

Lesson 5

Climate Change in Oral History



Climate and Oral History

NYS Intermediate Level Science

Standard 1: Analysis, Inquiry and Design/Mathematical Analysis

M2.1a Interpolate and extrapolate from data.

M2.1b Quantify patterns and trends.

Standard 1: Analysis, Inquiry and Design/Scientific Inquiry

S1.3 Represent, present, and defend their proposed explanations of everyday observations so that they can be understood and assessed by others.

S1.4 Seek to clarify, to assess critically, and to reconcile with their own thinking the ideas presented by others, including peers, teachers, authors, and scientists.

S2.3c Collect quantitative and qualitative data.

S3.1a Organize results, using appropriate graphs, charts, and data tables.

S3.2d Formulate and defend explanations and conclusions as they relate to scientific phenomena.

S3.2h Use and interpret graphs and data tables.

Standard 2: Information Systems

1.2 Use spreadsheets and database software to collect, process, display, and analyze information. Students access needed information from electronic databases and on-line telecommunication services.

Standard 6: Interconnectedness

5.2 Observe patterns of change in trends or cycles and make predictions on what might happen in the future.

Standard 4: The Living Environment

7.2d Since the Industrial Revolution, human activities have resulted in major pollution of air, water, and soil. Pollution has cumulative ecological effects such as acid rain, global warming, or ozone depletion. The survival of living things on our planet depends on the conservation and protection of Earth's resources.

Standard 4: The Physical Setting

2.2i Weather describes the conditions of the atmosphere at a given location for a short period of time.

2.2j Climate is the characteristic weather that prevails from season to season and year to year.

2.2q Hazardous weather conditions include thunderstorms, tornadoes, hurricanes, ice storms, and Humans can prepare for and respond to these conditions if given sufficient warning.

2.2r Substances enter the atmosphere naturally and from human activity. Some of these are carbon dioxide, methane, and water vapor. These substances can affect weather, climate, and living things.

Next Generation Science Standards

Science and Engineering Practices:

2. Developing and using models
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information



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Grade 6

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

Grade 7

ESS3-2. Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.

Common Core State Standards**ELA in the Content Areas - Grades 6-8**

CCSS.ELA-Literacy.RST.6-8.7

Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

CCSS.ELA-Literacy.WHST.6-8.1b

Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.

CCSS.ELA-Literacy.WHST.6-8.8

Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.

Common Core State Standards - Mathematics**Standards for Mathematical Practice**

CCSS.Math.Practice.MP2

Reason abstractly and quantitatively.

CCSS.Math.Practice.MP4

Model with mathematics.

Grade 6

CCSS.Math.Content.6.NS.C.8

Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.

CCSS.Math.Content.6.SP.A.2

Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.

CCSS.Math.Content.6.SP.B.5c

Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.

Grade 7

CCSS.Math.Content.7.SP.A.2

Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions.



Climate Change in Oral History

This lesson is adapted from a Smithsonian National Museum of Natural History curriculum, Forces of Change: http://forces.si.edu/arctic/pdf/ACT%20202_CHANGES.pdf

Introduction

In this lesson, students will interview community members about their perceptions of local climate during their lifetimes. Students will then compare these interview data with 30-year local temperature and precipitation data.

Objectives

Students will be able to

- Compile and summarize community survey results on local climate change
- Analyze local climate data and calculate averages
- Compare survey results with climatic data
- Communicate the results of their investigations

Materials Required

- Laptops or tablets for students to use. (If computers are not available, then access and print out the data for your area for students to use in the Elaborate section of the lesson.)

Advanced Preparation

- Identify some local community members who will have some historic knowledge of your area. Some resources to consider are partnering with a local seniors group, or reaching out to school/district alumni so that students who are newcomers to the area will have people to interview.
- Make copies of Activity Sheets 1 and 2 (one copy per student) and 3 (two copies per student).
- If possible, bookmark the following website: <http://www.ncdc.noaa.gov/cag/> on each student computer.

Engage

Ask students to describe the weather during the past week. Would a description of one week's weather be adequate to describe the climate where they live? Why or why not? How do weather and climate differ?

How much would they say their lives are affected by climate? List ways their climate can affect them. (Examples include: Winter snows can cause school to close. Rains can trigger mudslides. Spring rains can flood the softball field. A mild climate allows me to bike year-round. A hurricane caused us to be without electricity for several days. A warm climate allows me to swim outside year round, etc.).

What, if any, changes have they observed in the climate since they were old enough to go to school? How do they think their observations would compare with observations by older people in their community?



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Explore

- Tell students that each one (or a pair of students) will interview three longtime residents of the community. The interview subjects should have lived in the community for at least two or three decades. Discuss why they are surveying long-time residents. (Climate is a long-term record of weather.)
- Discuss who they might consider interviewing. (Subjects could include teachers, family members, and neighbors. Teachers might consider contacting a local senior center where students could conduct their interviews. Teachers should collect names of intended interview subjects ahead of time to verify that each student has a different interview subject.) Emphasize that the subjects they interview should remain anonymous.
- Distribute and discuss the survey (see note) form on Activity Sheet 1. Delete questions that are not relevant to your area. Add questions if they like. (Alternatively the class can design its own form.)
- Distribute Activity Sheet 2. Students summarize the results of their interviews on this form. It is very important that students understand Part 3 on Activity Sheet 2. Here, they calculate the average for the number of years their three subjects lived in the community. If necessary, review the steps for calculating an average. Students will need this number to complete the exercise in Step 3 on page 3.
- Give students a week or so to conduct their interviews and summarize their data.

Explain

*Note: To save time, begin the **Elaborate** during the time that students are completing their interviews and compiling their findings.*

Facilitate a class discussion of the survey results. Discuss the relationship between the survey results and the historical weather records for their community.

- What were the results of the survey? Were responses similar or different among the residents surveyed? Did responses vary based on the amount of time subjects spent outdoors in their work or hobbies?
- How did the responses of long-time residents compare with the students' observation? If they differed, why might that be the case? (examples: age, work, hobbies.)

As a class, choose three of the most interesting questions on the survey. Create a data table in which you can compile class findings.

Have students create a bar graph of the class data for those three findings. Then, discuss students' observations based on the graph.

(Alternatively, compile the data for all questions and have groups of students create graphs for different questions.)

Elaborate

Tell students they will use the Internet to acquire historical weather records for their city. They will be using this data to determine if the results of their surveys agree or disagree with actual changes in climate over the same time period.



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Explain that the data they use will be annual mean (average) temperature and precipitation records. Review the term “mean.” A mean is computed by summing the values and dividing by the number of values. The arithmetic mean is commonly referred to as an “average.”

Distribute Activity Sheet 3.

NOAA's National Climatic Data Center (NCDC) provides public access to the Nation's climate and historical weather data. You may want to review the NCDC Climate Data Online Search tool www.ncdc.noaa.gov/cdo-web/search to help you understand the breadth of data available.

This lesson utilizes the NCDC Climate at a Glance interactive tool located at <http://www.ncdc.noaa.gov/climate-information/climate-us>



The screenshot shows the NOAA National Climatic Data Center website. The header includes the NOAA logo and the text "NATIONAL CLIMATIC DATA CENTER NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION". The navigation bar has links for Home, Climate Information, Data Access, Customer Support, Contact, and About NCDC. A search bar is also present. The main content area is titled "Climate of the U.S." and includes a sidebar with links to various climate-related topics. The main text describes the climate system within the United States and lists several interactive tools and reports available.

Climate of the U.S.

The climate system within the United States varies by place and by time of year. Climate Normals define the climate of a place during a time of year. Other products help define climate trends and variability over time.

- **Climate at a Glance**
This interactive tool provides historical information on precipitation and temperature for selected places, from cities to states to climate regions to the contiguous United States. A menu-driven system provides the history and trend for each place. Annual data can be further broken down by month and by season.
- **Monthly U.S. Climate Reports**
Analyses of the Nation's recent climate conditions, their unusualness, and their long-term trends for many aspects of the climate system.
- **Climate Normals**

Satellite view of the contiguous United States

If possible, bookmark this page on student computers <http://www.ncdc.noaa.gov/cag/>

Show students how to select data for the Hudson Valley (under Location>New York>Hudson Valley) and how to change the dates for the first 10 years of their interviewees' lives as well as for the past 10 years. They will get this information from Activity sheet 2.

NOAA NATIONAL CLIMATIC DATA CENTER
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

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Home > Climate Monitoring > Climate at a Glance July U.S. release: Tue, 12 Aug 2014, 11:00 AM EDT

Climate at a Glance

Climate Monitoring
State of the Climate
BAMS State of the Climate
Temp, Precip, and Drought
Climate at a Glance
Extremes
Societal Impacts
Snow and Ice
Teleconnections
GHCN Monthly
Monitoring References

Time Series | Mapping | Data Information | Background

NCDC transitioned to the nClimDiv dataset on Thursday, March 13, 2014. This was coincident with the release of the February 2014 monthly monitoring report. For details on this transition, please visit our [public FTP site](#) and our [U.S. Climate Divisional Database site](#).

Time Series

U.S. Globe

Choose from the options below and click "Plot" to create a time series graph.
Please note, Degree Days are not available for Agricultural Belts, NWS Regions and Cities; Palmer Indices are not available for NWS Regions and Cities.

Parameter: Average Temperature
Time Scale: 1-Month Month: June
Start Year: 1895 End Year: 2014
State/Region: Contiguous U.S.
Climate Division/City: All 48 States

Options
☒ Display Base Period
Start: 1901 End: 2000
☐ Display Trend
☒ per Decade ☐ per Century
Start: 1895 End: 2014
☐ Show Smoothed Time Series

Plot

Repeat above steps and select "Precipitation." Print the data on the "Climate at a Glance Table" for annual mean precipitation. (See Teacher Reference #1 for how to calculate these averages—you may wish to share this reference page with students). Note that you can download the data into Excel, and have student calculate an average that way if you prefer.

Use data to complete Activity Sheet 3. With the data they access, the students calculate an average for the first ten years in the record and an average for the last ten years in the record. They then calculate the difference between the two averages. They complete this exercise for both annual average temperatures and average annual precipitation. *Note that the data is tabular.*

Once students have completed their calculations, discuss their findings and how they relate to the survey they conducted.

- What did the historical weather records tell you about climate change during the period of time your subjects lived in the community?
- Have temperatures been warming, cooling, or about the same? Has precipitation increased, decreased, or stayed the same?
- Did the observations made by your subjects agree or disagree with the actual records of temperatures and precipitation? Do you think the actual changes have been large enough for people to notice?
- How did your interviewees' recollections compare to the historical data?
- When are oral histories important?
- Why are scientific data important? Evaluate

Student Activity Sheet 1 Climate Change in Oral History

Student Name _____

Interview participant # _____

Use a separate form for each of the three people you interview. Do not use the participant's name. Just enter a number 1, 2, 3, etc.

Before you begin:

- 1> Introduce yourself.
- 2> Explain the purpose of the survey: to collect observations from people in your community about changes in local climate. You are interested in talking to them because they have lived here for many years.
- 3> Define the term "climate:" Climate is the average weather in a location over a long period of time: Climate tells us what the weather is usually like in a particular place.

Ask each subject the following questions.

- 1 > How many years have you lived in the area? _____
- 2 > Overall, would you say that the climate has changed during the time you have lived here? If so, how has it changed?

- 3 > Do you (or did you) spend a lot of time outdoors in your work or your hobbies? Explain.

Ask each subject to respond to the following statements. (Circle one answer for each question)

- 1 > Compared to the past, today's summer temperatures are:
much hotter / somewhat hotter / same/ somewhat cooler / much cooler / not sure
- 2 > Compared to the past, today's winter temperatures are:
much colder / somewhat colder / same / somewhat warmer / much warmer / not sure
- 3 > Compared to the past, the number of unusually hot days now is:
much more / somewhat more / same/ somewhat fewer / fewer / not sure
- 4 > Compared to the past, the number of unusually cold days now is:
much more / somewhat more / same / somewhat fewer / fewer / not sure
- 5 > Compared to the past, our climate today is:
much wetter / somewhat wetter / same / somewhat drier / much drier / not sure
- 6 > We have more heavy downpours now than in the past: strongly agree / agree/ disagree / strongly disagree / not sure
- 7 > We have more droughts now than in the past: strongly agree / agree / disagree / strongly disagree / not sure
- 8 > We have more snow now compared to the past: strongly agree / agree / disagree / strongly disagree / not sure
- 9 > How much would you say your life today is affected by climate: significantly / somewhat / not at all
- 10 > How much was your life in the past affected by climate: significantly / somewhat / not at all



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Student Activity Sheet 2 Climate Change in Oral History

Student Name _____

STEP 1 > Tally the responses from each person you surveyed for each of the 10 questions you asked. For each question, write in how many of your subjects—0, 1, 2, or 3—selected each of the possible choices. For example, if three of your subjects chose “much hotter,” place a “3” in the blank next to “much hotter.” You will share this data during a class discussion.

1 > Compared to the past, today's summer temperatures are:

___much hotter ___somewhat hotter ___same ___somewhat cooler ___much cooler ___not sure

2 > Compared to the past, today's winter temperatures are:

___much colder ___somewhat colder ___same ___somewhat warmer ___much warmer ___not sure

3 > Compared to the past, the number of unusually hot days now is:

___much more ___somewhat more ___same ___somewhat fewer ___fewer ___not sure

4 > Compared to the past, the number of unusually cold days now is:

___much more ___somewhat more ___same ___somewhat fewer ___fewer ___not sure

5 > Compared to the past, our climate today is:

___much wetter ___somewhat wetter ___same ___somewhat drier ___much drier ___not sure

6 > We have more heavy downpours now than in the past:

___strongly agree ___agree ___disagree ___strongly disagree ___not sure

7 > We have more droughts now than in the past:

strongly agree ___agree ___disagree ___strongly disagree ___not sure

8 > We have more snow now compared to the past:

___strongly agree ___agree ___disagree ___strongly disagree ___not sure

9 > How much would you say your life today is affected by climate:

___significantly ___somewhat ___not at all

10 > How much was your life in the past affected by climate:

___significantly ___somewhat ___not at all



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Student Activity Sheet 2 Climate Change in Oral History

Student Name _____

STEP 2 >

Subject #1

1 > Subject has lived in my community for _____ years, since _____.

(Subtract the number of years lived here from the current year.)

2 > Summarizing this subject's responses, he/she observed that the climate has changed *(circle one)*

Significantly

Somewhat

None

They were not sure

Subject #2

1 > Subject has lived in my community for _____ years, since _____.

(Subtract the number of years lived here from the current year.)

2 > Overall, this subject observed that the climate has changed *(circle one)*

Significantly

Somewhat

None

They were not sure

Subject #3

1 > Subject has lived in my community for _____ years, since _____.

(Subtract the number of years lived here from the current year.)

2 > Overall, this subject observed that the climate has changed *(circle one)*

Significantly

Somewhat

None

They were not sure

STEP 3 >

1 > Calculate an average number of years lived here for your three subjects and enter it here. _____

2 > Subtract the average you calculated in #1 from the current year and enter it here _____. (You will enter this year as the "beginning year" and the "base period year" on the NOAA Web site to access historical weather records.)



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Student Activity Sheet 3 Climate Change in Oral History

Student Name _____

DATA FROM "CLIMATE AT A GLANCE" TABLE

STEP 1 >

Calculate an average **temperature** for the **most recent** ten years from your "Climate at a Glance" Table. Enter it here_____.

Calculate an average **temperature** for the **first 10** years from your "Climate at a Glance" Table. Enter it here_____.

Compare the two averages. How much of an increase or a decrease has there been? _____

STEP 2 >

Calculate an average **precipitation** for the **most recent 10** years from your "Climate at a Glance" Table. Enter it here_____.

Calculate an average **precipitation** for the **first 10** years from your "Climate at a Glance" Table. Enter it here_____.

Compare the two averages. How much of an increase or a decrease has there been? _____



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Hudson River Estuary Climate Change Lesson Project

www.nyseagrant.org
<http://www.dec.ny.gov/lands/>



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