RESILIENT CHICAGO
Climate Planning for the Future

Winter Adaptation Measures for the City of Chicago


credit: Illinois-Indiana Sea Grant

Most attention in climate adaptation literature focuses on adapting to the impacts of hotter summers (such as droughts, heat waves, shifting biomes and disease vector ranges, and increased air pollution risks), greater variability in warmer season weather patterns (including a higher frequency of severe storms, with associated flood risks), and increased risk of coastal hazards (from increasing sea levels). While these are critical topics to consider, few studies have examined adapting to the impacts of warmer winters. For instance, the potential for a higher frequency of winter precipitation in the form of rain, more freeze-thaw cycles, more precipitation in the form of intense snowstorms despite a shorter winter season, and a greater likelihood of snowfall in the form of heavy, wet snow.

Recently, the Great Lakes Integrated Sciences and Assessments Center (GLISA) funded Illinois-Indiana Sea Grant and the Midwestern Regional Climate Center to assess possible winter climate change impacts for the City of Chicago, and to propose winter adaptation policies to address these potential changes. The project's main findings and policy suggestions are summarized in the tables below and on the following page.

Projected Climate Changes	Potential Impacts	Policy Recommendations
Temperature-related variables		
Overall increase in average temperature	Fewer extremely cold days during the winter, which could reduce harm to vulnerable populations in winter. Potentially alter length of snow cover on the ground.	A more efficient approach to plowing in the future may be to delay plowing of neighborhood streets after a major snowstorm and focusing snow clearance efforts on priority routes.
Decrease in heating degree days and increase in cooling degree days	Minimal economic impact for the average Chicago household, largely because of the much greater energy efficiency of air conditioning units when compared to heating units.	
Increase in freeze-thaw cycles	Concrete roads and structures are more susceptible to spalling, cracking, and potholes.	Inter-departmental coordination with respect to infrastructure repair and replacement, as well as roadway resurfacing projects and maintenance budgets may need to increase. Alternative paving materials like permeable surfaces may be beneficial to reduce the saturation of paving materials by freezing water, which contributes to cracking.
	Increased risk to pedestrians as freeze-thaw cycles can compromise the integrity of building fasteners, causing them to loosen and fall.	Increase the structural inspection of vulnerable buildings and those with projections over sidewalks. Mandatory insurance requirements for buildings with projections over public ways. Encourage building design features to reduce pedestrian exposure to falling facade.

The main contacts for this project are:
Martin Jaffe: Associate Professor, University of Illinois at Chicago, Department of Urban Planning and Policy, Chicago, IL.
Molly Woloszyn: Extension Climatologist, Illinois-Indiana Sea Grant and Midwestern Regional Climate Center, Champaign, IL.

Winter Adaptation Measures for the City of Chicago, continued

Projected Climate Changes	Potential Impacts	Policy Recommendations
Precipitation-related variables		
Overall increase in average winter and spring precipitation	Increased risk for surface and basement flooding throughout the year.	Chicago's flood risk model should be modified to accommodate the additional winter stormwater loads to Chicago's currently undersized combined sewer systems.
Extreme precipitation likely to increase		
Precipitation shift from declining winter snowfall to increasing winter rainfall	Less road salting over the entire snow season (reducing pollutant loading of chlorides).	Green infrastructure (GI) tends to be less effective in the winter. Therefore, more on-site monitoring of GI performance during winter months may be needed until stormwater modeling can better account for changing winter precipitation patterns. Increased margin of safety in the design of GI may be a good precaution (e.g. oversizing GI by 20-25%).
	Ambient water quality might not be as seasonally variable (reduce the "spring flush" phenomenon).	
	Increased flood risk as the runoff coefficient is higher when rain falls on snow or frozen ground.	
	Increased combined sewer overflow issues.	
Higher frequency of heavier and more dense snowfall events	Increased risk for winter power blackouts.	Public health risks may require establishing emergency heating centers (same locations used as cooling centers in summer and possibly CTA buses for centers affected by blackout).
		Issue public service announcements as to which foods are safe for consumption after blackouts to reduce food safety risks.
		Increased schedule of tree trimming around above-ground power lines.
		Building codes and development regulations governing new development should specify or encourage underground installation of utilities.
	Increased risk for falling trees and branches, causing damage to automobiles, structures, and possibly causing blackouts.	Reconsider the urban tree planting list to include tree species that are less vulnerable to damage from blizzards and snowstorms with higher snow density.


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