

# CLIMATE CHANGE



**Grades 7–12**

## Global Climate Crisis

### Objectives:

- Introduce students to the scientific definition of climate crisis
- Discuss the 7 key components of climate science

**Vocabulary:** Climate change, Climate crisis, Climate mitigation

### Lesson:

*What is climate change?*

- To understand climate change, start by asking some questions:
  - What changes are happening to climate patterns in this region?
  - What changes are happening in other environments?
  - How are those changes affecting plants and animals?

**Climate change** is a change in global or regional climate patterns.

**Climate crisis** is the term that is used to describe climate change and its consequences.

**Climate mitigation** is the term that is used when referring to the efforts that are made to reduce or eliminate threats to the climate.

There are 7 essential principles of climate science:

1. Life on Earth has been shaped by, depends on and affects climate.
2. We increase our understanding of the climate system through observation and modeling.
3. The sun is the primary source of energy for the climate system.
4. Earth's carbon cycle and climate system are the results of complex interactions.
5. Earth's climate varies over time and space.
6. Evidence indicates that human activities are impacting the climate system.
7. Human decisions involving economic costs and social values influence Earth's climate system.

*What changes will happen to different environments?*

*How will these changes affect the plants and animals living in them?*

- Example: Most scientists agree the earth is warming: according to the Intergovernmental Panel on Climate Change (IPCC)—the authority on GCC—the surface temperature of the earth has warmed by about  $0.74^{\circ}\text{C}$  or  $1^{\circ}\text{F}$  over the past 100 years. Currently, the amount is predicted to increase unless we do something to slow it down.

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3.1.7B, 3.1.7C, 4.3.7B, 4.7.7C, 4.3.7B  
3.3.8 A5



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### Activities:

- Earth's climate history workshop: Analyze tree rings to learn about weather patterns and climate history, using the downloadable worksheet called Reading Tree Rings (pages 4-5 of this document).
- Climate science research and presentation: Present to the class one of the major key components of climate science. Choose a living organism on planet earth as your focus, and share how it's being affected by climate change.
  - <https://www.climaterealityproject.org/blog/key-terms-you-need-understand-climate-change>

### PA Academic Standards:

3.2.3.B3, 3.1.4. A5, 3.1.4.C2, 3.1.4.A5 3.3.5.A5, 3.4.6.E2

### Tools:

- Videos:
  - Academy staff and visitors share thoughts on Climate Change
    - [https://www.youtube.com/watch?v=znBVTE2tv\\_o](https://www.youtube.com/watch?v=znBVTE2tv_o)

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### Academy Connections

Several different groups of scientists at the Academy are researching the effects that Global Climate Change is having on our environs. One example is the **Institute of Mongolian Biodiversity and Ecological Studies (IMBES)**. In 1995, the Institute of Mongolian Biodiversity and Ecological Studies (IMBES) was founded at the Academy to support research at Hövsgöl. Lake Hövsgöl (Hövsgöl Nuur) is a 100-mile-long lake located 20 miles from the Russian border in northern Mongolia. Concern with environmental protection, sustainable economic development and **climate change** led the government to establish the Mongolian Long-Term Ecological Research network in 1997. The primary goal of the Hövsgöl LTERN is to study the long-term ecological interactions of livestock herding and climate change with the watershed's taiga forests, steppes and waters. Changes in climatic regimes and continued increases in the frequency of climatic extremes will have significant and potentially devastating impacts on local peoples and entire countries. Recent and ongoing work at Hövsgöl (Mongolia) has contributed considerable insight into the interactions of climate change with permafrost degradation, desertification and sustainable rangeland management.

### The Patrick Center for Environmental Research (PCER)

More than 60 years ago, Dr. Ruth Patrick created a powerful vision for how science could help society protect environmental quality. She founded a new program (the Department of Limnology) at the Academy of Natural Sciences in pursuit of that vision. One of many ongoing projects in the Patrick Center includes a study entitled “Linking Impacts of Climate Change to Carbon and Phosphorus Dynamics along a Salinity Gradient in Tidal Marshes.” How will climate change affect the nutrients in our tidal marshes, areas that provide food and shelter and nurseries for many of the species that make their homes in the ocean, including many commercially important species? This research will improve the assessment of how ecosystem services provided by tidal freshwater marshes are likely to respond to predicted changes in climate-induced sea level rise and salinity.

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## Reading Tree Rings

Trees experience a lot of climate events and natural occurrences in their long lives. Their history is literally in their wood, if only you know how to read it.

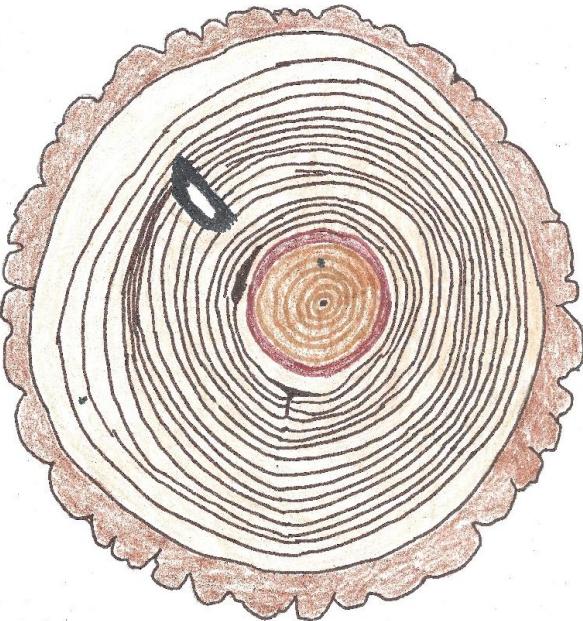
### Materials:

- Tree slices or pictures

### Instructions:

Take a look at our example tree picture to answer these questions:

- How old is the tree?
  - The tree's age can be figured out by counting the rings.
  - Start with the first dark ring in the center.
  - Count out to the last dark ring before the bark.
  - Each ring equals a year.
- What was each year like?
  - The width of the ring tells you if the environment was good or bad that year.  
In years with good rain and temperature, the rings are wider.
  - If the rings become thinner on one side, it probably means the tree was leaning (due to a storm or high winds).
  - Strange marks like scars might have been left by insects or disease.



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