

SUGGESTED REFERENCES

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- Reid, Stephen J. **Ozone and Climate Change: A Beginner's Guide.** Taylor and Francis 2000.
- Gutnik, Martin. **Experiments That Explore the Greenhouse Effect (Investigate).** Millbrook Press, 1991.
- Silverstein, Alvin. **Global Warming.** 21st Century Books, 2003.
- Discovery School*
<http://school.discovery.com/lessonplans/programs/weather>
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NATIONAL SCIENCE EDUCATION STANDARDS

K - 4

Physical Science
Transfer of Energy

Earth and Space
Changes in Earth and Sky

Science in Personal and Social Perspectives
Types of Resources

*Source: *National Science Education Standards, 1996, National Academy Press*

5 - 8

Physical Science
Transfer of Energy

Science in Personal and Social Perspectives
Populations, Resources, and Environments

CREDITS

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EDUCATOR ADVISORY PANEL

Fred Barch, M.S.
Rose-Marie Botting, M.S.

Debra A. Murnan, B.A.
John A. Murnan III, M.S.

PRODUCTION CREDITS

WRITER/PRODUCER:
ASSOCIATE PRODUCER:
EDITOR:
NARRATORS:

Megan Chaney
Patricia Norman
Jon Glassman
Cyrilla Baer Pond & Joshua Forman

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1000 Clint Moore Road, Suite 211, Boca Raton, FL 33487
tel: 1.800.232.2133 email: info@ssrvideo.com
www.ssrvideo.com

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SCIENCE SCREEN REPORT FOR KIDS

VOLUME 15 ISSUE 2

BLANKET OF PROTECTION - EARTH'S ATMOSPHERE



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SYNOPSIS

Within our solar system life is known to exist on one planet, planet Earth. Why is planet Earth the only known planet able to support life? One of the reasons is our atmosphere - a blanket of air that surrounds our planet. The atmosphere is a mixture of different gases, each with its own physical properties. As the sun heats the earth's surface, these atmospheric gases trap some of the solar energy keeping the planet at a warm and comfortable temperature. This intricate but natural process is known as the greenhouse effect.

In this edition of SCIENCE SCREEN REPORT FOR KIDS, we will learn about Earth's atmosphere, climate and the greenhouse effect. We will explore the impact human activity is having on our atmosphere and ways scientists believe we can prevent further destruction to the Earth's atmosphere, so our planet can continue to thrive.

CURRICULUM UNITS

- BIOLOGY
- EARTH SCIENCE
- ENVIRONMENTAL SCIENCE
- GEOLOGY
- PHYSICAL SCIENCE

RUNNING TIME

16:33

BACKGROUND

Earth is home to all living things. But what makes Earth the only planet able to support life? The answer lies in the atmosphere. A mixture of gases, each with its own physical properties, work together with the sun's solar energy to create an average temperature of 15 degrees Celsius. Unlike any other planet, Earth's atmosphere traps the heat and reflects it back towards Earth. Without this intricate process known as the greenhouse effect, Earth would be a frozen planet.

In this edition of SCIENCE SCREEN REPORT FOR KIDS, we will explore the earth's atmosphere and the importance of the greenhouse effect. As we learn the impact that human activity is having on the earth's atmosphere, we will also take a look at ways scientists think we can help prevent further interference of the greenhouse effect.

For millions of years, earth has undergone natural changes. Approximately 150 years ago, the earth's climate was influenced almost entirely by the sun. Earth has experienced dramatic climate cycles due to changes in its rotation and orbit.

Biologists and geologists have found evidence that documents such climatic changes. Thirteen thousand year old forests reveal tree rings confirming weather patterns of the past, while sediment from the ocean floor uncovers changes in currents that might have affected surface temperatures. When temperatures rise globally, it affects global weather patterns.

From studying past climate changes, scientists have found that there is one-third more carbon dioxide in the earth's atmosphere today than there was before the industrial revolution. This leads scientists to believe that human activity plays a significant role in global warming. Human activities such as deforestation, a process that involves the destruction of forests, and desertification, the process of land turning into dry arid desert, are to blame. Land that once flourished and provided a balance of the greenhouse effect is being destroyed. Both of these activities are causing an increase in carbon dioxide and contribute to global warming.

Global warming is a world-wide concern. As scientists continue to research what causes the increase of carbon dioxide, countries around the world, like the United States, are working towards alleviating the destruction of earth's atmosphere. Environmentalists are providing education so that we too can lend a helping hand. With the use of renewable energy sources such as wind, water and solar energy we can help slow the global warming process. In addition, households can participate in conservation by saving electricity, car-pooling, and recycling. By making conscious efforts to conserve, we will be aiding in the preservation of our home, planet Earth.

ADVANCED ORGANIZERS

Prior to showing this video students should have some understanding of the following Benchmarks for Science Literacy, Oxford University Press, which are excerpted and, in some cases, abbreviated below. Refer to the Benchmarks for more information.

Benchmark 1: The Nature of Science

Section B - Scientific Inquiry

Know by the end of Grade 2

- Tools such as thermometers, magnifiers, rulers, or balances often give more information about things than can be obtained by just observing things without their help.

Know by the end of Grade 5

- Scientific investigations may take many different forms, including observing what things are like or what is happening somewhere, collecting specimens for analysis, and doing experiments. Investigations can focus on physical, biological, and social questions.

Benchmark 4: The Physical Setting

Section E - Energy Transformations

Know by the end of Grade 2

- The sun warms the land, air, and water.

Section B - The Earth

Know by the end of Grade 8

- Climates have sometimes changed abruptly in the past as a result of changes in the earth's crust, such as volcanic eruptions or impacts of huge rocks from space. Even relatively small changes in atmospheric or ocean content can have widespread effects on climate if the change lasts long enough.

Section C - Processes That Shape the Earth

Know by the end of Grade 8

- Human activities, such as reducing the amount of forest cover, increasing the amount and variety of chemicals released into the atmosphere, and intensive farming, have changed the earth's land, oceans, and atmosphere. Some of these changes have decreased the capacity of the environment to support some life forms.

Benchmark 8: The Designed World

Section C - Energy Sources and Use

Know by the end of Grade 2

- People can save money by turning off machines when they are not using them.
- People burn fuels such as wood, oil, coal, or natural gas, or use electricity to cook their food and warm their houses.

Know by the end of Grade 8

- Energy from the sun (and the wind and water energy derived from it) is available indefinitely. Because the flow of energy is weak and variable, very large collection systems are needed. Other sources don't renew or renew only slowly.

*Benchmarks can be found at www.project2061.org/tools/benchol/bolintr.htm

CRITICAL THINKING EXERCISES

- Read a book aloud about the greenhouse effect and global warming. For example, *The Greenhouse Effect*, by Tony Hare. New York, NY: Gloucester Press, 1990. (3rd-6th).
- Discuss the fossil fuels and renewable energy. Compare and contrast the affects that each have on the environment.
- Construct a greenhouse (terrarium) to demonstrate how temperatures are affected by global warming. Visit a website such as: www.earth.uni.edu/EECP/mid/mod5_sc.html for further instruction and materials.
- Write an expository essay explaining the greenhouse effect and global warming. Or, write a persuasive essay about convincing people to help stop global warming by using renewable energy sources, recycling, planting a tree. Have students pair up and peer edit their papers.
- Work in cooperative groups to create ideas on how students can help the environment. What can they do at school, at home? Present ideas to class. Have class vote on one idea that they can implement in their classroom and one that they can implement school wide - like collecting aluminum cans.
- If global warming increases, what affect will the melting icebergs have on our sea levels? Will sea levels rise? Conduct an experiment. Place an ice cube in a container and fill it with water until it is almost overflowing. Watch the water level as it melts. Did the water level rise? Explain why you think it did or did not rise.

VOCABULARY

- Atmosphere** A gas surrounding a given body.
- Carbon dioxide** A heavy odorless colorless gas formed during respiration and by the decomposition of organic substances; absorbed from the air by plants in photosynthesis.
- Climate** The weather in some location, averaged over some long period of time.
- Deforestation** To cut down and clear away the trees or forests.
- Desertification** The transformation of arable or habitable land to desert, as by a change in climate or destructive land use.
- Fossil fuels** A hydrocarbon deposit, such as petroleum, coal, or natural gas, derived from living matter of a previous geologic time and used for fuel.
- Global warming** An increase in the average temperature of the earth's atmosphere, especially a sustained increase sufficient to cause climatic change.
- Greenhouse effect** The atmosphere traps solar radiation, caused by the presence in the atmosphere of gases such as carbon dioxide, water vapor, and methane that allow incoming sunlight to pass through but absorb heat radiated back from the earth's surface.
- Heat energy** Form of energy that is transferred by a difference in temperature.
- Renewable energy** Alternative energy; energy derived from sources that do not use up natural resources or harm the environment
- Water vapor** Water in a gaseous state, especially when diffused as a vapor in the atmosphere.

CAREER POSSIBILITIES

- BIOLOGIST
- GEOLOGIST
- ENVIRONMENTAL SCIENTIST
- PHYSICAL SCIENTIST