Climate Change Information Resources
New York Metropolitan Region
(CCIR-NYC)

How will climate change affect the region's transportation system?

Key Points

Climate change places the tri-state metropolitan area's low-lying transportation infrastructure at increased risk of flooding. This includes bridge and tunnel access roads, subway stations, tunnels, highways, and New York City's airports. In addition to the risk of storm flooding, some coastal transportation facilities may be at risk of inundation as the sea level rises

Figure 1. La Guardia Airport, Queens, NY. November 25, 1950. Source: NYC Office of Emergency Management.

The Transportation System

Four out of five boroughs of New York City are located on islands. The bridges and tunnels that connect the five boroughs are critical bottlenecks along the main transportation paths to the suburbs and counties located in the region. The vast majority the region's transportation infrastructure was built during the period between the 1920s and the 1970s as part of the construction of an integrated Greater New York and the emergence of extensive suburban development.

Today, with about 20 million people living, working and commuting in its 31 counties, the New York metropolitan region is home to the largest public transportation system in the United States. Many organizations are part of this system: the Metropolitan Transportation Authority (MTA), New Jersey Transit (NJT), and the Port Authority of New York and New Jersey (PANYNJ), to name a few. These important components of the region's transport system provide and maintain a large-scale public service. For example, MTA operates subways, buses, and railroads that move 5.7 million riders a day or 1.7 billion in a year. The MTA's bridges and tunnels carry upwards of a quarter of a billion vehicles annually, more than any other bridge and tunnel authority in the nation.

Sea-Level Rise and Flooding

Sea-level rise is projected to cause an increase in flooding events, to which the region's low-lying transportation infrastructure is vulnerable. In recent decades, the region has been hit by severe Nor'easters. Two examples are November 24 – 25, 1950 and December 11, 1992, with lesser events at other times. These Nor'easters flooded airports and roadways (Figures 1 and 2). The 1992 storm caused flooding at the Hoboken, New Jersey PATH Station, interrupting commuter service between New Jersey and New York City for 10 days and service on other sections for two days while equipment was repaired. Following this storm, floodgates were installed at the top of stairways leading to station platforms. In addition, design of any new openings to the platform levels must now account for current flood elevations.

Figure 2. Lower East Side, Manhattan. November 24, 1950. Source: NYC Office of Emergency Management.

Many elements of the transportation and other essential infrastructure systems in the New York metropolitan region are located at elevations two to six feet above current

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sea level. Storms frequently produce flood waters that exceed six feet. The shaded region in Figure 3 displays

Figure 3. Potential Category 2 hurricane surge on the Saffir-Simpson (SS) Hurricane Scale at Holland Tunnel, Manhattan entrance. Source: NYC Office of Emergency Management.

the water level in the event of a category 2 hurricane, indicating that the Holland Tunnel would be inundated. Bridge access roads, entrances to road and rail tunnels, and many transportation facilities are put in jeopardy by flooding, including all three of the major New York metropolitan region airports (La Guardia, JFK, and Newark-Liberty), the Holland Tunnel and Lincoln Tunnel, the Passenger Ship Terminal, and major arteries like the FDR Drive, the Brooklyn Belt Parkway, and the New Jersey Turnpike as it crosses the Hackensack Meadowlands. Projections have been made about the height of future flood waters which indicate that at the least some transportation facilities could be under 6 to 16 feet of water (Figure 4).

References

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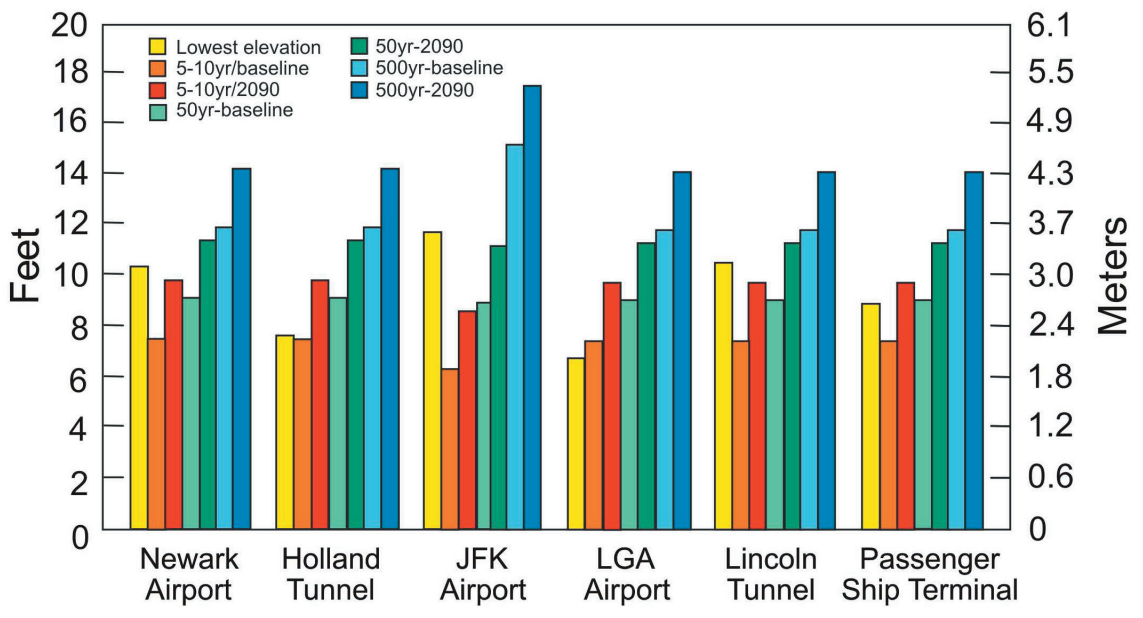

Figure 4. Comparison of lowest critical facility elevation with surge heights for three reference periods: 5, 10, and 500 years (from left to right) and at the beginning (baseline) and end (2090) of the twenty-first century. Source: Jacob et al, Infrastructure, in *Climate Change and a Global City.*

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