



# Advanced Environmental Science 120

Implementation February 2018

# Acknowledgments

The Department of Education and Early Childhood Development of New Brunswick gratefully acknowledges the contributions of the following groups and individuals toward the development of the New Brunswick *Advanced Environmental Science 120* Curriculum Document:

- High School Science Curriculum Development Committee of Katherine Barclay (UNB Science), Shelley Gingras, Peter MacDonald, Sarah Morgan-Lee, André Savoie and Grant Williams (STU Education)
- *Advanced Environmental Science 120* Writing Committees  
Aaron Abbott, Erma Appleby, Odette Barr, Monica Coté, Kimberly Cripps, Pamela Fowler, Misty Gallant, Emily Lennon, Laura McManaman
- *Advanced Environmental Science 120* Piloting teachers  
Aaron Abbott, Erma Appleby, Pamela Fowler, Misty Gallant, Emily Lennon
- Martha McClure, Learning Specialist for High School Mathematics and Science Curriculum (EECD)

# Table of Contents

## Acknowledgments 3

### 1. Introduction 6

1.1	Mission and Vision of the Educational System.....	6
1.2	Atlantic Canada Essential Graduation Competencies .....	6

### 2. Pedagogical Guidelines 7

2.1	Diverse Cultural Perspectives.....	7
2.2	Universal Design for Learning.....	7
2.3	English as an Additional Language Curriculum.....	8
2.4	Assessment Practices .....	9
2.5	Cross-Curricular Literacy .....	9

### 3. Subject Specific Guidelines 10

3.1	Rationale for this course.....	10
3.2	Course Description .....	10
3.3	Scientific Literacy.....	11
3.4	Science Safety Guidelines.....	12
3.5	GCO and SCO Outcome Summary .....	12

### 4. Curriculum Outcomes 13

Student Project.....	13
Working individually or with a partner complete a student project on an issue of personal concern: investigate, analyze and present the issue: design and carry out an original experiment; discuss and explore possible solutions. (20h)	13
GCO 1 Introduction to the human sphere: recognize and appreciate the variety of ways people understand and interact with the natural world.....	15
SCO 1.1 Review the discipline of Environmental Science	15
SCO 1.2 Demonstrate an understanding of different views of the natural world.	16
SCO 1.3 Recognize factors that influence local, regional and global environmental decision-making.	18
SCO 1.4 Briefly explore a range of current environmental issues.	19

GCO 2 Earth Systems: Develop an understanding of the issues and their impact on the dynamics of biotic and abiotic components of the environment.....	21
SCO 2.1 Develop an understanding of how Earth’s spheres interact and support the biosphere.	21
SCO 2.2 Develop a general understanding of biosphere dynamics and the importance of biodiversity at the species, community and ecosystem levels	22
SCO 2.3 Examine and develop an understanding of soil composition and ecology, and current issues in agriculture and forestry	24
SCO 2.4 Examine and demonstrate an understanding of fresh and salt water composition and ecology, and current issues in water resources and fisheries	26
SCO 2.5 Examine and demonstrate an understanding of atmosphere composition and dynamics, and current issues in air pollution and global warming	28
<b>5. General Resources    30</b>	
International	30
National Non-Government	30
National Government	30
New Brunswick/ Atlantic Non-Government Groups	30
Government of New Brunswick	31
Media/News	31
Teacher Resources	31
Text and Curriculum References	31
Outcomes Correlation with Core Texts	32

# 1. Introduction

## 1.1 Mission and Vision of the Educational System

The New Brunswick Department of Education and Early Childhood Development is dedicated to providing the best public education system possible, where all students have a chance to achieve their academic best. The mission statement for New Brunswick schools is:

*“To have each student develop the attributes needed to be a lifelong learner, to achieve personal fulfillment and to contribute to a productive, just and democratic society.”*

## 1.2 Atlantic Canada Essential Graduation Competencies

(Atlantic Provinces Education Foundation DRAFT 2015)

Essential Graduation Competencies provide a consistent vision for the development of a coherent and relevant curriculum. The Essential Graduation Learnings statements offer students clear goals and a powerful rationale for school work. They help ensure that provincial education systems’ missions are met by design and intention. The Essential Graduation Learnings statements are supported by curriculum outcomes.

Essential Graduation Competencies are statements describing the knowledge, skills and attitudes expected of all students who graduate high school. Achievement of the Essential Graduation Competencies prepares students to continue to learn throughout their lives. These Learnings describe expectations not in terms of individual school subjects but in terms of knowledge, skills and attitudes developed throughout the curriculum. They confirm that students need to make connections and develop abilities across subject boundaries if they are to be ready to meet the shifting and ongoing demands of life, work and study today and in the future.

<b>Creativity and Innovation</b>	<i>Learners are expected to engage in creative processes, to make unforeseen connections, and to generate new and dynamic ideas, techniques and products. They value aesthetic expression and appreciate the creative and innovative works of others.</i>
<b>Citizenship</b>	<i>Learners are expected to act responsibly and contribute positively to the quality and sustainability of their environment, communities and society. They assess the social, cultural, economic and environmental interconnectedness and act as stewards in a local, national and global context.</i>
<b>Communication</b>	<i>Learners are expected to express themselves effectively through a variety of media. They listen, view and read for information and enjoyment.</i>
<b>Personal and Career Development</b>	<i>Learners are expected to become self-aware and self-directed individuals who set goals, make thoughtful decision regarding learning, health and wellness, and career pathways, and take responsibility for pursuing their goals throughout life.</i>
<b>Critical Thinking</b>	<i>Learners are expected to analyze and evaluate ideas using various types of reasoning and systems thinking to inquire, make decisions, and solve problems. They reflect critically on thinking processes.</i>
<b>Technology Fluency</b>	<i>Learners are expected to use and apply technology to collaborate, communicate, create, innovate, and solve problems. They use technology in a legal, safe, and ethically responsible manner to support and enhance learning and career and personal goals.</i>

2017

Department of Education and Early Childhood Development  
Curriculum Branch

## 2. Pedagogical Guidelines

### 2.1 Diverse Cultural Perspectives

It is important for teachers to recognize and honour the variety of cultures and experiences from which students are approaching their education and the world. It is also important for teachers to recognize their own biases and be careful not to assume levels of physical, social or academic competencies based on gender, culture, or socio-economic status.

Each student's culture will be unique, influenced by their community and family values, beliefs, and ways of viewing the world. Traditional indigenous culture may view the world in a more holistic way than the dominant culture, connecting disciplines and learning through active participation, oral communication and experiences. Immigrant students may also be a source of alternate experiences, world views and cultural understandings. Cultural variation may also arise from the differences between urban, rural and isolated communities. It may also arise from the different value that families may place on academics or athletics, books or media, theoretical or practical skills, or on community and church. Providing a variety of teaching and assessment strategies to build on this diversity will provide an opportunity to enrich learning experiences for all students.

### 2.2 Universal Design for Learning

Universal Design for Learning is a “framework for guiding educational practice that provides flexibility in the ways information is presented, in the ways students respond or demonstrate knowledge and skills, and in the ways students are engaged. It also “...reduces barriers in instruction, provides appropriate accommodations, supports, and challenges, and maintains high achievement expectations for all students, including students with disabilities and students who are limited English proficient.” (CAST, 2011).

In an effort to build on the established practice of differentiation in education, the Department of Education and Early Childhood Development supports *Universal Design for Learning* for all students. New Brunswick curricula are created with universal design for learning principles in mind. Outcomes are written so that students may access and represent their learning in a variety of ways, through a variety of modes. Three tenets of universal design inform the design of this curriculum. Teachers are encouraged to follow these principles as they plan and evaluate learning experiences for their students:

- **Multiple means of representation:** provide diverse learners options for acquiring information and knowledge
- **Multiple means of action and expression:** provide learners options for demonstrating what they know
- **Multiple means of engagement:** tap into learners' interests, offer appropriate challenges, and increase motivation

For further information on *Universal Design for Learning*, view online information at the [CAST website](#), or download the [UDL reference handout](#).

UDL is neither curriculum nor a checklist. If it were either one of those things, it would oversimplify the act and professionalism of teaching. As an educator, you have taken courses in pedagogy, classroom management, and theory. You have a collection of tools, resources, and

2017

Department of Education and Early Childhood Development  
Curriculum Branch

strategies you have learned recently or over the years. The structure of UDL guides you to actively, attentively, and purposely pull from that collection. It also asks you to possibly think differently. The Difference: Because UDL is a framework versus a curriculum, teachers are in full control in designing the learning environment and lessons (p. 4, *Design and Deliver*).

Loui Lord Nelson (*Design and Deliver: Planning and Teaching Using Universal Design for Learning* 1st Edition, 2014 Paul H. Brooks Publishing) suggests the following reflective questions to support planning (p. 134):

*When I plan my lessons do I:*

- *Have a clear goal?*
- *Know how I am going to measure whether students have met the goal?*
- *Create activities and assignments that guide students toward the lesson goal?*
- *Create lessons and activities designed with options mentioned under the three principles of Engagement, Representation and Action and Expression?*
- *Create assessments directly related to the lesson's goal?*
- *Create assessments designed with the options listed under Action and Expression?*
- *Use a variety of tools and Suggested Learning Strategies and Resources to create my lesson plans?*

Nelson makes the following recommendation:

*Start small. Choose one focus within the framework. Choose one focus within your practice. Enlist the involvement of other teachers, and talk with each other about your experiences. Trade suggestions. Share experiences. Share successes. Watch for change. (p. 136)*

The curriculum has been created to support the design of learning environments and lesson plans that meet the needs of all learners. The **Planning for All Learners Framework** will guide and inspire daily planning.

## 2.3 English as an Additional Language Curriculum

Being the only official bilingual province, New-Brunswick offers the opportunity for students to be educated in English and/or French through our public education system. The New Brunswick Department of Education and Early Childhood Development (EECD) provides leadership from K-12 to assist educators and many stakeholders in supporting newcomers to New-Brunswick. English language learners have opportunities to receive a range of instructional support to improve their English language proficiency through an inclusive learning environment. NB EECD, in partnership with the educational and wider communities offer a solid, quality education to families with school-aged children.

2017

Department of Education and Early Childhood Development  
Curriculum Branch

## 2.4 Assessment Practices

Assessment is the systematic gathering of information about what students know and are able to do. Student performance is assessed using the information collected during the evaluation process. Teachers use their professional skills, insight, knowledge, and specific criteria that they establish to make judgments about student performance in relation to learning outcomes. Students are also encouraged to monitor their own progress through self-assessment strategies such as goal setting and rubrics.

### Formative Assessment

Research indicates that students benefit most when assessment is regular and ongoing and is used in the promotion of learning (Stiggins, 2008). This is referred to as formative assessment, a teaching and learning process that is frequent and interactive. A key component of formative assessment is providing ongoing feedback to learners on their understanding and progress. Throughout the process adjustments are made to teaching and learning.

Students should be encouraged to monitor their own progress through goal setting, co-constructing criteria and other self-and peer-assessment strategies. As students become more involved in the assessment process, they are more engaged and motivated in their learning.

Additional details can be found in the [Formative Assessment](#) document.

### Summative Assessment

Summative evaluation is used to inform the overall achievement for a reporting period for a course of study. Rubrics are recommended to assist in this process. Sample rubrics templates are referenced in this document, acknowledging teachers may have alternative measures they will apply to evaluate student progress.

For further reading in the area of assessment and evaluation, visit the Department of Education and Early Childhood Development's [Assessment and Evaluation site](#).

## 2.5 Cross-Curricular Literacy

Literacy occurs across learning contexts and within all subject areas. Opportunities to speak and listen, read and view, and write and represent are present every day -in and out of school. All New Brunswick curricula include references to literacy practices and materials are available to embed explicit strategies for strengthening comprehension and to help teachers strengthen their students' reading skills.

Key documents that highlight specific cross- curricular strategies include: [K-2 Literacy Look-Fors](#), [3-5 Literacy Look-Fors](#), [Cross-Curricular Look-Fors](#) (Grades 6-12) and [Cross-Curricular Reading Tools](#). These documents describe learning environments and key strategies that support cross-curricular literacy practices.

2017

Department of Education and Early Childhood Development  
Curriculum Branch

## 3. Subject Specific Guidelines

### 3.1 Rationale for this course

In *Introduction to Environmental Science 120*, students were introduced to a variety of environmental issues and practiced the methods of researching and presenting a particular issue of interest. Students also explored the concepts of resource limitations, dependence on Earth's systems, the history of land and water use in NB, and factors that impact on sustainable development.

In *Advanced Environmental Science 120* students will explore the impact and the significance of the many ways that humans interact with the natural world, including exploration of indigenous and other ways of knowing the world. They will gain a deeper understanding of biosphere dynamics and importance of biodiversity. As a class students will study the composition and dynamics of soil, salt and fresh water systems, and the atmosphere and explore current environmental issues in agriculture, forestry, fresh and salt water resources and fisheries, global warming and air pollution. In addition, students will be responsible for completing a project to investigate and report on an environmental issue of personal interest.

This course has been developed for those students interested in pursuing a career and further studies in Environmental Science or in related disciplines such as Environmental Law, Sustainable Architecture, Environmental Health or Sustainable Urban Development. This course will build on conceptual understandings and investigative techniques developed in previous courses. Students must complete one other Grade 11 or 12 provincial Science course as a pre-requisite, as well as *Foundations of Mathematics 110* as a pre- or co-requisite.

### 3.2 Course Description

Environmental science is interdisciplinary, drawing on understandings from biology, chemistry, and the earth sciences, as well as the social sciences. *Advanced Environmental Science 120* explores the variety of ways in which people understand and interact with the natural world, including exploration of indigenous and other ways of knowing the world. Students will study the ecology of ecosystems and what sustains them. Within this context they will study specific environmental issues in detail and will gain a deeper understanding of how humans impact and are impacted by natural systems.

New environmental issues continue to emerge and current issues change focus. In this course, specific topics of study will be chosen based on the current interests and concerns of the students.

For this course each student will be responsible for completing a project. They will be introduced to the requirements for this project near the beginning of the course, and once they have had a chance to explore a range of issues as a class they will choose an environmental issue of personal concern. As they complete their project they will demonstrate scientific literacy through science inquiry, problem solving and decision making.

The first part of this course (GCO 1) focuses on the world from a human perspective. Students will explore the discipline of environmental science, the variety of perspectives from which humans view the natural world, the influences on people when they make decisions about

2017

Department of Education and Early Childhood Development  
Curriculum Branch

the environment, and some of the issues of concern to humans today. The importance of indigenous knowledge as gained from a long-term relationship with an environment is highlighted.

For the second part of this course (GCO 2) students will study the interaction of the biosphere with the lithosphere, hydrosphere and atmosphere. They will then study the biosphere in more depth looking at community ecology, population ecology and biodiversity. With this as background, the class will focus on the composition and dynamics of soil, salt and fresh water systems, and the atmosphere and on issues related to these ecosystems. These issues will include current issues in agriculture, forestry, fresh and salt water resources and fisheries, global warming and air pollution.

The objective of this course is for students to gain a broad understanding of the discipline of Environmental Science that has a wide scope. To meet this objective it is important for students to gain an understanding of the underlying structure and dynamics of ecosystems and the abiotic systems that support them, and to gain the skills needed to explore and analyze a few environmental issues in depth.

By the end of this course students will be able to critically analyze a given issue, draw conclusions, and defend their position on the issue. They will be able to position the issue with reference to the natural abiotic and biotic world. They will recognize both their own and others' biases. They will understand the importance of scientifically derived knowledge, as well as knowledge that arises from indigenous traditions and long-term experience. They will also understand the importance of considering world views, cultural perspectives, and community concerns as important considerations for any given issue.

### **3.3 Scientific Literacy**

This course provides a rich opportunity for students to develop and use scientific literacy skills. These include the ability to plan and carry out experiments and to interpret and apply the data collected. Students should demonstrate their ability to:

- Explore and evaluate environmental issues
- Evaluate the source and quality of information
- Propose a scientific question, and state a prediction and a hypothesis.
- Plan a process and describe a set of steps to investigate the question.
- Record observations and collect relevant data.
- Display data in appropriate format
- Analyze data trends and identify discrepancies and sources of error.
- Draw conclusions and explore next steps.
- Apply learning to a larger context.

Student inquiry should not be confused with learning content, watching demonstrations or doing “labs”, which are important but serve as just a starting point from which student inquiry can arise and critical analysis can be done.

### 3.4 Science Safety Guidelines

For laboratory work teachers should refer to the [Science Safety Guidelines](#) for New Brunswick.

### 3.5 GCO and SCO Outcome Summary

This curriculum identifies General Curriculum Outcomes (GCO), Specific Curriculum Outcomes (SCO), and Achievement Indicators.

This course covers a broad range of topics in 90 hours. As such, the focus should be on the big concepts around each topic, and on exploring a limited number of issues in detail.

The following is a suggested timeline:

**Student project:** Working individually or with a partner, complete a student project on an issue of personal concern: research and communicate the issue; design and carry out an original experiment; discuss and explore possible solutions. (20 hours throughout the course)

**GCO 1 Introduction to the human sphere: Recognize and appreciate the variety of ways people understand and interact with the natural world** (Total 11 hours)

**SCO 1.1:** Explore the discipline of Environmental Science. (2h)

**SCO 1.2:** Demonstrate an understanding of different views of the natural world. (3h)

**SCO 1.3:** Recognize factors that influence local, regional and global environmental decision-making. (3h)

**SCO 1.4:** Briefly explore a range of current environmental issues. (3h)

**GCO 2 Earth Systems: Develop an understanding of the issues impacting the dynamics of biotic and abiotic components of the environment** (Total 54 hours)

**SCO 2.1:** Develop an understanding of how Earth's spheres interact and support the biosphere (3h)

**SCO 2.2:** Develop a general understanding of biosphere dynamics and the importance of biodiversity at the species, community and ecosystem levels (15h)

**SCO 2.3:** Examine and demonstrate an understanding of soil composition and ecology, and current issues in agriculture and forestry (12h)

**SCO 2.4:** Examine and demonstrate an understanding of fresh and salt water composition and ecology, and current issues in water resources and fisheries (12h)

**SCO 2.5:** Examine and demonstrate an understanding of atmosphere composition and dynamics, and current issues in air pollution and global warming (12h)

Total 85 hours, plus 5 hours flex-time

2017

Department of Education and Early Childhood Development  
Curriculum Branch

## 4. Curriculum Outcomes

### Student Project

Working individually or with a partner complete a student project on an issue of personal concern: investigate, analyze and present the issue: design and carry out an original experiment; discuss and explore possible solutions. (20h)

#### *Achievement Indicators*

##### Student Project Part 1

Working individually or with a partner complete an in-depth investigation and analysis of an environmental issue of particular personal concern:

- Research the history of the issue and the evidence of a problem.
- Analyze the role of technology, society, culture and economics on the environmental issue.
- Describe the perspectives of all stakeholders including those of local, regional and national environmental organizations.
- Demonstrate an awareness of alternate values and viewpoints.
- Determine how current environmental legislation and policy applies to the issue.
- Consider the impact of the issue locally, regionally and beyond.
- Synthesize and analyze information from a variety of sources
- Develop a cohesive and engaging presentation for the class, including visuals such as graphs, pictures, or videos.
- Actively participate in other student presentations.

##### Student Project Part 2

Demonstrate science literacy skills by designing and carrying out an original experiment including:

- Initial research - How do we know there is a problem? What is the evidence?
- Presentation of a research proposal - From the initial research, a hypothesis is stated and a prediction made as to how changing one variable will change a second variable.
- Plan a set of steps to test the hypothesis, including identifying the independent and dependent variables and controls
- Perform and carry out the planned experiment

2017

Department of Education and Early Childhood Development  
Curriculum Branch

- Collect and display data.
- Analyze and interpret results.
- Draw conclusions and suggest how this may address some aspect of the issue.
- Identify new questions that arise as a result of this investigation.

### Student Project Part 3

Develop a sustainable solution to an environmental issue

- Research and describe solutions that have been proposed or implemented to resolve the issue.
- Describe the risks and benefits of current solutions.
- Design and develop an original solution to address some aspect of the issue in the form of a tool or device, a planned event, a printed interactive website, a literary piece, a work of art or in some other medium.
- As related to the issue of concern, demonstrate personal appreciation, stewardship, and advocacy for the environment.

### Opinion Essays

[Cultivating Intimacy with Trees](#)

[Launching the Great Environmental Revolution](#)

[Fixing Earth by Fixing Ourselves](#)

[I Want a World Where...](#)

[Lost and Found](#)

[Time to celebrate Interdependence Day](#)

[Comparing the Truax and Lorax](#)

<b>GCO 1</b> Introduction to the human sphere: recognize and appreciate the variety of ways people understand and interact with the natural world	
<b>SCO 1.1</b> Review the discipline of Environmental Science	
<i>Concepts and Content</i>	<i>Achievement Indicators</i>
<p>As humans, we create, control and manipulate the world in an effort to meet our needs and wants, impacting the natural world around us.</p> <p>As we seek to solve issues, it is important to understand the range of ways that humans understand and interact with the natural world.</p> <p>This outcome is meant to be a brief overview of the history and scope of the discipline of Environmental Science.</p> <p>Some students will have completed the <i>Introduction to Environmental Science</i> course, but others will come to the course with another science pre-requisite and will need more of an introduction.</p>	<ul style="list-style-type: none"> <li>• Explain the connections between Environmental Science and Sustainable Development (social, economic, environmental, and cultural).</li> <li>• Recognize that the study of ES involves the skills to critically analyze issues from a variety of perspectives</li> <li>• Examine Environmental Science as an interdisciplinary science that draws on knowledge from biology, ecology, chemistry, geology, geography, economics, political science and ethics</li> <li>• Recognize the importance of sustainability and the role of humans to manage our actions with reference to the natural world.</li> <li>• Review the history of the environmental movement and the establishment of Environmental Science as a discipline.</li> </ul>
<p><u><a href="#">General Resources</a></u></p> <p><u><a href="#">SCO Specific Resources</a></u></p> <p><u><a href="#">UN Sustainable Development Goals</a></u></p> <p><u><a href="#">Global Spheres</a></u></p> <p><u><a href="#">Sustainability Articles</a></u></p> <p><u><a href="#">The Sustainability Challenge</a></u></p> <p><u><a href="#">Sustainability – Tragedy of the Commons</a></u></p>	<p><u><a href="#">Eco-Economy Indicators (Earth Policy Institute)</a></u></p> <p><u><a href="#">Environmental History Notes</a></u></p> <p><u><a href="#">Pichot vs Muir</a></u> audio file, <u><a href="#">Pichot vs Muir PDF</a></u></p> <p><u><a href="#">Teacher Developed Resources</a></u></p> <p><i>Available on the Portal ONE site</i></p>

**GCO 1** Introduction to the human sphere: recognize and appreciate the variety of ways people understand and interact with the natural world

**SCO 1.2** Demonstrate an understanding of different views of the natural world.

*Concepts and Content*

The focus of this outcome is to explore the variety of ways that people approach the natural world.

An individual's approach to the natural world can be influenced by things such as the culture in which they live, the type of environment on which they depend or with which they interact, the amount of social stability in their society and the level of poverty in community.

Indigenous peoples have a long history of living on the land, their traditional knowledge of the land coming from long term experience, handed down through the generations.

In contrast, the western scientific approach tends to be reductionist, isolating and studying parts of the environment in detail and then applying the knowledge to the larger whole.

Students will gain an understanding that we each bring our own values and perspectives to our discussions about environmental issues, and that all perspectives must be respected to find solutions.

*Achievement Indicators*

- Explore a range of personal and cultural views of human place in nature and how this impacts on how people interact with the natural world. Define terminology such as: human centered/ expansionist/ ecological/ life centered worldviews, deep ecology, eco-feminism.
- Compare traditional indigenous ways of knowing the environment with the western scientific approach to studying the environment
- Give examples of how indigenous and western scientific knowledge can be integrated to create an understanding greater than each taken separately.
- Explain ways in which social stability and level of poverty in human populations influence priorities of environmental issues and ability to find solutions.
- Explore and describe your personal approach to the natural environment.

## Resources

### [General Resources](#)

#### *SCO Specific Resources*

[NB First Nations Elders Share Their Stories](#) 25:03

[The Journey of the Mi'kmag](#) 24:34

[Land & Sea: The Mi'kmag Journey](#) 21:53

[Main-Wabanaki: qkisedtanamoogk](#) Tedx

[Lessons in Native American Plant Gathering](#) Kat Anderson

[Solving Problems Peacefully](#)

[Environmental World views summary](#)

[Poverty and Environmental Inequality in India \(article\)](#)

Environmental Artwork/Photography Chris Jordon

[land art video](#) [land art photos](#) Andy Goldsworthy

#### *Teacher Developed Resources*

*Available on the Portal ONE site*

<b>GCO 1</b> Introduction to the human sphere: recognize and appreciate the variety of ways people understand and interact with the natural world	
<b>SCO 1.3</b> Recognize factors that influence local, regional and global environmental decision-making.	
<i>Concepts and Content</i>	<i>Achievement Indicators</i>
<p>In this outcome students will identify factors that influence decision-making ranging from those that are relatively objective to those that are heavily affected by political, religious, economic or other factors.</p> <p>Students will become familiar with some of the protocols, legislation, policies and agreements that protect and control development of our natural areas.</p>	<ul style="list-style-type: none"> <li>• Discuss and research biases from both scientific and non-scientific sources including the role of media and social media in shaping opinion.</li> <li>• Discuss the role of economics, science, society and culture in shaping opinions and government policy. Explain the differences between protocol, law, policy, agreements</li> <li>• Identify the perspective and mandate of local, regional and national community organizations and cultural groups such as COSEWIC, IPCC, CPAWS, UNEP, UNESCO, and WWF.</li> <li>• Review and summarize major environmental protocols, legislation, policies and agreements at the international, federal, and provincial level as they pertain to different ecosystems such as SARA, CITES, Brundtland Report, Ramsar Convention, Montreal protocol, UN Earth Summit 1992, Kyoto, Agenda 21.</li> </ul>
<b>Resources</b>	
<p><u><a href="#">General Resources</a></u></p> <p><u><a href="#">SCO Specific Resources</a></u></p> <p><u><a href="#">Environment and Climate Change Canada – Acts, Regulations and Agreements</a></u></p> <p><u><a href="#">United States EPA: Laws &amp; Regulations</a></u></p> <p><u><a href="#">Leverage Points: Places to Intervene in a System</a></u> (Sustainability Institute text resource)</p>	<p><u><a href="#">Teacher Developed Resources</a></u></p> <p>Available on the Portal ONE site</p>

**GCO 1** Introduction to the human sphere: recognize and appreciate the variety of ways people understand and interact with the natural world

**SCO 1.4** Briefly explore a range of current environmental issues.

<i>Concepts and Content</i>	<i>Achievement Indicators</i>
<p>This is to be a brief overview to explore the wide range of environment issues that are currently of concern.</p> <p>Most environmental issues can be grouped around five themes: chemical changes to air, soil or water; ecosystem conservation and balance; energy flow and matter cycling; quality and depletion of water and other natural resources.</p> <p>Examples from each of these themes should be briefly touched on in class discussions.</p> <p>By the end of this exploration students will identify areas for which they have a particular personal concern, and will choose an issue to research and report on for their student project.</p> <p>This should be a different issue than one that will be covered in class later in the course.</p>	<p>Identify and describe a wide range of environmental issues concerning:</p> <ul style="list-style-type: none"> <li>• chemical changes to air, soil and water due to e.g., waste disposal, fertilizer use, leaching of tailing ponds, greenhouse gases, ozone depletion, endocrine disrupters, genetic mutations.</li> <li>• ecosystem conservation and balance               <ul style="list-style-type: none"> <li>- changes to the natural land surface by e.g., agriculture, forestry, and mining</li> <li>- reduction of biodiversity due to e.g., destruction, fragmentation and degradation of wildlife habitats, hunting species to extinction, and introduction of toxic compounds in to food webs</li> <li>- disruption of species balance by e.g., increasing resistance to pesticides, elimination of predators, introduction of non-native species</li> </ul> </li> <li>• energy flow and matter cycling               <ul style="list-style-type: none"> <li>- disruption of natural chemical cycling and energy flow e.g., phosphorus and nitrogen fertilizers, fossil fuels and release of carbon dioxide, release of sulphur dioxide</li> <li>- changes to the rates of Earth’s natural processes e.g. increased the rate of melting of polar ice cap, reduction of forest cover</li> </ul> </li> <li>• quality and depletion of water and other natural resources.               <ul style="list-style-type: none"> <li>- decreases to the quality, availability and distribution of the Earth’s water causing e.g., melting of Greenland ice sheet, the collapse of the Indian summer monsoon, coastal erosion, sea level rise, groundwater contamination and depletion leading to loss of ecosystems, desertification</li> <li>- depletion of non-renewable resources e.g., fossil fuels</li> </ul> </li> </ul> <p><b>Student Project – students will choose a topic to begin working on their project</b></p>

## **Resources**

### [General Resources](#)

### [SCO Specific Resources](#)

#### Chemical changes

[Chemical Pollution](#)

[Ocean Health Index](#)

[Why the Mercury Falls](#)

#### Ecosystems conservation and balance

[Environmental and Climate Change Canada - Nature](#)

[Nature Preserves – Nature Trust NB](#)

[Protected Natural Areas NB](#)

[Global Issues – Why is Biodiversity Important?](#)

[Ecological Balance - WWF](#)

[Species Introduction](#)

[Invasive Predators](#)

#### Energy Flow and matter cycling

[Matter Cycling Disruption](#)

#### Water Issues

[Water contamination- student solution](#)

[Friends of the Earth Canada](#)

[World Water Council](#)

[UN Water Issues](#)

[Water.org](#)

[Global Issues – Water and Development](#)

[WWF – Water Scarcity](#)

#### Resource Depletion

[Choosing a Life Without Trash](#)

[No Impact Man](#)

[Why I live a Zero Waste Life 13:30 Video](#)

[The World Counts – resource depletion](#)

[What will be left?](#)

[Ecological Footprint](#)

[The Age of Stupid Documentary \(review\)](#)

[I am \(movie\)](#)

### [Teacher Developed Resources](#)

*Available on the Portal ONE site*

**GCO 2 Earth Systems: Develop an understanding of the issues and their impact on the dynamics of biotic and abiotic components of the environment**

**SCO 2.1** Develop an understanding of how Earth’s spheres interact and support the biosphere.

<i>Concepts and Content</i>	<i>Achievement Indicators</i>
<p>This outcome will focus on ecology as the scientific study of organisms and how they interact with each other and with the non-living (or abiotic) world.</p> <p>The biosphere has been used to describe the sum of all living organisms, the sum of all ecosystems and the zone in which organisms live on Earth make up the biosphere (or ecosphere). It is how living organisms interact with the abiotic components of Earth that make up the lithosphere, hydrosphere, and atmosphere.</p> <p>The lithosphere (or geosphere) is the outermost shell of the Earth, composed of the crust and the uppermost solid mantle.</p> <p>The hydrosphere is the combined mass of water found on, under and above the surface of the Earth made up mostly of salt water.</p> <p>The atmosphere is the layer of gases or air that surrounds Earth and is retained by Earth’s gravity, made up mostly of water vapour, nitrogen and oxygen.</p>	<ul style="list-style-type: none"> <li>• describe the different levels of organization for living things from organisms-&gt;populations-&gt;communities-&gt;ecosystems-&gt;biosphere</li> <li>• describe the components and dynamics of the abiotic spheres – lithosphere, hydrosphere, atmosphere – and how they interact and support life</li> <li>• explain the concept of conservation and cycling of matter</li> <li>• describe how energy flows through systems</li> <li>• explain the role that producers, consumers, detritivores, parasites, play in matter cycling and energy flow-through</li> </ul>

**Resources**

[General Resources](#)

[SCO Specific Resources](#)

- [Graphic of Earth system dynamics](#)
- [Global Spheres](#)
- [Geochemical Cycling Overview](#)
- [Environmental Literacy Council](#)

- [The Nitrogen Cycle Note & Cool Game using coins](#)
- [Biogeochemical Cycles](#)
- [Summary of biogeochemical cycles](#)

[Teacher Developed Resources](#)

*Available on the Portal ONE site*

**GCO 2 Earth Systems: Develop an understanding of the dynamics of biotic and abiotic components of the environment and the impact of current environmental issues**

**SCO 2.2** Develop a general understanding of biosphere dynamics and the importance of biodiversity at the species, community and ecosystem levels

<i>Concepts and Content</i>	<i>Achievement Indicators</i>
<p>In this outcome, biosphere dynamics is explored from the perspective of ecology; the different ways that organisms interact with each other at the population, community and ecosystem levels. Biodiversity is explained at the genetic, species, ecological, functional and structural levels. The importance of genetic biodiversity for adaptation and ecosystem sustainability is then highlighted</p> <p>Students gain an understanding of some of the work of the groups involved in the preservation and restoration of biodiversity.</p>	<p>Population dynamics</p> <ul style="list-style-type: none"> <li>• Describe the concepts and dynamic patterns of distribution, migration, speciation and extinction.</li> <li>• Describe characteristics of different types of populations with reference to density, age distribution and dispersion patterns.</li> <li>• Examine examples of changes in species' configuration and distribution over time</li> <li>• Use examples to describe the relationship between population change, reproductive patterns and survival of r-selected and K-selected species.</li> </ul> <p>Community dynamics</p> <ul style="list-style-type: none"> <li>• Describe behavioural relationships between species including competition, defense mechanisms, and predator-prey and other feeding relationships.</li> <li>• Use examples to define the terms native, non-native, indicator, keystone and foundation species and describe the ecological roles of each.</li> <li>• Explore and provide examples of a variety of types of relationships between soil species including symbiosis, parasitism, mutualism and commensalism</li> </ul> <p>Biodiversity</p> <ul style="list-style-type: none"> <li>• Describe the importance of biodiversity at the genetic, species, ecological, functional and structural levels</li> <li>• Demonstrate an understanding that genetic biodiversity within a species may allow an organism to adapt to a changing environment</li> <li>• Discuss how diminishing populations and the resulting reduction in genetic diversity will compromise survival of a species</li> <li>• Discuss how loss of diversity affects the sustainability of an ecosystem</li> <li>• Review the role that government and non-government organizations take to preserve and restore ecosystem biodiversity</li> </ul>
<p><b>Resources</b></p>	

<p><a href="#"><u>General Resources</u></a></p> <p><u>SCO Specific Resources</u></p> <p><a href="#"><u>The Habitable Planet Online text book</u></a></p> <p>Unit 1: Many Planets, One Earth</p> <p>Unit 4: Ecosystems/ Section 3: Energy Flow Through Ecosystems</p> <p>Unit 9: Biodiversity Decline</p>	<p><a href="#"><u>Ecology Review (APES)</u></a></p> <p><a href="#"><u>How Wolves Change Rivers</u></a> (4:33) The link between biodiversity and ecosystems</p> <p><a href="#"><u>Cordyceps Endo Parasitic Fungi Video 1</u></a> (3:00) <a href="#"><u>Video 2</u></a> (3:33)</p> <p><a href="#"><u>TedTalk: A Shrimp with Record Speed!</u></a> (16:25)</p> <p><u>Teacher Developed Resources</u></p> <p><i>Available on the Portal ONE site</i></p>
--	--

**GCO 2 Earth Systems: Develop an understanding of issues impacting the dynamics of biotic and abiotic components of the environment**

**SCO 2.3 Examine and develop an understanding of soil composition and ecology, and current issues in agriculture and forestry**

<i>Concepts and Content</i>	<i>Achievement Indicators</i>
<p>Biotic and abiotic soil composition ecosystem dynamics will be examined and researched.</p> <p>At least one agricultural and one forestry issue will be explored in depth. This will include the history of the issue, evidence of damage, perspectives and legislation, and efforts taken to mitigate damage.</p> <p>Students are asked to use what they have learned to develop another possible solution to address the issue.</p>	<ul style="list-style-type: none"> <li>• Describe the abiotic composition, properties and structure of soil</li> <li>• illustrate the cycling of phosphorus, carbon, nitrogen and sulphur through biotic and abiotic components of an ecosystem</li> <li>• Describe how different kinds of soil are formed</li> <li>• Describe soil biodiversity and explain its importance to sustainability               <ul style="list-style-type: none"> <li>○ Observe and identify a range of small organisms found in a variety of soil samples using magnification e.g., worms, nematodes, fungi, plants, protists</li> <li>○ Research and provide examples of a variety of plant, animal and other species that are dependent on soil for habitat and nourishment</li> <li>○ Give examples of soil organisms at different trophic levels and the role they play in the cycling of energy and matter e.g., detritivores, herbivores, carnivores</li> </ul> </li> <li>• Demonstrate an understanding of soil conservation, erosion and degradation</li> <li>• Review history and legislation of indigenous use of land resources</li> </ul> <p><u>Soil and Land Use issues</u></p> <p>As a class, investigate current issues – at least one agricultural and one forestry issue e.g., soil erosion, depletion of nutrients, effects of pesticide and herbicide use, effects of clearcutting</p> <p>For each of the issues studied:</p> <ul style="list-style-type: none"> <li>• Describe how humans are dependent on the sustainability of the ecosystem</li> <li>• Research and discuss the history of the issue</li> <li>• Report on evidence that the health of the soil and ecosystem sustainability is compromised</li> <li>• Identify the perspective and mandate of community and industry stakeholders</li> <li>• Determine how current environmental legislation and policy applies</li> <li>• Determine if there have been efforts to mitigate damage and whether the efforts have been successful.</li> <li>• Suggest and develop another possible solution to address the issue</li> </ul>

<b>Resources</b>	
<p><a href="#"><u>General Resources</u></a></p> <p><i><u>SCO Specific Resources</u></i></p> <p><a href="#"><u>Dirt! the Movie</u></a>  <a href="#"><u>Garbage to Gold - Composting</u></a>  <a href="#"><u>How Composting works</u></a>  <a href="#"><u>NB Food Security Action Network</u></a>  <a href="#"><u>World resource Institute on Food</u></a>  <a href="#"><u>World Resources Institute on Forests</u></a>  <a href="#"><u>The Nature Education Knowledge Project: Soil, Agriculture &amp; Agricultural Biotechnology</u></a>  <a href="#"><u>The Nitrogen Cycle Note &amp; Cool Game using coins</u></a>  <a href="#"><u>Soil and nutrient cycling</u></a></p>	<p>Lab activities  <a href="#"><u>Dendrology Lab</u></a> (Leaf Types)  <a href="#"><u>Dendrology Site</u></a>  <a href="#"><u>Interactive Labs</u></a> (Habitable Planet)</p> <p><i><u>Teacher Developed Resources</u></i></p> <p><i>Available on the Portal ONE site</i></p>

**GCO 2 Earth Systems: Develop an understanding of issues impacting the dynamics of biotic and abiotic components of the environment**

**SCO 2.4 Examine and demonstrate an understanding of fresh and salt water composition and ecology, and current issues in water resources and fisheries**

<i>Concepts and Content</i>	<i>Achievement Indicators</i>
<p>Biotic and abiotic water composition and ecosystem dynamics will be examined and researched.</p> <p>At least one water resources and one fisheries issue will be explored in depth, including both fresh and salt water issues. This will include the history of the issue, evidence of damage, perspectives and legislation, and efforts taken to mitigate damage.</p> <p>Students are asked to use what they have learned to develop another possible solution to address the issue.</p>	<ul style="list-style-type: none"> <li>• Describe the components and dynamics of the hydrosphere e.g., rivers, wetlands, lakes, oceans and water currents,</li> <li>• Illustrate or model the water cycle and describe ways in which the hydrosphere interacts with the lithosphere and the atmosphere e.g., soil erosion, rain, storms, volcanoes</li> <li>• Describe fresh and salt water biodiversity and explain its importance to sustainability             <ul style="list-style-type: none"> <li>○ Observe and identify a range of small organisms found in a variety of water samples using magnification e.g., algae, seaweed, barnacles, protists</li> <li>○ Research and provide examples of a variety of plant, animal and other species that are dependent on water for habitat and nourishment e.g., fish, mammals, algae, jellyfish</li> <li>○ Give examples of water organisms at different trophic levels and the role they play in the cycling of energy and matter e.g., detritivores, herbivores, carnivores</li> </ul> </li> <li>• Demonstrate an understanding of sustainable water use at local, national, and global levels</li> <li>• Review history and legislation of indigenous use of water resources – both fresh and salt water</li> </ul> <p><u>Water issues</u></p> <p>As a class, investigate current issues at least one in water resources and one in fisheries, including both fresh water and salt water issues e.g., sustainability of the global fishery, impacts of fishing methods, salmon farming, depletion of ground water, ocean waste pollution, fresh water pollution</p> <p>For each of the issues studied:</p> <ul style="list-style-type: none"> <li>• Describe how humans are dependent on the sustainability of the ecosystem</li> <li>• Research and discuss the history of the issue</li> <li>• Report on evidence that water quantity or quality or ecosystem sustainability are compromised</li> <li>• Identify the perspective and mandate of community and industry stakeholders</li> <li>• Determine how current environmental legislation and policy applies</li> <li>• Determine if there have been efforts to mitigate damage and whether the efforts have been successful.</li> <li>• Suggest and develop another possible solution to address the issue</li> </ul>

## **Resources**

### [General Resources](#)

### [SCO Specific Resources](#)

[“Gone Fishing” Project](#)

[Bottled Water PPT](#)

[Water Oceans](#) (from Online text “The Habitable Planet”)

[World Resource Institute](#)

[National Geographic Water Conservation Tips](#)

[EPA: Healthy Watershed Protection](#)

[Undamming the Elwha](#) (26 mins)

[The Story of Bottled Water](#)

[War on Tap: America’s Obsession with Bottled Water](#) (20 mins)

[50 Things We Love About Rivers](#) (Interlude-type video)

[Sewage Treatment](#) (AP Enviro Science)

### Ted Talks

[How to Make Filthy Water Drinkable](#)

[Seas of Plastic](#)

[Ocean’s Glory – and horror](#)

[How I Fell in Love with Fish](#)

[Life in the Deep Oceans](#)

[How We Wrecked the Ocean](#)

[Hidden Toxins in the Fish We Eat](#)

### [Teacher Developed Resources](#)

*Available on the Portal ONE site*

**GCO 2 Earth Systems: Develop an understanding of issues impacting the dynamics of biotic and abiotic components of the environment**

SCO 2.5 Examine and demonstrate an understanding of atmosphere composition and dynamics, and current issues in air pollution and global warming

<i>Concepts and Content</i>	<i>Achievement Indicators</i>
<p>The composition, structure and dynamics of the atmosphere and the associated ecosystem dynamics will be examined and researched.</p> <p>Students will investigate environmental issues in air pollution and global warming.</p> <p>This will include the history of the issue, evidence of damage, perspectives and legislation, and efforts taken to mitigate damage.</p> <p>Students are asked to use what they have learned to develop another possible solution to address the issue.</p>	<ul style="list-style-type: none"> <li>• Describe the composition and structure of the atmosphere e.g., gases that make up air, troposphere-exosphere, ozone</li> <li>• Explain dynamics of the atmosphere e.g., formation of clouds, movement of hot and cold air masses, blockage of ozone layer, greenhouse effect, effect of volcanic eruptions</li> <li>• Describe the cycling of matter and energy with relation to the atmosphere e.g., Nitrogen, oxygen and CO<sup>2</sup> cycling, heat transfer and reflection or absorption of light from the terrestrial and aquatic spheres</li> <li>• Provide examples of a variety of plant, animal and other species that are impacted by the atmosphere e.g., birds and insects following wind currents, ultraviolet rays on plants and animals, global warming</li> <li>• Describe the role that different organisms play and the importance biodiversity</li> </ul> <p><u>Atmospheric issues</u></p> <p>As a class, investigate environmental issues in air pollution and global warming e.g., thinning of the ozone layer, effect of greenhouse gases, acid rain</p> <ul style="list-style-type: none"> <li>• Research and report the evidence for environmental damage</li> <li>• Define and trace the history of how humans and technology have influenced the environmental issue.</li> <li>• Describe how humans are dependent on the system locally, regionally and globally.</li> <li>• Identify the perspective and mandate of community and industry stakeholders.</li> <li>• Determine how current environmental legislation and policy applies</li> <li>• Determine if there have been efforts to mitigate damage caused by humans and whether the efforts have been successful.</li> <li>• Suggest and develop a possible sustainable solution to address the issue</li> </ul>

<b>Resources</b>	
<p><u><a href="#">General Resources</a></u></p> <p><u><a href="#">SCO Specific Resources</a></u></p> <p><u><a href="#">Encyclopedia or Atmospheric Environment</a></u>  <u><a href="#">Science Daily – Atmosphere News</a></u>  <u><a href="#">What is Air Pollution?</a></u></p> <p>Videos</p> <ul style="list-style-type: none"> <li><u><a href="#">Introduction to the Atmosphere</a></u> 5:23 video</li> <li><u><a href="#">25 facts about the Atmosphere that are Truly Magnificent</a></u> 11:01</li> <li><u><a href="#">A Journey through the Atmosphere</a></u> 7:32</li> <li><u><a href="#">Atmospheric circulation</a></u> 22:43</li> <li><u><a href="#">Global Atmospheric Circulation</a></u> 2:24</li> <li><u><a href="#">Coriolis effect</a></u> 3:05</li> </ul>	<p>Ted talks</p> <ul style="list-style-type: none"> <li><u><a href="#">Global Pandemic – Air Pollution</a></u> 19:06</li> <li><u><a href="#">Science behind a climate headline</a></u> 4:07</li> <li><u><a href="#">Why I must Speak out about Climate Change</a></u> 17:51</li> <li><u><a href="#">A Critical looking at Geoengineering for Climate Change</a></u> 15:58</li> <li><u><a href="#">Climate Change Adaptation</a></u>14:23</li> <li><u><a href="#">ABC's of Pollution</a></u> 11:12</li> </ul> <p><u><a href="#">Teacher Developed Resources</a></u></p> <p><i>Available on the Portal ONE site</i></p>

## 5. General Resources

### International

- [UN Educational, Scientific and Cultural Organization \(UNESCO\)](#)
- [UNESCO Open Access documents](#)
- [UN Environment Programme](#)
- [UN Sustainable Development Goals](#)
- [World Bank](#)
- [Nasa Global Climate Change](#)
- [The Environmental Literacy Council](#)
- [World Resources Institute](#)

### National Non-Government

- [Green Peace Canada](#)
- [COSEWIC Endangered Wildlife in Canada](#)
- [Sierra Club Canada](#)
- [Friends of the Earth \(Canada\)](#)

### National Government

- [Department of Fisheries and Oceans \(DFO\)](#)
- [Natural Resources Canada \(NRCan\)](#)
- [Agriculture and Agri-Food Canada \(AGR\)](#)
- [Parks Canada](#)
- [Global Affairs Canada](#)

### New Brunswick/ Atlantic Non-Government Groups

- [Conservation Council NB](#)
- [Envirothon](#)
- [Falls Brook Centre](#)
- [Nature NB](#)
- [East Coast Environmental Law](#)
- [New Brunswick Environmental Network](#)
- [Petitcodiac Watershed Alliance](#)
- [Tantramar Wetlands Centre](#)

## Government of New Brunswick

- [Department of Environment and Local Government](#)
- [NB Regional Solid Waste Commissions](#)
- [Department of Energy and Resource Development](#)
- [Department of Agriculture, Aquaculture and Fisheries](#)

## Media/News

- [CBC Environment Documentaries](#)
- [Guardian Weekly International Environment News](#)
- [NBMedia Co-op](#)

## Teacher Resources

- [EcoKids](#)
- [Environmental Literacy Council](#)
- [Facing the Future](#)
- [Green Teacher magazine](#)
- [EcoCanada Environmental Careers](#)
- [resources4rethinking](#)
- [Holt Environmental Science](#)
- [Earthtimes online text](#)

## Text and Curriculum References

- Cunningham et al. *Environmental Science: A Global Concern* 2005 McGraw-Hill Ryerson Ltd.
- Draper and Read *Our Environment (4th Edition)* 2009 Nelson Education Ltd.
- Miller and Hackett *Living in the Environment (2nd Canadian Edition)* 2011 Nelson Education Ltd.
- Newfoundland and Labrador Department of Education and Early Childhood Development 2010 [Environmental Science 3205 Curriculum Guide](#)
- Prince Edward Island Department of Education and Early Childhood Development 2011 [Environmental Science 621A Curriculum Guide](#)

## Outcomes Correlation with Core Texts

	Miller and Hackett 2011	Draper and Reed 2009	Cunningham et al. 2005
<b>SCO 1.1:</b> Explore the discipline of Environmental Science	Ch. 2 Environmental History: Learning from the past	Ch.2 Environmental Studies: Science, Worldviews and Ethics	Ch. 1 The Science of Our Environment Ch.2 Environmental Ethics and Philosophy
<b>SCO 1.2:</b> Demonstrate an understanding of different views of the natural world	Ch. 1 Environmental problems: An introduction and Overview	Ch.2 Environmental Studies: Science, Worldviews and Ethics	Ch. 1 The Science of Our Environment Ch.2 Environmental Ethics and Philosophy
<b>SCO 1.3:</b> Recognize factors that influence local, regional and global environmental decision-making.	Ch. 26 Economics, Environment, and Sustainability Ch. 27 Politics, Environment, and Sustainability	Ch.2 Environmental Studies: Science, Worldviews and Ethics	Ch.19 Environmental Law: Its Role in Guiding Governing Instruments
<b>SCO 1.4:</b> Briefly explore a range of current environmental issues concerning soil and land use, water systems and air	Throughout text	Throughout text	Throughout text
<b>SCO 2.1</b> Develop an understanding of how Earth's spheres interact and support the biosphere	Ch.4 Ecosystems: what are they and how do they work? Ch.5 Evolution and biodiversity	Ch.3 Earth's life support systems	
<b>SCO 2.2</b> Develop a general understanding of biosphere dynamics and the importance of biodiversity at the population, community and ecosystem levels	Ch.8 Community Ecology Ch. 9 Population Ecology	Ch.3 Earth's life support systems Ch.12 Biodiversity	Ch.16 Biodiversity
<b>SCO 2.3</b> Examine and demonstrate an understanding of soil composition and ecology, and current agriculture and forestry issues	Ch.11 Sustaining Terrestrial biodiversity: Managing and protecting ecosystems Ch.14 Food and Soil Resources	Chapt.3 p.85 Matter Cycling Chapt.6 Agroecosystems and land resources Chapt.9 Forests and Forestry Chapt.12 Biodiversity	Ch.14 Food and Agriculture Ch.17 Land Use: Forests and Rangelands

<b>SCO 2.4</b> Examine and demonstrate an understanding of fresh and salt water composition and ecology, and current issues of water conservation and pollution	Ch.7 Aquatic biodiversity Ch.13 Sustaining aquatic biodiversity Ch.15 Water Resources Ch.22 Water Pollution	Chapt.3 p.89 Hydrologic cycling Chapt.7 Fresh Water Ch.8 Oceans and Fisheries Chapt.12 Biodiversity	Ch.10: Water Ch.11: Water Quality and Quantity
<b>SCO 2.5</b> Examine and demonstrate an understanding of atmosphere dynamics, and current issues of global warming and pollution	Ch.20 Air Pollution Ch.21 Climate change and ozone loss	Ch.5 Our Changing Atmosphere (climate change, ozone layer, acid rain)	Ch.9 Air Pollution
<b>Possible topics for Student Projects</b>			
Sustainable Cities	Ch. 25 Sustainable Cities	Ch.14 Sustainability and the City	Ch.21 Urbanization and Sustainable Cities
Human Population Growth	Ch.10 Applying Population Ecology: The Human Population	Ch.4 Human Population, Environment, and Development	
Energy	Ch.17 Non-renewable Energy Resources Ch.18 Energy Efficiency and Renewable Energy	Ch.11 Energy	Ch.12 Conventional Energy Ch.13 New Energy Technologies
Pest Control	Ch.23 Pest Management	Throughout	Ch.15 Pest Control
Waste Management	Ch.24 Solid and Hazardous Waste	Ch.7 Fresh Water	Ch.18 Solid, Toxic and Hazardous Waste
Conservation	PART IV Sustaining Natural Resources	Throughout	Ch.22 Preserving our Natural Environment
Minerals and Mining	Ch.16 Geology and non-renewable Mineral Resources	Ch.10 Minerals and Mining	Ch.7 Geology
Traditional Knowledge	Throughout	Throughout	
Indigenous Rights	Throughout	Throughout	Throughout