

## Summary

This lesson focuses on climate change and the effects that it may have on different species of plants and animals and on biodiversity. Students will participate in an activity where they will add clothing to illustrate how climate change may impact habitats and species adaptations.

## Activity Info

**Level:** Grade 4

**Subject:** Life Science, Habitats and Communities

**Estimated Duration:** 45 minutes for activity, 45 minutes for follow up and extension opportunities

**Materials:** extra clothing such as mittens, scarves, sweaters, hats for each child in the class



## Learning Outcomes

### Students will:

- Recognize that structural and behavioural adaptations make organisms well-suited to a particular habitat, but not to another.
- Understand the dependency of organisms on their habitat as well as on the relationships within that habitat.
- Understand how various human behaviours and natural events have had an impact on habitats and populations, both positively and negatively.

## Teacher Background

Climate change is a tremendously important issue that has the potential to affect every species of plant and animal on the planet, including humans. It may be the most significant environmental problem we face today.

Climate change has been defined as a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods (United Nations Framework Convention on Climate Change).

In other words, climate change is an overall change in weather patterns resulting from human activities such as burning fossil fuels.

Burning fossil fuels releases greenhouse gases into the atmosphere. These gases, such as carbon dioxide (CO<sub>2</sub>), methane and nitrous oxide, build up in the atmosphere capturing heat and warming the air, which leads to rising temperatures and climate change.

It is important to remember that some level of change in climate is natural and has been experienced many times over the life of our planet. The problem today is that the climate appears to be changing dramatically, very quickly and on a large scale.

Changes in regional climate patterns may have positive and negative effects on important ecosystems and resources. Several sectors of the Canadian economy are based on the natural resources that have the potential to be affected by climate change. Consider some of these potential impacts:

- **Longer growing seasons** allow productive agriculture to move further north. At the same time, there will be risks to agriculture such as drought, pests, disease and fires.
- **Changes in water levels** in our lakes may threaten valuable shoreline and wetland habitats and have an impact on shipping, fisheries and shoreline property values.
- **Changes in temperature and precipitation** may increase in insect-borne diseases such as Lyme disease and malaria.
- **Changes in water cycle patterns** could threaten wetland areas that are important habitat for migrating birds and other species.

 **Procedure****Step 1**

Introduce the concept of climate change to your students. Explain that weather is the day to day change of temperature, snowfall and rainfall that takes place in a particular location. Climate is the average weather that occurs in a given place over a long period of time.

Explain that burning fossil fuels (such as the gas and oil we use to power our vehicles) creates greenhouse gases, which in turn raise the Earth's temperature.

**Step 2**

Divide your classroom into three areas and assign each area a biome representing different climates. The northern biome represents the Arctic where it is cold all year around. The central biome represents mid-latitude regions with four distinct seasons. The southern biome represents a tropical climate with lots of warm weather and seasonal dry and rainy periods.

Clearly define the boundaries of your areas (suggested size 10 m by 10 m).

**Step 3**

Begin a discussion with your students to describe each biome, asking:

- What is the climate there?
- What animals live there and what are their characteristics (do they have fur)?
- What plants live there and what are their characteristics?

Put the answers on the board so the students can see what kind of animals and plants live there.

**Step 4**

Select one student to be a Driver. This student will represent the cars that burn fossil fuels, releasing greenhouse gases into the

atmosphere, causing the temperature to rise. While the rest of the students move to Step 5, the Driver can create his/her character (possibly develop a costume or sign signifying their role).

**Step 5**

Divide the students into three working groups. Assign each group to a biome.

Ask each student in each group to select a species (animal or plant) to represent in their biome. Ask them to think about and record their habitat needs (food water, shelter and space).

NOTE: Ensure that at least two students in each group assume the role of a plant in their biome.

**Step 6**

When everyone is ready, ask the students who represent animals to move around their own biome, pretending to gather their food and water. Those students who are plants can remain still.

**Step 7**

Ask the students how they are feeling right now. Are they feeling comfortable, full, happy or just right?

**Step 8**

Ask the Driver to drive through the classroom. Then explain to the students that due to human activity, we have raised the level of greenhouse gasses in the atmosphere, causing the temperature to increase. Have the students put on a jacket or sweatshirt.

**Step 9**

Ask the students in all three groups to move around for another two minutes. Then have the Driver pass through the three biomes again. Ask each group how they are feeling. Is everyone beginning to feel a little warm, or even hot? How do they think this affects their species? The answers you want to help your students find are that some animals will

migrate to cooler regions, while others will adapt to their new climate. Still others will not be able to adapt and will die. Most plants will likely die.

### Step 10

Have the students add one more layer of clothing and move around a final time. Then ask how they are feeling. You can anticipate that they are starting to feel quite warm!

Ask the students what happens when they begin to feel warmer and more uncomfortable in their habitat. What are they going to do – migrate, adapt or die? If they decide they will migrate to a cooler biome, some questions you can ask them might be:

- Will they be cooler?
- Will they be more comfortable?
- Do they think they may become overcrowded?
- Do they believe there will be enough food, water, shelter and space for all inhabitants including the new ones?
- What do they think is happening in their old biome?

### Step 11

Ask the students to write a short story on one of the following topics:

- Explain what kind of species you were. What it was like to be in a zone when it was just right? How did you feel as the temperature increased? What did you do, and what were the consequences that you had to face?
- What would happen to the southern biome as the temperature increases? What happens to the plants that cannot migrate. What about those animals that need colder environments to survive?
- What happens in the northern and central biomes as new species migrate in? Is there enough habitat for all the new plants and animals?



### Extension

- Have your students complete the activity as if they were all plants. What would happen to the vegetation in each climate biome? Ask them to describe how the plants could adapt over time to deal with increased temperatures and reduced water availability.
- Ask your students to make a list of some potential positive effects of climate change. They can think about those effects by taking on a role of a particular animal, plant, farmers, tourist operators or a specific category of people who might be impacted by a long term temperature change.

