

New York state may soon suffer outside effects from climate, says report

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Street flooding that occurred during Hurricane Irene could become more common in the decades ahead. Credit: Reuters

(PhysOrg.com) -- In the first statewide climate change outlook for New York, scientists say that the state may suffer disproportionate effects in coming decades compared with other regions, due to its geography and geology. The report paints a harsh picture, including possible extreme temperature and sea-level rises, downpours, droughts and floods. The changes are projected to affect nearly every region and facet of the economy by the 2080s, from ski resorts and dairy farms to New York City's subways, streets and businesses.

The [600-page report](#) and a [shorter synthesis](#) were released today by the New York State Energy Research and Development Authority (NYSERDA). With it, New York joins California, Maryland and a

growing number of states in trying to predict and plan for disruptions that warming climate and related extreme weather events could bring. Researchers at Columbia University's Earth Institute, Cornell University and the City University of New York coordinated the research and drew input from more than 50 scientists.

“The climate is already changing,” said Cynthia Rosenzweig, a climate scientist at Columbia's Center for Climate Systems Research (CCSR) and one of the study's three lead investigators. “We have a responsibility to prepare for the increasing risks of the future. Let's roll up our sleeves and be ready.”

Global warming is not evenly distributed; because of its northerly latitude, New York has already warmed 2.4 degrees Fahrenheit in the last 40 years—more than twice the global average. The report projects a further 1.5 to 3-degree rise by the 2020s; 3 to 5.5 degrees by the 2050s; and 4 to 9 degrees by the 2080s. Winters will be milder, and summers will see more extreme heat waves and [droughts](#), say the researchers.

[Sea level](#) rise--a foot in the last century—has also surpassed the global average of 7 inches. Ocean currents and other factors unevenly distribute ongoing sea-level rise around the globe; New York is one place where seas have risen higher and will continue to do so. The interior of the state is still slowly rebounding from heavy glaciers that pushed down the surface tens of thousands of years ago—but as land rises inland, the coast, like a hinge, is slowly tilting into the rising water. As a result, the study predicts 8 to 23 inches of relative sea-level rise by the 2080s. But it warns that a drastic 55 inches—four and a half feet—is possible if melting of the Greenland and West Antarctic ice sheets accelerates. The ice sheets' future pace of reaction to warming is still a big unknown in climate science.

Inland and upstate, heavier and more frequent precipitation events, like

those that have caused massive damage in the last few months, are also expected, especially during milder winters. “New York State is highly vulnerable to extreme climate events,” said Radley Horton, a climate scientist at CCSR who led the report’s climate projections. [New York City](#) is at risk because of its extensive shoreline, but so are towns and cities along the Hudson River as far north as the Troy Dam, 150 miles away, he added. Horton and Rosenzweig are also with the Earth Institute-affiliated NASA Goddard Institute for Space Studies.

New York City and Long Island are at greatest risk from rising sea level and more severe storms. For instance, the report says that by 2020, nearly 96,000 people on the barrier island of Long Beach, off Long Island, could be at risk from rising seas, at a potential cost of \$6.4 billion. Currently, 11 percent of New York City streets are at risk of flooding during a 100-year storm. With two feet of sea level rise, a quarter of its streets are at risk, and at four feet of sea level rise, 34 percent are at risk.

A four-foot rise in sea level by the 2080s would also put the New York City subway system (much of it already below sea level and subject to flooding) at risk of extreme flooding once a decade, instead of once every hundred years. Klaus Jacob, a scientist at Columbia’s Lamont-Doherty Earth Observatory who led the chapters on transportation and telecommunications, said, “You can’t have the whole system being shut down once a decade. What’s important is that we’re vulnerable right now to the 100-year storm. After 40 minutes of rain the entire subway system could be underwater.”

Drinking water and the health of coastal and river ecosystems may also be at risk if flooding increases. “If the increase in extreme precipitation events over the last 50 years continues, we can expect more severe combined sewer overflows and curb and drainage problems, and more severe inland flooding of rivers and low-lying areas,” said Horton. “More

intense precipitation events may lead to fouling of coastal waters and rivers and also more sediment washing into drinking-water reservoirs. It could potentially harm the quality of our drinking water.”

Patrick Kinney, an epidemiologist at Columbia University’s Mailman School of Public Health, who led the report’s public-health chapter, said that heat-related illnesses and deaths are expected to increase, especially in urban areas, which tend to build up and hold heat during the summer. Heat-related deaths could rise 70 percent over the 1990s, he said, and declining air quality from added ground-level smog and rising pollen counts may lead to more asthma and other respiratory illnesses. The poor and the elderly are projected to be most vulnerable to the added risk of heat waves and floods. (Maps included in the report show where poverty is concentrated in the far north of the state, along the western tier, and in parts of New York City and Long Island.) Demand for air conditioning would also strain the energy grid.

Farms cover a quarter of New York, according to the report, and contribute \$4.5 billion a year to the state economy. While a longer growing season may benefit some crops, others are at risk of heat stress, including New York’s famous Empire and McIntosh apples. Some plants, such as the grapes that feed the state’s wine industry, are vulnerable to spring frosts if they become active too early due to warmer temperatures. Milk production may also decline, because heat-stressed cows produce less milk.

In the Catskill and Adirondack mountains, shorter and warmer winters with less snow could hurt ski- and snowmobile-related tourism. Both regions may also see declines in native brook trout—the state fish—as their cold-water habitat warms, and if the hemlock trees that shade their streams succumb to the woolly adelgid, an invasive insect that has recently spread into central New York from the south.

The report offers practical strategies for the state to adapt. It says that when municipalities upgrade or build bridges, sewers and other infrastructure, they should choose designs that can withstand heavier rains. Flood zones can be expanded, along with shoreline setbacks for new construction, and [flood](#) walls expanded. In the long term, the state may want to buy out some coastal property owners.

It recommends that the Metropolitan Transportation Authority invest in more pumps to vacuum water from New York's subway system, and barriers to keep water from raining through sidewalk grates and other openings. In New York City, there are already plans to build berms to divert water away from highway tunnel entrances.

To cool the air during summer heat waves, cities can plant trees and paint dark surfaces white to reflect the sun. The state could also provide incentives for people to use their air-conditioners and other appliances at off-peak hours. The researchers also recommend more uniform regulations for the telecommunications industry, and for phone and internet cables to be decoupled from the energy grid, which has repeatedly shown itself vulnerable to storms. The report says that for every \$1 put toward climate adaptation, \$4 may be saved in avoided losses.

Provided by Columbia University

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