and contemporary forest experiences, native people are well-positioned to contribute to today's sustainable forest management practices for the benefit of their communities and all Canadians.

The objective of this lesson is for students to better understand First Nations people and their connection and relationship to the forests of Canada.

Procedure

Step 1

Begin with a discussion of First Nations in Canada. Who are they, and what role have they played in Canada's history? Consider their special ties to the Earth, and how they might be particularly interested in the forest environment. Ask the students to list as many First Nations tribes or groups that they can. Put their answers on the chalkboard. You may wish to include some of the following:

- Haida
- Mi'Kmaq
- Ojibway
- Cree
- Dakota
- Tlingit
- Maliseet
- Montagnais
- Nisga'a
- Dene
- Salteaux
- Shuswap
- Nipissing
- Oneida, and any others you want to mention.

Step 2

Divide your class into groups of three or four students, with a maximum of eight groups. Explain that each group will select a First Nations tribe or group. They will carry out background research on their First Nations, exploring specifically how the forest is important to their culture. They will then prepare a presentation to share with the rest of the class.

Step 3

Ask a representative from each group to come to the chalkboard/flip chart and check off the tribe their group is going to study. There can only be one group per tribe. Explain that they will be given library/class time to prepare but that they will need to spend time after school hours to complete their work.

Provide the following questions to your students, explaining that their research and presentation must address the following questions:

- Where is your First Nations tribe located?
- What are three interesting facts about the First Nations people that you discovered in your research?
- What kind of forest do they live in/near? (Boreal, deciduous, etc.)
- What do they use the forest for? (Cultural traditions, harvesting, recreation, etc.)
- Are there any threats to the forest?
- Are there any formal rules, laws or policies in place to protect the forest?

- Are there any cultural practices or traditions that help protect the forest?

Step 4

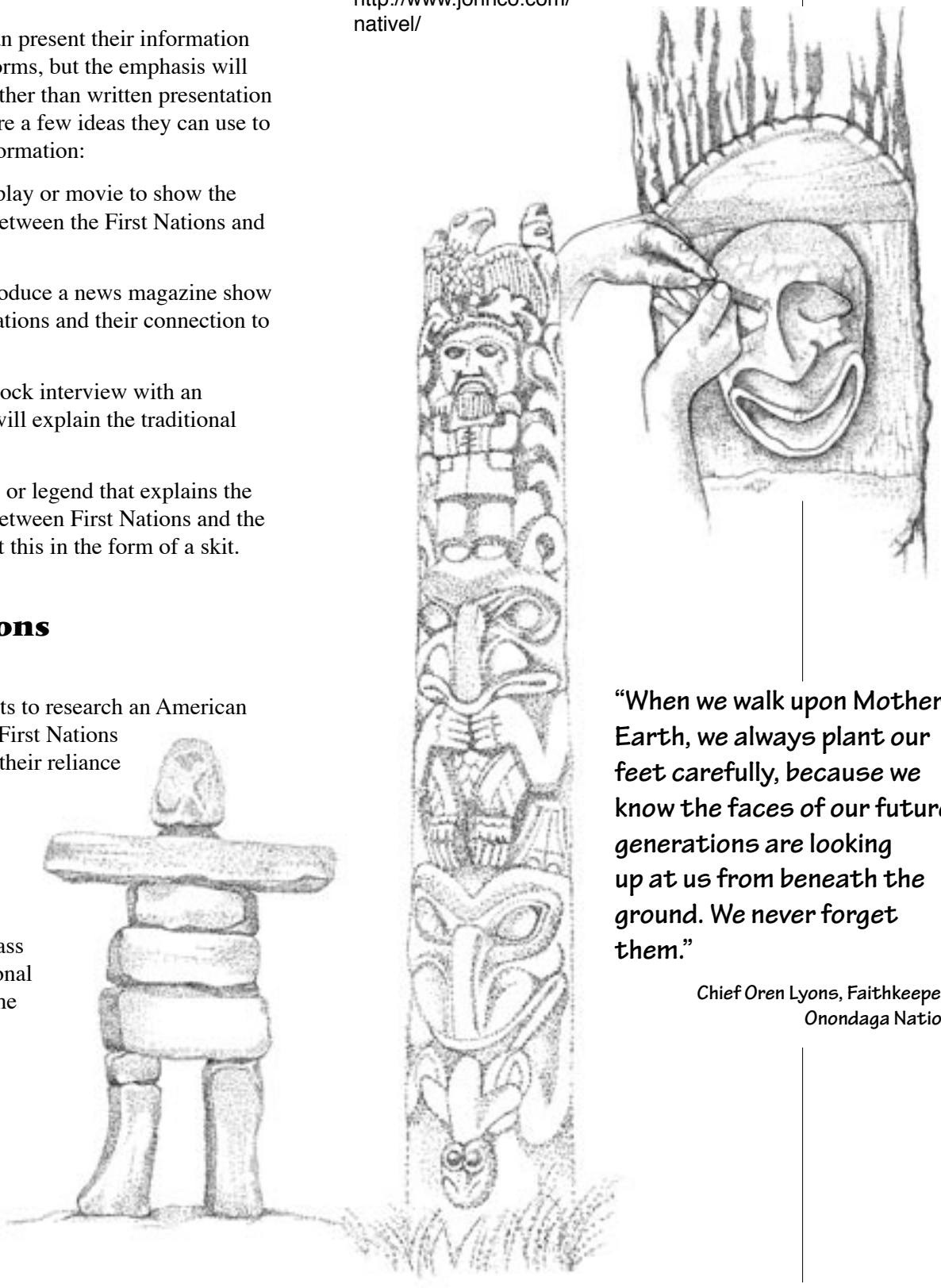
Your students can present their information in a variety of forms, but the emphasis will be on the oral rather than written presentation material. Here are a few ideas they can use to present their information:

- Create a skit/play or movie to show the relationship between the First Nations and forests.
- Create and produce a news magazine show about First Nations and their connection to forests.
- Carry out a mock interview with an "elder" who will explain the traditional relationship.
- Create a story or legend that explains the relationship between First Nations and the forest. Present this in the form of a skit.

Extensions

- Ask your students to research an American or International First Nations community and their reliance on the forest.
- Invite an elder from a local First Nations group to speak to your class about their personal connections to the forest.
- Search the Native Links Page and contact a First Nations school – coordinate a pen pal exchange between schools.

Native Links Page
http://www.johnco.com/nativel/



"When we walk upon Mother Earth, we always plant our feet carefully, because we know the faces of our future generations are looking up at us from beneath the ground. We never forget them."

Chief Oren Lyons, Faithkeeper, Onondaga Nation

Water, Water Everywhere!

Lesson 6

Summary

Students will explore and demonstrate how trees can filter water by creating their own experimental models.

Activity Information

Level: Grade 8

Subject: Life Science: Water Systems on Earth; Language Arts; Geography; Math

Estimated Duration: One 60 minute class period to present sustainable forest management and water information, homework for experiment design, and another period for a class experiment presentation session.

Materials: sponges, paper towels, facial tissue, food colouring, strainer, glass/measuring cup.

Learning Outcomes

Students will:

- Design an experiment and identify major variables (e.g. design an experiment to find the optimal viscosity of a milk shake for a particular size straw, and control variables such as straw diameter, refrigeration temperature, and fat content in milk).
- Apply given criteria for evaluating evidence and sources of information (e.g. test a prototype in a variety of situations to ensure that the results were not due to chance).
- Work cooperatively with team members to develop and carry out a plan, and troubleshoot problems as they arise (e.g. consider alternative ideas suggested by group members on ways to reduce friction in a liquid circulation system).

Teacher Background

Without water, there would be no life on Earth. Think about it – every living thing needs water to survive. However, most of the water on this planet is in the ocean. Most of that water (97.5 per cent) is salt water. Only 2.5 per cent of the Earth's water is fresh water, and most of that is in frozen glaciers, deep underground or on polar ice caps. What does that mean to us? Most fresh water is not available to us. It also means that we need to be conscious of how we use (or lose) the fresh water we have.

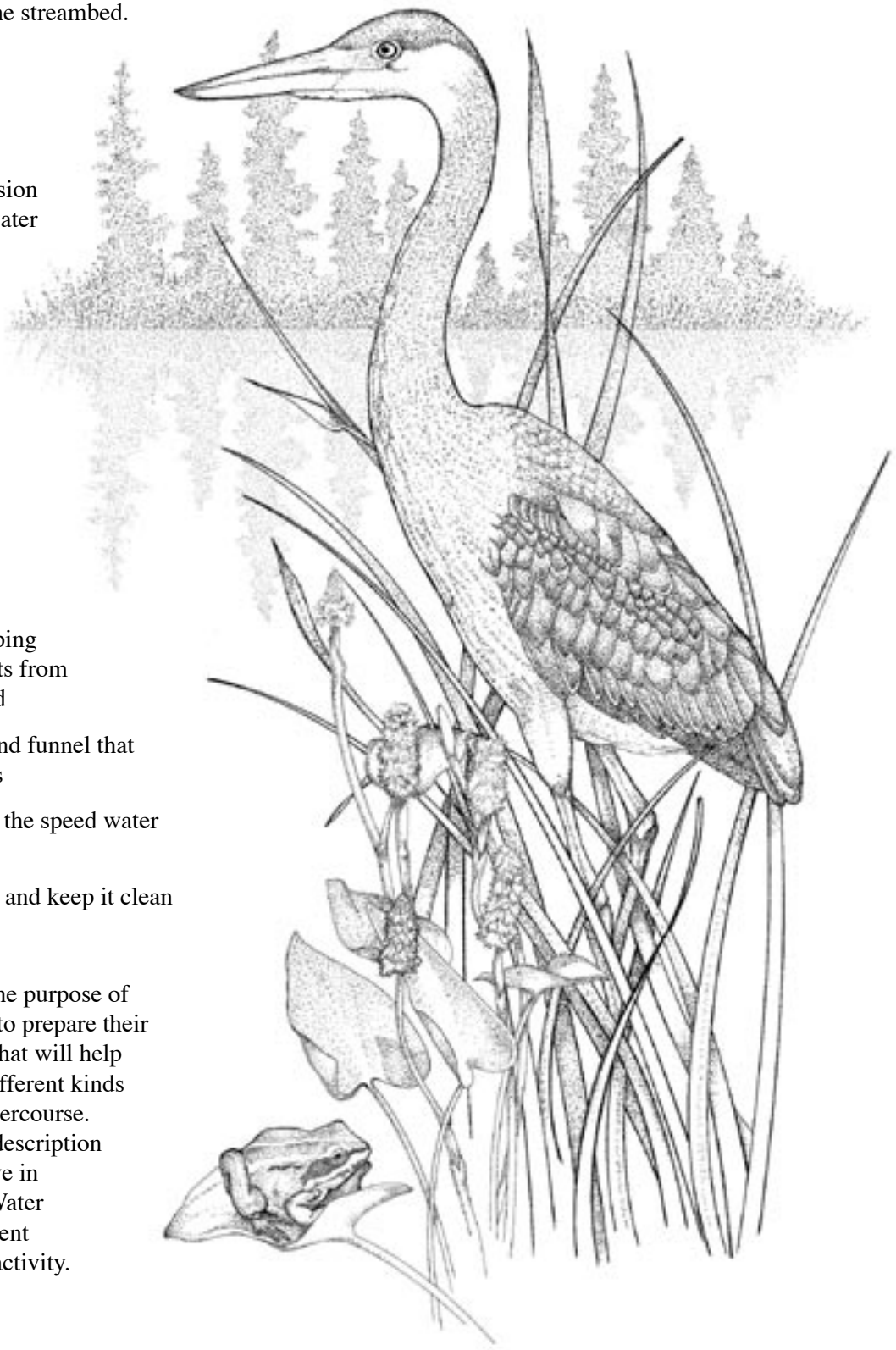
The water we have now is all the water we are ever going to have! Lucky for us, it moves endlessly through the Earth's systems, through our skies, oceans, rivers, plants, animals and back through again. In a forest, water cycles through the ecosystem by evaporation and transpiration, surface water run-off, and even underground water flow. Nutrients that are necessary for those trees to grow and thrive are transported through that same water cycle.

The trees and plants in the forest affect water quality significantly. Root networks of trees and plants will slow the speed that water seeps through soil, and will help bind the soil together, reducing erosion. Many of the nutrients entering fresh water come from the surrounding vegetation. Lots of trees and vegetation mean that good nutrients enter the water course. Without the vegetation cover, the nutrients either do not make their way into the water, or excess nutrients from farm fields or other kinds of run-off enter the stream bed.

When forest managers are managing forest communities near streams, rivers, lakes and wetlands, they must remember that these areas are important habitats for species like salamanders, frogs and orchids. Shoreline vegetation bordering these water bodies protect fish habitat and provide important habitat for many other species of wildlife. Forest cover provides shade and helps maintain stream temperature, especially important for cold water fish species, and helps to slow runoff from the watershed.

Consequently, sustainable forest management means that forest workers need to be careful when working around streams. For example, they try not to walk or drive through stream-beds, or

damage streams, cause erosion or cause silt to enter streams. They do not cut trees that might fall across a stream and that would then require skidding or dragging through the streambed.



Procedure

Step 1

Begin an interactive discussion with your class about the water cycle, focusing on the role that trees play in that cycle. Ask your students to think of all the ways that trees and water interact together. Begin a list on the board or flip chart with their responses. You can use this list as a starting point:

- trees serve as a barrier preventing soil erosion
- trees act as a barrier keeping large amounts of nutrients from flowing into a stream bed
- trees collect rain water and funnel that water down to their roots
- roots of trees slow down the speed water moves through the soil
- trees serve to filter water and keep it clean

Step 2

Explain to your class that the purpose of this activity is for students to prepare their own experimental models that will help them study the effects of different kinds of plants and trees on a watercourse. They will be given a brief description of what they need to achieve in their experiment. Use the Water Experiment Outline document included at the end of this activity.

Working together in partners, they will create a working model that will demonstrate how trees and other plants can filter water, conserve water and slow sedimentation into a water course.

Step 3

Divide the class into teams of two. Hand out the Water Experiment Outline sheets. Once you have assigned the experiment, give your students two weeks to complete it. They will need to develop their own design that works for them. They will also need to be prepared to present their experiment to the rest of the class. In their presentation, they need to answer the following questions:

- Please explain how your model demonstrates the role of trees in filtering and conserving water.
- What is your model constructed of? Why did you choose these materials?
- What role do plants and trees play in protecting streams or other water courses?
- How can trees serve to filter water?
- How can trees filter water and run off from agricultural fields?
- How can a forest manager protect streams and water courses from getting over-loaded with sedimentation?
- If you were a forest manager, how could you best conserve water quality in the streams in the forests that you manage?

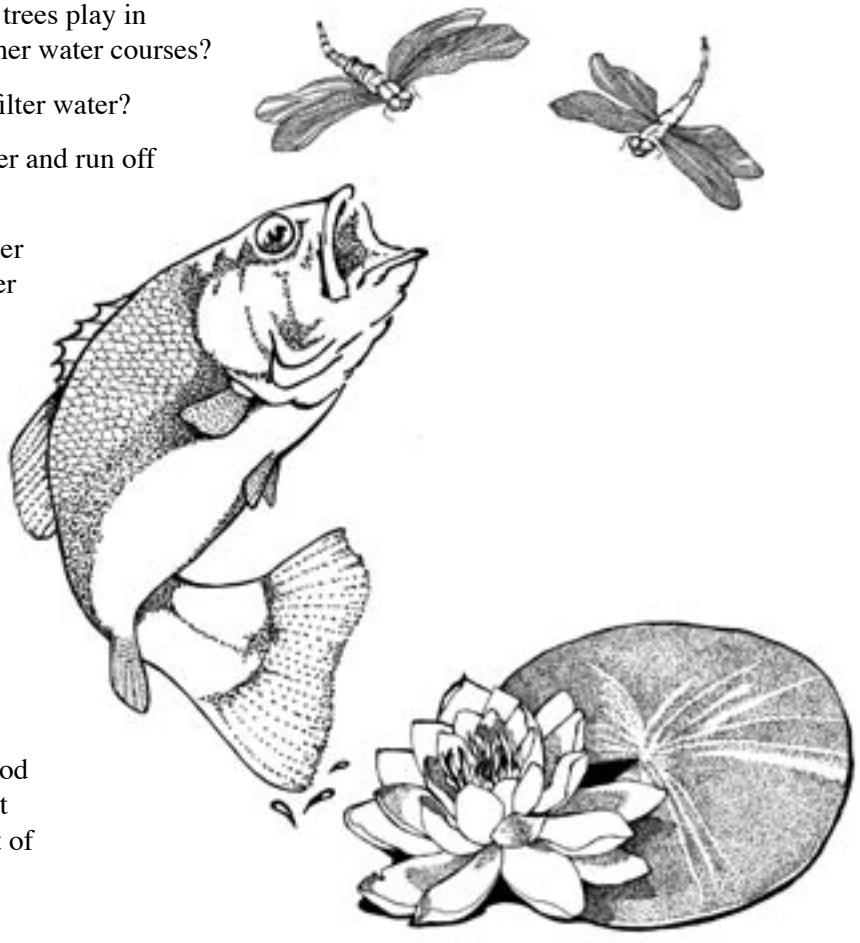
Step 4

When the two weeks have finished, use one class period and have each team present their experiment to the rest of the class (five minutes to present and five minutes for questions).

Leave the experimental models up in the classroom for a few days so you can refer to them as appropriate in your ecosystem discussions.

Extensions

- Have students design an outdoor "real life model" using real plants and a large scale model of a stream.
- Have students prepare an article for the local paper describing the value of trees as filtering agents and soil savers, discussing how sustainable forest management can help protect streams and other water courses.



Water Experiment Outline

You and your partner have an exciting challenge in front of you! You are going to prepare a 3D model and conduct an experiment that demonstrates how trees (and other plants) filter water, conserve water and slow sedimentation. You are scientists and you need to design the model together.

Your experiment can be focused on either a forest environment or an agricultural setting. Your requirements for the experimental model are the following:

- Create an experiment that will demonstrate how trees slow sedimentation, filter and conserve water.
- Your model must be no larger than the size of a desktop.
- Use mostly "found" materials – anything you can find at home, in a garage, in the school, etc. Avoid purchasing anything.

Suggested materials for model making:

Wood	A flat surface can represent the landscape; think about how you can build some kind of stream or water course on/through the surface. You could also use a shoe box, plastic pipe or a pop bottle cut in half for the stream.
Sponge	Different textures of sponge can represent different species of trees.
Paper Towel	These represent smaller shrubs. You could also use abrasive pot scrubbers or steel wool.
Facial Tissue	This can represent grasses or sedges next to a stream bank.
Food Colouring	This can represent some of the nutrients that might filter through.
Sand	Use sand or soil to demonstrate sedimentation into a stream, or infiltration of water through the soil.

After you set up your model and design your experiment, you will need to keep a log/chart/table of all of your results. It may look something like this:

	AMOUNT OF WATER		
	Tree	Shrub	Grass
Water, no additives			
Water, with food colouring			
Water, with pebbles or sand			

Urban Trees for a Greener School

Lesson 7

Summary

Students will create maps of their schoolyard (or closest treed area), categorizing the diversity of trees they find, and designing a plan (real or imaginary) for enhancing the environmental value of the schoolyard.

NOTE: This activity is best used after students have already learned how to use a dichotomous key for tree and plant identification.

Activity Information

Level: Grades 6 and 7

Subject: Life Science: Diversity of Life, Interactions Within Ecosystems; Visual Arts

Estimated duration: One 60 minute class period for discussion and survey, a second class period to prepare map and design plan, one 60 minute class for presentations

Materials: clipboard, large paper for drawing maps, pencils, diameter tape measure, and pencil crayons

Learning Outcomes

Students will:

- Classify according to several attributes and create a chart that shows the method of classifying.
- Describe the role of a common classification system for living things.
- Identify strengths and weaknesses of different methods of collection and displaying data.
- Describe interactions between biotic and abiotic factors in an ecosystem.

Teacher Background

If you visited Caledon East Public School in Caledon East, Ontario, you would see all kinds of trees that students can explore when they head outside. There are black locusts, silver and sugar maple, white ash, basswood, and some spruce and a variety of pine. However, if you asked the students and staff, they would most likely tell you that they would like to see more trees in their schoolyard. Why?

Trees provide a variety of values to any area. We tend to assume that trees are valuable in rural areas because they are a source for wood and paper products. They give us forests in which to hike, ski and snowshoe, and they provide habitat for a host of wildlife species. But even in urban settings, forests and trees hold great value. Urban forests also need to be managed in a sustainable manner.

Along a city street, trees provide shade and cooling, help in cleaning the air of dust and small particles, serve as barriers to help keep water in the soil and not running over the surface, reduce the impact of noise and generally add to the overall attractiveness of the community. Urban forests need to be managed and protected – they often become damaged by pollution, road salt and vandalism.

Trees in a schoolyard serve the same purposes, and more. They provide shade for outdoor activities for students; they provide nesting and perching sites for birds. They are the day to day interface between students and their natural environment, lending their beauty to the yard and naturalizing the school setting for students and staff alike.

We cannot underestimate the importance of trees in urban communities, including your own schoolyard. Imagine if your schoolyard had more trees, more shade and a greater amount of green space. Imagine if you could “green” the schoolyard! What can be done to make a schoolyard more environmentally friendly and support or enhance the sustainability of the local ecosystem? This lesson will help you and your students explore those possibilities.

NOTE: Depending upon the location of your school, you might consider taking your students to a park or other forested area.

Procedure

Step 1

Begin a class discussion about the importance of forests and forest communities and what trees and forests provide:

- Photosynthesis
- Wildlife habitat
- Travel corridors
- Shade
- Decoration
- Soil stability, etc.

Ask your students if they think there are many trees in their community. Then, have them consider their immediate schoolyard. What are the trees used for in the schoolyard (shade, roosting branches for birds, beauty, place to hang ornaments, etc.)? Do they think the school could benefit from more trees? Where do they think more trees and shrubs could be added without compromising play areas or safety?

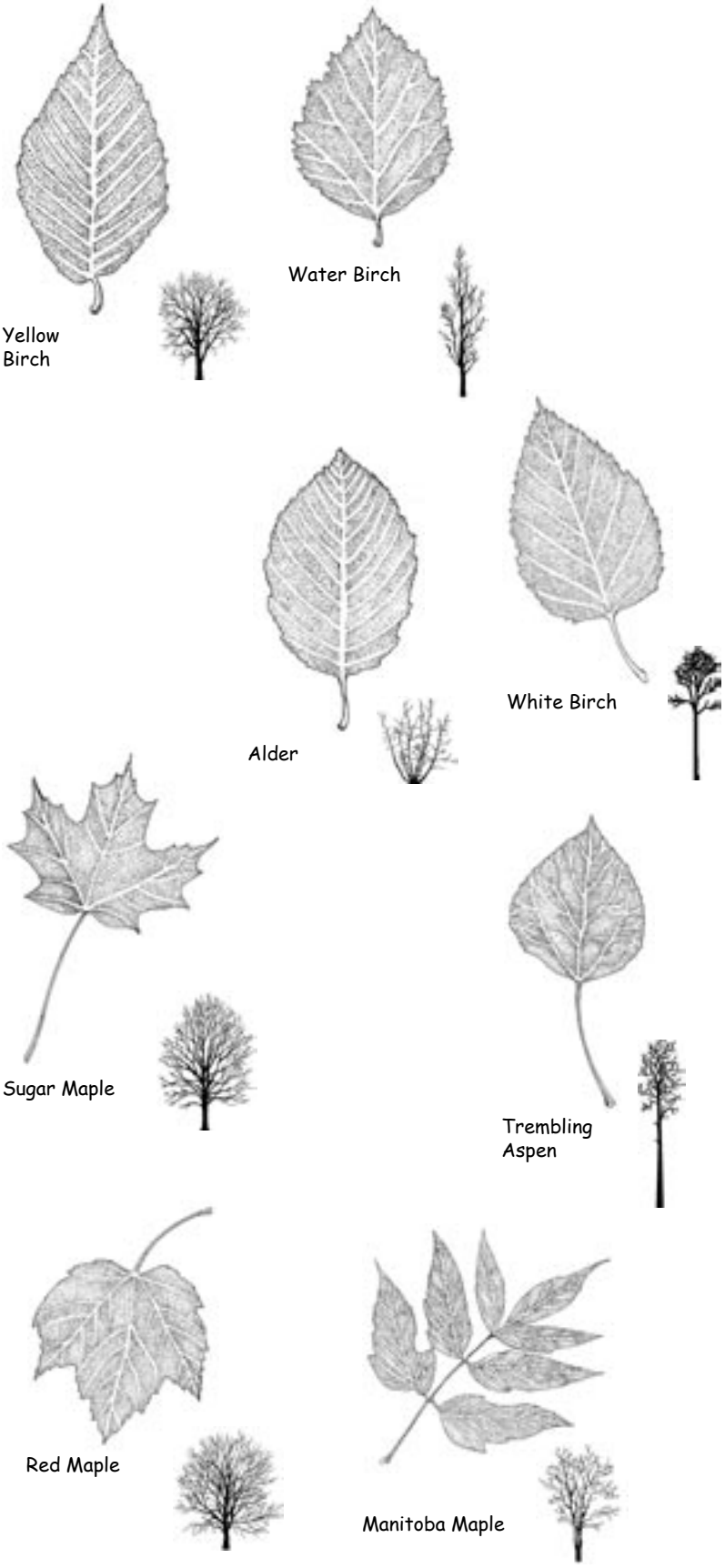
Step 2

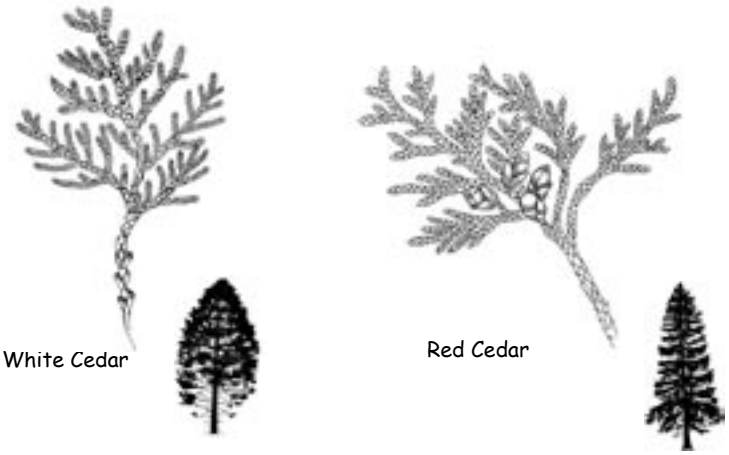
Explain to your students that they will be working together in teams to carry out a survey of their schoolyard. They will gather information about each of the trees they find in the schoolyard: the number, size, species, location and value to the school that each of the trees provides. In order to conduct the survey, they will first need to create a sketch map of the school grounds. They will then consider how they can enhance the environmental value of their schoolyard.

NOTE: Talk to your local municipal offices and determine whether you can access aerial photographs of your schoolyard before the school was built to compare the forest cover.

Step 3

Divide your class into Schoolyard Survey Teams. Each team should be made up of approximately four students. Their first task



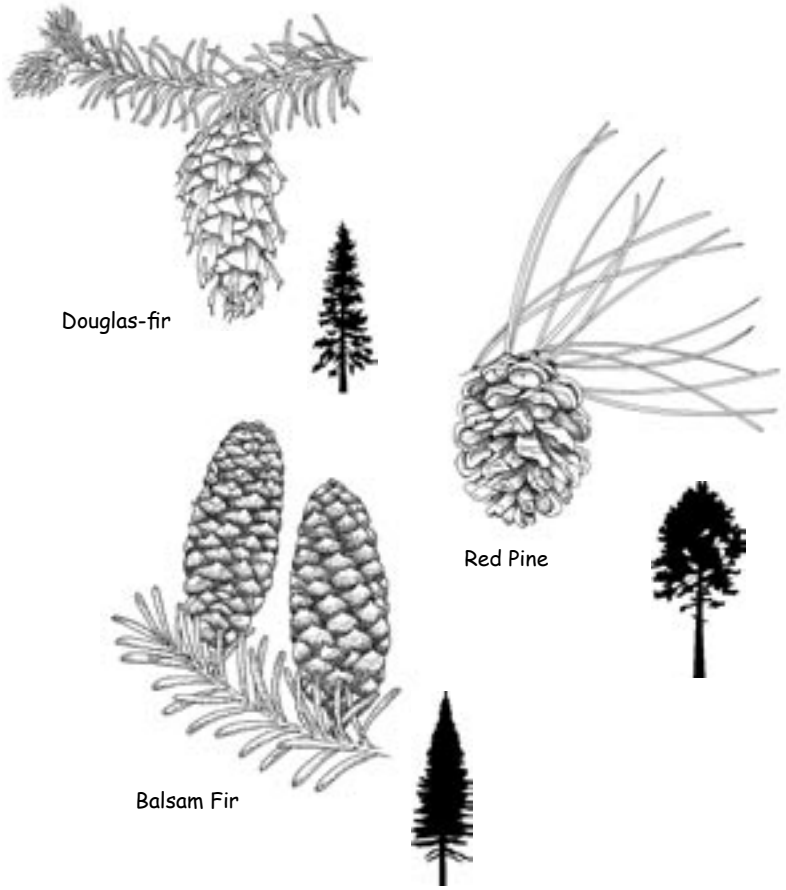


is to create a team name and logo! Then have each group prepare a Tree Survey Form similar to the outline below.

Step 4

Head outside! Each Schoolyard Survey Team will first begin by mapping the school grounds. Have each team walk around the schoolyard and create an outline map of the area. Each time they include a tree on their map, they can approach the tree, measure it, and input their data for that tree onto their survey form.

Tree Number	Tree Species	Diameter	Human Impacts	Value to the School
1	Sugar maple	25 cm	soil compaction by students	provides shade, roost for winter birds
2	White pine	42 cm	decorations hung here during holidays	provides shelter for birds, nesting site, shade
3	Red oak	15 cm	mulch around roots	provides beauty, fall colours
Etc.				



Step 5

Return to the classroom. Have each team review the data they collected in their tree survey. Ask them to answer the following questions:

- What are the common human impacts to the trees in the schoolyard?
- What are the common values that the trees provide?
- In looking at your map, are there places in the school grounds where trees could be added to provide additional value?
- Can you suggest ways to reduce negative human impacts on the existing trees?

Step 6

Have each Schoolyard Survey Team prepare a formal copy of their map, entitled "(The name of the Team)'s Environmental Landscape Design Plan." Have students clearly indicate where they propose to add new trees, shrubs or other plants.

Step 7

Have each Schoolyard Survey Team present their completed Environmental Landscape Design for Urban Forest Sustainability to the class.

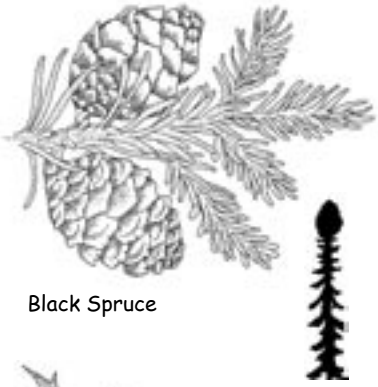
Extensions

- Have the class vote on their favourite plan. Continue to refine the plan, seeking input from everyone in the class. You can proceed as far as you want:
- Do a presentation to the principal/student council
- Do a presentation to the Parent Council
- Do a presentation to the School Board
- Contact Evergreen, Tree Canada or other organizations that provide information about greening schoolyards (see page 10)
- See Cathy Dueck's article entitled "Creating a Schoolyard Tree Nursery" in *Green Teacher* magazine #47 for ideas on how to start your own school tree nursery

Jack Pine

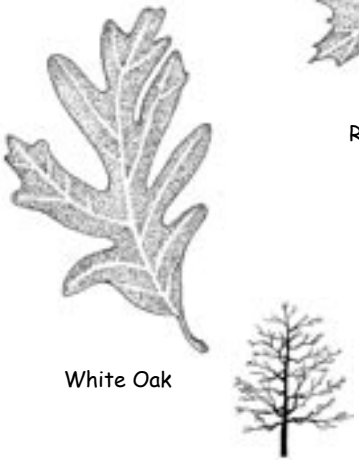
White Pine

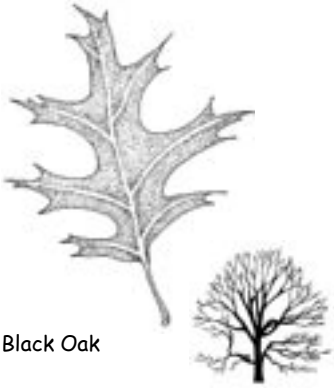
White Spruce


Black Spruce

American Elm

Red Oak


White Oak


Black Oak

And the Award Goes To...

Lesson 8

Summary

Students will work in small groups to research sustainable forest management case studies in Canada, and prepare an award show presentation.

Activity Information

Level: Grade 7

Subject: Life Science: Interactions Within Ecosystems; Language Arts; Geography; Drama

Estimated Duration: One 60 minute class period for discussion and research. Homework includes research time (may choose to run two classroom periods for further research and presentation preparation). Two 60 minute class periods for presentations and nominations.

Materials: SFM'ie Award Nomination Ballot

Learning Outcomes

Students will:

- Provide examples to illustrate that scientific and technological activities take place in a variety of individual or group settings.
- Select and integrate information from various print and electronic sources or from several parts of the same source.
- Defend a given position on an issue or problem, based on their findings

Teacher Background

Historically, forests were managed for singular purposes: for fibre production, elimination of pests, hydro poles, etc. However, in this new age of sustainable forest management, forest companies are recognizing the benefits of blending their forest activities. Now, forests are carefully managed for multiple uses and sustainable forest management is seen as an important management tool that benefits the environment, local communities and the forest industry.

Forest companies, governments, forests and private land owners are realizing that forest management activities need to be sustainable, for a variety of reasons:

- protection of the environment
- biodiversity
- recreational opportunities
- economic health
- societal benefits, etc.

This interactive lesson will have student groups select and research an example of excellence in sustainable forest management and carry out a formal awards process that recognizes that excellence.

Procedure

Step 1

Begin with a general introduction of sustainable forest management for your students. This should include:

- A definition of sustainable forest management: “Management that maintains and enhances the long-term health of forest ecosystems for the benefit of all living things while providing environmental, economic, social and cultural opportunities for present and future generations.”
- A history of how forests have been managed; managed for singular purposes such as hydro poles, extensive clear cutting, non-sustainable harvesting techniques, etc.
- How that management has changed in the past few years: selective clear cutting, silviculture, new harvesting techniques, engineering and processing techniques, training domestic harvesters about the environment and ways to have less impact, new/less damaging equipment. There is

recognition that there must be a balance between society's demand for forest products and the preservation of forest health.

- Reason this has changed (it was no longer sustainable, recognition that forest industry could still survive even while considering the environment, etc.).
- What makes sustainable forest management important? (It considers all aspects and values of the forest and incorporates social, economic and environmental factors).

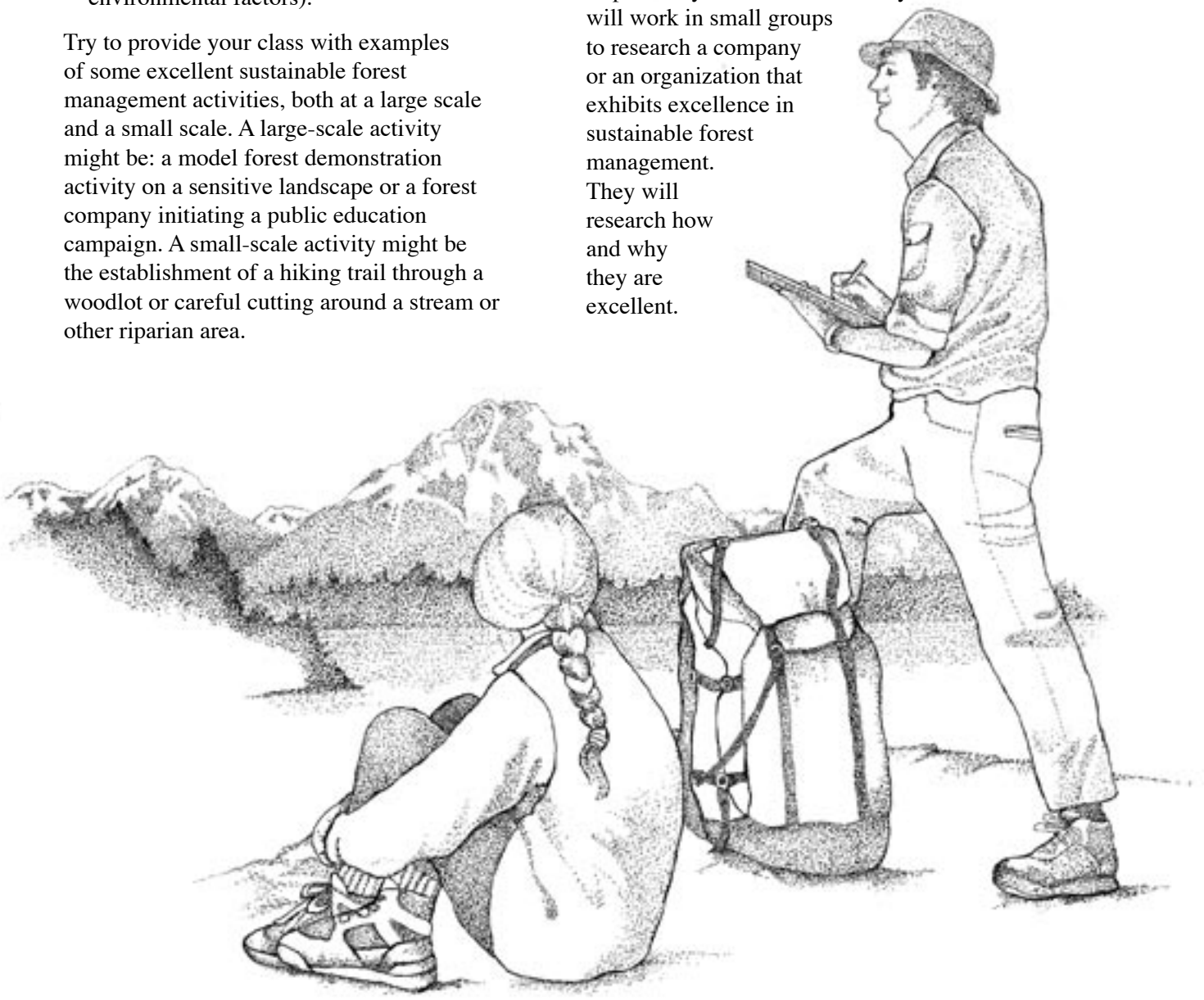
Try to provide your class with examples of some excellent sustainable forest management activities, both at a large scale and a small scale. A large-scale activity might be: a model forest demonstration activity on a sensitive landscape or a forest company initiating a public education campaign. A small-scale activity might be the establishment of a hiking trail through a woodlot or careful cutting around a stream or other riparian area.

Step 2

Carry out a brief introduction/discussion about large-scale award ceremonies, and how awards formally recognize excellence in something. You can consider the Grammy's (music), Emmy's (television); Oscar's (movies)… even the Nobel Prize (peace, science, literature). Ask the students to share their thoughts about what makes these awards (and award shows) special.

Step 3

Explain to your students that they will work in small groups to research a company or an organization that exhibits excellence in sustainable forest management. They will research how and why they are excellent.



During their research they will be preparing a nomination presentation that describes why and how they are excellent, and why they should be selected as the best representation of sustainable forest management in Canada.

Step 4

Divide your class into groups of three or four. Each group will select a company or organization that exhibits excellence in sustainable forest management. The groups can choose an organization listed on the back of this Teaching Kit or complete their own web search and select their nominee. Each group will then conduct their research, and prepare the nomination presentation. (NOTE: Some key words for their web search include: sustainable forest management, model forests, forest industry, environmental policies, etc.)

The presentation can take any form the groups decide: speech, radio broadcast, video conference, commercial (live or video), storyboard, PowerPoint or any combination of media. Each presentation should not be more than ten minutes in length.

Students must include the following in their presentation:

- Environmental policies – Do they have environmental policies?
- Social policies – Do they consider education, recreation and other activities?
- Native/aboriginal people involvement – Do they consider Traditional Ecological Knowledge (TEK)?
- Public participation - Is there community involvement in projects, model forests or other commercial involvement?
- Communication – Do they communicate their excellence to the public?
- Forest Practices – Do they consider the environmental impacts in their harvesting, processing, road construction and water crossing activities?
- Proof of excellence – What is it that makes them excellent?

Step 5

After each group has delivered their presentation, hand out the SFM'ie Award Nomination Ballot to each student (not group; this is an individual assignment). Each student must nominate the company/organization they believe represents the best in sustainable forest management, based on the criteria provided on the ballot. The students must justify their selections on the ballot. (Yes, they can choose their own company/organization if they think it warrants selection!)

Step 6

Collect and tabulate the ballots and then announce the winning company or organization to the class. Facilitate a brief discussion about why this particular organization/company won the SFM'ie.

NOTE: You may suggest that the team that wins could contact the company/organization and present them with the presentation materials.

Extension

- In order to expand the lesson geographically, and recognize that sustainable forest management is happening throughout the world, you may choose to have your class research an international forest company or organization that exhibits excellence in sustainable forest management. Do their forestry activities mirror Canada's or are they significantly different?

The SFM'ie Award Nomination Ballot

	Selection Criteria						
The Nominees Are: (write names of all companies or organizations below)	Does the company/organization recognize sustainable forest management as an important management tool?	Does the company/organization have any special programs (tours, trails, etc.) to help the general public understand sustainable forest management?	Does the company/organization participate in a recognized certification program?	Does the company/organization have any educational programs for employees or school children?	Does the company/organization carry out any environmental research on plants and/or wildlife?	Total	

Based on the criteria above, my vote goes to:

The rationale for my selection is (use the back of the sheet if necessary):

Glossary of Terms

Biodiversity: The variety of life on earth, different species, genetic variability within species and the variety of ecosystems in which they live.

Boreal forest: One of three main forest zones in the world (see also tropical forest, temperate forest); it is located in northern regions and is characterized by the predominance of conifers.

Certification (forest): Forest certification is a market-based instrument aimed at promoting sustainable forest management that takes into account environmental, economic and social issues. It involves the independent assessment of forest management according to internationally (or nationally) accepted standards, and the tracking and monitoring of the supply of forest products to the marketplace. If the forest management is in compliance with a set of specified standards, and the timber from this forest has been tracked and accounted for through all stages of the production process, then it can be given a label which is recognized in the marketplace.

Coniferous: Refers to a forest stand or category of trees or bush that is popularly called "evergreen." Cone-bearing trees with needles or scale-like leaves. The wood of conifers is commercially known as "softwood."

Deciduous: Perennial plants which are normally leafless for some time during the year.

Deforestation: Clearing an area of forest for another long-term use.

Ecosystem: An interdependent system of living organisms and their physical and geographic environment.

Forest fire: Any wildfire or prescribed burn that is burning in forest, grass, alpine or tundra vegetation types.

Forester: A person trained in forest management usually with a university degree in forestry science.

Habitat: The arrangement of food, water, shelter and space suitable for species survival.

Hardwood(s): Trees with leaves and that are found primarily in a deciduous forest. Trees that lose their leaves in autumn; broad leafed species such as oak, alder or maple.

Harvesting: The practice of felling and removing trees or the removal of dead or damaged trees from an area.

Prescribed burning: The knowledgeable application of fire to a specific unit of land to meet predetermined resource management objectives.

Reforestation: The reestablishment of trees on denuded forest land by natural or artificial means, such as planting and seeding.

Regeneration: The continuous renewal of a forest stand. Natural regeneration occurs gradually with seeds from adjacent stands or with seeds brought in by wind, birds, or animals. Artificial regeneration involves direct seeding or planting.

Renewable: Something that can be used again or replaced. Trees are a renewable resource because they can be easily regrown.

Riparian Zone: An area of land adjacent to a stream, river, lake or wetland that contains vegetation that, due to the presence of water, is distinctly different from the vegetation of adjacent upland areas.

Second growth: A forest or stand that has grown up naturally after removal of a previous stand by fire, harvesting, insect attack or other cause.

Silviculture: The science and art of the cultivation of forests; the growing and tending of trees. (e.g. planting and seeding) and intensive silviculture (e.g. site rehabilitation, spacing, and fertilization).

Softwood(s): Cone-bearing trees with needle or scale-like leaves such as Douglas-fir, western red cedar and Ponderosa pine. Softwoods are the predominant tree type in coniferous forests.

Stand: A community of trees possessing sufficient uniformity in composition, age, arrangement, or condition to be distinguishable from the forest or other growth on adjoining areas, thus forming a silvicultural or management entity.

Sustainable forest management: Management that maintains and enhances the long-term health of forest ecosystems for the benefit of all living things while providing environmental, economic, social and cultural opportunities for present and future generations.

Traditional ecological knowledge: Ecological information and knowledge, handed down from generation to generation through beliefs, legends and stories, particularly among Aboriginal peoples.

Urban forestry: The cultivation and management of trees and forests for their present and potential contributions to the physiological, sociological and economic well-being of urban society.

Wetland: A swamp, marsh or other similar area that supports natural vegetation that is distinct from adjacent upland areas.

CFA Programs www.canadianforestry.com

National Forest Week

The CFA has been the sponsoring agency for National Forest Week in Canada for over 70 years. National Forest Week allows the CFA to work with partners across the country to raise awareness of forest issues.

The CFA and the provincial forestry associations work together to set a theme for the week. The theme then becomes the focus for a series of educational and public information campaigns and activities across Canada.

The federal and provincial governments, forest industry, regional and community organizations, and educational institutions take part in National Forest Week activities.

Smokey Bear and the National Fire Education Program

Fire remains an important element of the CFA's public education program. The CFA is Smokey Bear's home in Canada. Smokey has been carrying the flag for forest fire prevention since 1940, and his message is as important now as it has ever been. A large number of forest fires are still caused by human carelessness.

CFA's Smokey Bear program allows us to get that important forest fire prevention message out to school children, but it also provides an opportunity to talk about the critical and positive role of fire in some forests ecosystems.

The CFA distributes a large and very popular selection of promotional items under the Smokey Bear program. Contact our Ottawa office for information.

Forest Capital of Canada

Each year, the CFA designates one community in Canada as the Forest Capital of Canada. The Forest Capital community then becomes the focal point for a series of forest education and public information activities, programs and events.

The Forest Capital of Canada program allows the CFA to bring municipalities, industry, and community organizations together to build understanding of forest issues at the local level. It also allows communities to highlight and celebrate their rich forest heritage on a national level. The Forest Capital for 2002-2003 is Corner Brook, Newfoundland and Labrador.

Poster Contest

This year's National Poster Challenge is designed to fit into the upcoming World Forestry Congress. Posters are being solicited through the CFA as well as the Canadian Model Forest Network and International Model Forest Network. Students are invited to create a landscape (horizontal) 8 1/2 x 11 piece of art that depicts "what the forest means to me." The poster should be drawn on unlined, plain white paper with the use of pencil crayons, crayons or markers (the name, age, grade and name of school - with school address - should be on the back of the poster).

The exciting part of this challenge is that winning posters will be printed on a large 10 m x 3 m high quilt which will serve as a backdrop to special events at the World Forestry Congress. Participants whose posters are selected to be included on the quilt will receive special recognition from the World Forestry Congress on behalf of the Food and Agriculture Organization of the United Nations.

If you have any questions, please contact: dlemkay@nrcan.gc.ca

Membership

The CFA was established in 1900 as a voice for Canada's forests, with a mandate to promote long-term forest health. Our efforts are as important now as they were 100 years ago. We believe we can maintain the ecological integrity, physical health and natural beauty of Canadian forests. You can help us in this forest conservation effort by becoming a member of our organization.

For more information visit our web site: www.canadianforestry.com/html/about_cfa/cfa_membership

Answers to "Sustainable Forests, What's Involved?"

S	F	M	D	D	A	E	R	A	D	E	T	C	E	T	O	R	P	R	A
N	I	L	H	D	F	I	R	S	T	N	A	T	I	O	N	S	T	R	F
Q	A	P	I	U	G	G	Z	F	E	E	E	G	C	A	D	E	G	G	C
W	R	T	C	E	R	T	I	F	I	C	A	T	I	O	N	K	T	H	J
E	N	F	U	H	G	D	G	J	J	O	B	D	S	B	J	G	T	D	C
F	R	O	G	R	C	S	Y	T	I	S	R	E	V	I	D	O	I	B	N
C	R	C	I	L	A	V	M	N	B	Y	K	N	L	R	S	H	B	J	H
H	D	N	A	T	S	L	V	O	V	S	O	A	F	Q	E	T	S	G	D
O	R	C	J	V	A	S	D	R	D	T	B	N	N	G	N	K	O	A	G
S	F	V	F	V	M	R	Q	I	G	E	F	U	N	N	N	R	F	S	N
F	L	O	R	A	F	H	E	J	S	M	L	A	G	J	S	A	T	C	I
O	W	F	H	C	N	J	J	N	V	T	H	F	S	B	A	T	W	B	T
R	M	M	G	S	F	F	S	V	E	C	U	A	O	A	F	T	O	N	T
E	P	U	F	B	J	K	H	S	E	G	D	R	D	R	V	J	O	J	U
S	I	L	V	I	C	U	L	T	U	R	E	A	B	G	E	C	D	O	C
T	D	H	J	F	H	S	A	V	N	S	J	R	K	A	K	S	C	L	R
F	K	T	S	S	G	M	J	B	D	M	D	D	D	D	N	K	T	P	A
I	G	T	Y	U	I	G	D	G	T	A	T	I	B	A	H	C	B	D	E
R	N	M	S	L	R	R	F	J	J	S	S	R	U	K	B	B	E	B	L
E	S	G	C	R	J	M	S	H	A	R	D	W	O	O	D	D	G	S	C

Answers to "Searching for Signs of Sustainability"

1. Who's who in the forest – **owl**
2. Where the maple syrup for your pancakes starts – **tapping the maple tree**
3. A rotten home for forest insects – **stump and fallen log**
4. An early stage of paper, books, chairs or toothpaste – **log pile**
5. Forest gardening machine – **feller-buncher**
6. Does this tree measure up – **forester technician measuring tree**
7. Planting for the future – **tree planter planting seedling**
8. Human harvester – **a logger cutting a log**
9. A furry species at risk and its habitat – **pine marten in hollow of tree**
10. Long-legged herbivore sharing the forest – **deer**
11. Forest floor biodiversity – **worm, rabbit, mushrooms, iris.**
12. A lid on the forest – **forest canopy (top left corner)**
13. A walk on the wild side – **hiker**
14. Junior member of the forest – **seedling**

The following group of dedicated organizations has partnered with the Canadian Forestry Association for the past century:

Newfoundland Forest Protection Association
Box 728 Mount Pearl, NL A1N 2C2
T: 709-729-1012 F: 709-368-2740
E: nlfpa@nfld.com

Nova Scotia Forestry Association
Box 1113
Truro, NS B2N 5G9
T: 902-893-4653 F: 902-893-1197
E: dtotten@nsfa.ca

PEI Forest Improvement Association
Covehead Road, RR1, York
Covehead, PE C0A 1P0
T/F: 902-672-2114
E: wm.hemphill@pei.sympatico.ca

Canadian Forestry Association of New Brunswick (The Tree House)
124 St John Street
Fredericton, NB E3B 4A7
T: 506-452-1339 F: 506-452-7950
E: treehouse@fundy.net

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
E: afce@afce.arbre.foret.org

Ontario Forestry Association
200 Consumers Road, Suite 307
North York, ON M2J 4R4
T: 416-493-4565 F: 416-493-4608
E: forestry@oforest.on.ca

Manitoba Forestry Association
900 Corydon Avenue
Winnipeg, MB R3M 0Y4
T: 204-453-3182 F: 204-477-5765
E: mfainc@sympatico.ca

Saskatchewan Forestry Association
Box 400
Prince Albert, SK S6V 5R7
T: 306-763-2189 F: 306-764-7463
E: forestry@inet2000.com

Forest Education British Columbia
1505 West Second Avenue, Suite 503
Vancouver, BC V6H 3Y4
T: 604-737-8555 F: 604-737-8598
E: info@fored.com

Envirothon

Envirothon is an environmental education program for secondary school students. In Canada, it is administered by the Canadian Forestry Association (CFA) and participating provincial forestry associations. Envirothon is delivered through local schools with the assistance of cooperating organizations, agencies, companies and individuals. There are three components to Envirothon:

- School-based learning guided by a set of learning expectations, and key references.
- Workshops and field trips led by local professionals.
- Regional, provincial and international team competitions, including an outdoor component and group oral presentations.

Goal

To increase secondary school students' knowledge of environmental issues and ecological sustainability principles through practical studies in their own communities.

Program Review

- Envirothon is an environmental education program based on teamwork, collaboration and competition.
- Teams consist of five students from grades 9 to 12.
- Teams compete in four environmental areas through studies in aquatic ecology, forests, soils, and wildlife, and a fifth topic that changes annually.
- This year's fifth topic is agricultural land conservation preservation.

Canada's Envirothon co-ordinator is Debbie Totten. She can be reached at dtotten@nsfa.ca

Nova Scotia Envirothon Champions from Digby Regional High, Nova Scotia. Envirothon teammates from Swan River Regional High, Manitoba (inset photo).

CFA Teaching Kits

The CFA's Canada's Forest Teaching Kit Series is a popular set of tools for Canadian educators. Each volume of the series deals with a specific topic important to the health of Canadian forests. Our Teaching Kits are developed by professional curriculum writers and reviewed by teachers and science experts. Please contact the CFA or visit our web site for copies of:

Volume 1: Learning From the Past, Building for the Future (Forest Practices)

Volume 2: A Breath of Fresh Air (Climate Change)

Volume 3: All Things Big and Small (Biodiversity)

Volume 4: Source of Life (Sustainable Forests)

www.canadianforestry.com/html/education/cfa_kits_e.html

Available in French and English

Canadian Forestry Association
since 1900

The CFA is Canada's oldest conservation organization, with a rich legacy of public education and advocacy, promoting the wise use of Canadian forest resources.

Partners in Forest Education

The Canadian Forestry Association gratefully acknowledges the following organizations for their assistance in the development, production and distribution of the Canada's Forests Teaching Kit Series:

Abitibi-Consolidated Inc.

Alberta Environment

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Canadian Council for Geographic Education

Canadian Model Forest Network

Canadian Wood Council

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John Deere

Louisiana Pacific Canada Limited

Kruger

National Forest Strategy Coalition

Natural Resources Canada, Canadian Forest Service

NSERC PromoScience

Province of Ontario, Ministry of Natural Resources

Province of Nova Scotia, Department of Natural Resources

Royal Bank of Canada Foundation

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