ARM

CLIMATE RESEARCH FACILITY

Education and Outreach Lesson Plan

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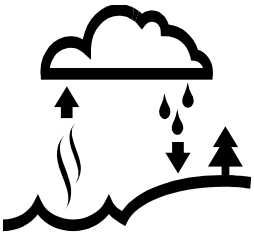
Grade levels 6–8

Current Weather

Current Weather



Approximate Time

1 to 2 hours. The best use of time might be to introduce the background information in 1 hour and then do the research activity in another hour.

Objective

The objective of this activity is to investigate the difference between weather and climate and changes that take place in a given environment.

Key Points to Understand

- Although they are closely related and interdependent, there is a noticeable difference between weather and climate in terms of time.
- When we talk about climate change, we talk about changes in long-term averages of daily weather.

Background Information

- Although they are closely related and interdependent, there is a noticeable difference between weather and climate. The difference between weather and climate is a measure of time. Weather is what the atmospheric conditions are over a short period of time, and climate is how the atmosphere "behaves" over relatively long periods of time.
- There are many components to weather. Weather includes sunshine, rain, cloud cover, winds, hail, snow, sleet, freezing rain, flooding, blizzards, ice storms, thunderstorms, steady rains from a cold front or warm front, excessive heat, heat waves, and more.
- Climate is the description of the long-term pattern of weather in a particular area. Some scientists define climate as the average weather for a particular region and time period, usually taken over 30 years. It's an average pattern of weather for a particular region.
- When scientists talk about climate, they're looking at averages of precipitation, temperature, humidity, sunshine, and wind velocity; phenomena such as fog, frost, and hail storms; and other measures of the weather that occur over a long period in a particular place. For example, after looking at rain gauge data, lake and reservoir levels, and satellite data, scientists can tell if, during a summer, an area was drier than average. If it continues to be drier than normal over the course of many summers, than it would likely indicate a change in the climate.
- When we talk about climate change, we talk about changes in long-term averages of daily weather. To separate daily weather from climate, the National Weather Service uses values from the past 30 years to compile average weather. In the study of global climate change, scientists use even longer time periods, preferring to go back as far as the historical record will go, as long as it is thought to be accurate.
- If summers seem hotter lately, then the recent climate may have changed. In various parts of the world, some people have even noticed that springtime comes earlier now than it did 30 years ago. An earlier springtime is indicative of a possible change in the climate.

- Why study climate? The reason that studying climate and a changing climate is important is the effect that climate change will have on people around the world. Rising global temperatures are expected to raise sea levels and change precipitation and other local climate conditions. Changing regional climate could alter forests, crop yields, and water supplies. It could also affect human health, animals, and many types of ecosystems. Deserts may expand into existing rangelands, and features of some of our national parks and national forests may be permanently altered.

Key Vocabulary

- **Climate**: General weather conditions expected in a given area, usually based on the 30-year average weather. May also be applied more generally to large-scale weather patterns in time or space (for example, an Ice Age climate or a tropical climate).
- **Climate Change**: Changes in long-term averages of daily weather.
- **Crop Yields**: A measurement of the amount of a crop that was harvested per unit of land area.
- **Ecosystem**: An ecosystem is a complex set of relationships among the living resources, habitat, and residents of an area. It includes plants, trees, animals, fish, birds, microorganisms, water, soil, and people.
- **Fog**: A cloud with its base at the Earth's surface. It reduces visibility below 1.5 miles.
- **Freezing Rain**: Rain or drizzle that falls in liquid form and then freezes upon striking a cold object or the ground. Both can produce a coating of ice on objects, which is called "glaze."
- **Frost**: A covering of ice produced by deposition of precipitation on exposed surfaces when the air temperature falls below the frost point.
- **Hail Storm**: Transparent or partially opaque particles of ice that range in size from that of a pea to that of golf balls. Hail is one of the most common elements of a thunderstorm. A thunderstorm producing hail 3/4 inch in diameter is called a "severe thunderstorm."
- **Humidity**: The amount of water vapor in the air.
- **Precipitation**: Any form of water particles, liquid or solid that falls from the atmosphere and reaches the ground.
- **Rain Gauge**: An instrument used to gather and measure the amount of liquid precipitation over a set period of time.
- **Sleet**: Precipitation that falls to Earth in the form of frozen or partially frozen raindrops, often when the temperature is near the freezing point. Sleet usually leaves the cloud in the form of snow that melts as it passes through warm layers of air during its descent. The raindrops and partially melted snowflakes then freeze in the colder layers nearer the Earth before striking the ground as pellets of ice, which usually bounce.
- **Variability**: The quality, state, or degree of being variable or changeable; the extent to which data points in a statistical distribution or data set diverge from the average or mean.
- **Weather**: Current atmospheric conditions including temperature, rainfall, wind, and humidity (for example, what's going on outside now, what's likely to happen tomorrow).

Materials

Each student or group of students will need the following:

- Local weather information from newspapers or the Internet
- Colored pencils
- Graph paper or printed worksheets with predetermined graphs and charts (to be determined by teacher depending upon ability level of students)
- Lined paper or science notebook, if applicable, for answering follow-up questions
- Student Record Sheet.

Preparation

- The teacher will need to locate daily weather data from several local newspapers or weather websites for students to record findings in graph form. Daily weather data often include high and low temperatures, record high and low temperatures, and normal high and low temperatures.

Management Tip

1. Students may need to fill in Student Record Sheets as directed by the teacher, depending upon student needs. The Student Record Sheet can be modeled under a document camera or can be enlarged to poster size to be completed as a whole-class activity.
2. Depending upon teacher goals and available technology, you may want to have students research weather data online rather than use newspapers.

Procedure

1. Prepare graphs to record data (the detail of the graph will depend on the duration of your weather data collection and which data you choose to include). Students will either use a pre-made graph or create one based on data and parameters introduced by the teacher.
2. Collect data, including weekends, by clipping weather data from the newspaper or using a weather website. Record this information in a notebook.
3. Either daily or weekly, record each day's weather data on the graph.
4. Using the completed graphs, compare daily weather with the normal or average condition for this time period.
5. Answer the following questions in student science notebooks or on lined paper and prepare to discuss and defend the answers in class with the values (data) you have recorded.

Closure and Evaluation

Ask students:

1. Among the various items which you have plotted, which show the most variability: the daily values or average values? Why?
2. If you were asked to predict the weather for tomorrow from the data shown on the graph, what data would you find the most useful—the daily or average values?
3. Would the answer change if you were asked to predict the weather one month ahead?
4. Access annual temperature records for a high-latitude city like New York and compare the temperature range with that of your own county or town.
5. Using the weather data that you have graphed, compare this daily weather information with longer-term climate trends in your area. Use archived information from the local newspaper or online sources to make your comparison. What trends do you see emerging? Has there been a noticeable change in weather patterns over the past 5, 10, and 30 years? If so, describe your conclusions based on data.

Students will gather in groups of 3–4 to compare data and conclusions (use question 5 above).

Suggested Follow-Up Activities

Invite a local meteorologist into the classroom to answer your meteorological questions, or play "stump the meteorologist" by drawing up weather questions from your research. See if he or she can answer the questions. Another twist would be for the meteorologist to ask the class the questions they have put together.

Name:_____

Date:_____

Title:_____

Current Weather

Research Question/Hypothesis

_____
_____
_____
_____

Materials

- Local weather information
- Colored pencils

Data

The following graph can be used to direct students to independently fill in their own chart.

_____Title

Date	High Temperature	Low Temperature	Normal for Today	Precipitation in Inches	Average Wind Speed	Humidity in Percentage	UV Index

Conclusion

Write a conclusion based on your hypothesis, recorded data, and findings.