

Dear Teachers,

The forests play a vital role in sustaining and enhancing the lives of people in this province. Our forests are ecologically, economically and culturally important to Newfoundland and Labrador and we rely on them to provide employment, recreation, products and a healthy environment.

For this reason, the *Futures from Forests* teaching materials were produced by the Model Forest of Newfoundland and Labrador on behalf of our project partners: The Department of Natural Resources – Forestry Division, Department of Innovation, Trade and Rural Development, Service Canada, Natural Resources Canada, Kruger and Abitibi-Bowater. Guidance for this project was also received from the Department of Education and the Canadian Institute of Forestry.

This teaching resource is designed for teachers of high school environmental science but they can also be used by teachers of science, social science, careers and other courses at the high school and junior high school levels. The binder includes a DVD and PowerPoint presentations developed specifically for this project, as well as teacher's notes, worksheets, case studies and supplementary materials. These resources are user friendly and designed to fit with the learning objectives found in the relevant course curriculum. Worksheets and case studies found in this binder can be photocopied for student use and answer keys are provided for teachers. The DVD can be viewed in its entirety or divided into three sections, each with its own student worksheet. PowerPoint presentations contain teacher's notes and discussion questions to enhance the learning experience for students. **Please note that the PowerPoint presentations were designed using PowerPoint 2007 so some formatting options may be lost if using an older version of this software.**

This project would not have been possible without the help and support of those who provided advice, information, guidance and review of all teaching materials. Thank you to all those who have been involved in *Futures from Forests*!

Copies of this teaching resource can be obtained by contacting the Model Forest of Newfoundland and Labrador in Corner Brook by phone (709) 637 7300 or fax (709) 634 0255. Further contact details can be found on our website www.mfnl.ca

We welcome your feedback and have included an evaluation form for this purpose. We hope that you find this resource useful in teaching your students about the forests and forest industry in Newfoundland and Labrador.

Bonny Moroni
Education Specialist
Model Forest of Newfoundland and Labrador





Thank you to our partners



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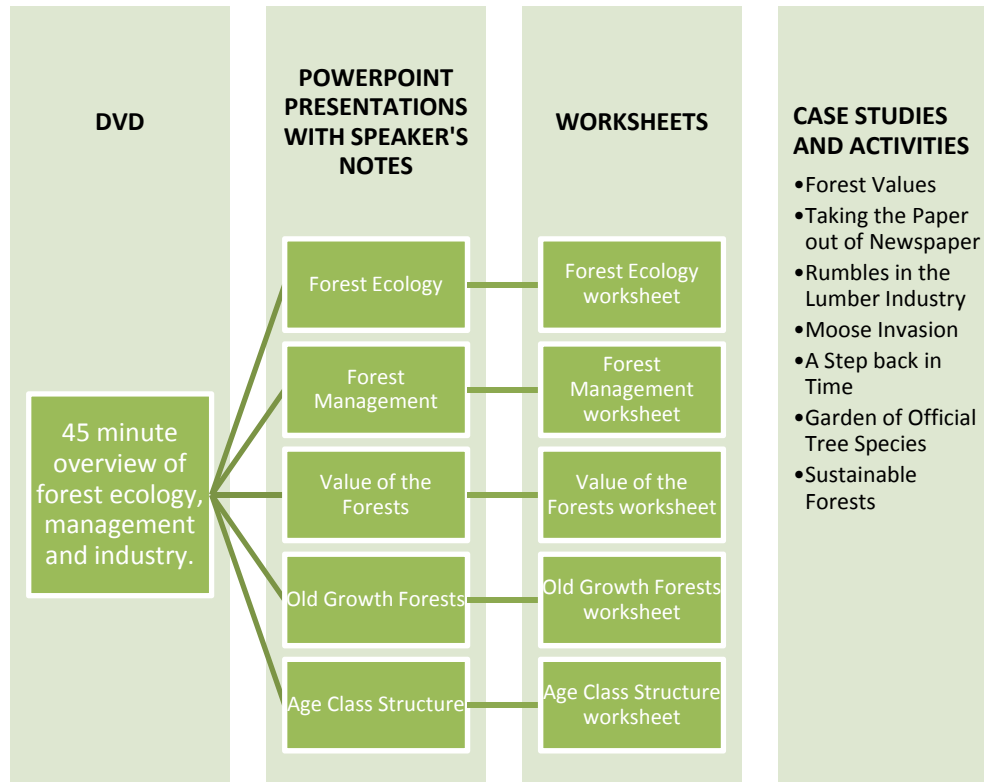


Model Forest
OF NEWFOUNDLAND & LABRADOR

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How to use Futures from Forests



Futures from Forests can be used in a variety of ways. The DVD and PowerPoint presentations can be used on their own or in conjunction with the relevant worksheets and case studies. All printed materials in this binder can be reproduced for educational purposes.

- The **DVD** is designed as an overview of the forests and forestry industry in Newfoundland and Labrador. At 45 minutes in length, it can be shown in one lesson, or divided into 3 individual lessons:
 - Part 1 – Introduction to the boreal forests (6 minutes)
 - Part 2 – Forest Management in Newfoundland and Labrador (28 minutes)
 - Part 3 – Forest Products and Research (11 minutes)
- The **PowerPoint Presentations** are each designed to take around 30-45 minutes. Each PowerPoint presentation contains teacher's notes with further explanation of concepts, definitions of terms, discussion questions, web links and activities to use before, during or after the presentation. The associated worksheet is designed to allow students to take notes during the presentation and possible answers are provided in the 'Answer Key' section of this binder.
- The **Case Studies and other Worksheets** are designed as 'stand alone' activities to be used as homework tasks or extension exercises. Answers are also provided in the 'Answer Key' section of this binder.

Discussion Questions

The following is a list of questions to be used either *before* or *after* the DVD or PowerPoint presentations. They can be used for a number of purposes: to generate student interest in the presentation; allow teachers to determine student knowledge prior to the presentation; follow up on concepts covered in the presentations; or evaluate student learning through the presentation.

DVD

These questions were asked to students as part of the DVD production and many student responses are featured in the DVD presentation, providing a useful connection between the discussion questions and the DVD presentation.

- Do you know anyone who works in the Forestry Industry? What do you like most about the forests in Newfoundland and Labrador?
- What kind of trees do we have in Newfoundland and Labrador?
- Why are the forests important for the future of Newfoundland and Labrador?
- Who owns the forests in Newfoundland and Labrador?
- How do you feel about clear cutting?
- Should we protect the forests from fire? Why/why not?
- What should be done about insect outbreaks in the forests?
- Should forestry companies be required to plant one tree for every tree that is harvested?
- What is made from all of the trees harvested in Newfoundland and Labrador?
- What does the future hold for the forestry industry in Newfoundland and Labrador?
- What do you like the most about our forests in Newfoundland and Labrador?

Forest Ecology PowerPoint Presentation

- What forest type/s do we have in Newfoundland and Labrador?
- Where else are boreal forests found?
- What climatic conditions are required for boreal forests to survive?
- How have trees adapted to the climate and conditions in Canada?
- What are the most common trees found in Newfoundland and Labrador?
- What is the provincial tree of Newfoundland and Labrador?
- What are the main natural disturbances in the forests of Newfoundland and Labrador?
- “Fire, insects and harvesting are a threat to the forests in Newfoundland and Labrador and should be suppressed wherever possible.” Discuss.

Forest Management PowerPoint Presentation

- How has our view of the forests and forest resource changed over the past 100 years? Provide some examples.
- Many things have changed in forest management over the past 100 years. List some issues that are considered important in forest management today but were not viewed as so important in the past.
- Inventory is the collection of information about the forests, such as location, type and age of forests, evidence of wildlife and damage caused by fire or insects. Why would this information be useful to forest managers?
- What is Crown land?
- What do you think is the biggest threat to the forest resources of Newfoundland and Labrador?
- Should all forest fires in the province be suppressed? Why/why not? Under what circumstances?
- How should forest managers respond to insect outbreaks?
- What are the advantages of using insecticides to control insect outbreaks? What are the disadvantages?
- What kinds of illegal activities might forest managers or conservation officers face?
- Why do some parts of the province need to be replanted with seedlings?

Value of Forest Ecosystems

- Why are forests important to you?
- How do your forest values differ from other people's forest values?
- What is meant by the 'global economy?' How do changes in the global economy affect the newsprint and lumber industries here in Newfoundland and Labrador?
- What do you think the future holds for the newsprint industry in Newfoundland and Labrador?
- What do you think the future holds for the lumber industry in Newfoundland and Labrador?
- List five non-timber forest products.
- Why is there less demand for lumber in North America over the past few years? Do you think this situation will change? Why/why not?
- What is meant by the 'value added' industry? What are the benefits to the province of moving into this industry?
- How do forests store carbon? How can this carbon be released?

Old Growth Forests/Main River Forest Ecology

- What are old growth forests?
- Should we protect old growth forests? Why/why not?

- What values are found in areas of old growth forests?
- Should harvesting of trees be allowed in old growth forests? If not, why not? If so, how should it be conducted?

Age Class Structure

- What is the annual allowable cut?
- What factors do you think should be considered when determining the annual allowable cut?
- What are the benefits of maintaining some old trees in the forest landscape?
- What factors should forest managers consider to ensure that forest resources are sustainable?
- List the ways that forest manager intervene to manage forests? What are the benefits and risks of this intervention?

Suggested Activities

The following suggestions and activities may be useful *extension* to the DVD or PowerPoint presentations.

Forest Ecology in Newfoundland and Labrador

- Take students outdoors to look closely at a coniferous tree, or bring a few branches into the classroom. Ask students to jot down the features that they observe (for example, needles rather than leaves, downward sloping boughs, waxy needles etc.) After reporting back on their observations, ask students to brainstorm as to how these features may help the conifer survive in our boreal climate.
- Collect black spruce cones. Put the cones on a cookie sheet and place in the oven. Set the temp at a low setting (around 100 degrees Celsius) for a short time. Look to see that some of the resin sealing the cone is melting onto the cookie sheet. Once the cone has begun melting its resin, turn off the heat in the oven and allow the cones to cool down. Once cool, remove and allow the scales to pull back (usually takes a few hours). As the scales open, the cone should release its seeds (you may need to shake the cones a bit to get all of the seeds out). Use this as the basis for a discussion of fire as a natural disturbance in Boreal forests.
- Allow students to conduct research on a forest ecosystem (such as tropical rainforest or temperate mixed forest) and compare the location, climate, tree species, and dominant natural disturbance of this ecosystem with the Boreal forest ecosystem found in Newfoundland and Labrador.
- Research the mountain pine beetle and its effects on the forests in Western Canada. What factors caused the spread of the beetle in the forests of Western Canada? How did this affect the forestry industry in these regions? How might these changes affect our forestry industry here in Newfoundland and Labrador? For more information, see http://mpb.cfs.nrcan.gc.ca/biology/index_e.html

Forest Management in Newfoundland and Labrador

- Invite a forest manager or conservation officer into the classroom to present this slideshow or talk about his or her career in forest management.
- Interview a retired person who worked in the forestry industry and who has lived in Newfoundland and Labrador for at least 60 years. Ask them to describe how the forest industry and forest management have changed since they were young.
- Conduct a classroom debate or prepare a poster presentation on the advantages and disadvantages of using insecticides to protect our forest resources.

- Prepare a research report on the impact of the introduction of moose to the island of Newfoundland.
- What are bio-fuels? Research a bio-fuel product being developed in Newfoundland and Labrador, such as wood pellets or briquettes. What are the advantages of using these products over traditional heating products such as oil?

Value of Forest Ecosystems in Newfoundland and Labrador

- Invite one or more of the following people into your class to discuss how and why the forests are valuable to them:
 - Forester, harvester, woodlot owner or person working in the pulp and paper or sawmilling industries
 - Woodworker, cabinet maker, wood turner, or craftsperson
 - Member of a First Nations or Aboriginal group
 - Representative of Parks and Natural Areas or Parks Canada
 - Scientist who researches forest soil, water, vegetation, wildlife, or fish
- Invite a forest manager or conservation officer to lead your class through a forested area and identify the various components of a forest ecosystem. Create a flow chart to illustrate how all the plants and animals in this ecosystem are reliant on each other for survival.
- Research changes in the pulp and paper industry in Newfoundland and Labrador, Canada and globally over the past decade. Why is there less demand for Canadian newsprint?
- Research how climate change is predicted to affect the boreal forests of Canada. Present your findings as a poster or research report.
- What are 'ecological goods and services?' What ecological goods and services do the forests provide in Canada? Should we put a dollar figure on these goods and services? See "Natural Values: Linking the Environment to the Economy" from Ducks Unlimited (in the supplementary resources of Futures from Forests binder or at http://www.ducks.ca/conservation/wetland_values/pdf/nv1_eg.pdf) for an overview of this issue.
- Research the George River Caribou herd in Quebec and Labrador. Why is this caribou herd receiving such attention in the media?
- How is maple syrup produced? Prepare a poster or diagram illustrating the syrup making process.
- What ecosystem is favored by the Newfoundland Pine Marten? Present your research findings as a poster or brochure aimed at educating the public on the Marten. For further information, see <http://cfs.nrcan.gc.ca/index/newfoundlandmarten> or <http://www.newfoundlandmarten.com>
- How do forests sequester (store) carbon from the atmosphere? Research how forests can be used to lesson global dependency on fossil fuels.

Old Growth Forests/Main River Forest Ecology

- Look at a topographical map of Newfoundland. What geographical features may help explain why the forests in Main River have been insulated from the impact of insects, wind, fire and disease that have destroyed other areas of forest outside this region?
- Prepare a poster or presentation on one of the rivers found in the Canadian Heritage River system. For more information, see <http://www.chrs.ca>
- Research the controversy surrounding the harvesting of Main River in the 1990's. Prepare a chart showing the groups involved in the debate and why they were either opposed to or supportive of harvesting in this area.

Age Class Structure

- Invite a forest manager or conservation officer into the classroom to present this slide show.
- Invite a forest manager or conservation officer to show you around some managed forest stands near your community.
- Prepare a chart that compares managed forests with unmanaged forests. What are the advantages of allowing forests to grow on their own without human intervention? What are the advantages of human intervention to manage forests, such as seen through the age class structure presentation?

Curriculum Connections¹

Environmental Science 3205	DVD Presentation & Worksheet	Forest Ecology PowerPoint Presentation & Worksheet	Forest Management PowerPoint Presentation & Worksheet	Forest Values PowerPoint Presentation & Worksheet	Old Growth Forests PowerPoint Presentation & Worksheet	Age Class Structure PowerPoint Presentation & Worksheet	Case Studies and Worksheets
3.01 identify the role forest ecosystems have in the supporting life in the biosphere	●	●		●			
3.03 list and locate the forest regions of Canada		●			●		-Garden of Official Tree Species ²
3.04 outline the value of forest ecosystems	●			●			-Forest Values
3.05 recognize that Newfoundland and Labrador exists within the boreal forest region	●	●			●		
3.06 list forest usage in Newfoundland and Labrador	●		●	●			-Taking the paper out of Newspaper -Rumbles in the Lumber Industry
3.07 list the characteristics of the boreal forest ecosystem.	●	●					-Let's be clear about clear cutting
3.08 list the dominant flora (trees) of the boreal forest	●	●					
3.10 define primary and secondary succession		●					
3.11 outline the role of fire in boreal forest succession	●	●	●				
3.12 describe the unique forest succession in the Main River old growth forest					●		
3.13 identify regions of old growth forest in Newfoundland and Labrador					●		
3.14 list characteristics of old growth forests					●		
3.15 describe the importance of an old growth forest					●		

¹ Curriculum Connections were accurate at time of printing. Please check with the Department of Education for the most recent curriculum documents.

² Lesson plan, worksheets and answer keys supplied by Natural Resources Canada

Environmental Science 3205 (continued)	DVD Presentation & Worksheet	Forest Ecology PowerPoint Presentation & Worksheet	Forest Management PowerPoint Presentation & Worksheet	Forest Values PowerPoint Presentation & Worksheet	Old Growth Forests PowerPoint Presentation & Worksheet	Age Class Structure PowerPoint Presentation & Worksheet	Case Studies and Worksheets
3.16 evaluate environmental and social concerns related to the maintenance versus harvesting of old growth forests	●					●	
3.17 outline the history of forest management in Newfoundland and Labrador from the 19th century to present.	●		●				-A step back in time
3.18 recognize the paradigm shift in forest management from exploitation to sustainable development			●				-Let's be clear about clear Cutting
3.20 list the criteria used for measuring success of SFM			●				-Sustainable Forests ³ -Canadian Model Forest Network
3.21 identify the role of the Canadian Model Forest Network in promoting SFM							-Canadian Model Forest Network
3.22 list the components in forest management planning	●		●			●	
3.23 identify the role of the public in the development of a forest management plan			●				
3.24 distinguish between clear cutting and selective cutting as forest harvesting techniques in NL	●						
3.25 identify the improvements made to clear cutting to reduce impacts on the forest ecosystem.	●					●	-Let's be clear about clear cutting
3.26 define silviculture	●		●				
3.27 describe silviculture techniques	●		●				
3.30 identify new technologies used in the forest industry	●		●				-Let's be clear about clear cutting
3.31 identify various environmentally related careers within the forestry sector.	●		●	●			

³ Lesson plan, worksheets and answer keys supplied by Natural Resources Canada

Science 1206 UNIT 1 (LIFE SCIENCE: SUSTAINABILITY OF ECOSYSTEMS)	DVD Presentation & Worksheet	Forest Ecology PowerPoint Presentation & Worksheet	Forest Management PowerPoint Presentation & Worksheet	Forest Values PowerPoint Presentation & Worksheet	Old Growth Forests PowerPoint Presentation & Worksheet	Age Class Structure PowerPoint Presentation & Worksheet	Case Studies and Worksheets
114-1 explain how a paradigm shift can change scientific world views	●		●				-A Step Back in Time
118-1 compare the risks and benefits to society and the environment of applying scientific knowledge or introducing a new technology			●			●	
118-5 defend a decision or judgment and demonstrate that relevant arguments can arise from different perspectives							-Moose Invasion
212-4 state a prediction and a hypothesis based on available evidence and background information							All case studies
213-7 select and integrate information from various print and electronic sources or from several parts of the same source	●	●	●	●	●	●	All case studies
214-3 compile and display evidence and information, by hand or computer, in a variety of formats, including diagrams, flow charts, tables, graphs, and scatter plots							-Moose Invasion -Forest Values
215-1 communicate questions, ideas, and intentions, and receive, interpret, understand, support, and respond to the ideas of others							All case studies
215-4 identify multiple perspectives that influence a science-related decision or issue							-Moose Invasion -Sustainable Forests ⁴
331-6 analyse the impact of external factors on an ecosystem	●		●		●	●	-Moose Invasion
318-6 explain how biodiversity of an ecosystem contributes to its sustainability	●	●			●		

⁴ Lesson plan, worksheets and answer keys supplied by Natural Resources Canada

Newfoundland and Labrador Studies 2205	DVD Presentation & Worksheet	Forest Ecology PowerPoint Presentation & Worksheet	Forest Management PowerPoint Presentation & Worksheet	Forest Values PowerPoint Presentation & Worksheet	Old Growth Forests PowerPoint Presentation & Worksheet	Age Class Structure PowerPoint Presentation & Worksheet	Case Studies and Worksheets
SCO 8.0 The student will be expected to demonstrate an understanding of economic, political and social change in Newfoundland and Labrador since 1972.	●		●				-A Step Back in Time -Rumbles in the Lumber Industry -Taking the paper out of Newspaper

World Geography 3200/3202	DVD Presentation & Worksheet	Forest Ecology PowerPoint Presentation & Worksheet	Forest Management PowerPoint Presentation & Worksheet	Forest Values PowerPoint Presentation & Worksheet	Old Growth Forests PowerPoint Presentation & Worksheet	Age Class Structure PowerPoint Presentation & Worksheet	Case Studies and Worksheets
4.6.1 Compare the terms clear-cutting and selective cutting.	●						
4.6.2 Compare the advantages and disadvantages of each approach to the harvesting of timber.							-Harvesting Techniques
4.6.3 Examine major threats to forest resources.	●	●				●	-Moose Invasion -Taking the paper out of Newspaper -Rumbles in the Lumber Industry
4.6.4 Examine strategies for a sustainable forestry.	●		●			●	-Sustainable Forestry ⁵
4.6.6 Infer a relationship between climate and the extent of forest cover.	●	●					-Garden of Official Tree Species ⁶

⁵ Lesson plan, worksheets and answer keys supplied by Natural Resources Canada

⁶ Lesson plan, worksheets and answer keys supplied by Natural Resources Canada

Web Links

Department of Natural Resources – Forestry Division	http://www.nr.gov.nl.ca/forestry
Model Forest Newfoundland and Labrador	http://www.mfnl.ca
Canadian Model Forest Network	http://www.modelforest.net/cmfn/en
Canadian Forest Service	http://cfs.nrcan.gc.ca
Natural Resources Canada	http://canadaforests.nrcan.gc.ca
Canadian Institute of Forestry	http://www.cif-ifc.org
Canadian Forestry Association	http://www.canadianforestry.com
Forest Products Information Portal	http://www.planetfriendlycanada.com
Corner Brook Pulp and Paper	http://www.cbppl.com
Go Forestry	http://goforestry.ca
Boreal Forest Organization	http://www.borealforest.org
Canadian Council of Forest Ministers	http://www.ccfm.org/english/index.asp
Parks Canada	http://www.pc.gc.ca
Department of Environment and Conservation – Wildlife	http://www.env.gov.nl.ca/env/wildlife
Parks and Natural Areas Division	http://www.env.gov.nl.ca/parks
Forest Products Association of Canada	http://www.fpac.ca
FP Innovations	http://www.fpinnovations.ca
Non-timber forest products directory - Atlantic	http://fromouratlanticwoods.com
INFOR (Information and Forestry – Canada)	http://www.infor.ca
Atlas of Canada – Boreal Forests	http://atlas.nrcan.gc.ca/site/english/learningresources/theme_modules/borealforest/index.html

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 Canadian Institute of Forestry

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Evaluation⁷

YES	NO	
<input type="radio"/>	<input type="radio"/>	This is an effective teaching resource for high school students.
<input type="radio"/>	<input type="radio"/>	This resource is most applicable to these courses: _____
<input type="radio"/>	<input type="radio"/>	I am aware of other similar resources on the forestry industry in the province.
<input type="radio"/>	<input type="radio"/>	I will use this resource again.
<input type="radio"/>	<input type="radio"/>	I am aware of other tools or resources that could be incorporated into this binder, including _____

Please rate the following components of the Futures from Forests resource binder based on the following scale: **1=poor, 2=below average, 3=average, 4=good, 5=excellent**

1	2	3	4	5	Overall presentation and layout
1	2	3	4	5	Curriculum connections
1	2	3	4	5	DVD presentation
1	2	3	4	5	PowerPoint presentations
1	2	3	4	5	Teacher's notes for PowerPoint presentations
1	2	3	4	5	Worksheets
1	2	3	4	5	Case Studies
1	2	3	4	5	Web links and other resources

Additional Comments:

⁷ Please make a copy of this form and send the completed evaluation to the Model Forest of Newfoundland and Labrador, Fax (709) 634 0255 or P.O. Box 68, Corner Brook, NL, A2H 6C3