Recording Weather and Climate

Description:

This lesson encourages students to think about where our climate and weather information comes from. Students are asked to practice their graphing skills by recording and illustrating data. This lesson also asks students to make predictions as we begin to plan for the future of our planet. Asking students to think deeply about climate and weather should highlight the differences between the two concepts and their associated time scales.

Objectives:

- Become more familiar with weather monitoring to help differentiate between weather and climate
- Analyze and interpret data
- Improve monitoring and graphing skills

Vocabulary:

Atmosphere, climate, equator, latitude, longitude, microclimate, weather

Materials:

- Copies of DEP's Recording Weather and Climate worksheet (included below)
- Thermometers (affordable set of thermometers can be found here)
- Graph paper
- Computers, laptops, or tablets with internet access

Background Information:

To understand climate change, we must first understand the difference between weather and climate. Weather is the day-to-day atmospheric changes that we see and feel. This can shift rapidly, as we can see sunshine in the morning and rain at night. Weather includes most standard factors like rain, wind, sun, as well as natural disasters.

Weather monitoring has very important functions for humans. Knowing what to expect when it comes to weather helps us make important decisions that are sometimes vital to our health, safety, and well-being. Weather data can be used to inform what we wear to school, how farmers care for their crops, and when we evacuate our homes during natural disasters.

The weather data recorded in this activity is similar to the data that experts use to understand the weather patterns that impact people around the world. According to the National Oceanic and Atmospheric Administration (NOAA), "Each year, the United States averages some 10,000 thunderstorms, 5,000 floods, 1,300 tornadoes and 2 Atlantic hurricanes, as well as widespread droughts and wildfires. Weather, water and climate events, cause an average of approximately 650 deaths and $15 billion in damage per year and are responsible for some 90 percent of all presidentially-declared disasters."[1] Information like this is crucial to helping us prepare communities, protect the most vulnerable populations, and strengthen local infrastructure for extreme weather conditions.

Climate, on the other hand, is a pattern of weather averaged over many years. Some places have four seasons and are considered temperate

[1] NOAA Weather

climates, like in New York, while other places have more extreme or homogenous conditions, like deserts or tundras. Considering this, there are some major differences in forecasting weather versus climate. Weather predictions can be very accurate when made between 3-14 days. Whereas climate predictions can be made decades in advance based on different climatic patterns that can span over decades, using indicators such as sea temperature or oxygen levels in ice cores.

There are often specific locations within a region where weather and climate data is recorded. This allows us to compare data over long periods of time with the constant factor being the exact geographic location of recording. In many cities around the world, this has often taken place at airports. In NYC, Central Park, LaGuardia Airport, and John F. Kennedy Airport are the most common locations used for weather monitoring. The National Weather Service relies on Central Park for their NYC weather data. Weather monitoring began in Central Park in 1821. Below is a photo of the Central Park Weather Monitoring Station.

Source: National Weather Service

It is important to consider where exactly weather data is recorded. Conditions in NYC can vary greatly by borough and even neighborhood. You may experience dry weather in Brooklyn, while a friend in Queens experiences a torrential downpour. This is not uncommon. This describes the concept of microclimates, where smaller, more localized areas have largely varying conditions, despite being relatively close to each other.

If you have not seen the Weather vs. Climate Crash Course Kids Video, watch it as a class for a better understanding of the differences between climate and weather. For more information, explore the Distinguishing between Weather and Climate lesson in this module.

Method:

- Introduce the lesson by asking students, "How do you usually prepare for weather each day?" Discuss the different tools and information that students rely on to make daily decisions related to weather.
- With students, set up a temperature monitoring station near a window in the classroom. Position a thermometer outside the window or plan to hold the thermometer outside the window each day. Equip the station with a chart for students to record temperature readings at approximately the same time each day (see worksheet below).
- Tell students they will be recording the weather over a given period of time (recommended for 2-4 weeks).
- Assign students roles for data collection, a different person should be responsible for data recording each day.
- Have students record the temperature in the table provided on the worksheet.
- Be sure students note other weather and climate observations on the back side of their worksheet, including cloud coverage, wind, precipitation, humidity, etc.
- In addition to the temperature data collected by students, use data from NOAA's National Weather Service and another

non-governmental weather recording organization, like The Weather Channel, as points of comparison. Have students record this temperature data in the table on the worksheet, and note the location used for weather monitoring by the other weather datasets. This will help prepare students for a conversation on microclimates.

- When all of the data is collected, have students display their information in a graph on a piece of graphing paper. The time (date of recording) should be on the X-axis and temperature should be on the Y-axis.
- Analyze the graphs to determine the coldest and warmest recorded days and determine the average temperature over time.
- Ask students to compare and contrast the weather information they collected and the information found from weather services. Why does temperature data vary? What are some factors that cause these variances?
- This weather data can become a snapshot of our local climate as it is now. In the future, we would be able to use this weather data to understand our local climate and how it changed over time. This kind of data can also be used in models to predict future weather and climate.
- The US Climate Resilience Toolkit's Climate Explorer has designed interactive web tools for us to visualize weather and climate data. Have students use the Climate Explorer NYC data to study historical and projected climate data in their area. Look at the temperature and precipitation data. How does this data compare to students' temperature data and what they know about the future impacts of climate change?
- Process their research as a class in a group discussion.

Discussion:

- Compare and contrast student-recorded data and the data they found online. What are the biggest differences in the data? Why did these differences occur?
- Why is it helpful to know the difference between weather and climate?
- Can you remember a time when you or a friend might have mistaken weather for climate or vice versa?
- When do people rely on weather and climate data? Are there any specific jobs that need this information? Discuss how weather data helps farmers, marine biologists, pilots, etc.

Extension:

- Expand the weather collection beyond temperature to include a measurement of rainfall, wind speed, wind direction, etc.
- Get creative! Have students present a weather report based on their collected data. Record the presentation and share in a school assembly or on social media (such as Vimeo or TeacherTube).
- Learn about NOAA CESSRST and CUNY CREST Institute's New York Urban Hydro-Meteorological Testbed Weather Stations Research for information on real-world weather and microclimates in NYC.
- Encourage students to use the different features of the Climate Explorer application. Have students predict future patterns, analyze precipitation patterns, or compare climates in different locations.
- Explore NOAA's real time satellite imagery portal. What can we learn from satellite data about weather and climate?

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For more information visit www.nyc.gov/dep

Recording Weather and Climate Worksheet

Use this worksheet to record temperature as a class. Use a new sheet for each week of recording. Include daily temperature data from the National Weather Service (NWS) and a non-governmental weather organization of your choice for comparison. Try to record your data at the same time each day. Note the name of the organization you choose in the column on the right. Use the back of this page to make observations of other weather and climate conditions, including cloud coverage, wind, precipitation, and humidity.

School Name: _____

Class Name: _____

Week #: _____

Location: _____

Day	**Class Temperature Data**	**NWS Temperature Data**	**_____ Temperature Data**
Monday Date: Time:	_____°F _____°C	_____°F _____°C	_____°F _____°C
Tuesday Date: Time:	_____°F _____°C	_____°F _____°C	_____°F _____°C
Wednesday Date: Time:	_____°F _____°C	_____°F _____°C	_____°F _____°C
Thursday Date: Time:	_____°F _____°C	_____°F _____°C	_____°F _____°C
Friday Date: Time:	_____°F _____°C	_____°F _____°C	_____°F _____°C
Saturday Date: Time:	_____°F _____°C	_____°F _____°C	_____°F _____°C
Sunday Date: Time:	_____°F _____°C	_____°F _____°C	_____°F _____°C

Notes and Observations