



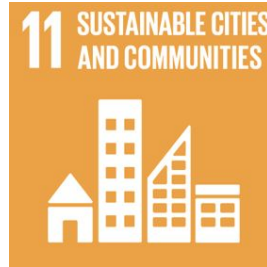
Supporting Winter Climate Adaptation in Worcester

Camila Gomez
Hassan Dajana

March, 2024

Abstract

Our project aims to create a better understanding of winter climate impacts in the city of Worcester.



Objectives:

1. Reconstruct and analyze historical ice storms in Worcester to enhance understanding of past events and their impacts on infrastructure.
1. Assess the vulnerability of Worcester's critical infrastructure to winter storm events, including power grids, buildings, telecommunications, and transportation systems in essence conducting an infrastructure vulnerability analysis.
2. Identify populations and areas vulnerable to winter climate events in Worcester and assess their impacts in essence establishing a social vulnerability index.
3. Suggest recommendations (policy, operational, programmatic) alongside short-, medium--, and long-term actions based on research and studies from other cities.

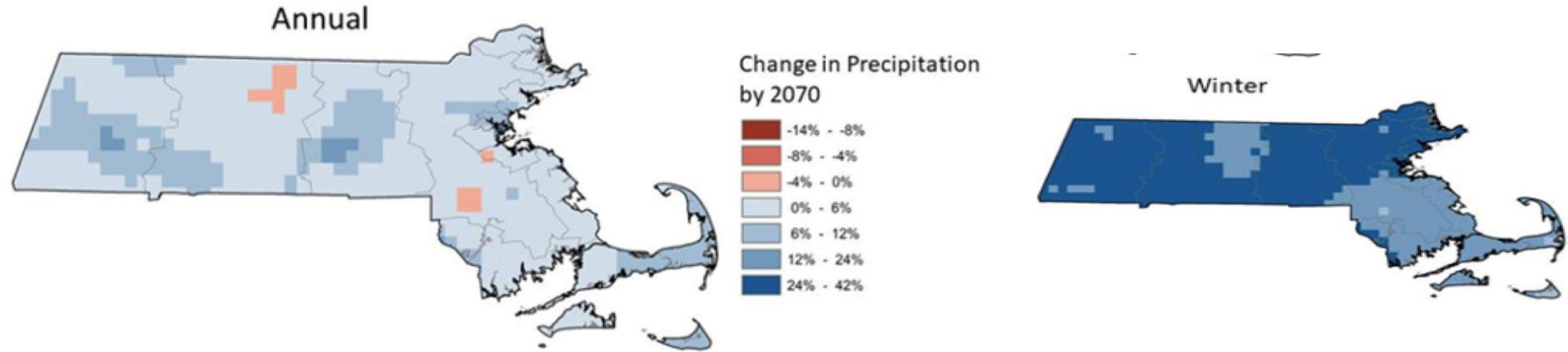
Winter's weather is increasing faster than other seasons.

Figure 3. Temperature Change by Season in the Contiguous 48 States, 1896–2021



Source: US EPA via NOAA 2022

Annual precipitation is expected to increase across Massachusetts



Source: MA Climate Assessment , 2022

Objective 1 Historical Reconstruction & Climate Projections

We have identified 23 major Winter storms in Worcester between 1920 - 2023.

Year		Date	Inches of Snow
1921	Ice Storm	Nov 25-29	24"
1925	Ice Storm	April 19	16"
1947	Snowstorm	Dec 26-27	16.9"
1961	Blizzard	Dec 24	24"
1969	Snowstorm	Feb 25-29	26.3"
1978	Blizzard	Feb 5-7	20.2"
1983	Blizzard	Feb 11	21"
1987	Snowstorm	April 28	17"
1992	The Great Nor'easter	Dec 10-12	27"

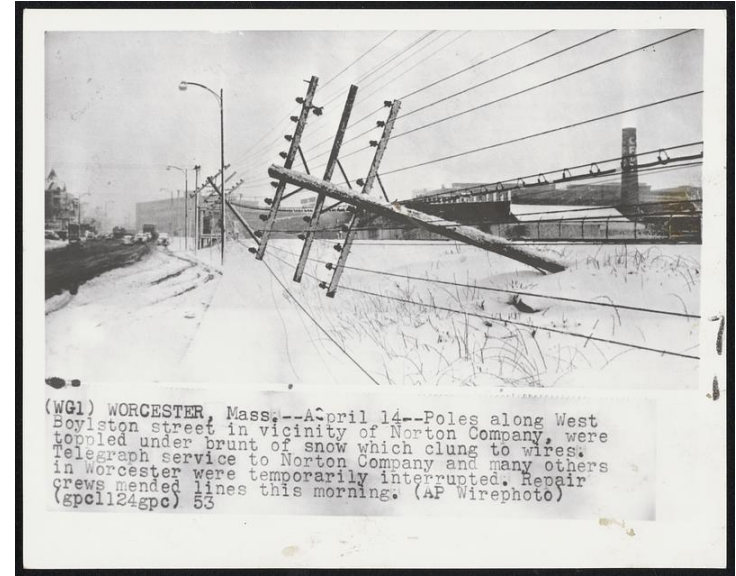
Year		Date	Inches of Snow
1993	Snowstorm	Mar 13-14	20.1”
1994	Intense cyclone	Dec 22-26	70m/h Wind Speed
1996	Blizzard	Jan 6-10	14”
1997	April Fool’s Blizzard	March 30 - April 1	30”
2002	Snowstorm	Dec 25-26	15.5”
2003	Blizzard	Feb 14-19	27.5”
2005	Blizzard	Jan 20-23	24.1”
2006	Blizzard	Feb 11-13	22”
2008	Ice Storm	Dec 11-12	1” (Ice)
2010	Blizzard	Dec 22-29	24”
2011	Snowstorm	Oct 29-30	14”
2013	Blizzard NEMO	Feb 7-18	28.8”
2015	Winter Blitz Juno	Jan 26-27	34.5”
2018	Bomb cyclone	Jan 4th	17”

For each storm event we are looking at the following information and weather conditions:

- Temperature
- Wind Speed
- Snow accumulation
- Precipitation
- Impacts
- Pictures showing impact

How are we getting this data?

- Reviewing newspaper (Telegram) microfilms
- NOAA ([NOWData](#))
- Archival documents from Libraries
- NOAA *Storm Events Database*



How are we representing this information?

- Graphics:
 - a. Historical power outages and winter storms
 - b. Wind speed and winter storms.
 - c. Average temperature and winter storms.
 - d. Snow accumulation and winter storms.
- GIS maps

Objective 2 (Infrastructure Vulnerability)

MVP Plan:

Community Resilience Building (CRB) workshop (held on January 25, 2019) identified vulnerable Infrastructure.

- a. Transportation.
- b. Utilities (Electricity and Gas).
- c. Buildings.
- d. Tree and vegetation management.



Objective 2 (Infrastructure Vulnerability)

1. **Utilities** : National Grid working on its [Future Grid Planning](#) for grid modernization.
2. **Transportation**: [Snow detours](#).
3. **Buildings**: [Green Worcester Plan](#).
4. **Tree and Vegetation Management**: [Right Tree - Right Place](#) of DPW's Park and Recreation Team, Urban Forest Master Plan, inclusion of winter consideration in the urban forest master plan.

Objective 3 (Social Vulnerability)

MVP Plan

Community Resilience Building (CRB) workshop (held on January 25, 2019) identified the following social vulnerable groups.

Population:

- a. Large non-English speaking demographic.
- b. Large homeless population.
- c. Elderly community.
- d. Wide disparity in education levels.
- e. Environmental justice community.
- f. Differently abled population



Source: Bentley University

Resident Survey:

Survey

Winter Storm Survey: Share Your Experience!



We want to hear from you! Your feedback is crucial in helping us understand how winter storms impact our community. Please take a few minutes to complete our Winter Storm Survey.



Your input will help us:

- Ensure our community is prepared and safe
- Protect our critical infrastructure

Scan the QR code to participate



Your voice matters. Thank you for your participation!

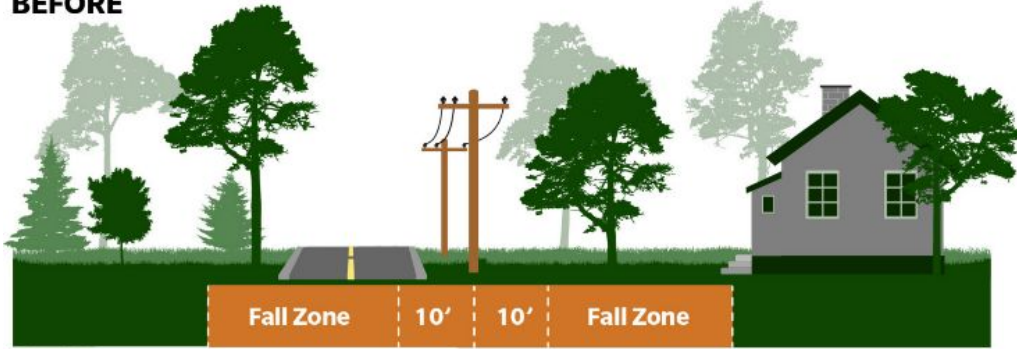
Objective 4 (Recommendations)

- Tree management and vegetation mechanism, example [stormwise](#) at UConn, researching the ways in which trees could be management to proactively prepare for storms & coordination mechanism between private and public stakeholders.
- A collaborative academic and industrial partnership between a utility provider and university to improve data sharing, academic learning and industrial linkages to align and improve future course of action, case in point Eversource energy center at UConn.



Example of vegetation management:

BEFORE



AFTER

