

## NPCC4: Climate Risk and Equity | Advancing Knowledge Toward A Sustainable Future | Glossary

### The New York City Panel on Climate Change Fourth Assessment Report

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### *3-Year Return Period Event*

An event that has a 33.33% chance of occurring each year, but an event of this magnitude may not occur exactly every 3 years. By convention, this probability is expressed as its inverse (1/0.333).

### *Adaptation*

Initiatives and measures to reduce the vulnerability of natural and human systems against actual or expected climate change effects. Several types of adaptation exist, such as anticipatory and reactive, private, and public, and autonomous and planned. For health, physiological adaptation is also relevant (Congressional Research Service, 2021).

### *Adaptive Capacity*

The ability of systems, institutions, humans, and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences (Intergovernmental Panel on Climate Change (IPCC), 2014).

### *All-cause Mortalities*

The sum of external and non-external (also called natural cause) deaths or all deaths.

### *Allostatic Load*

The cumulative burden of chronic stress and life events involving multiple physiological systems, activities, and environmental challenges (Guidi et al., 2021).

### *Ambient Temperature*

Ambient temperature is the temperature of the surrounding area.

### *Backcasting*

Envisioning a desired future and then using that future comparatively to current context to develop the steps (investments, policies, etc.) leading to desired outcomes.

### *Bioregion*

A region defined by characteristics of the natural environment rather than by man-made divisions (Cascadia Department of Bioregion, 2024).

### *Bluelining*

Designating geographic areas as less desirable due to risks of climate-related disasters (Garcia, 2024).

### *Business-As-Usual (BAU) Scenarios*

Scenarios based on analysis of current trends using forecasting (e.g., rule-based or dynamical systems) approaches to extrapolate emergent trajectories.

### *Buyouts*

Government purchasing of homes and land as part of a broader strategy to relocate humans away from particularly devastated or hazardous areas (Lieberknecht & Mueller, 2023).

### *Carbon Sinks*

Places that absorb more carbon than they release.

### *Climate Change*

A significant change in the state of the climate that can be identified from changes in the average state or the variability of weather and that persists for an extended time period, typically decades to centuries or longer. Climate change can refer to the effects of (1) persistent anthropogenic or human-caused changes in the composition of the atmosphere and/or land use, or (2) natural processes such as volcanic eruptions and Earth's orbital variations (Intergovernmental Panel on Climate Change (IPCC), 2014).

### *Climate Change and Health Indicators (CCHIs):*

A subset of environmental health indicators providing information about population health, climate-sensitive environmental exposures, vulnerabilities, demographics, neighborhood conditions and linkages among these which are used to inform and evaluate climate actions and their influence on health, vulnerability, and distributional equity (Di Napoli et al., 2022; English et al., 2009).

### *Climate Change Risk Information*

A product of the likelihood of an event occurring (typically expressed as a probability) and the magnitude of consequences should that event occur (Rosenzweig et al., 2013).

### *Climate Displacement*

Especially of vulnerable populations, displacement caused directly or indirectly by events related to climate change (Urban Displacement Project, 2024).

### *Climate Hazard*

A weather or climate state such as a heat wave, flood, high wind, heavy rain, ice, snow, and drought that can cause harm and damage to people, property, infrastructure, land, and ecosystems. Climate hazards can be expressed in quantified measures, such as flood height in feet, wind speed in miles per hour, and inches of rain, ice, or snowfall that are reached or exceeded in a given period of time.

### *Climate Riskscape*

Describes how climate-based vulnerabilities are experienced differentially across geographies and individual or collective experiences and knowledge (Muller-Mahn, 2012).

### *Cloudburst*

A high-intensity, short-duration (less than a few hours) rainfall event.

### *Combined Sewer Overflow (CSO)*

A combined sewer system (CSS) collects rainwater runoff, domestic sewage, and industrial wastewater into one pipe. Under normal conditions, it transports all the wastewater it collects to a wastewater treatment plant (WWTP), where it receives treatment, before it is then discharged as treated effluent to a nearby waterbody. During wet weather (e.g., rainfall events or snowmelt), the volume of combined wastewater can sometimes exceed the capacity of the CSS or WWTP. When this occurs, untreated or partially treated combined wastewater discharges from an outfall directly to nearby streams, rivers, and other water bodies.

### *Community-level Energy Insecurity*

Infrastructure and building energy services that are unreliable and prone to outages that have community-level impacts.

### *Coproduction*

Collaborating to reach collective outcomes.

### *Critical infrastructure*

Systems and assets (electrical grid, water supply, functioning health care facilities) so vital that the incapacity or destruction of such systems and assets would have a debilitating impact on security, national economic security, national public health or safety, or any combination of those matters.

### *Deaths: Deaths Caused by Climate-sensitive Exposures*

The total burden of deaths caused by hot weather, freezing temperatures, flooding, or other climate-sensitive exposures.

### *Deaths: External Cause Deaths*

Intentional (homicide or suicide) and unintentional injury, poisoning (including drug overdose), and complication of medical or surgical care as identified with International Classification of Diseases, Tenth Revision codes V01–Y89 and U01–U03.

### *Disamenity*

As opposed to an amenity, a disamenity is a negative perception of a feature or object's value within a given context. Trees, for example, are often considered an amenity in landscapes. However, diseased or damaged trees can also be considered a hazard and a disamenity for neighborhoods (Kloster et al., 2021). Proximity to open water (a perceived amenity) can raise land value, while proximity to manufacturing or industrial uses (a perceived disamenity) can lower land values. In NYC, low-lying marshes were historically considered an environmental disamenity.

### *Eco-colonialism*

The erasure of indigenous sovereignty over land and subsequent imposition of Western (settler) conservation paradigms.

### *Energy Affordability*

A household's ability to attain sufficient and essential energy services, such as a warm home, at an affordable cost.

### *Energy Burden; Energy Cost Burden*

Low-income, high-energy expenditures with a focus on affordability (Hernández et al., 2022).

### *Energy Insecurity: Household Energy Insecurity*

A multidimensional (physical, environmental, behavioral) concept that refers to the inability to adequately meet basic household energy needs (Hernández et al., 2016).

### *Energy Poverty*

Households that spend more than a pre-defined threshold share of their overall consumption expenditure on energy products, where the threshold equals 'double of the national average ratio number (Moore, 2012).

### *Energy Security: Household Energy Security*

Consistent access to enough of the kinds of energy needed for a healthy and safe life in the geographic area where a household is located (Cook et al., 2008).

### *Environmental Public Health Indicators*

Summary measures that provide information about a population's health status in relation to environmental factors (World Health Organization, 2024).

### *Equity*

The absence of unfair, avoidable, or remediable differences among groups of people (socially, economically, demographically, or geographically or by other dimensions of inequality e.g. sex, gender, ethnicity, disability, or sexual orientation) as described by the World Health Organization. As it relates to climate change, equity would imply the absence of these differences in how all humans experience climate change.

### *Exposure*

People, livelihoods, environmental services and resources, infrastructure, or economic, social, or cultural assets in places that could be adversely affected by physical events and which are subject to potential future harm, loss, or damage (Intergovernmental Panel on Climate Change (IPCC), 2014).

### *Extractivism*

Self-reinforcing practices, mentalities, and power differentials underwriting and rationalizing socio-ecologically destructive modes of organizing life-through subjugation, depletion, and non-reciprocity (Chagnon et al., 2022).

### *Fast-flowing Water*

Flowing water that can generate life-threatening conditions (knocking down pedestrians, causing vehicles to float, destroying solid walls, dislodging buildings, eroding soils and sand), even when water depths are relatively shallow (Martínez-Gomariz et al., 2016, 2018; Musolino et al., 2020).

### *Flood Resilience*

When communities, ecosystems and infrastructure can experience extreme meteorological shocks and stresses associated with flooding (e.g. intense rainfall, storm surges and sea level rise) and continue to function, can quickly recover from flooding when it occurs, and can learn from flooding events to better adapt for future shocks and stresses.

### *Flooding: Coastal Flooding*

Caused by high tides, storm surge, and their gradual exacerbation by sea level rise.

### *Flooding: Compound Flooding*

Caused by the co-occurrence of precipitation-induced (pluvial, fluvial, and/or groundwater) and coastal flooding.

### *Flooding: Groundwater Flooding*

When the groundwater table rises to levels that cause groundwater to inundate tunnels and basements and/or to emerge at the land surface at locations that are not normally inundated. *See groundwater.*

### *Flooding: Fluvial Flooding*

When the stage of a river, creek, or stream exceeds the elevation of its banks; also known as river flooding.

### *Flooding: Pluvial Flooding*

When the intensity of precipitation and resulting stormwater exceeds the capacity of the land surface to infiltrate it, and/or when the rate of excess precipitation exceeds the stormwater conveyance capacities of natural and engineered drainage systems, resulting in surface ponding. Pluvial flooding is commonly described as 'urban' flooding since it is a particularly important type of flooding in cities.

### *Flooding Rise Time*

The time between the peak of a rain event that causes (pluvial and/or fluvial) flooding and the time of peak inundation (Gourley et al., 2013).

### *Foresighting*

Correctly anticipating future actions and preparing accordingly.

### *Fuel Poverty*

Households whose fuel expenditure on all energy services exceeded 10% of their income (Boardman, 1991).

### *Gentrification*

Neighborhood change via real estate investments (including economic and demographic change) in a historically disinvested neighborhood (Urban Displacement Project, 2024).

### *Global Climate Models (GCMs)*

A mathematical representation of the behavior of the Earth's climate system over time that can be used to estimate the sensitivity of the climate system to changes in atmospheric concentrations of greenhouse gases (GHGs) and aerosols. Each model simulates physical exchanges among the ocean, atmosphere, land, and ice (Rosenzweig et al., 2013).

### *Green Infrastructure*

Engineered solutions that recreate natural processes to manage floodwater and erosion or an array of practices that use or mimic natural systems to manage stormwater runoff, that need to be maintained in order to replicate natural function and ideally those benefits, and that may provide further beneficial services or social benefits in addition to flood risk reduction (Grabowski et al., 2022). *See Natural and Nature-Based Solutions.*

### *Greenlining*

Advocacy and investments targeted to historically marginalized communities (Mohnot et al., 2019).

### *Groundwater*

“Water in the ground that fully saturates pores or cracks in soils and rocks” (U.S. Geological Survey, 2024).

### *Hazard*

The potential occurrence of a natural or human-induced physical event that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, and environmental resources (Intergovernmental Panel on Climate Change (IPCC), 2014).

### *Health Surveillance*

Ongoing, systematic collection, analysis, and interpretation of health-related data essential to planning, implementation, and evaluation of public health practice, closely integrated with the timely dissemination of these data to those responsible for prevention and control. (Centers for Disease Control and Prevention, 2022).

### *Health Vulnerability*

The propensity for the health of individuals or groups to be adversely affected as a result of exposure to a climate hazard. Vulnerability is an internal characteristic of the affected system and includes the characteristics of persons or groups and their situation that influence their capacity to anticipate, cope with, resist, and recover from an adverse climate event. Different levels of vulnerability will lead to different levels of health damage and loss under similar conditions of exposure to physical events of a given magnitude (Intergovernmental Panel on Climate Change (IPCC), 2014).

### *Heat Exposure Metrics*

Metrics such as minimum, mean, or maximum temperature or composite indices of temperature, humidity, and/or other meteorological variables used to quantify the effects of heat on morbidity and mortality (Metzger et al., 2010).

### *Heat Waves or Extreme Heat Events*

Periods of unusually hot weather over an extended period, relative to local, seasonal conditions. In New York, the National Weather Service defines a heat wave as a period of at least three consecutive days with observed maximum daily temperatures  $\geq 90^{\circ}\text{F}$  ( $32^{\circ}\text{C}$ ). However, it is worth noting that health impacts can occur when only one or two days of elevated temperatures are experienced.

### *Hydrologic Cycle*

Continuous circulation of water in the Earth-Atmosphere system.

### *Impervious*

Impermeable, not allowing water to pass through.

### *Infrastructure*

The human-made built environment and supporting systems and facilities, including buildings, land use (e.g., parks and green space), transportation systems, and utilities (e.g., electricity, running water).

#### *Infrastructure: Critical Infrastructure*

Systems and assets (excluding residential and commercial buildings) that support activities that are vital to the city and for which the diminished functioning or destruction of such systems and assets would have a debilitating impact on public safety and/or economic security (Rosenzweig et al., 2009).

#### *Infrastructure: Lifeline Infrastructure*

A subset of the New York City metro area’s critical infrastructure sectors: (1) energy, (2) transportation, (3) telecommunications, (4) water, (5) waste and sewers (Zimmerman et al., 2019).

### *Inundation Duration*

The length of time over which an area remains inundated (direct increases in the length of time of disrupted transportation, transport and utilities service, likelihood of mold growth and corrosion (Marvi, 2020).

### *Just Transition*

The ongoing and potential differential impacts on humans and other nonhuman animals of the transition away “from the incumbent fossil fuel energy system to a low/zero carbon system” (Wang & Lo, 2021). A just transition, according to the IPCC's report (2022), requires that “the state intervenes more actively in the eradication of poverty, and creates jobs in low-carbon sectors, in part to compensate for soon-to-be abandoned fossil-fuel-based sectors, and that governments, polluting industries, corporations and those more able to pay higher associated taxes pay for transition costs, provide a welfare safety net and adequate compensation for people, communities, places, and regions that have been impacted by pollution, marginalized or negatively impacted by a transition from a high- to low-carbon economy and society.”

### *Keystone Species*

An organism essential to the overall health of a particular ecosystem.

### *Lock-in*

The tendency for past decisions and events to self-reinforce, thereby diminishing and possibly excluding the prospects for alternatives to emerge (Erickson et al., 2015).

### *Maladaptation*

Adaptation solutions that inadvertently increase vulnerability to climate change.

### *Nature-based Solutions (NbS) | Natural and Nature-Based Solutions (NNBS) | Natural, Ecological and Blue Infrastructure*

Nature-based Solutions (NBS) is a broad term for approaches that use nature and natural processes to address societal and ecological challenges while providing multiple benefits for people and nature. The nuanced use of Natural and Nature-Based Systems, or NNBS, acknowledges that there's a difference between relying on existing natural processes, and engineering solutions to mimic natural processes or to replicate them in new areas. Nature-Based Solutions are engineered projects that need to be maintained in order to replicate natural function and ideally those benefits while Natural infrastructures are natural systems that are functioning well enough on their own or with some restoration. See *Green Infrastructure*

### *Normative*

Deriving from the standard or the norm.

### *NYC heat health warning system*

A system using forecast criteria and public warnings when dangerously hot weather is forecast. In New York City, a heat advisory is issued by the National Weather Service and a citywide heat emergency response is triggered when an extreme heat event is forecast, defined as any one day reaching a heat index (HI) of 100°F or any two or more consecutive days reaching 95°F HI. These thresholds are based on studies of the relationship between temperature and excess mortality in NYC (Metzger et al., 2010).

### *Pervious*

Permeable, allowing water to pass through. See *Impervious*

### *Pinning Point*

An underwater ridge or other topographic obstacle that holds a floating ice shelf in place and prevents it from easily advancing or retreating. Once the ice shelf thins enough, it “unpins” or floats freely and is able to retreat.

### *Planning: Long-Term Planning*

Planning for mid- to end-of-century, inclusive of planning horizons tied to climate change, and with minimal guidance for adaptation pathways.

### *Planning: Mid-Term Planning*

Visionary Plans for mid-century with plausible approaches to achieving such visions. Examples include ONENYC 2050, PLANYC.

### *Planning: Short-Term Planning*

Planning for near-term decision-making such as annual plans or the City's Hazard Mitigation Planning cycle which renews every 5 years with an annual update.

### *Post Tropical Cyclone*

The remnant low pressure (storm) system of a tropical cyclone (hurricane, tropical storm, tropical depression) after it no longer meets the meteorological criteria of a tropical cyclone. Unlike tropical cyclones, which derive their energy from warm ocean water, post-tropical cyclones can gain energy from horizontal temperature contrasts in the atmosphere. As a result, these storms can cause hazardous conditions during all seasons.

### *Precipitable Water Values*

Amount of water in the atmosphere that could be condensed to cause precipitation.

### *Predictive Scenarios*

Projections of future conditions or future forecasts extrapolate future conditions based upon predefined models of historic and existing trends.

### *Redlining*

A process by which certain neighborhoods, based on a government agency's assessment of lending "risk" there, are devalued, and borrowers are consequently "denied access to credit due to the demographic composition of their neighborhood" (Aaronson et al., 2021).

### *Rent-burdened Household*

Spending more than 30% of household income on rent, mortgage, and other housing needs. For New York City in 2020, 49.5% of all 2.14 million households living in rental housing were rent-burdened (American Community Survey, 2022).

### *Representative Concentration Pathways (RCP)*

Models to predict future emissions and possible emissions reductions.

### *Sea Level Rise: Global Mean Sea Level Rise (GMSLR)*

Global mean trend of monthly or annual sea level trends as measured by tide gauges or satellite radar or laser altimeters (the latter since 1993). *See Relative Sea Level Rise.*

### *Sea Level Rise: Relative Sea Level Rise (RSLR)*

The mean annual trend of sea level rise as measured by tide gauges or other instruments for a particular locality or region. This may differ from the global mean due to several factors including differences in near-by ocean thermal expansion, vertical land movements, or shifts in ocean circulation. *See Global Mean Sea Level Rise.*

### *Resilience*

The ability of a system and its component parts to anticipate, absorb, accommodate, or recover from the effects of a potentially hazardous event in a timely and efficient manner, including through ensuring the preservation, restoration, or improvement of its essential basic structures (Lavell et al., 2012).

### *Restorative Justice*

Used both within and outside the criminal justice system, restorative justice is widely understood as 'a process whereby all the parties with a stake in a particular offense come together to resolve collectively how to deal with the aftermath of the offense and its implications for the future' (Gavrielides, 2020). It responds to a plurality of meanings, theories and cultural processes (Ashworth, 2002). Broadly, though, there is agreement that restorative justice shifts the focus from just the offender and their crime to an inclusion of the victim and their vulnerabilities (McCauley & Heffron, 2018). In this approach, victims are active and offenders take responsibility for their wrongs (Robinson & Carlson, 2021; Uprimny & Saffon, 2005).

### *Right-of-Way (ROW)*

A legal term describing infrastructure accessible to the public for moving people, vehicles, and goods. It includes, but is not limited to streets, roads, and sidewalks.



### *Risk*

The probability of harm from a flood event, described by hazard, exposure, and vulnerability.

### *Scenarios*

Plausible, coherent narratives about the future of a place or a situation, that have a consistent internal logic.

### *Sensitivity*

The degree to which a system or species is affected, either adversely or beneficially, by climate variability or change. The effect may be direct or indirect (Intergovernmental Panel on Climate Change (IPCC), 2014).

### *Shared Socio-economic Pathway (SSP)*

Scenarios of projected socioeconomic changes across the globe through 2100 that are used to develop emissions scenarios. Each SSP is consistent with multiple radiative forcing targets based on the timing this century of policies implemented at different spatial scales. There are nine SSPs that are broken down into two smaller groups; four scenarios that update the representative concentration pathways (RCPs) from CMIP5, achieving equivalent forcing levels (2.5, 4.5, 6.0 and 8.5 W/m<sup>2</sup>) and five new scenarios that were not included as part of the prior RCPs. This report uses two SSPs: SSP245 and SSP585. These scenarios have the same end-of-century radiative forcing as the two RCPs used by NPCC2 and NPCC3 (Hausfather, 2018).

### *Special Flood Hazard Area (SFHA)*

Geographic area that has a 1% chance of coastal and fluvial flooding each year (100-year return period) with an inundation depth greater than 1 foot. These areas were identified through Flood Insurance Studies (FIS) by the Federal Emergency Management Agency (FEMA) and are often referred to as the '100 Year Floodplain'.

### *Stormwater / Stormwater Flow*

Amount of water that flows off impervious surfaces.

### *Surcharged Flow*

The situation in which a pipe (such as a sewer or drain) entrance and exit are submerged and the pipe is flowing full and under pressure.

### *Surface Ponding*

Precipitation pooling instead of infiltrating or exiting through drainage systems.

### *Surface Temperature*

Temperature of the air near the surface of the earth or ocean.

### *Syndromic Surveillance*

A syndrome is a group of signs (something a health care provider can observe, like a rash, or body temperature) and symptoms (something a patient feels - like pain, or fatigue) that are often associated with a particular disease or condition. A heat-related illness syndrome can be identified in health surveillance data by looking for diagnostic codes for heat-related illness and by searching chief complaints (descriptions of why patients are at the ED) for words related to heat exposure and heat-related illness, such as overheating, sunstroke, and similar terms (City of New York Department of Health and Mental Hygiene, 2022).

### *Tipping Point*

A temperature threshold, which if exceeded will cause an irreversible change in some climate characteristic (e.g., an irreversible loss of ice on the Greenland Ice Sheet).

### *Tropical Cyclone*

A warm-core non-frontal synoptic-scale low-pressure storm system, originating over tropical or subtropical waters, with organized thunderstorms and a closed surface wind circulation around a well-defined center. Once formed, a tropical cyclone is maintained by the extraction of heat energy from the ocean and subsequent heat export at the upper troposphere.

### *Upzoning*

Adjusting zoning restrictions to increase the potential amount of housing. While sometimes purported as a strategy to make housing more accessible and affordable, many studies show that it “principally unleash[es] market forces that serve high-income earners, therefore reinforcing the effects of income inequality rather than tempering them” (Rodríguez-Pose & Storper, 2020).

### *Urban Heat Island Effect (UHI)*

The occurrence of substantially higher temperatures (especially at night) within an urban area than in surrounding less-built-up areas. A recent study in New York City found that the city's heat island effect can reach 8°F (Rosenzweig et al., 2009). The urban heat island may enhance the health risks of climate-related warming.

### *Vulnerability*

“The characteristics of [a community or natural ecosystem and their/its situation], that influences their capacity to anticipate, cope with, resist, and recover from the adverse effects of physical events” (modified from Intergovernmental Panel on Climate Change (IPCC), 2014).

### *Water Chemistry*

Floodwaters can transport dissolved and suspended contaminants, including potentially toxic chemicals or pathogens. Corrosion from saline coastal and groundwater inundation can cause additional damage to infrastructure and utilities (Abdelhafez et al., 2022; Tansel & Zhang, 2022) and can impact the health of urban trees and other vegetation that is not salt tolerant (Hallett et al., 2018; Sacatelli et al., 2023; Woods et al., 2020).

### *Water Table*

The depth below the surface at which the groundwater pressure head equals atmospheric pressure, which is usually an approximation for the depth below which sediments are saturated. See *Groundwater*.

### *Waves*

Hydrodynamic forces caused by wave breaking, runup and slam can cause severe structural damage to buildings and other infrastructure located along the coast.

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