

Activity 4: Impacts of Climate Change on Food Production in Canada

Summary

Although we tend to think of biodiversity in terms of natural settings such as forests and oceans, species variety and the ecosystems in which they interact play a key role in human food production. In small teams, students brainstorm and discuss climate change impacts on food production in Canada.

Duration: One 60-minute session (two sessions if students make sketches to illustrate their ideas)

Learning outcomes

After participating in the activity, students will be able to:

- Analyze the impacts of climate change on food production in relation to
 - crop production
 - pollinators
 - animal production
 - food processing
 - fish stocks
 - pests, diseases and invasive species
 - northern communities
 - trade, and
- Suggest adaptation measures to deal with the effects of climate change

Competency outcomes

During this activity, students will develop or improve these abilities:

- Collaboration
- Analysis
- Problem-solving
- Critical thinking

Set-up and materials

- Print a set of “*Impacts of Climate Change on Food Production in Canada*” cards, with the reflection questions on one side (p. 32 and 34) and the graphic on the other (p. 33 and 35)
- Copies of the **Climate Change and the Environment** infographic (one per student)
- Copies of the **Climate Change and the Economy** infographic (one per student)
- Copies of the **Student BLM Possible Impacts of Climate Change on Food Production in Canada**
- Set of cards entitled “*Impacts of Climate Change on Food Production in Canada*” (one card per group of three to four students), printed on both sides
- Large sheets of paper for display on flip chart, plus markers (enough for each team of three to four students)
- Copies of the **Teacher BLM: A Summary of Possible Impacts of Climate Change on Food Production in Canada—Key**

What to do

1. Review impacts caused by climate change using the “infographics entitled Climate **Change and the Environment** and **Climate Change and the Economy**.”

Tip: Don’t forget, in Canada, climate change has different impacts depending on location (e.g., more precipitation in British Columbia and less precipitation on the Prairies).

2. Use one sheet of paper per issue. Write the title of the issue followed by two columns with the heading “**Opportunities**” above one and “**Negative impacts**” above the other.
3. Give out one card per team and ask students to write ideas related to their particular issue on the sheet.

Alternative instructions tips:

- Give out cards according to team strengths
- Give students the option of expressing themselves through drawing
- Allow students to perform their results from the perspective of an animal or plant (e.g., from a bee’s perspective)

4. Invite students to share their ideas.
5. Synthesize the main points in the student BLM **Possible Impacts of Climate Change on Food Production in Canada**.
6. With the students, suggest measures that might be put in place to adapt to the repercussions of climate change (e.g., find ways of reducing water consumption or genetically engineer insect-/disease-resistant plants, etc.).

Extension

On the blackboard, draw a diagram representing how different issues are connected, in order to demonstrate their interdependency.

Move on to the vertical vegetable garden activity, which represents a practical adaptation to food production challenges, whether they are small-scale (at home) or large-scale (in industry). Ask students this key question: To which issue (of those discussed) could the vertical vegetable garden be a solution?

Tip: For more information on these repercussions and on the adaptation measures that Canada has already started to take, see *Food production* (chapter 4) in *Canada in a Changing Climate: Sector Perspectives on Impacts and Adaptation* (2014), on the Natural Resources Canada website at <http://www.nrcan.gc.ca/environment/impacts-adaptation10761>

1

Crop production

Use the *Climate Change and the Economy* and *Climate Change and the Environment* infographics to brainstorm about how climate change affects crop production.

Are there any positive impacts? Negative impacts?

Further questions

How will rising temperatures affect crop production (amount, quality)?

How will changes in water supply affect crop production?

How are crop locations affected?

2

Pollinators

Use the *Climate Change and the Economy* and *Climate Change and the Environment* infographic to brainstorm about how climate change affects pollinators.

Are there any positive impacts? Negative impacts?

Further questions

Which factors affect pollinators' activities and survival?

3

Animal production

Use the *Climate Change and the Economy* and *Climate Change and the Environment* infographic to brainstorm about how climate change affects animal production.

Are there any positive impacts? Negative impacts?

Further questions

Which factors affect animal production?

What do animals need?

4

Food processing (storage, transportation)

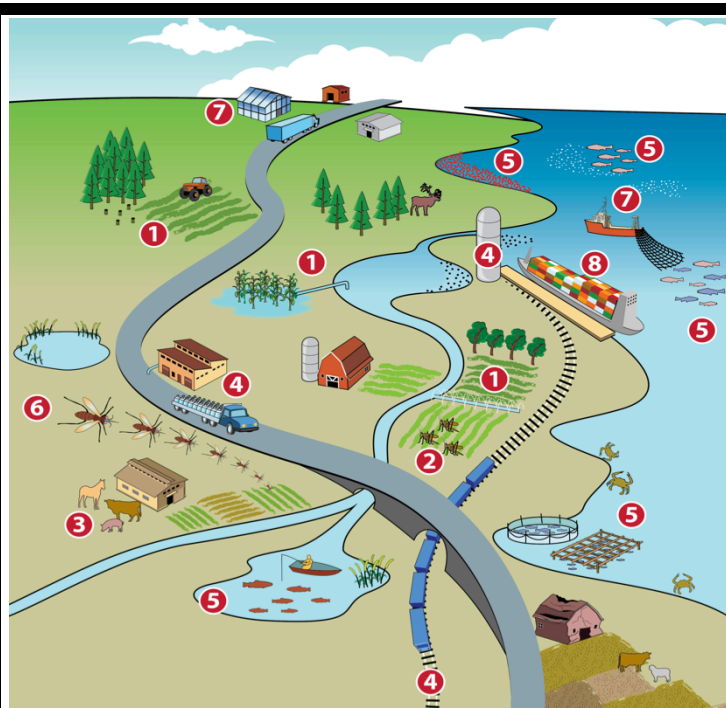
Use the *Climate Change and the Economy* and *Climate Change and the Environment* infographic to brainstorm about how climate change affects food processing.

Are there any positive impacts? Negative impacts?

Further questions

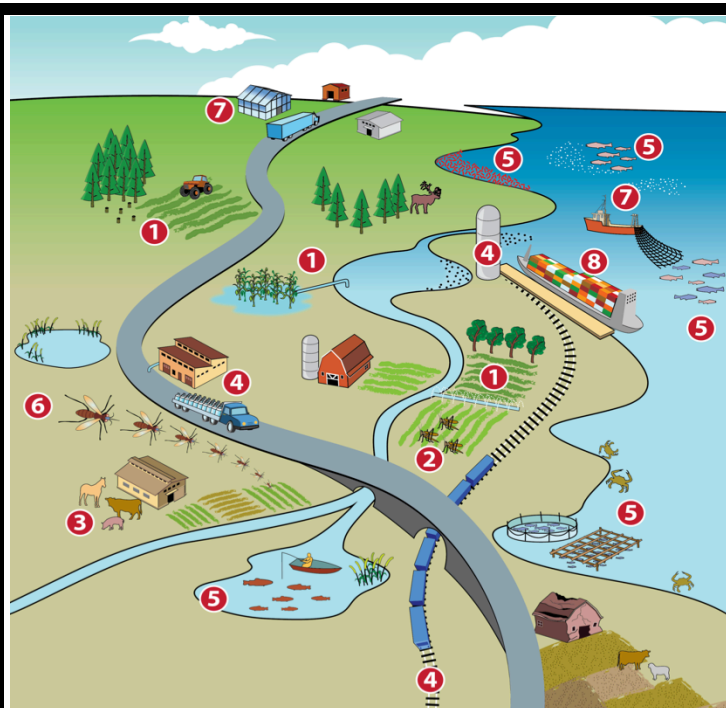
How will rising temperatures affect food storage?

How will transport disruptions (floods, violent storms) affect food transport?



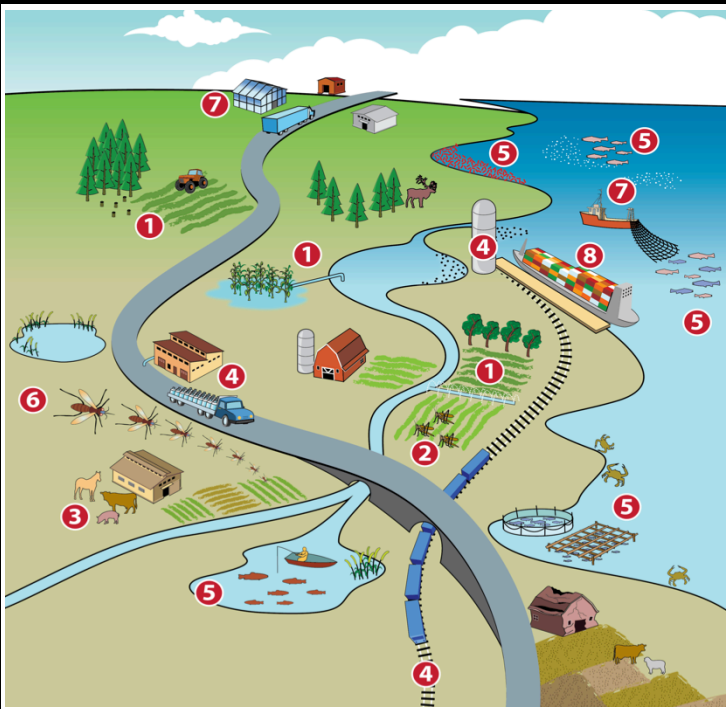
Potential impacts of climate change on food production in Canada

- 1. Crop production
- 2. Pollinators
- 3. Animal production
- 4. Food processing
- 5. Fish stocks
- 6. Pests, diseases, and invasive species
- 7. Northern communities
- 8. Trade



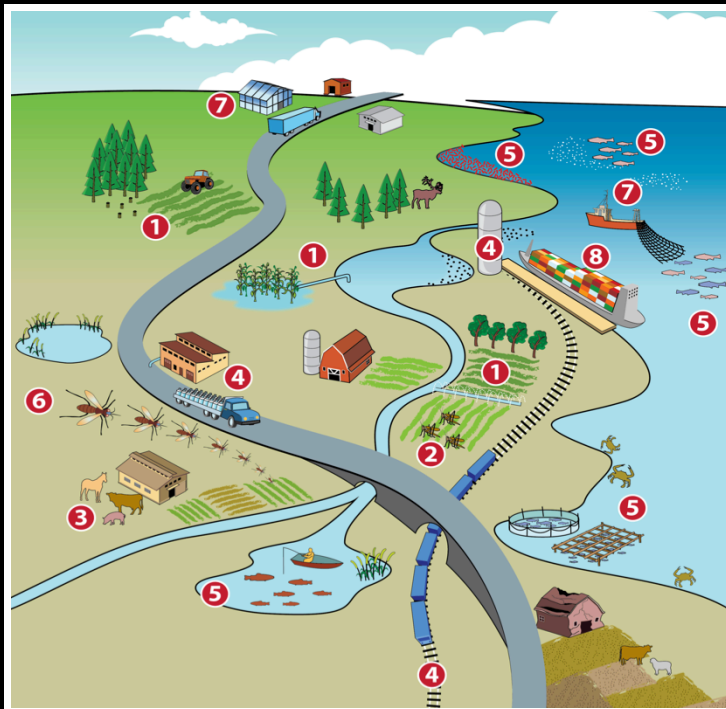
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5

Fish stocks

Use the *Climate Change and the Economy* and *Climate Change and the Environment* infographic to brainstorm about how climate change affects fish stocks.

Are there any positive impacts? Negative impacts?

Further questions

Which factors affect fish stocks?

What are the effects on fishing?

6

Pests, diseases, and invasive species

Use the *Climate Change and the Economy* and *Climate Change and the Environment* infographic to brainstorm about how climate change affects pests, diseases, and invasive species.

Are there any positive impacts? Negative impacts?

Further questions

How will pests, diseases, and invasive species be affected?

What will the impact be?

7

Northern communities

Use the *Climate Change and the Economy* and *Climate Change and the Environment* infographic to brainstorm about how climate change affects northern communities.

Are there any positive impacts? Negative impacts?

Further questions

What is the impact on agricultural production in the Great North?

What is the impact on food grown in nature?

What is the impact of the reduction of sea ice on transportation?

8

Trade

Use the *Climate Change and the Economy* and *Climate Change and the Environment* infographic to brainstorm about how climate change affects trade.

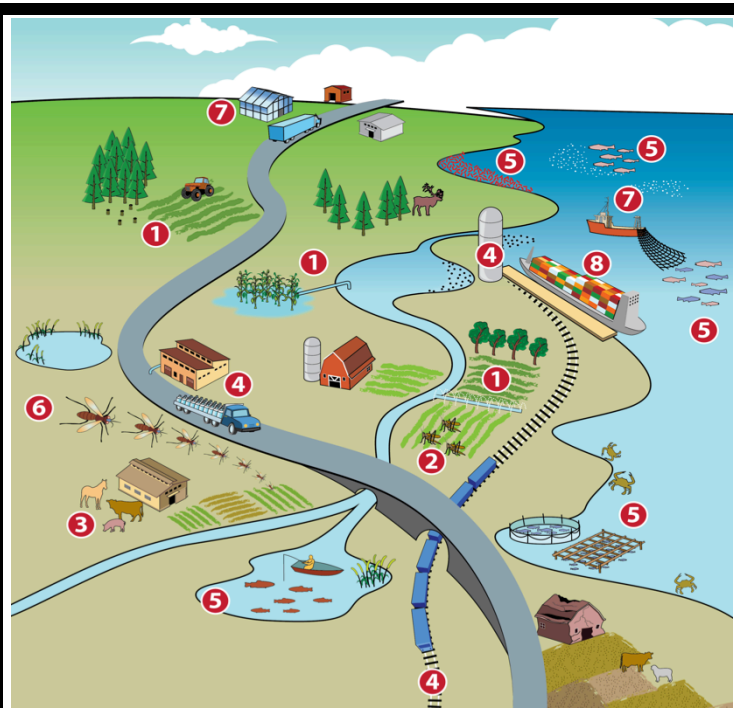
Are there any positive impacts? Negative impacts?

Further questions

What are the impacts on worldwide geographic distribution?

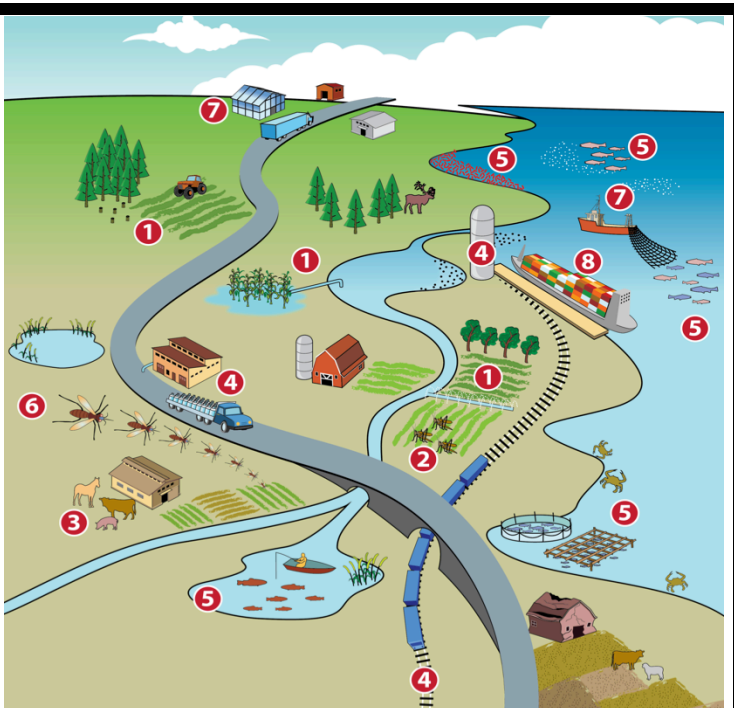
What are the impacts on transportation routes in northern Canada?

How are food prices affected?



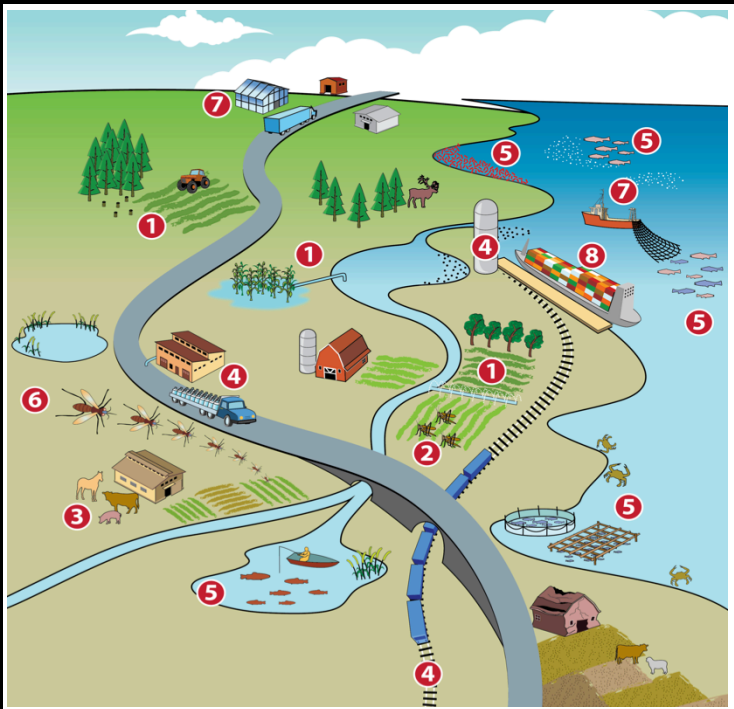
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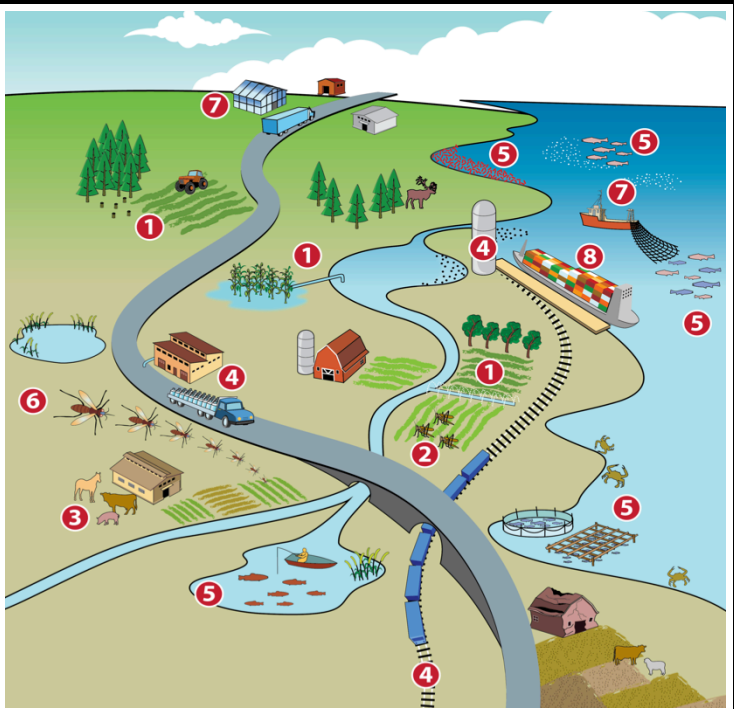
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Name: _____

Date: _____

Activity 4—Student BLM: Possible Impacts of Climate Change on Food Production in Canada

Issue	Opportunities	Negative Impacts
1. Crop production		
2. Pollinators		
3. Animal production		
4. Food processing (storage, transportation)		

5. Fish stocks		
6. Pests, diseases, and invasive species		
7. Northern communities		
8. Trade		

Activity 4—Teacher BLM: A Summary of Possible Impacts of Climate Change on Food Production in Canada—Key

Issue	Possible positive impacts	Possible negative impacts
<p>1) Crop production</p> <p>How will rising temperatures affect crop production (amount, quality)?</p> <p>How will changes in water supply affect crop production?</p> <p>How will these factors affect crop location?</p>	<ul style="list-style-type: none"> • Production of new crops • Increase in local food production thanks to adaptation measures (e.g., greenhouses, <i>large-scale production of crops and cold-resistant fodder</i>) 	<ul style="list-style-type: none"> • Soil toxins due to drought or floods • Decrease in nutritional value of plants • Increase in pesticide use • Increase in drainage needs • Increase in waterways contaminants due to heavy precipitation • Increase in irrigation needs
<p>2) Pollinators</p> <p>How will climate change affect pollinators' activities and survival?</p>	<ul style="list-style-type: none"> • Benefits of shorter and milder winters 	<ul style="list-style-type: none"> • Increase in pest and disease activity • Changes in food source • Changes in the start of flowering seasons
<p>3) Animal production</p> <p>How will climate change affect animal production?</p>	<ul style="list-style-type: none"> • Diversification of cattle (different species) • Better resistance to diseases and pests • Increase in pasture production (higher temperatures and CO₂ levels) in certain regions 	<ul style="list-style-type: none"> • Changes in crop production (soil toxins due to drought or floods, decrease in nutritional value of plants, increase in pesticide use) • Requirement for heating and cooling • Decrease in pasture production (temperature too high) in certain areas
<p>4) Food processing (storage, transportation)</p> <p>How will rising temperatures affect food storage?</p> <p>How will transport disruptions (floods, extreme storms) affect food transportation?</p>		<ul style="list-style-type: none"> • Challenges in food processing due to reduced or inconsistent water supply • Changes in storing food for cattle due to increasing temperatures • Increase in storage capacity (in certain places) to adapt to longer and more frequent transport disruptions

Issue	Possible positive impacts	Possible negative impacts
<p>5) Fish stocks How will climate change affect fish stocks? How will it affect fishing?</p>	<ul style="list-style-type: none"> Ability to access fish species that are found in warmer waters 	<ul style="list-style-type: none"> Challenges related to changes related to water temperature and chemistry, food supply, algae proliferation, water flow, and oceanic currents Changes to ecosystems of lakes and oceans (which may affect all types of fishing)
<p>6) Pests, diseases, and invasive species How will climate change affect pests, diseases, and invasive species?</p>		<ul style="list-style-type: none"> Changes in pests, diseases, and invasive species (more aggressive and diverse) since milder winters reduce their mortality and certain species found in the south may move northwards
<p>7) Northern communities How will climate change affect agricultural production in the North? How will it affect food grown in nature? How will the reduction in sea ice affect food transportation?</p>	<ul style="list-style-type: none"> Increase in local food production thanks to adaptation measures (e.g., greenhouses, <i>large-scale production of crops and cold-resistant fodder</i>) Prolonged sailing season (allowing increased transport of goods to northern ports) due to reduction in sea ice 	<ul style="list-style-type: none"> Changes in access to food growing in nature since vegetation is directly impacted by climate change, and in species distribution due to rising temperatures Decrease in some hunting and traditional fishing activities due to a reduction in sea ice
<p>8) Trade How will climate change affect the distribution of food worldwide? How will it affect transportation routes in Canada's North? How will it affect food prices?</p>	<ul style="list-style-type: none"> Differences in types of products certain countries send due to changes in the distribution of food worldwide Reduced transport time between the northern Pacific and the northern Atlantic with opening of the Northwest Passage 	<ul style="list-style-type: none"> More frequent disruption of food transportation worldwide due to extreme climatic events Increase in food prices due to necessary adaptations — increase will impact low-income families even more

Based on Canada in a Changing Climate: Sector Perspectives on Impacts and Adaptation (2014, chapter 4) available on the Natural Resources Canada website at <http://www.nrcan.gc.ca/environment/resources/publications/impacts-adaptation/reports/assessments/2014/16309>.