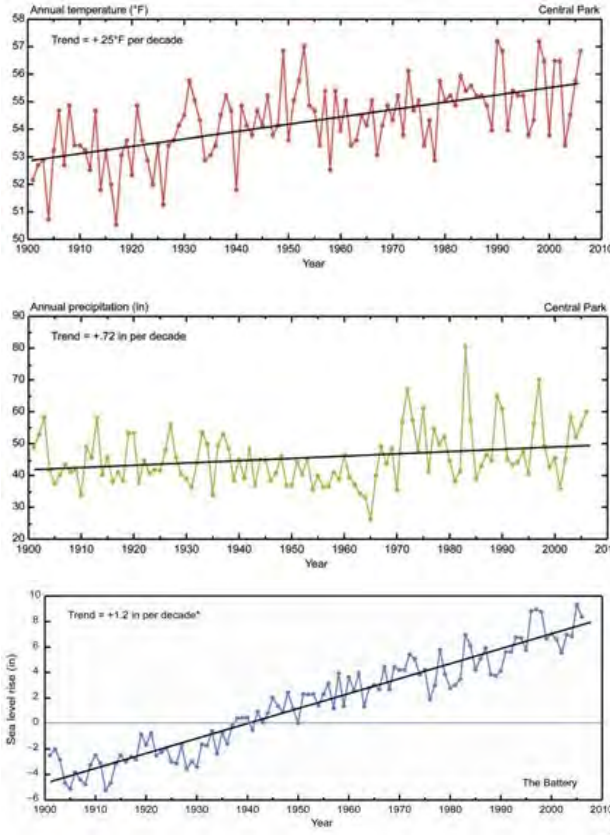
CLIMATE SCIENCE & SERVICES ... IN ACTION

NOAA's Data Helps New York City Prepare for Climate Change

New York City is America's largest coastal community at risk from the effects of a changing climate. Temperature increases and sea level rise are already occurring and, along with other climate changes, are likely to accelerate. As a city of more than 8 million people situated along 520 miles of coastline, with an extensive underground infrastructure prone to flooding, and lack of easy evacuation routes, it is particularly vulnerable to coastal storms and sea level rise.[1,2] Recognizing the seriousness of climate change, city planners and decision-makers have started to take action.



Observed annual temperature and precipitation in Central Park (1901-2006) and sea level rise at The Battery tide gauge station (1901-2006), NYC. Temperature data sets are not adjusted for urbanization effects. All trends are significant at the 95% level. Source: Horton et al. 2009 & NYCDEP 2008.

As part of PlaNYC[1], New York City's long-term sustainability plan, Mayor Michael Bloomberg convened the New York City Panel on Climate Change (NPCC) to advise the city on issues related to climate change and adaptation. The panel of experts used NOAA's climate data to analyze the current climate and project future climate scenarios. This climate information was a key part of the coordinated adaptation plan for the city's critical infrastructure developed by the New York City Climate Change Adaptation Task Force, comprised of public agencies and private companies.

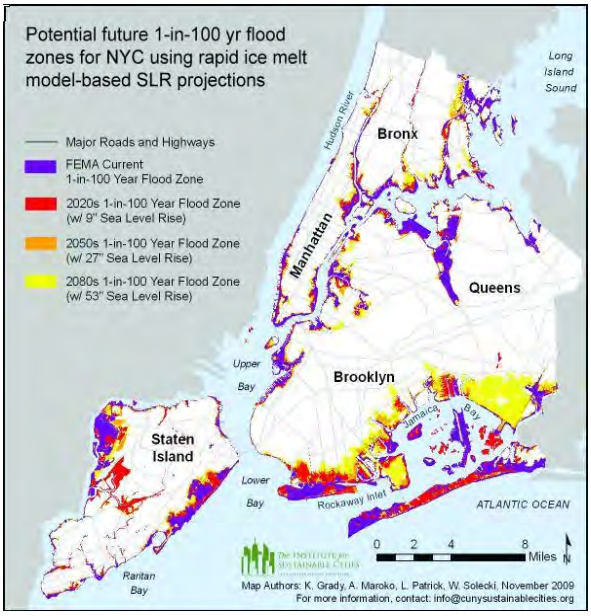
The NPCC used observed weather data from NOAA's National Climatic Data Center (NCDC) to complete a historical climate analysis for temperature and precipitation. NPCC used these analyses to identify observed trends in both mean climate and climate extremes, such as hot or cold temperatures and intense precipitation events. Their analysis for Central Park has determined that the observed trend for temperature is increasing by 0.25 degrees Fahrenheit per decade and increasing for precipitation by 0.72 inches per decade.[3] A similar historical analysis for sea-level rise, conducted with data collected from the NOAA tide gauge at The Battery, indicates that the net sea level has been rising relative to the land since 1900, at a rate of 1.2 inches per decade.[4]

Future climate projection scenarios for temperature, precipitation, sea level rise, and extreme events were developed by the NPCC using a suite of global climate models and greenhouse gas emissions scenarios, including two versions of NOAA's Geophysical Fluid Dynamics Laboratory (GFDL) model. By comparing climate projections with the observed data analysis, the NPCC was able to determine whether current climate risks can be expected to continue into the future, how risk frequency and severity may change, and how to identify new climate hazards.

Data from NOAA played a crucial role in both the NPCC's observed climate analysis and climate projections. NPCC projections indicate that sea level may rise approximately 1 to 2 feet by the middle of this century, and as a result, more frequent coastal flooding can be anticipated.

For a city that has a significant amount of infrastructure in coastal areas, climate projections are necessary to adequately prepare and plan for a more resilient future. Climate information provided by the NPCC is already being used by the city and local stakeholders to examine how risks posed by climate will affect critical infrastructure and determine how to develop climate resilience in these areas.

New York City has taken several steps to begin preparing for rising sea level and more frequent coastal flooding. For example, the New York City Department of Environmental Protection (NYCDEP) is raising pumps at the Rockaway Wastewater Treatment plant from 25 feet below the existing sea level to 14 feet above the existing sea level.



Current FEMA 1-in-100-year floodplain (purple); with projected sea level rise by the 2020s (yellow); 2050s (orange); 2080s (red). Areas potentially at-risk to a 1-in-100 year flood with future sea level rise assumes a rapid ice melt scenario that is based on observed trends in the melting of West Antarctic and Greenland ice sheets and paleoclimate studies of ice melt rates during the most recent postglacial period. Note: This map is subject to limitations in accuracy resulting from the climate models, datasets, and methodology used in its preparation. The map and data should not be used to assess actual coastal hazards, insurance requirements or property values, or be used in lieu of the Flood Insurance Rate Maps issued by FEMA. Source: Horton et al. 2009 & NYC 2011.

Design plans for higher water levels have also been used in the development of a park on Governors Island in New York Harbor, much of which lies below the elevation where the NPCC projects the 1-in-100-year flood level could be by the end of the century. In the design plans for the new park, a significant portion of the new parkland will be raised above the projected 1-in-100-year flood level by reusing construction debris. Other steps under consideration to address these climate risks include utilizing saltwater-tolerant plants that can thrive on brackish groundwater and replacing impervious paved surface with plants and permeable materials.

In addition to helping the NPCC analyze past, present, and future climate, NOAA data products have the potential to play an integral role in a climate indicators and monitoring network. The NPCC has recommended that New York City develop such a network to track and analyze key climate change factors, impacts, and adaptations over time. Data from NCDC is useful for monitoring how temperature and precipitation are changing.[5] NOAA's National Ocean Service[4] is a source of data for sea level and coastal storms, while the agency's Earth System Research Laboratory[6] generates data on greenhouse gases.

References

- [1]City of New York (2011), PlaNYC: A greener, greater New York. http://www.nyc.gov/html/planyc2030/html/theplan/the-plan.shtml
- [2]New York City Department of Environmental Protection. *Assessment and Action Plan*, May, 2008. http://www.nyc.gov/html/dep/html/news/climate_change_report_05-08.shtml
- [3]Horton, R., C. Rosenzweig, V. Gornitz, D. Bader, and M. O'Grady, 2009: *Climate Risk Information*. New York City Panel on Climate Change. Reprinted as Appendix A: Climate Risk Information: Climate Change Scenarios & Implications for NYC Infrastructure", *Ann. New York. Acad. Sci.*, 1196, 147-228. 228.
- [4]NOAA Tide Station for "The Battery": http://tidesandcurrents.noaa.gov/geo.shtml?location=8518750
- [5]NOAA National Climatic Data Center, Climate Monitoring: http://www.ncdc.noaa.gov/climate-monitoring/
- [6] NOAA Earth System Research Laboratory, Global Monitoring Division: http://www.esrl.noaa.gov/gmd/index.html

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