
SYNOPSIS:

Carbon dioxide and other gases are released into the air through natural and manmade causes. If the levels of these gases continue to increase at the current rate without relief, many scientists predict significant climatic changes, an escalating threat caused by greenhouse effect. Using animation, time-lapse and live-action photography, this program describes the greenhouse effect, its causes and impact on global warming, and what scientists are doing to understand and prevent the problems that a warmer atmosphere could cause.

CURRICULUM UNITS:

Climatology
Earth Science
Ecology
Environmental Science
Geography
Meteorology
Oceanography

CAREER OPPORTUNITIES:

Astronaut
Climatologist
Earth Science Teacher
Environmental Scientist
Forester
Geographer
Meteorologist
Oceanographer

PROGRAM OVERVIEW:

This program introduces the concept of the greenhouse effect which has given the planet, alone among

all others so far as we can determine, the atmospheric conditions necessary to sustain life. But there is concern and controversy within the scientific community that increasing emissions of natural and manmade "greenhouse" gases, such as carbon dioxide, are intensifying the greenhouse effect, causing global warming.

Your students will learn how small changes in the relationship between the sun, earth, oceans and atmosphere affect the weather patterns that give us our climate, and can mean big changes in where and how we live. They'll see the results of weather patterns such as drought and El Niño, an explanation of how our atmosphere acts like the glass of a greenhouse to keep warmth close to the earth, and how carbon dioxide and other gases can make our "greenhouse" warmer. The program ends with ways we can all help prevent global warming from happening: plant more trees, drive more fuel-efficient cars and use renewable energy sources.

You may wish to begin a discussion with the question, "Is it possible to have too much of a good thing?" (the greenhouse effect) or "What is meant when we say that things are 'in balance' or that 'the balance is upset'?"

ISSUES AND CRITICAL THINKING:

Ask students in the class who have lived elsewhere to describe the climate there. How did the temperatures, precipitation and humidity differ from where they now live? Which climate do they prefer?

Have class members describe an extreme weather condition they have witnessed. What happened? How severe was it? What did it look like outdoors afterwards?

Take a field trip to a local television station or a National Weather Service office. Examine some weather maps and watch a radar screen to locate highs, lows, fronts, and areas of precipitation. Do your students know the differences between a thermometer and a barometer? Are there other means or instruments meteorologists use to forecast or track weather?

Have student's plant flower seeds in small containers. As the seeds sprout, expose too much heat/light, some too little water, and others too much water. Discuss the impact of each "ecology" on growth and relate this to the greenhouse effect.

Have student's chart high and low temperatures for a two-week period. Compare these temperatures with records from ten or twenty years ago. Are recent temperatures lower or higher?

Discuss the average rainfall your town receives annually. How do rainfall levels affect the kinds of agricultural activities and growing seasons of your town, county, or state.

As students name various wood or paper products, list them on the blackboard. Use a map to indicate major forested areas that supply wood for those products.

Define and discuss the differences between nonrenewable and renewable energy sources. How can students conserve energy in their homes?

GLOSSARY:

ARID- Parched or dry land or air.

ATMOSPHERE- The thin envelope of air that surrounds the Earth, held to the surface by the pull of gravity.

CARBON DIOXIDE- A colorless, odorless gas created during combustion, respiration, and organic decomposition.

CLIMATE- Prevailing weather conditions in a particular area.

DEFORESTATION- Destruction and reduction of forested land due to natural and manmade causes, such as fire and land clearing.

DROUGHT- An extended period of time with little or no rainfall.

EL NIÑO- A Pacific Ocean current which sometimes over warms ocean and air temperature and changes ocean circulation, causing heavy rains and flooding in the southern hemisphere.

GLOBAL WARMING- An overall rise in the earth's temperature.

GREENHOUSE EFFECT- An increase in the temperature of the atmosphere caused when carbon dioxide and other gases in the air trap the sun's energy near the earth's surface.

REFORESTATION- Controlled and planned planting of new trees to replace those that are harvested or destroyed.

SOLAR ENERGY- The energy we receive from the sun.

TRADE WINDS- A system or regular, tropical wind patterns which blow northeasterly in the northern hemisphere and southeasterly in the southern hemisphere, and are of major importance to circulation in the atmosphere.

WEATHER- The state of the atmosphere at a particular place and time, including the temperature, humidity, cloudiness, wind and precipitation.

The Wonders of Ecology & Conservation



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UNDERSTANDING THE GREENHOUSE EFFECT



TMW MEDIA GROUP

2321 Abbot Kinney Blvd., Venice, CA 90291

(310) 577-8581 Fax (310) 574-0886

Email: sale@tmwmedia.com

Web: www.tmwmedia.com

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