

Weather & Climate



Department of
Environmental
Conservation

Topics: Climate, climate change, erosion, weather, weathering

GRADE LEVEL: 3-5

Big Ideas:

- Weather is short term conditions of the atmosphere.
- Climate is the average daily weather for an extended period of time.
- Weather can change all the time.
- Weather and climate are related but different.
- Wind and water can change the landscape.
- Our climate is changing.

Learning Objectives: *students will be able to...*

- Identify the differences between weather and climate.
- Identify and describe the various types of weather.
- Compare the different types of weather.
- Identify similarities and differences of different types of weather.
- Collect and organize data on various types of weather.
- Create a model of Earth's greenhouse gases.

New York State Science Learning Standards:

3-ESS2-1. Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.

3-ESS2-2. Obtain and combine information to describe climates in different regions of the world.

3-ESS3-1. Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.

4-ESS3-1: Obtain and combine information to describe that energy and fuels are derived from natural resources and that their uses affect the environment.

5-ESS2-1. Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.

5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

Key Understandings:

- The ocean supports a variety of ecosystems and organisms, landforms, and influences climate.
- Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather.
- Atmospheric gases affect the temperature at Earth's surface.
- Weather is the combination of sunlight, wind, snow or rain, and temperature in a particular region at a particular time.
- Scientists measure weather conditions to describe, record, and notice patterns of weather over time.
- Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years.

Essential Questions:

- What is the difference between weather and climate?
- How are climate and weather related?
- How can wind change the shape of the land?
- How does the weather change over time?
- How do weather and climate affect our lives?
- What are some actions we can take to affect positive change in our community?

- Weather and climate are different but related.
 - Sunlight warms Earth's surface.
 - The weather is different depending on the region you live in.
 - Wind and water can change the shape of the land.
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Students will know...

- People measure wind, snow or rain and temperature to describe and record the weather and to notice patterns over time.
- Meteorologists forecast severe weather, so communities can prepare for and respond to these events.
- Weather changes over time.
- The difference between weather and climate.
- How to measure and record weather data.
- Scientists use a variety of methods and materials to study our weather and climate.
- When making observations and collecting data, scientists look for (repeated) patterns.
- Key vocabulary terms.

Vocabulary:

- Carbon dioxide: a heavy odorless, colorless gas formed during respiration and by the decomposition of organic substances; absorbed from the air by plants in photosynthesis.
 - Climate: the average weather for a given area.
 - Climate change: the result of changes in Earth's atmosphere (the layer of gas that surrounds Earth).
 - Erosion: the process by which the surface of the earth gets worn down by forces such as water, wind, or ice.
 - Modeling: the act of representing something (usually on a smaller scale)
 - Greenhouse gas: a gas that absorbs and emits radiant energy within the thermal infrared range. Greenhouse gases cause the greenhouse effect on planets. The primary greenhouse gases in Earth's atmosphere are water vapor, carbon dioxide, methane, nitrous oxide, and ozone.
 - Weather: the set of current atmospheric conditions, including temperature, rainfall, wind, and humidity at any given place.
 - Weathering: breaking down of rocks, soils, and minerals as well as wood and artificial materials through contact with the earth's atmosphere, water, and biological organisms.
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Learning Plan: We recommend doing these lessons in sequential order; however, they can be done as individual lessons. Lessons have multiple links (videos, songs, diagrams, activities) that can be used at the teacher's discretion depending on class time.

Pre-assess: What is the weather like outside today? Is the weather the same all the time? Use K-W-L to assess students' prior knowledge, have students write or draw in response to the essential questions.

Progress Monitoring: Formative assessment and teacher feedback should be ongoing throughout the lessons. Teachers should develop assessments based on their individual class needs. Think-pair share,

exit tickets, interactive discussions, questions and listening, informal observations, quizzes and student work samples can all be used.

Lesson 1: Weather vs. Climate- Students watch a video, then observe the weather over a period of time, create a rain gauge, and explore interactive website.

- Video: [Weather Vs. Climate](#)
 - [Weather Observation Activity](#)
 - NASA [Climate Interactive](#)
 - [Distinguishing between Weather and Climate Game](#) & [Presentation Slides](#)
 - Extension Activity: [Weather Adds Up to Climate](#)
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Lesson 2: What is Climate Change? - Students watch a video, then develop an understanding of key terms, such as weather and climate, and discuss the causes and impact of climate change. Note: watch video first, read the story book, and have students look over the Conservationist for Kids, and then do the activity. Follow up with the student workbook for homework or as an extra activity.

- Video: [Climate Change](#)
 - Story Book: [What in the World is Happening to our Climate?](#)
 - How is Earth's Climate Changing [Reading and Online Quiz](#)
 - Investigating Climate Change [NYSDEC Conservationist for Kids](#) & [Student Worksheet](#)
 - We're All Part of the Solution! [Student Activity](#)
 - Supplemental: [Climate Change and Coastal Resilience Student Workbook](#)
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Lesson 3: Modeling Weather Data- Students compare and graph the precipitation averages and seasonal patterns for several different locations.

- Precipitation Towers: [Modeling Weather Data Student Activity](#)
 - Polar Lab: [Online Interactive Game\(s\)](#)
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Lesson 4: Modeling Earth's Atmosphere- Students model atmospheric gases and understand how they affect the temperature at the earth's surface through interactive lessons. Note: demonstrate the STEM activity first, then have students do the activity.

- The Greenhouse Effect [Teacher Information](#)
 - STEM Demonstration: [Baking Soda and Vinegar Balloon](#)
 - Modeling the Earth's Atmosphere [Student Activity](#)
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Lesson 5: The Power of Voice- Students explore how pollution disproportionately affects low-income communities and how its members can empower themselves to take a stand. Note: The Young Voices for the Planet short films feature youth speaking out, and creating solutions, in their communities.

- Short Film: [Young Voices for the Planet Save Tomorrow](#)
 - Short Film: [Words Have Power](#)
 - The Power of Voice [Student Activity](#) & [Teacher Section](#)
 - Video: [I am only a kid, I can't do anything about Climate Change right?](#)
 - Online Book: [Mindy the Mindful Butterfly](#)
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Teachers: Would you like to visit us at Norrie Point environmental education center, or have an educator visit your classroom in-person or virtually? Contact us to schedule a program: hrteach@dec.ny.gov

Resources:

Children's books:

- [Heroes of the Environment](#) by Harriet Rohmer
- [How We Know What We Know About Our Changing Climate: Scientists and Kids Explore Global Warming](#) by Lynne Cherry
- [Climate Smart & Energy Wise](#) by Mark McCaffrey
- [Empowering Young Voices for the Planet](#) by Lynne Cherry, Julianna Texley and Suzanne Lyons.
- [All about Weather](#) by Huda Harajli, MA
- [Explore My World: Weather](#) by Lisa Gerry
- [Climate Change, The Choice is Ours: The Facts, the Future, and Why There's Hope](#) by David Miles
- [Puddles](#) by Jonathan London
- [Mindy the Mindful Butterfly](#)

Websites:

- [Climate Kids \(NASA\)](#)
- [What's the Difference between Weather and Climate \(NASA\)](#)
- [NY Climate Change Science Clearinghouse](#)
- [Shaping Our Future Climate Change Classroom Resources \(WWF\)](#)
- [Climate Change Education: A Model of Justice-Oriented STEM Education](#)
- [Young Voices for the Planet](#)
- [Celebrating Youth Climate Activists \(Scenic Hudson\)](#)
- [Youth Climate Program \(The WILD Center\)](#)
- [Teaching about Climate and Energy \(CLEAN\)](#)
- [Alliance for Climate Education](#)
- [National Science Teaching Association Climate Change](#)
- [Climate Change Education Module \(NYCEP\)](#)
- [NYC-DEP-Education Curriculum Guide](#)
- [The Globe Program](#)
- [What did Earth Look Like? Dinosaur Database Interactive](#)