



Climate Risk and Equity: Advancing Knowledge Toward a Sustainable Future - Executive Summary

Climate change presents urgent, immediate, and long-term challenges to New York City (NYC). To confront these challenges and build a more resilient and equitable future for all New Yorkers, the New York City Panel on Climate Change (NPCC) regularly assesses the current state of the science on climate change and provides actionable, policy-relevant recommendations for adaptation and mitigation to the Mayor and City Council. Each NPCC assessment provides climate projections of record for NYC and also covers other relevant, climate-related topics. The 4th NPCC assessment is organized around six main topics (Fig 1), explored across eight chapters and a special report on climate risk information.

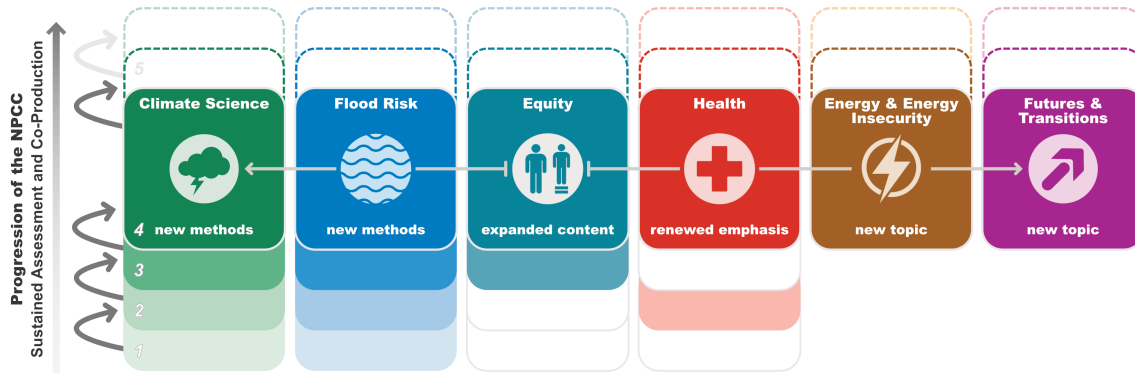


Figure 1. Graphic representation of NPCC4 topical content, and innovations from prior NPCCs. Figure by the authors.

NPCC4 was co-produced through the collaborative efforts of climate scientists, social scientists, planners, architects, engineers, NYC agency representatives, and community groups (Fig 2). NPCC4 made a deliberate decision to incorporate justice, equity, diversity, and inclusion in its collective work with special attention to racial equity in its practices, procedures, and methods of assessment.

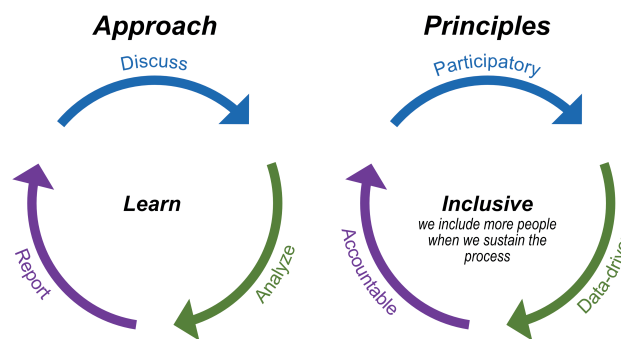


Figure 2. The Sustained Assessment process and principles of the City's Climate Knowledge Exchange (CKE) initiative that informed NPCC4 activities. Four key components (group discussion, surveys, focus area identification / refinement, and reporting) occurred sequentially. Figure adapted from the City of New York Mayor's Office of Climate and Environmental Justice.

NPCC4 SUMMARY:

NYC faces many challenges due to climate change and its interactions with social vulnerabilities and uneven urban development patterns and processes, summarized as follows:

Climate science: NPCC4 provides a new methodology for projecting extreme events and confirms new NYC projections of record for sea level rise, temperature, and precipitation.

- Sea level is projected to rise for centuries and remain elevated for thousands of years. NYC coastal locations continue to experience higher rates of relative sea level rise as compared to the global mean. The magnitude of future sea level rise in NYC will depend on the stability of West Antarctic and Greenland ice sheets.
- While the increase in total annual precipitation in NYC is projected to be relatively small, global climate models project increases in the frequency of extreme precipitation events.
- The number of days in NYC with minimum temperatures below freezing has been declining since 1900. The number of hot days and the frequency and duration of heat waves are expected to increase as this century progresses.

Flooding: NYC faces risk from multiple types of flooding: pluvial (rainfall), fluvial (rivers and streams), coastal (tidal and storm surge), groundwater, and compound (when multiple types occur in combination).

- Risks associated with all types of flooding will increase due to sea level rise and the intensification of precipitation.
- Comprehensive flood risk management must include neighborhood-specific combinations of grey infrastructure (e.g. sewers) and green infrastructure (e.g. parks). These approaches to living with water must be implemented across multiple systems and scales, and be synergistic with the needs and goals of communities.
- Natural and nature-based solutions will need to be integrated extensively, and in novel ways, to have measurable impact on a city that has been modified profoundly over centuries of development.



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Equity: Since the release of NPCC3 (2019), the City's climate-related equity work has become more explicitly focused on redressing environmental injustice and racial disparities.

- There is a need for more comprehensive data on disaggregated climate risks at the local level and tracking of City-sponsored climate adaptation projects and resilience investments in different communities.
- Climate risks for the most socially vulnerable populations are connected to both past and present land use decisions and their underlying inequities. Understanding the impacts of this history is vital for formulating effective mitigation and adaptation policies and strategies.
- Climate displacement is an important dimension of social vulnerability. The City's ability to measure the risks of climate displacement at a relevant scale (i.e., neighborhoods) is vital for understanding risks associated with new investments and infrastructure.

Health: Climate change-related health risks are a threat to all New Yorkers, but especially those most vulnerable because of age, poor health, racial and social inequities, and social isolation. Inequities in household and neighborhood physical environments further impact these vulnerabilities.

- Hot weather and flooding are the most important health risks associated with climate change.
- Climate change may increase exposures to air pollution, pollen and mold, mosquito and tick vectors, and water contaminants.
- Current policies and strategies already address many exposures (e.g., improving access to residential air conditioning, tree planting). These efforts can be informed and evaluated using data on climate-health vulnerabilities, such as components of the Heat or Flood Vulnerability Indices.

Energy and energy insecurity: The urgent need to reduce energy use and greenhouse gas (GHG) emissions in NYC brings to light significant challenges surrounding energy security but also presents new opportunities associated with energy transitions.

- Energy insecurity poses direct and indirect threats to public health and well-being, especially among vulnerable populations and communities.
- Transitioning to renewable energy and the electrification of infrastructure offers prospects for local economic investment, improved air quality, and the mitigation of GHG emissions.
- The energy transition must be navigated carefully to ensure energy affordability and reliability, particularly during extreme weather events, and to reduce energy insecurities among vulnerable groups.

Futures and transitions: NYC is dynamic and complex. Planning for the future requires the use of tools for addressing the complexities and uncertainties inherent in climate change as well as those in social, built, and ecological environments.

- The City's built environment will largely remain in place, yet changes in land use and land cover (e.g., conversions in impervious areas) are expected. NYC's future population will remain diverse and become increasingly older.
- Nature-based solutions are important for addressing the City's climate adaptation needs and can simultaneously benefit public health, climate mitigation, flood risk management, and habitat for biodiversity. Future assessments need to examine scenarios that account for nature and housing as well as the intersections of built, social, and ecological processes.
- Future planning should include longer-term time horizons and pay attention to local and regional variation in physical and socioeconomic characteristics.

LOOKING FORWARD

NPCC4 confirms, with a high degree of certainty, that NYC's future will be warmer, with more extreme heat events, and wetter, with growing risks from intense rainfall and inland flooding. Compound and cascading events are likely to expose the city to increased climate risk. Addressing ongoing climate risks while also fostering a more resilient, equitable, and adaptable future will require multiple levels of cross-sectoral investment, innovation, and transformation. Future NPCCs will continue to benefit from interdisciplinary framings and broad engagement. These efforts need urgent consideration now, as well as a continued commitment throughout the coming years.

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Read the full report
<https://climateassessment.nyc>

