

Climate Then & Now Lesson Plan

Students consider how climate affects us and whether our climate history recollections are accurate.

Water Atlas Curriculum Lesson 31

Topic: This module considers how climate affects our lives and livelihoods and whether our recollections about climate are accurate. Students interview older residents in the community about climate changes during their lifetime and compare the results to a climate change index that is based on historical temperature measurements. It was adapted from the *Union of Concerned Scientists Global Warming: Early Warning Signs Lesson 2* (See Resources, below).

Grade Level: High School (Grades 9th–12th)

Time Allotted: 3+ hours

Performance Objectives

References are to the Next Generation Sunshine State Standards (2007).

Science

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|--------------|---|
| SC.912.N.1 | Identify the basic process used in scientific investigations, including questioning, observing, recording, determining, and sharing results. |
| SC.912.N.2.4 | Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability. |
| SC.912.N.2.5 | Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations. |
| SC.912.N.3.1 | Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer. |
| SC.912.N.3.2 | Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science. |
| SC.912.N.4.1 | Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making. |
| SC.912.N.4.2 | Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental. |

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- SC.912.L.17.12 Discuss the political, social, and environmental consequences of sustainable use of land.
- SC.912.L.17.13 Discuss the need for adequate monitoring of environmental parameters when making policy decisions.
- SC.912.L.17.16 Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution.
- SC.912.L.17.18 Describe how human population size and resource use relate to environmental quality.
- SC.912.L.17.20 Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.

Social Studies

- SS.912.G.3.2 Use geographic terms and tools to explain how weather and climate influence the natural character of a place.
- SS.912.G.3.3 Use geographic terms and tools to explain differing perspectives on the use of renewable and non-renewable resources in Florida, the United States, and the world.
- SS.912.G.3.4 Use geographic terms and tools to explain how the Earth's internal changes and external changes influence the character of places
- SS.912.G.6.1 Use appropriate maps and other graphic representations to analyze geographic problems and changes over time.
- SS.912.G.6.3 Formulate hypotheses and test geographic models that demonstrate complex relationships between physical and cultural phenomena.
- SS.912.W.1.1 Use timelines to establish cause and effect relationships of historical events.
- SS.912.W.1.3 Interpret and evaluate primary and secondary sources.
- SS.912.W.1.4 Explain how historians use historical inquiry and other sciences to understand the past.
- SS.912.W.1.5 Compare conflicting interpretations or schools of thought about world events and individual contributions to history (historiography).

Prior Knowledge

Students will need to recall the climate conditions throughout their lifetimes.

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Overview

After considering their own experience with climate change, students interview older residents in the community about climate changes during their lifetime and compare the results to a climate change index that is based on historical temperature measurements.

Key Vocabulary

Climate

The long-term average of conditions in the atmosphere, ocean, and ice sheets and sea ice described by statistics, such as means and extremes.

Climate change

A change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forces, or to persistent anthropogenic (human-caused) changes in the composition of the atmosphere or in land use.

Common Sense Climate Index

A measure of whether an area has experienced a temperature change that should be noticeable to most people who have lived at that location for a few decades. Positive values indicate climate is warmer than average and a persistent index value of +1 or greater represents a climatic warming that should be noticeable to the people of a region.

Normal temperatures

Historical temperature (and precipitation) data are evaluated relative to a “normal,” which is the average for a particular sub-period of time or the average of all the years of record.

Weather

The state of the atmosphere at a specific time and place.

Materials

- Computers with internet access
- Survey forms for interviews

Resources

The following documents may be found in the [Digital Library](#) in the Orange County Water Atlas:

[Oral History Project: Guidelines for Recording an Interview](#)

Adapted from guidelines developed by the Girl Scouts of America.

[Global Warming: Early Warning Signs Curriculum Guide](#)

Source: Union of Concerned Scientists. 2000.

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Sarasota County Water Atlas Oral History pages

<http://www.sarasota.wateratlas.usf.edu/history/oralhistory.aspx>

Climate Change Oral History Project (Lesson 15)

Source: World Wildlife Fund. 2007. (adapted from the Union of Concerned Scientists Curriculum Guide; has additional ideas for questions, as well as suggested forms)

Other resources:

A New Oral History: Where Words Touch the Earth (video series)

National Aeronautics and Space Administration and WGBH Educational Foundation. 2010.

Common Sense Climate Change Index for Orlando

National Aeronautics and Space Administration Goddard Space Flight Center. (Site accessed June 2011)

Cook, John. [Skeptical Science: Getting Skeptical About Global Warming Skepticism](#). Website. Accessed June 2011.

[Intergovernmental Panel on Climate Change](#). Website. Accessed June 2011.

[Power Up Florida](#) (Orlando/Orange County web portal to sites for electrical efficiency, solar usage, electric vehicles, clean technology, Climate Change Education Center, etc.). Accessed July 2011.

Stanton, Elizabeth K., and Frank Ackerman. [Florida and Climate Change: The Cost of Inaction](#). 2007. Tufts University Global Development and Environment Institute and Stockholm Environment Institute—US Center.

[A Student's Guide to Climate Change](#). Website. Environmental Protection Agency. Accessed June 2011.

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Procedure

Engage/Elicit

Have each student write a description of the local climate – students new to the area can describe the climate where they grew up. Allow room for creativity in format (this may be done on computers or paper), but be sure students consider the following points:

- average temperature
- average precipitation (rain and/or snow)
- any seasonal change of temperature
- any seasonal change of precipitation
- what they know about air masses that affect the climate
- what they know about geographical features that affect the climate (large bodies of water, mountains etc.)

Have them also describe how the local climate affects their life, including any activities they enjoy.

Finally, have them decide if the climate has changed since they were younger, and if so, how. Collect the papers when they have finished and quickly tally the results of the climate change question.

Explore 1: The Interviews

Share the results of the climate change question with the class – what percentage thought that climate change was happening? Discuss why some might think so and others not, including lifestyle (for example, how much time do they spend outdoors?) and media consumption habits (e.g., Do they believe Al Gore or Rush Limbaugh?).

Have the class consider how reliable their results are. Can people really notice climate change? What could be done to get more reliable results?

Assign a project where each student interviews 2 or 3 older community members, using the ***Climate Change Survey – Sample Questions Handout*** as a guide. The class may choose the questions they want to include in their interviews from the handout, and add others they want answered as well. You may want to watch or assign some of the resources as background material for this activity, including ***A New Oral History: Where Words Touch the Earth*** and the ***Climate Change Oral History Project***. You will definitely want them to read the brief ***Oral History Project: Guidelines for Recording an Interview***, updating the information for the technology they will be using.

To simplify legal and ethical issues, students should interview people who have lived in the area for at least three decades, but should not include names or addresses – keep the responses anonymous, and be sure to explain this to the people being interviewed.

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Explore & Explain: Comparing the Data

Once the interviews have been done and the results summarized, have the students access local climate data using the **Common Sense Climate Change Index**. The link for Orlando is given in the list of Resources, but you will probably want to let students explore the site and find the closest station for themselves.

In groups, have the students prepare a paper or presentation on any differences between the results of their oral history surveys and the Common Sense Climate Change Index. The paper or presentation should incorporate answers to the following questions:

- What were the results of the resident survey?
- Was there a clear opinion on change in climate or did answers differ from one resident to another?
- If they differed, were there any clear patterns relating the answers to the length of time the resident lived in the area, lifestyle, occupation, or other factors?
- What does the Climate Index say about local climate change?
- Has climate been warming, cooling, fluctuating, or more or less consistent (both over the entire period of record, and for the period of record that corresponds to the lifetime of the interviewed residents)?
- According to the index, should the climate changes over the last few decades be noticeable to older residents (i.e. has the Climate Index been persistently greater than 1, or less than 1)?
- Do the results between the survey and the Climate Index agree? If they do agree can you say anything about the usefulness of the Climate Index, or do you still need more information?
- If they do not agree, can you suggest reasons for the disagreement (i.e. people's perceptions are not always consistent with reality, Climate Index is not a perfect measure of noticeable climate change, etc.)?

After students have completed their projects, conduct a class discussion on how perception of climate change might affect a person's position on climate change policy. Be sure to consider other factors that may affect such positions as well.

Extend

The class could summarize the oral history reports as an article for a local or school newspaper, prepare them as a multimedia presentation, or submit them to the **Orange County Water Atlas**. See the **Sarasota County Water Atlas Oral History pages** for examples.

If the school has a partner in another region or country, results from both surveys and the Common Sense Climate Change Index could be compared. You might also want to try choosing a school where the Climate Index has been persistently above +1, such as some Alaskan and Canadian sites.

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Exchange/Evaluate

Examine the students' initial reports on their local climate – thoughtful and creative responses are ideal.

Evaluate their group paper/presentation on the differences between the oral history surveys and the Common Sense Climate Change Index for the area.

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