



Climate Change Building Community

Empowering Youth for Change

food and sustainable development

(a resource for middle years)



A project of the Saskatchewan Organic Directorate's Food Miles Campaign, with the financial assistance of Saskatchewan's Ministry of Environment

Empowering Youth for Change: the benefits of local, organic foods

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Acknowledgements

These resources, part of the larger Food Miles Campaign (FMC) of the Saskatchewan Organic Directorate (SOD), would not have been possible without the financial assistance of Saskatchewan's Ministry of Environment's goGreen program. During the project as a whole and these resources in particular, many people have contributed their efforts: the FMC steering committee, Cathy Holtslander and Pat Godhe as chairpersons, Lynn Anderson and Marion McBride as editors, and Elaine Sukava as FMC project coordinator and resource developer, along with Tyson Fetch, Joyce Polowski, Noreen Jeffreys, Paulette Millis and Carla Cooper.

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Saskatchewan Ministry of Education, 2003

Climate Change and Building Community

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 2. [Taking on Climate Change](#)
 3. Communities and Climate Change
 4. Food Miles, Sustainable Development and Climate Change
 5. Design a Safe Garden using Barriers
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For information about the relationships among the pillars of sustainable development and local, organic foods, please refer to the following document on the web site.

Sustainable Development and Local, Organic Foods

- **The Pillars of Sustainable Development**
 - **The Big Picture, Localism and Food**
 - **Food Miles and the Call for Local Food**
 - **Principles of Local, Organic Food in Saskatchewan**
 - **An Invitation to Explore Saskatchewan Organic Foods**
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Introduction

Rationale

The Saskatchewan Organic Directorate (SOD) has produced these materials to help middle years learners explore the challenges and advantages of local food production, particularly that which is embedded in a holistic view of human connection to and dependence on ecological systems (see **Principles of Local, Organic Food in Saskatchewan**). These resources, three units, for middle years contextualize the benefits of local, organic foods within the larger picture of sustainability principles and practices. The lessons within each of the three units can be added to other units of study, adapted, changed, and / or used as catalysts for further study, according to student interests, community needs, and available time.

Unit One introduces students to the connection between their food choices and their ecological foot prints., and making healthy choices.

Unit Two introduces the students to climate change and the need for individual and community responses to help mitigate it.

Unit Three introduces students to living soils, building and growing and community action projects

Curriculum Goals Explored: Saskatchewan Ministry of Education

Among significant changes in Saskatchewan’s Ministry of Education curriculum renewal process are the introduction of outcomes and indicators of learning rather than the previous foundational and learning objectives, and also, the stronger focus on depth of understanding stemming from active study and learning.

Both the broad areas of learning and the cross-curricular competencies are reflected in these resources which focus on the need for a sustainable supply of affordable, nourishing food for all. Specific goals in Health, Science and Social Studies are addressed as well as Career Education. There are opportunities to engage students in different English Language Arts contexts and themes.

Area of Study	Goals / learning contexts directly addressed
Health	goals: -Develop the understanding, skills, and confidences necessary to take action to improve health. -Make informed decisions based on health-related knowledge. -Apply decisions that will improve personal health and/or the health of others.
Science	goals: -Understand the Nature of Science and STSE Interrelationships -Develop Attitudes that Support Scientific Habits of Mind -Construct Scientific Knowledge -Develop Scientific and Technological Skills
Social Studies	goals: -Examine various worldviews about the use and distribution of resources and wealth in relation to the needs of individuals, communities, nations, and the natural environment, and contribute to sustainable development (RW).
English Language Arts	goals: -Comprehend and respond (CR), compose and create (CC) and assess and reflect (AR) in a number of contexts including social, cultural, and historical; environmental and technological; and communicative.
Career Education	goal: -Explore the connections between learning and work pathways and their connections to community. - Engage in inquiry to construct a personal life and work plan.

Middle Years Outcomes Explored

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RAS= Required Area of Study

Social Studies = (SS), Science = (Sc), Health = (H), English Language Arts (ELA)

Cross Curricular Competencies created in Sept 2010 are emphasized throughout

RAS	Outcomes	Lesson title and Page
Grade 6	RW6.1 - Resources and Wealth (SS) see link	Lesson 3 Page 19
	RW6.2 - Resources and Wealth (SS)	Lesson 2 Page 14
Grade 7	IE7.4 - Interactions Within Ecosystems (Sc) see link	Lesson 5 Page 23 Lesson 3 Page 19
	USC7.5 - Understanding, Skills and Confidences (H)	Lesson 4 Page 21
Grade 8	RW8.1 - Resources and Wealth (SS) Analyze the social and environmental consequences of living in the Canadian mixed market economy based on consumerism.	Lesson 2 Page 14
	RW8.2 - Resources and Wealth (SS) Assess the implications of personal consumer choices.	Lesson 2 Page 14
	RW8.3 - Resources and Wealth (SS) Critique the approaches of Canada and Canadians to environmental stewardship and sustainability.	Lesson 2 Page 14
	USC8.6 - Understanding, Skills and Confidences (H) Examine and assess the concept of sustainability from many perspectives, and develop an understanding of its implications for the well-being of self, others, and the environment.	Lesson 2 Page 14
	AP 8.10 - Action Planning (H) Design, implement, and evaluate three seven-day action plans that establish multiple supports for responsible health action related to family roles and responsibilities, non-curable infections/diseases, violence and abuse, body image, sustainability, and sexual health.	Lesson 3 Page 19 Lesson 5 Page 23
	CC8.2 , CC8.3 , CC8.6 , AR8.1 - See link (ELA)	Lesson 1 Page 5
Grade 9	USC9.5 - Understanding, Skills and Confidences (H) Evaluate a variety of healthy food policies and plan to participate in the development, revision, and/or implementation of a healthy food policy (e.g., fundraising, feasts, canteen sales, extra-curricular events) in the community (e.g., home, school, arena, youth center).	Lesson 4 Page 21
Other	Career Education - These resources help students explore work and critical issues around food production, processing, procurement, preparation, marketing, selling, and being actively involved in their communities. Due to these foci, outcomes regarding "Connections to Community" and "Life and Work Plan" from each grade level can be considered. English Language Arts - Each lesson provides opportunities for skills development in ELA. An example is included for grade 8 above.	

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What is a Greenhouse Gas (GHG) and what's so important about it?

Outcomes

ELA Middle years (6-9) ELA Curriculum Guides page 13 - [Environmental and Technological Context](#)

CR8.4 View critically and demonstrate comprehension of a variety of visual and multimedia textsto locate and interpret key messages and details, to develop conclusions, opinions, and understanding, and to evaluate the effectiveness of the text.

CR8.5 Listen critically to understand, gather information, follow directions, form an opinion, and analyze oral presentations for diverse opinions, presenter's point of view, values, and biases, stereotypes, or prejudices.

CR8.7 Read independently and demonstrate comprehension of a variety of information texts including understanding the main ideas and supporting evidence, explaining connections between new ideas and information and previous thoughts, and recognizing any biases or false reasoning.

CC8.3 Select and use the appropriate strategies to communicate meaning before (e.g., plan, organize, and sequence ideas to fit purpose, point of view, and format), during (e.g., use and maintain appropriate point of view for audience and purpose), and after (e.g., revise final drafts and presentations to ensure that the format and patterns within that format contribute to the effectiveness of the composition) speaking, writing, and other representing activities.

AR8.1 Use information gathered in self-assessment and teacher's assessment to develop and work on goals for improving viewing, listening, reading, representing, speaking, and writing.

Assessment

Rubrics found in the [Appendix #3](#) and [#4](#)

Materials

Government of Canada - The Greenhouse Effect

Government of Canada - Canada's 2007 greenhouse Gas Inventory

- Each lab has a materials list.
- Chalkboard
- Picture of a greenhouse

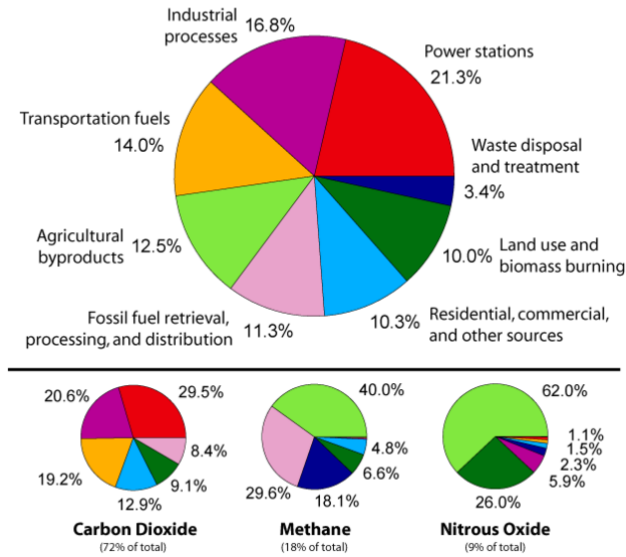
The following links has many additional resources:

http://www.cbt.org/uploads/pdf/Climate_Change_Resources_on_Precipitation_Patterns_and_Flooding.pdf

[Environment Canada](#)

Falls Brook Centre <http://www.fallsbrookcentre.ca/>

Annual Greenhouse Gas Emissions by Sector



source: [wikimedia commons](#)

Background

This lesson introduces the students to greenhouse gases (GHG) as the foundation of climate change. In later lessons students will connect the food chain (growing, processing, transportation, preparation and consumption) to this bigger picture

The Greenhouse Effect

"The greenhouse effect is the term used to describe the role of the atmosphere in insulating the planet from heat loss. Greenhouse gases (GHG) are gases in the atmosphere that give rise to this greenhouse effect. GHGs allow shortwave solar radiation to penetrate down to the atmosphere and the Earth's surface. When this radiation is absorbed and the Earth's surface warms the reflected radiation has a longer wavelength that will not penetrate the GHGs. GHGs function as a blanket that traps heat in the lower atmosphere - termed the "greenhouse effect."

(Government of Canada)

[\(greenhouse effect diagram\)](#)

This "natural greenhouse effect" is an important phenomenon to biological life on Earth. The average surface temperature is maintained at approximately 15°C because of this effect. If all the radiant energy were to escape out of the atmosphere, the global temperature would be -18°C, a difference of 33°C.

The Earth's temperature and climate system can be thought of as a heat engine driven by energy from the sun. There is an energy balance between incoming and outgoing radiative energy that is partially regulated by the concentrations of GHG gases in the atmosphere. Climate change occurs when the total amount of the sun's energy absorbed, does not equal the amount of energy released, causing an imbalance in the radiative exchange.

Consequently, humans can also cause temperatures and the climate system to change. Human activities such as the burning of fossil fuels, deforestation or land surface change, industrial processes, etc., are increasing the

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concentration of GHGs in the atmosphere at an alarming rate. This additional increase of GHG is known as the "enhanced greenhouse effect", where more incoming energy is trapped within the atmosphere. This can have serious impacts on the physical and chemical processes, and biological life on Earth.

The proportion of GHGs amounts to less than 1% of the total gases in the atmosphere. However, these gases collectively increase the Earth's surface temperature by 33°C. Because the concentrations of these gases in the atmosphere are so low, it is possible for human emissions to have a drastic effect on the radiative budget and resulting surface temperature. "

Source: Government of Canada

Learning event

Set:

Before the students enter the room, place the following words and chemical formulas on the board: water [H₂O], carbon dioxide [CO₂], methane [CH₄], nitrous oxide [N₂O], and chlorofluorocarbons [CFCs]. Ask the students to talk to their neighbour about what they know about each formula. Once they have discussed each formula show the students a picture of a greenhouse. Tell the students that the formulas on the board are greenhouse gases. While carbon dioxide is the well known greenhouse gas, there are others.

Place the Government of Canada [diagram illustrating the greenhouse effect](#) for students to see (page 12). Tell them they will explore the ways the world and its atmosphere are like a greenhouse

Ask students to consider their personal contributions to GHG emissions and how they compare and contrast with people in other parts of Canada or the world. Then, show them the graphic information from the "[Indicators of Well-being in Canada](#)" at the Human Resources and Skills Development web site of the Government of Canada. Ask them to re-assess their connection to climate change via GHG emissions.

Method:

1. The following two labs examine the effects of the heating of the earth. The first lab has been borrowed and adapted from [Falls Brook Centre of New Brunswick](#) and is designed for a teacher to do as a demonstration. The second lab is easy to do and gives good results as long as there is a sunny window to keep the jars in.

Lab One Greenhouse Gas Lab: Measuring the heat absorption of carbon dioxide in a bottle

Students have the chance to create and observe a simulation of the greenhouse effect. They can observe a model of the role that atmospheric gases play in warming the earth. The greenhouse effect is a tricky concept, mainly because the actual processes are more complex than the common "greenhouse" analogy would imply. In reality, the sun's rays coming in (ultraviolet light) pass through the atmosphere without a problem while the long wave radiation (infrared light) that radiates off the surface and has a much harder time passing through the atmosphere. Gas molecules in the atmosphere absorb this infrared radiation, creating an additional heat for the planet. By contrast, greenhouses and the insides of cars heat up mainly because the heated air that is let in cannot escape. But unlike the atmosphere, the glass in a greenhouse or a car does not absorb the energy and act as a continuing heat source, as the atmosphere does for Earth.

The most common greenhouse gases are, in order,

1. water [H₂O]
2. carbon dioxide [CO₂]
3. methane [CH₄]
4. nitrous oxide [N₂O]
5. chlorofluorocarbons [CFCs].

For a description of these gases, visit "Information on Greenhouse Gases and Sinks" at the Government of Canada.

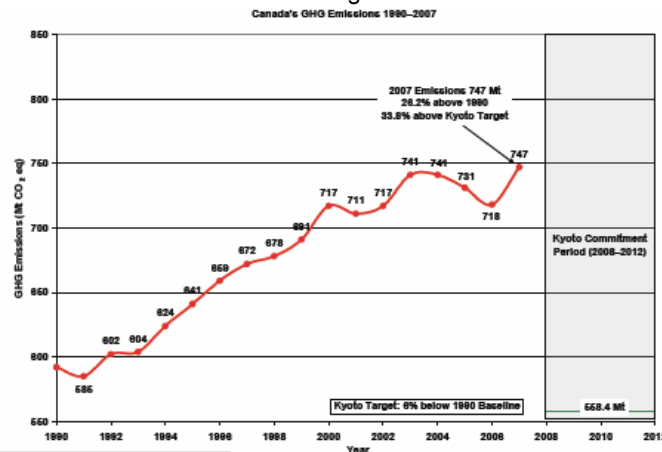
While water is the most prevalent greenhouse gas in the atmosphere, carbon dioxide is the one scientists are most concerned about because it is the one that humans are controlling most directly—mainly through the burning of fossil fuels.

Materials:

- (per group of four students or for single teacher demonstration)
- Two 250 ml flasks
- 1 #6 no hole stopper or equivalent
- 2 #6 one hole stoppers or equivalent
- Alka-Seltzer
- large pan or bucket of water
- glycerin
- short glass tube connected to 30 cm of flexible tubing, such as airline tubing (to run from one of the flasks to the pan of water)
- short glass tube connected to 30 cm of flexible tubing, such as airline tubing (to run from one of the flasks to the pan of water)
- 2 thermometers (preferably lab thermometers)
- 2 lamps with 100 watt light bulbs
- 1 extension cord if needed
- Activity worksheets
- Background supplement—“What are the Greenhouse Gases?”

[Canada’s 2007 Greenhouse Gas Inventory: a Summary of Trends](#)

Note: Compare and contrast this information with current information regarding GHG, available through Environment Canada



“Between 1990 and 2007, large increases in oil and gas production—much of it for export—as well as a large increase in the number of motor vehicles and greater reliance on coal electricity generation, have resulted in a significant rise in emissions.”

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Purpose of Investigation:

This investigation is designed to compare the abilities of a sample of carbon dioxide gas and a sample of air to absorb thermal energy.

Pre-Lab Discussion:

Tell the class we/they will build a *model* that explores the property of CO₂ to retain heat energy.

Teacher note:

Ask students to identify the different parts of the model and what they represent (i.e., the lamps model the sun, the bottles model the atmosphere). Using two separate lamps achieves best results for this experiment. It seems that the more heat generated, the clearer the temperature differences will be in a 25 minute period.

If a group is near a draft or in direct sunlight, relocate them to another place. Outside factors such as these may interfere with the results of the experiment.

Preparing the bottles: http://www.fallsbrookcentre.ca/teaching/docs/Lesson_Plans/whole_world_climate.pdf

1. Fill one 250 ml flask with water to the rim, and then stopper the flask with a #6 no-hole stopper. Place the flask, upside down, into a pan or bucket of water and then remove the stopper. The flask should remain filled with water as it sits upside down in the pan.
2. Add 100 ml of water to a second flask.
3. Insert a short glass tube into a #6 one-hole rubber stopper. Then attach a 30 cm piece of airline tubing to the glass tube.
4. Feed the free end of the airline tubing under the water in the pan and into the inverted flask.
5. Drop one Alka-Seltzer tablet into the flask containing 100 ml of water and then quickly stopper the flask with the tube assembly. The carbon dioxide from the dissolving Alka-Seltzer will begin to displace the water in the inverted flask in the pan.
6. After the water has been evacuated from the flask in the pan, place the #6 no-hole stopper in the flask and remove the flask from the pan of water.
7. Insert a laboratory thermometer into each of two #6 one hole stoppers. Dip the thermometers in glycerin before attempting this procedure.
8. Put one of the thermometer stoppers into an empty flask. This will be the air sample.
9. Remove the stopper from the flask of carbon dioxide gas and quickly replace it with a thermometer stopper. (Note: carbon dioxide gas is denser than air and should remain in the flask after it is opened.)

Measuring temperature:

1. Place each flask 5 cm from a 100 watt light bulb.
2. Record the beginning temperature in each flask of gas.
3. Turn on the light and record the temperature in each flask. Have all students begin at the same time and record their data at one minute intervals for 25 minutes or until temperatures begin to level off.
4. Students will construct a line graph of the collected data, using separate colored pens for each flask.

Discussing the results and Relating the experiment to the Greenhouse Effect

1. Compare the data as a class and discuss results.
2. We have already learned that the greenhouse effect is a natural phenomenon, responsible for sustaining a livable climate on Earth. So what's the big deal about carbon dioxide?
3. Why should we care about a few degrees of temperature increase? Would that be so bad? Discuss how this could set off a much larger chain of events. A small increase could melt a little more of the polar ice caps. This would release a little more water into Earth's system, possibly leading to more evaporation, and more clouds. Water is actually the most potent greenhouse gas.
4. How do you think scientists measure carbon dioxide in the atmosphere? What do you think might make it difficult

- to prove whether or not carbon dioxide levels are rising?
5. Compare this experiment to an example of a car parked under the sun on a hot day with all the windows and doors shut. What happens to the temperature inside the car? Does the temperature keep rising as long as the sun is shining? How can you cool the car down? Why does that work?
 6. Explain that the greenhouse effect works in a somewhat similar-- but not entirely the same—way. The sun's rays pass through the atmosphere and warm the surface. The earth emits some of this energy back into space (like heat from a campfire). But gases such as carbon dioxide and water vapor (in clouds) absorb much of this energy and send it back to earth. People have come to call this process the “greenhouse effect” because it reminds them of how actual greenhouses, which are made out of glass and grow plants, let the sun's rays in while trapping much of the radiation that would otherwise escape.
 7. Discuss differences between the greenhouse analogy and what actually happens in Earth's atmosphere

Connecting the greenhouse effect to global warming

1. Reiterate that scientists know that the atmosphere absorbs energy that is radiated from earth's surface. This helps keep us warm and is a natural process. However, when humans emit an excessive amount of greenhouse gases—more than are natural—this can potentially result in additional warming of Earth. This is how the greenhouse effect is connected to global warming.

Lab #2:

Materials:

2 identical glass jars
4 cups cold water
10 ice cubes
1 clear plastic bag
Thermometer

<http://www.energyquest.ca.gov/projects/greenhouse.html>

Method:

Take two identical glass jars, each containing 2 cups of cold water.
Add 5 ice cubes to each jar.
Wrap one jar in the plastic bag (this simulates the greenhouse effect).
Leave both jars in the sun for one hour.
Measure the temperature of each jar before and after the time in the sun.

What you will discover:

In bright sunshine, the air inside a greenhouse becomes warm. The greenhouse glass lets in the sun's light energy and some of its heat energy. This heat builds up inside the greenhouse. You just showed a small **greenhouse effect**. What could happen if this **greenhouse effect** changed the Earth's climate?

Another version of a greenhouse is what happens inside an automobile parked in the sun. The sun's light and heat gets into the vehicle and is trapped inside, like the plastic bag around the jar. The temperature inside a car can get over 120 degrees Fahrenheit (49 degrees Celsius).

Concluding activities:

1. If you have not done so already, examine both the “Annual greenhouse gas Emissions by Sector” and “Canada's 2007 greenhouse Gas Inventory: A Summary of Trends” and compare and contrast these with discoveries and discussions arising from the labs in this lesson.
2. Have students write a newspaper article describing the results of the labs. The newspaper article should be at least two paragraphs in length and must include their results as well as recommendations that could be taken to reduce our greenhouse gas emissions. The students are to keep Saskatchewan in mind, especially the community that they live in. This means that they **must include** recommendations **their community** can take to reduce that greenhouse gas emissions.

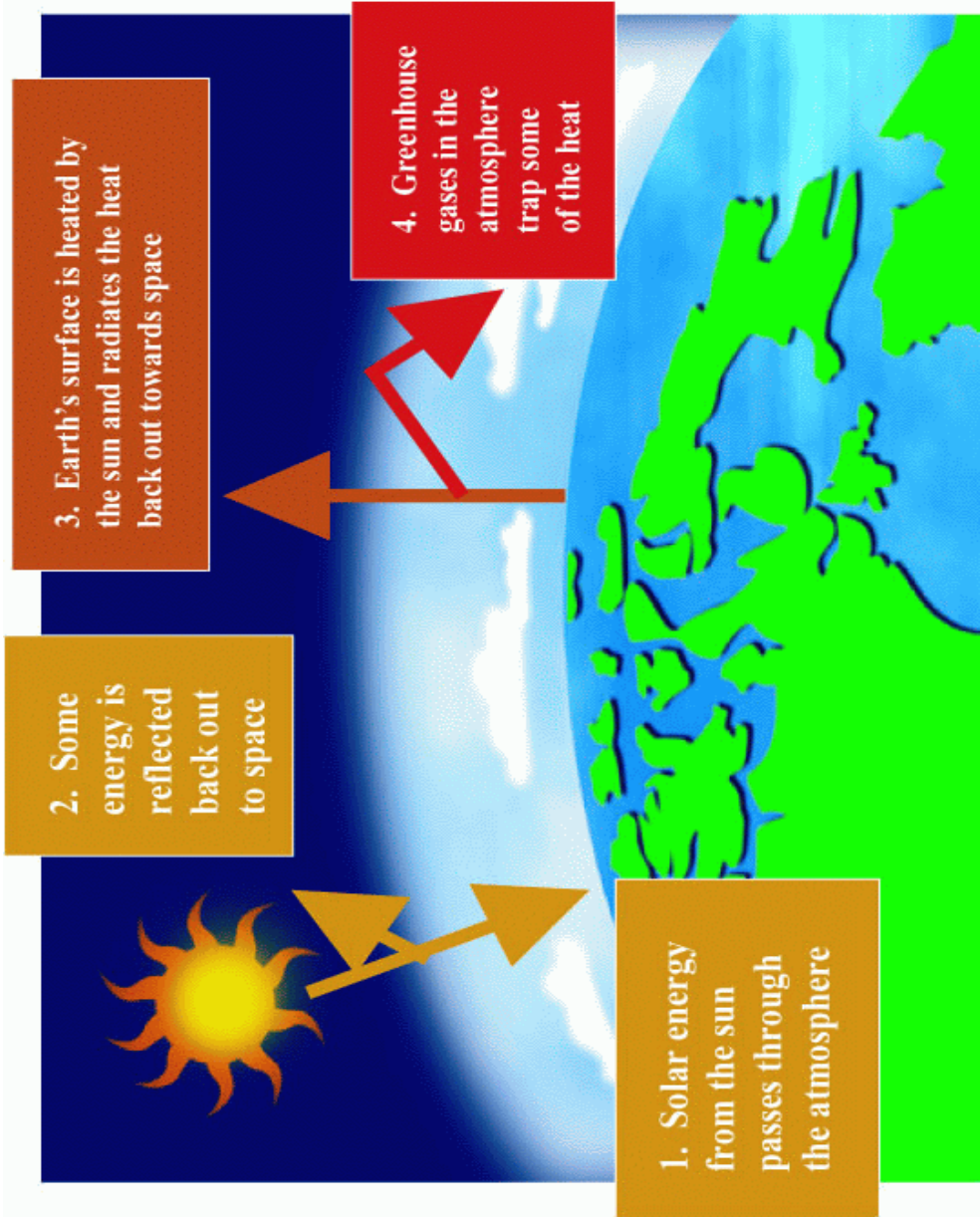
8 Things You should know About Climate Change

1. **Climate change refers to a long-term change in average weather conditions over time.** This includes changes in temperature, precipitation and winds. Climate change can be the result of natural processes or human activity.
2. **Global warming observed over the last 50 years has been largely attributed to human influences on the climate.** This human influence is largely a result of burning fossil fuels such as coal, oil and natural gas. Burning these fuels generates carbon dioxide, a greenhouse gas that is blamed for much of the warming. Land use changes, such as deforestation and conversion of land to agriculture, have also contributed carbon dioxide to the atmosphere.
3. **Natural processes can also cause climate change.** The Earth's climate has changed throughout its history, with the planet experiencing glacial periods or 'ice ages', as well as natural warming cycles. These changes can be explained by changes in the Earth's orbit, changes in the sun's intensity, and by volcanic eruptions that produced aerosol and carbon dioxide emissions.
4. **Climate change is primarily attributed to the enhancement of the natural greenhouse gas effect caused by increased levels of gases in the atmosphere from human activity.** Greenhouse gases are atmospheric gases that absorb and emit thermal radiation. So-named for their ability to trap heat in, greenhouse gases greatly affect the temperature of the Earth. Major greenhouse gases in Earth's atmosphere are water vapour, carbon dioxide, methane, nitrous oxide and ozone.
5. **The ozone hole does not have a strong effect on global climate change, although research indicates that it has affected the circulation (winds) in the southern hemisphere.** The thinning of the ozone layer is caused mainly by chlorofluorocarbon chemicals (CFCs), used in the past in refrigerator and air conditioning units. The Montreal Protocol, which has effectively banned the emission of CFCs, has put the climate on a path towards gradual recovery of the ozone hole, but these actions alone will not slow climate change.
6. **Climate change is a warming trend, not just a warming cycle.** Global temperature naturally varies up and down from year to year and decade to decade. However, over the long term, global temperatures have been warming, and most of the warming over the past half-century has been attributed to human influences on the climate system, primarily greenhouse gas emission. This has resulted in glaciers melting, sea levels rising, and changes in weather patterns and precipitation.
7. **Climate change will have adverse effects on communities all over the world.** Extreme weather is likely to increase, potentially destroying human and animal habitats. As well, rising sea levels and changes in weather and precipitation will affect communities, agriculture and food supplies.
8. **Individuals, organizations and the international community can make a difference in dealing with climate change.** We must act. Measures such as reducing greenhouse gas emissions and gaining awareness of the issues surrounding climate change can make a significant difference. .

Environment Canada—<http://www.climatechange.gc.ca/default.asp?lang=En&n=20A201A3-1>

source - Government of Canada

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The radiative balance of the atmosphere, termed the greenhouse effect. The solar energy passes through the atmosphere and is absorbed by the Earth. This energy is emitted as long-wave radiation and is absorbed by the greenhouse gases in the atmosphere.

Source: Government of Canada.

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source: http://www.adaptation.nrcan.gc.ca/posters/pr/images/pr_poster_e.jpg

Taking On Climate Change

Outcomes ([Unit One - outcomes](#))

[RW6.2](#) Contribute to initiating and guiding change in local and global communities regarding environmental, social, and economic sustainability.

[RW8.1](#) Analyze the social and environmental consequences of living in the Canadian mixed market economy based on consumerism.

[RW8.2](#) Assess the implications of personal consumer choices

[RW8.3](#) Critique the approaches of Canada and Canadians to environmental stewardship and sustainability.

[USC8.6](#) Examine and assess the concept of sustainability from many perspectives, and develop an understanding of its implications for the well-being of self, others, and the environment.

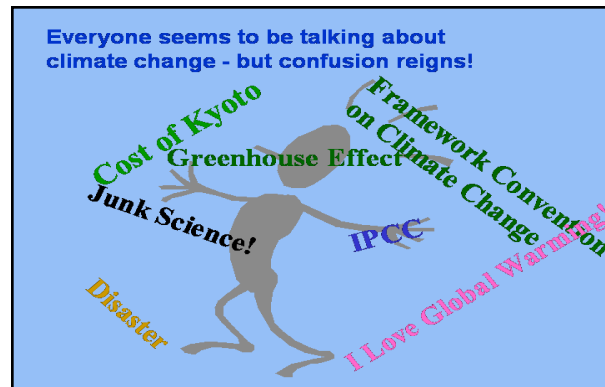
[AP8.10](#) Design, implement, and evaluate three seven-day action plans that establish multiple supports for responsible health action related to ...sustainability...

[CR7.1](#) View, listen to, read, comprehend, and respond to a variety of texts that address efficacy (e.g., Doing Our Part for Planet Earth).

[CC7.1](#) Create various visual, oral, written, and multimedia (including digital) texts that explore social responsibility (e.g., Taking Action), and efficacy (e.g., Building a Better World).

[CR8.1](#) View, listen to, read, comprehend, and respond to a variety of texts that address identity efficacy (e.g., Building a Better World).

[CC8.1](#) Create various visual, oral, written, and multimedia (including digital) texts efficacy (e.g., Creating Turning Points).



Background:

In previous lessons, students have explored and identified their ecological footprints and some ways to lessen them. They have been introduced to climate change created by Green House Gases (GHG). They have generated some ideas as to how people can help mitigate climate change to help ensure the health and wellbeing of the planet. In this lesson, students will be given an opportunity to reflect on the human story and its role in climate change. They will also be able to explore human powers to change in positive ways.

NOTE: The teacher should read the story "Wisdom's Return" a couple of times before using it for this lesson.

Set:

Have soft music without words playing in the background as students arrive. On the board write the words "Wisdom's Return".

Materials:

Music CD- relaxation music

Art supplies – primary colours of paint, brushes, paint paper (about 11"x 14")

Story- "Wisdom's Return" – attached below

Copies of story for students after the teacher's reading the present.

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Method:

Put the classroom lights off and have students find a comfortable place to listen to a story. When they are settled tell them that you will read a short story to them and they are to close their eyes and Visualize the scenes of the story as you read. But first they must get very comfortable, take deep breaths, and relax, listening to the music... and that in a few moments you will begin the story. It's very important that all are quiet so that all can hear....Remember to imagine the story in their minds so that they can recall the details afterward.

When students are settled, begin the story, *Wisdom's Return*.

Read the story slowly and with intonation, pausing momentarily between paragraphs to allow visualization.

At the finish of the story, tell students to relax, recall the images of the story, and take their time coming back to the present.

When all are back, put the lights on, but leave the music playing for a while Place the students into groups of 4-5 and ask them to re-create the story in visual form with the supplies provided (story copies and art supplies). Each group is to examine the story and sequence its elements in a series of 4 or 5 paintings.

When each group is done, have them tape their sequence together and place it on the board.

Have each group present their illustrations, explaining their choice of visual representation.

After all have presented draw a Venn diagram on the board and have students compare the story to what they have learned about climate change thus far. (The difference will likely be that the story has a positive ending but humanity doesn't yet).

For homework have students research what is being done in Saskatchewan by organizations and communities to lessen human impact on climate change.

The next day, have students report their findings and create action plans on personal, family and community levels. These ideas can be recorded on chart paper in three columns as reminders for the class, and can include classroom changes, changes in homes, and lobbying for changes in the community. If the teacher wishes, she may copy the graphic of the painting for students, as a reminder of the story. The story in the painting begins on the right side, travels to the left, to the middle and back to the right.

"Observational evidence from all continents and most oceans shows that many natural systems are being affected by regional climate changes, particularly temperature increases."

**source: Inter-governmental Panel on
Climate Change, 2007**

'Climate Change 2007 Synthesis Report:

WISDOM'S RETURN



*painting and story Elaine Sukava
used with permission*

NOTE: The story "Wisdom's Return" begins on the right side of the painting and proceeds in a circular pattern down and to the left and so on. The painting can be used to illustrate the re-reading of the story, after students have completed other tasks.

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Wisdom's Return

Long ago Sun was happy. It enjoyed its power to warm, to provide light, to help Person and all other living creatures, all the animals and plants, to grow and flourish. When Person was unhappy or cold, Sun would come and warm Person's spirit and body. When Rain gave water, Sun soon followed to create balance with light and warmth. Always, when there was hardship, Person knew that Sun would come to heal.

Sun knew that it also had the power to destroy but did not say anything; there was no need. Person and all other creatures lived well with Sun, living their lives according to the time, warmth and energy provided by their powerful benefactor and the sustenance provided by Earth, their mother. Each life, at its end, returned to Earth, who, with Sun's help, kept the circle of life strong.

They respected Sun. Many even thought Sun was the Creator because of its power. They were especially careful to show their respect. They made special ornaments to remind them of Sun and said special prayers each day as Sun emerged from the east. Sun was pleased that Person and the others lived in balance and with such respect and asked Wisdom, the eagle, to keep the story so that others would not forget.

So it went for thousands of years, Wisdom carrying the story.

Then, things began to change..... slowly at first. Person began to feel stronger and more important than other creatures because the other animals and plants so readily gave their lives to Person to use. As time went on, Person grew larger and larger and began to spread over Earth. The other creatures seemed smaller and less important as Person forced its power over creation, consuming as much as possible and leaving behind a trail of destruction. Sun, watching Person breaking away from the delicate balance that had sustained life, now began to feel angry. It asked Wisdom to retell the story because Person had forgotten.

Wisdom came to tell the story but Person would not listen, even laughing at Wisdom because, after all, Person now had the power to do many things and did not have to listen. Angry and frustrated, Wisdom flew to tell Sun.

Sun tried to talk to Person, saying that Earth would be hurt forever if Person continued in its current path. Again, the pleas to return to the story met with contempt. It seemed that nothing would help. Until, in its sadness and after long contemplation, Sun decided to use its power to destroy. But Sun hated the idea of destroying something so wonderful and mysterious as

Earth, so decided to give Person little tastes of its power. One summer, Rain was not allowed on some parts of Earth. Another summer, storms were used to destroy Person's food. And yet another time, winter cold reached into southern lands to steal summer and cause desperate need for shelter. Still, Person would not remember the story.

One day, Sun saw Person continuing on the destructive path, throwing poison into the air and the water. In its ignorance, Person did not even know, or perhaps did not want to know that surrounding Earth was a mysterious, invisible cloud, a shield that protected Earth and all her beings from the power of Sun, just as a mother's arms protect her children from harm. And because of its ignorance, the shield was getting weak..... Sun waited until Person was asleep.....

That night Person had a dream.... Sun, in its anger, broke through the shield and washed Earth with its burning rage. The tree that Person was using for shelter began to wither and die. The soil under Person became dry and parched. The water became undrinkable. All around, there was no life and Person felt alone and terribly afraid.

Person awoke from this troubled sleep remembering Sun's message. It could see that Sun had left many warnings. The destruction was still there and would not disappear unless Person changed. Person looked pleadingly into the night sky and felt a glimmer of hope at the sight of Wisdom, at first far away, but coming closer, soaring through the voices of the ancestors.

Wisdom was calling once again, and this time Person listened.

Knowing that it alone was responsible for the damage Person felt ashamed. It promised Sun that it would change if only Sun would heal the weakened shield.

Slowly Sun pulled back, allowing the shield to once again envelop Earth. A long time later and as this story ends, Sun, Earth and all her beings returned to the circle of life to keep it strong. Person did not forget its promise.

To this day Wisdom stays nearby so that Person will always remember the story.

Communities and Climate Change:

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Outcomes

- [AP8.10](#) Design, implement, and evaluate three seven-day action plans that establish multiple supports for responsible health action related to family roles and responsibilities, non-curable infections/diseases, violence and abuse, body image, sustainability, and sexual health.
- [RW6.1](#) Examine and analyze factors that contribute to quality of life, including material and non-material factors.
- [IE7.4](#) Analyze how ecosystems change in response to natural and human influences, and propose actions to reduce the impact of human behaviour on a specific ecosystem. [DM, CP]
- [CR7.1](#) View, listen to, read, comprehend, and respond to a variety of texts that address efficacy (e.g., Doing Our Part for Planet Earth).
- [CC7.1](#) Create various visual, oral, written, and multimedia (including digital) texts that explore social responsibility (e.g., Taking Action), and efficacy (e.g., Building a Better World).
- [CR8.1](#) View, listen to, read, comprehend, and respond to a variety of texts that address identity efficacy (e.g., Building a Better World).
- [CC8.1](#) Create various visual, oral, written, and multimedia (including digital) texts efficacy (e.g., Creating Turning Points).

Set:

Bring into the classroom pictures of your town / city, groups of people in your community, activities in the community, businesses, and so on. Ask the students to tell you about each picture, what do all of the pictures have in common? They all represent aspects of community. Tell them that they will have the task of discovering ways that their community and its components can help to combat climate change.

Materials:

Pictures of your town / city, Saskatchewan, your school and classroom

Method:

As a class, look up the definition of the word "community". What does it mean?

Begin a concept map as students supply their definitions of "**community**." Encourage students to develop a broad definition while asking:

Who does a community include?

What purposes does a community serve?

What services does a community provide its members?

What services can a member provide for the community?

What are the community's needs and wants?

- Recording student answers on the board, ask students to list elements of a strong, healthy community (e.g. good government, services, schools, and opportunities; work for all, neighbourliness, non-violence, people helping each other, having enough money for goods and services).
- Ask students if self-sufficiency is also a trait that would enhance health and wellbeing in the community. Why? Why not? Have them cite examples of self-sufficiency in terms of goods and services (food and its production should emerge).
- How does the community benefit from being as self-sufficient as possible (probe until students arrive at the idea that depending on community members for goods and services keeps money within the community and enhances financial wellbeing)?
- What are some ways in which a community is dependent on other communities, province, nation, and so on

- (e.g. technology, news, health care, foods, transportation, entertainment, and so on)?
- Can any of these be provided in the local area or region? In what ways (e.g. have students think about getting same goods and services locally/regionally)?
 - Ask students, "Does our community fit the description we have just developed?" In what ways does it/ doesn't it? Record responses on board.
 - Explain that their assignment is to interview two community members (e.g. mayor, business owners, school teacher, parents, youth, workers, health care people, non-profit organizations, farmers, community development people, police, and so on). They are to discover their perspectives on:
 1. What makes a strong and healthy community?
 2. How people can support community health and wellbeing in terms of economy, the environment, and social development?
 3. How people can help the interviewee to be more effective in their role in the community?
 4. During the following class period, ask for volunteers to share their interviews. On chart paper, begin to record phrases and unique attributes of the community as students share. Ask students to add to the list. Post the list in the classroom for reference during the unit.
 5. Compare and contrast interview data with previous data about the community and about strong and healthy communities. Are there areas that are weak and in need of development? Are there clear and doable solutions that can help create a stronger and healthier community (e.g. buy goods and services from local people rather than big box stores, frequent locally owned restaurants, use Active Transportation and public transit, and so on)?
 6. Have students examine possible solutions and determine how they relate to ecological footprints and climate change. They should discover that as a community becomes more focused on local and regional solutions for goods and services generally and, as noted in earlier lessons, food specifically, that the community as a whole can significantly reduce its contributions to climate change.

On a chart, record how might students begin acting on these in their community and school in order that health and wellbeing is sustainable and which will have the added benefits of lessening footprints?

Community component	Actions ideas	Benefits	How will we Know?
Example-Food needs	Farmers market Eat Well Guide LoFo google map Local organic food Research and lobby for change Enjoy home cooking	Local organic foods Fresh Support local economy less pollution etc. build community	#s at market Survey consumers and local business owners

Decide on ways that the class can act on its ideas for a community climate change action challenge.

HAVE FUN!

Rubric for Student Evaluation

Point	Description
4	Student completed two interviews on appropriate topic and turned in a careful and complete written document of the interview.
3	Student completed two interviews; however, written document is incomplete or hastily completed or appropriate topic was not addressed.
2	Student completed one interview on appropriate topic and turned in a careful and complete written document of the interview.
1	Student completed one interview; however, written document is incomplete or hastily completed or appropriate topic was not addressed.
0	Assignment was not attempted.

Food Miles, Sustainable Development and Climate Change:

OUTCOMES

[USC7.5](#) Evaluate personal food choices and needs by applying accurate and current nutritional knowledge (e.g., content labels).

[USC9.5](#) Evaluate a variety of healthy food policies and plan to participate in the development, revision, and/or implementation of a healthy food policy (e.g., fundraising, feasts, canteen sales, extra-curricular events) in the community (e.g., home, school, arena, youth center).

Eat Well Guide at <http://foodmiles.saskorganic.com/>

Food Miles Campaign Directories at <http://foodmiles.saskorganic.com/>

Assessment:

Newspaper article: /100

See Rubric [Appendix # 2](#)

Prior preparation:

Contact your local newspaper and request permission to have an insert added to the paper. This will include submissions from your class about ways to reduce ecological footprints, with a specific focus on use of foods from local producers.

As well, have students submit their ideas and plans to [source foods locally](#) by using the [Food Miles Campaign](#)

DVD's about foods and food issues may be accessed at the [Saskatchewan Organic Directorate Office library](#).

NOTE: It would also possible to create a new website that links to other community websites or include a new page on the school web site.

Set:

Place a variety of newspapers on a table in your classroom; if possible obtain one local newspaper for each student. Hand out the newspapers to each student; discuss the importance of newspapers for your local community. Why are newspapers important? How can citizens use the newspaper, or Internet and social media to take action?

Tell students that they will be doing so by creating an insert (or articles, website with linkages) to support positive change by supporting local food producers, encouraging people to purchase more from local sources, and to support local businesses that already source foods locally.

Examples of student work is posted on the <http://saskorganic.com/> site.

Have Students look up the [Dining with the Stars](#) television series or the Youtube series of videos about [local Saskatchewan producers and chefs](#) from the [Saskcess Series](#) or DWS.

Materials:

Digital Cameras

Computer access

Method:

- Your students will design an insert focusing on the theme of local organic agriculture and food miles for the local newspaper. The theme should include community development and why eating locally helps develop a sense of community and lessens ecological footprints Students should also discuss the benefits of local and regional organic production to the community, economy and the environment.

[contents](#)

- Students should interview [local organic](#) and other local producers. If there is a [Farmers Market](#) in the area, students should visit and speak with the president of the local farmers' market. If there are local businesses such as [a grocery store](#), [a restaurant](#), health food store, Tourism office, Bed and Breakfast or other business that has local food.
- Give a list of sample questions and request 5 questions the students have to come up with in addition to scripted ones.

Before the students speak with individuals in the community, review the basics of interview skills

News paper piece

1. Ask about products for sale, why they do what they do, what are the risks, what have they learned from their experiences, what are their goals and dreams about their business, what is their chief difficulty. Ask them to tell their story. Talk to some of their consumers about why they buy their food this way.
2. Ensure that students take photos of the people interviewed, the landscape and businesses. They must explain that pictures are for publication and request permission to use them.
3. Give the students a due date to have the newspaper completed, all newspapers run on a deadline.
4. Once the insert is complete, give a copy to your local newspaper.
5. The students may receive feedback from the newspaper! Invite the newspaper editor into your classroom to discuss the student's work and the importance of getting information to the public.

Social Media piece

1. Have students create a class blog about their experience
2. Suggest the use of Tweeting about their interview and what they found out.

Alternatives:

1. Have students do some **research/interviews** about a sustainable lawn without the use of chemicals. It leads to discussions about home and garden overuse of herbicides and pesticides, allergies and sensitivities related to chemicals, scents and our current perception of what is valued. Discussions about esthetics versus practical and discussions regarding safe and healthy using common sense rather than contrived and perceived "healthy", can cause students to question the current norm.
2. This could be turned into a **debate** presenting both sides of the issue. Discussions on how to maintain a lawn without the use of chemicals is another practical application of sustainability.
3. Have students do research on the end results of plastic on shorelines where our local community and personal decisions impacts the larger world community.
4. Have the students develop red wiggler composting of school scraps, using newspapers and plastic storage containers is very doable. It is an active demonstration of using the local materials to develop soil, rather than add to the land fill. Students who are interested can take home beginner groups of worms and instructions on how to start and maintain their own home compost without odor and all year round.

Building Community: Design a Safe Gardening Community Using Barriers

[contents](#)

Outcomes

[IE7.4](#) Analyze how ecosystems change in response to natural and human influences, and propose actions to reduce the impact of human behaviour on a specific ecosystem. [DM, CP]

[AP8.10](#) Design, implement, and evaluate action plans that establish multiple supports for responsible health action related to family roles and responsibilities, non-curable infections/diseases, and sustainability.

Due to gardening season being during the school summer break this assessment will be of the planning and construction only.. This activity will need to be marked in a holistic manner.

10 marks = original concept and design

10 marks = sufficient research done into constructing barriers

25 marks = construction of barrier

5 marks = has barrier seemed to be working during first few weeks (before school is out for the summer)

/ 50 See Rubric in [Appendix # 4 and # 5](#)

Cruciferous flea beetle (phyllotreta cruciferae)

<http://www.ag.ndsu.edu/pubs/plantsci/pests/e1234w.htm>



<http://www.thebuglady.ca/control.htm> On this website from Vancouver the bug lady offers suggestions on ways to control pests naturally.

Websites for barrier ideas:

<http://www.gardenandhearth.com/OrganicVegetableGarden/Slugs.htm>

http://boldweb.com/gw/index.php?option=com_content&task=view&id=24&Itemid=25

<http://www.organicgardeningworld.com/organic-garden-pest-control.html>

It is possible to garden organically! In this activity students will design barriers for home and community gardens that work just as well as pesticides. There are many people who are allergic to pesticides. Designing barriers not only ensures safety to those who have allergies but peace of mind for gardeners. Choosing to use a barrier in the garden instead of chemicals is not only a safer for humans, but also for the environment.

Set:

Bring a picture of a cabbage beetle into your classroom.

Materials:

Computer access

Any materials needed for design of the barriers, the PAA teachers at the school may be a valuable source of information.

[contents](#)

Method:

Show them the picture and explain that it is a cruciferous flea beetle. These beetles will do a lot of damage to a cabbage plant while it is growing in the garden.

Ask your students to give you a list of different ways to prevent the beetle from eating the cabbage? Write the students ideas on the board.

Now, ask your students to rank the methods of preventing the cruciferous flea beetles from eating the cabbage in order from most earth friendly to least earth friendly.

Tell the class that they will be designing barriers that will help gardeners in your community to grow their produce organically by finding a non-chemical way to prevent pests from eating the fruit and vegetables that the gardeners have planted.

Students will research different types of barriers, and then design one and locate the required materials. Once the student research has been completed, your students will need to access a community garden or even a plot in your school yard to try out their barriers. Doing an activity like this in the classroom is too controlled; therefore it does need to be done outside in a natural setting. If a community garden plot is not available have students locate gardens where the barriers could be set up.

If you have found a community garden or are using a plot at your school, preferably one that has already been used as a garden, you will need schedule for volunteer gardeners over the summer. The volunteers will be responsible for checking on the barriers to see how well they are working.

For home gardens, the students should contact the gardener regularly and ask how the barriers are working.

Students should be cautioned not to go over to someone else's garden without an invitation.

Ask the students to take pictures of their barriers in the design process, as they are put in place and during the growing season. A record of the barrier effectiveness should be kept.

At the completion of one growing season, reports showing the designs and success of the barriers should be written. This may require some coordination with other teachers as the students will likely not be in the same class. It would be nice if arrangements could be made so that students get recognition for their work in the current school year.

Invite guests from your local community garden and present your research to them; this research will help gardeners in your community understand that chemicals are not needed, there is an organic way to garden. If your community is very interested in organic gardening using barriers, hold a class and have the students show and describe their barriers.

Appendix

1. Blooms Taxonomy Science Experiment Form for use with lesson 1
2. Science Experiment Rubric for use with lesson 1
3. Newspaper Rubric for use with lesson 1
4. Barrier Design Rubric for use with lesson 5
5. Barrier Write-up rubric for use with lesson 5

Bloom's Experiment Form (for use with any Science Topic)

Remembering

List the materials used in this experiment.

Materials:

Understanding

Outline the procedure for conducting this experiment

Procedure:

Applying

Record data observed and collected during your experiment.

Data: Make a chart on the back of your sheet of What I Did and What I Observed

Analysing

Examine your data and draw conclusions.

Conclusions:

1. _____

2. _____

3. _____

Evaluating

Describe how you would rate the success of you experiment. Establish a set of criteria for measuring the result.

Creating

Create a series of "What if" statements about your data to show things that might be different should variables be changed.

What if...

What if...

Newspaper Rubric

	1	2	3	4
Description of Lab Results	The student described the results of the lab, but more than one of the results were not accurate.	The student described the results of the lab, but one of the results was not accurate.	The student described the results of the lab with accuracy.	The student described the results of the lab with accuracy and determined how these results could be used in further experiments.
Recommendations to Reduce Greenhouse Gas Emissions	The student determined at least one way to reduce greenhouse gas emissions, but they did not make recommendations on how to reduce these emissions and/or they did not determine how it would impact their own Saskatchewan community.	The student determined at least one way to reduce greenhouse gas emissions and as well they made at least one recommendations on how to reduce greenhouse gas emissions, but they did not determine how it would impact their own community.	The student determined one way to reduce greenhouse gas emissions and as well they made recommendations on how to reduce greenhouse gas emissions by keeping their own Saskatchewan community In mind.	The student determined one way to reduce greenhouse gas emissions and as well as made recommendations on how to reduce greenhouse gas emissions by keeping their own Saskatchewan community In mind. As well, they discussed how this would impact lives in Canada.
Language Conventions (Spelling, Grammar, Punctuation)	The student took no time to edit their newspaper article. They had more than 10 errors in terms of language conventions.	The student had 5 -10 errors in terms of language conventions.	The student had less than 5 errors in their article in terms of language conventions.	The student had no mistakes in terms of language conventions.
Article Requirements	More than one article requirement was skipped.	One article requirement was skipped.	The student described the lab results, made recommendations to reduce greenhouse gas emissions in Saskatchewan, and the article was at least 2 paragraphs in length.	The student described the lab results, made recommendations to reduce greenhouse gas emissions in Saskatchewan, and the article was at least 2 paragraphs in length. As well, the student determined how their recommendations would impact their daily lives.

Science Experiment Rubric

	1	2	3	4
Experiment Write-up	The student did not fill in more than one parts of the write-up.	The student did not fill in one of the expected parts of the write-up.	The student completely and correctly filled in all areas of the experiment write-up.	The student completely and correctly filled in all areas of the experiment write-up. They also made further observations on conclusions in
Applying	The student correctly entered all the data on the write-up, but more than 1 conclusion was not valid.	The student correctly entered all the data on the write-up, but 1 conclusion was not valid.	The student correctly entered all the data on their experiment sheet. As well, they drew valid observations.	The student correctly entered all the data on their experiment sheet. As well, they drew valid observations and the student explained how these observations could be utilized for further experiments.
Analysing	No conclusions were drawn by the student.	Conclusions were drawn by the student but may not be accurate and/or valid.	Valid conclusions were drawn directly from the data the student collected.	Valid conclusions were drawn directly from the data the student collected and the student is able to explain how those conclusions would impact organic farms in Canada.
Evaluating	The student did not complete this section.	The student self-evaluated the success of their experiment but did not decide what the results mean.	The student self-evaluated the success of their experiment based on the criteria that they created.	The student self-evaluated the success of their experiment based on the criteria that they created and were able to state how their criteria could be utilized for future experiments.
Creating	The student did not create "what if" statements.	The student created only one "what if" statement and correctly discussed how the data would change if the variables would be changed.	The student created 2 "what if" statements, but only discussed how the data would change for one of the statements.	The student created 2 "what if" statements that discussed how the data would change if the original variables were changed.

Barrier Design / Garden Care Rubric

	1	2	3	4
Barrier Design/ Usage	Barrier does not work because more than 4 pest types were allowed to get into the garden.	Barrier was designed so that 2 -4 types of pests have entered the garden.	Barrier was designed so that one type of pest is detected in the garden.	Barrier was designed so that no pests were allowed into the garden.
Barrier Research	Student does not show any signs of research. No research has been handed in.	Student has only 1 source of information	Student has only 2 sources of research	Student has more than 3 sources of information
Barrier Construction	Inappropriate materials were selected and contributed to a product that performed poorly	Appropriate materials were selected	Appropriate materials were selected and some attempt was made to creatively modify them during the construction	Appropriate materials were selected and creatively used
Garden Follow-up With Community Garden, Personal Garden, or Volunteer School Garden Care	Student did not follow up with community garden, personal garden, or did not show up for volunteer care of school garden.	Student only followed up 1 - 3 times with community garden, personal garden, or the school garden.	Student followed up 4 - 6 times with community garden, personal garden, or the school garden.	Student made regular checkups (more than 6 times) of gardens or took part in volunteering for school garden care.

Barrier Write-up Rubric

	1	2	3	4
Research Write-up	Student did not hand in a write-up.	Student's write-up did not include two of the required elements.	Student's write-up missed one of the required elements.	Student's write-up included all of the required elements.
Write-up Content	Student's write-up did not make reference to three or more of the required elements	Student's write-up did not make reference to two of the required elements	Student's write-up was detailed but did not make reference to one of the required elements.	Student's write-up was detailed and discussed or made reference to every aspect of the required elements.
Use of Research	Student did not use any research to support their project.	Student found at least 2 sources of research, but they only made use of 1 to support their project	Student found at least 3 sources of research, but they only made use of 2 to support their project	Student showed evidence that they used all the research to support their project
Language Conventions (Spelling, Grammar, Punctuation)	The student took no time to edit their barrier write-up. They had more than 10 errors in terms of language conventions.	The student had 5 -10 errors in terms of language conventions.	The student had less than 5 errors in their write-up in terms of language conventions.	The student had no mistakes in terms of language conventions.