

CREATIVE CONSERVATION IN A CHANGING CLIMATE CAMILLE PARMESAN HOT SCIENCE COOL TALKS ACTIVITY

Lesson plan for grades 5-10

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Length of Lesson: 45-50 minutes

SOURCES AND RESOURCES:

- <http://calc.zerofootprint.net/youth/>
- <http://www.epa.gov/climatechange/index.html>
- <http://www.epa.gov/climatechange/kids/>
- <http://climate.nasa.gov/kids/>
- <http://www.ncdc.noaa.gov/oa/climate/globalwarming.html>
- <http://www.ipcc.ch/>

SAMPLES OF POTENTIAL TEKS ADDRESSED THROUGH THIS LESSON:

§112.15. Science, Grade 4, Beginning with School Year 2010-2011. 2F, 3A, 6A, 7C

§112.16. Science, Grade 5, Beginning with School Year 2010-2011. 2F, 3A, 6A, 7C, 9C, 9D

§112.18. Science, Grade 6, Beginning with School Year 2010-2011. 7A, 7B, 9C

PERFORMANCE OBJECTIVES:

The students will be able to:

- Determine the relative carbon footprint of pairs of items
- Make suggestions about how they can reduce their own carbon footprint

CONCEPTS:

In this activity, students will compare a pair of similar, everyday items and decide which one has the higher carbon footprint. That our climate is changing due to anthropogenic activities is no longer a question; it is a fact. The amount of greenhouse gases (things like CO₂, CH₄, N₂O and fluorinated gases) being emitted into the atmosphere from the production of electricity, transportation of people and goods, and other human activities has drastically increased since the initiation of the industrial revolution, and this increase is directly related to the changing climate we are seeing today. Effects of climate change include increases in average temperature, changes in precipitation patterns, more intense hurricanes, increased ocean acidity, sea level rise, melting glaciers and Arctic ice, earlier flowering dates and bird migrations, increased growing seasons and changes in species ranges and many others. Human health is also being affected as is seen with the increased instances of heat-related illnesses and deaths. Sometimes the problem seems so overwhelming we wonder what we as individuals can do about such a massive issue. We can start by trying to reduce our own carbon footprint – the amount of CO₂ emissions our daily activities contribute to total greenhouse gas emissions.

The purpose of this lesson is to have students use inquiry to realize how their actions and choices are related to climate change through understanding the amount of carbon needed to make, use and transport regular, every-day items. The students will need some prior knowledge of the greenhouse effect.

MATERIALS:

Per group of 2 students:

- 1 pair of similar items with different carbon footprints. Examples include:
 - Light with a compact fluorescent light bulb/light with an incandescent light bulb
 - Locally grown or made product/Similar product imported from a distant location
 - Plastic single-use grocery bags/reusable bags/paper bags
 - A car/a bicycle (or pictures of them)
 - A reusable water bottle/a single-use plastic water bottle
 - A bulk item/several individually packaged items e.g., a large bag of chips/several small, individual packages of the same kind of chips (with an equal volume of chips in both)
- Document with pictures of each item and spaces below to write why that item has a higher/lower carbon footprint than the other item on the page

TEACHER PREPARATION:

Acquire 1 pair of objects for each pair of students. Each pair should also receive a document with pictures of the item they are analyzing and space for writing their determination of whether it has a higher or lower carbon footprint and their justification why.

ENGAGEMENT (7 minutes):

Start off the class by quickly working through a carbon footprint calculator. Zero footprint is a good, kid-friendly one (<http://calc.zerofootprint.net/youth/>). Go through the questions as a class. Use the majority answer as the class answer. When finished, the website gives a ‘number of carbon Earths’ score that indicates how many Earths would be needed if everyone in the world produced the same amount of carbon as the class does. You can also see how your class score compares to average scores of people in other countries.

EXPLORATION (20 minutes):

Have the students work in pairs to figure out which of two similar items has the lower carbon footprint. Once they have made their decision, they can write it and their justification down on their document. Students should be encouraged to think about more than just the more obvious differences. For example, between a car and a bike, the car emits greenhouse gases, whereas the bike does not. There are other differences too, though, such as the amount and kind of materials used to build the two vehicles and potentially how far those materials traveled. In general, the materials used, the distance an item traveled and in/on what kind of vehicle it traveled, the amount of packaging of the item, whether it has a one-time-use or can be reused and the kind of energy used to make it (among other things) will affect its carbon footprint.

EXPLAIN (12 minutes):

Ask the students to take turns sharing with the class what their pair of items is, which one has the higher/lower carbon footprint and why they decided this.

ELABORATE (6 minutes):

At the end of class, ask the students to individually write to themselves a list of suggestions of ways that they can reduce their own carbon footprint.