

Adult Basic Education
Level III Science

Science 3108

Environmental Science II

Study Guide

Credit Value: 1

Pre-Requisite: Science 3107: Environmental Science I

Text: *Toward A Sustainable Future: Challenges, Changes and Choices*. Department of Education. Province of Newfoundland and Labrador. 2009. ISBN: 978-1-55146-367-4.

Science Courses [General College Profile]

Science 2100A
Science 2100B
Science 2100C
Science 3101
Science 3102
Science 3103
Science 3104
Science 3105
Science 3106
Science 3107
Science 3108



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To the Student

Introduction to Science 3108

This course is intended to introduce you to the key concepts of Environmental Science and continue with the knowledge learned in **Science 3107: Environmental Science I**. **Science 3107: Environmental Science I** must be completed before completing this course. These two ABE Science courses are based on **Environmental Science 3205** offered in Newfoundland and Labrador high schools.

Science 3108 Environmental Science II is divided into five units. The outcomes for this course are given below. By completing the **Required Work** in this Study Guide, including the assignments and core labs, you will fulfill the outcomes for this course. You only need to complete one unit from Units 3 to 5.

The first unit, ***The Marine Ecosystem***, will cover the following course outcomes:

- 1.01 Define estuaries.
- 1.02 Know the kinds of vegetation found in salt marshes and swamps.
- 1.03 Understand why the Grand Banks of Newfoundland and Labrador are a rich resource area on the continental shelf.
- 1.04 Understand pressure placed on marine resources.
- 1.05 Understand issues that are a contributory to the decline in global fishing stocks.
- 1.06 List some of the possible reasons for the demise of the northern cod stock.
- 1.07 Understand the history and role of ICNAF and NAFO.
- 1.08 Understand reasons why federal jurisdiction of the fisheries is sometimes challenged.
- 1.09 Understand why fish stocks are assessed.
- 1.10 List and describe the different sources of data that scientists use when assessing fish stocks.
- 1.11 Understand the purpose of the sentinel fishery.
- 1.12 Understand issues surrounding getting an accurate measurement of fish population size.
- 1.13 Understand how the status of one fish population can affect other fish populations.
- 1.14 Understand how the biological characteristics of a fish species are important in deciding how well a fish population can sustain fishing pressure.
- 1.15 Understand how changes in the environment may cause populations of marine wildlife to fluctuate over time.
- 1.16 Understand how fishing pressure can impact marine wildlife.
- 1.17 Understand how by-catch impacts the population of marine wildlife.
- 1.18 Understand how habitat destruction can have significant impacts on marine ecosystems.

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- 1.19 Understand how responsible fishing is promoted in Canada's fishing industry.
- 1.20 Understand environmental impacts of mobile bottom fishing gear.
- 1.21 Understand how ghost fishing negatively impacts marine ecosystems.
- 1.22 Understand some of the difficulties in determining the impact of seals on fish stocks.
- 1.23 Understand the environmental impact of using gillnets in the fishery.
- 1.24 Understand ways that coastal activities can impact marine habitat.
- 1.25 Understand the concerns associated with invasive species.
- 1.26 Understand the negative environmental impact caused by drilling fluids or "muds".
- 1.27 Understand how production water negatively impacts the marine environment.
- 1.28 Understand how the transportation of oil negatively impacts the marine environment.
- 1.29 Identify sources of oil pollution.
- 1.30 Understand how oil kills seabirds.
- 1.31 Understand the importance of Marine Protected Areas.
- 1.32 Understand components of Canada's Marine Protected Areas Strategy.

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The second unit, ***The Atmosphere and the Environment***, will cover the following course outcomes:

- 2.01 Identify the four layers of the atmosphere.
- 2.02 Understand how the atmosphere supports life on Earth.
- 2.03 Recognize the importance of studying the atmosphere.
- 2.04 List common pollutants in the atmosphere.
- 2.05 Understand why Newfoundland and Labrador is a relatively high emitter of sulfur dioxide.
- 2.06 List sources of volatile organic compounds in the home.
- 2.07 Define smog.
- 2.08 List effects of smog on human health.
- 2.09 List effects of smog on the environment.
- 2.10 Understand the effects of heavy metals in organisms.
- 2.11 Understand actions that can be taken to improve air quality in the community.
- 2.12 Understand how acid rain is created.
- 2.13 List sources of acid precipitation in Newfoundland and Labrador.
- 2.14 Understand effects of acid rain on human health.
- 2.15 Understand effects of acid precipitation on economic activities.
- 2.16 Understand how certain chemicals deplete ozone in the atmosphere.
- 2.17 Identify sources of greenhouse gas emissions in your community.
- 2.18 Understand how people can respond to climate change in an ecologically sustainable manner.
- 2.19 Understand opposing viewpoints on climate change.
- 2.20 Distinguish between weather, climate and climate change.
- 2.21 Understand the effect of solar radiation on the Earth.
- 2.22 Identify natural causes of climate change.
- 2.23 Understand the greenhouse potential of common greenhouse gases.
- 2.24 Recognize historic global temperature trends.
- 2.25 Understand the potential impacts of climate change on Newfoundland and Labrador.
- 2.26 Recognize what is expected to be the largest contributor to global sea-level rise over the next hundred years.
- 2.27 Recognize two threats that climate change poses to human health.
- 2.28 Identify possible measures that could be taken to adapt to sea-level rise.
- 2.29 List economic approaches to reducing greenhouse gases.
- 2.30 Understand ways to reduce greenhouse gas emissions.
- 2.31 Evaluate wind turbine technology as an option for Newfoundland and Labrador.

To the Student

You are only required to complete ONE of the next three units. Select ONE of these units based on your interest in the subject matter.

The third unit, *Forests*, will cover the following course outcomes:

- 3.01 Understand the ecological value of forests.
- 3.02 Understand pressures facing the world's forests.
- 3.03 Understand challenges facing people who manage the forests of Newfoundland and Labrador.
- 3.04 Identify the dominant forest type in Canada and in Newfoundland and Labrador.
- 3.05 List ways that Canadians use the forest.
- 3.06 List and summarize the ecological, economical and social value that relates to forests.
- 3.07 List the characteristics of the boreal forest.
- 3.08 Distinguish between primary and secondary succession.
- 3.09 Distinguish between seasonal and successional changes in the boreal forest.
- 3.10 Identity two important roles of forest fires.
- 3.11 Understand some disadvantages of preventing forest fires.
- 3.12 List the characteristics of an old-growth forest.
- 3.13 List values of old-growth forests.
- 3.14 Define silviculture.
- 3.15 Understand issues responsible for the shift in resource management approaches.
- 3.16 Understand the information provided by aerial photographs of a forest and the kinds of decisions this information might support.
- 3.17 Understand the purpose of permanent sample plots and ground-truthing plots.
- 3.18 Understand why clear-cutting is the preferred method of tree harvesting in Newfoundland and Labrador.
- 3.19 Understand some problems associated with clear-cutting.
- 3.20 Understand the components of integrated pest management.
- 3.21 Understand two advantages of biological control agents for controlling forest pests over traditional chemical use.
- 3.22 List positive and negative effects of dealing with insects and pesticides in the boreal forest.
- 3.23 List innovations in harvesting technology used in the forest industry.
- 3.24 List some advantages of using walking mechanized harvesters over wheeled harvesters.
- 3.25 Identify types of activities that involve the use of forests.

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The fourth unit, ***Mining***, will cover the following course outcomes:

- 4.01 Distinguish between a mineral and an ore.
- 4.02 Understand why mines today use a community workforce rather than develop a town around the mine.
- 4.03 List examples of historic mining activities in Newfoundland and Labrador.
- 4.04 List and briefly describe the four main stages of the mining process.
- 4.05 Explain the difference between underground and open pit mining.
- 4.06 Identify two commonly used mineral separation techniques.
- 4.07 Recognize the purpose of scrubbers in a smelter stack.
- 4.08 List three forms of waste produced by the mining industry.
- 4.09 Understand the risk associated with tailings.
- 4.10 Understand the purpose of environmental assessment in relation to the mining industry.

The fifth unit, ***Agriculture***, will cover the following course outcomes:

- 5.01 Define agriculture.
- 5.02 Understand factors that limit the range of agriculture in Newfoundland and Labrador.
- 5.03 Understand why the soils of Newfoundland and Labrador are shallow and stony.
- 5.04 List common crops raised in Newfoundland and Labrador.
- 5.05 List historical crops grown in Newfoundland and Labrador.
- 5.06 List challenges facing Christmas tree farming in Newfoundland and Labrador.
- 5.07 Define and give examples of forage.
- 5.08 Identify environmental challenges that had to be overcome to get corn to grow in Newfoundland and Labrador.
- 5.09 List the main animals raised by livestock farmers in Newfoundland and Labrador.
- 5.10 Identify the group of animals raised for meat that have had the greatest impact on the planet.
- 5.11 List the impacts of livestock production.
- 5.12 List and briefly describe the livestock raised in the poultry industry in Newfoundland and Labrador.
- 5.13 List methods used to prevent frost damage.
- 5.14 Understand how spraying water on a crop can prevent frost damage even when the temperature dips below freezing.
- 5.15 Define the term “agrometeorology” and give some examples of how climate influences agriculture.
- 5.16 Define a growing-day.

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- 5.17 Understand how growing degree-days are used to determine (i) what crops can be grown in a specific area and (ii) predicting harvest time.
- 5.18 Understand the four components of soil.
- 5.19 List and briefly explain the factors influencing soil formation.
- 5.20 Define tillage.
- 5.21 List the common practices of soil management.
- 5.22 Understand how adding limestone to soil helps improve overall soil quality.
- 5.23 Distinguish between inorganic and organic fertilizers.
- 5.24 List methods that can be used to reduce the effects of soil erosion.
- 5.25 Identify three types of pesticides used in Newfoundland and Labrador.

To the Student

Use of Science Study Guides

Before beginning this course, ensure you have the text(s) and any other resources needed.

Your Study Guide is organized as follows:

Required Work	Suggested Resources/Notes
<p>The left-hand column guides you through the material you must complete in order to successfully complete the course. You will see three headings in this left-hand column:</p> <p>Writing: This section comprises your notes for the unit. Here you will find either written questions or references to specific questions or problems from your text. You may want to write out each question followed by the answer. This material should be checked by your instructor before moving on to the next unit.</p> <p>Laboratory: This section indicates if there is a Core Lab that should be completed for the unit. Let the instructor know in advance that you will be ready for the lab. A lab report should be submitted for each Core Lab. Your instructor will provide guidelines as to how s/he wants the report written.</p> <p>Assignment: This section indicates if there is an assignment that should be completed for the Unit. The information in the “Suggested Resources/Notes” column will indicate any additional information you need to complete the assignment. These assignments frequently relate the science content to a practical application.</p>	<p>This right-hand column provides you with information on the resources needed for the course. It also draws your attention to assignments and core labs that will be evaluated as part of your final course mark. Other notes may be included here such as helpful suggestions, safety precautions, etc.</p>

The textbook for this course is listed on the cover page of this Study Guide. It can also be found in its entirety online at
<http://www.ed.gov.nl.ca/edu/k12/curriculum/documents/science/highschool.html#envsci3205>.

You are required to complete all work listed in this Study Guide, including the assignments and core labs, in order to receive a passing grade for Science **3108: Environmental Science II**. Your instructor is able to substitute any of the assignments and/or core labs with an alternative at his/her discretion

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Recommended Evaluation

Written Notes	10%
Labs/Assignments/Test(s)	20%
Unit Test(s)	20%
Final Exam (entire course)	<u>50%</u>
	100%

The overall pass mark for the course is 50%.

Note: The evaluation scheme recommended above is presented as a suggestion. Institutions/instructors may choose an alternate evaluation scheme in order to meet the individual needs of adult learners.

Unit 1: The Marine Ecosystem

Required Work	Suggested Resources/Notes
<p>Writing:</p> <p>1. Read pages 504-509 in the text, and then complete the following:</p> <ul style="list-style-type: none"> a) What are estuaries? What are estuaries commonly known as in Newfoundland and Labrador? p. 505 b) What kinds of vegetation are found in salt marshes and swamps? p. 505 c) What is the continental shelf? Why are the Grand Banks of Newfoundland and Labrador a resource-rich area of the continental shelf? p. 507 d) What is the largest marine zone? Why do you think there is a limited understanding of this marine zone? p. 508 e) What do you think are some sustainability issues related to the continental shelf off Newfoundland and Labrador? p. 510 <p>2. Read pages 510-518 in the text, and then complete the following:</p> <ul style="list-style-type: none"> a) What two things are identified as placing unprecedented pressure on marine resources? Give an example of each. p. 510 b) What is the fastest growing sector of the global agriculture economy? p. 511 c) List three issues that are contributory to the decline in many global fish stocks. p. 513 d) What are the three types of commercial fish stocks in the waters off Newfoundland and Labrador? pp. 514-515 e) List some of the possible reasons for the demise of the once great northern cod stock. 	

Unit 1: The Marine Ecosystem

Required Work	Suggested Resources/Notes
f) What advice would you offer to ensure that any future fishing activity in Newfoundland and Labrador is sustainable?	
3. Read pages 518-521 in the text, and then complete the following:	
a) What was ICNAF and when was it established?	pp. 518-519
b) Why was ICNAF replaced by NAFO? What is the role of NAFO?	p. 519
c) What are some measures NAFO has adopted to improve the conservation and management of fish stocks?	p. 520
d) Can you think of reasons why federal jurisdiction of the fisheries is sometimes challenged?	p. 520
4. Read pages 522-528 in the text, and then complete the following:	
a) Why do we assess fish stocks?	p. 522
b) List and briefly describe the different sources of data that scientists use when assessing fish stocks.	pp. 523-524
c) What is the purpose of the sentinel fishery?	p. 524
d) Which is easier to measure—the size of a moose population or the size of a fish population? Explain your reasoning.	
e) Why do you think scientific assessments are important for the sustainability of the fishery?	

Unit 1: The Marine Ecosystem

Required Work	Suggested Resources/Notes
<p>5. Read pages 529-534 in the text, and then complete the following:</p>	
<p>a) Explain, using an example, how the status of one fish population can affect other fish species associated with, or dependent upon, the harvested species.</p>	p. 531
<p>b) Explain, using an example, how the biological characteristics of a fish species are important in deciding how well a fish population can sustain fishing pressure.</p>	p. 531
<p>c) Explain, using an example, how changes in the environment may cause populations of marine wildlife to fluctuate over time.</p>	p. 532
<p>d) Explain, using an example, how fishing pressure can impact marine wildlife.</p>	p. 532
<p>e) Explain, using an example, how by-catch impacts the population of marine wildlife.</p>	p. 532
<p>f) Explain, using an example, how habitat destruction can have significant impacts on marine ecosystems.</p>	p. 532
<p>g) List three ways how responsible fishing is promoted in Canada's fishing industry.</p>	p. 534
<p>6. Read pages 535-545 in the text, and then complete the following:</p>	
<p>a) What are some of the environmental impacts of mobile bottom fishing gear (MBFG)?</p>	pp. 535-536
<p>b) What is ghost fishing and how does it negatively impact marine ecosystems?</p>	pp. 536-537
<p>c) What are some of the difficulties in determining the impact of seals on fish stocks?</p>	pp. 539-541

Unit 1: The Marine Ecosystem

Required Work	Suggested Resources/Notes
<p>d) What recommendation would you offer in order to maintain sustainability between fish stocks and the seal population?</p>	
<p>7. Assignment #1: Research the use of gillnets in the fishery. Should the use of gillnets be banned? Explain your reasoning in a one paragraph response.</p>	<p>This assignment is to be submitted and is part of the evaluation for the course.</p>
<p>8. Read pages 559-566 in the text, and then complete the following:</p>	
<p>a) List some ways that coastal activities can impact marine habitat.</p>	<p>pp. 560-561</p>
<p>b) Where do invasive species come from and why should we be concerned about them?</p>	<p>pp. 561-562</p>
<p>c) Plastics continue to litter the marine environment. List at least five problems with plastics related to marine ecosystems.</p>	<p>p. 564</p>
<p>9. Read pages 567-582 in the text, and then complete the following:</p>	
<p>a) What are drilling fluids, or “muds”, and what negative environmental impact can it cause?</p>	<p>p. 568</p>
<p>b) How does production water negatively impact the marine environment?</p>	<p>p. 569</p>
<p>c) How can the transportation of oil negatively impact the marine environment?</p>	<p>p. 569</p>
<p>d) List five sources of oil pollution in Newfoundland and Labrador.</p>	<p>p. 571-572</p>
<p>e) Explain how oil kills seabirds.</p>	<p>p. 576</p>

Unit 1: The Marine Ecosystem

Required Work	Suggested Resources/Notes
f) The offshore oil industry contributes significantly to the economy of Newfoundland and Labrador. What do you think should be done in order to ensure that this industry develops and operates in a sustainable manner?	
10. Read pages 583-586 in the text, and then complete the following:	
a) What are marine protected areas (MPA)? Why are they important? b) Besides marine protected areas, what other components make up Canada's Marine Protected Areas Strategy? c) Where are there marine protected areas in Newfoundland and Labrador and why are they important?	p. 583 p. 584 p. 584
11. Assignment #2: On a map of Newfoundland and Labrador, label the following: a) Locations of oil and gas fields. b) Areas where oil spills may occur. c) Location of the transshipment terminal. d) Location of the marine protected area(s).	This assignment is to be submitted and is part of the evaluation for this course.

Unit 2: The Atmosphere and the Environment

Required Work	Suggested Resources/Notes
1. Read pages 591-593 in the text, and then complete the following:	
a) List the four layers of the atmosphere. In what layer are most living things found? b) How does the atmosphere support life on Earth? c) Why is it important to study and understand the atmosphere?	p. 591 p. 592 p. 593
2. Read pages 594-599 in the text, and then complete the following:	
a) Air quality is measured by the presence and quantity of five common pollutants. What are these pollutants? b) Why is Newfoundland and Labrador a relatively high emitter of sulfur dioxide? c) List sources of volatile organic compounds in your home.	pp. 594-595 p. 596 p. 596
3. Read pages 599-601 in the text, and then complete the following:	
a) Define the term “smog”. b) List the effects of smog on human health. c) List the effects of smog on the environment.	p. 599 p. 600 p. 601

Unit 2: The Atmosphere and the Environment

Required Work	Suggested Resources/Notes
<p>4. Read pages 602-606 in the text, and then complete the following:</p>	
<p>a) Heavy metals are found in the tissues of animals that live in Canada's far arctic regions. How is this possible?</p> <p>b) Your friend, who is an avid trout angler, tells you that you should not worry about eating trout with low levels of mercury in their tissue. Is your friend correct in what he is saying?</p>	p. 602 p. 603
<p>5. Read pages 606-612 in the text, and the complete the following:</p>	
<p>a) What actions can you and your family take to improve air quality in your community?</p> <p>b) What can you do with your firewood to maximize the amount of energy it releases and to reduce emissions?</p>	p. 606 p. 608
<p>6. Read pages 612-615 in the text, and then complete the following:</p>	
<p>a) How is acid rain created?</p> <p>b) What are the sources of acid precipitation in Newfoundland and Labrador?</p> <p>c) List some effects of acid precipitation on human health.</p> <p>d) List some effects of acid precipitation on economic activities.</p>	p. 613 p. 613 p. 613 pp. 614-615

Unit 2: The Atmosphere and the Environment

Required Work	Suggested Resources/Notes
<p>7. Read pages 616-619 in the text, and then complete the following:</p> <ol data-bbox="285 570 1003 675" style="list-style-type: none"> <li data-bbox="285 570 1003 601">What is the “ozone layer”? <li data-bbox="285 644 1003 675">What are the sources of ozone depleting chemicals? 	p. 616 p. 617
<p>8. Read pages 620-624 in the text, and then complete the following:</p> <ol data-bbox="285 813 1068 1151" style="list-style-type: none"> <li data-bbox="285 813 1068 876">List some sources of greenhouse gas emissions in your community. <li data-bbox="285 918 1068 1077">People can respond to climate change in two ways—either by reducing their consumption of natural resources or by adapting their lifestyle. Which of these responses is more ecologically sustainable? Explain your answer. <li data-bbox="285 1119 1068 1151">Discuss the opposing viewpoints on climate change. 	pp. 621-622 p. 621 p. 624
<p>9. Core Lab #1: Read the <i>Core Laboratory Activity</i> on pages 625-627 in the text. Follow the procedure and make a table in your notebook like the one on page 626 in the textbook. Record your results and complete questions from “Analyze and Conclude” on page 627 as assigned by your instructor.</p>	pp. 625-627
<p>10. Read pages 627-634 in the text, and then complete the following:</p> <ol data-bbox="285 1552 1085 1883" style="list-style-type: none"> <li data-bbox="285 1552 1085 1584">Distinguish between weather, climate and climate change. <li data-bbox="285 1626 1085 1689">What is solar radiation and what happens when it reaches the Earth? <li data-bbox="285 1731 1085 1763">Identify natural causes of climate change. <li data-bbox="285 1805 1085 1869">List the common greenhouse gases. Which has the greatest and least greenhouse potential? 	p. 627 pp. 628-629 p. 629 p. 632

Unit 2: The Atmosphere and the Environment

Required Work	Suggested Resources/Notes
<p>e) Based on the greenhouse potential of the various greenhouse gases, which would have the greatest impact on reducing global warming—cutting carbon dioxide emissions in half or cutting methane emissions in half? Why?</p>	pp. 632-633
<p>f) Limestone deposits along the west coast of the Island of Newfoundland suggest that the climate was similar to that of Bermuda when the deposits were laid down. Account for this.</p>	p. 631
<p>11. Read pages 635-637 in the text, and then complete the following:</p>	
<p>a) What do we know from analyzing the data of historic global temperature trends?</p>	p. 635
<p>b) What conclusions are noted in the 2001 Intergovernmental Panel on Climate Change (IPCC) scientific report?</p>	p. 636
<p>c) Which areas of Canada are expected to have warmed the most by the year 2090? What is the expected temperature change for Newfoundland and Labrador? Is there variation within the province?</p>	p. 637
<p>12. Read pages 638-651 in the text, and then complete the following:</p>	
<p>a) List the potential impacts of climate change on Newfoundland and Labrador, ranking them from what you consider to be the most important to the least important.</p>	pp. 638-644
<p>b) What is expected to be the largest contributor to global sea-level rise over the next hundred years?</p>	pp. 643-644

Unit 2: The Atmosphere and the Environment

Required Work	Suggested Resources/Notes
<p>c) Name two main threats that climate change poses to human health. Briefly explain why they are threats. Discuss possible adaptive measures that could reduce the impact of these two threats on human health.</p> <p>d) Given that we expect most areas of the earth to warm as a result of climate change, can ecosystems simply move toward the poles or higher elevations? Explain.</p> <p>e) Give examples of three possible measures that could be taken to adapt to sea-level rise.</p> <p>13. Read pages 652-654 in the text, and then complete the following:</p> <p>a) List and briefly explain economic approaches to reducing greenhouse gases.</p> <p>b) Why might governments subsidize the fossil fuel industry?</p> <p>14. Read pages 656-670 in the text, and then complete the following:</p> <p>a) Why is reducing the need for transportation one of the most effective ways to reduce greenhouse gas emissions?</p> <p>b) List some alternate fuels that can be used in vehicles to help lower greenhouse gas emissions.</p> <p>c) List some alternate forms of energy sources that can be used to help reduce greenhouse gas emissions.</p> <p>d) Do you think wind turbine technology is a good option for Newfoundland and Labrador? Explain.</p>	<p>pp. 649-650</p> <p>p. 650</p> <p>pp. 650-651</p> <p>pp. 653-654</p> <p>p. 653</p> <p>p. 656</p> <p>pp. 658-650</p> <p>pp. 665-670</p> <p>pp. 665-666</p>

Unit 3: Forests

You are only required to complete ONE of the next three units. Select ONE of these units based on your interest in the subject matter.

Required Work	Suggested Resources/Notes
<p>1. Read pages 251-253 in the text, and then complete the following:</p> <ul style="list-style-type: none"><li data-bbox="283 635 1073 709">a) What is the ecological value of forests? Why do we need them to sustain life on the planet?<li data-bbox="283 741 980 777">b) Outline some pressures facing the world's forests.<li data-bbox="283 819 1073 893">c) What are some challenges facing people who manage the forests of Newfoundland and Labrador?	<p>pp. 251-252</p> <p>p. 252</p> <p>p. 252</p>
<p>2. Read pages 254-255 on the text, and then complete the following:</p> <ul style="list-style-type: none"><li data-bbox="283 1079 980 1153">a) What is the dominant forest type in Canada and in Newfoundland and Labrador?<li data-bbox="283 1184 1046 1258">b) In a table format, list the different ways that Canadians use the forest.	<p>p. 255</p> <p>pp. 254-255</p>
<p>3. Read pages 256-257 in the text, and then complete the following:</p> <ul style="list-style-type: none"><li data-bbox="283 1406 1192 1442">a) What is a value?<li data-bbox="283 1480 1054 1554">b) List and summarize the ecological, economic and social value that relates to forests.<li data-bbox="283 1596 1037 1691">c) Which is easier to measure, the economic value of cut wood, or the value and the beauty of an uncut forest? Explain.	<p>p. 256</p> <p>p. 256</p> <p>p. 256</p>

Unit 3: Forests

Required Work	Suggested Resources/Notes
<p>4. Read pages 262-272 in the text, and then complete the following:</p> <ul style="list-style-type: none"> a) What is the purpose of the dark green colouring of spruce and fir needles? b) List the characteristics of the boreal forest. 	p. 263 pp. 262-263
<p>5. Read pages 272-274 in the text, and then complete the following:</p> <ul style="list-style-type: none"> a) Distinguish between primary and secondary succession. b) Distinguish between seasonal and successional changes in the boreal forest. c) What are two important roles of forest fires? d) Forest fires are suppressed to protect valuable forest resources and property. What are some disadvantages of preventing forest fires? 	pp. 272-273 pp. 272-273 p. 273 p. 273
<p>6. Read pages 275-286 in the text, and then complete the following:</p> <ul style="list-style-type: none"> a) What are the characteristics of an old-growth forest? b) List values of old-growth forests. 	p. 275 p. 276
<p>7. Assignment #3: Read the <i>Case Study: Logging the Main River Watershed</i> on pages 279-282. Complete questions on pages 282-283 as assigned by your instructor.</p>	This assignment is to be submitted and is part of the evaluation for this course.

Unit 3: Forests

Required Work	Suggested Resources/Notes
8. Read pages 288-292 in the text, and then complete the following:	
a) Define silviculture.	p. 289
b) What events or issues might be responsible for the shift in resource management approaches?	pp. 290-291
9. Read pages 293-299 in the text, and then complete the following:	
a) What kinds of information can be collected from aerial photographs of a forest? What kinds of decisions might this information support?	p. 297
b) What is the purpose of permanent sample plots and ground-truthing plots?	pp. 297-298
10. Core Lab # 2: Read the <i>Mini-Lab Activity</i> on pages 302-304 of the text. Complete the “Analyze and Conclude” questions on pages 304-305.	
11. Read pages 311-319 in the text, and then complete the following:	
a) Why is clear-cutting the preferred method of tree harvesting in Newfoundland and Labrador?	p. 311
b) What are some problems associated with clear-cutting?	pp. 311-312
c) In what situations would selective cutting be used?	pp. 312-313

Unit 3: Forests

Required Work	Suggested Resources/Notes
<p>12. Read pages 324-329 in the text, and then complete the following:</p> <ul style="list-style-type: none">a) What are the components of integrated pest management?b) What are two advantages of biological control agents for controlling forest pests over traditional chemical use?c) List two positive and two negative effects of dealing with insects and pesticides in the boreal forest. <p>13. Read pages 330-336 in the text, and then complete the following:</p> <ul style="list-style-type: none">a) List some innovations in harvesting technology used in the forestry industry.b) List some advantages of using walking mechanized harvesters over wheeled harvesters.c) How do you value the forests of the province? What types of activities do you participate in that involve the use of our forests?d) What advice would you suggest to government leaders in order to ensure that the forestry industry in Newfoundland and Labrador remains sustainable?	<p>p. 324</p> <p>p. 325</p> <p>p. 327</p> <p>p. 333</p> <p>p. 333</p>

Unit 4: Mining

Required Work	Suggested Resources/Notes
1. Read pages 403-407 in the text, and the complete the following: <ul style="list-style-type: none"><li data-bbox="290 566 1008 597">a) What is the difference between a mineral and an ore?<li data-bbox="290 635 1090 741">b) Why do mines today often use a community workforce (fly in/fly out) rather than develop a town around the mine site?	p. 403
2. Read pages 408-410 in the text, and then complete the following: <ul style="list-style-type: none"><li data-bbox="290 903 915 967">a) List examples of historic mining activities in Newfoundland and Labrador.<li data-bbox="290 1005 1078 1068">b) What are the top five minerals required to produce a mid-size family car?	p. 408
3. Read pages 411-422 in the text, and then complete the following: <ul style="list-style-type: none"><li data-bbox="290 1220 1008 1284">a) List and briefly describe the four main stages of the mining process.<li data-bbox="290 1322 1078 1385">b) Explain the difference between underground and open pit mining.<li data-bbox="290 1423 975 1486">c) What are two commonly used mineral separation techniques?<li data-bbox="290 1524 1008 1556">d) What is the purpose of scrubbers in a smelter stack?	pp. 411-421
	pp. 414-417
	p. 418
	p. 420

Unit 4: Mining

Required Work	Suggested Resources/Notes
4. Read pages 423-425 in the text, and then complete the following:	
a) List the three forms of waste produced by the mining industry.	p. 423
b) What are tailings? Explain the risks associated with them and how they should be contained.	pp. 423-425
c) What environmental impact was caused by the Rambler mine on the Baie Verte Peninsula?	p. 425
d) Why did the Nugget Pond gold mine operator win national awards for environmental awareness?	p. 425
5. Assignment #4: Read the <i>Case Study: Voisey's Bay Environmental Assessment</i> on pages 433-434 of the text. Complete the "Analysis" questions on page 434.	This assignment has to be submitted and is part of the evaluation for this course.
6. What advice would you suggest to government leaders in order to ensure that the mining industry in Newfoundland and Labrador remains sustainable?	

Unit 5: Agriculture

Required Work	Suggested Resources/Notes
<p>1. Read pages 342-343 in the text, and then complete the following:</p>	
<p>a) Define agriculture.</p> <p>b) Make a list of everything you ate yesterday. Next to each item in your list, make another list that traces back to the food's origin (see the example).</p>	<p>p. 343</p> <p>Example: milk...cow cheese...milk...cow bread...flour...wheat</p>
<p>2. Read pages 344-350 in the text, and then complete the following:</p>	
<p>a) What factors limit the range of agriculture in Newfoundland and Labrador?</p> <p>b) Why are the soils of Newfoundland shallow and stony?</p> <p>c) What common crops are raised in Newfoundland and Labrador?</p> <p>d) Every year Newfoundlanders and Labradorians go berry picking. Why is it not possible to find one spot where you can pick blueberries and bakeapples at the same time?</p>	<p>pp. 344-345</p> <p>p. 344</p> <p>p. 346</p> <p>pp. 347-348</p>
<p>3. Read pages 351-356 in the text, and then complete the following:</p>	
<p>a) In the past, what were the most important crops grown in Newfoundland and Labrador?</p> <p>b) What are the vegetables more recently added to the agriculture crop mix?</p> <p>c) List some challenges facing Christmas tree farming in Newfoundland and Labrador?</p>	<p>p. 352</p> <p>p. 352</p> <p>p. 353</p>

Unit 5: Agriculture

Required Work	Suggested Resources/Notes
<p>d) What is forage? Give examples of common forage grown in Newfoundland and Labrador.</p> <p>e) Corn is the ideal silage for dairy cattle. What environmental challenges had to be overcome to get corn to grow in Newfoundland and Labrador?</p>	p. 355 pp. 355-356
<p>4. Core Lab #3: Read the <i>Core Laboratory Activity: Testing the Effectiveness of Plastic Mulch</i> on pages 357-358 of the text. Follow the procedure and complete the “Analyze and Conclude” questions on page 358.</p>	
<p>5. Read pages 358-365 in the text, and then complete the following:</p> <p>a) List the main animals raised by livestock farmers in Newfoundland and Labrador.</p> <p>b) Sheep were much more important than cattle to the early settlers on the island of Newfoundland. Why was this true?</p> <p>c) What group of animals raised for meat has had the greatest impact on the planet?</p> <p>d) What are the impacts of livestock production?</p> <p>e) List and briefly describe the livestock raised in the poultry industry in Newfoundland and Labrador.</p> <p>6. Read pages 366-368 in the text, and then complete the following:</p> <p>a) List methods used to prevent frost damage.</p> <p>b) Explain how spraying water on a crop can prevent frost damage even when the temperature dips below freezing.</p>	pp. 359-360 p. 360 p. 361 p. 361 pp. 364-365 p. 368 p. 368

Unit 5: Agriculture

Required Work	Suggested Resources/Notes
<p>7. Read pages 369-370 in the text, and then complete the following:</p>	
<p>a) Define the term “agrometeorology” and give some examples of how climate influences agriculture.</p> <p>b) What is a growing degree-day? How are growing degree-days used to determine the following: (i) what crops can be grown in a specific area and (ii) predicting harvest time?</p> <p>c) Describe the possible effects of climate change on agriculture in Newfoundland and Labrador.</p>	p. 369 pp. 369-370
<p>8. Read pages 374-376 in the text, and then complete the following:</p> <p>a) What are the four components of soil? What is required to make a well-balanced soil?</p> <p>b) List and briefly explain the factors influencing soil formation.</p> <p>c) Why are most soils in Newfoundland and Labrador no more than 10,000 years old?</p>	p. 374 pp. 374-375 p. 375
<p>9. Read pages 379-386 in the text, and then complete the following:</p> <p>a) What is tillage?</p> <p>b) List the common practices of soil management.</p> <p>c) How does adding limestone to soil help improve overall soil quality?</p>	p. 379 p. 379 p. 380

Unit 5: Agriculture

Required Work	Suggested Resources/Notes
d) Distinguish between inorganic and organic fertilizers. e) List methods that can be used to reduce the effects of soil erosion. 10. Read pages 387-399 in the text, and then complete the following:	p. 380 pp. 383-384
a) List and give examples of common agriculture pests in Newfoundland and Labrador. b) Why are some vehicles washed with a high-pressure spray at ferry terminals in Port aux Basques and Argentia? c) What three types of pesticides are used in Newfoundland and Labrador?	pp. 388-389 p. 389 p. 390
11. What advice would you suggest to government leaders in order to ensure that the agricultural industry in Newfoundland and Labrador remains sustainable?	