

***Greenhouse in a Bottle***  
**Safe Routes to Schools 2006**  
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Hi everyone, I'm \_\_\_\_\_ and I work for Safe Routes to Schools. I teach people how to walk and bike safely all over Marin County.

Who can tell me why someone like you or me would want to ride a bike?

I can think of 4 Fantastic reasons to do it. Can you?

More Exercise

Less Pollution

More Fun

Less Traffic

Today's lesson is about your transportation choices/options and how they affect the earth that we all live on. You have some choices now and you are going to have more and more later on. But you don't have to wait that long.

First of all, what is your "environment?" The place that we live, communities, ecosystems (life systems). Why is it important to take care of our environment?

Why should I care? Why should you care?

In my hand I have 4 things that some people say all living things need.

4 film canisters –3 black and one clear-(sun –clear film container, soil, water and air).

Have students try to guess what is in each container.

Ask what is the problem if I remove one of them. Do it with each one, one at a time and have students explain the consequences.

Humans are 80% water.

Plants need all 4 things.

We need plants or things that need plants to survive.

Let's focus on the Air we breathe.

Introduce CO<sub>2</sub> and O<sub>2</sub> exchange between humans and plants.

I breathe out what?

Plants breathe in what?

Write this on the board in the form of a balance with humans on one side and plants on the other. It is a teeter totter that has developed over millions and millions of years.

Now people are making more and more Carbon Dioxide. Add in driving. (Producing electricity optional) to the same side of the teeter totter.

So, let's talk about the impact of CO<sub>2</sub>.

Draw the sun then a greenhouse below it.

What is life like in a greenhouse? Have students explain.

Heat is trapped and can't get out.

Let's talk about the earth.

Draw earth

What % of earth is water? 75%

What % of earth is land? 25%

Upper atmosphere

The Ozone layer above the lower atmosphere and reflects bad radiation back into space. It is like sunglasses for the earth. It is damaged by some chemicals (CFC's) and rocket ships.

Lower atmosphere is

78% nitrogen

20% O<sub>2</sub>/CO<sub>2</sub>

2% other stuff

We are going to focus on the 20% that has to do with CO<sub>2</sub> and O<sub>2</sub>.

Address change in CO<sub>2</sub> levels that is leading to increase in temperature. This is called the Greenhouse Effect. The hottest temperatures on record have happened since the 1990's. Many top scientists say that rapid heating is changing our weather- causing Global Climate Change.

It means more extreme weather- colder and hotter. More storms and droughts. Have students tell of extreme weather in the last couple of years. ... Tsunami, Hurricanes... record rainfall.

Brainstorm problems/effects of Global Warming/Climate change on earth and life.

Rises in ocean levels will destroy the homes of our population.

An estimated 1million species will go extinct by 2050 if things stay the same.

Polar bears don't have ice to live on- their environment is changing rapidly. ....

But you can do something about it. You can "cut out" and reduce the amount of carbon you produce.

Let's do and experiment to illustrate this.

Have students work in groups of 4. Each group gets a bottle, water (75%), soil (25%) and a bucket to catch dirt. Put ingredients into bottle. The bottle represents CO<sub>2</sub> as it traps heat.

½ of the bottles get cut carefully with razor knife. Only hold the bottle at the top and cut with the knife in a downward direction, slowly and with care. Keep fingers out of the path of the cutting blade.

Cap bottles and place out in the sun.

Illustrate with students:

Have 10 students hold up 10 fingers each. The 100 fingers represent 100% of the world population. Pick a volunteer from the group to represent the United States. That person holds up 6 fingers because the USA has 6% of the world population. Have one more new volunteer hold up 4 fingers.

State the fact that in the US, as 6% of the world's population (have the US person wiggle their fingers) each year we drive more miles each year than the rest of the world drives combined. Repeat. 6% drives more miles than the other 94% of the combined.

In the US we produce 25% of the global CO<sub>2</sub> emissions each year. That means that we can do much better.

Let's look at how the rest of the world gets around. Who has been to another country?

Call on students: Which country and how did most people get around?

Students usually point out that most people walk, bike, take the bus or train, before driving.

How could you personally "cut out" or reduce the amount of carbon you produce.

What gets in the way of doing that here in the US?

Brainstorm barriers and solutions.

Check on Bottles.

The bottles with more condensation have a greater temperature difference and therefore steam up more. We have tested the difference and it is about 3 degrees Celsius hotter in the regular bottles vs. the bottles where the carbon has been cut out.

Many top scientists are also predicting that we are on a one way rollercoaster ride with the amount of oil we are taking out of the Earth. We are almost at the top and after that the only way to go is down. So, even if you don't think that much about saving the earth or taking care of your Sun, Soil, Water and Air, you are going to have to figure out how to get around and live without using so much oil.

You can make a difference... and Thanks for joining us!