

WATER FACTS






Boston, Massachusetts: Identifying and Becoming More Resilient to Impacts of Climate Change



Cities across the United States should anticipate significant water-related vulnerabilities based on current carbon emission trends because of climate change, ranging from water shortages to more intense storms and floods to sea level rise. To help cities become more resilient to the rising threats of climate change, NRDC reviewed more than 75 scientific studies and other reports to summarize the water-related vulnerabilities in 12 cities—including Boston. Although there may still be some uncertainty about what particular impacts threaten cities and how quickly or severely they might occur, action at the local level is the most effective method of reducing, mitigating, and preventing the negative effects of water-related climate change outlined in this fact sheet. NRDC urges cities to prepare for coming challenges relating to water resources. Fortunately, there are steps cities are already taking to become more resilient.

Situated on Boston Harbor where a number of rivers empty into the Atlantic Ocean, the city of Boston has irregular contours and is exposed on many sides to water. Thus, Boston is especially vulnerable to projected increases in the frequency and intensity of storms, sea level rise, and flooding. Based upon current climate research, we know that Boston's vulnerabilities include:

Summary of water-related climate changes and impacts in Boston throughout the 21st century

	Rising sea levels
	More frequent and intense storm events
	Increased flooding
	Increased annual precipitation
	Water supply challenges due to increased droughts

-  Highly likely
-  Likely
-  Possible

Source: NRDC



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RISING SEA LEVELS AND STORM SURGE FLOODING

Relative sea level in Boston has already increased approximately 11.8 inches (0.3 meters) since 1900—half due to climate change and half due to natural land subsidence. Conservative estimates are that by 2100, sea levels in Boston could rise another 2 to 3.3 feet (0.6 to 1 meter) due to climate change and natural land subsidence. Higher relative sea levels increase the flood potential of storm surges. With a 3-foot rise in sea level, the recurrence of a 100-year flood event is every 2 years or less by 2100. Coastal infrastructure, such as port facilities in Boston's Inner Harbor and Boston Logan Airport, will be at risk of flooding, and a number of Boston's landmarks and transportation infrastructure would be at risk for future flooding as well.

STORM EVENTS AND COASTAL FLOODING

By 2100, annual precipitation in the Boston area could increase from 5.9 to 23 percent, depending on the climate change scenario. The frequency and intensity of severe storms in winter and summer is expected to increase. Cities like Boston situated along the coast with concentrated development along riverbanks and coastal shorelines are at high risk from floods. If current growth and land use practices remain unchanged while relative sea levels rise 3.3 feet (1 meter) by the end of the century, a 100-year storm surge could cost the City of Boston about \$36 billion (in 2000 dollars) in damages to residential, commercial, and industrial structures and in emergency response. Over the course of the 21st century, river flooding could affect twice as many properties at twice the cost of past floods. Flood damage could snarl traffic, leaving motorists sitting in traffic for about 80 percent more hours and result in 82 percent more cancelled road trips. River flooding could affect water treatment plants, and increase pathogen concentrations washing onto recreational beaches, possibly increasing the number of days when beaches are closed or under a no-swim advisory.

INCREASED TEMPERATURE AND WATER QUALITY

By 2030, temperatures in Boston could increase from 2 to 2.3°F (1.1 to 1.3°C), and by 2100, temperatures could increase from 5.2 to 8.6°F (2.9 to 4.8°C). The number of days above 90°F (32°C) each year could double to at least 30 days. Warmer temperatures are likely to affect water quality. Research demonstrated that an air temperature increase of 4.3°F (2.4°C) would lower dissolved oxygen in Boston rivers by 0.5 milligrams per liter, a significant decrease. Decreased levels of dissolved oxygen make it difficult for rivers to support fish and plant life. The Assabet River in Metro Boston, for instance, is already listed by state environmental authorities as unsuitable for fish, wildlife, and certain recreational activities such as swimming and boating because of low dissolved oxygen levels.

ACTION

In recent years, Boston has begun to develop a focused and comprehensive strategy for preparing for the effects of climate change, in part informed by a 2004 report titled "Climate's Long-term Impacts on Metro Boston" (CLIMB). The CLIMB report analyzed the potential socioeconomic impacts to the Boston area from climate change and evaluated the monetary and environmental costs associated with three adaptive scenarios. CLIMB concluded that adopting a proactive strategy now to deal with climate change impacts would be the least costly scenario and would provide the greatest environmental benefits over the long term. Actions taken by the city include:

- An executive order requiring new and major renovations of municipal facilities to include considerations of the risk of climate change impacts on the project and related infrastructure through 2050;
- The Boston Water and Sewer Commission including climate change impacts, notably sea level rise and storm intensity changes, into long-range capital planning for the city's sewer and stormwater system; and
- Participation by the city in the Climate Resilient Communities program developed by ICLEI USA. Participants in the program receive access to adaptation resources and technical support to guide adaptation planning.