

EcoSchools Multimedia Presentation: *The Impacts of Climate Change*

This answer key corresponds to the student question sheet for the EcoSchools multimedia presentation, *The Impacts of Climate Change*. Video clips are linked to some of the slides. These provide additional information that describes the impact on specific people and communities. Answers to the questions are found in both the slides and the video clips.

The student question sheet is designed to help focus the attention of the class as the teacher is delivering the multimedia presentation. This answer key/extension suggestions resource is meant to support the delivery of the presentation. Many of the questions link to the Big Ideas found in the Climate Change Connections section of the EcoSchools curriculum document *Climate Change in Grade 9 Geography (Academic or Applied)*. *The Impacts of Climate Change* multimedia presentation complements this curriculum document.

The presentation can be viewed over a number of periods. Below is a suggested schedule, based on 40 minute periods:

Period 1: Introduction to climate change: Slides 1 – 22

Period 2: Review climate change, impacts of climate change: Slides 23 – 45

Period 3: Making a Difference: Slides 46 - 57

Answer Key

The numbered questions below correspond to the questions found on the student question sheet. The student questions appear in regular type; *answers appear in italics*.

Extensions for Teachers

Opportunities to engage in class discussion and extend students' learning as the presentation is being made are identified in the text below as:

- ▶ **Making Connections:** Here is a chance to make links to other subject areas. You may want to use these to illustrate to students how climate change affects many areas of our lives. Climate change is a complex issue that requires multidisciplinary study and numerous solutions.
- ▶ **Skills Building:** activities or questions that can be used during or after the presentation that help to build skills listed in the curriculum.

Introduction: Slides 1-22

- ▶ **Making Connections:** Ask students if they have heard of the terms climate change or global warming.

1. What is a natural system? Give an example.

Natural systems are parts and interactions found in nature: river system, forest system, digestive system.

2. What is a human system? Give an example.

Human systems are parts and interactions created by people: road system, electricity production and transmission system, library system, religious beliefs system.

- ▶ **Making Connections:** Discuss how energy and natural resources (parts of natural systems) have become an important part of human systems.

3. What energy source have scientists linked to climate change?

Burning of fossil fuels

- ▶ **Making connections:** Some human systems contribute to the natural climate system, which in turn affects human systems. Natural and human systems are profoundly *interconnected*.

4. Describe the greenhouse effect. Draw a diagram showing the greenhouse effect.

Heat and light energy (radiation) from the sun is either reflected back into space by the atmosphere or passes through the atmosphere and warms the Earth's surface. Some of this energy is radiated back out from Earth. Some gases in the atmosphere absorb or "trap" some of the radiation, increasing the temperature of the Earth's surface. Thus the gases are said to act like a greenhouse.

5. What are two natural causes of climate change?

- ▶ *Variations in the solar energy reaching the earth's climate systems (changes in the sun itself or changes in the earth position/orientation to the sun)*
- ▶ *Changes within the climate system (e.g., increases in volcanic activity)*

6. How do scientists know that the climate and the gases in the atmosphere have changed in the past?
Scientists can measure growth rings in trees that are over 10 000 years old and relate changes in tree growth to changes in global temperature. Ice core samples gathered from the Arctic and glaciers around the world contain trapped air bubbles that can be over thousands of years old. The gases in each bubble can be measured and analyzed to determine the composition of the atmosphere in the past.

▶ **Building Skills:** Reading Graphs (Use the graph link icon)

7. During what period did concentrations of carbon dioxide in the atmosphere show a dramatic increase? What in particular contributed to the increase in carbon dioxide?

Late 1800s to the present

The Industrial Revolution: large number of factories built, increased urbanization, change in transportation, beginning of use of fossil fuels in large quantities - coal, gas, oil

8. What is the climate-changing gas that humans have released the most of (by volume)?

Carbon dioxide

9. What are 2 human-created sources of carbon dioxide?

Burning of fossil fuels (stored carbon), agriculture (cattle, deforestation, fertilizer), cement production

10. What human activities reduce natural sinks for carbon dioxide?

Forests are being cut down; wetlands are being destroyed to clear land for housing

11. Describe the “enhanced” (the word used to signal the link to human activity) greenhouse effect.

When the concentrations of CO₂ and other greenhouse gases in the atmosphere increase, the amount of solar radiation returning from the earth to space is reduced. The radiation is ‘trapped’ or absorbed and converted to heat energy by greenhouse gases (GHGs).

Slides 23 – 45: Impacts of Climate Change:

12. What is the name of the international organization that released a report in 2001 that concluded that the earth's climate was definitely changing because of human activities?

Who sits on this panel? Why is it important?

The Intergovernmental Panel on Climate Change (IPCC). It is made up of senior climate scientists from all over the world. The IPCC produces reports that bring together the latest scientific research on climate.

13. What severe weather events have occurred in Canada in the last 15 years?

Quebec ice storm, Red River floods (Manitoba), Hurricane Juan (Halifax, Nova Scotia), Edmonton (Alberta) flood, Peterborough (Ontario) flood

14. List ways that climate change will have an impact on the weather.

Severe weather events are predicted to become more frequent, more intense and last longer. (Climate change scientists speak of this change in terms of frequency, intensity and duration.)

15. List the impacts of melting glaciers and the polar ice caps.

The melting of ice-caps results in:

- *higher sea levels*
- *more freshwater introduced into the oceans*
- *reduced reflection (because less ice surface) of heat energy*
- *increased coastline erosion*

- ▶ **Making Connections:** Major ocean currents are influenced by salinity (the salt content) and temperature. Hence, large inputs of cold freshwater from melting ice in the polar regions may change ocean current patterns. Reductions in polar ice cover may further change the global climate system by reducing the 'albedo,' i.e., less solar radiation will be reflected back to space.

16. How might climate change affect natural ecosystems?

Most plants and animals have evolved over centuries to live in a specific habitat in a specific ecosystem. Rapid changes to parts of the ecosystem (e.g., climate and weather) may change the biotic (living) and abiotic (non-living) conditions of an area more quickly than plants and animals can adapt. Animals and plants already under pressure from other environmental factors (pollution, habitat loss, etc.) will not survive the added threat of climate change.

17. List ways that climate change will affect human communities.

- *Health problems:*
 - *diseases previously found in other warmer regions (e.g., West Nile virus, dengue fever)*
 - *heat-related ailments (e.g., heat stroke)*
 - *increased respiratory disease (e.g., asthma, bronchitis) and death (children and the elderly are vulnerable to the effects of smog, which in turn is related to the increased use of electricity for keeping cool during hot spells)*

- *Economic problems:*
 - *food supply (agriculture, fisheries)*
 - *potentially less runoff (less water available)*
 - *forestry (reduction in the area covered by boreal forests, the major northern bioregion that supplies wood products)*
 - *rising insurance losses/costs as a result of damaged lives and property*

Note that these problems will vary regionally.

Slides 46 – 57: Making a Difference

18. Describe the international agreement that addresses climate change

Kyoto Protocol—In 1997, representatives of over 160 countries gathered in Kyoto, Japan to draw up the Kyoto Protocol, an international agreement that seeks to reduce greenhouse gas emissions to below 1990 levels by 2008-2012.

19. What is the Canadian government doing about climate change?

- *In 1997, representatives of over 160 countries gathered in Kyoto, Japan to draw up the Kyoto Protocol, an international agreement that seeks to reduce greenhouse gas emissions to below 1990 levels by 2008-2012.*
- *Canada ratified, or committed to, the Protocol in 2002*
- *In Canada, implementing Kyoto means reducing our greenhouse gas emissions by 20% below today's levels, or 6% below 1990 levels.*

20. What changes in energy use are needed to reduce the impacts of climate change?

- *Use less energy - conserve*
- *Switch to non-fossil fuels. Hydro, solar and wind power can all produce electricity with fewer GHG emissions than when fossil fuels are burned*

21. What are three actions you can take to reduce your carbon dioxide emissions?

Answers will vary.