

CLIMATE CHANGE FACTS

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NEW YORK'S CHANGING CLIMATE

The Earth is warming and New York is too. Just as we are seeing unprecedented rates of change at the global level, we are also observing rapid change in New York, including rising temperatures and changing precipitation patterns, with effects on the natural world and human health. Intense rains and floods, summer droughts, and heat waves are more common than they were in our grandparents' time. New York's climate will continue to change over the next 10, 20, and 100 years as detailed below.



WHAT NEW YORKERS CAN EXPECT NOW AND IN THE FUTURE

Temperature

Average temperatures across the Northeastern United States have risen by over 2°F since 1970. Winter temperatures are 4°F warmer. The change in temperature is more noticeable at the extremes, however. Here in New York, we have seen an increase in the number of extremely hot summer days (above 90°F) and a decrease in the number of cold winter days (below 32°F). In the future, New Yorkers can expect:

- An increase in average temperature of 1.5 to 3°F by the 2020s; 3 to 5.5°F by the 2050s; and 4 to 9°F by 2080, depending on the amount of greenhouse gases humans continue to emit into the atmosphere.

Looks Like a Heat Wave!

Summers in New York will get increasingly uncomfortable as the number of extremely hot days increase. Heat waves – defined as three consecutive days with maximum temperatures above 90°F – are projected to occur more frequently and last longer. This will lead to an increase in heat-related illness and put stress on ecosystems and human infrastructure.

According to the Centers for Disease Control, heat waves are silent killers – extreme heat and humidity associated with heat waves kill more people in the United States on average than hurricanes, lightning, tornadoes, floods, and earthquakes combined. The adverse health impacts of extreme heat fall disproportionately on infants and children, people with chronic medical conditions, and the elderly, a sector of the population expected to double in size by 2030.



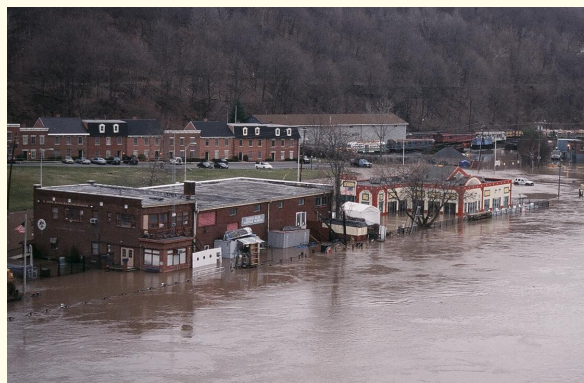
Precipitation and Snowfall

Total precipitation amounts have increased slightly in the Northeast, by approximately 3.3 inches over the last 100 years. Even more dramatically, we have seen a 67% increase in the number of 2-inch rainfall events occurring over a 48-hour period since the 1950s. In the future, New Yorkers can expect:

- An increase in average annual precipitation of up to 5% by 2020; 10% by the 2050s; and 15% by the 2080s.
- Changing precipitation patterns, with increased precipitation in the winter, and decreased precipitation in late summer or fall.
- Lower rainfall amounts in the summer may increase the frequency of drought, and may negatively affect the ability of small drinking water supply systems to meet demand.
- Decreased snow cover, by as much as 25 to 50% by the end of the next century, jeopardizing opportunities for skiing, snowmobiling, and other forms of winter recreation; natural ecosystems will also be affected by the changing snow cover.

When it Rains...it Pours!

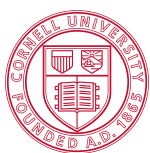
The number and intensity of extreme precipitation events are increasing in New York, and this trend is expected to continue. More rain, coming in sustained heavy downpours, heightens the danger of localized flash flooding, streambank erosion, and storm damage. While climatologists cannot determine if a specific rainfall event was caused by climate change, the extreme rainfall in August and September 2011 associated with Hurricane Irene and Tropical Storm Lee forced thousands of people to evacuate their homes when streams and rivers rose to record flood levels, washed out towns and farms, and caused billions of dollars of damage, particularly in the Catskill Mountains and Southern Tier.



Sea Level Rise and Impacts to Lakes

Sea levels have been rising globally because water expands as it warms, and there has been widespread melting of glaciers and ice sheets. In the future, New Yorkers can expect:

- Continued sea level rise of 2 to 5 inches by the 2020s; 7 to 12 inches by the 2050s; and 12 to 23 inches by the 2080s in the lower Hudson Valley, New York City, and Long Island.
- Potential salination along the Hudson River could affect drinking water supplies, since the river, a tidal estuary, is affected by sea level rise.
- Dangerous coastal storm surges, caused by high winds and high tides, will increase the risk of coastal flooding, beach erosion, and damage to infrastructure in low-lying areas.
- Changes in the timing of ice coverage and high flow on New York's inland lakes and rivers, along with potential change to the water level of the Great Lakes, will affect wildlife and economic and recreational activities.



Ecosystems

Climate change will continue to affect New York's ecosystems and biodiversity, including shifts in species ranges and sharp declines in populations of certain species. In the future, New Yorkers can expect:

- Northward expansion of the range of some invasive species currently found in warmer climates, such as kudzu (an aggressive weed) or the hemlock woolly adelgid (an aphid-like pest of hemlock trees), threatening native species and ecosystems in New York.
- Increasing mosquito populations, along with the danger of mosquito-borne disease.
- Increasing populations of white-tailed deer as winters grow milder. Deer will survive more winters and become more of a problem for drivers on roadways, while doing more damage to the crops, plants, and suburban landscapes.

Gone Forever?

Species in isolated habitats or at the southern edge of their range are particularly vulnerable to climate change. By the end of the century, it is likely that New York State will completely lose its spruce-fir forests from the Catskills and Adirondack Mountains, changing the fabric of our natural landscapes forever. Cold water fish species like New York's state fish, the brook trout, and mammals like the fisher that are suited for deep winter snow cover are especially at risk. Widespread economic impacts to the tourism and recreation industries are also expected.



Agriculture Impacts

The agriculture sector is already feeling the effects of New York's changing climate. Warmer temperatures and changing precipitation patterns present both economic challenges and opportunities for agriculture. For example, farmers are already experiencing increased insect, disease, and weed pressure, but have also had success planting new longer-season varieties of corn. Since the 1960s, the growing season has lengthened by nearly a week, as evidenced by observations of earlier spring bloom dates for lilacs, apples, and grapes at agricultural research stations across the state.

Agriculture Challenges and Opportunities

New patterns of rainfall and temperature may alter the appearance of New York's agricultural landscape.

- Warmer temperatures and a longer growing season (by as much as a month by the end of the century) could create opportunities for farmers to produce warmer-temperature crops (e.g., peaches or watermelon). The dairy industry and many of the state's current high-value crops (e.g., apples, cabbage, and potatoes) will be vulnerable to heat-induced crop damage and losses.
- Rising energy costs for cooling may cut into farm operation profits.



Human Health Effects

Climate change will have broad effects on human health. In the future, New Yorkers can expect:

- Increases in the severity of heat-related illness, including heat stroke and heart attacks. Adaptation to heat waves will place additional stress on energy infrastructure and local governments.
- Declining air quality, caused by the increase in formation of ground-level ozone, leading to increased cardiovascular illness and respiratory disease.
- An increase in the severity and incidence of asthma and seasonal allergies, as plants such as ragweed produce pollen earlier and longer.



Infrastructure, Energy, and Transportation Impacts

Local infrastructure, the energy grid, and institutions such as schools and hospitals are all susceptible to the climate impacts discussed above. Local and regional planners need to integrate climate change information into their comprehensive planning processes. For example:

- Infrastructure – such as subway systems, railways in low-lying coastal areas, water treatment plants, and bridges – may need to be relocated or rebuilt due to the changing climate.
- Certain water districts may not be able to meet water demands if there are prolonged summer droughts.
- Emergency plans will need to take into account scenarios such as increased incidences of localized flooding and road closures.



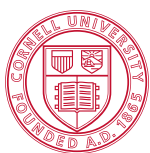
Planning for Climate Impacts

Many communities, municipalities, businesses, and households in New York have already begun to reduce their greenhouse gas emissions and prepare for the future. For example, nearly 100 communities have adopted the NYS Climate Smart Communities Pledge to start planning for change.

The Cornell University Climate Change Program Work Team (PWT) is developing new resources and tools. These will help stakeholders, such as farmers and communities, make more informed decisions to mitigate greenhouse gases and adapt to New York's changing climate.



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