



New York City Climate Risk Information 2022: Observations & Projections - Summary

This NPCC4 report offers current climate projections for use by New York City for decision-making about climate change impacts. It draws from and updates the findings reported in the 2nd and 3rd NPCCs and the New York State Climate Impact Assessment. Its primary focus areas are (1) sea level rise and storm surge; (2) inland and coastal flooding; (3) average and extreme temperatures; and (4) extreme precipitation and drought.

Highlights from this report include:

- 1. Coastal New York City continues to experience higher rates of sea level rise as compared to the rest of the world - a trend that's expected to continue.** Projected sea level rise will continue for centuries and worsen flood risks posed by storm surges and high-tide flooding. Stakeholders need to consider ways to protect vulnerable neighborhoods and secure critical infrastructure.
- 2. Although the increase in annual rainfall is predicted to be relatively small, larger increases are expected for extreme rainfall events.** Average annual rainfall is projected to increase up to 14 percent by the 2050s and 22 percent by the 2080s. The models suggest an increase in the number of extreme rainfall events.
- 3. The number of days with temperatures below freezing has steadily declined since 1900, while the total number of hot days and heat waves are increasing as the century progresses.** Average annual temperatures are projected to increase across New York City by 2.7° to 3.9°F by the 2030s, 4.0° to 6.0°F by the 2050s, and 5.6° to 9.8°F by the 2080s. Higher temperatures will affect neighborhoods differently based on infrastructure, tree canopy coverage, and geography. More work is needed to assess the effect of climate on heat islands and inequalities in heat exposure into the future.
- 4. Since the 1960s drought of record, which drove New York's current water management practices, several smaller droughts have had measurable impacts.** Water management currently relies on estimates of imbalances between supply and losses, but droughts are interactions between supply and demand, as the risks vary over time and by sector. There is a need for a more comprehensive assessment of drought vulnerability that accounts for projected changes in demand and projected climate impacts.

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describes the climate challenges New York City faces. The data suggest sea levels will continue to rise globally, and projected sea level rise in New York City is expected to lead to more dangerous storm surges and frequent high-tide flooding. While there have been efforts to protect neighborhoods and critical infrastructure in New York City in case of future floods, many areas remain vulnerable to coastal flooding. The report notes a need for more research on the potential impacts of the flooding, now and into the future.

	10th Percentile	25th Percentile	75th Percentile	90th Percentile
2030s	6 in.	7 in.	11 in.	13 in.
2050s	12 in.	14 in.	19 in.	23 in.
2080s	21 in.	25 in.	39 in.	45 in.
2100	25 in.	30 in.	50 in.	65 in.
2150	38 in.	47 in.	89 in.	177 in.

Projections for Sea Level Rise in New York City for 2030-2150. Note: equal weights were assigned to each of the three scenarios utilized in the creation of the projections for NPCC4.

Temperatures are also going to continue to fluctuate in the current century. The number of days below freezing in New York City is projected to decrease while the number of hotter days is expected to increase. New York City will also experience a greater frequency of extreme weather events, as the number of heat waves is expected to increase, as is the frequency of heavy rainfalls and periods of drought. Lastly, while there are current estimates about how climate change might impact New York City's water supply, more research is needed to understand the potential vulnerability of water supply due to drought. These climate impacts are projected to affect low-income and non-white communities and people of color at a higher rate, which challenges environmental justice in New York City.

While the NPCC4 research team based its analysis on a review of climate models, regional and global trends, and the scientific literature, the team also sought to incorporate local stakeholder input to make these assessments more relevant for urban adaptation. As part of this process, the team organized a series of workshops focused on climate science and racial equity that complemented other activities organized by the NYC Mayor's Office of Climate & Environmental Justice (Climate Knowledge Exchange meetings) to reach a broad base of local stakeholders.



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This report provides detailed discussions on the climate risks that New York City is facing now, and how these risks will likely impact the city in the future.

- **Sea Level Rise:** The sea level along New York City's coastline and Hudson River is projected to rise by 7-11 inches in the next decade, 14-19 inches by the 2050s, and 25-39 inches by the 2080s. By the start of the next century, sea levels are projected to rise by as much as 65 inches. It is possible, in a worst-case scenario that cannot be ruled out, that additional loss of land ice could increase sea level rise up to 81 inches by the 2080s and 114 inches by the next century.
- **Tropical Cyclones:** Warmer weather is also expected to increase and intensify tropical cyclones, which may increase storm surges and resulting flooding in New York City. Basement and cellar apartments are particularly vulnerable to flood risks, and a disproportionate number of residents of these apartments are low-income, immigrants, non-white, and/or working-class New Yorkers.
- **Temperatures:** Historical data has shown significant increases in air temperatures in New York City during the last several decades and more frequent extreme heat events. In addition to daytime temperatures, nighttime temperatures have also increased, extending exposure to heat, which further poses a health risk. Indoor spaces without air conditioning or the ability to afford to use AC, can also pose health risks.
- **Precipitation:** Average annual rainfall is projected to increase over the next decades, with the greatest increases predicted to occur during the winter months and decreases in the summer and fall months.
- **Extreme Weather Events:** Although the increase in annual rainfall is predicted to be relatively small, larger increases are expected for extreme rainfall events, meaning those with more than 1-4 inches of rain per day. In addition, New York City is expected to experience more frequent hot days over the coming decades, with higher frequency and duration of heat waves (three or more days at 90 degree or above weather). The number of days that New York City falls below freezing (e.g., 32 degrees) is expected to decrease.
- **Drought:** New York City depends on Catskill/Delaware Watersheds for much of its water supply and bases its assessment of drought conditions on the probability of these reservoirs being full by June each year. Increasing water needs have stressed the water supply, and decreasing summer precipitation and winter snow will result in less water in the reservoirs. More attention is needed to perform a comprehensive drought risk assessment that can develop stress indicators for drought conditions relative to current and projected demands depending on future climate change scenarios.

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