

# Placing Climate Change in New York City

## Description:

This lesson will help students understand the local effects of climate change by discussing short-term impacts and projections for the future. For many, climate change seems distant and local impacts are rarely considered. This lesson works to expose students to the risks we face here in NYC and the large-scale effects on the broader global community, by framing climate change as both local and global. We can make climate change feel more relevant to students by encouraging them to consider their own community, city, state and country.

## Objectives:

- Encourage a broader understanding of the impacts of climate change to include our local communities
- Understand local phenomena related to the impacts of climate change
- Connect experiences or observations of shifts in weather and climate to up-to-date science, specific to New York City

## Vocabulary:

Precipitation, representative concentration pathway, sea level rise, thermal expansion

## Materials:

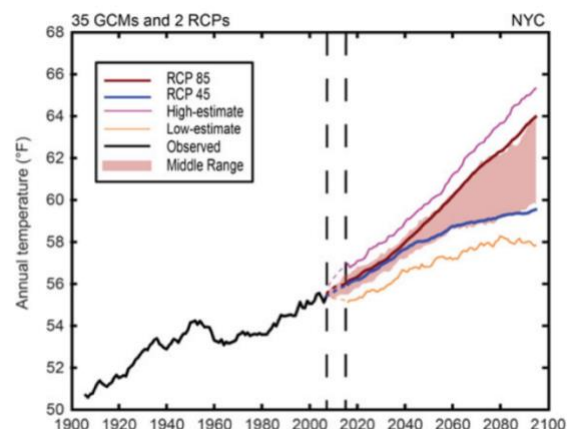
- Pens and paper
- A class set of the Reflecting on Our Experiences with Climate Change worksheet (find on the last pages of this lesson)

## Background Information:

New Yorkers are already being affected by climate change, which may come as a surprise to many. According to the New York City Panel on Climate Change (NPCC), temperature, precipitation and local sea level have already shifted. These changes in climate will continue to have an impact on public health and local ecosystems.

### A Warmer New York City

The NPCC states that New York City has gotten approximately 3.4°F warmer on average since 1900.<sup>1</sup>



Source: [New York City Panel on Climate Change](#)

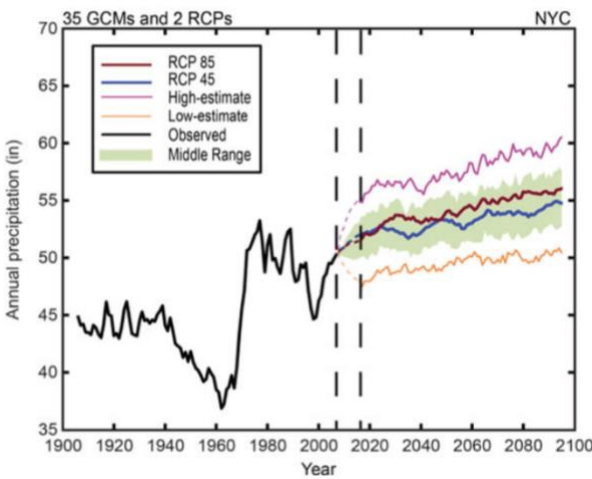
The above NPCC graph uses climate modeling to display the potential future changes related to temperature in NYC based on observed data. The RCP abbreviation on the graph stands for “representative concentration pathways.” Coined by the Intergovernmental Panel on Climate Change (IPCC), RCPs represent projections based on information “from

<sup>1</sup> [New York City Panel on Climate Change 2015 Report Executive Summary](#)

different combinations of economic, technological, demographic, policy and institutional futures.”<sup>2</sup>

### A Wetter New York City

The water cycle in New York City is also being impacted. Annual precipitation in New York City has risen by 8 inches as compared to recordings from the year 1900.



Source: [New York City Panel on Climate Change](#)

The above NPCC graph displays projected changes in precipitation in NYC based on GCMs (global climate models).

The change in precipitation has greater implications for NYC’s infrastructure, including the sewer system and wastewater resource recovery facilities, public transit, and construction of buildings.. The impacts of climate change on NYC’s wastewater resource recovery facilities is expanded on in DEP’s [Navigating New York City’s Wastewater lesson](#).



Source: [New York State Department of Environmental Conservation](#)

The diagram above displays the impacts of climate change on the water cycle; to view it in greater detail, [visit DEC’s climate change site](#).

### Higher Sea Levels on New York City’s Coasts

In addition to temperature and precipitation, sea level rise is a significant aspect of climate change that is impacting New Yorkers. New York’s geographic location, and that of many other coastal regions, makes sea level rise stand out as a pressing threat. Sea level rise also makes us more vulnerable to coastal flooding and storm surge.

There are two main factors that result in sea level rise: thermal expansion and ice melt. Thermal expansion occurs when ocean water warms and the water molecules expand to take up more space. Glacial ice melt results in sea level rise because when glaciers melt, the glacial water is fed into the ocean, which increases the overall amount of water in the ocean. Ice melt affects sea level most when glaciers are located on land, not already floating in the ocean.

<sup>2</sup> [Intergovernmental Panel on Climate Change Scenario Profess for AR5](#)

Sea level rise is a great example of the interconnectedness of our global systems. Thermal expansion and ice melt are the result of warmer atmospheric temperatures. Ocean water is taking up more space because the molecules are warming, and ice is melting because the air is warmer. This is where our systems thinking foundation comes in. It is important to realize that by addressing one aspect of climate change, we are addressing other parts indirectly. By working to prevent the temperature increases associated with climate change, we also work to limit sea level rise.

### **Intersections between Climate Change and Public Health**

Temperature increases and sea level rise are closely tied to public health issues, especially in dense urban environments like New York City. With the effects of climate change intensifying, temperature rise is leading to dangerous instances of extreme heat and increases in heat waves in New York City. According to Cool Neighborhoods NYC, as published by the Mayor's Office of Resiliency, "Every year, NYC experiences an average of 450 heat-related emergency department visits, 150 heat-related hospital admissions, and 13 heat-stroke deaths."<sup>3</sup> Some New Yorkers are more vulnerable to extreme heat and the health issues associated with it, including "older adults, those in poor health, and those who do not have access to air conditioning."<sup>3</sup> Visit the [Heat Vulnerability Index](#) for more information about heat risks by neighborhood.

It is also important to consider the public health impacts of sea level rise. Coastal storms and storm surge put vulnerable populations at risk. For more information on the public health

impacts of climate change, explore the [NYC Department of Health Environment and Health Data Portal](#).

Find the [most recent NPCC report](#) published in March 2019 for updated data. For more information on how New Yorkers are being affected by climate change, please refer to this module's [resource list](#).

### **Method:**

- After presenting the background information and discussing as a class, tell students that they will now be given time to reflect on these potentially overwhelming concepts through journal writing.
- Hand out DEP's Reflecting on Our Experiences with Climate Change worksheet (find on the last pages of this lesson).
- Ask students to fill out each prompt as best they can. The prompts encourage reflection in the form of a journal entry, a drawing, a stream of consciousness passage (where the student writes the first thing that comes to mind without judgement or analysis), and the creation of a public service announcement, informed by personal experience. Encourage students to be honest and personal in their reflections, there is no correct answer. If students do not have personal experience to share, encourage them to consider experiences of family members or close friends.
- Based on your class schedule, the journals can be filled in once a day for four days, or all in one sitting.
- Ask students to share their responses in pairs or as a class.

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<sup>3</sup> [Cool Neighborhoods NYC](#)

- Once the last page of the journals are completed, ask students to either cut out their public service announcement (PSA) or use their designs in the journal to create larger posters based on their PSAs.

### Discussion:

- How did it feel to recall these experiences?
- Can you think of communities in NYC that might have experienced more extreme circumstances related to climate change? What factors make their experiences more extreme?
- Discuss whether students in different cities, states, and countries would have different answers to the journal prompts. Why or why not?
- Did you come to any realizations while reflecting on your experiences with the various climate factors?
- Were you conscious of the distinctions between climate and weather while reflecting?

### Extension:

- As a class, look into how New York City is responding to climate change through resiliency projects and encourage students to design their own. See DEP's [Exploring Resiliency with the NPCC](#) lesson for detailed instructions.
- Consider following [Ohio State University's instructions](#) for a virtual pen-pal activity using epals.com with students in different climates. This will give your class a better understanding of people's realities in different parts of the world and will illustrate how students are impacted differently by climate change.

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For more information visit [www.nyc.gov/dep](http://www.nyc.gov/dep)

Name: \_\_\_\_\_ Date: \_\_\_\_\_

## Preparing Your Community for the Future

Based on your understanding and lived experiences related to extreme heat, shifts in precipitation and sea level rise, **design a public service announcement (PSA)** to share with your local community. This should raise awareness on the local effects of climate change, highlight what people can do to address climate change, and tell people how they can learn more. When finished, cut out your PSA, or use larger paper to create a poster.

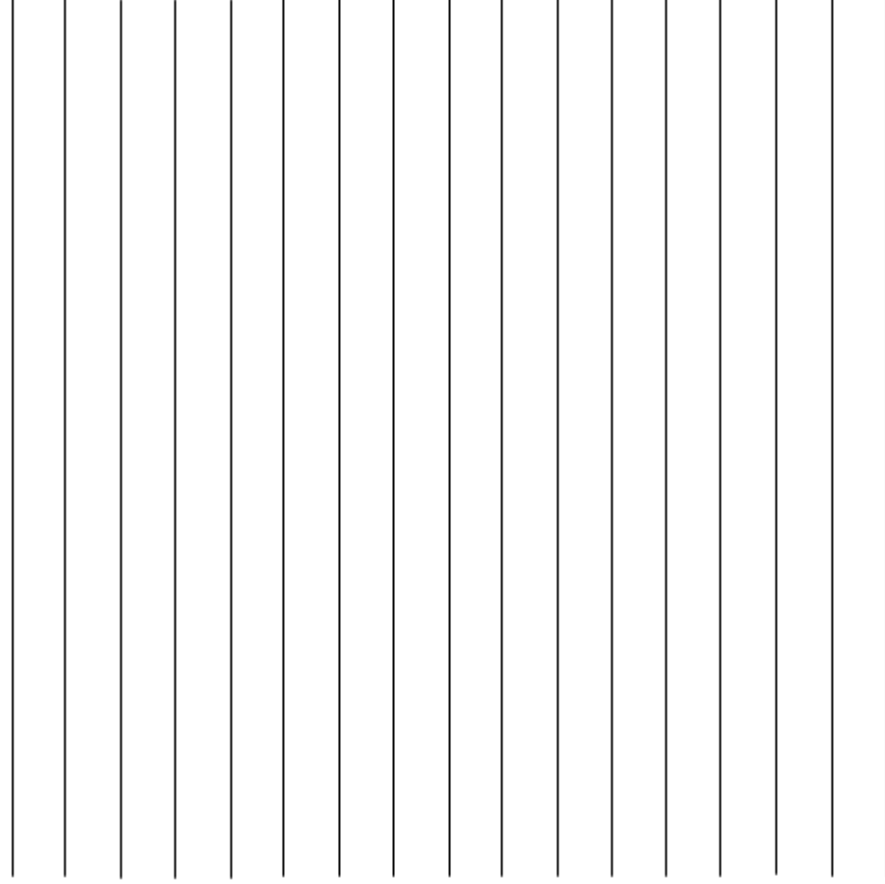


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## Reflecting on our Experiences with Climate Change:

### Extreme Heat

Reflect on a time when you experienced **increased temperatures**. Recall where you were, what it felt like, what you were thinking about and what you did in that moment. Write a short journal entry on your experience below.

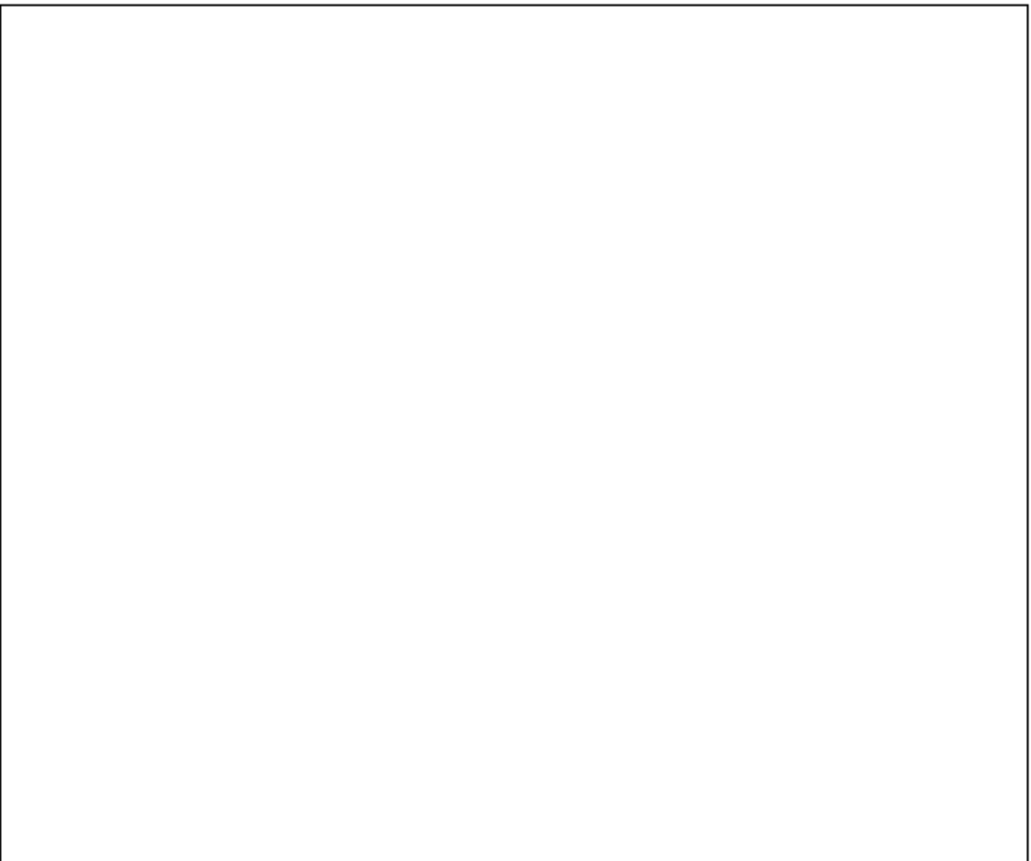


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Reflecting on our Experiences with Climate Change:

**Shifts in Precipitation**

Reflect on a time when you experienced **increased rain**. Recall where you were, what it felt like, what you were thinking about, and what you did in that moment. Draw your experience below.

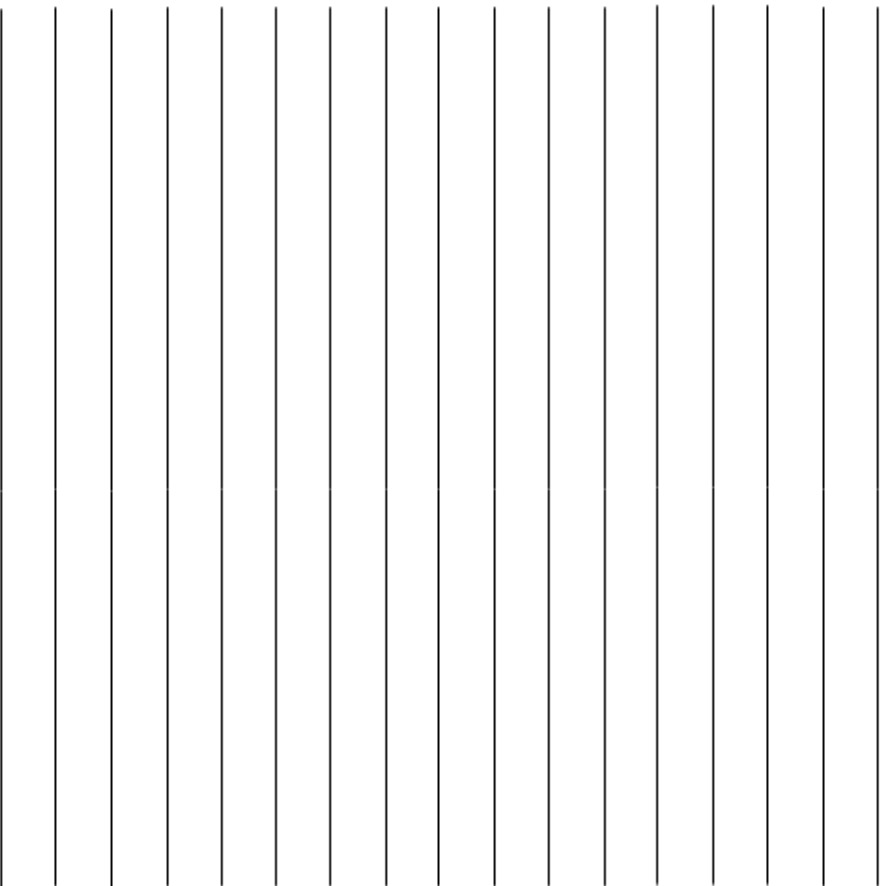


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Reflecting on our Experiences with Climate Change:

**Sea Level Rise**

Reflect on a time when you experienced **super-storms like Hurricane Sandy, increased flooding, or issues related to stormwater management**. Recall where you were, what it felt like, what you were thinking about and what you did in that moment. Write a stream of consciousness passage about your experience below.



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