

Climate Change Impacts – Weather, Climate, Storms and Sea Level Rise March 2019

Rising Temperatures

- Anthropogenic carbon dioxide emissions have increased 40% in the Northeastern United States since the late 1700s, along with other greenhouse gasses. As a result, the surface and lower atmosphere of our planet has warmed approximately 1°F during the last 50 years.¹
- Overall, New Jersey's annual temperatures have increased an average of 2.2°F since 1900.²
- New Jersey has begun to experience more rapid warming since 1980, with five of the warmest years occurring after 1998.²
- 2012 was New Jersey's warmest year recorded thus far with an average temperature 2.8°F above mean the 1981-2010 mean.²
- "Annual average temperature over the contiguous United States has increased by 1.2°F (0.7°C) over the last few decades and by 1.8°F (1.0°C) relative to the beginning of the last century."³
- "Average annual temperatures across the Northeast have increased from less than 1°F (.06°C) in West Virginia to about 3°F (1.7°C) or more in New England since 1901."³
- By 2050, average annual temperatures in the Northeast are expected to increase by 4.0°F (2.2°C) under a lower scenario and 5.1°F (2.8°C) under a higher scenario relative to the near present (1975-2005), with several more days of extreme heat occurring throughout the region each year.³
- "1,400 premature deaths from extreme temperatures could be avoided in the Northeast each year by 2090 if global greenhouse gas emissions are consistent with the lower scenario (RCP4.5) [presented by the source], resulting in \$21 billion in annual savings (in 2015 dollars)."³
- https://climate.rutgers.edu/stateclim/images/nj_12month_temp_dep.JPG
- https://climate.rutgers.edu/stateclim/NJ_monthly_extremes.pdf

Increased Rainfall

- In the past century, New Jersey has experienced an upward trend of 4.1" (9% increase) in precipitation per 100 years. Most of the upward trend comes from changes in precipitation during the spring and fall.²
- 2011 was the wettest year on record for New Jersey, with August 2011 setting the record for all-time wettest month.²
- The heaviest precipitation amount for six of the last twelve calendar months (March, April, June, August, October and December) in New Jersey has occurred since 2003.²
- https://climate.rutgers.edu/stateclim/NJ_monthly_extremes.pdf
- https://climate.rutgers.edu/stateclim/images/nj_12month_pcp_dep.JPG

Extreme Events

- Heavy precipitation events have increased significantly in the past two decades, occurring more than twice as often in recent years than during the past century.²
- "Furthermore, the strongest hurricanes are anticipated to become both more frequent and more intense in the future, with greater amounts of precipitation."³
- "Thirty-two percent of open-coast north and Mid-Atlantic beaches are predicted to overwash during an intense future nor'easter type storm, a number that increases to more than 80% during a Category 4 hurricane."³

Sea Level Rise

- New Jersey will continue to experience Sea Level Rise. A 2016 study led by Rutgers scientists has projected the following future rates of sea level rise:
 - By 2050 the sea level along New Jersey's coast is projected to rise from 1.0 – 1.8 ft.²
 - By 2100, under a low emissions scenario, the sea level along New Jersey's coast is projected to rise from 1.7 – 3.1 ft.²

- By 2100, under a high emissions scenario the sea level along New Jersey coast is projected to rise from 2.4 – 4.5 ft.²
- According to the National Climate Assessment (2014) report, sea level rise of two feet, without any changes in storms, would more than triple the frequency of dangerous coastal flooding throughout most of the Northeast.²
- A sea level rise line with median projections would threaten much of New Jersey's coastlines. These effects will be magnified during storm events, increasing the severity of storm-related flooding and associated erosion in coastal and bay areas. Atlantic City is predicted to experience floods as severe as those that today happen only once a century, to every year or two by the end of the century.²
- “Sea level is rising more rapidly along the New Jersey shore than in most coastal areas because the land is sinking. If oceans and atmosphere continue to warm, the sea is likely to rise eighteen inches to four feet along the New Jersey shore in the next century.”¹
- “The United States Geological Survey estimates that barrier islands of the New Jersey shore from Bay Head to Cape May would be broken up by new inlets or lost to erosion if sea level rises three feet by the year 2100, unless people take actions to reduce erosion.”¹
- “Long-term coastal erosion, as driven by sea level rise and storms, is projected to continue, with one study finding the shoreline likely to erode inland at rates of at least 3.3 feet (1 m) per year among 30% of sandy beaches along the U.S. Atlantic coast.”³
- “Continued increases in the rate of sea level rise—on the order of 0.08 inches (2 mm) per year above the 20th-century rate—could cause much of the open ocean coasts in the Mid-Atlantic to transition to a state wherein coastal barrier systems migrate landward more rapidly, experience reductions in width or height, and overwash and breach more frequently. Such an increase is projected to occur this century under the Intermediate-Low scenario, which suggests that global sea levels will rise approximately 0.24 inches (6 mm) per year.”³
 - “ For example, estimates of coastal property losses and protective investments through 2100 due to sea level rise and storm surge vary from less than \$15 billion for southeastern Massachusetts to in excess of \$30 billion for coastal New Jersey and Delaware under either the lower (RCP4.5) or higher (RCP8.5) scenarios [outlined in source] (discounted at 3%).”³

Other Links/Tools

- Sustainable Jersey has a Heat Island Assessment Action, which is accompanied with an interactive land surface temperature map generated by LandSat 8 satellite imagery. The map allows you to measure and analyze UHI effects in your community, map link: <http://www.arcgis.com/home/webmap/viewer.html?webmap=8557b6f11906438f800ab99378394236>
- Community Resiliency Assessment Tool with various mapping tools (NJFloodMapper & Flood Exposure Profiler): <http://www.prepareyourcommunitynj.org/>

1 What Climate Change Means for New Jersey. (2016). EPA.

<https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-nj.pdf>.

2 Indicators of Climate Change in New Jersey. (2018). DEP.

<https://www.nj.gov/dep/ages/climate/data.html>.

3 L.A., E.L. Mecray, M.D. Lemcke-Stampone, G.A. Hodgkins, E.E. Lentz, K.E. Mills, E.D. Lane, R. Miller, D.Y. Hollinger, W.D. Solecki, G.A. Wellenius, P.E. Sheffield, A.B. MacDonald, and C. Caldwell, 2018: Northeast. In Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, pp. 669–742. doi: 10.7930/NCA4.2018.CH18. <https://nca2018.globalchange.gov/chapter/18/>.