

POST-PROGRAM PACKAGE INSERT: CLIMATE CHANGE PRIMER

Climate change is a phenomenon that will affect everyone on the planet; it is only a matter of time. For that reason, students should be educated upfront about how their actions can harm and benefit our climate.

Since the industrial revolution, our planet has experienced a drastic increase in the amount of greenhouse gases in its atmosphere. This process has triggered a condition called global warming or climate change. There has been a lot of debate around the existence, causes and effects of climate change, but today it seems there is little doubt that the symptoms we are experiencing (severe weather, glacial melting, species extinction and insect infestations) have been influenced by climate change.

Many of our daily behaviours contribute to climate change. During programs focused on climate change it is important that students understand both the basic concepts and the individual things we can do to reduce the rates and effects of this phenomenon.

When teaching about climate change, the following key words can be helpful:

- **Atmosphere**- The mixture of gases surrounding the earth.
- **Biodegradable** - The ability of a substance to be broken down physically and/or chemically by micro-organisms. For example, many chemicals, food scraps, cotton, wool, and paper are bio-degradable; plastics and polyester generally are not.
- **Carbon Dioxide (CO₂)** - The greenhouse gas whose concentration is most affected directly by human activities.
- **Carbon sinks** - Areas that take in and store more carbon than they release. Forests and oceans are common carbon sinks.
- **Climate** - The average weather for a particular region and time period.
- **Climate change** - A significant change from one climate to another.
- **Deforestation** - Removing the tree cover from land.
- **Emissions** – As referring to climate change, this means releasing a gas, especially a greenhouse gas, into the atmosphere.
- **Fossil fuel** - Geologic deposits of carbon from living things, including oil, coal, natural gas, and tar sands; these can be burned for energy.
- **Global warming** - An increase in the near surface temperature of the Earth.
- **Greenhouse effect** - When greenhouse gases allow incoming solar radiation in to the Earth, but restrict some from escaping back into outer space. Life on earth would not exist without the natural greenhouse effect.
- **Greenhouse gas** - Any gas in the atmosphere that absorbs radiation. This includes water vapour, CO₂, methane and nitrous oxide.
- **Population** - A group of individuals of the same species living within an area.
- **Recycling** - Collecting and reprocessing a resource so it can be used again.
- **Renewable energy** - Energy from sources that are essentially inexhaustible, like sun and wind.

ACTIVITY ONE: CLIMATE CHANGE INTRODUCTORY SKIT

Purpose

- To introduce some basic concepts of climate change
- To present the information in a fun and interactive way

Activity Overview: This introduction is most effective with the help of a volunteer and quickly conveys to students the basic concepts of climate change. The concepts outlined include fossil fuels and their sources, greenhouse gases, their creation and the effects they are having on our planet.

Materials: 6 signs with the images of each of the following:

- earth
- ferns & small pre-dinosaur animals
- pile of black "goo" or fossil fuel
- uses of fossil fuels (cars, trucks, boats, electricity, fire, and gas)
- the green house effect
- a list of species and ecosystems that are affected by climate change

Time: 15 minutes

Procedure

1. Pick a volunteer from the group. Explain that you are going to discuss:
 - How climate change is happening
 - Where they come from
 - What fossil fuels are
 - Impacts of human use of fossil fuels
2. Ask your volunteer to hold up the **first** sign. The first image has an earth on it.
3. Ask the students what this is an image of. Tell them that the earth is approximately 5 billion years old, and there have been a LOT of changes in that time – landscapes, animals, plants, and climate.
4. Have the volunteer show the **second** image which has ferns and little animals on it. Then explain that we are going to look back to the **Carboniferous** period. 360 million years ago the earth was covered in big ferns, trees and other green stuff, as well as big swamps. There were no dinosaurs yet, but some small creatures did exist. When these small animals and the ferns and trees of that time died, they fell into the swamps and oceans, piling up until they started to pack down into these thick layers of stuff called **peat**. Over thousands of years, the peat was covered by rocks and clays, and the weight of those rocks pushed all the water out of it and turning it into something else.
5. Then have the volunteer hold up the **third** card and show the image of fossil fuels or a pile of black goo. Ask them what they think it is. If they can't figure it out give them hints like: "*We burn it to create energy. One form of it goes it to our cars.*" Over time humans have found ways to extract it from the earth and use it for many things.
6. Have the volunteer hold up the **fourth** image. The image is a picture of machines that use fossil fuels. Back in the 1700's, people figured out that we could burn coal to heat up water in engines, and the steam from the water could power

- machines to make clothing and other goods. Enter the modern factory. Ask them what they think we get from factories.
- Let them know that even though this seems great, when we burn fossil fuels the carbon in them doesn't just disappear, just like our breath doesn't disappear after we've exhaled.
 - When fossil fuels burn, they give off gases like **carbon dioxide, sulphur dioxide** and **nitrous oxide**.
 - Have the volunteer hold up the **fifth** card, showing how solar heat gets trapped by the increase of carbon dioxide in the earth's atmosphere. Use the graphic to explain how the green house effect works. First the atmosphere – it is important because it keeps all the air around the earth, so we can breathe. Plus, the atmosphere acts like a blanket around the earth, and holds in some of the sun's heat so that the earth is warm. Ask if they know what this is called (*the greenhouse effect*). Without the atmosphere and the greenhouse effect, we'd be a frozen planet, like Pluto. The gases, like carbon dioxide, are similar to the glass in the greenhouse, keeping the heat in; this is why they are called **greenhouse gases (GHGs)**. The more GHGs we produce the thicker our atmosphere will get. This is what is causing climate change.
 - Ask the group if they have any good ideas of things they can do to reduce their effect on climate change. Get students to contribute some ideas randomly. Make sure to suggest some if they are having a hard time. The **sixth** sign has a short list of animals and earth systems that are being affected by climate change. Ask students to brainstorm some of the ways the earth is affected by climate change.

Once the group has brainstormed some ideas of ways they can help reduce their personal impact on climate change, hand out the "**Sierra Club's 10 things you can do to help stop global warming**" handout (next page).



ACTIVITY TWO: CLIMATE CHANGE OLYMPICS

Overview

This series of activities are super fun and include several stations encouraging students to make connections between climate change and their daily life. Activities include **reflective activities** with the Art stop, **running games** with the relays, and **individual connections** with the climate change scavenger hunt.

#1: Art Project

Purpose: To leave the group of students with a visual representation of positive actions they can take to help with Climate Change

Activity Overview: Create a large poster with an image of the earth. Students contribute to the earth by drawing earth-friendly modes of transportation or green energy or initiatives. Leave the poster with the students as a reminder!



Materials: Large line drawing of the earth on roll paper

Time: 15 -20 minutes

Procedure

1. Provide each student with a small 6"X6" piece of paper to create their image on.
2. Brainstorm ideas of things we can do to help reduce their impact on the planet.
3. Circulate, support, and listen as they explore ideas for their drawing. Then create!

#2: Climate Change Scavenger Hunt

Purpose

- To help students recognize the affects of climate change in their surroundings.
- To share with students positive options to their current actions.

Materials

- Climate Change Scavenger Hunt Sheet (see next page)
- Clip boards
- Pens or pencils

Time: 20 minutes

Procedure

1. Briefly review the scavenger hunt sheet with the campers. Set exploration boundaries.
2. Have the group break in to pairs or threes and hand-out the Scavenger Hunt sheets.
3. In small groups of 2 or 3 they will look in their immediate surroundings for evidence of climate change.
4. Meet back after the 15 min. and review what they found. Some suggested questions might include, "What they liked the best? What they found they didn't expect? If they discovered something they hadn't known about?"



THE OFFICIAL CLIMATE CHANGE CHAMPION SCAVENGER HUNT

Find as many as you can, and write them down as you go...

An effect of Climate Change that we see everyday _____



A human behaviour that ...

Helps reduce climate change in our environment _____



... Contributes to Climate Change _____

An Example of people-powered transportation _____



Something that releases oxygen _____

Something that reflects sunlight _____

An example of something that absorbs CO₂ _____

Something that can be recycled _____



Something that can be reused _____

A person interacting with their environment _____

A natural resource you depend on _____

An example of technology affecting the environment _____

People and wildlife experiencing some of the same problems _____



#3: The Climate Change Obstacle Course

Overview: This obstacle course is a combination of several smaller activities that can be rearranged or substituted with other activities to the organizers liking.

A. HEATING UP

Purpose

- To have students physically experience heating up
- To create empathy for mother earth and the changing climatic conditions

Activity Overview: This is a speed event in the obstacle course where students speed dress and skip rope a set number of times.

Materials: One skipping rope per team; A set of hat, and scarf per team

Time: 10 minutes

Procedure

1. Students take turns speed dressing, skipping and then undressing. They have to put on 2 items of clothing - a toque and a scarf to represent current trends in global warming.
2. The skipping rope (representing human powered travel) and each child has to jump 10 times with the winter clothes on.
3. Because they participated in alternative energy production their personal impact is reduced. After jumping rope, they take off winter clothes and move to the next activity.

B. WATER LEVEL RISING RELAY

Purpose: To recognize that human activity is causing a rise in ocean levels.

Activity Overview: A running activity to introduce the idea of sea levels rising.

Materials: Two buckets per team; one sponge per team; something to mark the area you are playing within

Time: 15 minutes

Procedure

1. Ask the students, "Did you know there are two kinds of glaciers? Ones that are in the water and one that are on land." In this game we will be recreating the effect when glaciers on land start to melt and run in to the ocean.
2. The 1st bucket has a sponge in it and is filled with water. The 2nd bucket is empty.
 - a. Bucket #1 = glaciers melting
 - b. Bucket #2 = the sea levels rising.
3. When the relay starts students will go one at a time and takes the sponge (full of water) out of the first bucket, and run it to the second bucket. There they squeezes it out and then returns it back in the first bucket.
4. Once each team member has gone have the teams check which bucket #2 has more water in it. Then ask them, "Where do you think the rest of the water went? In nature can water go in to the earth instead of in to the ocean? What do you guys think we can do to help stop ocean levels from rising?"

ACTIVITY THREE PINE BEETLES & CLIMATE CHANGE

Purpose

- To show the habitat requirements of a mountain pine beetle.
- To show the effects of climate change on a mountain pine beetle ecosystem.
- To use the mountain pine beetle as one example of the influence of climate change on global ecosystems.

Activity Overview: This is a running game based on a tag model. It examines how mountain pine beetles are affected by climate change and how this is changing our landscape.

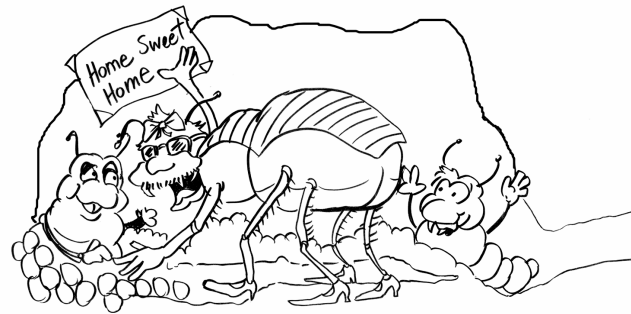
Materials

- A hat and scarf
- 30 arm band
- A red t-shirt for fire
- A blue scarf for frost
- Six pylons to set boundaries
- Two ropes for safe zones
- A whistle

Time: 30 minutes

Procedure

1. Discuss the following questions with the group:
 - What is climate change?
 - What is the mountain pine beetle?
 - What does it eat? What specific parts of trees?
 - How is climate change related to mountain pine beetles?



2. Remind the group that the beetle infestation is just one of many visible effects of climate change. Brainstorm some other effects [dramatic weather fluctuations (more severe hurricanes), drought, species movement (grizzly bears north, polar bears south), rising sea levels, etc.].

Outdoor Game

Set up Remind students that we are playing this game because pine trees need long periods of cold to kill the mountain beetle larvae. This game is similar to *freeze tag*. Set up a rectangular play area approximately 20 meters by 30 meters using the pylons. Near each long end lay a rope on the ground to make a safe area. Split students into $\frac{1}{4}$ pine beetles and $\frac{3}{4}$ pine trees; give all students an arm band, but have pine beetles hide their arm bands to start. One facilitator wears a red t-shirt to represent fire, and the other wears a blue scarf to represent frost.

Play The beetles start by trying to catch the pine trees. When trees are tagged by a beetle they are frozen and become beetle larvae for 10 seconds. If they are not unfrozen by an other tree they become a beetle (remove their arm band), and begin chasing the pine trees. Trees can find refuge in the safe zone for 10 seconds – which is a below-zero cold zone where the pine beetles can't go. As the game progresses the time that they are allowed to be in the cold zone starts to shrink because of climate

change and shorter winters. The facilitator decides when to decrease the time in the cold zone until there is no cold zone (i.e. there is no sub-zero winters anymore because of climate change).

When you see that there are too many beetles running around, send in a leader as FIRE, who then runs around for 30 seconds and randomly tags everyone. They are frozen for 10 seconds, and if they are a beetle, they change into a tree. The other facilitator is the FROST which runs through the game and tags beetles so that they become trees. Explain to the group that if there were no cold winters then the beetle population would continue to rise. The game ends when the 20 minutes is up.

Evaluation

Following the activity, spend time with the group discussing the following ideas:

- How long did students last as pine trees? How much more difficult was the game as the cold zone shrank? What were the effects of climate change?
- What sorts of systems are also affected by natural disasters? Could these natural disasters be affected by climate change?



CLIMATE CHANGE LEARNING RESOURCES

PRINT

Teaching About Climate Change: Cool School Tackle Global Warming.

Edited by Tim Grant and Gail Littlejohn. An excellent guide to school activities and background information for teachers, focussing on climate change stewardship. Green Teacher Magazine & New Society Publishers. 2001. Order through the website at www.greenteacher.com.

WEBSITES

www.pembina.org/climate-change/index.php A mega-site with tons of information on climate change reduction ideas targeted from individuals to organizations. High-level information, but an excellent resource.

www.bcclimateexchange.ca A centre for B.C. climate change information & programs.

www.climatechange.gc.ca The Government of Canada's climate change website, including teacher and student resources, and a greenhouse gas calculator.

ENVIRONMENTAL GROUPS

Wild BC. Provides education and stewardship workshops for educators and BC communities. Programs include the *Climate Change Solutions Teacher Workshops*. www.hctf.ca/wild. You can also contact them by phoning 1-800-387-9853 ext. 4 or emailing wild@gems5.gov.bc.ca.

The Pembina Institute. An amazing organization that focuses on renewable energy and energy alternatives. Their website will teach you about climate change and energy sources, with many links to education resources, such as www.re-energy.ca where you can learn to build your own solar-powered car! www.pembina.org.

Check the links page on our website at www.sierraclub.ca/bc/programs/education/educators/weblinks.shtml for more websites and environmental groups of interest.