NATIONAL GEOGRAPHIC

RESOURCE LIBRARY I ACTIVITY : 50 MINS

Heating Up

Students activate prior knowledge of climate change and its causes and consequences with a gallery walk. They next discuss a video on current climate change effects and read encyclopedia articles to define and distinguish the terms *climate change* and *global warming*. Finally, students record their pre-existing knowledge and questions in response to the unit challenge.

GRADES

6, 7, 8

SUBJECTS

Conservation, Earth Science, Climatology

CONTENTS

4 Resources, 1 PDF

OVERVIEW

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For the complete activity with media resources, visit:
http://www.nationalgeographic.org/activity/heating/

In collaboration with

educurious
learning that connects

DIRECTIONS

This activity is part of the Climate Change Challenge unit.

1. Facilitate a gallery walk to help students link climate change with its causes and consequences.

- Place copies of images from *The Greenhouse Effect and our Planet* around the perimeter of the classroom (or show sequentially using a projector).Focus and connect students to evidence of *climate change* and/or global warming in the photographs by asking:
    - *What do you see in this image, and how do you think it relates to changes in Earth's climate?*
    - (For each of these images, see the online caption for a description of the subject and its relation to climate change. Students may need help with some images more than others; this may be their first exposure to the fact that cattle ranching relates to climate change, for example).
- When students have completed the gallery walk, ask them to share their answers, keeping track of their ideas in a visible place. Prompt students to similarly record their own and peers' responses in their notes, which they will use in constructing the *Know and Need to Know* chart in Step 4.

2. Show a video depicting an impact of climate change and facilitate a student discussion in response to the content.

- Introduce the *Climate Change and California's Drought* video (1:49), previewing the following questions for students:
    - *What extreme weather event is occurring in this video?* (Drought)
    - *What evidence from the video demonstrates that this weather event is extreme?* (The reservoir is extremely low; water is far from docks and parking.)
- After the video viewing and discussion of factual information, connect to students' lives by drawing out their prior knowledge and experiences with the following question:
    - *What extreme weather events have you experienced in your lifetime?* (Student responses may vary. It may be helpful to bring up recent local events, to distinguish

between weather and other events (such as earthquakes), and to prompt students to think of tornadoes, hurricanes, blizzards, and/or floods. Students from across the country and world may share interesting examples!)

3. Guide students as they define and distinguish climate change and global warming through short readings and a discussion.

- Assign half of the class to read the encyclopedic entry *Climate Change* individually or in pairs. Assign the other half to read the encyclopedic entry *Global Warming*. Prompt students to annotate as they read, especially relating to any text that describes the relationship between these terms.After students have finished reading, build conceptual understanding and reinforce differences between the two terms with the *Heating Up Meaning Maker* handout.
    - Ask volunteers to contribute a definition for *climate change* and *global warming* in their own words, based on their respective readings. Edit and record these definitions in a visible location, such that students can complete both in the *Heating Up Meaning Maker*, regardless of their article topic.
    - Invite students to list some characteristics or think of a way they could illustrate each conceptual term, and again, give students time to complete this element in their *Heating Up Meaning Maker*.
    - Brainstorm examples and non-examples of each term as a class, focusing in particular on those that distinguish climate change from global warming.
        - For a relevant example, refer to the video from Step 2, showing how climate change can involve events such as drought, which are more complex than warming alone.

4. Introduce the unit challenge and record students' pre-existing knowledge and questions in a *Know and Need to Know* chart.

- Explain that the video *Causes and Effects of Climate Change* (2:49) will provide key information in response to the unit driving question: *How can we communicate evidence of climate change to convince our community to act?*Before showing the video, preview questions for students to consider as they watch:
    - *What are some pieces of evidence for global climate change?*

    - *Why is it important for us to slow and reverse the effects of climate change?* (Possible responses within the video or from students' prior knowledge)

- Show the video and then discuss volunteers' responses to the above questions, writing them in a visible location for use in the *Know and Need to Know* chart later in this step.Using these student responses as motivation, introduce the project for the *Climate Change Challenge* unit: Students will learn to communicate the relevance and reality of climate change. They will also design a Climate Change Challenge Pledge, asking community members to help take action to address the causes and effects of climate change on planet Earth. To prepare for this, students will examine local and global data, storing their analyses in a digital portfolio throughout the unit.Create a *Know and Need to Know* chart based on the unit and its driving question. Ask students to discuss with a partner:

    - *What do we already know about the evidence for causes and effects of climate change?*
    - *What do we need to know about the evidence for causes and effects of climate change to convince our community to act?*

- Tell students they will revisit the chart throughout the unit as they learn new content and develop new questions. Keep the chart in a visible place in the classroom or easily accessible online for student use.

Tip

Step 1: *Cornell Notes*, a system to help students record and retain information, is one of many possibilities for structuring note taking. If you are using this system in your classroom, students can draw out key points from their notes as an exit ticket, or write a summary for homework to provide review and spacing.

Tip

Step 2: The *Heating Up Meaning Maker* is a version of the *Frayer Model chart*; the video and resource linked here can help you adapt this vocabulary-building tool to meet the needs of your students.

Tip

Step 3: Although students will explicitly encounter the differences between climate and weather during Lesson 2, it may be helpful to support them here in distinguishing between weather events (such as a single drought) and long-term weather patterns (more frequent droughts over multiple decades), which constitute climate.

Informal Assessment

Informally assess students' prior knowledge of global warming and climate change through their responses to the videos and gallery walk, as well as through the insights and questions they bring to the *Know and Need to Know* chart.

OBJECTIVES

Subjects & Disciplines

- Conservation

  Earth Science
  - Climatology

Learning Objectives

Students will:

- Read to compare and contrast the terms climate change and global warming.
- Begin to link climate change and global warming with their causes and consequences.
- Orient to the driving question and project for the Climate Change Challenge unit.
- Collaborate to share prior knowledge and ask questions related to climate change and evidence of its causes and effects.

Teaching Approach

- Project-based learning

Teaching Methods

- Discussions
- Multimedia instruction

- Reading

Skills Summary

This activity targets the following skills:

- 21st Century Student Outcomes
  - Learning and Innovation Skills
    - Communication and Collaboration
  - Life and Career Skills
    - Initiative and Self-Direction
    - Social and Cross-Cultural Skills
- 21st Century Themes
  - Environmental Literacy
  - Global Awareness
- Critical Thinking Skills
  - Remembering
  - Understanding
- Science and Engineering Practices
  - Asking questions (for science) and defining problems (for engineering)

National Standards, Principles, and Practices

COMMON CORE STATE STANDARDS FOR ENGLISH LANGUAGE ARTS & LITERACY

• **CCSS.ELA-LITERACY.RST.6-8.4:**
Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.

NEXT GENERATION SCIENCE STANDARDS

• **Crosscutting Concept 2: Cause and Effect:**
Cause and effect relationships may be used to predict phenomena in natural or designed systems.

• **MS. Earth and Human Activity:**

MS-ESS3-5. Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.

• **Science and Engineering Practice 1:**

Asking questions and defining problems

Preparation

What You'll Need

REQUIRED TECHNOLOGY

- Internet Access: Required
- Tech Setup: 1 computer per classroom, Monitor/screen, Speakers

PHYSICAL SPACE

- Classroom

GROUPING

- Large-group instruction
- Large-group learning
- Small-group learning
- Small-group work

RESOURCES PROVIDED: UNDEFINED

- National Geographic: Causes and Effects of Climate Change

RESOURCES PROVIDED: HANDOUTS & WORKSHEETS

- Heating Up Meaning Maker

RESOURCES PROVIDED: REFERENCE

- Greenhouse Effect
- Climate Change
- Global Warming

RESOURCES PROVIDED: AUDIO & VIDEO

- Climate Change and California's Drought

BACKGROUND & VOCABULARY

Background Information

Climate change is a broad term for the many ways that Earth's long-term weather patterns can change. Earth's climate has always changed, for example, with periods of warmer or colder temperatures, and these periods often last thousands or millions of years. Recently, however, Earth's climate has begun to warm at a rapid pace, relative to previous changes. This is called global warming, and it has led to many other changes, such as the melting of glaciers and rising sea levels.

An increase in the greenhouse effect is responsible for the recent rapid pace of global warming. This phenomenon occurs when certain gases, called greenhouse gases, such as carbon dioxide, trap energy from sunlight inside Earth's atmosphere, gradually heating the surface of the planet. Many greenhouse gases are byproducts of human activities, like the burning of fossil fuels. As a result, the vast majority of scientists accept that these human activities are responsible for increasing the rate of global warming.

Prior Knowledge

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Recommended Prior Activities

- None

Vocabulary

Term	Part of Speech	Definition
climate	*noun*	all weather conditions for a given location over a period of time.

Term	Part of Speech	Definition
climate change	*noun*	gradual changes in all the interconnected weather elements on our planet.
drought	*noun*	period of greatly reduced precipitation.
global warming	*noun*	increase in the average temperature of the Earth's air and oceans.
reservoir	*noun*	large, concentrated supply or reserve.
weather	*noun*	state of the atmosphere, including temperature, atmospheric pressure, wind, humidity, precipitation, and cloudiness.

For Further Exploration

Articles & Profiles

- National Geographic: Earth's Changing Climate

Instructional Content

- National Geographic: Resource Library: Collection: Climate Change
- National Geographic: Resource Library: Collection: Weather
- National Geographic: Resource Library: Collection: Catastrphic Weather Events
- National Geographic: Resource Library: Collection: Climate