



Food for Thought

AGRICULTURE AND SUSTAINABILITY IN THE LOWER MAINLAND

by Jim Wiese





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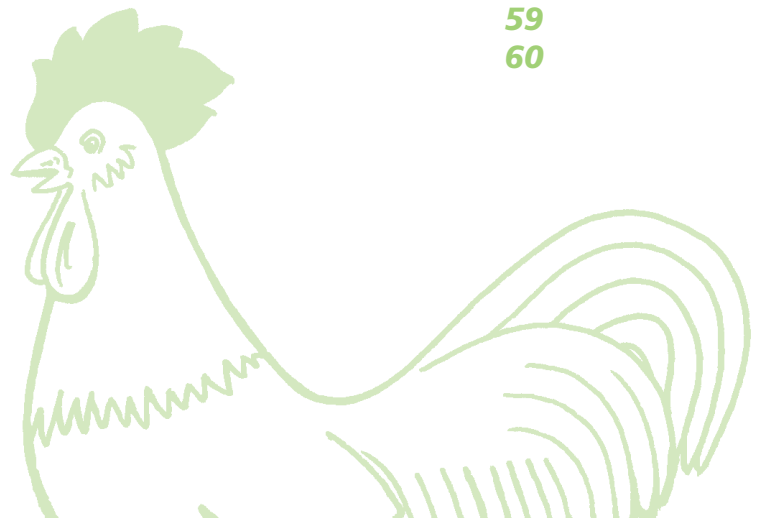
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INTRODUCTION ●●●

AGRICULTURE IN THE LOWER MAINLAND

The Lower Mainland region, which houses about 50% of the province's population, is an area that also produces an enormous amount of the food through a variety of agriculture products. According to the 2001 Census of Agriculture, farms in the Lower Mainland represent just over 1.5% of the total farmland area in British Columbia. However, the region is incredibly productive, accounting for approximately:

- 17% of the total number of farms;
- 21% of the total farm capital value;
- 30% of total farm income; and
- 61% of all greenhouse space.

Since 1973 agricultural land in British Columbia has been protected by the Agricultural Land Commission Act. This act recognizes agricultural land as a “scarce and important resource.” The Agricultural Land Reserve (ALR) covers approximately 4.7 million hectares and includes both private and public lands that may be farmed, forested, or vacant land. These BC lands have the potential for agricultural production. Some ALR blocks of land cover thousands of hectares while others are relatively small parcels of only a few hectares (1 hectare = 2.47 acres). Less than 5% of BC is considered suitable for agriculture.

The amount of land in the Lower Mainland region is limited. The physical boundaries of the mountains, the ocean and an international border create a limit for urban growth. Yet, 16% of the Lower Mainland region is in the Agricultural Land Reserve.

At the same time, the Lower Mainland also has one of the fastest growing populations. The region's population is currently about 2.1 million and is expected to grow to 3 million by 2030. This growing population places a demand on land for housing and other purposes, creating competing land interests.

These unique circumstances create an opportunity to develop the land in a way that reflects our shared interest in maintaining the region as both livable and appealing, with agriculture as part of that mix. This strategy produces many questions. What should we do with the limited land we have? What role does agricultural land have in the Lower Mainland? How can we make the region more sustainable and how can we maintain it? These and other questions will serve as the focus of the Food for Thought module.

GOALS AND OBJECTIVES OF THE MODULE

This module was created to help students explore agriculture and sustainability in the Lower Mainland, as well as the relationship between agriculture, the environment and society. It will do this through an investigation of the following concepts:

- We all use many agricultural products in our daily lives.
- Agriculture has played and continues to play an important role in British Columbia and the Lower Mainland, including in the lives of many First Nations People.
- As the population of the Lower Mainland increases, there is an increased need for agricultural products.
- The population increase also stimulates an increased demand on land for housing and other uses, creating conflicting land interests.
- Sustainable agricultural practices and local agricultural products need to be supported to ensure there will be food for the future.
- Agricultural practices have changed for land farming and livestock rearing to meet both the increasing demand for food and environmental concerns.

These goals are imbedded within the module activities as outlined below. Student learning is supported with videos from the GVTV and BC Agriculture in the Classroom. The GVTV videos can be viewed by students and support the learning objectives in each activity. The Agriculture in the Classroom videos were created for a slightly older audience and were designed to give elementary teachers more background information on specific topics. However, these videos can be used in the classroom if they meet the needs of your students. The goals and objectives for the module can best be met through the combined use of the module activities and the videos.

The Module Overview on the next page shows the link between the goals of the module and the activities and videos that support the student learning for that goal.

Additional activities that explore the science of agriculture are included in the Appendix.





MODULE OVERVIEW

The overview below shows how the goals of the module can be reached using the activities and videos.

GOAL/CONCEPT	MODULE ACTIVITY	METRO VANCOUVER VIDEO LINK	BC AGRICULTURE IN THE CLASSROOM VIDEO LINK**
Orientation and Elicitation Activity	What do students already know about agriculture and sustainability?		
We all use many agricultural products	1. Agriculture in our Daily Lives	<i>Agriculture Overview</i>	<i>Feeding Frenzy</i>
Agriculture plays an important role in BC	2. A History of Agriculture	<i>History of Agriculture</i>	<i>Feeding Frenzy</i>
Population increases create a demand for agriculture products	3. Agriculture in the Lower Mainland	<i>Barnston Island</i> <i>Glen Valley Organic Co-op Farm</i>	<i>Feeding Frenzy</i> <i>Put Your Money Where Your Mouth Is</i>
Population increases create a demand for land	3. Agriculture in the Lower Mainland	<i>Field to Fork</i> <i>Food Democracy</i>	<i>Put Your Money Where Your Mouth Is</i>
Agriculture practices have changed	4. Challenges to Farming in the Lower Mainland	<i>Modern Farming Challenges</i>	<i>Feeding Frenzy</i> <i>Put Your Money Where Your Mouth Is</i>
Sustainable agriculture helps meet society demands	5. Sustainability and Agriculture	<i>Sustainable Urban Farming</i> <i>Wildlife Habitat Conservation</i>	<i>Feeding Frenzy</i> <i>The Sustainability Road Show</i>
Application and Review Activities	Creative Endings Sustainability Times Up Close and Personal		

* Metro Vancouver video segments are available online at www.metrovancouver.org

** BC Agriculture in the Classroom videos are available at <http://www.aitc.ca/bc>

CURRICULUM CONNECTIONS FOR THE MODULE

Each activity in the module links to a specific Prescribed Learning Outcomes. The outcomes are connected to the 2006 BC Ministry of Education Integrate Resource Packages for Science and Social Studies (<http://www.bced.gov.bc.ca/irp/irp.htm>).

MODULE ACTIVITY	BC PRESCRIBED LEARNING OUTCOMES
<p>1. Agriculture in our Daily Lives</p>	<p>GRADE 5 SCIENCE Earth and Space Science: Renewable and Non-renewable resources</p> <ul style="list-style-type: none"> • analyse how BC’s living and non-living resources are used
<p>2. A History of Agriculture</p>	<p>GRADE 5 SCIENCE Earth and Space Science: Renewable and Non-renewable resources</p> <ul style="list-style-type: none"> • analyse how BC’s living and non-living resources are used • identify methods of extracting and harvesting and processing BC’s resources <p>GRADE 5 SOCIAL STUDIES Economy and Technology</p> <ul style="list-style-type: none"> • analyse the relationship between development of communities and their available natural resources • explain how supply and demand are affected by population and the availability of resources <p>GRADE 7 SCIENCE Life Science: Ecosystems</p> <ul style="list-style-type: none"> • analyse the roles of organisms as part of interconnected food webs, populations, communities and ecosystems • assess survival needs and interactions between organisms and the environment
<p>3. Agriculture in the Lower Mainland</p>	<p>GRADE 5 SCIENCE Earth and Space Science: Renewable and Non-renewable resources</p> <ul style="list-style-type: none"> • analyse how BC’s living and non-living resources are used • identify methods of extracting and harvesting and processing BC’s resources <p>GRADE 5 SOCIAL STUDIES Economy and Technology</p> <ul style="list-style-type: none"> • analyse the relationship between development of communities and their available natural resources • explain how supply and demand are affected by population and the availability of resources

<p>4. Challenges to Farming in the Lower Mainland</p>	<p>GRADE 5 SCIENCE Earth and Space Science: Renewable and Non-renewable resources</p> <ul style="list-style-type: none"> • analyse how BC’s living and non-living resources are used • identify methods of extracting and harvesting and processing BC’s resources <p>GRADE 7 SCIENCE Life Science: Ecosystems</p> <ul style="list-style-type: none"> • assess the requirements for sustaining healthy local ecosystems • evaluate human impacts on local ecosystems <p>GRADE 7 SOCIALS STUDIES Economy and Technology</p> <ul style="list-style-type: none"> • economic systems, trade, exploration, technology and the physical environment <p>Environment</p> <ul style="list-style-type: none"> • evaluate the impact of natural processes and human-induced changes on communities
<p>5. Sustainability and Agriculture</p>	<p>GRADE 5 SCIENCE Earth and Space Science: Renewable and Non-renewable resources</p> <ul style="list-style-type: none"> • describe potential environmental impacts of using BC’s living and non-living resources <p>Environment</p> <ul style="list-style-type: none"> • natural resources in Canada • demonstrate understanding of sustainability, stewardship, a renewable versus non-renewable natural resource • assess effects of lifestyles and industries on local and global environments <p>GRADE 7 SCIENCE Life Science: Ecosystems</p> <ul style="list-style-type: none"> • assess the requirements for sustaining healthy local ecosystems • evaluate human impacts on local ecosystems <p>GRADE 7 SOCIALS STUDIES Economy and Technology</p> <ul style="list-style-type: none"> • economic systems, trade, exploration, technology and the physical environment <p>Environment</p> <ul style="list-style-type: none"> • evaluate the impact of natural processes and human-induced changes on communities

<p>Application and Review Activities</p>	<p>GRADE 5 SOCIAL STUDIES Applications of Social Studies</p> <ul style="list-style-type: none"> • identify and clarify a problem, issue, or inquiry • gather and record a body of information from a variety of primary and secondary sources. • develop alternative interpretations from varied sources • defend a position on a regional issue in light of alternative perspectives • use an outline to organize information into a coherent presentation <p>Environment</p> <ul style="list-style-type: none"> • natural resources in Canada • demonstrate understanding of sustainability, stewardship, a renewable versus non-renewable natural resource • assess effects of lifestyles and industries on local and global environments <p>GRADE 7 SCIENCE Life Science: Ecosystems</p> <ul style="list-style-type: none"> • assess the requirements for sustaining healthy local ecosystems • evaluate human impacts on local ecosystems <p>GRADE 7 SOCIALS STUDIES Applications of Social Studies</p> <ul style="list-style-type: none"> • identify and clarify a problem, issue or inquiry • defend a position on a global issue by considering reasons from various perspectives • organize information into a formal presentation using several representations <p>Environment</p> <ul style="list-style-type: none"> • evaluate the impact of natural processes and human-induced changes on communities
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CRITICAL THINKING IN THE MODULE

In all grades, across all subjects, students’ ability to successfully think through the challenges posed by the curriculum and their daily lives is recognized to be of critical importance. Often, the labels used to describe these challenges differ. Depending on the subject, they may be called problems, issues, decisions, tasks, inquiries or dilemmas. Regardless of the wording, at the heart of these challenges is the ability to think critically – to make thoughtful judgments about what to believe or how to act. This module supports the use of critical thinking in the classroom. Refer to the Appendix for more information on Critical Thinking in the Classroom.





TEACHING STRATEGIES USED IN THE MODULE

Food for Thought offers many complete lessons for teaching minds-on, discovery-oriented science and social studies in the middle school classroom (Grades 5 – 8) using a thematic approach. Each lesson in this module has clearly defined content objectives supported and enriched with links to other appropriate curricular areas. Each activity includes the following:

Teacher Information

Purpose

Curriculum Connections

Suggested Time

Materials

Background Information

Presentation Suggestions and Notes for the Teacher

Student Information

Reproducible Student Activity Pages

A major component of the lessons is the GVTV video segment. These are available online at www.gvtv.ca for download or on a DVD. Each video segment lasts about 5 minutes and covers a topic related to agriculture and sustainability in Metro Vancouver and the Lower Mainland. There are video viewing worksheets that students can use while viewing the video in the Appendix of this module. In addition, there is more background information on the topics in the BC Agriculture in the Classroom videos: *Feeding Frenzy*, *Put Your Money Where Your Mouth Is* and *The Sustainability Road Show*. These videos can be accessed online at <http://www.aipc.ca/bc>.

The activities in the module are not designed as a stand-alone curriculum; rather the lessons are intended to complement and enrich your own curriculum. You are encouraged to consider how these lessons can meet the needs of your students, match your specific grade curriculum and fit with your own teaching style.

The activities in the Food for Thought module are grouped in a way that encourages the use of a constructivist teaching strategy. See the Appendix for more information on Constructivism in Education.

COOPERATIVE GROUPS AND FOOD FOR THOUGHT

The Food for Thought module is an excellent place to use cooperative group teaching. Cooperative small group learning is an approach that organizes classroom activities so students can interact with and learn from one another, as well as from the teacher and the world around them. Whether working in pairs, or groups of three or four, students in a cooperative setting build on one another's ideas and strengths to learn more effectively.

Cooperative small group learning is based on five principles. Teachers whose group work is successful generally find they are applying these principles intuitively. Using these five principles intentionally to structure classroom activity enables teachers to improve the effectiveness of their small group activities. The five principles are:

1. Students work in positive interdependence.
2. Students work in small heterogeneous groups.
3. Students are accountable both as individuals and as a group.
4. Students learn through ample opportunity for purposeful talk.
5. Students learn and practice cooperative skills as they study and explore subject matter together.





TEACHING ACTIVITIES ●●●

ORIENTATION AND ELICITATION

What do students already know about agriculture and sustainability in the Lower Mainland?

Purpose: to have students examine their own lives in order to become aware of the role agriculture and agricultural products have in their lives; to have students express their own knowledge about agriculture and sustainability in the Lower Mainland.

Curriculum Connections: science, social studies, language arts

Suggested Time: 1 – 2 class periods

Materials

Student sheet
Chart paper
Felt pens and/or colored pencils

Background Information

Students will come to this learning experience with a variety of levels of knowledge and understanding about agriculture and sustainability. By doing one or more of these activities, students will begin to examine what they already know. The teacher can use this information as the lessons progress to direct their instruction.

Presentation Suggestions and Notes for the Teacher

Choose one or more of the following orientation and elicitation activities.

1. You may wish to have students use a journal or learning log. Have them divide a sheet of paper into two parts. Label the top of one section with, “What I know about agriculture and sustainability” and the other with “What I want to know about agriculture and sustainability.”

2. Have students create a mind map. They may have little previous knowledge on agriculture, so you may wish to start by having them explore a simpler term, like food. Have students put the word “FOOD” in the middle of a sheet of paper and have students write and connect all the words and concepts that they already know about food. You may suggest that students include links for the kinds of food they eat and where it comes from. Students may have more knowledge about the food they eat than where it comes from.
3. Another way to record students’ understanding is through the use of an elicitation poster. The following outline suggests it be done as a group activity. However, it can also be done individually, prior to group work.
 - a. After dividing the class into groups of four, hand out pieces of chart paper or other large writing surface to each group.
 - b. Have students fold their paper so that it forms four quadrants.
 - c. Have students represent their knowledge of agriculture and sustainability by doing the following: (a sample of the student sheet is on the next page)
 - In quadrant 1, list 5 foods they eat and 5 agricultural products that people use.
 - In quadrant 2, draw a picture of a farmer working to raise an agricultural product.
They can show either a plant or animal that can be raised in a field or in a greenhouse. Below the picture list several of the things that the agricultural product will need in order to grow healthy.
 - In quadrant 3, write any questions they may have about agriculture and sustainability. This may begin with the question about what the word sustainability means.
 - In quadrant 4, write a poem about food in your life.
 - d. Have the groups share what they did in the activity. Post their work around the classroom. Refer to it during the rest of the module, whenever appropriate.





NAME: _____

DATE: _____

STUDENT SHEET ● ● ●

ELICITATION ACTIVITY

<p>List 5 foods you eat and 5 agricultural products that you use.</p>	<p>Draw a picture of a farmer working to raise an agricultural product (either plant or animal). Below the picture list several things that the agricultural product will need in order to grow.</p>
<p>List questions you have about agriculture and sustainability.</p>	<p>Write a poem entitled "Food in my Life"</p>

RESTRUCTURING ●●●

ACTIVITY 1 - AGRICULTURE IN OUR DAILY LIVES

Purpose: to have students examine their own lives in order to become aware of the role agriculture and agricultural products have in their lives; to have students express their own knowledge about agriculture and sustainability in the Lower Mainland.

Curriculum Connections

Grade 5 Science

Earth and Space Science: Renewable and Non-renewable resources

- analyse how BC's living and non-living resources are used

Suggested Time: 2 class periods

Materials: materials needed depend on the activity chosen.

Student sheet

Pencil or pen

Agriculture Overview Video

Background Information

Few of us think about the plants and animals around us. Yet they play an important part in our lives. They supply the food we need to live and grow. Large plants, trees, supply the raw materials we need to build homes and businesses. In addition to food, animals give us materials we use for clothing and provide companionship. We use plants and animals everyday and seldom give them a thought.

This is especially true in the Lower Mainland. We seldom think about the many agricultural products that are produced locally. These local products are an integral part a sustainable region.

Presentation Suggestions and Notes for the Teacher

1. Hand out the student activity sheets.
2. Have students list the plant, animal, plant product and animal products that they have already used that day. Clarify any questions students have about completing the list.
3. Have students continue to list the agricultural products they use for the next 24 hours.
4. The next day, have students answer the questions on the worksheet.
5. Use the Introductory Video – *Agriculture Overview*. It gives the scope of agriculture in Metro Vancouver and the Lower Mainland region. A video viewing student worksheet can be found in the Appendix.



6. If time permits, have students compare the food they eat with Canada's Food Guide. The Food Guide suggests we eat:

- 6 servings of grain products
- 6 servings of fruits and vegetables
- 3 to 4 servings of milk products
- 1 to 2 servings of meat and alternatives

EXTENSION ACTIVITIES

Local Products

In pairs or small groups:

1. Choose a food store in your community that has been approved by the teacher.
2. Make an appointment with the store manager for your students. Ask the store manager where they get the food they sell. Which plant and animal products does the store sell that come from the your local community? Which come from elsewhere in the Lower Mainland or throughout British Columbia and the world?
3. Have students record their findings on a chart and prepare a brief report for the class.

Ramping It Up

Have students keep track of how much their family spends per week on food. If time permits, have students track this for several weeks and find the average amount spent per week. Have students calculate the amount of money their family would spend in a year for food if they continue spending at this same rate. How much money would the entire class spend on food in a year?

Are you close to the Canadian average? According to statistics, an average Canadian consumes these amounts of food every year:

- 63.9 kg of flour and cereal products
- 13.6 kg of poultry
- 63.2 L of milk
- 13 dozen eggs
- 4.3 L of yogurt
- 8.8 kg of cheese
- 7 kg of butter or margarine
- 90 L of coffee
- 77 kg of vegetables
- 133.8 kg of fruit
- 25 L of juice
- 6.9 kg of fish
- 27 kg of red meat
- 5.7 kg of rice
- 75 kg of potatoes
- 6.4 L of ice cream

NAME: _____

DATE: _____

STUDENT SHEET ●●●

Although we don't think about it, we use plants, animals, and the products that come from them every day. The food we eat, the homes we live in, and the products we use come from plants and animals. In this activity you will investigate the ways we use plants, animals and the products that come from them.

Materials

Worksheet
Pencil or pen

Procedure

1. List all the plant, animal and plant or animal products that you use in a 24-hour period.
2. When the list is complete, sort the items by making a check in the appropriate box as to whether the item is a plant, an animal, a plant product or an animal product.
3. Next to the check, list what the plant or animal is, or where the plant or animal product comes from. Several examples are given below:

ITEM	PLANT	ANIMAL	PLANT PRODUCT	ANIMAL PRODUCT
Toast			X Wheat	
Lettuce	X			
Shirt			X Cotton	
Hot Dog		X Meat	X Bun (wheat)	
Belt				X Leather from a Cow




AGRICULTURE IN OUR DAILY LIVES QUESTIONS:

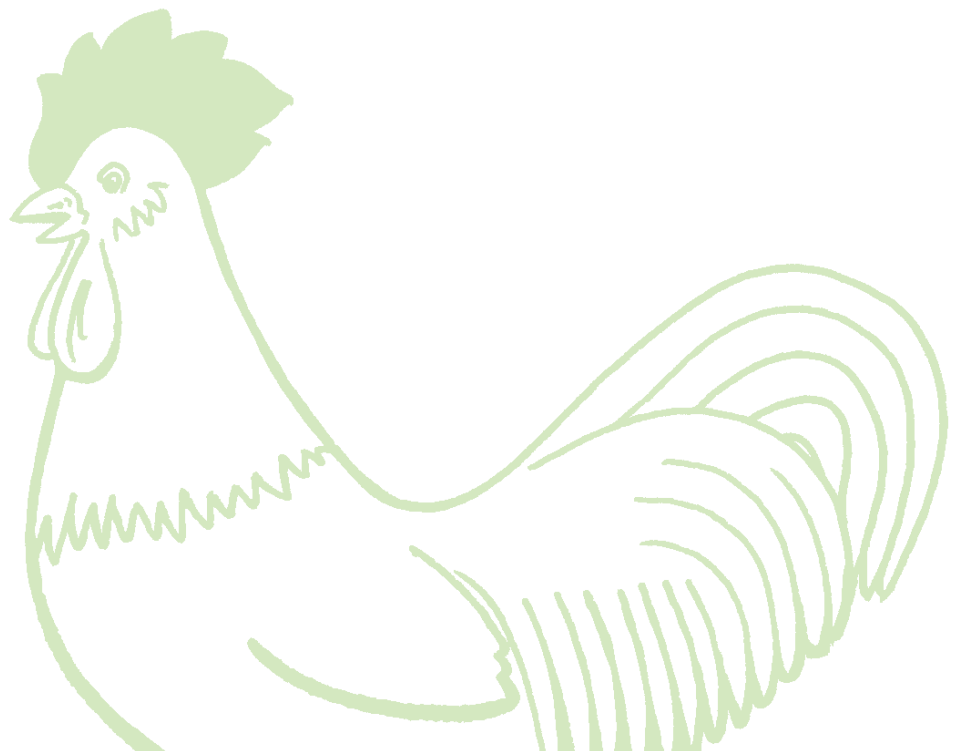
1. Besides food, what other uses do you have for plants and animals?
2. How many different items did you list?
3. If there were no animals, how would your life be different?
4. Write a Haiku poem about how plants and animals are important to your life. A Haiku is a traditional form of Japanese poetry that tells about one specific incident, experience or impression. The Haiku is a three-line poem with 17 syllables arranged as follows:
Line 1: 5 syllables
Line 2: 7 syllables
Line 3: 5 syllables

Example:

Eating every day
Plants and animals for life
Important to me

5. What is a human need? How many of the items in your list would you classify as a human need?
6. What is a human want? How many of the items in your list would you classify as a human want?
7. Compare your list of human needs and wants with another student in the class. How are your lists the same? How are your lists different?
8. Where does your local grocery store get the food that your family eats? Are any plants and animals produced in your local community?

 **AGRI-FACTS:**
Did you know that 97% of the farms in BC are family owned?





ACTIVITY 2 - A HISTORY OF AGRICULTURE IN SOUTHWESTERN BRITISH COLUMBIA

Purpose: to allow students to explore the history of British Columbia and examine the role that farming played in its growth, especially the Lower Mainland region of the province.

Curriculum Connections

Grade 5 Science

Earth and Space Science: Renewable and Non-renewable resources

- identify methods of extracting and harvesting and processing BC's resources

Grade 5 Social Studies

Economy and Technology

- analyse the relationship between development of communities and their available natural resources
- explain how supply and demand are affected by population and the availability of resources

Grade 7 Science

Life Science: Ecosystems

- analyse the roles of organisms as part of interconnected food webs, populations, communities and ecosystems
- assess survival needs and interactions between organisms and the environment

Suggested Time: 1 – 2 class periods

Materials

Student sheets

Pencil or pen

History of Agriculture Video

Background Information

It's been said that the economy of early British Columbia was built on the 4 "F's" – fur, forestry, farming and fishing. Shortly after Captain Vancouver sailed into the Georgia Straits, the Hudson's Bay established Fort Langley in 1827 to support the fur trade. They also started a farm there that stretched for thousands of acres. It initially provided food for just the people living at the Fort to make it self-sufficient. Eventually the farm grew so much vegetables, they began selling their products to others. It quickly reached the point where agricultural products were traded more often than fur trade products. Local farming continues to be a major source of food for the region as well as for exports around the world.

But an increasing population in the Lower Mainland has caused a growth in cities and a shift in housing into area previously only used for agriculture. This change has created a discussion around competing land interests. How can our land best be used and what role does agriculture play?

Presentation Suggestions and Notes for the Teacher

1. Ask students if they have even visited a farm. Invite them to tell of their experiences. What was grown there? Do any students have a relative who is a farmer or who works on a farm?
2. You can use the *History of Agriculture* video as either an introduction or a review of the activities students do. It is important because it introduces the concept of the Agricultural Land Reserve (ALR). A video viewing student worksheet can be found in the Appendix.





NAME: _____

DATE: _____

STUDENT SHEET ●●●

ACTIVITY 2 - A HISTORY OF AGRICULTURE IN THE LOWER MAINLAND

Humans have lived in southwestern British Columbia for over 10,000 years. For most of that time, First Nations people fished, hunted and gathered other food in the region. BC's location on the west coast of North America kept it from being explored by early European explorers. But eventually they came and found a land rich with fish, forests and fertile soil. It's been said that the economy of early British Columbia was built on the 4 "F's" – fur, forestry, farming and fishing.

The Hudson's Bay established Fort Langley in 1827 to support the fur trade. They also started a farm there that stretched for thousands of acres. It initially provided food for just the people living at the Fort making it self-sufficient. Eventually they began selling agricultural products to others. It quickly reached the point where agricultural products were traded more often than fur trade products. Farming was an important industry that helped open BC.

In 1857, gold was discovered in the sand bars of the Fraser River and life in the Lower Mainland changed as gold miners came from around the world. Most of the miners travelled further up the Fraser Canyon to the source of the gold, but many others settled the Lower Mainland and began farming. They primarily settled close to the Fraser River, as it was the primary means of transportation. These first farms were sustainable. Sustainable agriculture refers to the ability of a farm to produce agricultural products forever without needing a lot from the outside world.

Similarly, the abundance of salmon brought many people to BC. It's understandable that commercial fishing for salmon began shortly after the arrival of Europeans on the West Coast. The Hudson's Bay Company shipped salted salmon from Fort Langley to the Hawaiian Islands starting in 1835, and the first salmon cannery opened in 1876. When the Canadian Pacific Railway was completed in 1887 it was possible to more easily ship fresh, frozen and canned salmon to markets in eastern Canada and the United States. By the turn of the century, 70 canneries were in operation. Since then, salmon fishing has remained an important part of the BC economy and for many communities a way of life.

Meanwhile, Lower Mainland farmers struggled with floods from the Fraser River. In addition, this area was forested and farmers had massive trees to clear before they could plant their crops. Sumas Lake (33,000 acres between Chilliwack and Abbotsford) was drained in the 1920s to control flooding and create more farmland. To encourage farmers to settle the area, BC Electric Rail opened, linking Fraser Valley farmers with markets as far away as New Westminster and Vancouver.

After World War 2, the mechanization of agriculture began in earnest. Tractors and fertilizers allowed more food to be grown on the same size land. In addition, freezing, canning and other food processes allowed local agricultural products to travel to further markets. But mechanization and fertilizers made farms less sustainable. They needed farm machinery, fertilizers and other products as well as distant markets to sell their food in order to make a living.

Today urbanization has started to encroach on farms as more people move to the cities. Better roads allow people to live further away from their jobs in the city and the value of farmland has increased. Farmland was sold for housing. In 1972, the Agricultural Farm Reserve (ALR) was established to protect farmland. Farmland is still threatened by urbanization but changes in intensive production technologies allow the Lower Mainland to ship food all over the world.

Agriculture is part of any discussion of sustainable living. Sustainable living might best be defined as a lifestyle that could be sustained for many generations without exhausting any natural resources. Sustainability is a goal or guide, and we can make lifestyle tradeoffs favoring sustainability where practical. Most often these tradeoffs involve transportation, housing, energy, and diet.

Check for Understanding

1. What are the 4 “F’s” and how did they help in the growth of early British Columbia?
2. Where was the first Hudson’s Bay Company fort? What did it do?
3. How was more farmland created in the Fraser Valley?
4. What happened to farming after World War II?
5. What is threatening farmland today? What helps protect it?
6. What is sustainability? How is agriculture a part of it?

Reflections

Do you think farmland needs to be protected? Is the Agricultural Land Reserve still important today? Explain your thinking.



AGRI-FACTS:

Did you know that it takes the hides of 3000 cows to make all the footballs that the NFL uses in just one season?





● ● ● ACTIVITY 3 – AGRICULTURE IN THE LOWER MAINLAND ● ● ●

Purpose: To allow students to investigate the issues in agriculture and to begin to examine the views that various stakeholders have on these issues.

Curriculum Connections

Grade 5 Science

Earth and Space Science: Renewable and Non-renewable resources

- analyse how BC's living and non-living resources are used
- identify methods of extracting and harvesting and processing

BC's resources

Grade 5 Social Studies

Economy and Technology

- analyse the relationship between development of communities and their available natural resources
- explain how supply and demand are affected by population and the availability of resources

Suggested Time: 1 - 2 class periods

Materials

Student sheets

Access to the Internet if other sources of information are being used – see the Appendix for resource web sites

Barnston Island, Glen Valley Organic Co-op Farm, Field to Fork, and Food Democracy Videos

Background Information

Few of us think about the plants and animals around us. Yet they play an important part in our lives. They supply the food that we need to live and grow. Large plants, trees, supply raw materials we need to build our homes and businesses. In addition to food, animals give us materials we use for clothing and provide companionship. We use plants and animals every day and seldom give them a thought.

Although plants and animals are important, agricultural land is disappearing all over the world because of many factors such as soil erosion, the spread of cities, and pollution. In British Columbia, only 5% of the total land is suitable for various agricultural practices. The remaining 95% is mostly mountainous, rocky or forested. Similarly, there are only a few locations where salmon farms can be located.

Population and economic pressures have caused farming, ranching, and fishing practices to change over the years. Limited space and an increased need for low-cost food have caused more intensive agricultural techniques, such as factory farms, confinement rearing and salmon farms to be introduced and expanded. These techniques have both benefits and risks. Society will decide which techniques they agree with.

Presentation Suggestions and Notes for the Teacher

1. Writing-to-Learn strategies allow students to assemble information by taking notes about subject matter. Before students begin the reading, have them draw a line down the center of a piece of paper. Label the left column “Benefits of the New Agricultural Practices” and the right column “Risks of the New Agricultural Practices.” As they read this section, have them write notes about the information in the appropriate column. They can use these notes to answer the Check for Understanding questions, as well as later in the Application and Review section.
2. Use the *Field to Fork*, *Barnston Island*, *Glen Valley Organic Co-op Farm* and *Food Democracy* videos as a springboard for discussion about the link between farmers and the people who eat their food. How does the food get from the field to the markets for people to purchase and later eat? A video viewing student worksheet can be found in the Appendix.





NAME: _____

DATE: _____

STUDENT SHEET ●●●

ACTIVITY 3 – AGRICULTURE IN THE LOWER MAINLAND

The farmland in the Lower Mainland plays a significant role in the total food production for British Columbia. These farms raise a variety of agricultural products as shown in the chart below:

LOWER MAINLAND AGRICULTURAL SPECIALTIES, AS SHARE OF BC PRODUCTION

COMMODITY	SHARE OF BC PRODUCTION (%)
Field vegetables	44
Greenhouse vegetables	68
Greenhouse flowers	57
Mushrooms	58
Berries (excluding cranberries)	36
Cranberries	92
Grapes	4
Nursery (young plants)	29
Dairy	13
Livestock	4
Poultry and eggs	26

Source: Stats Can 2001

These products help farmers meet the demand for food in BC and around the world. Demand for food has increased due to an increasing population and a decrease in available farmland. There are many practices that farmers, ranchers and fishermen do to increase their products. Each practice produces more food and yet creates other challenges.

CHANGING FARM PRACTICES

In order to grow more cereal and pulse grains, farmers have changed their farming practices. They need to grow more food per acre of land. Farmers use more fertilizer to supply and replace missing soil nutrients and to increase crop yields. They also use large machines to increase the amount of food that can be produced by each worker. Another method to grow plants (i.e. – tomatoes, peppers, cucumbers) is hydroponics, a gardening method in which plants are grown in a greenhouse without soil. Plants are instead grown in a chemical nutrient solution.

These farming practices have risks, which concern many people. Excess fertilizer can run off into streams, fewer people are employed in the farm industry, and some question the use of genetically modified seeds.

CHANGING RANCH PRACTICES

Demand for more protein has also changed the way ranchers raise pigs, chickens, and cattle. Confinement rearing is a method of raising large numbers of animals in a relatively small area under conditions that ensure rapid growth. Confinement rearing includes bringing food to the animals, often through computerization and automation, rather than having them forage. The use of selective breeding also ensures that animals will grow faster and produce more meat protein. Diseases are controlled through the use of medicines and vaccines. In general, confinement methods produce meat, milk, or eggs in less time and at lower costs than is possible with conventional animal raising practices. Examples of confinement rearing are chicken houses that hold thousands of chickens, or farms that house large numbers cows or pigs in confined pens and cattle feedlots.

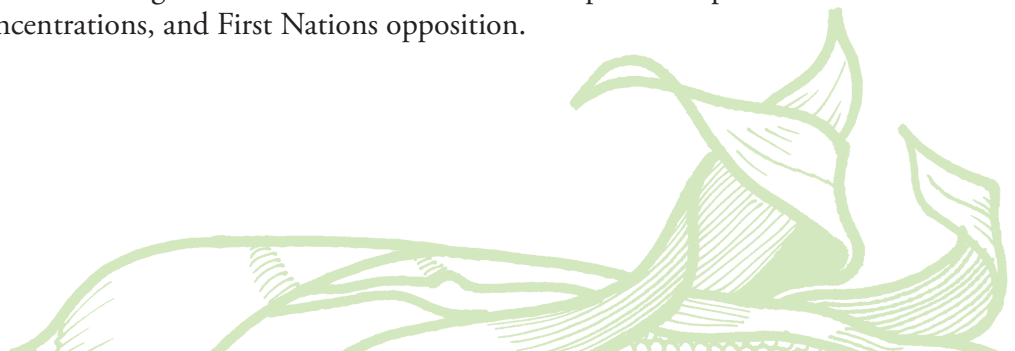
These farming practices also have risks which concern people. Confining animals in a small space concentrates their waste, automation means that fewer people are employed, and some question the use of selective breeding as it decreases the size of the gene pool for that species.

CHANGING FISH PRACTICES

Initially, fish were caught in their native environment with hooks, spears and nets. Using these methods, fishing boats were able to catch a steady supply of fish for decades. However, over fishing, habitat destruction, manmade obstructions (i.e. - dams, canals), and pollution have greatly decreased the number of fish caught each year.

This decrease in fish has led to an increase in the amount of aquatic products, especially salmon, that are raised using aquaculture techniques. Similar to other intensive farming techniques, salmon farms raise large numbers of fish in a confined space. Salmon farms monitor and control diet, dissolved oxygen, and growth rates to maximize fish protein for processing.

Like other farming practices, salmon farming has risks. These include salmon diseases and parasites, salmon escapes and cross breeding, excess food and waste below net-pens, competition with wild salmon, chemical concentrations, and First Nations opposition.





CHECK FOR UNDERSTANDING

1. Make a histogram graph of the agricultural products that are produced in the Lower Mainland and the % of BC they total. Which agricultural products show the largest percentage of BC's production?
2. Why have agricultural practices changed over the years?
3. What agricultural practices have increased the amount of food that farmers, ranchers, and fishers can produce?
4. What are the positive effects of the new agricultural practices?
5. What are the negative effects of the new agricultural practices?
6. What alternatives could be used to replace the new agricultural practices?

EXTENSIONS

1. How do the new agricultural practices sustainable? How are they not sustainable?
2. Write an editorial for the local newspaper either for or against one of the new agricultural practices.

ACTIVITY 4 – CHALLENGES TO FARMING IN THE LOWER MAINLAND

Purpose: to examine some of the challenges to agricultural production in an urban area.

Curriculum Connections

Grade 5 Science

Earth and Space Science: Renewable and Non-renewable resources

- analyse how BC's living and non-living resources are used
- identify methods of extracting and harvesting and processing BC's resources

Grade 7 Science

Life Science: Ecosystems

- assess the requirements for sustaining healthy local ecosystems
- evaluate human impacts on local ecosystems

Grade 7 Socials Studies

Economy and Technology

- economic systems, trade, exploration, technology and the physical environment

Environment

- evaluate the impact of natural processes and human-induced changes on communities

Suggested Time: 1 – 2 class periods

Materials

student sheet

pencil or pen

Modern Farming Challenges Video

Background Information

There are many challenges that Lower Mainland farmers face today. In addition to urban conflict, they also need to be experts in business, weather forecasting and new agricultural practices if they want to make a profit and have enough money to support their family.





Presentation Suggestions and Notes for the Teacher

1. Ask students if they know how farming was done 100 years ago. They may have seen movies that were set on farms at that time. Then ask how farms have changed now.
2. Use the *Modern Farming Challenges* video as a follow up to this activity. After students have completed the activity and watched the video, have a discussion about farming. How many students would want to be farmers? What kinds of education and training does a farmer need in order to be successful? What are the benefits and challenges to farmers in the Lower Mainland? A video viewing student worksheet can be found in the Appendix.
3. There are additional science activities that students can use to investigate the role of soil in plant growth. These activities can be found in the Appendix.
4. The Extension question touches on the role of the ALR in protecting land for agricultural production. If you haven't already previously shown the Barnston Island video, use it as a lead in to a discussion on soil types and how they might affect the growth of plants. A video viewing student worksheet is in the Appendix.
5. After showing the *Barnston Island* video and class discussion, have students read the editorial below. Although the Barnston Island decision has been made, there will be other, similar challenges to other ALR land.

A BLOW FOR SANITY

In the end, there was really no other answer that made any sense for Barnston Island or for the region as a whole. The Agricultural Land Commission in its decision last month to choose farming over industrial use, struck a blow for sanity.

It ruled that 1,100 acres covering most of the pastoral Fraser River Island will remain in the Agricultural Land Reserve (ALR).

Had it approved the proposal to develop a business/industrial park there, a select group of land owners would have reaped immense profits. It might also have become an important base of industrial land on the river, and possibly an inland port site to handle containers.

Lined up in favour of farmland preservation were an array of other island users and groups. Many rightly called Barnston a jewel in the Fraser that should not be paved over.

Each reduction in ALR land rips at the fabric of the interconnected agriculture industry in the region. It undercuts our ability to feed ourselves locally and should only be done with clear justification.

Lifting most of Barnston out of the ALR would have been the single largest exclusion in decades - nearly matching all the ALR land removed in the Lower Mainland in the past five years.

Approving redevelopment there would have, in effect, declared open season on ALR land elsewhere, fueling more intensified land speculation and making a mockery of the principles behind both the reserve and the Livable Region Strategic Plan.

In its ruling, the commission systematically dismantled the specific arguments in favour of industrializing Barnston.

It found the soils are adequate and the island is indeed farmable – a logical conclusion since even the developer’s paid agrologist called Barnston fertile.

Finally, commissioners refused to consider the “community need” argument – that development is needed to satisfy a pending industrial land shortage – because it wasn’t backed by Metro Vancouver, which governs the island.

This was the right decision at the right time to push back fears that the integrity of the ALR is crumbling.

– **Surrey Leader**



NAME: _____

DATE: _____

STUDENT SHEET ●●●

ACTIVITY 4 – CHALLENGES TO FARMING IN THE LOWER MAINLAND

Metro Vancouver, which houses about 50% of the province’s population, is an area of competing land interests. According to the 2001 Census of Agriculture, farms in southwestern BC represent just over 1.5% of the total farmed area in British Columbia. However the region is incredibly productive, accounting for approximately:

- 17 % of the total number of farms;
- 21 % of total farm capital value;
- 30% of total farm income; and
- 61% of all greenhouse space

Since 1973, agricultural land in BC has been protected by the *Agricultural Land Commission Act*. This act recognizes agricultural land as a “scarce and important resource.” Less than 5% of BC is considered suitable for agriculture. However, about 16% of Metro Vancouver is in the Agricultural Land Reserve (ALR).

Farmland is important to all of us. It contributes to the regional economy, supplies the region with a diverse supply of high-quality local foods, and provides green space for humans and wildlife.

Southwestern BC is one of the most productive agricultural areas in Canada, due to its rich soils, excellent climate and proximity to Canada’s third largest urban market. The region generates approximately 30% of BC’s total farm income. Lower Mainland farms grow field vegetables, berries, dairy, poultry and eggs, mushrooms and greenhouse produce (tomatoes, peppers and cucumbers). By producing food locally, we become more self-sufficient and help create food security.

Agricultural land benefits the region in other ways. Its green space helps the local ecosystem through water infiltration, soil conservation, air quality, and habitat preservation. While farmers are primarily responsible for growing food, they are also stewards of the land.

Given that food is a basic need, cities were often established near land that was good for agriculture. But as communities grew, competition for the land started to develop. For instance, as houses were built closer to farming areas, conflict sometimes developed over noise, smells, dust, and pesticide use. At the same time, farmers faced challenges as a result of increased runoff from new houses, trespassing, theft, and damage to crops and equipment.

Many initiatives have been undertaken to raise the profile of agriculture in Metro Vancouver. Most of the agricultural lands in the region are also protected from urban development by designation as Lower Mainland Green Zone in the Livable Region Strategic Plan. Many municipalities have undertaken local agricultural studies, looking at such issues as land use and economic viability.

While the area of land in the ALR has remained relatively stable, there have been changes in farm demographics over the past several years. The number of farms in the Lower Mainland has decreased significantly. Cultivated area has remained more or less unchanged while average farm size has increased.

Nonetheless balancing urban development, while maintaining a viable agricultural sector, is still a continuing challenge. Urban – rural conflicts, increased competition in the marketplace due to trade liberalization, and environmental challenges such as changing weather patterns impact agricultural viability.

Check for Understanding

1. What Act protects farmland in BC? When did it come into effect?
2. What area of BC has a wide variety of productive farmland? What agricultural products does it produce?
3. Besides food, what are some of the other benefits of farmland?
4. What other interests affect farmland in the Lower Mainland? What would they use it for?

Extensions

Do you think that agricultural land in the Lower Mainland should be protected? Explain your answer.



AGRI-FACTS:

Did you know that the agriculture and food industry is a \$9 billion industry in BC involving over 120 different products and employing over 190,000 British Columbians.



ACTIVITY 5 – SUSTAINABILITY AND AGRICULTURE

Purpose: to allow students to investigate some of the issues involved in sustainable agriculture and to discuss them as a class.

Curriculum Connections

Grade 5 Science

Earth and Space Science: Renewable and Non-renewable resources

- describe potential environmental impacts of using BC’s living and non-living resources

Environment

- natural resources in Canada
- demonstrate understanding of sustainability, stewardship, a renewable versus non-renewable natural resource
- assess effects of lifestyles and industries on local and global environments

Grade 7 Science

Life Science: Ecosystems

- assess the requirements for sustaining healthy local ecosystems
- evaluate human impacts on local ecosystems

Grade 7 Socials Studies

Economy and Technology

- economic systems, trade, exploration, technology and the physical environment

Environment

- evaluate the impact of natural processes and human-induced changes on communities

Suggested Time: 1 – 2 class periods

Materials

students sheets

pencil or pen

sheets for human graph

Sustainable Urban Farming and *Wildlife Habitat Conservation* Videos

Background Information

Sustainable agriculture refers to the ability of a farm to agricultural products forever without using up the natural resources. Two key issues in sustainable agriculture are:

1. the long-term effects of farm practices on the soil’s properties essential for crop productivity, and
2. the long-term availability of products (such as fertilizer, energy or machinery) necessary to operate the farm.

Presentation Suggestions and Notes for the Teacher

1. One way to discuss the issue of sustainability is with a human graph. By requiring students to physically indicate their agreement/disagreement or preference on an issue, the human graph quickly plots the total group response.
 - Post five sheets of paper on the wall – they should say “Strongly Agree,” “Agree,” “Neutral,” “Disagree,” and “Strongly Disagree.”
 - As you debrief the questions, have students stand in a line in front of the word that represents their feeling.
 - Once in position, have different students explain why they are standing in a particular location.
 - As students give their responses, other students can move as they modify or rethink their opinions. The oral exercise prepares students for later writing expressions.
2. Use *Sustainable Urban Farming* and *Wildlife Habitat Conservation* videos as either an introduction or a summary to the class discussion on sustainability in agriculture. A video viewing student worksheet can be found in the Appendix.

Extensions

1. One way to look at your impact on the environment is to measure your “ecological footprint”, the amount of land that is necessary to support your lifestyle. Students can measure the size of their ecological footprint using an on-line calculator. One is located at <http://www.myfootprint.org/>.
2. More lessons on agriculture and sustainability are available using the following BC Agriculture in the Classroom video, *The Sustainability Road Show – A fresh look at the environment through agriculture*.



NAME: _____

DATE: _____



STUDENT SHEET ● ● ●

ACTIVITY 5 – SUSTAINABILITY AND AGRICULTURE

Sustainable agriculture integrates three main goals: environmental stewardship, farm profitability, and prosperous farming communities. In sustainable agriculture a farm has to be able to produce its farm products for a very long time without consuming all its natural resources.

A century ago, most farms raised both crops and livestock. The two were highly complementary, both environmentally and economically. However, the current picture has changed drastically since then. Crop and animal producers now may still be dependent on one another to some degree, but the interaction is between farmers and not within the farm itself. This is a result of a trend toward separation and specialization of crop and animal production systems.

There are several issues involved in creating sustainable agriculture for crops. They include the long-term effects of various farming practices on the soil that are essential for crop productivity and the long-term availability of products (such as fertilizer, energy or machinery) necessary to operate the farm. Practices that can cause long-term damage to soil include excessive tilling (leading to erosion) and irrigation without enough drainage (leading to accumulation of salt or other chemicals in the soil).

Similarly, raising poultry and other livestock needs to be sustainable. Practices of selective breeding, animal nutrition and confinement rearing all need to be viewed with a view toward sustainability.

While air and sunlight are generally available in most geographic locations, crops also depend on soil nutrients and the availability of water. When farmers grow and harvest crops, they remove some of these nutrients from the soil. Without replenishment, the land would suffer from nutrient depletion and couldn't be used for further farming. Sustainable agriculture depends on replenishing the soil while minimizing the use of non-renewable resources, such as natural gas (used in converting atmospheric nitrogen into synthetic fertilizer), or mineral ores (e.g., phosphate). Nitrogen loss is one important nutrient that must be replenished every time a crop is grown. Possible sources of sustainable nitrogen that would include:

- 1) recycling crop waste and livestock manure,
- 2) growing legume crops (such as beans) and forages (such as alfalfa) that form symbioses with nitrogen-fixing bacteria that return nitrogen to the soil,
- 3) adapting the current industrial nitrogen fixation process to use hydrogen made by electrolysis (perhaps using electricity from solar cells or windmills) instead of natural gas, or
- 4) genetically engineering (non-legume) crops to form nitrogen-fixing symbioses.

Sustainable options for replacing other nutrients, such as phosphorus, potassium, etc., are more limited.

At the basis of sustainable agriculture is the realization that there is a finite supply of natural resources. Agriculture that is inefficient will eventually exhaust the available resources or make the resources too expensive. Agriculture that relies on fertilizers and machinery that are extracted from the earth's crust or produced by factories, are not sustainable. Unsustainable agriculture continues because it is financially more cost-effective than sustainable agriculture in the short term. However, it's the long-term we should be concerned about.

A farm must also generate revenue. The way that crops are sold is also part of the sustainability equation. Fresh food sold from a farm stand requires little additional energy, aside from what's used for cultivation, harvest, and transportation (including consumers). Food sold at a remote location, whether at a farmer's market or the supermarket, incurs a different energy cost for materials, labour, and transportation. Buying local agricultural products, when possible, is more sustainable than buying food that comes from great distances.

When farm products are sold a great distance away, there is an even more complex system involved in which the farmers form the first link in a chain that leads to the consumer. This practice can create greater revenue but it is vulnerable to fluctuations caused by things such as strikes, oil prices, and global economic conditions including interest rates, futures markets, and farm product prices.

Check for Understanding

Read each statement below, then write the number of the answer that best indicates your honest feeling.

- 1 = strongly agree
- 2 = tend to agree
- 3 = uncertain
- 4 = tend to disagree
- 5 = strongly disagree

- 1. Because of our agricultural knowledge and technology, the trend toward separation and specialization of crop and animal production systems is good and necessary.
- 2. Soil will never run out of the nutrients it needs to grow plants.
- 3. We don't have to worry about future generations, they can take care of the environment.
- 4. A person living in the city doesn't have to worry about sustainable agriculture or conserving the environment.
- 5. The environment is more of a problem for people who live in rural areas than those who live in a city.
- 6. The use of technology in agriculture is bad.





- 7. We all use many agricultural products in our daily lives so agriculture concerns us all.
- 8. There is little I can do personally to help support sustainable agriculture.
- 9. A healthy environment is something we all need.
- 10. When natural resources are used up in one area, we can always move on to another area.
- 11. Sustainable agricultural practices and local agricultural products need to be supported to ensure there will be food for the future.

Extensions

Where are local agricultural products sold in your community? When might you choose to purchase agricultural products that are grown or raised a long distance from where you live? Explain your answer.

APPLICATION AND REVIEW ●●●

CREATIVE ENDINGS

Purpose: To allow students to begin to apply their learning in a case study format

Curriculum Connections

Grade 5 Social Studies

Applications of Social Studies

- identify and clarify a problem, issue, or inquiry
- gather and record a body of information from a variety of primary and secondary sources.
- develop alternative interpretations from varied sources
- defend a position on a regional issue in light of alternative perspectives
- use an outline to organize information into a coherent presentation

Environment

- natural resources in Canada
- demonstrate understanding of sustainability, stewardship, a renewable versus non-renewable natural resource
- assess effects of lifestyles and industries on local and global environments

Grade 7 Science

Life Science: Ecosystems

- assess the requirements for sustaining healthy local ecosystems
- evaluate human impacts on local ecosystems

Grade 7 Social Studies

Applications of Social Studies

- identify and clarify a problem, issue or inquiry
- defend a position on a global issue by considering reasons from various perspectives
 - organize information into a formal presentation using several representations

Environment

- evaluate the impact of natural processes and human-induced changes on communities

Suggested Time: 1 to 2 class periods, depending on the number of case studies that each group of students discusses.

Materials

Student information sheets
Student sheets for Creative Endings





Background Information

Once students have begun to learn about agriculture in the Lower Mainland, they are ready to apply their new knowledge in different situations. Although the situations are hypothetical, they are based on current, real issues that British Columbians need to discuss and answer.

Background information on the various points of view has been covered in several of the previous activities. This information may be useful for the students. Students can also look for further information on the Internet using the web sites provided in the appendix.

Presentation Suggestions and Notes for the Teacher

1. Divide students into groups of three or four.
2. Give one person in each group one of the Creative Endings scenarios. Have that person read the situation aloud and give his or her opinion. The other students should listen actively without giving their opinion initially. After the first person has had a chance to give his or her opinion, the other students in the group will have a chance to give their opinions.
3. Give the groups 10 - 15 minutes to discuss the situation and to come up with a general consensus.
4. Debrief the class by having several groups share their solutions to the situation. Is there a class consensus on a solution?
5. Give another student in each group the next scenario. This way each student will get a chance to be the first to speak.
6. After two or three situations have been discussed, ask the class which scenario posed the hardest problem and why.
7. If desired, repeat the lesson the next day with more situations.

NAME: _____

DATE: _____

STUDENT SHEET ●●●

CREATIVE ENDINGS

1. At a Sunday dinner, a friend says that any company, including farms, should be able to conduct their business as long as they can make a profit and follow all laws and regulations. Beyond that, they should be left alone to do their job.
 - a. What do you think of that attitude? Explain your view.
 - b. If you disagree, what would you say to your friend to try to change his or her mind?
2. Frank and Zoe live in Abbotsford. The government is considering giving a local company a license to open a large poultry farm on ARL land near their town. Frank's family owns a real estate company with property near the farm and is against it. Zoe's family owns a feed store in town and thinks the farm is a good idea. Frank and Zoe talk about the issue at lunch.
 - a. Why do you think Frank's family is against the farm? What points do you think Frank would use in his side of the talk?
 - b. Why do you think Zoe's family is for the farm? What point do you think Zoe would use in her side of the talk?
 - c. Do you personally agree with Frank or Zoe? Explain your answer.
3. Lizzy lives on Vancouver Island. Her cousin Dan lives in Delta. Their families get together in the summer for a family vacation. While lying in the sun, their conversation moves to the environment. Dan is concerned about the number of greenhouses in his town while Lizzy thinks there are other more important issues.
 - a. Why do you think Dan is concerned about greenhouses?
 - b. Why do you think Lizzy doesn't see greenhouses as a problem?
 - c. Do you agree with Lizzy or Dan? Explain your point of view.
 - d. Do you think there are more important issues than greenhouses? If yes, explain what you think is more important and why.
4. Eddie and John are talking about what "agricultural land" actually is. Eddie thinks it means that the land is currently being farmed. John says that he thinks it means that the land has the potential to produce an agricultural product.
 - a. How do you think the term "agricultural" should be used?
 - b. What do you think are the benefits and risks of having land designated as part of the ALR?



SUSTAINABILITY TIMES

Purpose: the purpose of this activity is to allow students to represent their knowledge and understanding of agriculture and sustainability in various ways using a newspaper format.

Curriculum Connections

Grade 5 Social Studies

Applications of Social Studies

- identify and clarify a problem, issue, or inquiry
- gather and record a body of information from a variety of primary and secondary sources.
- develop alternative interpretations from varied sources
- defend a position on a regional issue in light of alternative perspectives
- use an outline to organize information into a coherent presentation

Environment

- natural resources in Canada
- demonstrate understanding of sustainability, stewardship, a renewable versus non-renewable natural resource
- assess effects of lifestyles and industries on local and global environments

Grade 7 Science

Life Science: Ecosystems

- assess the requirements for sustaining healthy local ecosystems
- evaluate human impacts on local ecosystems

Grade 7 Socials Studies

Applications of Social Studies

- identify and clarify a problem, issue or inquiry
- defend a position on a global issue by considering reasons from various perspectives
- organize information into a formal presentation using several representations

Environment

- evaluate the impact of natural processes and human-induced changes on communities

Suggested Time: 2 – 3 class periods

Materials

sample newspaper
paper
pencil or pen
coloured pencils or felts
large poster paper if you choose to make it look like a newspaper at the end

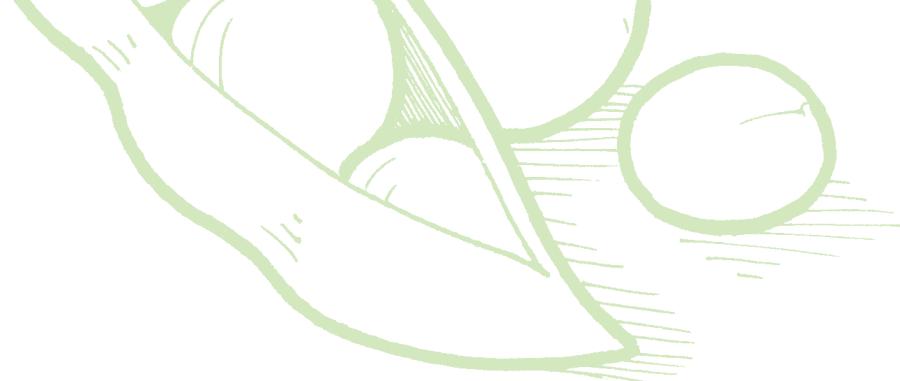
Background Information

A newspaper is a publication that contains news, information and advertising. General-interest newspapers are usually journals of current news, political events, business, culture and opinions (often in editorials or political cartoons. Many also include weather news and forecasts. Newspapers use pictures and photographs to illustrate their stories. They may also have comic strips, crosswords and horoscopes.

Presentation Suggestions and Notes for the Teacher

1. Ask students if they have ever looked at a newspaper. What is included in a newspaper? Write the word NEWSPAPER on the front board and start a mind map. Write the student responses around the word. After they have finished their answers, hand out a sample newspaper and add any new things that they discover about a newspaper.
2. Tell students that as a class you are going to put together a newspaper on Agriculture and Sustainability. It is their chance to represent what they've learned in this unit. Each student or group of students will create a different part of the paper. Some will write news and information stories while others will create editorials or a business report. They can even create a weather report and forecast, comics, advertisements, or even a farmer's almanac section. Their section of the newspaper can include both words and pictures. Divide the class and let them get to work of their section.
3. After each group has done their part, put the pieces together on a larger piece of poster paper so that the finished product looks like a newspaper.





NAME: _____

DATE: _____

STUDENT SHEET ●●●

SUSTAINABILITY TIMES

A newspaper is a publication that contains news, information and advertising. General-interest newspapers are usually journals of current news, political events, business, culture and opinions (often in editorials or political cartoons). Many also include weather news and forecasts. Newspapers use pictures and photographs to illustrate their stories. They may also have comic strips, crosswords and horoscopes.

You have been studying agriculture and sustainability. Now you have a chance to be creative in the way you represent what you've learned. Your teacher will divide you into groups and each group will be assigned a different section of the newspaper to create. Several groups may be asked to develop different news and information stories.

Every good news story involves the 5 W's – who, what, when, where and why. When you write your story, try to include information that addresses each one. Your story can either be a factual one, such as the story of a local farmers market, or one that blends fact and fiction, such as an interview with a fictitious farmer about his farming techniques. You can include stories about the activities you did during this module. Add pictures or drawings to help tell your story.

When you have all completed your sections, you'll put them together into one newspaper. Each one of you plays a very important part in the finished product. So, give it your best!

UP CLOSE AND PERSONAL

Purpose: to allow students to see agricultural practices in action.

Curriculum Connections: science, social studies

Suggested Time: 1 to 2 class periods, depending on the amount of time necessary to debrief the student visit to the farm.

Materials

normal field trip procedures

Presentation Suggestions and Notes for the Teacher

Organize a field trip to a local farm to see how they raise their agricultural products. A list of possible field trip locations is given at www.aitc.ca/bc

After the field trip, ask students to review their answers from the orientation/elicitation activity. How did these activities and their visit to the farm affect their knowledge and understanding about agriculture and sustainability?





ASSESSMENT AND EVALUATION IN FOOD FOR THOUGHT ●●●

Assessment and evaluation can be an integral part of a teacher's curriculum provided we invest in educationally useful and valid measures of student learning. The methods and instruments of assessment and evaluation should be varied so that they focus on a broad range of skills, strategies and knowledge, reflecting the various dimensions of learning.

Thus, in addition to the Student Sheets provided with each activity, you may wish to incorporate other activities that may be useful in your assessment. These could include:

- Journals or Learning Logs
- Notebooks
- Self Evaluation Forms
- Presentations
- Portfolios

You may also wish to use a presentation as part of an authentic assessment. An example of a student presentation sheet is provided below. Rating scales are similar to checklists except that they also include a measure of the quality of the performance. The scale below could be used when observing and rating a student's performance in a presentation. Consideration should be given to the student's finished reports, as well as to the performance. This can be used for a variety of that students represent their learning. The information collected can be used for diagnostic, reporting, or interview purposes.

RATING SCALE FOR ASSESSING STUDENT PRESENTATIONS

STUDENT NAME:

DATE:

	Approaching Expectations		Meets Expectations		Exceeds Expectations
A. Demonstrates understanding of the problem or issue	1	2	3	4	5
B. Introduction	1	2	3	4	5
C. Materials are relevant to topic	1	2	3	4	5
D. Materials have been researched in depth	1	2	3	4	5
E. Materials are clear and concise	1	2	3	4	5
F. Content is organized in a logical and easy to follow way	1	2	3	4	5
G. Conclusion is derived from material presented	1	2	3	4	5
H. Shows an openness to a variety of points of view	1	2	3	4	5
I. Presentation voice is clear and audible	1	2	3	4	5
J. Presentation shows confidence in stance and gestures	1	2	3	4	5
K. Uses notes and aids effectively	1	2	3	4	5





APPENDIX ●●●

CRITICAL THINKING IN THE CLASSROOM

Although there are many definitions and concepts about what critical thinking is, or isn't, recent developments by the BC Ministry of Education and The Critical Thinking Consortium suggests that critical thinking can be usefully understood as thinking in any situation provided the thinker intends to come to a reasoned judgment.

This definition of critical thinking is based on several assumptions about the nature of critical thinking. Three principles are particularly crucial:

- 1. There is a contextual nature to thinking.** A meaningful challenge always arises in a particular context and that context determines what qualifies as a sensible or reasonable response.
- 2. There is an interrelationship between thinking and knowledge.** Critical thinking requires the possession of relevant knowledge in both the background of the subject to be studied and in the principles and concepts that characterize quality thinking.
- 3. There is an importance in the quality of thinking.** In judging the quality of thinking, the key is not whether we agree with the conclusion but rather the quality of thinking that supports the reasoned judgment.

The ability think critically develops over a lifetime by acquiring and refining the range of “tools” necessary to respond to problems and issues. These tools include:

- 1. Possession of relevant background information:** students cannot think critically about a topic if they know nothing about it
- 2. Understanding of appropriate standards of reasoning:** students need to understand rational or logical arguments, deliberation, inquiry and justification.
- 3. Possession of key critical concepts:** students need to understand key concepts so they have the same vocabulary to distinguish issues.
- 4. Fluency with regard to heuristics:** there are certain strategies that are useful in guiding students through some thinking tasks.
- 5. Possession of essential habits of the mind:** there are many habits that students should possess, including open-mindedness, an intellectual work ethic, respect for high-quality thinking and performance, fair-mindedness, independent-mindedness, and an inquiring attitude.

CONSTRUCTIVISM IN EDUCATION

Food for Thought is based on a learning model called “constructivism” or “concept change learning.” Constructivism believes that the learner constructs knowledge and understanding through interacting with meaningful experiences.

Constructivism assumes that students always have previous ideas and that they learn by combining new information with earlier ideas, creating new knowledge and understanding. Often, new ideas challenge or conflict with original ones. This leads to questioning, which in turn leads to modification and reorganization of ideas into new understandings. This way of learning is adaptive. People make sense of the world for themselves. Constructivism suggests that the best way to teach is not simply to transmit knowledge to students but to help them expand or reconstruct their original beliefs with more sophisticated ones.

Food for Thought activities themselves are organized into five phases to help students acquire and use new ideas. The phases are:

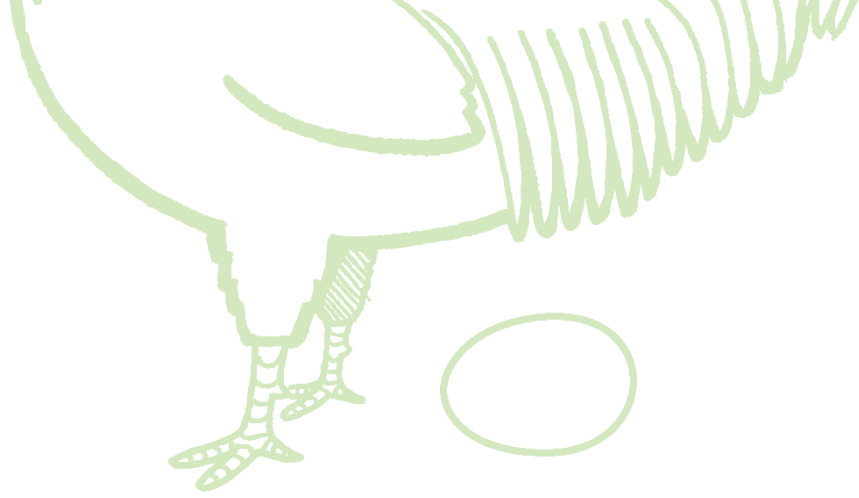
- 1. Orientation** – This phase helps students focus attention on the problem or idea to be introduced.
- 2. Elicitation** – This phase allows students to identify their original thoughts and ideas. This is their starting place for learning.
- 3. Restructuring** – This phase is where student activities are focused on new learning.
- 4. Application** – This phase is where students use their new understanding to draw conclusions, make decisions, or summarize their understanding of the topic.
- 5. Review** – In this phase, students recap their new ideas to see how they have added to their understanding.

To maximize learning, it is important to include all of these elements when teaching an educational unit. Although you don't need to undertake all the activities in this module, try to include ones that represent all phases of constructivism to maximize student learning and understanding.

In addition, Food for Thought holds to several other learning principles that form its educational philosophy:

- Learning requires the active participation of the learner
- People learn in a variety of ways and at different rates
- Learning is both an individual and a group process
- Active learning in hands-on and minds-on
- Integrated curriculum incorporates real-life learning situations





Additional Science Activities ●●●

SOIL TYPES

Purpose: to examine soil and begin to understand the similarities and differences that soil samples can have.

Curriculum Connections

Grade 5 Science

Earth and Space Science: Renewable and Non-renewable resources

- analyse how BC's living and non-living resources are used
- identify methods of extracting and harvesting and processing BC's resources

Grade 5 Social Studies

Economy and Technology

- analyse the relationship between development of communities and their available natural resources
- explain how supply and demand are affected by population and the availability of resources

Grade 7 Science

Life Science: Ecosystems

- analyse the roles of organisms as part of interconnected food webs, populations, communities and ecosystems
- assess survival needs and interactions between organisms and the environment

Suggested Time: 1 class period

Materials

three samples of soil:

- sandy soil
- potting soil from a garden store
- soil from a garden

magnifying glass

white paper

Background Information

Soil is the living layer on the earth's surface, which is essential for life to flourish. Soils nourish plants, which in turn provide food for many types of animals. Soils vary from place to place, but all have the same basic composition and are developed through similar processes.

Soil has two main components. One is the mineral or inorganic material that comes from the weathering and erosion of rocks. The other is organic material called humus, which comes from living matter, usually decaying plants. The amounts of each one of these components in the soil determines many factors, such as how much water it will hold, how well plants will grow in it, and what colour it is. These factors create a soil profile.

Soil research has shown that soil profiles are influenced by five separate, yet interacting, factors: parent material, climate, topography, organisms, and time. Soil scientists call these the *factors of soil formation*. These factors give soil profiles their distinctive character. Soil properties are determined by the soil profile, soil characteristics and soil classification. Soil profiles are affected by additions and removals from the soil, transformations (weathering and decomposition) and vertical transfers. Soil characteristics include soil colour, texture, amount of organic (living) matter, structure, density, water retention and chemical properties, such as pH. Soil is generally classified into based on the amount of clay, sand and loam it contains.

Presentation Suggestions and Notes for the Teacher

1. Before the class starts the activity, ask them what they think soil is. Ask them if they think that all soils are the same and to give examples of plants and the soil that grows in each. For example, some students may have been to the desert and have seen cactus will grow in the rocky, sandy soil there. Others may have been to the coast and seen the ferns that grow in the rich loam soil that is found there. Tell the class that they are going to examine soil samples and then predict what plants might be able to grow in them.
2. If you haven't already previously shown the Barnston Island video, use it as a lead in to a discussion on soil types and how they might affect the growth of plants. A video viewing student worksheet is in the Appendix.
3. After showing the Barnston Island video and class discussion, have students read the editorial below. Although the Barnston Island decision has been made, there will be other, similar challenges to other ALR land. An editorial on the final decision for Barnston Island is included in Activity 4 – Challenges to Farming in the Lower Mainland.



NAME: _____

DATE: _____

STUDENT SHEET ●●●

SOIL TYPES

Agricultural land is disappearing all over the world because of many factors such as soil erosion, the spread of cities, and pollution. The Canada Land Inventory Act monitors soil use throughout our country. In Canada, the provincial and federal governments are trying to maintain the land that is presently used for agriculture.

In British Columbia, only 5% of the total land is suitable for various kinds of agriculture. The remaining 95% of the total land in BC is mostly mountainous, rocky, or forested land. On the land suitable for agriculture, only a small part can sustain a wide variety of crops. Good farm land is very limited in British Columbia.

There are many different types of soil. Some are better for growing plants than others. In this activity, you will investigate the different types of soils.

Materials

three samples of soil:

- sandy soil
- potting soil from a garden store
- soil from a garden

magnifying glass

white paper

Procedure

1. Spread the soil onto separate pieces of the paper.
2. Examine the samples with the magnifying glass.
3. Record your observations on the sheet below. You can describe what you see, draw a picture of each soil sample, or do both.

Soil Data

Soil Sample 1:

Soil Sample 2:

Soil Sample 3:

Investigation Questions

1. How are the soil samples the same? How are they different? Is the soil light or dark?
2. What size are the grains that make up each soil? Which sample has the smallest grain? Which has the largest?
3. In there any decaying plant material in any of the soil samples?
4. Which soil do you think will be better for growing plants? Why?
5. How are plants adapted to the type of soil and the climate they grow in? For example, would a cactus plant grow in the same soil as corn?

Extensions

Research the history of the Agricultural Land Reserve in British Columbia. What is it? Why do you think it was started? What does it do for the citizens on British Columbia? Is it still needed today?



AGRI-FACTS:

Did you know that diabetic test strips contain an enzyme found in horseradish?



PLANT PARTS AND GROWING SEEDS

Purpose: to allow students to examine the role soil plays in the growth of plants.

Curriculum Connections

Grade 5 Science

Earth and Space Science: Renewable and Non-renewable resources

- analyse how BC's living and non-living resources are used
- identify methods of extracting and harvesting and processing BC's resources

Grade 5 Social Studies

Economy and Technology

- analyse the relationship between development of communities and their available natural resources
- explain how supply and demand are affected by population and the availability of resources

Grade 7 Science

Life Science: Ecosystems

- analyse the roles of organisms as part of interconnected food webs, populations, communities and ecosystems
- assess survival needs and interactions between organisms and the environment

Suggested Time: 1 – 2 class periods to set it up and 10 days to grow the seeds

Materials

Three soil samples from previous activity (sandy soil, potting soil, garden soil)

Three small plant pots

Six green bean seeds

Water

Background Information

While there are many different types of plants, they have many things in common. Most plants use the process of photosynthesis, combining the energy of the sun with carbon dioxide and water to form carbohydrates – energy rich chemical compounds that provide materials required to sustain both plant and animal life – and oxygen. But plants also need soil and the nutrients it contains in order to grow. Think of soil as a thin living skin that covers the land. It goes down into the ground just a

short way. Even the most fertile topsoil is only a foot or so deep. Soil is more than rock particles. It includes all the living things and the materials they make or change.

As you move down into soil you pass distinct layers, or horizon. These layers form the soil profile. Plants grow and animals live in the top later of the soil. A thick cover of plants can keep the soil cool and keep it from drying out. Decomposers recycle dead plants and animals into humus, the part of the soil that comes from living organisms. Below the topsoil is the subsoil, a mix of mineral particles and some humus near the top. Subsoil is very low in organic matter compared to the topsoil. This is the layer where most of the soil's nutrients are found. Deep plant roots come here looking for water. Clays and minerals released up above often stick here as water drains down. The minerals are absorbed by the plants and provide the necessary chemicals the plants need for healthy growth. If the soil does not have the proper nutrients for the type of plants that are grown there, a farmer may add those nutrients.

Presentation Suggestions and Notes for the Teacher

1. Review the results of the previous activity on soil types prior to starting the activity. Ask them to predict with soil will produce the best plants and explain their thoughts.
2. If you haven't already previously shown the *Glen Valley Organic Co-op Farm* video, use it as a springboard for discussion about the role of organic farming practices. How does organic farming differ from other forms of farming? How does it relate to sustainable agriculture? A video viewing student worksheet is in the Appendix.



NAME: _____

DATE: _____

STUDENT SHEET ● ● ●

PLANT PARTS AND GROWING SEEDS

While there are many different types of plants, they have many things in common. Most plants use the process of photosynthesis, combining the energy of the sun with carbon dioxide and water to form carbohydrates – energy rich chemical compounds that provide materials required to sustain both plant and animal life – and oxygen.

Plants don't start their lives full grown. They begin their life as a seed. Seeds are like babies. They need proper care to help them grow healthy. In this activity, you will investigate the growth of seeds into plants.

Materials

Three soil samples from previous activity (sandy soil, potting soil, garden soil)
Three small plant pots
Six green bean seeds
Water

Procedure

1. Fill each pot with a different soil sample.
2. Use your finger to make 2 holes in the soil, each about 1 cm deep, about 2 cm apart. Place one seed in each hole.
3. Fill the hole with extra soil and lightly pack the soil.
4. Water the soil thoroughly. Continue to water the seeds (and later the bean plants) regularly, about every other day.
5. Record observations of your seeds every day. Measure the height of your plant every day.



Data:

PLANT OBSERVATION AND PLANT HEIGHTS

DAY	SANDY SOIL PLANTS	POTTING SOIL PLANTS	GARDEN SOIL PLANTS
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Investigation Questions

1. Which seeds sprouted first?
2. Construct a line graph to show the growth of the bean plants for each soil sample. Put data from all three soil sample plants on the same graph using different coloured pencils.
3. What do you notice about the growth of bean seeds in different soils? Why do some agricultural crops grow better in different soils?
4. If you were a farmer and your soil didn't grow a specific crop, such as beans, very well, what could you do?

Extensions

Research what farmers can do to grow better crops.



AGRI-FACTS:

Did you know that while only 1.6% of British Columbians lived on farms in 2001, primary agriculture contributed \$1.74 billion to the Gross Domestic Product in 2002?



NAME: _____

DATE: _____

STUDENT SHEET ● ● ●

VIDEO VIEWING WORKSHEET

Name of the video you watched: _____

List at least five (5) interesting things that you learned from the video. Tell why you found each interesting.

Interesting things I learned from the video	Why I found these things interesting
1.	
2.	
3.	
4.	
5.	
6.	

What was the most important thing you think the video was trying to say?

WEB SUPPORT AND INFORMATION

Web sites for more information on agriculture and sustainability in the Lower Mainland and across Canada:

- B.C. Ministry of Agriculture and Lands – This site contains information about agriculture in BC.
<http://www.al.gov.bc.ca>
- Agriculture and Agri-Food Canada – This site has a variety to information on agriculture in Canada
<http://www.agr.gc.ca>
- BC Agricultural Land Commission – This site connects to the Agricultural Land Commission, the primary steward of B.C.'s valuable agricultural land.
<http://www.alc.gov.bc.ca>
- SmartGrowth BC – This site supports the creation of more livable communities.
<http://www.smarthgrowth.bc.ca>
- InfoBasket – This site is a link to agri-food information in British Columbia.
<http://www.inforbasket.gov.bc.ca>

More lessons on agriculture and sustainability are available using the following BC Agriculture in the Classroom video series:

- The Sustainability Road Show – A fresh look at the environment through agriculture
- Feeding Frenzy – A fresh look at economics and technology through agriculture
- Put Your Money Where Your Mouth Is – A fresh look at economics through agriculture

The video series is available through BC Agriculture in the Classroom.

<http://www.aitc.ca/bc>



NAME: _____

DATE: _____

STUDENT SHEET

FOOD FOR THOUGHT WORD SEARCH

There have been many words that you have encountered in your study of agriculture and sustainability in the Lower Mainland. How many can you find in the Word Search Puzzle below? Words can be spelled forwards or backwards, horizontally or vertically. You can find the words on this page and scattered through the pages of the Food for Thought module. Do you know what each word means?

S U S U S T A I N A B L E X K
N K J V E F L O O D S N F A R
O N O B E T R T L C O O P D A
I O N C D E E S G N I M R A F
T D N A S R A L I Z L O N I I
A P O U L T R Y C H I C K R S
Z V R H B X C I N A G R O Y H
I M H U D S O N S B A Y N F A
N Y H I J T D S O N N Y C O B
A W I E B S P Y O U N R M O I
B A R N S T O N I S L A N D T
R C S E S U O H N E E R G B A
U A F I R S T N A T I O N S T

Hudson's Bay
Coop
Sand
Urbanization
Barnston Island
Poultry

First Nations
ALR
Fish
Organic
Seeds
Dairy

Farming
Soil
Greenhouse
Sustainable
Food
Habitat

