Tail Risk, Climate Drivers of Extreme Heat, and New Methods for Extreme Projections - Summary

This chapter offers the latest assessment of the drivers and impacts of potential changes in New York City resulting from climate change using a range of greenhouse gas (GHG) emissions scenarios. The assessment, which makes use of the latest climate models, presents projections of record for sea level rise, air temperature changes, extreme heat, precipitation, and extreme events, and addresses compound risks associated with climate change. The chapter emphasizes the equity implications of climate change adaptation.

Highlights from this chapter include:

1. **NPCC4 uses new methods to downscale global projections to account for local changes in climate, temperature, and precipitation.** More research is needed to better understand the interplay between large-scale and more localized drivers of climate change.

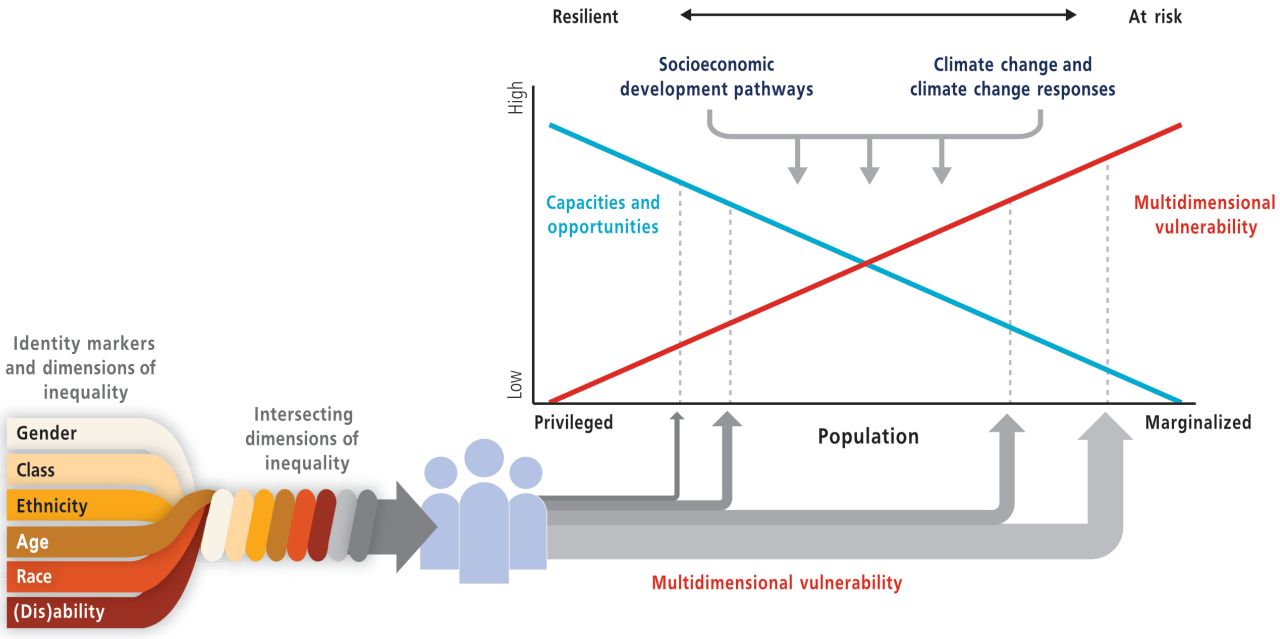
2. **Future sea level rise in New York City will depend on the stability of ice sheets in the West Antarctic and Greenland.** There are signs these sheets may be thinning, and this, combined with higher temperatures, raises the risk of coastal flooding in New York City. While more research is needed to understand the interactions between ice sheets, temperatures and coastal flooding, city stakeholders should consider the higher-end projections for sea level rise in long-term planning.

3. **Increasing temperatures and increases in the number, frequency, and duration of extreme heat events exacerbate heat islands in New York City.** Local patterns of infrastructure and green space affect how extreme heat is experienced in different neighborhoods in the city. Access to cooling centers and shade are essential to reduce the health risks associated with extreme heat exposure. Additional research is needed to assess the impact of our warming climate and differences in extreme heat exposure across New York City.

Summary

Tail Risk, Climate Drivers of Extreme Heat, and New Methods for Extreme Event Projections provides the latest assessment of the drivers and impacts of climate projections in New York City. The chapter builds on earlier assessments and describes new methods to develop predictions of sea level rise, temperature change, and precipitation for the city.

As with the other NPCC4 chapters, this chapter centers equity in its assessment and recognizes that our current climate crisis is rooted in long traditions of land dispossession, forced migration, colonialism, and ongoing patterns of marginalization and structural racism.



Schematic depicting the relationship between Marginalization, Vulnerability, and Resilience. Courtesy of Field et al. (2014)

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The chapter discusses how average annual air temperatures have increased over the last 70 years across the city. In addition, the daily nighttime temperature is increasing at a faster rate than daytime temperatures. The total number of hot days and nights is expected to increase, as is the frequency of heat waves.

It also projects that the total annual rainfall is predicted to increase, though with less certainty than air temperature predictions, along with the number of extreme rainfall events. Sea level is also predicted to rise and potentially accelerate as the century progresses.

In addition to offering these projections, the chapter also describes how large-scale climate processes, along with local land and infrastructure characteristics, affect extreme heat in the city. Local drivers in New York City include urban infrastructure (e.g., streets, sidewalks, and buildings) and the natural environment (e.g., shrubs, trees, and grasses). Local and physical factors can lead to inequitable exposure to risks from extreme heat, including stronger urban heat islands. Considering different experiences of extreme heat across the city is important for developing an equitable strategy.

Lastly, the chapter discusses the implications of low probability extreme weather and climate change scenarios, known as “tail risks.” These tail risks can have significant consequences for cities, e.g., Hurricane Sandy, so it is important to consider their implications. The chapter discusses tail risks associated with rainfall, sea level rise, and tropical cyclones.

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