

People and Climate

The Science of Global Atmospheric Change: Activity 10

Nancy Moreno, PhD.
Barbara Tharp, MS.

Center for
Educational Outreach

Baylor College of Medicine



BioEd Online

People and Climate

The objectives of this activity are aligned with the National Science Education Standards, specifically those related to Science as Inquiry and Physical Science. “People and Climate” uses guided inquiry to build students’ awareness of how climate influences all aspects of our lives. Students will make observations and references, model, use maps, and draw conclusions based on their investigation.

This activity addresses the following science concepts.

- Major climate zones are determined by distance from the equator and angle of light received from the sun.
- Rainfall is an important part of climate.
- Climate affects all aspects of human life.

Student Worksheets

Student pages in the teacher’s guide are provided in English and in Spanish.

Reference

Moreno N., and B. Tharp. (2011). *The Science of Global Atmospheric Change Teacher’s Guide*. Third edition. Baylor College of Medicine. ISBN: 978-1-888997-76-7. Development of this student activity was supported, in part, by grant numbers R25 ES06932 and R2510698 from the National Institute of Environmental Health Sciences of the National Institutes of Health to Baylor College of Medicine.

Image Reference

Photo © Stephen Bures. Licensed for use.

Key Words

lesson, energy, sun, climate, people, global change, global warming, weather, health, human,

People and Climate © Baylor College of Medicine.

Materials



BioEd Online

Materials

Begin the activity with a class discussion. Then have students work in groups of 4.

Teacher Materials

- Flashlight
- Flashlight batteries
- Globe, large inflated balloon, or ball

Materials per Student Group

- Large sheet of paper or poster board
- Several sheets of construction paper, asst. colors, 9 in. x 12 in.
- Glue sticks or paste
- One or more copies of “Global Climate Map” student sheet.

Reference

Moreno N., and B. Tharp. (2011). *The Science of Global Atmospheric Change Teacher’s Guide*. Third edition. Baylor College of Medicine. ISBN: 978-1-888997-76-7. Development of this student activity was supported, in part, by grant numbers R25 ES06932 and R2510698 from the National Institute of Environmental Health Sciences of the National Institutes of Health to Baylor College of Medicine.

Image Reference

Photo by Christopher Burnett © Baylor College of Medicine.

Key Words

materials list, materials needed,

People and Climate © Baylor College of Medicine.

Science Safety Considerations

- Follow all instructions.
- Begin investigation only when instructed to do so.
- Report accidents or spills.
- Wash hands thoroughly after the investigation.



BioEd Online

Science Safety Considerations

Students always must think about safety when conducting science investigations. This slide may be used to review safety with your class prior to beginning the activity.

Safety first!

- Always school district and school science laboratory safety guidelines.
- Have a clear understanding of the investigation in advance.
- Practice any investigation with which you are not familiar before conducting it with the class.
- Make sure appropriate safety equipment, such as safety goggles, is available.
- Continually monitor the area where the investigation is being conducted.

References

1. Dean R., M. Dean, and L. Motz. (2003). *Safety in the Elementary Science Classroom*. National Science Teachers Association.
2. Moreno N., and B. Tharp. (2011). *The Science of Global Atmospheric Change. Teacher's Guide*. Third edition. Baylor College of Medicine. ISBN: 978-1-888997-76-7. Development of this student activity was supported, in part, by grant numbers R25 ES06932 and R2510698 from the National Institute of Environmental Health Sciences of the National Institutes of Health to Baylor College of Medicine.

Key Words

science, classroom, safety, lab, laboratory, rules, safety signs,

People and Climate © Baylor College of Medicine.

Climate Differences

- Have you ever wondered why some parts of the world get more snow, rain, or sunlight than others?
- What is the coldest region of Earth? The hottest?
- Why is Antarctica cold and the Sahara Desert hot?
- Does climate depend on how much sunlight a region of Earth receives?



BioEd Online

Climate Differences

Begin the activity by asking the class questions like, *Have you ever wondered why some parts of the world get more snow, rain or sun than others? Which part of Earth is coldest? Which part is hottest? and Why is Antarctica cold and the Sahara Desert hot?*

Lead students in a discussion about the climate in different parts of the world. Be sure to emphasize the importance of the sun as a source of heat and other energy. Follow the discussion by asking, *Do you think climate depends on how much sunlight a region receives?* Explain to students that because Earth is tilted, some areas receive more direct sunlight than others.

Reference

Moreno N., and B. Tharp. (2011). *The Science of Global Atmospheric Change Teacher's Guide*. Third edition. Baylor College of Medicine. ISBN: 978-1-888997-76-7. Development of this student activity was supported, in part, by grant numbers R25 ES06932 and R2510698 from the National Institute of Environmental Health Sciences of the National Institutes of Health to Baylor College of Medicine.

Image Reference:

1. Photos of lightening, clouds, snow peak and hurricane from Microsoft Clip Art Library.

2. Photo of rain shower © Malene Thyssen CC-BY-SA 3.0.
<http://commons.wikimedia.org/wiki/File:Regnbyge.jpg>

3. Photo of tornado courtesy of NOAA. Public domain.
<http://commons.wikimedia.org/wiki/File:Dszpics1.jpg>

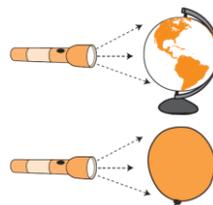
Key Words

lesson, energy, sun, climate, people, global change, global warming, weather, heat,

People and Climate © Baylor College of Medicine.

Let's Get Started

1. Observe as your teacher shines a flashlight toward the center of a globe or balloon. Which part received the most direct light?
2. Locate Earth's equator and poles on the "Global Climate Map" worksheet.
3. Discuss the characteristics of the climate where you live.
4. Work with your group to describe and illustrate how people might live in the climate type you were assigned.



Climate Zone
Geographic Area

DESCRIBE:
The Seasons
Major Crops
Major Foods
Types of Clothes
Types of Houses
Other Factors



BioEd Online

Let's Get Started

In this activity, students will learn about Earth's major types and how they affect people's lifestyles. Students will make observations, infer, model, use maps, and draw conclusions based on their investigations.

1. Darken the room and shine a flashlight at the center of a globe (or a balloon or large ball). Explain that the globe represents Earth and the flashlight represents the sun. Ask, *Based on this model, which part of Earth receives the most direct light and heat from the sun?* Help students to understand that the planet's midsection (near the equator) receives light at the most direct angle from the sun. Follow by asking, *Which part of Earth do you think might be warmest? Which part do you think would be coldest? Why?*

2. Distribute copies of the "Global Climate Map" sheet to each student or group. Help students find the equator and relate it to the central portion of the globe, balloon or ball you used for the demonstration. Next, have students identify Earth's polar and the temperate regions. Ask, *Is temperature the only important part of climate?* Lead students to understand that rainfall also is an important part of weather and climate. If students are not familiar with the concepts of weather and climate, introduce them at this point. (The term "weather" refers to conditions in the atmosphere at a given time or place. We use several variables to describe weather, including temperature, rainfall, wind speed, and humidity. The term "climate" refers to a region's normal weather patterns over long periods of time.)

3. Ask students, *What is our climate like?* Encourage a discussion of climactic characteristics in your area (winter conditions, amount of rainfall, temperatures in summer, etc.). Point out that regions with very little rainfall (deserts) also are shown on the "Global Climate Map."

4. Assign a climate zone and geographic area on the student page (e.g., temperate zone of North America; tropical zone of South America; tropical desert zone of Africa) to each group of students. Assign more explicit geographic locations (by country or region) to older students, and have them use outside resources to gather additional information. In all cases, explain that students will be envisioning how people in the assigned climate type might live. Have each group discuss and decide upon the types of clothing people might wear in summer and winter (or during rainy and dry seasons), what their homes might look like, and what types of food people might eat.

5. For helpful ideas, refer students to the cover of the *Explorations* mini-magazine accompanying this unit. Older students also may want to seek out resources in the library or on the Internet. Have each group write a description of the climate in its assigned region, and explain the lifestyle of people who live there. Have students illustrate their descriptions. When preparing their reports, students may want to follow a format similar to the one on this slide. Display each group's written descriptions and pictures in the classroom.

Reference

Moreno N., and B. Tharp. (2011). *The Science of Global Atmospheric Change Teacher's Guide*. Third edition. Baylor College of Medicine. ISBN: 978-1-888997-76-7. Development of this student activity was supported, in part, by grant numbers R25 ES06932 and R2510698 from the National Institute of Environmental Health Sciences of the National Institutes of Health to Baylor College of Medicine.

Image Reference

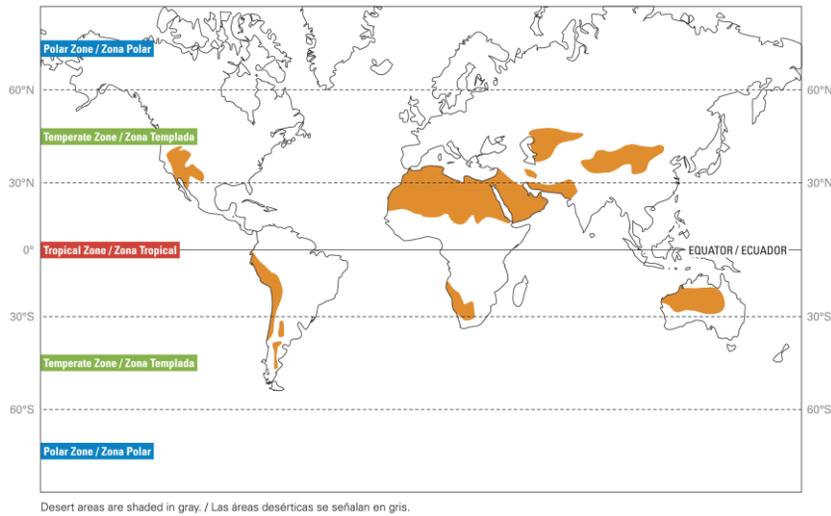
Illustrations by M.S. Young © Baylor College of Medicine.

Key Words

lesson, energy, sun, climate, people, global change, global warming, weather, heat, climate change,

People and Climate © Baylor College of Medicine.

Global Climate Map



BioEd Online

Global Climate Map

There are three major climate zones on the planet, by distance from the equator.

- The zone nearest the equator—the tropical zone—is warmest because it receives the most direct radiation from the sun.
- The zones closest to each pole—the polar zones—are the coldest, because they receive the least direct radiation.
- The broad areas between the tropical and polar zones—known as the temperate zones generally have snow or rain during cool or very cold winters. The temperate zones lie between 30° and 60° latitude in both hemispheres.

Reference

Moreno N., and B. Tharp. (2011). *The Science of Global Atmospheric Change Teacher's Guide*. Third edition. Baylor College of Medicine. ISBN: 978-1-888997-76-7. Development of this student activity was supported, in part, by grant numbers R25 ES06932 and R2510698 from the National Institute of Environmental Health Sciences of the National Institutes of Health to Baylor College of Medicine.

Image Reference

Illustration by M.S. Young © Baylor College of Medicine.

Key Words

lesson, energy, sun, climate, people, global change, global warming, weather, heat, climate change, Earth, polar zone, temperate zone, tropical zone, latitude, equator,

People and Climate © Baylor College of Medicine.

Let's Talk About It

- The central part of Earth (near the equator) receives light at a more direct angle from the sun than do other regions of the globe.
- People living nearest the equator will likely experience warmer temperatures and more sunlight than will people in other areas.
- Seasons are caused by the tilt of Earth as it revolves around the sun.
- When Earth's Northern Hemisphere is tilted toward the sun, it experiences summer; at the same time, the Southern Hemisphere experiences winter.



BioEd Online

Let's Talk About It

In this activity, students observe that sunlight shines most directly on the center of the globe, nearest to the equator. Conversely, areas furthest from the equator receive the least sunlight and heat. Students learn about the major climate types on Earth, and how climate affects people's lifestyles.

Discuss how light from the flashlight shined on the globe. Tell students that the central part of Earth (near the equator) receives light at a more direct angle from the sun than do other regions of the globe. Emphasize that in addition to temperature and sunlight, rainfall (or lack thereof) is an important component of weather and climate.

Ask students if they have ever wondered why there are seasons of the year. Tell them that seasons are caused by Earth's tilt as it revolves around the sun. When the Northern Hemisphere is tilted toward the sun, that half of Earth experiences summer, and the Southern Hemisphere has winter.

Reference

Moreno N., and B. Tharp. (2011). *The Science of Global Atmospheric Change Teacher's Guide*. Third edition. Baylor College of Medicine. ISBN: 978-1-888997-76-7. Development of this student activity was supported, in part, by grant numbers R25 ES06932 and R2510698 from the National Institute of Environmental Health Sciences of the National Institutes of Health to Baylor College of Medicine.

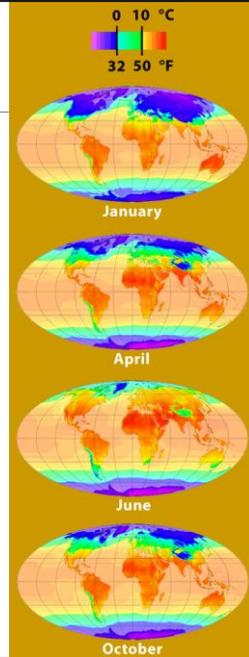
Key Words

lesson, energy, sun, Earth, climate, people, global change, global warming, weather, heat, climate change, equator, seasons, summer, winter,

People and Climate © Baylor College of Medicine.

The Science of Earth's Climate

- Major climate zones are determined by distance from the equator and angle of light received from the sun.
 - **Tropical zone:** nearest the equator
 - **Polar zone:** coldest; nearest the poles
 - **Temperate zone:** located between the tropical and polar zones
- Rainfall is an important part of climate that varies from region to region.
- Climate affects all aspects of human life.



BioEd Online

The Science of Earth's Climate:

In this activity, students learned the following properties of global resources.

- **Major climate zones are determined by distance from the equator and angle of light received from the sun.** There are three major climate zones on Earth, determined by distance from the equator. The zone nearest the equator—the tropical zone—is warmest because it receives the most direct radiation from the sun. The zones closest to each pole—the polar zones—are the coldest, because they receive the least direct radiation. The broad areas between the tropical and polar zones—known as the temperate zones—generally have snow or rain during cool or very cold winters.
- **Rainfall is an important part of climate.** Rainfall varies from region to region, depending on wind patterns and characteristics of the land. Some parts of the world receive little or no rainfall. Most of these desert areas are located near or within the tropical zone. Other parts of the tropical zone receive large amounts of rain during certain seasons.
- **Other factors also influence climate.** Nearness to an ocean usually keeps temperatures cooler in summer and warmer in winter. Altitude also influences temperature and mountainous areas experience colder temperatures than sea-level regions at the same latitude.
- **Climate affects all aspects of human life.** Most scientists are concerned that human activities are modifying Earth's climate. Increases in the levels of

greenhouse gases, such as carbon dioxide, may cause global temperatures to rise (global warming). This could change rainfall and temperature patterns in many parts of the world, with enormous consequences for ecosystems, cities and agriculture.

Reference

Moreno N., and B. Tharp. (2011). *The Science of Global Atmospheric Change Teacher's Guide*. Third edition. Baylor College of Medicine. ISBN: 978-1-888997-76-7. Development of this student activity was supported, in part, by grant numbers R25 ES06932 and R2510698 from the National Institute of Environmental Health Sciences of the National Institutes of Health to Baylor College of Medicine.

Image Reference

Images courtesy of the University of East Anglia Climatic Research Unit, CC-BY-SA 3.0.
<http://commons.wikimedia.org/wiki/File:MonthlyMeanT.gif>

Key Words

lesson, energy, sun, Earth, climate, people, global change, global warming, weather, heat, rain, rainfall, climate change, equator, seasons, summer, winter,

People and Climate © Baylor College of Medicine.

Extensions

- Research the main plant and animal communities in your group's assigned climate zone.
- Create a "torn paper art" picture of people and houses in one climate zone.
- Select any city in the world and identify where it would fall on the "Global Climate Map."
- Research the climate and lifestyles of people living in that city.



BioEd Online

Extensions

- Encourage students to ask questions and think of variations to the experiment.
- The global distribution of plants and animals is determined largely by climate. Have students research the principal plant and animal communities in their assigned climate zones and regions.
- Have each group create a "torn paper art" picture on a large sheet of paper or poster board, depicting people and homes in their assigned their climate zones. To create torn paper art, students should use only pieces of construction paper, torn to any size and pasted onto a background. Instead of using torn paper art, students could be allowed to choose their own medium.
- Have each group select a city, anywhere in the world, and identify where that city would fall on the "Global Climate Map." Groups then should research the climate for that city and the lifestyles of people who live there.
- Ask students, *How would people have to change their lifestyles if the predictions of global warming are accurate?* Follow by asking, *Would something that affects Earth's atmosphere impact the entire world, or only certain regions?*

Reference

Moreno N., and B. Tharp. (2011). *The Science of Global Atmospheric Change Teacher's Guide*. Third edition. Baylor College of Medicine. ISBN: 978-1-888997-76-7. Development of this student activity was supported, in part, by grant numbers R25

ES06932 and R2510698 from the National Institute of Environmental Health Sciences of the National Institutes of Health to Baylor College of Medicine.

Key Words

lesson, extensions, energy, sun, Earth, climate, people, global change, global warming, weather, heat, climate change, equator, seasons, summer, winter, climate zone, climate,

People and Climate © Baylor College of Medicine.