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Appendix 2 | Acronyms and Abbreviations

ACIA	Arctic Climate Impact Assessment
ADG	Anaerobic Digester Gas
Alum	Aluminum sulfate
BEPA	Bureau of Environmental Planning and Analysis
BMPs	Best Management Practices
BNR	Biological Nutrient Removal
CCSR	Columbia University Center for Climate Systems Research
CLIME	Climate and Lakes Impacts in Europe
CO ₂ e	Carbon Dioxide Equivalent
CSO	Combined Sewer Overflow
DEP	Department of Environmental Protection
FAD	Filtration Avoidance Determination
°F	Degrees Fahrenheit
GCM	Global Climate Model
GHG	Greenhouse Gas(es)
GISS ModelE	NASA/Goddard Institute for Space Studies Global Climate Model (New York, NY)
GWLF	Generalized Watershed Loading Function
GWP	Global Warming Potential
IDF	Intensity-Duration-Frequency
IPCC	Intergovernmental Panel on Climate Change
kWh	Kilowatt Hour
mgd	Million Gallons Per Day
MPF	Maximum Probable Floods
MPI ECHAM5	Max Planck Institute Global Climate Model (Hamburg, Germany)
NASA	National Aeronautics and Space Administration
NCAR CCSM3.0	National Center for Atmospheric Research Global Climate Model (Boulder, CO)
NCDC	National Climatic Data Center
NGO	Non-Governmental Organization
NHTSA	National Highway Traffic Safety Administration
NTU	Nephelometric Turbidity Units
NYC	New York City
NYSERDA	New York State Energy Research and Development Authority
PATH	New York Harbor Pathogens Model
RCM	Regional Climate Model
SRES	Special Report on Emissions Scenarios
SWEM	System-Wide Eutrophication Model
UKMO HadCM3	United Kingdom Meteorological Office Global Climate Model (Devon, UK)
UV	Ultraviolet
WPCP	Water Pollution Control Plant

Appendix 3 | Glossary of Terms

Anthropogenic

Resulting from or produced by human beings.

Best Management Practices

A device, practice, or method used to manage stormwater runoff.

Carbon Dioxide (CO₂)

A naturally occurring gas that is also a by-product of burning fossil fuels and biomass and can also be emitted by other industrial processes and land-use changes. It is the principal anthropogenic greenhouse gas that affects the Earth's radiative balance. It is the reference gas against which other greenhouse gases are measured and therefore has a *Global Warming Potential* of 1.

Carbon Foot Print

A representation of the effect human activities have on the climate in terms of the total amount of greenhouse gases produced (measured in units of carbon dioxide).

Climate

Climate in a narrow sense is usually defined as the "average weather," or more rigorously, as the statistical description in terms of the mean and variability of relevant quantities over a period of time ranging from months to thousands of years. The classical period is 3 decades, as defined by the World Meteorological Organization. These quantities are most often surface variables such as temperature, precipitation, and wind. Climate in a wider sense is the state, including a statistical description, of the climate system.

Climate Adaptation

Adjustments in natural or human systems, in response to actual or expected climatic stimuli or their effects, which moderate harm or exploit beneficial opportunities.

Climate Adaptation Process

The practice of identifying options to adapt to climate change and evaluating them in terms of criteria such as availability, benefits, costs, effectiveness, efficiency, and feasibility.

Climate Change

Climate change refers to any change in climate over time, whether due to natural variability or as a result of human activity. This usage differs from that in the *United Nations Framework Convention on Climate Change*, which defines "climate change" as: "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods." See also *climate variability*.

Climate Impact Assessment

The practice of identifying and evaluating the detrimental and beneficial consequences of climate change on natural and human systems.

Climate Impacts

Consequences of *climate change* on natural and human systems.

Climate Model

A numerical representation of the climate system that is based on the physical, chemical, and biological properties of its components and the components' interactions and feedback processes. The *climate system* can be represented by models of varying complexity (i.e., for any one component or combination of components a hierarchy of models can be identified) differing in such aspects as the number of spatial dimensions the extent to which physical, chemical, or biological processes are explicitly represented or by the level at which empirical parameterizations are involved. Coupled atmosphere/ocean/sea-ice *General Circulation Models* provide a comprehensive representation of the *climate system*. There is an evolution towards more complex models with active chemistry and biology. Climate models are applied as a research tool to study and simulate the climate and also for operational purposes.

Climate Prediction

A climate prediction or climate forecast is the result of an attempt to produce a most likely description or estimate of the actual evolution of the climate in the future (e.g., at seasonal, annual, or long-term timescales). See also *climate projection* and *climate scenario*.

Climate Projection

A projection of the response of the climate system to emission or concentration scenarios of greenhouse gases and aerosols, or radiative forcing scenarios, often based upon simulations by climate models. Climate projections are distinguished from climate predictions in order to emphasize that climate projections depend upon the emission/concentration/radiative forcing scenario used, which are based on assumptions concerning, for example, future socioeconomic and technological developments that may or may not be realized and are therefore subject to substantial uncertainty.

Climate Scenario

A plausible and often simplified representation of the future climate, based on an internally consistent set of climatological relationships, that has been constructed for explicit use in investigating the potential consequences of anthropogenic climate change, often serving as input to impact models. Climate projections often serve as the raw material for constructing climate scenarios, but climate scenarios usually require additional information such as observations of the current climate. A "climate change scenario" is the difference between a climate scenario and the current climate.

Climate System

The climate system is the highly complex system consisting of five major components (the atmosphere, the hydrosphere, the cryosphere, the land surface, and the biosphere) and the interactions between them. The climate system evolves in time under the influence of its own internal dynamics and because of external forcings such as volcanic eruptions, solar variations, and human-induced forcings such as the changing composition of the atmosphere and land use.

Climate Variability

Climate variability refers to variations in the mean state and other statistics (such as standard deviations, the occurrence of extremes, etc.) of the *climate* on all temporal and spatial scales beyond that of a single weather event. Variability may be due to variations in natural internal processes within the *climate system* or in natural or *anthropogenic* external forcings.

Cryptosporidium

A genus of water-polluting protozoa which causes gastroenteritis (stomach upsets) in humans.

Downscaling

Reducing the spatial scale of a model from a global to a regional level.

Drought

Drought is a normal recurrent feature of climate characterized by a deficiency of precipitation for an extended period of time, resulting in a water shortage for some activity, group, or environmental sector. Drought should be considered relative to some long-term average condition of balance between precipitation and evapotranspiration (i.e., evaporation + transpiration) in a particular area.

Ecosystem

A distinct system of interacting living organisms and their physical environment. The boundaries of what could be called an ecosystem are somewhat arbitrary, depending on the focus of interest or study. Thus, the extent of an ecosystem may range from very small spatial scales to, ultimately, the entire Earth.

Emissions Scenario

A plausible representation of the future development of emissions of substances that are potentially radiatively active (e.g., *greenhouse gases* and aerosols), based on a coherent and internally consistent set of assumptions about driving forces (such as demographic and socioeconomic development and technological change) and their key relationships. In 2000, the *IPCC* published the *Special Report on Emission Scenarios* (Nakicenovic et al., 2000) - the SRES scenarios - which are the emissions scenarios currently used to drive *climate models*.

Eutrophication

The process by which a body of water becomes (either naturally or by pollution) rich in dissolved nutrients causing an increased growth of algae with a seasonal deficiency in dissolved oxygen.

Extreme Weather Event

An event that is rare within its statistical reference distribution at a particular place. Definitions of "rare" vary, but an extreme weather event would normally be as rare as or rarer than the 10th or 90th percentile. By definition, the characteristics of what is called "extreme weather" may vary from place to place. An "extreme climate event" is an average of a number of weather events over a certain period of time, an average which is itself extreme (e.g., rain-fall over a season).

Forcing

A boundary condition or other input to a mathematical model which must be specified by the user prior to model execution, e.g., temporal variations in solar irradiance; future GHG emissions, etc.

General Circulation Model (GCM)

Also known as Global Climate Model. See *climate model*.

Giardia

A protozoan that causes stomach and intestinal illness.

Glacial Isostatic Adjustment

Glacial isostatic adjustment (also called continental rebound, post-glacial rebound, or isostatic rebound) is the movement of land masses in a process of achieving equilibrium in the Earth's crust. On a local level, the land mass in the New York City region is becoming lower as land masses to the north that were depressed by the weight of ice sheets during the last ice age are rebounding.

Global Warming Potential (GWP)

The ratio of the warming caused by a substance to the warming caused by a similar mass of *carbon dioxide*.

Greenhouse Effect

Greenhouse gases absorb infrared radiation emitted by the Earth's surface, the atmosphere, and clouds. Atmospheric radiation is emitted to all sides, including downward to the Earth's surface. Thus greenhouse gases trap heat within the surface-troposphere system. This is called the "natural greenhouse effect." Atmospheric radiation is strongly coupled to the temperature of the level at which it is emitted. In the troposphere, the temperature generally decreases with height. Effectively, infrared radiation emitted to space originates from an altitude with a temperature of on average -2°F, in balance with the net incoming solar radiation, whereas the Earth's surface is kept at a much higher temperature of on average 57°F. An increase in the concentration of *greenhouse gases* leads to an increased infrared opacity of the atmosphere, and therefore to an effective radiation into space from a higher altitude at a lower temperature. This causes a radiative forcing, an imbalance that can only be compensated for by an increase of the temperature of the surface-troposphere system. This is called the "enhanced greenhouse effect."

Greenhouse Gases

Greenhouse gases are those gaseous constituents of the atmosphere, both natural and *anthropogenic*, that absorb and emit radiation at specific wavelengths within the spectrum of infrared radiation emitted by the Earth's surface, the atmosphere, and clouds. This property causes the *greenhouse effect*. Water vapor (H₂O), *carbon dioxide* (CO₂), nitrous oxide (N₂O), methane (CH₄), and ozone (O₃) are the primary greenhouse gases in the Earth's atmosphere. Moreover, there are a number of entirely human-made greenhouse gases in the atmosphere, such as halocarbons and other chlorine- and bromine-containing substances. Beside CO₂, N₂O, and CH₄, the Kyoto Protocol deals with the greenhouse

Greenhouse Gases (Continued)

gases sulfur hexafluoride (SF₆), hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs).

Intergovernmental Panel on Climate Change (IPCC)

A body established in 1988 by the World Meteorological Organization and the United Nations Environment Programme, the IPCC is the authoritative international body charged with studying *climate change*. The IPCC surveys the worldwide technical and scientific literature on *climate change* and publishes assessment reports.

Kyoto Protocol

The result of negotiations at the third Conference of the Parties (COP-3) in Kyoto, Japan, in December of 1997. The Kyoto Protocol sets binding greenhouse gas emissions targets for countries that sign and ratify the agreement. The gases covered under the Protocol include *carbon dioxide*, methane, nitrous oxide, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride.

Mitigation

An *anthropogenic* intervention to reduce the sources or enhance the *sinks* of *greenhouse gases*.

Radiative Forcing

Radiative forcing is the change in the net vertical irradiance [expressed in Watts per square meter (Wm⁻²)] at the tropopause (a boundary region in the atmosphere between the troposphere and the stratosphere) due to an internal change or a change in the external forcing of the *climate system*, such as a change in the concentration of CO₂ or the output of the Sun. Radiative forcing is usually computed after allowing for stratospheric temperatures to readjust to radiative equilibrium, but with all tropospheric properties held fixed at their unperturbed values.

Saltwater Intrusion/Encroachment

Displacement of fresh surface water or groundwater by the advance of saltwater due to its greater density, usually in coastal and estuarine areas.

Sea Level Rise

An increase in the mean level of the ocean. Eustatic sea-level rise is a change in global average sea level brought about by an alteration to the volume of the world's oceans. Relative sea level rise occurs where there is a net increase in the level of the ocean relative to local land movements. Climate modelers largely concentrate on estimating eustatic sea level change. Impact researchers focus on relative sea level change.

Seawall

A human-made wall or embankment along a shore to prevent wave erosion.

Sequestration

The process of increasing the carbon content of carbon pools other

than the atmosphere (such as oceans, soils, and forests).

Sink

Any process, activity, or mechanism that removes a *greenhouse gas*, an aerosol, or a precursor of a *greenhouse gas* or aerosol from the atmosphere.

Source

Any process, activity, or mechanism that releases a *greenhouse gas*, an aerosol, or a precursor of a *greenhouse gas* or aerosol into the atmosphere.

Thermal Expansion

In connection with *sea level rise*, this refers to the increase in volume and decrease in density that result from warming water. A warming of the ocean leads to an expansion of the ocean volume and hence an increase in sea level.

Uncertainty

An expression of the degree to which a value (e.g., the future state of the *climate system*) is unknown. Uncertainty can result from lack of information or from disagreement about what is known or even knowable. It may have many types of sources, from quantifiable errors in the data to ambiguously defined concepts or terminology or uncertain projections of human behavior. Uncertainty can therefore be represented by quantitative measures (e.g., a range of values calculated by various models) or by qualitative statements (e.g., reflecting the judgment of a team of experts).

Urban Heat Island

An area within an urban area characterized by ambient temperatures higher than those of the surrounding area and created when naturally vegetated surfaces are replaced with non-reflective, impervious surfaces that absorb a high percentage of incoming solar radiation (Taha, 1997).

Vulnerability

The degree to which a system is susceptible to, or unable to cope with, adverse effects of *climate change*, including *climate variability* and extremes. Vulnerability is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity.

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