

Unit 1
INTRODUCTION TO ENVIRONMENTAL SCIENCE

Suggested Time:
32 hours

Introductory Comments

There are a great number of activities such as portfolios, journals, newsletters, website postings, etc, that can be integrated throughout this unit and following units. It is not intended that students would do every suggested activity. For example, where it is suggested that students be divided into groups to research and present on a topic, not all students would need to be involved in that activity. Groups could be assigned specific topics to research so that over the course of the unit, all students would have an opportunity to work as a group to research and present of various topics. Teachers could identify the particular activities and projects in which they would like their students to engage and determine a set number of these written activities for each student to engage in over the course of the unit. (Likewise, individual students could be assigned topics to research and then present to the class.) Thus, rather than have every student complete each of the written activities, part of the student's assessment could require that each student/group complete a set number of tasks that could be included in a portfolio/newsletter/website. This could then be compiled for the entire class in the form of a newsletter, website, class display, etc. Where possible, students should be engaged in at least one long term project or activity throughout the unit or the whole course. This could be an individual or group project.

For topics that contain a great deal of factual information, it would be very helpful for students to use the "mind mapping" technique (refer to Appendix) to help them summarize and consolidate this information. References and suggestions for how students could create the mind map will be made throughout this unit. As students become more proficient with the use of mind maps they should be encouraged to create their own without teacher suggestions. Teachers could have students create one mind map for the entire unit or a series of small maps for discrete sections. It is important that students refer to their notes and text when completing their mind maps to ensure the map is completely accurate (i.e. this is a learning strategy and is not appropriate for use as an assessment technique). Teachers should note that mind maps are most effective when students create them from scratch and when color and sketches/picture are used along with their written text. In the absence of colored pencils, etc, teachers could supply students with one of several different colored highlighters. While individual students would create their own mind maps, the teacher could a "class mind map". Several sheets of large paper or poster board could be posted on the wall. The teacher could add to the class mind map each day as a summary of the day's lesson or at the beginning of the next class as a bridge between the current and previous lesson. Student mind maps could be used in Think-Pair-Share activities in which each student explains their mind map to their partner.

Teachers could use rubrics and/or checklists to assess student products and learning. Refer to Appendix for samples.

The Biosphere

Outcomes

Students will be expected to

1.01 define biosphere as a complex system of living things that interact with each other and extend into the geosphere, atmosphere, and hydrosphere

1.02 identify that humans are one part of a complex system of living thing that can have a great impact on the other systems

Elaborations—Strategies for Learning and Teaching

Teachers could begin this topic by using the analogy of Earth as a spaceship. Students could be engaged in a discussion of how Earth is like a spaceship (e.g. limited amounts of food, water, oxygen, set amount of space, etc) and how Earth is unlike a spaceship (e.g. spaceship is much smaller, has fewer occupants, etc).

Teachers should review the following terms: geosphere, atmosphere, hydrosphere, and biosphere. Students should know that volcanic outgassing is the major contributor to the formation of the atmosphere and hydrosphere.

Teachers could use a partially inflated balloon to represent the biosphere. Using a marker, the teacher would label the balloon in three places to represent the hydrosphere, atmosphere and geosphere. This will be used to demonstrate how affects on one aspect of the biosphere will have impacts on other aspects/areas. To do this, the teacher asks student to observe what happens when one part of the balloon is squeezed. Students will see that another area of the balloon expands (experiences increased pressure) even though it is not being directly squeezed. This is analogous to what happens when one aspect of the biosphere is stressed by human impact. The stress is often “felt” in other areas of the biosphere and can have far-reaching and initially unseen effects.

Teachers should clarify that energy transfer and utilization is an integral part of the biosphere.

Teachers should ensure that student realize that “impact” does not always mean “negative impact”. Some human impacts have positive effects on an ecosystem. However, teachers should briefly discuss the fact that even though humans are only one part of the system of living thing, they often have the greatest impact on other living thing. This is because of our use of technology to achieve the things we need from the natural world or to provide us with the things we want or need. Teachers could refer back to the balloon analogy. Teachers could develop a bulletin board or multimedia presentation in which selected articles or photos of human impact are displayed.

The Biosphere

Tasks for Instruction and/or Assessment

Journal

- Compare Earth and a spaceship by constructing a diagram and using pictures to represent the different components (i.e. energy, waste, resources) of both.

Presentation

- Collect graphics that describe the biosphere. Present your findings in a visual as a collage, poster, or multimedia presentation.

Performance

- Create a mind map using one of the graphics from the biosphere presentation to communicate the interrelationships between that organism, other organisms and the non-living elements of Earth.
- Using markers, draw a section on a balloon that is labelled humans. Draw other sections on the balloon that is labelled with living and non-living elements of Earth. Squeezing the section on the balloon labelled humans causes the other sections to be distorted (expanded or contracted). Students will look at their balloons and provide an example of how humans affect each of the other sections on the balloon.

Alternatively, teachers could use a bruised apple to illustrate that, while only that section of the apple is affected, overtime the effects will cause rot that spreads through the entire apple. This illustrates how damage on one area of Earth can eventually have an effect on other parts of Earth.

Resources/Notes

<http://www.ed.gov.nl.ca/edu/k12/curriculum/documents/science/highschool.html>

ST: p. 2

ST: pp. 2-4

Our Impacts on the NL Environment

Outcomes

Students will be expected to

1.03 describe the Newfoundland and Labrador transition, from aboriginals, European settlers, to present day, in terms of how they impacted the land

Elaborations—Strategies for Learning and Teaching

Teachers could utilize guest speakers to supplement this topic. Students should explore the general Aboriginal people’s view about their environment. In particular, students could investigate views from Newfoundland and Labrador aboriginal culture. These cultures saw themselves as only one part of the “environmental system”. They had the first concepts of sustainability, which included respect for the environment, understanding of interconnectedness, and “take only what you need and always give back”.

Teachers could further supplement this topic by showing the National Film Board production, “Hunters and Bombers” that contrasts aboriginal attitudes with Euro-North American attitudes.

Teachers could have students refer to the CBC Land and Sea episode entitled, “The People of the Torngats”. This video highlights the lifestyle changes to the Inuit people of Labrador as a result of policies developed and enforced by various governments.

Teachers should also have students explore the early European settlers’ views and use of their environment. Teachers could point out that, at that time, North America was considered “wild” and as such settlers wanted to “tame” and shape their environment. Early settlers saw the environment as a source of unlimited resources to sustain life. This differed from the aboriginal view and led to substantial exploitation of resources.

For example, when logging began in Newfoundland by early industries (Bowater/Abitibi) in the 1900s, the forests were considered limitless and were used as collateral to develop infrastructure. Considered limitless, the Reid family was given land in return for building the railway across Newfoundland. Ownership of the land became individualized and this contrasted with the view of aboriginal peoples. This view caused a disconnection between environmental impacts and the extraction and processing of resources. The costs of environmental impacts were not considered in resource development. These decisions ultimately influenced how our environment is managed today.

Teachers should include some discussion of the early pioneers of environmental conservation (Aldeo Leopold, Rachael Carson, and Sir Clifford Sifton). These pioneers led the way for others in North America to realize that we need to be connected with the environment. Teachers could point out that as a result of this

Our Impacts on the NL Environment

Tasks for Instruction and/or Assessment

Performance

- Start a “scrap booking” project using photos and examples from various media that show human impact (positive and negative) on Earth. This project could continue throughout the entire course and referred to at various times and units. Present a sample from your scrapbook to your class on a weekly or monthly basis.
- Research and provide one example from each each aboriginal culture in terms of their relationship with the environment. For example, students could explore the Innu’s relationship with the forest.
- Create a mind map or other graphic organizer to summarize the information on how the changes from aboriginal cultures to present day impacted the environment of Newfoundland and Labrador.
- Create a poster or collage that depicts the impact humans have had on the environment in Newfoundland and Labrador from aboriginals to European settlers to present day.

Resources/Notes

<http://www.ed.gov.nl.ca/edu/k12/curriculum/documents/science/highschool.html>

ST: pp. 3-4,
18-19,
156

Land and Sea episode: “The People of the Torngats”

Our Impacts on the NL Environment

Outcomes

Students will be expected to

1.03 describe the Newfoundland and Labrador transition, from aboriginals, European settlers, to present day, in terms of how they impacted the land

(continued)

Elaborations—Strategies for Learning and Teaching

increased awareness, developers are now required to perform an Environmental Impact Assessment (EIA) and report the results to the public. An EIA would discuss plans for dealing with issues such as ecosystem impacts and rehabilitation procedures issues (e.g. energy use, waste management, and mineral extraction).

Teachers should ensure students recognize that a paradigm shift is occurring from a view whereby resources are limitless to a view whereby humans are practicing responsible resource utilization. Teachers could highlight the Eco Spotlight on Bernard Martin, whose efforts were directed to the plight of fisher people in the province.

Our Impacts on the NL Environment

Tasks for Instruction and/or Assessment

Paper and Pencil

- Draw a line on a graph to indicate trends in human population growth over the last two hundred years. On the same graph, draw two lines to indicate trends in energy use and available resources.

Examples:

Resource Demands	Energy Demands
oil	fossil fuels
paper	firewood
lumber	hydroelectric power
portable water	
available agricultural land	

Journal

- Survey family members and generate a list of items that they feel are not necessarily required in households to live a healthy and fulfilling lifestyle. How would not having these items have impacted on demands for resources and energy?

Resources/Notes

<http://www.ed.gov.nl.ca/edu/k12/curriculum/documents/science/highschool.html>

ST: p. 15

An Introduction to Environmental Science

Outcomes

Students will be expected to

- 1.04 describe environmental science. Include:
- (i) the science disciplines involved
 - (ii) social disciplines involved
 - (iii) levels of government involved
- 1.05 recognize common misconceptions about science. Include:
- (i) science can solve all problems
 - (ii) scientific knowledge is fact
 - (iii) science is done for noble causes
 - (iv) there is one scientific method
 - (v) science is not influenced by society
- 1.06 list some applications of Environmental Science. Include:
- (i) environmental impact assessments
 - (ii) environmental monitoring
 - (iii) risk assessment
 - (iv) decision making and policy development

Elaborations—Strategies for Learning and Teaching

Teachers should clarify that environmental science draws from a variety of areas including: science, social studies, law, math, fine arts, and health. Students also need to recognize that scientific knowledge is only one component of environmental decision-making. Government policies, societal needs, societal wants, etc, all play a part. In this context “governments involved” refers to the policy-making, legislation and decision-making that occurs at all levels of government agencies.

This outcome can best be dealt with through general class discussion where students can talk about some misconceptions about science and specifically what science can do for us. The teacher could list the common misconceptions as they are raised. Teacher can refer back to these misconceptions later in the course as students grapple with environmental decision making.

Teachers should clarify the relationship between environmentalism, conservations, and the application methods of Environmental Science. Teachers should also ensure that students recognize the role and significance that the tools and methods of Environmental Science play in assessments, monitoring, decision making, and policy development.

Teachers should limit the discussion of this topic to general description of the applications of environmental science. This topic can be addressed throughout the course and combined with career-related outcomes.

An Introduction to Environmental Science

Tasks for Instruction and/or Assessment

Performance

- Construct a mind map showing the multi-disciplinary nature of environmental science. Include the various government departments that are involved in environmentally-related issues.
- Create a poster or collage that provides a description and overview of what is involved in environmental science.
- In a group, create a mini EIA of a proposed development in your community, region or province. Possible developments could include mine construction, mineral processing, fish plant construction, logging, sewage outfalls, etc. Things to consider:
 - (a) What plants/animals might be affected? In what way?
 - (b) What are the possible economic impacts?
 - (c) What are the potential social/cultural impacts?
 - (d) What controls or regulations would need to be put in place to minimize the impacts?
 - (e) Should the development proceed? Why/why not?

Journal

- Provide an example of a misconception for a specific environmental issue.

Presentation

- Have students engage in a role play activity in which they are assigned various roles in which they contribute to an Environmental Assessment and as a group are required to consider all aspects of the issue.
- Create an audiovisual piece that outlines or describes the misconceptions some people have about science.

Resources/Notes

<http://www.ed.gov.nl.ca/edu/k12/curriculum/documents/science/highschool.html>

ST: p. 8

ST: pp. 280-281, 425-426, 475

Environmental Issues and Human Needs

Outcomes

Students will be expected to

1.07 identify that anthropocentric attitudes have contributed to many of today's environmental issues

1.08 identify the relationship between human population growth, demand for resources, and increased consumerism

Elaborations—Strategies for Learning and Teaching

Students could be asked to reflect on how human-centered attitudes have influenced environmental values, attitudes and decision making: (e.g. “it’s there for your use”, “humans are the top of the food chain”, etc). Teachers should ensure that students are aware that there are different belief systems and that our view is not the only or necessarily correct view. Teachers should also ensure that students understand that belief systems impact how people manage/interact with their environment. Teachers could also investigate opportunities to develop relationships with schools in other countries to allow their students to share attitudes and viewpoints with students of different cultures. Sharing could take the form of written letters, email, discussion forums, video conferences, etc.

Teachers should point out that our resource demands go well beyond our life-sustaining need for food, water, and space. Humans demand:

- transportation such as cars, motorcycles, snowmobiles, ATVs, etc.
- recreation such as videogames, computers, movies, magazines, books, etc., which utilize resources and energy
- the use of energy resources such as fossil fuels, electrical, and nuclear power

Teachers could encourage students to produce their own list of resource and energy demands on Earth. Students should therefore understand that our resource demands are driven by population growth and consumerism both on a collective level and an individual level.

Students should recognize that North American and European lifestyles have been developing (and continues to develop) an increasing need for energy and resources. Lifestyle trends in Asia (the most populated areas of the world) are shifting towards a more western lifestyle. With such a large population, this shift will have an enormous impact on the demand for resources and energy. Teachers could ask students to consider ways in which humans could reduce the impact of their resource demands and consumption of energy. This is a theme that could be continued throughout the course.

Environmental Issues and Human Needs

Tasks for Instruction and/or Assessment

Paper and Pencil

- What are some possible ecosystem impacts caused by the demands for fish and electricity? Share these impacts with classmates.
- What are some characteristics of our society that may have contributed to many of today's environmental problems and issues? The following should be used as a guide for this question: selfishness; greediness; profit-oriented; and stubbornness.

Performance

- Teachers could also investigate opportunities to develop relationships with schools in other countries to allow their students to share attitudes and viewpoints with students of different cultures. Sharing could take the form of written letters, email, discussion forums, video conferences, etc.
- Create a poster, slide show, or collage that shows the relationship between an anthropocentric attitude and many of today's environmental issues.

Journal

- Use the “what? so what? now what?” format to create a journal entry about the various resource and energy demands you make on the environment.

Resources/Notes

<http://www.ed.gov.nl.ca/edu/k12/curriculum/documents/science/highschool.html>

ST: p. 16

ST: p. 4

Environmental Issues and Human Needs

Outcomes

Students will be expected to

1.09 define sustainability as a human practice to maintain ecosystem stability

1.10 outline how balance is maintained in ecosystems. Include:

- (i) energy transfer (food chains/webs, pyramids)
- (ii) nutrient cycling

Elaborations—Strategies for Learning and Teaching

Students have already encountered this concept in Science 1206 or Science 2200. Teachers could clarify that ecosystems naturally establish a balance (one example would be carrying capacity). When humans interact with the ecosystem (e.g. hunt animals, cut down trees, etc.) they shift the natural balance. Sustainable practices are human attempts to minimize their impacts and to help ensure the ecosystem will continue to exist and thus continue to provide the things humans want.

Students should recognize that these concept as they have been covered in Science 1206 and Science 2200. Teachers should assess students' understanding of these topics and, if necessary, provide brief review.

Teachers should ensure that students understand that there is a finite amount of resources on Earth and in order to maintain life, resources must be recycled when their use comes to an end (e.g. replacing nitrogen from once living things back into a form that can be used by other living things). Nutrient cycling should be kept to a brief review. Ecosystem perspectives are a sub set of the global and occur at a more localized level.

Teachers could select examples of local and provincial ecosystems representing (i) freshwater, (ii) terrestrial, and (iii) marine areas and use previously learned concepts such as food chains, food webs, nutrient cycling, energy flow, etc, to demonstrate how these ecosystems remain sustainable.

As part of this review, teachers should ensure students can use the following terms: (a) producers, (b) consumers, (c) decomposers, (d) herbivores, (e) carnivores, (f) omnivores, to identify the organisms within each of the three ecosystems. Teachers could use examples of food webs to demonstrate these terms.

Environmental Issues and Human Needs

Tasks for Instruction and/or Assessment

Performance

- Create a list of the resources and types of energy you use on a day-to-day basis. Share these with the class.
- Create a review puzzle using a piece of software such as that available at www.puzzle-maker.com. Test your classmates recall of these terms.
- Create a stack of Quiz-Quiz-Trade cards that will help the class review common terms related to a study of the environment.

Journal

- What does sustainability mean to you and do you consider it to be important or not?

Resources/Notes

<http://www.ed.gov.nl.ca/edu/k12/curriculum/documents/science/highschool.html>

ST: pp. 26 - 29

ST: pp. 9-12

Conservation, Sustainability and Stewardship

Outcomes

Students will be expected to

1.11 define environmental conservation

1.12 define stewardship in relation to sustainability

1.13 identify the factors that influence sustainability.

Include:

- (i) ecological
- (ii) social
- (iii) economic

Elaborations—Strategies for Learning and Teaching

Teachers should ensure that students understand that the concept of sustainability does not just mean saving resources to use later. It may also involve the maintenance of untouched environments. Sustainability will be covered in greater detail later in this unit. Students could identify examples of where the principles of sustainability have been employed in NL and where they have not been employed.

Teachers should ensure that students recognize that stewardship is defined in terms of shared responsibility that aims to achieve sustainability. It includes activities that preserve the environment at three levels: self, local, and global. For example, recycling (self level), wetland protection and big game management (local level), and Kyoto Accord (global level). Students could reflect on the three levels of sustainability and how they might contribute at each. They could record their thoughts in their journal and include in their portfolio.

Teachers could briefly review the ecological concepts of biotic and abiotic factors (carrying capacity, environmental resistance, biotic potential, water availability, space, etc).

Teachers should guide discussions of social factors to include treatment of our culture, values, attitudes, and beliefs.

Teachers should identify economic impacts of decisions related to sustainability. For example, sustaining big game populations may involve setting lower quotas for hunting. This would have potential economic impact on outfitter operations. Teachers could also raise the fact that political factors are involved and will effect the social and economic factors.

Teachers could use an example (e.g. fishery, forestry, hunting) to discuss and examine three factors that influence sustainability. The concept of sustainability will also be addressed in later units that address fishing, forestry, and hunting.

Conservation, Sustainability and Stewardship

Tasks for Instruction and/or Assessment

Journal

- What do you think is meant by environmental stewardship? Give an example of how you could practice environmental stewardship locally and globally.

Presentation

- Create a poster that communicates the essence of environmental stewardship to your community.
- Create a poster time line that shows the history of environmental conservation, including people and events.

Performance

- Research aboriginal and mid-century European settlers' environmental attitudes. Take a position and debate with other students.

Paper and Pencil

- List several ecological, social, and economic factors that influence sustainability. Select one factor from each category and through research, find a local or regional example to demonstrate an understanding of each factor.

Resources/Notes

<http://www.ed.gov.nl.ca/edu/k12/curriculum/documents/science/highschool.html>

ST: pp. 17-18

ST: pp. 29-36

Conservation, Sustainability and Stewardship

Outcomes

Students will be expected to

1.14 define precautionary principle

1.15 recognize the role of legislation in guiding stewardship and sustainability

1.16 recognize that environmental monitoring is an essential component of sustainability

Elaborations—Strategies for Learning and Teaching

The precautionary principle is a moral and political principle which states that if an action or policy might cause severe or irreversible harm to the public, in the absence of a scientific consensus that harm would not ensue, the burden of proof falls on those who advocate taking action.

Teachers could provide students with examples of legislation that have been developed over the years. Students could assess the relative effectiveness of the various pieces of legislation in terms of guiding sustainability. For example, limiting the size of mesh in fishing nets, the establishment of various hunting and fishing seasons, etc. Teachers could use the animated video “The Man who Planted Trees”(available online) to illustrate the concepts of sustainability and stewardship and to demonstrate the “power of one”.

As an example of the type of monitoring that could be involved, teachers could have students monitor some aspect related to sustainability in their own lives. For example, students could record the amount of packaging that their family discards over a one or two week period. This data could be collected as a class and based on the class average; estimates could be made for their community. Based on the class results, students could make recommendations relative to sustainability of the practice. Other aspects that could be monitored are amount of meat products eaten, amount of water used daily, amount of recycling in the household, kilometers traveled in a week, etc.

The concept of sustainability and the need for monitoring are continuing themes in this course. As a result, opportunities to continue environmental monitoring arise again in later units.

Conservation, Sustainability and Stewardship

Tasks for Instruction and/or Assessment

Journal

- Students could reflect on their role in the legislative process and record their thoughts in their journal.

Performance

- Review a section of legislation relating to terrestrial, freshwater, or marine ecosystems. Summarize it in terms of its role in guiding stewardship and sustainability. Record information in a summary table.
- Monitor some aspect that relates to sustainability in your own life. Choose an aspect that can be easily monitored and recorded in a table over a period of one or two days. As examples, the amount of food that is discarded, the number of kilometers driven daily by parents, and the amount of paper products that are discarded.

Paper and Pencil

- What is meant by the Precautionary Principle? Include an example of a local issue to demonstrate where this principle is applied.

Resources/Notes

<http://www.ed.gov.nl.ca/edu/k12/curriculum/documents/science/highschool.html>

ST: p. 37

ST: pp. 41-43

Our Ecological Footprint

Outcomes

Students will be expected to

- 1.17 recognize some widely-held misconceptions related to sustainability. Include:
- (i) environment damage is permanent
 - (ii) forest fires are bad
 - (iii) one person cannot make a difference
 - (iv) science can solve all of our problems
 - (v) practicing the four R's is difficult
 - (vi) all human activity in nature is bad

- 1.18 identify individual impacts on the environment using the concept of ecological footprint

Elaborations—Strategies for Learning and Teaching

Teachers could have students work in groups to identify and list other myths related to sustainability. For example, others myths include: (i) dynamic equilibrium, nature is always able to heal itself, (ii) environmentalism and resource utilization are incompatible. Students could discuss possible reasons why people would believe the various myths. Teachers could assign students one or several of the myths discussed and have them write a journal entry for inclusion in their portfolio. Students could be assigned to groups and discuss what they know and what they believe relative to the various myths discussed. Their conclusions could be shared with the class and included in their portfolio.

Teachers should ensure that students understand the 4 R's refer to Reduce, Reuse, Recycle, Recover and are an important component of sustainability.

Teachers should clarify that the area of land and water ecosystems required to produce resources, which the population consumes, and to assimilate the wastes, which the population produces, is called the ecological footprint.

Students should be able to calculate their individual ecological footprint using the suggested web site. Using the results, students are able to predict their individual impact on the environment. This activity should be followed with students submitting a realistic plan to reduce their own foot print, which can be included in their portfolio.

Teachers should have students complete the **CORE Lab “How much Earth do you need?”** which address this and other outcomes of this course.

Teachers could lead students to a discussion of the role and importance of alternative energy sources as a means of reducing their ecological footprint (e.g. by using solar or wind power to supplement their energy needs). This could be accomplished by asking them the questions “what would you have to do to reduce your ecological footprint?” and “What changes could you make that would result in a significant reduction in your ecological footprint?”

Our Ecological Footprint

Tasks for Instruction and/or Assessment

Performance

- Calculate your ecological footprint. What steps can you take to lower your personal, impact on the Earth?
- Create a poster, collage, or slideshow that explains the concept of ecological footprint.
- Design an actions plan to lower your or your communities ecological footprint.
- Environmental Myth Busters: In small groups, research a sustainability myth or misconception to find evidence (e.g. graphics, text, videos) to disprove or prove the myth. Present your evidence either orally or as a poster collage.

Journal

- Use the “what? so what? now what?” format to create a journal entry about the size of your ecological footprint.

Portfolio

- Calculate your ecological footprint using one of the tools available on the Internet. The results must be printed and placed in your portfolio.
- What is meant by the term ecological footprint? Predict what you think are your individual impacts on the environment.

Presentation

- Create a poem, song, rap or audio visual presentation that describes the misconceptions some people have about sustainability.

Resources/Notes

<http://www.ed.gov.nl.ca/edu/k12/curriculum/documents/science/highschool.html>

ST: pp. 33-35

Core Lab: “How Much Earth do you Need”, pp. 38-40

Our Ecological Footprint

Outcomes

Students will be expected to

1.19 describe your community's impact on the environment

1.20 describe environmental responsibility. Include the role of:

- (i) individuals
- (ii) community
- (iii) industry
- (iv) government

Elaborations—Strategies for Learning and Teaching

Teachers should address this outcome with reference to one of the following:

- assessment of the present use/abuse of the local environment
- types of commercial and domestic activities
- use the environment for recreation
- waste management strategies

The intent of this outcome is to have students recognize that, as communities living in particular areas, we impact our local environment. Teachers could have students complete a “community value analysis” activity. Teachers could take students on a fieldtrip to their local landfill or waste management site. Teachers could invite a member from the municipal council to speak on the municipality's plans and use of the local environment.

Teachers could have students engage in a brainstorming activity to identify and explore different levels of responsibility. Students could engage in a role play to explore different levels of responsibility.

Teachers could have students refer to the CBC Land and Sea episode entitled, “Ashes Island” which documents individual and community efforts to sustain the commercial lobster industry through practicing environmentally responsible fishing techniques.

Teachers could include the following list of responsibilities to address this outcome:

Industry

- Compliance with environmental regulations at the provincial and national levels
- Being a corporate citizen
 - giving back to the community
 - hiring and buying locally
 - supporting “green” community projects
- Meeting international standards for industry (ie ISO)

Government

- Passing and enforcing legislation pertaining to the environment
- Supporting financially community based projects and nongovernmental organizations
- Signing and implementing international agreements

Teachers could have students complete the **Mini Lab Activity** “Pollution watch: How clean is your air?”

Our Ecological Footprint

Tasks for Instruction and/or Assessment

Performance

- Students could investigate ways in which their communities could reduce their energy consumption, thereby reducing the overall ecological footprint. Such solutions could include the use of alternative energy sources to supplement their energy needs (e.g. biofuels to power public transport or municipal vehicles, etc).

Presentation

- Through research, identify how your community impacts the local environment. Display your results on a community map.

Paper and Pencil

- Using a table format, identify the different levels of responsibility relating to the environmental impacts identified in the previous activity.

Example:

Impacts	Responsibilities
Garbage	Individual <ul style="list-style-type: none"> - recycle - proper disposal of toxic liquids - model appropriate environmental actions Community <ul style="list-style-type: none"> - provide an adequate and secure landfill site - implement appropriate programs for the collection of toxic wastes Government <ul style="list-style-type: none"> - develop, implement, and enforce policies relating to the disposal of garbage

Resources/Notes

<http://www.ed.gov.nl.ca/edu/k12/curriculum/documents/science/highschool.html>

ST: pp. 33-54

Land and Sea episode “Ashes Island”

Eco-citizenship

Outcomes

Students will be expected to

1.21 define eco-citizenship.

Include:

- (i) knowledge
- (ii) attitude
- (iii) practice

Elaborations—Strategies for Learning and Teaching

Teachers could use this as an opportunity to reiterate to students that this environmental science course provides a knowledge base from which to make informed decisions concerning local, regional, national and global environment issues. Emphasize that the formation of healthy environmental attitudes is based on sound knowledge and that practice is the outward manifestation of being an eco-citizen.

Organize students to get involved in community cleanup, school grounds cleanup, school beautification projects, community tree-planting, etc. If the school does not currently have a recycling program, the teacher could organize the students to initiate such a program. If the school currently has a recycling program, students could be involved in developing promotional materials and giving presentations to other classes. Teachers could have students organize and coordinate a recycling blitz for the school. Students could develop promotional materials to promote recycling in the home. Students could work on a program to encourage their peers, who live within walking distance, to walk to school instead of driving or encourage car-pooling among students and teachers. Materials the students create could be included in their portfolio and assessed using either a checklist or rubric.

Eco-citizenship

Tasks for Instruction and/or Assessment

Performance

- Outline a plan to help make your community a more environmentally responsible place. share this with the class.
- Organize and conduct a community cleanup, school grounds cleanup, community tree-planting event, beach cleanup, etc.
- Create an action plan to become more environmentally responsible. Revisit this weekly to determine how well you are doing.

Journal

- Describe the steps you would take to be more environmentally responsible.
- How good an eco-citizen are you and what could you do to become a better eco-citizen? Use the “what? so what? now what?” format.
- What does the term “eco-citizenship” mean to you?
- Are you a good eco-citizen? Why/why not?
- What behaviors do you need to change to become a better eco-citizen?

Resources/Notes

<http://www.ed.gov.nl.ca/edu/k12/curriculum/documents/science/highschool.html>

ST: pp. 43-54

Eco-citizenship

Outcomes

Students will be expected to

1.22 identify examples of eco-citizenship at different levels. Includes:

- (i) household
- (ii) community
- (iii) provincial

Elaborations—Strategies for Learning and Teaching

Teachers should address this outcome by identifying one local and one provincial example of eco-citizenship. Teachers could choose from the following list:

- cosmetic pesticide use
- household hazardous waste management
- community greening projects
- recycling and municipal waste management strategies
- supporting community transportation systems
- use of alternative energy sources
- responsible consumer practices

Teachers could follow up on this discussion by inviting a resource person (such as municipal employee or leaders) to speak to their students about a specific community initiatives in detail. Such a presentation should have a specific focus on the role of the individual and the community.

An example of cosmetic pesticide use is lawn care. Community greening projects would include such things as urban forest, Tidy Towns, Communities in Bloom, etc. Municipal waste management strategies would be specific to municipalities but could also include the provincial waste management strategy (MMSB). Supporting community transportation systems would involve car pooling, public transit, use of biofuels, etc. Municipalities could also use solar and wind power to supplement their energy sources.

Teachers could ask students to discuss and identify attributes of responsible consumerism. Attributes of responsible consumerism could include: purchasing items that can be recycled; purchase of fuel-efficient automobiles, eating less meat, purchasing products with less packaging, buying local products, etc. Teachers could use the example of packaging in the food sector to help students become aware of the environmental costs of excessive packaging.

Teachers could lead a discussion on how societal demands for nutritious, specialized and exotic foods on a year round basis can directly and indirectly impact on the environment.

Eco-citizenship

Tasks for Instruction and/or Assessment

Performance

- Contact your municipality office and determine the steps they are taking to be better eco-citizens.
- Write a letter to the editor of a local paper describing the steps your community could take to be better eco-citizens.
- Write a short story, poem, or song that reflects the role of industry in being environmentally responsible.
- Write a letter to a business either thanking them for being good environmental leaders or encouraging them to alter their practices so they would be more environmentally responsible.
- Draw a picture of your head on a sheet of paper. Fill the picture of your head with graphics and text that communicates your responsible consumer practices. Write what you think is meant by the term responsible consumerism below the picture.

Presentation

- Design some stickers or badges that communicate messages to the general public regarding responsible consumer practices. Distribute the stickers or badges during environment week. Teachers could use a rubric to assess students' learning.
- Create and perform a skit about eco-citizenship.

Resources/Notes

<http://www.ed.gov.nl.ca/edu/k12/curriculum/documents/science/highschool.html>

ST: pp. 43-54

Eco-citizenship

Outcomes

Students will be expected to

- 1.22 identify examples of eco-citizenship at different levels.. Includes:
- (i) household
 - (ii) community
 - (iii) provincial

(continued)

- 1.23 identify the conflict that may exist between eco-citizenship and economic realities

Elaborations—Strategies for Learning and Teaching

Students could describe their own consumer practices and identify ways in which they could reduce the environmental impacts of their practices. Students could set obtainable goals that reduce the impact of their consumer practices and monitor how well they achieve these goals on a regular basis.

Through discussion explore ways that students as consumers might make changes to how a company packages its products. For example, students could explore the MacDonald’s switch from Styrofoam to paper (which arose in response to public pressure) as a positive environmental impact.

Teachers should help students understand that living “green” requires commitment and in some cases an additional expense (ie hybrid cars, heat pumps, purchasing organically grown foods, etc). Also the need for employment and regional economic growth often takes precedent over environmental concerns. As a point of discussion, teachers could refer to either of the following: the controversy surrounding the Main River old growth forest (protecting it) and Corner Brook Pulp and Paper (using it); The NL Fishery (decisions regarding catch rate, modernization, global competitiveness, etc.).

Eco-citizenship

Tasks for Instruction and/or Assessment

Performance

- Write letters to organizations, politicians, and businesses that appear to be in conflict with protecting the environment. Express concerns or ask for information from the respective individuals. Such a “written” campaign could also be conducted using email.
- Write a short story, poem, or song that reflects your feelings and concerns on various environmental issues.
- Write an article about the impact of industry/business on your local environment. Indicate your feelings and thoughts on the impact. This article could be published in the school newspaper/newsletter or in an Environmental Science 3205 newspaper.

Presentation

- Identify one consumer related issue. Write a letter to the company or organization responsible for the issue expressing your concerns and demanding actions to address the issue.

Paper and Pencil

- Write an article about an environmental issue from NL and indicate your feelings and thoughts on the issue. The article could be published in the school newspaper/newsletter or in an Environmental Science 3205 newspaper.

Journal

- Are you a good eco-citizen? What difficulties do you have in being a good eco-citizen? What changes can you make that will help you become a better eco-citizen?

Resources/Notes

<http://www.ed.gov.nl.ca/edu/k12/curriculum/documents/science/highschool.html>

Eco-Regions and Biodiversity

Outcomes

Students will be expected to

1.24 recognize that Newfoundland and Labrador has a variety of eco-regions and ecosystems

1.25 define biodiversity

1.26 identify factors that relate to biodiversity. Include:

- (i) ecosystems
- (ii) species diversity
- (iii) genetic diversity

Elaborations—Strategies for Learning and Teaching

While teachers should ensure students recognize the diversity of eco-regions that exist within the province of Newfoundland and Labrador, this topic is intended to be covered briefly.

When treating this section, teachers should refer to and examine their local eco-region, paying particular attention to the unique features (biotic and abiotic) found there.

Teachers could refer to the Student Activity “Investigating a Newfoundland and Labrador Ecosystem” (e.g. guided walk or activity in an ecosystem) which is contained in the previous ES3205 teacher’s guide, or the previous Biology 3201 Forestry module)

Teachers could assign students to groups representing various eco-regions in Newfoundland and Labrador. Each group could conduct research into the unique features of their eco-region and create a visual (poster, collage, electronic presentation, etc) to represent the various biotic and abiotic features of the ecosystem. These visuals could be presented to the entire class and/or posted around the classroom.

Biodiversity is the variation of life forms within a given ecosystem, biome, or for the entire Earth. Biodiversity is often used as a measure of the health of biological systems in that the greater the biodiversity the healthier the biological systems will be.

Students will have encountered some of these factors in Science 1206 or Science 2200. Teachers should emphasize Canada was a signing member of the Convention on Biological Diversity. Teachers should ensure that students understand the importance of documents/protocols such as the CBD.

It is important at this point that students understand the relationship between genetic diversity and species diversity in the overall biodiversity of an ecosystem. For example, in an Arctic ecosystem the biodiversity is low because the number and types of species are all highly specialized for surviving in this ecosystem, which has limited places to exploit. In the Boreal forest, there is a greater biodiversity because there are a greater number of species present. This is related to the greater number of available ecosystems for them to exploit.

Teachers could have students do a “two minute review” on biodiversity and the factors that affect it.

Teachers could have students complete the **Mini Lab Activity** “What Ecoregion do I live in?”

Eco-Regions and Biodiversity

Tasks for Instruction and/or Assessment

Performance

- Create a collage by researching the eco-regions of NL. The collage could be included in your portfolio.
- Locate a graphic of an ecosystem and identify five biotic and five abiotic factors. Provide a reason to support each choice.
- Collect graphics that show what is meant by biodiversity at the local level. Paste the graphics into a circle and display on a poster. Answer the questions below:
 1. What ecosystems are displayed in the circle?
 2. What is the relationship between ecosystems and biodiversity?
 3. Many different types of plants and mammals are displayed in the circle?
 4. Do you think that if we were living in the tropics, there would be more or less species? Explain.
 5. Are there any graphics that appear to be similar? Are those graphics that you conclude to be similar really similar?
 6. Identify graphics of organisms that are considered to be at risk.
 7. Why are these organisms considered to be at risk?
- Create a brochure that describes one or more eco-regions in this province.

Performance

- Perform a skit that identifies the different factors that lead to biodiversity.

Resources/Notes

<http://www.ed.gov.nl.ca/edu/k12/curriculum/documents/science/highschool.html>

ST: pp. 55-61

ST: p. 62

ST: pp. 62, 66

Biodiversity and Species at Risk

Outcomes

Students will be expected to

- 1.27 describe the importance of species diversity and genetic diversity in an ecosystem
- 1.28 identify reasons why some organisms become species at risk
- 1.29 recognize the importance of protecting species

Elaborations—Strategies for Learning and Teaching

In terms of preserving species, biodiversity is essential for maintaining healthy ecosystems since organisms within an ecosystem are dependent on one another (e.g. food webs). Therefore removal of one species directly and indirectly affects those that remain.

Teachers should have students complete the **CORE Lab “Biodiversity - Why is it important?”** which addresses this and other outcomes of the course.

Genetic diversity equips organisms with the necessary adaptations for survival when environments change. When genetic diversity is reduced (i.e. when all members of a species are identical) the possibility of having the variability to adapt to changes in the environment is reduced. This in turn will reduce species survival in a changing environment. Teachers could use the peppered moth (discussed in junior high and Biology 3201) or the emerging issues threatening the cultivation of banana plants as examples.

Teachers could have students refer to the CBC Land and Sea episode entitled, “The King of Sheep” which documents the significance of protecting the genetically distinct breed of Newfoundland sheep.

The destruction of their habitat is a major factor, along with genetic and reproductive isolation, suppression of natural events, environmental contamination, over harvesting and excessive trade, climate change, disease and the presence of invasive species. The Enviro-Focus features, “Species Significance: Woodland Caribou”, “Marine Species at Risk: Wolf Fish”, and “Habitat Loss and Degradation: Leatherback Sea Turtle” all provide ample examples of why organisms become at risk.

Using examples, teachers should specify the importance of roles that organisms have in ecosystems. For example, insects represent an extremely important part of the plant pollination process. Without specific insects, some plants are unable to reproduce and genetic continuity is disrupted. Students could be encouraged to generate more examples to reinforce this point.

Teachers should ensure that students realize that we cannot pick and choose the species to protect or not protect since all species have value and roles within an ecosystem.

The CBC Land and Sea episodes “Protecting our Caribou” and “The Grey Island Eider Ducks” highlight the need to protect species.

Biodiversity and Species at Risk

Tasks for Instruction and/or Assessment

Performance

- Students could use the Internet to research various species at risk. They could identify which of the reasons discussed apply to the species they identify.
- Describe the role of a NL organism as a newspaper advertisement for employment.

Presentation

- Shields are meant to protect. Design a shield and include graphics or text that communicates what requirements are needed to protect a certain species. For example, a shield for the Newfoundland Marten might show a graphic depicting a mature forest, no snaring, education programs, and a protected area.
- In small groups, choose a convention, accord, agreement, or act that addresses species at risk and create a pamphlet to be distributed to the general public communicates the essence of the convention, the accord, the agreement, or the act.

Resources/Notes

<http://www.ed.gov.nl.ca/edu/k12/curriculum/documents/science/highschool.html>

ST: pp. 68-77

Core Lab: “Biodiversity - Why is it Important”, pp: 64-67

Land and Sea episode “The King of the Sheep”

ST: pp. 72-73,
78-95

Land and Sea episode
“Protecting our Caribou”

ST: pp. 73-77

Land and Sea episode, “The Grey Island Eider Ducks”

Biodiversity and Species at Risk

Outcomes

Students will be expected to

1.30 distinguish between natural extinctions and anthropogenic extinctions

1.31 describe the impacts of introduced species

Elaborations—Strategies for Learning and Teaching

Teachers should ensure that students understand that extinctions have been occurring since life began and that these extinctions represent a natural process. For example, the extinction of dinosaurs occurred millions of years before humans were on the planet. However, recent human activities have been directly linked to species extinctions. Species extinctions, in general, are now occurring at a faster rate than any other time in history (catastrophic events aside). Understanding of why species go extinct is very important. Anthropogenic extinctions are brought on by habitat loss, over-hunting, over-fishing, pollution, etc. Natural extinctions result from catastrophic events (such as volcanic eruptions, tidal waves, earthquakes), climate change, and changing environmental factors (competition, predation, disease, etc.) Scientists, however, recognize that humans are not separate from ecological interactions like food chains and food webs and our interactions in the environment are in fact “natural”. As a result, some scientists argue that there is little or no distinction between natural extinctions and anthropogenic extinctions.

Teachers could have students complete the Enviro-Focus “Over-exploitation of the Great Auk”, “The Effects of Pollution on Boreal Lichen”, or “Impact of Climate Change on Polar Bears” as they address this outcome.

This section refers mainly to the planned introduction of mammals. Teachers may want to discuss the effects of accidental or unplanned introductions. For example, coyotes and rats. Teachers may also want to discuss the impacts of other introductions such as various plants (e.g. dandelions, purple loosestrife), animals (e.g. various insects such as European earwig, Elm span worm, hemlock looper, etc). Teachers should ensure that students understand that sometimes introduced species out compete indigenous species and may result in their extinction or extirpation.

The Case Study “Population Growth of an Introduced Species” and the Enviro-Focus “Invasive Alien Species: Fungal Diseases of Newfoundland Red and White Pine” both address the impacts of specific non-native species.

Biodiversity and Species at Risk

Tasks for Instruction and/or Assessment

Performance

- Students could research the various impacts of an introduced species. This could be included in their portfolio
- Students could create a visual product (e.g. collage, poster, website) or a written product (e.g. an article for a newsletter, poem, song, short story, etc) in which they distinguish between anthropogenic extinctions and natural extinctions as well as provide examples of organisms affected. This could be included in their portfolio and this information can be added to their mind map.

Presentation

- Research a species in NL that has become extinct due to natural causes (e.g. trilobites) or anthropogenic causes (e.g. NL wolf, Great Auk, sea mink, Labrador duck). Present your findings in a visual format (collage, poster, multimedia) or a written format (newspaper article, poem, song, short story). Why is it easier to find examples of anthropogenic extinctions than natural extinctions?

Portfolio

- Students could research the organisms in Newfoundland and Labrador that have become extinct due to natural causes (e.g. trilobites) and anthropogenic causes (e.g. Newfoundland and Labrador wolf, Great Auk, sea mink, Labrador duck).
- Students should be asked to explain why it is easier to find examples of anthropogenic extinctions than natural extinctions. This could be added to their portfolio.
- Students could find examples of species for each of these categories and place this in their portfolio.

Resources/Notes

<http://www.ed.gov.nl.ca/edu/k12/curriculum/documents/science/highschool.html>

ST: pp. 72-73, 82

ST: pp. 83-85

Protecting Biodiversity - Species

Outcomes

Students will be expected to

- 1.32 recognize the process of classifying an organism as a species at risk. Include:
- (i) species assessment
 - (ii) COSEWIC's recommendation
 - (iii) government action/inaction
- 1.33 identify the COSEWIC listings that categorize species at risk. Include:
- (i) not at risk
 - (ii) data deficient
 - (iii) special concern
 - (iv) threatened
 - (v) endangered
 - (vi) extirpated
 - (vii) extinct
- 1.34 describe the recovery process of a species at risk. Include:
- (i) research
 - (ii) monitoring
 - (iii) stewardship
 - (iv) education
 - (v) socio-economic
 - (vi) recovery teams

Elaborations—Strategies for Learning and Teaching

The process of classifying organisms as species at risk is very detailed. For the purposes of this course, students only require a general understanding of the process.

Teachers should clarify that government action results in listing the species under the SARA (Species at Risk Act) legislation. The course of action that follows will be depended upon the nature of the listing. “Special concern” refers to species that are considered vulnerable in provincial legislation.

“Data deficient” is a temporary designation that is used until more data is collected and assessed.

The Enviro-Focus “Humpback Whale” could be used here as an example.

After they have covered the recovery process with students, teachers could ask students to Think-Pair-Share which of these has the greatest impact on helping a species recover. This could then be brought back to a whole class discussion. Students should come to the realization that, while some steps in the process may seem more crucial than others, each step in the process plays a vital role in recovering a species to an area.

Teachers could have students complete the Mini Lab Activity “Monitoring Species at Risk” to provide them with an opportunity to work with data collected during a monitoring process.

The Enviro-Focus features, “The benefits of Research and Monitoring - The Harlequin Duck” and “Piping Plover and Limestone Barren Plants” provide examples of species that have been part of a recovery process.

Protecting Biodiversity - Species

Tasks for Instruction and/or Assessment

Presentation

- Create a fictitious species and develop legislation that will protect it from acquiring the species at risk status.

Paper and Pencil

- Use a flow chart format to communicate the process of classifying a species as being at risk. Make sure that all steps in the process are included in the flow chart and that they are displayed in the correct sequence.
- Use a flow chart format to communicate the process of classifying a species as being at risk. Make sure that all steps in the process are included in the flow chart and that they are displayed in the correct sequence.

Performance

- Students could be assigned a specific example of a species designated at risk and describe each aspect of the recovery process pertaining to that species. Their summary could be included in their portfolio.

Portfolio

- Create a “*NL Species at Risk Portfolio*” for each of the categories.

Resources/Notes

<http://www.ed.gov.nl.ca/edu/k12/curriculum/documents/science/highschool.html>

ST: pp. 98-100

ST: p. 99

ST: pp. 102-115

Protecting Biodiversity - Spaces

Outcomes

Students will be expected to

1.35 define protected area

1.36 identify types of protected areas in Newfoundland and Labrador. Include:

- (i) parks
- (ii) reserves

1.37 explain the benefits of protected areas. Include:

- (i) environmental
- (ii) spiritual
- (iii) economic
- (iv) social

1.38 describe how protected areas are created

Elaborations—Strategies for Learning and Teaching

Teachers should ensure that students understand that there are many different types of protected areas and that these differ in terms of levels of protection, usage, etc. The jurisdiction of the various protected areas will also range from municipal, provincial or national. Teachers should address at least one of each type of protected area at the provincial and national level. Where possible, the choice should reflect the students' local area.

Teachers should ensure students understand that, as an environmental benefit, protected areas help preserve biodiversity in an ecosystem. As such, Canada has initiated a Biodiversity Strategy from which protected area conservation contributes important values.

Teachers could point out that the absence of a land use plan for the province of Newfoundland and Labrador is a major issue in the development and management of protected areas.

Teachers should include the following in the discussion of how a protected area is created:

- identify the need for a protected area
- scientific study of the area
- knowledge of wildlife patterns of behavior
 - habitat needs
 - how ecosystems function
 - public consultation and support
- legislation

Teachers could use the analogy of designing a house to gain an understanding of the process for determining how these boundaries are established. When considering a design for a house many aspects have to be considered such as the size, shape, amenities, special needs, etc.

Protected areas also have specifics that need to be determined in order to better preserve the environment.

Students could discuss the barriers or difficulties in obtaining protected area status. Teachers could refer to the “Bay du Nord” case study in the previous ES3205 courses.

The Eco Spotlight feature “Burnt Cape: The Making of an Ecological Reserve” provides an example of a successful community initiative to protect an ecologically sensitive area in this province.

Protecting Biodiversity - Spaces

Tasks for Instruction and/or Assessment

Performance

- Teachers could provide students with a map of Newfoundland and Labrador and have them identify the various protected areas within the province.
- Students could indicate on a map, areas that are proposed to become protected areas.
- Students could develop a color coded key to identify existing protected areas as well as proposed areas.

Journal

- What do you think is meant by the term protected area? Include examples of protected areas in Newfoundland and Labrador.

Paper and Pencil

- Create a table identifying how provincial and national parks differ in terms of the levels of protection, legislation, administration, and use.

Presentation

- Construct a poster that demonstrates why protected areas are important. Include environmental, spiritual, economic, and social benefits.

Resources/Notes

<http://www.ed.gov.nl.ca/edu/k12/curriculum/documents/science/highschool.html>

ST: pp. 116, 117-122

ST: p. 122

ST: pp. 127-133

Protecting Biodiversity - Spaces

Outcomes

Students will be expected to

1.39 identify the tools used in the management of protected areas. Include:

- (i) research
- (ii) monitoring
- (iii) education
- (iv) stewardship
- (v) protection and enforcement
- (vi) human resources

1.40 identify career opportunities related to the study of environmental issues

Elaborations—Strategies for Learning and Teaching

While teachers should limit discussion of this topic to the a basic description of the management tools employed, it is important that students understand that the management of a protected area involves a multifaceted approach which includes constant monitoring, ongoing research, public education, utilizing both employees and volunteers for protection and enforcement, coordination and cooperation between various levels of government and volunteer groups, etc.

Additional examples of the tools and methods involved in the management of protected areas can be found in the Eco Spotlight “Habitat Stewardship Program”; the Enviro-Focus features “Balancing Act - How Many Hikers are too Many?” and “Community Involvements helps Salmon Stocks Recover”.

Teachers could use a quiz-quiz-trade activity to review up to this point.

Teachers could have students refer to the Career Spotlights “Scientist, Fisheries and Oceans Canada (Dave Kulka) and “Biologists, Canadian Wildlife Service (Keith Chaulk)”. Teachers could also have representatives from various post-secondary institutions that offer environmental-related career programs to present to the class.

Protecting Biodiversity - Spaces

Tasks for Instruction and/or Assessment

Performance

- Research the criteria for determining the boundaries for protected areas. Identify an area within your community (e.g., a walking trail, a wetland, an urban forested area, a historical recreational area) and write a letter using the criteria to suggest why the community area should be protected. Include suggestions on how the area could be managed.
- Create a brochure that explains how protected areas are created.
- Create a poster or slide show that describes the process that is followed as an area becomes protected.
- Choose a protected area near your community. Develop a time line to detail the steps that were taken as it took on protected area status.
- Interview a scientist who works in an environmentally-related occupation Find out what they do on a day to day basis, what training/education they require, and any other interesting things about the job. Present your findings to class.

Resources/Notes

<http://www.ed.gov.nl.ca/edu/k12/curriculum/documents/science/highschool.html>

ST: pp. 133-148

