

Unit 7

Connecting Food Security and Climate Change

Overview

Climate Change and Food Security are both broad and important topics. This unit focusses on how they intersect in ways that affect the traditional foods of First Peoples in BC. It also asks students to consider how traditional Indigenous practices might be used to support food security for the wider community.

First Peoples, having lived in the lands we call British Columbia for thousands of years, have always adapted to ecological and climate changes. Their Indigenous Knowledge has generally been able to cope as they adjusted to different conditions.

However, the current rates of change are unprecedented. Traditional Ecological Knowledge is not always able to keep up with the extent of changes. This is compounded by other impacts of industrial society, such as loss of territories and habitats, changing diets and modern technologies.

The topic of food security can be examined in diverse ways, but in this unit students are only asked to consider the security of traditional foods for First Peoples communities, and how it is impacted by climate change.

NOTE: Some sections of this unit dealing with food security could trigger strong emotions in some students who may live in poverty and whose families may rely on food banks, or are otherwise food insecure. Be sensitive to how your students may receive some of the videos and discussions around these topics.

UNIT 7 • CONNECTING FOOD SECURITY AND CLIMATE CHANGE

Relevant BC Learning Standards for Senior Secondary Science

Course	Key Content Standards	Key Curricular Competencies
Life Sciences 11	<ul style="list-style-type: none"> • First Peoples understandings of interrelationships between organisms 	<p>Questioning and predicting</p> <ul style="list-style-type: none"> • Make observation aimed at identifying their own questions, including increasingly abstract ones, about the natural world. <p>Planning and conducting</p> <ul style="list-style-type: none"> • Collaboratively and individually plan, select and use appropriate investigation methods, including field work and lab experiments, to collect reliable data. <p>Processing and analyzing data and information</p> <ul style="list-style-type: none"> • Experience and interpret the local environment • Apply First Peoples perspectives and knowledge, other ways of knowing and local knowledge as sources of information <p>Evaluating</p> <ul style="list-style-type: none"> • Consider social, ethical, and environmental implications of the findings from their own and others' investigations <p>Applying and innovating</p> <ul style="list-style-type: none"> • Contribute to finding solutions to problems at a local and/or global level through inquiry <p>Communicating</p> <ul style="list-style-type: none"> • Express and reflect on a variety of experiences, perspectives, and worldviews through place.
Earth Sciences 11	<ul style="list-style-type: none"> • Evidence of climate change • First Peoples knowledge of climate change and interconnectedness as related to environmental systems 	
Environmental Science 11	<ul style="list-style-type: none"> • Ecosystem complexity: roles; relationships; population dynamics • Energy flow through ecosystems • Matter cycles through and between living systems • First Peoples knowledge and other traditional ecological knowledge in sustaining biodiversity • Human actions and their impact on ecosystem integrity • First Peoples ways of knowing and doing • Resource stewardship • Restoration practices 	
Environmental Science 12	<ul style="list-style-type: none"> • Changes to climate systems • Impacts of global warming • Mitigation and adaptations • Land management • Personal choices and sustainable living • Global environmental ethics, policies and law [including First Peoples perspectives, philosophies and responsibilities] 	

Cross-Curricular Connections

Culinary Arts 10; Food Studies 10

- First Peoples food protocols, including land stewardship, harvesting/gathering, food preparation and/or preservation, ways of celebrating, and cultural ownership
- Evaluate the influences of land, natural resources, and culture on the development and use of tools and technologies

Guiding Questions

- What are the connections between climate change and food security?
- How does climate change affect the diets of First Nations and others living in BC?
- How does food security impact the lives of Indigenous cultures in Canada?
- How can we adapt to climate change to ensure food security for the future?
- How can eating traditional foods increase First People's food security?

Resources

For further information on these resources, see the annotations in the Bibliography, beginning on page 273.

Suggested Resources

- First Nations Adapt Program. Government of Canada. <https://bit.ly/2DD2q1q>
- First Nations Health Authority. “Eating Healthy: Traditional Foods Are Good Medicine For Both Body And Soul.” <https://bit.ly/2ExJIKk>
- First Nations Health Authority. *Traditional Food Facts Sheets*. <https://bit.ly/2x5bCKc>
- Forests and Oceans for the Future. Unit 7, Traditional Ecological Knowledge and Climate Change. www.ecoknow.ca. Linked at <https://bit.ly/2DGpg91>
- *From Glaciers to Glass Sponge Reefs*. Kitsumkalum First Nations, 2018. <https://youtu.be/15CxqNnFJSw>
- Gonzalez, Andrea. “Climate Change Threatens First Nations’ Fisheries.” *The Ubysey*, 2016. <https://bit.ly/2Sa2Otp>.
- Great Bear Sea. *Exploring the Great Bear Sea, Environmental Science 11, 12*. <https://greatbearsea.net/environmental-science/>
- Myhal, Brittany. *Food Security Concerns and Challenges of First Nations Communities in the Interior of BC*. Master of Land and Water Systems, UBC, 2018. Linked at <https://bit.ly/2IlkX8a>.
- *River of Salmon People*. Theytus Books, 2015.
- Sterritt, Angela. “In fight to combat climate change, Squamish Nation joins forces to capture carbon” CBC 2018. Linked at <https://tinyurl.com/fnesc71>.
- *A Subsistence Culture Impacted by Climate Change*. Arctic Athabaskan Council. 3 minute video. <https://bit.ly/2cSLeGB>.
- *What's the Deal with Carbon*. Bell Museum, 2010. 3.03 min. Online at <https://youtu.be/2Jp1D1dxxj8>.

UNIT 7 • CONNECTING FOOD SECURITY AND CLIMATE CHANGE

Resources for studying caribou

- Caribou in British Columbia. BC government brochure. <https://bit.ly/2DiMHWT>.
- Caribou, BC Government web page. <https://bit.ly/2BVB1rt>
- *Project Caribou. An Educator's Guide to Wild Caribou of North America*. Project Caribou. Whitehorse: Government of the Yukon. 2001. <https://tinyurl.com/fnesc37>
- “Governments of Canada and British Columbia to collaborate with First Nations on recovery of Southern Mountain Caribou,” 2018 . <https://tinyurl.com/fnesc68>.

Resources for studying the Three Sisters and Food Forests.

- Appreciating the Three Sisters. 7:25 min. 1995. https://youtu.be/pb8ANVAhj_8
- *Bertha Sky, 3 Sisters Soup*. Factory Media Centre, 2017. 3.28 min. <https://youtu.be/bgineteFOOg>.
- *A Forest Garden With 500 Edible Plants Could Lead to a Sustainable Future*. National Geographic, 2019. 3.23 min. https://youtu.be/Q_m_0UPOzuI.
- The Iroquois Legend of the Three Sisters. <https://bit.ly/2D9GMDC>
- Strandberg, Diane. “Coquitlam school partnership to create First Nations forest garden,” Tricity News, 2017. <https://tinyurl.com/fnesc89>
- The Three Sisters: The Haudenosaunee’s Three Sisters. <http://www.oneidaindiannation.com/the-legend-of-the-three-sisters/>
- The Three Sisters curriculum package. <https://bit.ly/2CwEA70>
- Three Sisters Garden. 3.27 min. (made for young children.) <https://youtu.be/SQ4dgTwTpvk>.
- *Urban Food Forest Tour (Canada’s Oldest): Spring Ridge Commons*. Edible Landscapes Design, 2017. <https://youtu.be/CLJlsR7U8uc>.
- “What’s a food forest?” Canadian Feed the Children website, linked at <https://tinyurl.com/fnesc85>.
- “What is Permaculture?” Permaculture Research Institute website. <https://permaculturenews.org/what-is-permaculture/>

Additional Resources

- Canadian Wildlife Federation. “Strangers in a Strange Land.” Link at <https://tinyurl.com/fnesc38>.
- Looking Into Surface Albedo, UCAR Center for Science Education, linked at <https://tinyurl.com/fnesc39>.
- *Kitsumkalum on Climate Change and Food Security* (4:37 min) <https://youtu.be/VZiuUKu0D00>
- Turner, Nancy J. and Helen Clifton. “‘It’s so different today’: Climate change and Indigenous Lifeways in British Columbia.” *Canada Global Environmental Change* 19 (2009). Available online at <http://bit.ly/2dj8hvY>

UNIT 7 • CONNECTING FOOD SECURITY AND CLIMATE CHANGE

Blackline Masters

- 7-1 Food and Climate Change Discussion Questions
- 7-2 Food Security
- 7-3 A Carbon Journey
- 7-4 Carbon Transformation Stations
- 7-5 Caribou Data File

Outline of Activities

- 7.1 Climate Change and Food Security
- 7.2 Where Does Your Food Come From?
- 7.3 Traditional Foods and Food Security
- 7.4. Evidence of Climate Change in the Local Region
- 7.5 Carbon Transformations
- 7.6 Albedo and Climate Change
- 7.7 Ecosystem Inquiry
- 7.8 Caribou and Climate Change
- 7.9 First Nations Communities Adapt to Climate Change
- 7.10 Companion Planting: An Indigenous Model
- 7.11 Developing a Proposal To Address Local Climate Changes Issues.

Suggested Activities

Note: There are more activities here than most teachers will incorporate into their units. It is not expected that you will use all of the activities, or follow the sequence as it is described. These activities are intended to be adapted to fit the needs of your students and classroom, as well as inspire ways that you can respectfully include relevant Indigenous knowledge and perspectives in your course.

Activity 7.1

Climate Change and Food Security

Students are introduced to the connections between climate change and food security for First Peoples.

- a. Introduce the topic by having students think about their personal connections with food. This could be a class discussion, group discussions or individual reflection. Discuss questions such as:
 - What are your favourite foods? What foods could you not live without?
 - What about food is important to you and your families? Does food have any cultural or social connections for you?
 - In what ways can food bring your family or friends together?
- b. Have students use the Four Corners strategy to discuss the possible impacts of climate change on the food we eat. This activity gives an opportunity to introduce physical movement into the lesson.
 - To set up the activity, place a question card in each corner of the room. The questions can be found on Blackline Master 7-1, page 204, *Climate Change and Food Security Discussion Questions*.
 - One approach is to divide the class into four groups, and have the groups rotate to each corner to discuss the question they find there. You could assign recorders to stay in each corner and summarize the discussion of each group.
 - Another approach is to allow students to choose one topic they would like to discuss.
 - Explain all four questions.
 - Give students time to think about the questions.
 - Students pick a corner to move to and discuss the question.
 - One or two representatives can share the discussions with the rest of the class.
 - The questions can also be used for small group, whole class, or individual discussions.

 Blackline Master 7-1,
page 204, *Climate
Change and Food Security
Discussion Questions*

UNIT 7 • CONNECTING FOOD SECURITY AND CLIMATE CHANGE

- These are the discussion questions found on Blackline Master 7-1, page 204:
 1. Do you think climate change has an impact on the food you eat now? If so, in what ways?
 2. How do you think climate change will affect the availability of our food in the future? How might it impact the types of foods we eat and the sources of our food?
 3. How could climate change impact the foods that First Peoples and others who harvest some or all of their food from the land around them?
 4. How do you think climate change will affect the quality of our food in the future? Will it affect the nutritional value of our food?
- c. What is food security? Ask students what they know about the term food security. If they are not familiar with it, ask them to predict what it might mean.
 - Have students find out some definitions of food security from online sources. They could work in groups and share their findings with the rest of the class.
 - Have students refer to Blackline Master 7-2, page 205, *Food Security* to compare the United Nations definition with others they have found.
 - Have students list the key attributes of food security they have found.
- d. Discuss with students four aspects of food security:
 - Availability
 - Access
 - Utilization
 - Stability.
 - Ensure students understand each of the factors. Ask them to suggest examples of each.
 - Students can use Blackline Master 7-2 to record notes, examples or questions about each aspect.
- e. To introduce the connections between climate change and food security for Indigenous communities in BC, use one or more of the following resources.
 - *From Glaciers to Glass Sponge Reefs*. View and discuss this 27 minute video produced by the Kitsumkalum First Nation in 2018. Online at <https://youtu.be/15CxqNnFJSw>.
 - The video shows how one BC First Nation is studying the effects of climate change and finding ways to adapt to the coming changes to ensure they still have access to their traditional food resources.
 - It illustrates how the community uses both traditional knowledge and Western science to understand, monitor and adapt to the changes in their local ecosystems.
 - A shorter video comprised of the introduction to the full video is also available. It could be used as an introduction to the topic if there isn't



Formative Assessment Strategy

Use the discussion about climate change to assess students' depth of understanding of the topic and guide your further instruction.



Blackline Master 7-2, page 205, *Food Security*

UNIT 7 • CONNECTING FOOD SECURITY AND CLIMATE CHANGE

time to view the whole video. *Kitsumkalum on Climate Change and Food Security* (4:37 min) is online at <https://youtu.be/VZiuUKu0D00>.

- *Food Security Concerns and Challenges of First Nations Communities in the Interior of BC*. Brittany Myhal, Master of Land and Water Systems, UBC. 2018. Online at <https://bit.ly/2IlkX8a>.
 - This is a report on case studies of two interior First Nations groups, the Esh-kn-am Cultural Resources Management Services (a joint venture of three Nlaka'pamux First Nation Bands: Coldwater, Cook's Ferry and Siska) and the Lytton First Nation.
 - Students could focus on section 4.3, Climate Change (pages 8-9) for an overview and examples of how climate change impacts interior First Nations.
 - Students could then read the two case studies (sections 5.2 and 5.3) to see differences in how climate change affects different communities.
 - *Climate Change Threatens First Nations' Fisheries*. Andrea Gonzalez, *The Ubysey*, 2016. <https://bit.ly/2Sa2Otp>.
 - Students can read about a recent study that predicts the effects of climate change on First Nations marine fisheries. The article summarizes a UBC study examining the impacts of climate change for coastal First Nations communities where marine resources are crucial for both food and economic security.
 - Advanced students can also look at the original study and see some of the data that were collected, and read for themselves the conclusions drawn by the researchers: "Projected Scenarios for Coastal First Nations' Fisheries Catch Potential under Climate Change: Management Challenges and Opportunities." Lauren V. Weatherdon, Yoshitaka Ota, Miranda C. Jones, David A. Close, William W. L. Cheung. *PLOS* January 13, 2016. Online at <https://bit.ly/2V18ub2>.
 - *A Subsistence Culture Impacted by Climate Change*. Arctic Athabaskan Council. 3 minute video. <http://bit.ly/2cSLeGB>. This short video demonstrates the various impacts of climate change on food security of First Peoples' communities in Yukon and Alaska, particularly salmon and the muskeg ecosystem.
- f. Ask students to think about what they have learned about the connections between climate change and food security for First Peoples and other Canadians. Ask questions such as:
- What are two or three new ideas you learned from this resource?
 - What questions do you have about the connections between climate change and food security?
 - What are two of the most important impacts of climate change on the food supplies of First Nations communities?

Activity 7.2

Where Does Your Food Come From?

Students work together to cook a dish that requires a variety of different ingredients. Students will then calculate how far the ingredients travelled to get to their plates.

a. Planning to Cook

Explain to students that they will be planning and cooking a dish that requires a variety of ingredients, and they will track how far the ingredients they use travelled to get to their plate.

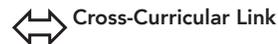
- Plan how the ingredients will be obtained. The school could supply some or all of the ingredients, or students could bring some from home. Depending on your classroom resources and how the supplies are obtained, this activity can be setup in several ways:
 - Groups could prepare one ingredient to add to one dish prepared by the whole class.
 - Groups could prepare the complete dish on their own, and compare them.
 - Groups could prepare different dishes. This could give the opportunity to compare dishes made with mostly local foods to dishes made with mostly imported foods.

b. Depending on your situation, you may want to decide on the recipe or recipes to make, or allow the students to contribute to making the decision. Some suggested dishes that students could make are:

- Salsa. This is a good choice because it doesn't involve cooking, and includes a number of imported ingredients. (Don't forget the chips.) Find a salsa recipe you like or make one up.
- Soups or stews. There are many recipe options for these dishes, which may give an opportunity to include a locally based meal to compare with the long-distance meal. There is also a possibility of including a soup or stew important to First Peoples, or one that is significant to another cultural group represented in your classroom.
- Pizza or another flatbread type of recipe.

c. Buy or gather all the ingredients and note where they come from. For example, if the cumin is from Mexico and the tomatoes from California make note of that. Before class starts put all the ingredients on the table for each group along with the recipe.

d. Students can record how far the ingredients they used travelled. They should show the ingredients, their sources, and the approximate distant they travelled to reach your community. Use a blank map of the world to record information about their ingredients.



Cross-Curricular Link

Culinary Arts 10
Food Studies 10

UNIT 7 • CONNECTING FOOD SECURITY AND CLIMATE CHANGE

- Students could use a map of the world to illustrate the distances that the ingredients travelled. They can find the locations on a map and draw a line to your community, recording the ingredient and distance on the line. You could provide student copies of a map, or the class could plot the travel on a large classroom map of the world.
 - Finally have students add up all the distances relevant to their recipe to find out how far their ingredients have travelled in total to get to them.
- e. Students work in groups to make the recipe. Then they can share the food.
- f. Discuss the differences in the distances that the ingredients travelled, and how food distance impacts the food we eat. Some discussion questions are:
- What surprised you about how far our food travels?
 - How does our imported food get to our stores?
 - How much of our food do you think is imported from other countries?
 - What effect does the importing of food have on the climate and the environment?
 - Why is imported food often cheaper than local food?
 - What would happen if there is a trade war, natural disaster or political instability in the country where the food comes from?
- g. Discuss the cooking in terms of the food security of the ingredients.

Activity 7.3

Traditional Foods and Food Security

Build on students' understanding of what traditional foods are and why they are significant. Students research local foods that First Peoples of the area have been harvesting and using for thousands of years.

It is best if this activity is specific to your location but if local resources are not available, you can focus on the broader region where you live. Connect with your school or district Aboriginal department, or local First Nations leaders to find out about local harvesting foods and techniques.

- a. Ask students to suggest or predict what traditional food resources are important for the First Nations of your region. Depending on your school location, there may be a spectrum of knowledge about local foods. Some students may be directly involved in food harvesting, while others may be very unfamiliar with what local resources are significant.
- Through consultation with your local First Nations support staff or local community, and through research, compile a list of local food resources.
 - If possible, display images of local food sources around the classroom. Have books available that describe local food sources, particularly books that deal with First Peoples foods.

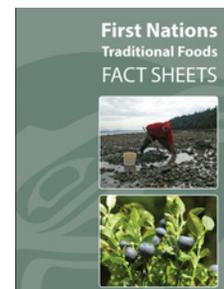


Foundations

For information about inviting guest speakers into the class, see *Involving Local First Peoples Communities*, page 17.

UNIT 7 • CONNECTING FOOD SECURITY AND CLIMATE CHANGE

- Students can refer to the First Nations Health Authority publication *Traditional Food Facts Sheets* for some of the important foods in BC. They will then need to determine which are found locally. Online at <https://bit.ly/2x5bCKc>.
 - Discuss what benefits there might be for eating traditional foods.
 - You may want students to refer to the article “Eating Healthy”: Traditional Foods Are Good Medicine For Both Body And Soul. First Nations Health Authority website. <https://bit.ly/2ExJIKk>
- c. Ask students to consider the four factors of food security in terms of traditional foods that First Peoples harvest from the land.
- Ask, how do these factors affect the ability of First Peoples to harvest food from their traditional territories?
 - Students can make notes on a new copy of Blackline Master 7-2, page 205, *Food Security*.
 - Sample responses:
 - Availability: There needs to be food to harvest. In some places that have not been harvested in years, the land is overgrown and plants are unproductive. Habitat loss can mean animals are not available to hunt. Some sources such as salmon have declined for a variety of reasons.
 - Access: People need to be able to get to the food. In some areas they may not be able to afford the technology to access the resources. People may be restricted from accessing private property that is on their traditional territories. Are there laws governing access to the resource?
 - Utilization: Are people able to process and store traditional foods using traditional or modern technologies? In some places the quality of the food resource may be affected by other sources such as pollution.
 - Stability: What outside forces could affect the supply of traditional foods from the land? For example, construction projects such as pipelines or dams; climate change; transportation such as tankers, ferries, trucks or railways.
 - You could select a common traditional food to apply as a model to the four factors of food security in a class discussion. For example, salmon is a significant fish for many First Peoples communities. Students can assess how secure salmon is as a food source now and in the future.
- d. Assessing local food security. Students can choose one traditional food source to determine how secure it is as a food supply for First Peoples in the future. They can use the four factors to guide their study. Have students research one or more traditional foods to find out about the current status as a food source, and how secure a food supply it is.
- For example, is the food readily available for the First Nations community to access? Can it be harvested sustainably? Is it impacted by factors such as climate change, habitat loss, or other industrial pressures?



- Have students identify relevant vocabulary in the local First Nations language.
- Students can find out further information about the resource, including these features:
 - What the resource is.
 - If there are any restrictions on harvesting by the Provincial or Federal government (like clams, salmon, and hunting.)
 - If there are any Indigenous protocols around harvesting the resources.
 - How to identify the resource
 - How to harvest the resource
 - Recipes or ideas of cooking.
- Some students may be interested in investigating traditional foods from a different part of the province.
- Have students create a presentation to present the information they have found. They can choose a format such as poster, tri-fold pamphlet, digital project or other format.

Activity 7.4

Evidence of Climate Change in the Local Region

Ask students to investigate the question “What can the Elders and other community members tell us about climate change in the local ecosystem?”

- a. Introduce or review the term Traditional Ecological Knowledge.
 - Give some examples, and ask students if they know of any examples from people in their community. (See Unit 1, Activity 1.1 and Unit 5, Activity 5.2 for more ideas.)
- b. Ask Elders and knowledge-keepers to share their observations about the local environment that may be caused by climate change.
 - You may want to have one or a small group of speakers come to the classroom, or meet at a community centre with the students.
 - Alternatively, you may want to have students work in groups to interview an Elder or other community member, and report back to the whole class.
 - Work with students to develop questions to ask the speakers or interviewees. For example, they could ask questions such as:
 - How have weather patterns changed?
 - Have growing seasons changed? (Earlier/Later)
 - Do the foods they harvest taste any different or have different textures?
 - Are plants growing better, worse or the same?
 - For additional ideas about interviewing about climate change, see the activity Strangers in a Strange Land on the Canadian Wildlife Federation website. Link at <https://tinyurl.com/fnesc38>.

 **Foundations**
For background to Traditional Ecological Knowledge, see Foundations, page 13

UNIT 7 • CONNECTING FOOD SECURITY AND CLIMATE CHANGE

- c. If you are unable to arrange speakers or interviews, you may want to use some published interviews with elders. Some suggested resources are:
- Forests and Oceans for the Future, Unit 7 (<https://bit.ly/2DGpg91>). Gitxaała Elders and knowledge-keepers are interviewed about their observations of the effects of climate change.
 - *River of Salmon Peoples* includes many useful discussions and memories about salmon and the Fraser River, and how the salmon resources have changed over time. Some examples are:
 - page 62, Nle'kepmxcin
 - pages 66-67, Dakelh and Tsilhqot'in
 - page 105, Nle'kepmxcin
- d. Students can look for current news items that report on noticeable impacts of climate change in the local region.
- e. As a class, construct a chart showing some of the evidence for climate change.

Activity 7.5

Carbon Transformations

Students view the carbon cycle from an Indigenous perspective, using the themes of interconnectedness and transformation. They will discover how the carbon cycle plays a role in the interconnectedness of all things through its many transformations, and how human activity in recent history has caused the balance in the carbon cycle to shift causing climate change.

Background: Carbon is one of the most important building blocks of life. It is an element that links nearly all biotic and abiotic substances on earth. Through the carbon cycle, it is continually being transformed. Carbon is one of the most essential components of our ecosystem, yet an excess of carbon in the wrong place can have catastrophic results.

- a. Carbon is everywhere. Ask students to identify objects in the classroom that do not contain carbon. You may want to discuss or explain that all organic materials and plastic materials contain carbon.
- Have students find evidence to prove that the objects they identified do not contain carbon.
- b. Ask students if they know how carbon is related to climate change. You can record their responses on chart paper to refer to later.
- c. To find out more about the carbon cycle and climate change, students can view the video *What's the Deal with Carbon*. Bell Museum 2010. 3.03 min. Online at <https://youtu.be/2Jp1D1dzxj8>.

d. Becoming a Carbon Atom

In this activity, students become carbon atoms and set off on a transformational journey to different stations that represent locations where carbon can be found.

- If possible, do this activities outdoors. Each station can be set up in different parts of the school grounds or a nearby park. Where possible, set up a station near a location that is connected to its topic. For example, the Soil station could be near a site that has exposed soil.
 - If it is not possible to use the outdoors, it can be conducted in the classroom or other indoor space.
- Introduce the activity with Blackline Master 7-3, page 206, *A Carbon Journey*. You could make copies for students, read the directions or paraphrase them.
- At each station place one regular die and one of the carbon transformation option cards found on Blackline Master 7-4, page 207, *Carbon Transformation Stations*. Students roll the die to determine what happens next on the carbon transformation journey.
 - Alternatively, if you don't have enough dice, you could prepare the options for each station on slips of paper that students draw at random from a container such as a bag or envelope.
- Time permitting, conduct the activity twice. First use the Pre-Industrial Option for Station 7, Coal, Oil and Gas. This represents the carbon cycle under traditional resource use. Later use the Post-Industrial Option for Station 7, which represents contemporary industrial uses of fossil fuels.
- Discuss with the students the transformations that their carbon atoms went through while on their journey.
 - Were there places where a large number of carbon atoms collected and were stored for a long time? (Introduce or discuss the term *carbon sinks*)
 - What locations did they remain in for only short periods of time?
 - If they conducted the activity with both options, discuss the differences between the two. (Traditional uses option carbon stays stored in oil, coal and gas for a long time whereas in contemporary times, carbon is stored in large quantities in the atmosphere.)
- Students can make a visual representation of their carbon atom's journey. They could make a chart to show who went were, what the most common location was or what their favorite place was. Encourage students to share details about what they imagined they felt or saw at each location.

e. Discuss the differences of how traditional land and resource use impacted the carbon cycle (and by extension climate change) in comparison to how modern/ industrial land and resource use (including extraction of fossil fuels for energy use) impacts the carbon cycle.



Consider conducting the Becoming a Carbon Atom activity outdoors.

Blackline Master 7-3, page 206, *A Carbon Journey*

Blackline Master 7-4, page 207, *Carbon Transformation Stations*

See an online simulation of this activity at <https://bit.ly/2DoJ7Kv>

UNIT 7 • CONNECTING FOOD SECURITY AND CLIMATE CHANGE

- f. Students can explore how one BC First Nation is helping to remove carbon from the atmosphere.
- See the CBC news article “In fight to combat climate change, Squamish Nation joins forces to capture carbon” by Angela Sterritt, CBC 2018. Linked at <https://tinyurl.com/fnesc71>.
 - Students can find out the technology that the Squamish Nation will use to capture carbon.
- g. Students can revise the Becoming a Carbon Atom activity to incorporate actions to capture carbon. This could include the technology used by the Squamish Nation, and the movement to plant a trillion trees. See the Carbon Sequestration activity in Unit 8, Activity 8.7-f.
- Students can create a new station, “Carbon Capture.”
- h. One Minute Essay. Have students work individually for one minute to write an answer to the question: What was the main point of the Carbon Journey Activity?



Formative Assessment Strategy

Use the One Minute Essay to assess students' understanding of the significance of the carbon cycle.

Activity 7.6 Albedo and Climate Change

In this activity students will learn about surface albedo and its effect on global temperatures. That understanding will then be applied to understanding how human activities are changing the amount of solar radiation being absorbed by the earth's surface.

- a. What is albedo? Review or introduce the concept of albedo.
- Ask students if they think it is more comfortable to wear light or dark clothing on a hot sunny day. Similarly, discuss the differences when walking barefoot on a sunny day on blacktop, a sandy beach, or on the grass. Ask students to suggest reasons for the differences.
 - Through the class discussion, you can assess students' level of understanding of radiant energy and how it is absorbed or reflected.
 - Discuss the term “albedo.”
- b. Have students work in groups to design a lab demonstration that will illustrate the effects of the sun's rays on different coloured surfaces.
- Groups could begin by having a general discussion about how they could design the lab demonstration. They can suggest what materials they could use to show the sun's effects on different surfaces.
 - If students require more structure you can provide them with the procedure for a simple way of conducting the demonstration:
 - Fold squares of black and white construction paper into pockets. Staple two sides leaving one end open.



Lab Activity



Formative Assessment Strategy

Assess the group's plans for their demonstration and provide support where needed.

UNIT 7 • CONNECTING FOOD SECURITY AND CLIMATE CHANGE

- Put the bulb end of each thermometer into a pocket
- Put the thermometers directly under the desk lamp so they both get the same amount of light
- Record the starting temperatures without the light, then record the temperatures every two minutes for a total of 10 to 20 minutes.
- You can have students find their own materials, or you can provide some basic materials for students to use. These could include:
 - 2 thermometers for each group
 - desk lamp with incandescent light bulb
 - black and white construction paper
 - scissors
 - stapler
- Have groups describe their lab demonstration. It should include a hypothesis or prediction of what their results will be, the materials used, a list of steps they will carry out, and a way of recording the data they collect.
- Have students analyse the data.
 - Calculate the temperature change for each colour
- Ask students to make a generalization about what their demonstration shows.
- For a different approach to this activity, see Looking Into Surface Albedo, UCAR Center for Science Education, linked at <https://tinyurl.com/fnesc39>. In this version, students put the thermometers under a colour photograph of a landscape that includes a glacier. This could be adapted to use colour images from the local region.



Land-Based Activity

Measuring Albedo

- c. Measuring the local albedo of different surfaces. Students go outside and determine the relative albedo of a number of different surfaces.
- Explain the purpose of the activity, to measure the albedo of 10 different area around the school (or other locations you plan to visit).
 - Before going outside, students can list ten different surfaces they expect to find. For example, open grass area, concrete, dirt, stone, metal object such as a car, wood, asphalt, gravel, in the shade of a tree.
 - Explain the procedure students should follow when they measure the albedos of different surfaces.
 - Set the thermometer about 5 cm about the surface. Students can design a stand that will hold it in place at a standard distance from the ground and without being affected by the body heat
 - Discuss why the thermometer is not placed directly on the surface. (Because you are measuring radiant heat energy)
 - Shade the thermometer from direct sunlight above. Discuss why this is important. (So it is the radiant heat that is warming the thermometer, not the direct sunlight.)
 - Wait two minutes then read and record the temperature.

g. Albedo and Climate Change

What types of surfaces are located in the local area (black asphalt, green forest canopy, blue lake water/ocean water, white snow cover, etc.)

- Discuss what human activities are affecting these surfaces. If so what affect would that have on temperature?

Activity 7.7

Ecosystem Inquiry

Students can study one type of ecosystem to see the relationships between food security and climate change that are specific to that ecosystem. Have students select an ecosystem that interests them, and develop an inquiry question. Some examples include:

- a. Climate Change and Food Security in Freshwater Ecosystems
 - Students focus on how changes in water systems affects food security, including factors such as:
 - flooding
 - water temperature
 - Refer to the activities in Unit 3, Relationships to Fresh Water.
- b. Climate Change and Food Security in Marine Ecosystems
 - Students focus on how changes in the marine ecosystems affect food security, such as:
 - changing seasons
 - acidification
 - water temperature
 - big tides and storms
 - Refer to Unit 8, Ocean Connections in Science First Peoples 5-9 (FNESC). See Activity 5, Ocean Case Study: Ocean Acidification and Hypoxia, page 184.
 - See *Exploring the Great Bear Sea, Environmental Science 11, 12*; Case Study 3: Pacific Herring. This case study examines changes in the spawning behaviour of the herring, observed by the Kitasoo/Xai'xais First Nations. <https://greatbearsea.net/environmental-science/>
- c. Climate Change and Food Security in Forest Ecosystems
 - Students focus on how changes in forest ecosystems can impact food security of traditional foods.
 - See Unit 8, Forests and First Peoples, Activities 8.7, Carbon Sequestration in Trees, and 8.8, Tracking Historical Forest Fires.

Activity 7.8

Caribou and Climate Change

Students will investigate how the impacts of climate change on caribou affects food security for First Peoples who rely on it.

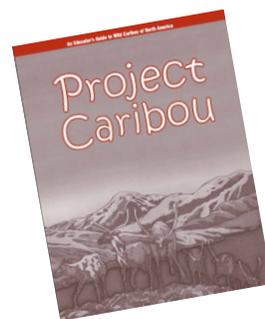
Background: This activity explores the impacts of climate change as it relates to caribou. The caribou is a culturally important species to First Peoples who have access to it, both as a food source and a provision for a variety of uses. All parts of the caribou are used, including meat, marrow, sinew, hide, antlers, tallow, fat and blood.

Climate change is disrupting caribou migration routes. For example, longer and warmer summers result in an increase in parasitic flies which torment caribou. Depending on the location, changes in vegetation growth could impact the diet of moss and lichen availability.

- a. Have students research the various species of caribou in British Columbia and other parts of Canada. Ask them to find out which of these species are threatened or endangered.
 - Students will be able to readily find general information about caribou in books or online.
 - One good resource to start with is the BC government brochure Caribou in British Columbia. Access at <https://bit.ly/2DiMHWT>.
 - As well, the BC Government web page about caribou gives a summary of the different BC types, including maps of their habitat. <https://bit.ly/2BVB1rt>
 - *Project Caribou. An Educator's Guide to Wild Caribou of North America* (2001) provides detailed information about caribou. Linked at <https://tinyurl.com/fnesc37>.
 - Have students work in groups to research ecological information about the types of caribou in BC. It will also be of interest to include the Barren-Ground caribou of the Arctic, as they are the caribou that are most commonly portrayed, especially their large populations and striking migrations. Note that the way scientists classify caribou types has changed, so students may find sources with different groupings. The types of caribou to research are:
 - Boreal Caribou
 - Central Mountain Caribou (formerly included in the “northern caribou”
 - Northern Mountain Caribou (formerly part of the “northern caribou”
 - Southern Mountain Caribou (formerly the “mountain caribou”
 - Barren-Ground Caribou (not found in BC)

UNIT 7 • CONNECTING FOOD SECURITY AND CLIMATE CHANGE

- Students can use Blackline Master 7-5, page 209, Caribou Data File to record their data, or create their own graphic organizer or way of recording the information.
 - After they have collected their data, students could work in a Jigsaw activity to share their information with the other students. Students can then compare the different types and summarize their similarities and differences.
- b. Discuss or have students research some ways that caribou interact with their environments. Ask questions such as:
- What type of diet or migratory pattern do caribou use?
 - Why would the migration patterns be an issue for caribou survival?
 - Why would the flies be an issue for caribou?
 - Is an increase in vegetation due to the longer and warmer summer months an issue for caribou?
- c. Caribou Activities. The online guide *Project Caribou. An Educator's Guide to Wild Caribou of North America* (2001) has a number of engaging activities that students can participate in. Link at <https://tinyurl.com/fnesc37>. They include:
- Barren-ground caribou migration (pages 33-37). Students participate in an active game that demonstrates how hunting and predation affect caribou populations.
 - “Ya gotta lichen caribou” (pages 101-103). This is physically active simulation in which students act as herds of caribou competing for water, food and space in an environment that changes as the game proceeds. The activity can take place in a gym or outdoors.
- d. Have students research to find out how caribou are significant to many First Peoples cultures. Ask them to find out how caribou are traditionally used.
- e. Students can use iMapBC to determine caribou distribution across British Columbia. For full instructions on how to use iMapBC, see Blackline Master 8-2, page 226, Mapping Historical Fires in Unit 8. Here are the basic steps for locating the caribou distribution data:
- With the iMapBC page open, click on the “I want to...” button at the top of the map.
 - Select Add Provincial Layers
 - Select Fish Wildlife and Plant Species
 - Select Caribou distribution
 - Select both Outlined and Colour Themed options.
 - Students may need to zoom in on the map to see the names of the various caribou herds.
 - Have students find out which species are distinct to a First Nations group. Determine locations of First Nations communities and reserve lands within the designated caribou regions of BC.



UNIT 7 • CONNECTING FOOD SECURITY AND CLIMATE CHANGE

- e. Have students find out how climate change impacts the caribou.
- Some impacts are:
 - uncertainty - long-term effects unknown
 - weather variability, severe weather events
 - severe wildfires
 - more freeze-thaw cycles
 - more freezing rain, deep snow hot summer temperatures
 - changes in forest composition
 - food supply
 - shift in timing and length of seasons
 - earlier spring thaws and later freeze-ups
 - changes in habitat
 - Climate change favours deer and prey species, which expand into caribou ranges; more deer means more predators; more predators means more caribou killed.
 - habitat change for caribou, such as if the boreal forest shifts northward
 - spreading northward of forest insects which kills trees - mountain pine beetle.
- f. Students can investigate how First Peoples and wildlife scientists are collaborating on the management of caribou and their habitat.
- See for example the article “Governments of Canada and British Columbia to collaborate with First Nations on recovery of Southern Mountain Caribou” 2018, <https://tinyurl.com/fnesc68>.

Activity 7.10

First Nations Communities Adapt to Climate Change

Students can investigate how First Peoples are adapting to climate change by combining traditional knowledge and modern technology. This can include food security and other concerns.

- a. Students can work in groups to investigate measures that a number of BC First Nations are undertaking to combat and adapt to climate change. First they will need to identify some First Nations who are actively working to adapt to climate change. Here are some examples:
- Kanaka Bar. The T’eqt’aqn’mux people of the Kanaka Bar Indian Band on the Fraser Canyon, part of the Nlaka’pamux Nation.
 - The Kanaka Bar Band has a page on their website devoted to their climate change strategy: <http://www.kanakabarband.ca/climate-change>. Students should make sure they explore the links on the right sidebar.

UNIT 7 • CONNECTING FOOD SECURITY AND CLIMATE CHANGE

- See the online article, Kanaka Bar four steps ahead of climate change (National Observer 2018) Linked at <https://tinyurl.com/fnesc69>.
 - T'Sou-ke First Nation
 - Video: T'Sou-ke Food Security. Channeldown2earth, 2010. 6:04 m. <https://youtu.be/f5I4Ooqd7Nw>.
 - Article: “How First Nations in Canada are addressing climate change – “This is power to the people – literally and metaphorically.” by Rod Janssen. Energy in Demand (energyindemand.com), 2018. <https://tinyurl.com/fnesc70>.
 - Kitsumkalum: See resources under Activity 7.1-e.
 - Squamish: See the article about the Squamish Nation and carbon capture in Activity 7.5-f.
- b. Students can examine the resources to find out what actions are being taken by First Nations communities to combat and adapt to climate change
- Students can create a chart of different types of actions taken by First Nations. They could identify which work towards food security and which deal with other factors.
- c. Students can suggest other ways that First Nations can adapt to climate change to mitigate the effects on food security. Suggest students look back at the four aspects of food security on Blackline Master 7-2, page 205.
- For example:
 - reviving traditional knowledge
 - renewing traditional harvest sites
 - growing local foods in community gardens
 - sharing, trading foods

Activity 7.11

Companion Planting: An Indigenous Model

In this activity students examine a traditional method of agriculture used for thousands of years by First Nations in eastern North America, known as the Three Sisters. Then they see a contemporary version of companion planting called a Food Forest.

- a. The Three Sisters. The Three Sisters refers to the traditional companion planting of three vegetable: corn, squash and beans. This practice was developed by Indigenous farmers in eastern North America long before contact. It is an excellent example of Indigenous scientific knowledge, and could be a model for people to use to adapt to climate change.
- Have students read the story of the Three Sisters. There are several versions of the story told by different Indigenous groups of eastern Canada and the USA.

UNIT 7 • CONNECTING FOOD SECURITY AND CLIMATE CHANGE

- The Three Sisters: The Haudenosaunee's Three Sisters.
<http://www.oneidaindiannation.com/the-legend-of-the-three-sisters/>
 - The Iroquois Legend of the Three Sisters. (in a diabetes program newsletter.)
<https://bit.ly/2D9GMDC>
 - The Three Sisters. This curriculum package includes three short versions of the narrative. See pages 2 and 3. <https://bit.ly/2CwEA70>
- b. Have students discuss the Indigenous knowledge inherent in the planting of beans, corn and squash. For example, Indigenous people understood that the leaves of the squash helped control the moisture of the soil.
- Have students explain how the three plants work together with each other. Ask, What does each plant give and receive? If students need to, they can research further to find out the important relationships between the three plants.
 - They can draw a diagram that illustrates the relationships of the three plants.
 - The main relationships include:
 - Corn stalks support bean vines
 - Beans provide nutrients (nitrogen) for the corn
 - Squash leaves provide cover which helps retain moisture and prevents weed growth between the mounds.
- c. If you haven't discussed it so far, tell students that this farming technique is called companion planting. Discuss why it is called that.
- Explain that companion planting is an old way of making the most out of a small area to plant, while also providing a balance of nutrients for plant growth and pest control. Crop rotations and cover crops improve these issues by managing the system to benefit the soil and crop. Mixed planting, or inter-cropping, of one or more plant species can help provide this kind of diversity.
- d. Additional videos that students could watch are:
- Appreciating the Three Sisters. 7:25 min. Produced 1995. (uploaded 2016). Youtube https://www.youtube.com/watch?v=pb8ANVAhj_8
 - Bertha Sky, 3 Sisters Soup. Factory Media Centre, 2017. 3.28 min. <https://youtu.be/bgineteFOOg>.
 - Three Sisters Garden. 3.27 min. (made for young children.) <https://youtu.be/SQ4dgTwTpvk>.
- e. Students can investigate a recently developed system of ecologically-based agriculture which involves companion planting. Permaculture, a word coined in 1978, is a holistic approach to food production which aligns with many Indigenous practises and concepts. Permaculture is built on three main ideas: care for the earth, care for the people, and fair share.
- One of the main features of permaculture is a system of planting called a food forest. It is designed to model the biodiversity of a natural forest using many plants that produce food.

UNIT 7 • CONNECTING FOOD SECURITY AND CLIMATE CHANGE

- Introduce the concepts of permaculture and food forests. You could use direct instruction, or have students research to come to an understanding of what they mean. There are many resources about both permaculture and food forests online. Here are some suggestions to start with.
 - “What is Permaculture?” Permaculture Research Institute website. <https://permaculturenews.org/what-is-permaculture/>
 - *A Forest Garden With 500 Edible Plants Could Lead to a Sustainable Future*. National Geographic, 2019. 3.23 min. This UK-based video gives a quick overview of food forests and their attributes and purposes. It shows a large woodlands food forest. https://youtu.be/Q_m_0UPOzuI.
 - *Urban Food Forest Tour (Canada’s Oldest): Spring Ridge Commons*. Edible Landscapes Design, 2017. An urban food forest example in Victoria, BC, which is a contrast to the large forest shown in the above video. <https://youtu.be/CLJlsR7U8uc>.
- Students can create a list of some of the important attributes of a food forest. (For example, they are sustainable, they use companion planting, they encourage biodiversity, pests are controlled naturally, they are highly productive, they are designed using natural layers found in forests.)
- Have students identify the seven layers of a forest that food forests are built on. They can draw a diagram to show the layers.
 - The layers are canopy or tall-tree layer, low tree layer, shrub layer, herbaceous layer, root layer, ground cover layer, vertical or vine layer.
 - Here are two online diagrams that can be used as references: <https://tinyurl.com/fnesc87>; <https://tinyurl.com/fnesc88>.
- f. Discuss how food forests could be used to improve food security in response to the effects of climate change, particularly in Indigenous communities.
 - This webpage describes how the Muskeg Lake Cree Nation in Saskatchewan uses food forests to help ensure food security for their people. “What’s a food forest?” at the Canadian Feed the Children website, linked at <https://tinyurl.com/fnesc85>.
- g. Students can design and create a food forest plan that could work in their area.
 - You may want to share a project involving BC secondary school students as partners in a First Nations forest garden. See “Coquitlam school partnership to create First Nations forest garden,” Diane Strandberg, Tricity News, 2017. <https://tinyurl.com/fnesc89>
 - Students’ food forest designs could include traditional plants as well as new ones that could now live in the area.
 - Students could draw and label a diagram of their food forest, or create a 3-D model of it.

Activity 7.13

Developing a Proposal to Address Local Climate Changes Issues.

In this activity, students will develop a proposal that could be submitted as part of the First Nations Adapt program put forth by the federal government to address local issues around climate change. First Nations communities have the opportunity to propose projects designed to mitigate the effects of climate change on such things as food security, road access, flooding and coastal erosion.

- a. Reflecting on the in-class discussions, guest speakers and other resources presented throughout this unit, brainstorm local climate change issues that affect the community either in terms of infrastructure (roads, housing, etc.), economy (tourism, resource management, etc.), culturally, access to traditional food sources or in any other way.
- b. Guide the class through the First Nations Adapt Program website, <https://bit.ly/2DD2q1q>. Cross reference the list of issues brainstormed during class against the “Program Areas: prioritized program areas”
 - Do any local issues match the program priorities? Choose one that does match or is as close as possible to a match. There are also a list of project examples on the web site to get an idea of what to focus on.
- c. As a class, focus the issue into a specific problem that affects the community in terms of the matter chosen by the class. Some examples might include:
 - Access to the community is reduced during the spring months due to increased flood levels. The number of days during the year where the road is flooded has been steadily increasing over the last ____ years.
 - Fish and game numbers in the area have steadily declined over the last ____ years and our community depends on these resources for cultural and nutritional reasons.
 - The website also contains examples of projects and a list of prioritized areas.
- d. Divide the class into discussion groups with the simple task of answering the question “What solutions can you think of for this issue?”
 - There should be no restrictions on the resources student minds can use in solving this problem. The understanding is, at this point, the funding will be in place. The solutions can include unlimited human resources, machinery or technology. Creativity is the key during this stage.
 - Each group will create a class presentation around their solution and present to the class. The class will have to choose one of the presented solutions to move forward with so it is important for the audience to consider each presentation carefully.

UNIT 7 • CONNECTING FOOD SECURITY AND CLIMATE CHANGE

- e. Each student will rank the solutions in terms of practicality, cost, length of time required, effectiveness at solving the issue,
- Teacher will compile the results. The solution that is most consistently ranked highest by students will be chosen as the class solution.
- f. Research: Once the class solution is decided upon, the class will be divided into groups tasked with researching various aspects of the proposal. These groups will be given tasks to complete sections of the proposal outlined by the website.

Other group topics could include:

- History of the issue: what data does the community have around the history of the issue? How has life in the community been affected by this issue?
 - Future prospects: If left unchecked, how will this issue impact the community in 10 years? 20 years?
 - Cost: As best as can be done, estimate the cost of the implementing this solution. How many people will this require? How many hours of work? What equipment or technology is required?
 - Procedure: What steps are required to implement this solution? Break down the process in a detailed, step by step description of events.
- h. Real-life action. For schools in a First Nations community, this activity could become more than a class project. Depending on your local situation, students and the school could work together with the local First Nations government to submit a proposal to the program.
- The First Nations Adapt program emphasizes community support for projects as part of the approval process. Projects with the most support from communities will be more likely to be approved. Once they have decided on their proposal, the class will need to present their solution to Chief and Council. Any feedback from Chief and Council would be incorporated into the proposal.
 - Proposal ideas can be talked through by staff in the FNA program. Email questions to aadnc.adaptation.aandc@canada.ca
 - Once the proposal is complete and has been supported in some way by the community, students can submit the proposal.

Food and Climate Change Discussion Questions

Food and Climate Change

Discussion question 1

Do you think climate change has an impact on the food you eat now? If so, in what ways?

Food and Climate Change

Discussion question 2

How do you think climate change will affect the availability of our food in the future? How might it impact the types of foods we eat and the sources of our food?

Food and Climate Change

Discussion question 3

How could climate change impact the foods that First Peoples and others who harvest some or all of their food from the land around them?

Food and Climate Change

Discussion question 4

How do you think climate change will affect the quality of our food in the future? Will it affect the nutritional value of our food?

Food Security

Food security is the condition in which all people, at all times, have physical, social and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.

(United Nations' Committee on World Food Security)

<p style="text-align: center;">AVAILABILITY</p> <p>Is there enough food available? Is there a sufficient supply for the future?</p>	<p style="text-align: center;">ACCESS</p> <p>Can people access the food? Can they get to it, or afford to buy it?</p>
<p style="text-align: center;">UTILIZATION</p> <p>Can people make good use of the food? Is it good quality and nutritious?</p>	<p style="text-align: center;">STABILITY</p> <p>How susceptible to local and global forces is the food supply?</p>

Blackline Master 7-3

A Carbon Journey



Carbon is on the move!

All organic matter contains carbon. Those berries you ate for lunch? They were full of carbon gathered from the atmosphere transformed through the process of photosynthesis. You are full of carbon.

Every time you eat, you ingest carbon and when you exhale you release carbon in the form of carbon dioxide created through cellular respiration. When a living organism dies the carbon goes into the soil or back into the atmosphere. Sometimes, if carbon is trapped under ground for a very, very, very long time, it can become oil, coal or natural gas.

Becoming a Carbon Atom

In this activity, you will take the role of a carbon atom and set off on a journey to different stations. The stations represent different locations where carbon can be found and stored.

At each station a random roll of dice will determine what happens next. Will you gain powers of invisibility as you are absorbed into the atmosphere? Will you be trapped for millions of years as oil or coal deep beneath the earth's surface or will you be swallowed by an animal only to be expelled a short while later?

Record your transformation in a Travel log. As you reach your destinations, take a minute to imagine what you would see while there and how you feel, then record what you see and feel in your travel log. Roll the dice and follow the directions on the sheet to move to the next location.

Station 1 ATMOSPHERE

1. You follow wind currents to the other side of the world. Stay in Atmosphere
2. You stay in the air. Stay in Atmosphere
3. You are taken in by a Devil's Club through photosynthesis. Go to Plants
4. You are dissolved in the Ocean. Go to Ocean
5. You are breathed in by a moose. Go to Animal
6. You remain in the air. Stay in Atmosphere

Station 2 HUMANS

1. The human respire and breathes you out as CO₂. Go to Atmosphere.
2. Through digestion the human eliminates you into its waste water system. Go to Ocean.
3. The human sneezes and you are expelled into the air. Go to Atmosphere.
4. You are absorbed into the human's bone. Stay in Humans.
5. You are eliminated and processed in a waste treatment plant. Go to Soil.
6. You are consumed by a bacteria in the human's gut. Stay in Humans.

Station 3 SOIL

1. You stay in the soil as dead plant matter.
2. You stay in the soil as dead animal matter.
3. You are burned for fuel and released into the atmosphere. Go to Atmosphere.
4. You remain buried deep in the earth for millions of years, eventually becoming Coal Oil or Gas. Go to Coal, Oil and Gas.
5. You are taken up through a plant's roots. Go to Plants.
6. You erode into a river and eventually end up in the Ocean. Go to Ocean.

Station 4 PLANTS

1. You become part of the plant's structure. Stay in Plant.
2. You are burned for fuel and released into the atmosphere. Go to Atmosphere.
3. The plant you are part of is eaten by an animal. Go to Animal.
4. The plant you are part of dies and falls to the ground. Go to Soil.
5. You are eaten in a salad for lunch. Go to Humans.
6. You die and are compressed over millions of years. Go to Oil and Gas.

Station 5 OCEAN

- 1 You are carried by the ocean currents. Stay in Ocean
2. You are absorbed by plankton in the process of photosynthesis. You are eaten by a fish. Go to Animals.
3. You follow currents through the ocean, stay in Ocean.
4. You are released into the atmosphere. Go to Atmosphere.
5. You are absorbed by phytoplankton in the process of photosynthesis. You are eaten by clam, which is then eaten by a human. Go to Humans
6. You are absorbed by a salmon who is caught by a bear when it is spawning. The bear drops the carcass in the forest by some trees. Go to Plants.

Station 6 ANIMAL

1. You become part of the animal's body. Stay in Animal.
2. You are released as waste through respiration when the animal breathes out. Go to Atmosphere.
3. The animal you are part of is eaten by another animal. Stay in Animal.
4. The animal you are part of dies and falls to the ground. Go to Soil.
5. The animal you are part of dies and decomposes, you are released into the atmosphere by the microbes decomposing the animal. Go to Atmosphere.
6. The animal you are part of is dinner for a Human. Go to Human.

Station 7 COAL, OIL, AND GAS - Pre-Industrial

1. You remain buried deep in the earth for millions of years. Stay in Coal, Oil and Gas.
2. You remain buried deep in the earth for millions of years. Stay in Coal, Oil and Gas.
3. You remain buried deep in the earth for millions of years. Stay in Coal, Oil and Gas.
4. You remain buried deep in the earth for millions of years. Stay in Coal, Oil and Gas.
5. You remain buried deep in the earth for millions of years. Stay in Coal, Oil and Gas
6. You are burned for fuel and released into the atmosphere. Go to Atmosphere.

Station 7 COAL, OIL, AND GAS - Post-Industrial

- 1 You remain buried deep in the earth for millions of years. Stay in Coal, Oil and Gas.
- 2 You remain buried deep in the earth for millions of years. Stay in Coal, Oil and Gas.
3. You are burned for fuel and released into the atmosphere. Go to Atmosphere.
4. You are burned for fuel and released into the atmosphere. Go to Atmosphere.
5. You are burned for fuel and released into the atmosphere. Go to Atmosphere.
6. You are in an oil spill and leak into the ocean. Go to Ocean.

Blackline Master 7-5
Caribou Data File

Caribou Types	Location	Ecological Relationships	Principal Foods	Population
Boreal Caribou				
Central Mountain Caribou				
Northern Mountain Caribou				
Southern Mountain Caribou				
Barren-ground Caribou				

