



Glossary and Acronyms

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6.1 GLOSSARY

Sources: Derived from the Intergovernmental Panel on Climate Change Third and Fourth Assessment Reports, Working Group II and other sources as indicated.

Words in italics indicate that the term is also contained in this glossary.

A

Acclimatization

The physiological *adaptation* to climatic variations.

Adaptability

See *adaptive capacity*.

Adaptation

Adjustment in natural or *human systems* to a new or changing environment. Adaptation to *climate change* refers to adjustment in natural or *human systems* in response to actual or expected climatic *stimuli* or their effects, which moderates harm or exploits beneficial opportunities. Various types of adaptation can be distinguished, including anticipatory and reactive adaptation, private and public adaptation, and autonomous and planned adaptation.

Adaptation assessment

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.

Adaptation benefits

The avoided damage costs or the accrued benefits following the adoption and implementation of *adaptation* measures.

Adaptation costs

Costs of planning, preparing for, facilitating, and implementing *adaptation* measures, including transition costs.

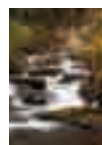
Adaptive capacity

The ability of a system to adjust to *climate change* (including *climate variability* and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences.

Aeroallergens¹

Any of various air-borne substances, such as pollen or spores, that can cause an allergic response.

¹ The American Heritage® Dictionary of the English Language, Fourth Edition. Retrieved November 21, 2007 from <http://dictionary.reference.com/browse/aeroallergen>.



Aerosol

Particulate matter (solid or liquid) that is larger than a molecule but small enough to remain suspended in the *atmosphere*. Natural sources include dust and clay particles from weathered rocks and salt particles from sea spray, both of which are carried upward by the wind. Aerosols are often considered pollutants and can be created through human activities. They are important in both the *atmosphere* and the Earth's *climate system* as nuclei for condensation of water droplets and ice crystals, participants in various chemical cycles, and as absorbers/scatterers of *solar radiation*.

Aggregate impacts

Total impacts summed up across sectors and/or regions. The aggregation of *impacts* requires knowledge of (or assumptions about) the relative importance of impacts in different sectors and regions. Measures of aggregate impacts include, for example, the total number of people affected, change in net primary productivity, number of systems undergoing change, or total economic costs.

Albedo

The fraction of *solar radiation* reflected by a surface or object, often expressed as a percentage. Snow-covered surfaces have a high albedo; the albedo of soils ranges from high to low; vegetation-covered surfaces and oceans have a low albedo. The Earth's albedo varies mainly through varying cloudiness, snow, ice, leaf area, and land-cover changes.

Algal bloom

A reproductive explosion of algae in a lake, river, or ocean.

Ancillary benefits

The ancillary or side effects, of policies aimed exclusively at *climate change mitigation*. Such policies have an impact not only on *greenhouse gas emissions*, but also on resource use efficiency, like reduction in *emissions* of local and regional air pollutants

associated with *fossil fuel* use, and on issues such as transportation, agriculture, *land-use* practices, employment, and fuel security. Sometimes these benefits are referred to as “ancillary impacts” to reflect that in some cases the benefits may be negative. From the perspective of policies directed at abating local air pollution, *greenhouse gas mitigation* may also be considered an ancillary benefit, but these relationships are not considered in this assessment.

Anthropogenic

Resulting from or produced by human beings.

Anthropogenic emissions

Emissions of *greenhouse gases*, *greenhouse gas precursors*, and *aerosols* associated with human activities. These include burning of *fossil fuels* for energy, *deforestation*, and *land use* changes that result in net increase in *emissions*.

Aquifer

A stratum of permeable rock that bears water. An unconfined aquifer is recharged directly by local rainfall, rivers, and lakes, and the rate of recharge is influenced by the permeability of the overlying rocks and soils.

Arid regions

Ecosystems with less than 250 mm precipitation per year.

Atmosphere

The gaseous envelop surrounding the Earth. The dry atmosphere consists almost entirely of nitrogen (78.1 percent volume mixing ratio) and oxygen (20.9 percent volume mixing ratio), together with a number of trace gases, such as argon (0.93 percent volume mixing ratio), helium, and radiatively active *greenhouse gases* such as *carbon dioxide* (0.035 percent volume mixing ratio) and *ozone*. In addition, the atmosphere contains water vapor, whose amount is highly variable but typically 1 percent volume mixing ratio. The atmosphere also contains clouds and *aerosols*.



B

Baseline

The baseline (or reference) is any datum against which change is measured. It might be a “current baseline,” in which case it represents observable, present-day conditions. It might also be a “future baseline,” which is a projected future set of conditions excluding the driving factor of interest. Alternative interpretations of the reference conditions can give rise to multiple baselines.

Biodiversity

A term that refers to the variety and variability among living organisms and the ecological systems in which they exist. Diversity can be measured by the number of different items and their relative frequencies. The items are organized at many levels, encompassing everything from *ecosystems*, to species, to genes.

Biofuel

A fuel produced from organic matter or combustible oils produced by plants. Examples of biofuel include alcohol, black liquor from the paper-manufacturing process, wood, and soybean oil.

Biogenic²

Produced by living organisms or biological processes.

Biomass

The total dry weight of all living organisms that can be sustained at each trophic level in a food chain. Also, all biological materials, including organic material (dead and living) from above and below ground, such as crops, grasses, roots, animals, animal waste, etc.

Biosphere

The region of Earth and the *atmosphere* where organisms exist. Also, a part of the global *carbon cycle* that includes living organisms and *biogenic* organic matter.

Bottom-up models

An approach to modeling that includes both technological and engineering details in the analysis.

C

Carbon cycle

The term to describe the flow of carbon through a system by various chemical, physical, geological, and biological processes. This cycle is usually thought of as a series of four main *reservoirs* of carbon interconnected by pathways of exchange. The *reservoirs* include the *atmosphere*, terrestrial *biosphere* (including freshwater systems), oceans, and sediments (including *fossil fuels*).

Carbon dioxide (CO₂)

A naturally occurring gas, and also a by-product of burning *fossil fuels* and *biomass*, as well as *land-use changes* and other industrial processes. 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 has a *Global Warming Potential* of 1.

Cholera

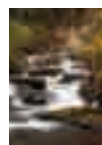
An intestinal infection that results in frequent watery stools, cramping abdominal pain, and eventual collapse from dehydration.

Chronic obstructive pulmonary disease (COPD)³

Chronic obstructive pulmonary disease, or COPD, refers to a group of diseases that cause airflow blockage and breathing-related problems. It includes emphysema, chronic bronchitis, and in some cases asthma.

² The American Heritage Dictionary of the English Language, Fourth Edition. Retrieved November 21, 2007 from <http://dictionary.reference.com/browse/biogenic>.

³ Centers for Disease Control and Prevention (CDC), “Chronic Obstructive Pulmonary Disease.” Retrieved November 21, 2007 from <http://www.cdc.gov/nceh/airpollution/copd/copdfaq.htm>.



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 or millions of years. The classical period is 30 years, as defined by the World Meteorological Organization (WMO, 2003). These relevant 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 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 (UNFCCC)*, 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” (IPCC, 2007). See also *climate variability*.

Climate change commitment

Due to the thermal *inertia* of the ocean and slow processes in the *biosphere*, the cryosphere and land surfaces, the *climate* would continue to change even if the atmospheric composition was held fixed at today’s *values*. Past changes in atmospheric composition lead to a “committed” *climatic change*, which continues for as long as a radiative imbalance persists and until all components of the *climate system* have adjusted to a new state. The further change in temperature after the composition of the *atmosphere* is held constant is referred to as the committed warming or warming commitment. Climate change commitment includes other future changes, for example in the hydrological cycle, in *extreme weather events*, and in *sea level rise*.

Climate model (hierarchy)

A numerical representation of the *climate system* based on the physical, chemical, and biological properties of its components, their interactions and *feedback* processes, and accounting for all or some of its known properties. The *climate system* can be represented by models of varying complexity—that is, 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 the level at which empirical *parametrizations* are involved. Coupled *atmosphere/ocean/sea-ice general circulation models* (AOGCMs) 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*, but also for operational purposes, including monthly, seasonal, and interannual *climate predictions*.

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, interannual, or long-term *time scales*). See also *climate projection* and *climate (change) 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 socio-economic 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 about the observed current climate. A “climate change scenario” is the difference between a climate scenario and the current climate.

Climate sensitivity

The equilibrium response of the *climate* to a change in *radiative forcing*, such as a doubling of *carbon dioxide* concentrations.

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 change*.

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 *spatial and temporal scales* beyond that of individual weather events. Variability may be due to natural internal processes within the *climate system* (internal variability), or to variations in natural or *anthropogenic* external forcing (external variability). See also *climate change*.

Co-benefits

The benefits of policies that are implemented for various reasons at the same time—including *climate change mitigation*—acknowledging that most policies designed to address *greenhouse gas mitigation* also have other, often at least equally important, rationales (e.g., related to objectives of development, sustainability, and equity). The term co-impact is also used in a more generic sense to cover both the positive and negative sides of the benefits. See also *ancillary benefits*.

Communicable disease

An *infectious disease* caused by transmission of an infective biological agent (virus, bacterium, protozoan, or multicellular macroparasite).

Confidence

In this Report, the level of confidence in a statement is expressed using a standard terminology defined in the Introduction. See also *uncertainty*.

Coping range

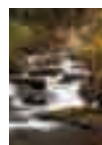
The variation in climatic *stimuli* that a system can absorb without producing significant impacts.

Cost-effective

A criterion that specifies that a *technology* or measure delivers a good or service at equal or lower cost than current practice, or the least-cost alternative for the achievement of a given target.

Cryosphere

The component of Earth’s *climate system* that includes snow, ice, and *permafrost* on or beneath land and ocean surfaces.



D**DALY (Disability-adjusted life years)⁴**

The sum of years of life lost due to premature death and illness, taking into account the age of death compared with natural life expectancy and the number of years of life lived with a disability. The measure of number of years lived with the disability considers the duration of the disease, weighted by a measure of the severity of the disease.

Deforestation

Those processes that result in the conversion of forested lands for non-forest *land uses*. This process is often considered to be a major cause of enhanced *greenhouse effect*, because the burning/decomposition of wood releases *carbon dioxide*, and also because trees that once removed *carbon dioxide* from the *atmosphere* through the process of *photosynthesis* are no longer present.

Dengue fever

An infectious viral disease spread by mosquitoes often called breakbone fever because it is characterized by severe pain in joints and back. Subsequent infections of the virus may lead to dengue hemorrhagic fever and dengue shock syndrome, which may be fatal.

Desert

An *ecosystem* with less than 100 mm precipitation per year.

Desertification

According to the United Nations Convention to Combat Desertification (UNCCD), desertification is “land degradation in *arid*, *semi-arid*, and dry sub-humid areas resulting from various factors, including climatic variations and human activities” (United Nations, 2004). Further, the UNCCD defines land degradation as a reduction or loss in *arid*, semi-arid, and dry sub-humid areas of the biological or economic productivity and complexity of rain-fed cropland, irrigated cropland, or range, pasture, forest, and woodlands resulting from

⁴ Millennium Ecosystem Assessment, 2005 glossary.

land uses or from a process or combination of processes, including processes arising from human activities and habitation patterns, such as: (i) soil *erosion* caused by wind and/or water; (ii) deterioration of the physical, chemical, and biological or economic properties of soil; and (iii) long-term loss of natural vegetation.

Detection and attribution

Climate varies continually on all *time scales*. Detection of *climate change* is the process of demonstrating that *climate* has changed in some defined statistical sense, without providing a reason for that change. Attribution of causes of *climate change* is the process of establishing the most likely causes for the detected change with some defined level of *confidence*.

Disturbance regime

Frequency, intensity, and types of disturbances, such as fires, insect or pest outbreaks, floods, and *droughts*.

Diurnal temperature range

The difference between the maximum and minimum temperature during a day.

Dose-response function⁵

A mathematical relationship is established which relates how much a certain amount of *exposure* impacts production, capital, *ecosystems*, or human health.

Downscaling

A method that derives local- to regional-scale (10 to 100 km) information from larger-scale models or data analyses.

Drought

The phenomenon that exists when precipitation has been significantly below normal recorded levels, causing serious hydrological imbalances that adversely affect land resource production systems.

⁵ Modified from OECD Glossary of Statistical Terms. “Dose-response Function.” Retrieved November 21, 2007 from <http://stats.oecd.org/glossary/detail.asp?ID=6404>.



E

Economic potential

The portion of *technological potential* for reductions in *greenhouse gas emissions* or energy efficiency improvements that could be achieved cost-effectively through activities like creation of markets, reduction of market failures, or increases in financial and technological transfers. In order to achieve economic potential, additional policies and measures must be established to remove *market barriers*.

Ecosystem

A system of interacting living organisms together with 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.

Ecosystem processes

The processes that underpin the integrity and functioning of ecosystems, such as decomposition, carbon cycling, or soil renewal, etc.

Ecosystem services

Ecological processes or functions that have monetary or non-monetary *value* to individuals or society. There are (i) supporting services such as productivity or *biodiversity* maintenance, (ii) provisioning services such as food, fibre, or fish, (iii) regulating services such as climate regulation or carbon *sequestration*, and (iv) cultural services such as tourism or spiritual and aesthetic appreciation.

El Niño Southern Oscillation (ENSO)

El Niño, in its original sense, is a warm water current that periodically flows along the coast of Ecuador and Peru, disrupting the local fishery. This oceanic event is associated with a fluctuation of the intertropical surface pressure pattern and circulation in the Indian and Pacific Oceans, called the *Southern Oscillation*. This

coupled *atmosphere-ocean* phenomenon is collectively known as El Niño Southern Oscillation, or ENSO. During an El Niño event, the prevailing trade winds weaken and the equatorial countercurrent strengthens, causing warm surface waters in the Indonesian area to flow eastward to overlie the cold waters of the Peru current. This event has great impact on the wind, sea surface temperature, and precipitation patterns in the tropical Pacific. It has climatic effects throughout the Pacific region and in many other parts of the world. The opposite of an El Niño event is called *La Niña*.

Emissions

In the *climate change* context, emissions refer to the release of *greenhouse gases* and/or their *precursors* and *aerosols* into the *atmosphere* over a specified area and period of time.

Endemic

Restricted or peculiar to a locality or region. With regard to human health, endemic can refer to a disease or agent present or usually prevalent in a population or geographical area at all times.

Epidemic

Occurring suddenly in numbers clearly in excess of normal expectancy, said especially of *infectious diseases* but applied also to any disease, injury, or other health-related event occurring in such outbreaks.

Erosion

The wearing away of land surfaces by wind or water, which is intensified by land-clearing activities related to farming, road building, logging, or residential/industrial development.

Eutrophication

The process by which a body of water (often shallow) becomes (either naturally or by pollution) rich in dissolved nutrients with a seasonal deficiency in dissolved oxygen.

Evaporation

The process by which a liquid becomes a gas.



Evapotranspiration

The combined process of *evaporation* from the Earth's surface and *transpiration* from vegetation.

Exotic species

See *introduced species*.

Exposure

The nature and degree to which a system is exposed to significant climatic variations.

External cost

Used to define the costs arising from any human activity, when the agent responsible for the activity does not take full account of the impacts of his or her actions on others. Equally, when the impacts are positive and not accounted for in the actions of the agent responsible they are referred to as external benefits. *Emissions* of particulate pollution from a power station affect the health of people in the vicinity, but this is not often considered, or is given inadequate weight, in private decision making and there is no market for such impacts. Such a phenomenon is referred to as an "externality," and the costs it imposes are referred to as the external costs.

Externality

See *external cost*.

Extinction

The complete disappearance of an entire species.

Extirpation

The disappearance of a species from part of its range; local *extinction*.

Extreme weather event

An extreme weather event is 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., rainfall over a season).

F**Feedback**

In relation to the climate, feedback is an interaction mechanism between processes in the *climate system* that occur when the result of an initial process triggers a change in a second process, which in turn influences the initial one again. Positive feedback occurs when the original process is intensified, negative feedback occurs when it is reduced.

Foodborne illness⁶

An illness caused by consuming foods or beverages contaminated with any of many different disease-causing microbes, *pathogens*, poisonous chemicals, or other harmful substances.

Food security

A situation that exists when people have secure access to sufficient amounts of safe and nutritious food for normal growth, development, and an active and healthy life. Food insecurity may be caused by the unavailability of food, insufficient purchasing power, inappropriate distribution, or inadequate use of food at the household level.

⁶ Modified from CDC. "Foodborne Illness." Retrieved November 21, 2007 from http://www.cdc.gov/ncidod/dbmd/diseaseinfo/foodborneinfections_g.htm.



Footprint (ecological)⁷

An index of the area of productive land and aquatic *ecosystems* required to produce the resources used and to assimilate the wastes produced by a defined population at a specified material standard of living, wherever on Earth that land may be located.

Forecast

See *climate prediction* and *climate projection*.

Fossil fuel

The general term for combustible geologic deposits of organic material buried underground. Fossil fuels are formed from decayed plant and animal matter that have been exposed to heat and pressure in the Earth's crust for hundreds of millions of years. Crude oil, coal, and natural gas are all fossil fuels.

G

General circulation

The large scale motions of the *atmosphere* and the ocean as a consequence of differential heating on a rotating Earth, aiming to restore the energy balance of the system through transport of heat and momentum.

General Circulation Model (GCM)

See *climate model*.

GIS (Geographic Information System)⁸

A computerized system organizing data sets through a geographical referencing of all data included in its collections.

Glacier

A mass of land ice that flows downhill and is constrained by its surrounding topography (i.e. sides of a valley or surrounding peaks). Glaciers are maintained by accumulation of snow at high altitudes and balanced by melting at low altitudes or discharge into the sea.

Globalization

The growing integration and interdependence of countries worldwide through the increasing volume and variety of cross border transactions in goods and services; free international capital flows; and the more rapid and widespread diffusion of *technology*, information, and culture.

Global surface temperature

The global surface temperature is the area-weighted global average of (i) the sea surface temperature over the oceans (i.e., the sub-surface bulk temperature in the first few meters of the ocean) and (ii) the surface air temperature over land at 1.5 m above the ground.

Global Warming Potential (GWP)

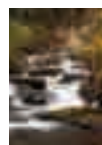
An index used to translate the *emission* levels of various gasses into a common measure so that their relative *radiative forcing* may be compared without directly calculated changes in atmospheric concentrations. GWPs are calculated as the ratio of *radiative forcing* that would result from the *emissions* of one kilogram of a *greenhouse gas* to that from the *emission* of one kilogram of *carbon dioxide* over a period of time (usually 100 years).

Greenhouse effect

Greenhouse gases effectively absorb *infrared radiation*, emitted by the Earth's surface, by the *atmosphere* itself due to the same gases, and by 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, -19°C, in balance with the net incoming *solar radiation*, whereas the Earth's surface is kept at a much higher temperature of, on average, +14°C. An increase in the concentration of *greenhouse gases* leads to an increased infrared opacity of the *atmosphere*, and therefore to an

7 Millennium Ecosystem Assessment, 2005 glossary.

8 Millennium Ecosystem Assessment, 2005 glossary.



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 the “enhanced greenhouse effect.”

Greenhouse gas

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 the *halocarbons* and other chlorine- and bromine-containing substances, dealt with under the *Montreal Protocol*. Besides CO₂, N₂O, and CH₄, the *Kyoto Protocol* deals with the greenhouse gases *sulfur hexafluoride* (SF₆), *hydrofluorocarbons* (HFCs), and *perfluorocarbons* (PFCs).

Gross Domestic Product

Gross Domestic Product (GDP) is the monetary value of all goods and services produced within a nation.

Gross National Product

Gross National Product (GNP) is the monetary value of all goods and services produced in a nation’s economy, including income generated abroad by domestic residents, but without income generated by foreigners.

Groundwater recharge

The process by which external water is added to the zone of saturation of an *aquifer*, either directly into a formation or indirectly by way of another formation.

H

Habitat

The particular environment or place where an organism or species tend to live; a more locally circumscribed portion of the total environment.

Halocarbon

A chemical that consists of carbon, sometimes hydrogen, and either chlorine, fluorine, bromine, or iodine.

Hantavirus

A virus in the family Bunyaviridae that causes a type of hemorrhagic fever. It is thought that humans catch the disease mainly from infected rodents, either through direct contact with the animals or by inhaling or ingesting dust that contains aerosolized viral particles from their dried urine and other secretions.

Healthy Cities program⁹

The WHO Healthy Cities program engages local governments in health development through a process of political commitment, institutional change, capacity building, partnership-based planning, and innovative projects. It promotes comprehensive and systematic policy and planning with a special emphasis on health inequalities and urban poverty; the needs of vulnerable groups; participatory governance; and the social, economic, and environmental determinants of health. It also strives to include health considerations in economic regeneration and urban development efforts.

Heat exhaustion¹⁰

Heat exhaustion is a phenomenon caused by fluid loss, which in turn causes decreased blood flow to vital organs. Reduced blood flow from heat exhaustion can result in a form of shock.

⁹ World Health Organization. “Healthy Cities and Urban Governance.” Retrieved November 21, 2007 from <http://www.euro.who.int/healthy-cities>.

¹⁰ U.S. Environmental Protection Agency. “Heat Island Effect Glossary.” Retrieved November 21, 2007 from <http://www.epa.gov/hiri/resources/glossary.html#h>.



Victims of heat exhaustion often complain of flu-like symptoms hours after *exposure*.

Heat index¹¹

The heat index (HI), given in degrees F, is a measure of how hot it feels when relative humidity (RH) is combined with the actual air temperature.

Heat island

An area within an urban area characterized by ambient temperatures higher than those of the surrounding area because of the absorption of solar energy by materials like asphalt.

Heat stroke¹²

Heat stroke occurs when the body's heat regulating mechanisms—including convection, sweating, and respiration—fail. The *likelihood* of heat stroke increases when air temperatures are higher than skin temperature, and when individuals are low on fluids. Body temperatures can be raised to the point at which brain damage and death can result unless cooling measures are quickly taken.

Human settlement

A place or area occupied by settlers.

Human system

Any system in which human organizations play a major role. Often, but not always, the term is synonymous with “society” or “social system” (e.g., agricultural system, political system, technological system, economic system).

Hydrofluorocarbons (HFCs)

Compounds that contain hydrogen, fluorine, chlorine, and carbon atoms. They have been introduced as temporary replacements for chlorofluorocarbons (CFCs) as they are less potent at destroying stratospheric *ozone*. However, they are considered both *ozone* depleting substances and *greenhouse gases*.

11 Modified from NOAA. “Heat Index.” Retrieved November 21, 2007 from http://www.crh.noaa.gov/jkl/?n=heat_index_calculator.

12 U.S. EPA. “Heat Island Effect Glossary.”

Hydrological systems

The systems involved in movement, distribution, and quality of water throughout the Earth, including both the hydrologic cycle and water resources.

Hydrosphere

All the water present on Earth, including liquid water (oceans, fresh water, underground *aquifers*), frozen water (polar ice caps, floating ice, frozen upper layer of soil known as *permafrost*), and water vapor in the *atmosphere*.

Hyperthermia¹³

Unusually high body temperature.

I

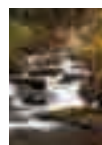
Ice sheet

A mass of land ice that is sufficiently deep to cover most of the underlying bedrock topography, so that its shape is mainly determined by its internal dynamics (the flow of the ice as it deforms internally and slides at its base). An ice sheet flows outward from a high central plateau with a small average surface slope. The margins slope steeply, and the ice is discharged through fast-flowing ice streams or outlet *glaciers*, in some cases into the sea or into *ice shelves* floating on the sea. There are only two large ice sheets in the modern world, on Greenland and Antarctica, the Antarctic ice sheet being divided into East and West by the Transantarctic Mountains; during glacial periods there were others.

Ice shelf

A floating *ice sheet* of considerable thickness attached to a coast (usually of great horizontal extent with a level or gently undulating surface); often a seaward extension of *ice sheets*.

13 *The American Heritage Dictionary of the English Language, Fourth Edition*. Retrieved November 21, 2007 from <http://dictionary.reference.com/browse/hyperthermia>.



(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*. Depending on the consideration of *adaptation*, one can distinguish between potential impacts and residual impacts. Potential impacts: All impacts that may occur given a projected change in *climate*, without considering *adaptation*. Residual impacts: The impacts of *climate change* that would occur after *adaptation*. See also *aggregate impacts*, *market impacts*, and *non-market impacts*.

Indicator¹⁴

Information based on measured data used to represent a particular attribute, characteristic, or property of a system.

Indigenous peoples

People whose ancestors inhabited a place or a country when persons from another culture or ethnic background arrived on the scene and dominated them through conquest, settlement, or other means and who today live more in conformity with their own social, economic, and cultural customs and traditions than those of the country of which they now form a part (also referred to as “native,” “aboriginal,” or “tribal” peoples).

Industrial revolution

A period of rapid industrial growth with far-reaching social and economic consequences, beginning in England during the second half of the 18th century and spreading to Europe and later to other countries including the United States. The invention of the steam engine was an important trigger of this development. The industrial revolution marks the beginning of a strong increase in the use of *fossil fuels* and emission of, in particular, fossil *carbon dioxide*. In this report, the terms “pre-industrial” and “industrial” refer, somewhat arbitrarily, to

the periods before and after the year 1750, respectively.

Inertia

Delay, slowness, or resistance in the response of the *climate*, biological, or *human systems* to factors that alter their rate of change, including continuation of change in the system after the cause of that change has been removed.

Infectious disease

Any disease that can be transmitted from one person to another. This may occur by direct physical contact, by common handling of an object that has picked up infective organisms, through a disease carrier, or by spread of infected droplets coughed or exhaled into the air.

Infrared radiation

Heat energy emitted by the Earth’s surface and its *atmosphere*, some of which is strongly absorbed by *greenhouse gases* and re-radiated back towards the Earth’s surface, creating the *greenhouse effect*. Also describes the heat energy emitted from all solids, liquids and gases.

Infrastructure

The basic equipment, utilities, productive enterprises, installations, institutions, and services essential for the development, operation, and growth of an organization, city, or nation. For example, roads; schools; electric, gas, and water utilities; transportation; communication; and legal systems would be all considered as infrastructure.

Integrated assessment

A method of analysis that combines results and models from the physical, biological, economic, and social sciences, and the interactions between these components, in a consistent framework, to evaluate the status and the consequences of environmental change and the policy responses to it.

¹⁴ Millennium Ecosystem Assessment, 2005, Current State and Trends Assessment glossary.



Introduced species

A species occurring in an area outside its historically known natural range as a result of accidental dispersal by humans (also referred to as “*exotic species*” or “*alien species*”).

Invasive species

An *introduced species* that invades natural *habitats*.

IPCC¹⁵

A panel set up by the United Nations in 1988 to review scientific information on *climate change*. This panel involves over 2,000 of the world’s climate experts. Many of the *climate change* facts and future predictions we read about come from information reviewed by the IPCC.

K

Kyoto Protocol

The Kyoto Protocol was adopted at the Third Session of the Conference of the Parties to the *UN Framework Convention on Climate Change (UNFCCC)* in 1997 in Kyoto, Japan. It contains legally binding commitments, in addition to those included in the *UNFCCC*. Countries included in Annex B of the Protocol (most member countries of the Organization for Economic Cooperation and Development (OECD) and those with economies in transition) agreed to reduce their *anthropogenic greenhouse gas emissions* (CO₂, CH₄, N₂O, HFCs, PFCs, and SF₆) by at least 5 percent below 1990 levels in the commitment period 2008 to 2012. The Kyoto Protocol entered into force on 16 February 2005.

L

Landslide

A mass of material that has slipped downhill by gravity, often assisted by water when the material is saturated; rapid movement of a mass of soil, rock, or debris down a slope.

Land use

The total of arrangements, activities, and inputs undertaken in a certain land cover type (a set of human actions). The social and economic purposes for which land is managed (e.g., grazing, timber extraction, and conservation).

Land-use change

A change in the use or management of land by humans, which may lead to a change in land cover. Land cover and land-use change may have an impact on the *albedo*, *evapotranspiration*, *sources*, and *sinks* of *greenhouse gases*, or other properties of the *climate system*, and may thus have an impact on *climate*, locally or globally.

La Niña

See *El Niño Southern Oscillation*.

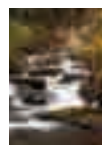
Lifetime (atmospheric)

The lifetime of a *greenhouse gas* refers to the approximate amount of time it would take for the atmospheric pollutant concentration to return to its natural level (assuming *emissions* cease), as a result of either being converted to another chemical compound or being taken out of the *atmosphere* via a *sink*. This length of time depends on both the pollutant’s *sources* and *sinks*, and its level of reactivity. Average lifetimes can vary from a week (e.g., sulfate *aerosols*) to more than a century (e.g., CFCs, *carbon dioxide*). Long lifetimes allow the pollutant to mix throughout the *atmosphere*.

Likelihood

The likelihood of an occurrence, an outcome or a result, where this can be estimated probabilistically, is expressed in this Report using a standard terminology, defined in the Introduction. See also *uncertainty* and *confidence*.

¹⁵ Climate Change North. “Glossary.” Retrieved November 21, 2007 from http://www.climatechangenorth.ca/H1_Glossary.html.



Lyme disease

A *vector-borne disease* caused by the spirochete *Borrelia burgdorferi* and transmitted by Ixodes ticks, commonly known as deer ticks. Symptoms include skin lesions, fatigue, fever, and chills, and if left untreated may later manifest itself in cardiac and neurological disorders, joint pain, and arthritis.

M**Maladaptation**

Any changes in natural or *human systems* that inadvertently increase *vulnerability* to climatic *stimuli*; an *adaptation* that does not succeed in reducing *vulnerability* but increases it instead.

Malaria

Endemic or *epidemic* parasitic disease caused by species of the genus *Plasmodium* (protozoa) and transmitted by mosquitoes of the genus *Anopheles*; produces high fever attacks and systemic disorders, and kills approximately 2 million people every year.

Market barriers

In the context of *mitigation* of *climate change*, conditions that prevent or impede the diffusion of *cost-effective* technologies or practices that would mitigate *greenhouse gas emissions*.

Market-based incentives

Measures intended to use price mechanisms (e.g., taxes and tradable permits) to reduce *greenhouse gas emissions*.

Market impacts

Impacts that are linked to market transactions and directly affect *Gross Domestic Product* (a country's national accounts)—for example, changes in the supply and price of agricultural goods. See also *non-market impacts*.

Market potential

The portion of *economic potential* for reductions in *greenhouse gas emissions* or improvements in energy-efficiency that could be achieved under forecast market conditions; assuming there are no new policies and measures

Methane (CH₄)

A hydrocarbon *greenhouse gas* produced through anaerobic (without oxygen) decomposition of waste in landfills, animal digestion, decomposition of animal wastes, production and distribution of natural gas and petroleum, coal production, and incomplete *fossil fuel* combustion.

Mitigation

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

Mitigative capacity

The social, political, and economic structures and conditions that are required for effective *mitigation*.

Montreal Protocol

Titled Montreal Protocol on Substances that Deplete the *ozone layer*, this international agreement addresses the phase-out of *ozone* depleting substances production and use. Under the Protocol, several international organizations report on the science of *ozone* depletion, implement projects to help move away from *ozone* depleting substances, and provide a forum for policy discussions. In the United States, the Protocol is implemented under the Clean Air Act Amendments of 1990.

Morbidity

Rate of occurrence of disease or other health disorder within a population, taking account of the age-specific morbidity rates. Health outcomes include chronic disease incidence/prevalence, rates of hospitalization, primary care consultations, disability-days (i.e., days when absent from work), and prevalence of symptoms.

Mortality

Rate of occurrence of death within a population within a specified time period; calculation of mortality takes account of age-specific death rates, and can thus yield measures of life expectancy and the extent of premature death.



N

Net primary production (NPP)

Refers to the increase in plant *biomass* or carbon of a unit of landscape. NPP is equal to the Gross Primary Production minus carbon lost through autotrophic respiration.

Nitrogen oxides¹⁶

Compounds of nitrogen and oxygen produced by the burning of *fossil fuels*.

Non-linearity

A process is called “non-linear” when there is no simple proportional relation between cause and effect. The *climate system* contains many such non-linear processes, resulting in a system with a potentially very complex behavior. Such complexity may lead to *rapid climate change*.

Non-market impacts

Impacts that affect *ecosystems* or human *welfare*, but that are not directly linked to market transactions—for example, an increased risk of premature death. See also *market impacts*.

Non-point source pollution

A large, non-specific area that discharges pollutants into surface and sub-surface water flows, for example crop fields and urban areas.

No-regrets opportunities

See *no-regrets policy*.

No-regrets options

See *no-regrets policy*.

No-regrets policy

One that would generate net social benefits whether or not there is *climate change*. No-regrets opportunities for *greenhouse gas emissions* reduction are defined as those options whose benefits such as reduced energy costs and reduced *emissions* of local/

regional pollutants equal or exceed their costs to society, excluding the benefits of avoided *climate change*. No-regrets potential is defined as the gap between the *market potential* and the *socio-economic potential*.

North Atlantic Oscillation (NAO)

The North Atlantic Oscillation consists of opposing variations of barometric pressure near Iceland and near the Azores. On average, a westerly current, between the Icelandic low pressure area and the Azores high pressure area, carries cyclones with their associated frontal systems towards Europe. However, the pressure difference between Iceland and the Azores fluctuates on *time scales* of days to decades, and can be reversed at times. It is the dominant mode of winter *climate variability* in the North Atlantic region, ranging from central North America to Europe.

O

Ocean conveyor belt

The theoretical route by which water circulates around the entire global ocean, driven by wind and the *thermohaline circulation*.

Opportunity

An opportunity is a situation or circumstance to decrease the gap between the *market potential* of any *technology* or practice and the *economic potential*, *socio-economic potential*, or *technological potential*.

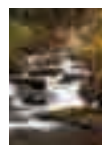
Opportunity cost

The cost of an economic activity forgone by the choice of another activity.

Ozone (O₃)

Ozone, the triatomic form of oxygen (O₃), is a gaseous atmospheric constituent. In the *troposphere*, it is created both naturally and by photochemical reactions involving gases resulting from human activities (*photochemical “smog”*). In high concentrations, tropospheric ozone can be harmful to a wide-range of living organisms. Tropospheric ozone acts as a *greenhouse gas*. In the *stratosphere*, ozone is created by the interaction between solar

¹⁶ Energy Administration Information, “Glossary.” Retrieved November 21, 2007 from http://www.eia.doe.gov/glossary/glossary_n.htm.



ultraviolet radiation and molecular oxygen (O₂). Stratospheric ozone plays a decisive role in the stratospheric radiative balance. Its concentration is highest in the *ozone layer*. Depletion of stratospheric ozone, due to chemical reactions that may be enhanced by *climate change*, results in an increased ground-level flux of ultraviolet-B radiation. See also *Montreal Protocol* and *ozone layer*.

Ozone layer

A group of human-made chemicals composed only of carbon and fluorine, introduced as alternatives (like hydrofluorocarbons) to *ozone* depleting substances. PFCs are emitted as by-products of industrial processes, and they are used in manufacturing. While PFCs do not harm the stratospheric *ozone layer*, they are powerful *greenhouse gases* which high *global warming potential*. Examples of PFCs are CF₄ and C₂F₆. See *Montreal Protocol*.

P

Parameterization

In *climate models*, this term refers to the technique of representing processes-that cannot be explicitly resolved at the *spatial or temporal resolution* of the model (sub-grid scale processes)-by relationships between the area- or time-averaged effect of such sub-grid-scale processes and the larger scale flow.

Pareto criterion/Pareto optimum

A requirement or status that an individual's *welfare* could not be further improved without making others in the society worse off.

Particulates

Very small solid exhaust particles emitted during the combustion of fossil and *biomass* fuels. Particulates may consist of a wide variety of substances. Of greatest concern for health are particulates of less than or equal to 10nm and 2.5 nm in diameter, usually designated as PM₁₀ and PM_{2.5}, respectively.

Pathogen¹⁷

An agent that causes disease, especially a living microorganism such as a bacterium or fungus.

Perfluorocarbons (PFCs)

A group of human-made chemicals composed only of carbon and fluorine, introduced as alternatives (like hydrofluorocarbons) to *ozone* depleting substances. PFCs are emitted as by-products of industrial processes, and they are used in manufacturing. While PFCs do not harm the stratospheric *ozone layer*, they are powerful *greenhouse gases* which high *global warming potential*. Examples of PFCs are CF₄ and C₂F₆.

Permafrost

Perennially frozen ground that occurs wherever the temperature remains below 0°C for several years.

Photochemical smog

A mix of photochemical oxidant air pollutants produced by the reaction of sunlight with primary air pollutants, especially hydrocarbons.

Photosynthesis

Complex process that takes place in living green plant cells that combines radiant energy from the sun with water (H₂O) and *carbon dioxide* (CO₂) to produce oxygen (O₂) and sugar, such as glucose (C₆H₁₂O₆).

Point-source pollution

Pollution resulting from any confined, discrete *source*, such as a pipe, ditch, tunnel, well, container, concentrated animal feeding operation, or floating craft. See also *non-point source pollution*.

Precursors

A term in photochemistry meaning a compound antecedent to a pollutant. For example, *volatile organic compounds* (VOCs) and nitric oxides of nitrogen react in sunlight to form *ozone* or

¹⁷ *The American Heritage Dictionary, Fourth Edition.*
Retrieved November 21, 2007 from <http://dictionary.reference.com/browse/pathogen>.



other photochemical oxidants. As such, VOCs and oxides of nitrogen are precursors.

Present value cost

The sum of all costs over all time periods, with future costs discounted.

Projection (generic)

A projection is a potential future evolution of a quantity or set of quantities, often computed with the aid of a model. Projections are distinguished from “predictions” in order to emphasize that projections involve assumptions concerning, for example, future socio-economic and technological developments that may or may not be realized, and are therefore subject to substantial *uncertainty*. See also *climate projection* and *climate prediction*.

Proxy

A proxy *climate indicator* is a local record that is interpreted, using physical and biophysical principles, to represent some combination of climate-related variations back in time. Climate-related data derived in this way are referred to as proxy data. Examples of proxies are tree ring records, characteristics of corals, and various data derived from ice cores.

Q

QALY (Quality Adjusted Life Year)¹⁸

A measure of the outcome of actions (either individual or treatment interventions) in terms of their health impact. If an action gives a person an extra year of healthy life expectancy, that counts as one QALY. If an action gives a person an extra year of unhealthy life expectancy (partly disabled or in some distress), it has a value of less than one. Death is rated at zero.

¹⁸ Australian Institute of Health and Welfare. “Australia’s Health 1996” glossary. Retrieved November 21, 2007 from <http://www.aihw.gov.au/publications/health/ah96/ah96-x04.html>.

Quality of life¹⁹

A scientific measure of personal *well-being*. Categories used to define place-specific quality of life include the inter-related categories of economic conditions; natural resources, environment, and amenities; human health; public and private *infrastructure*; government and public safety; and social and cultural resources.

R

Radiative forcing

Radiative forcing is the change in the net vertical irradiance (expressed in Wm^{-2}) at the *tropopause* due to an internal change or a change in the external forcing of the *climate system*, for example, a change in the concentration of *carbon dioxide* or the output of the Sun. Usually, radiative forcing is computed after allowing for stratospheric temperatures to readjust to radiative equilibrium, but with all tropospheric properties held fixed at their unperturbed *values*.

Rangelands

Lands (mostly grasslands) that support the growth of plants that provide food (i.e., forage) for grazing or browsing animals.

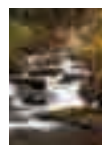
Range shifts

Climate change-induced changes in the geographical distributions of plants, animals and *ecosystems*

Rapid climate change

The *non-linearity* of the *climate system* may lead to rapid *climate change*, sometimes called abrupt events or even surprises. Some such abrupt events may be imaginable, such as a dramatic reorganization of the *thermohaline circulation*, rapid deglaciation, or massive melting of *permafrost* leading to fast changes in the *carbon cycle*. Others may be truly unexpected, as a consequence of a strong, rapidly changing forcing of a non-linear system.

¹⁹ Modified from text within Chapter 5 of this document.



Reference scenario

See *baseline/reference*.

Reinsurance

The transfer of a portion of primary insurance risks to a secondary tier of insurers (reinsurers); essentially “insurance for insurers.”

Relative sea level

Sea level measured by a tide gauge with respect to the land upon which it is situated. See also mean sea level.

Reservoir

A component of the *climate system*, other than the *atmosphere*, that has the capacity to store, accumulate, or release a substance of concern (e.g., carbon or a *greenhouse gas*). Oceans, soils, and forests are examples of carbon reservoirs. The term also means an artificial or natural storage place for water, such as a lake, pond, or *aquifer*, from which the water may be withdrawn for such purposes as irrigation or water supply.

Resilience

Amount of change a system can undergo without changing state.

Response time

The response time or adjustment time is the time needed for the *climate system* or its components to re-equilibrate to a new state, following a forcing resulting from external and internal processes or *feedbacks*. It is very different for various components of the *climate system*. The response time of the *troposphere* is relatively short, from days to weeks, whereas the *stratosphere* comes into equilibrium on a *time scale* of typically a few months. Due to their large heat capacity, the oceans have a much longer response time, typically decades, but up to centuries or millennia. The response time of the strongly coupled surface-*troposphere* system is, therefore, slow compared to that of the *stratosphere*, and mainly determined by the oceans. The *biosphere* may respond fast (e.g., to *droughts*), but also very slowly to imposed changes.

Revealed preference²⁰

The use of the value of expenditure to “reveal” the preference of a consumer or group of consumers for the bundle of goods they purchase compared to other bundles of equal or smaller value.

Rodent-borne disease²¹

Disease that is transmitted between hosts by a rodent (e.g., bubonic plague, *hantavirus*).

Runoff

That part of precipitation that does not *evaporate* and is not *transpired*.

S**Salinization**

The accumulation of salts in soils.

Salmonella²²

There are many different kinds of Salmonella bacteria. They pass from the feces of people or animals to other people or other animals and can cause diarrheal illness in humans. For over 100 years, Salmonella have been known to cause illness. They were discovered by an American scientist named Salmon, for whom they are named.

Saltwater intrusion/encroachment

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

Scenario (generic)

A plausible and often simplified description of how the future may develop, based on a coherent and internally consistent set of assumptions about key driving forces (e.g., rate of *technology*

²⁰Deardorff's Glossary of International Economics. Retrieved November 21, 2007 from <http://www-personal.umich.edu/~alandear/glossary/r.html>.

²¹Modified from definition of vector-borne disease.

²²Modified from information on the CDC's website retrieved November 21, 2007 from http://www.cdc.gov/nczved/dfbmd/disease_listing/salmonellosis_gi.html.



change, prices) and relationships. Scenarios are neither predictions nor *forecasts* and sometimes may be based on a “narrative storyline.” Scenarios may be derived from *projections*, but are often based on additional information from other sources. See also *SRES scenarios*, *climate scenario*, and *emission scenarios*.

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 ocean. *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*.

Semi-arid regions

Ecosystems that have more than 250 mm precipitation per year but are not highly productive; usually classified as *rangelands*.

Sensitivity

Sensitivity is the degree to which a system is affected, either adversely or beneficially, by climate-related *stimuli*. The effect may be direct (e.g., a change in crop yield in response to a change in the mean, range, or variability of temperature) or indirect (e.g., damages caused by an increase in the frequency of coastal flooding due to *sea level rise*).

Sequential decision making

Stepwise decision making aiming to identify short-term strategies in the face of long-term uncertainties, by incorporating additional information over time and making mid-course corrections.

Sequestration

The process of increasing the carbon content of a carbon *reservoir* other than the *atmosphere*. Biological approaches to sequestration include direct removal of *carbon dioxide* from the *atmosphere* through *land-use change*, afforestation, reforestation, and practices that enhance soil carbon in agriculture. Physical approaches include separation and disposal of *carbon dioxide* from flue gases or from processing *fossil fuels* to produce hydrogen and *carbon dioxide*-rich fractions, as well as long-term storage in depleted oil and gas reservoirs, coal seams, and saline *aquifers*.

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*.

Smog²³

Air pollution typically associated with oxidants.

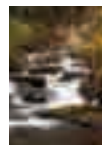
Snowpacks

A seasonal accumulation of slow-melting snow.

Social cost

The social cost of an activity includes the *value* of all the resources used in its provision. Some of these are priced and others are not. Non-priced resources are referred to as externalities. It is the sum of the costs of these externalities and the priced resources that makes up the social cost. See *total cost*.

23 U.S. EPA. “Terms of Environment Glossary.” Retrieved November 21, 2007 from <http://www.epa.gov/OCEPAterms/sterms.html>.



Social indicators²⁴

Broad, standardized measures of the *quality of life* or other socio-economic conditions of geographic areas such as nations, metropolitan areas, or other areas; used to assess health conditions, educational levels, food availability, violence, and other conditions.

Socio-economic potential

Represents the level of *greenhouse gas mitigation* that would be reached by overcoming social and cultural obstacles to using technologies that are cost effective.

Socio-economic scenarios

Scenarios concerning future conditions in terms of population, *Gross Domestic Product* and other socio-economic factors relevant to understanding the implications of *climate change*. See *SRES scenarios*.

Solar radiation

Energy from the sun, including ultra-violet radiation, visible radiation, and *infrared radiation*; also referred to as short-wave radiation.

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*.

Southern Oscillation

See *El Niño Southern Oscillation*.

Spatial and temporal scales

Climate may vary on a large range of spatial and temporal scales. Spatial scales may range from local (less than 100,000 km²), through regional (100,000 to 10 million km²), to continental (10 to 100 million km²). Temporal scales may range from seasonal to geological (up to hundreds of millions of years).

²⁴Methods for Social Researchers in Developing Countries. Glossary. Retrieved November 21, 2007 from <http://srmdc.net/glossary.htm#s>.

SRES scenarios

SRES scenarios are *emissions scenarios* developed by Nakicenovic et al. (2000) and used, among others, as a basis for the *climate projections* in the IPCC WGI contribution to the Third Assessment Report (IPCC, 2001). The following terms are relevant for a better understanding of the structure and use of the set of SRES scenarios:

(Scenario) Family: *Scenarios* that have a similar demographic, societal, economic, and technical-change *storyline*. Four *scenario families* comprise the *SRES scenario set*: A1, A2, B1, and B2.

(Scenario) Group: *Scenarios* within a family that reflect a consistent variation of the *storyline*. The A1 *scenario family* includes four groups designated as A1T, A1C, A1G, and A1B that explore alternative structures of future energy systems.

In the Summary for Policymakers of Nakicenovic et al. (2000), the A1C and A1G groups have been combined into one “Fossil-Intensive” A1FI *scenario group*. The other three *scenario families* consist of one group each. The *SRES scenario set* reflected in the Summary for Policymakers of Nakicenovic et al. (2000) thus consist of six distinct *scenario groups*, all of which are equally sound and together capture the range of uncertainties associated with driving forces and emissions.

(Scenario) Illustrative: A *scenario* that is illustrative for each of the six *scenario groups* reflected in the Summary for Policymakers of Nakicenovic et al. (2000). They include four revised *scenario markers* for the *scenario groups* A1B, A2, B1, B2, and two additional *scenarios* for the A1FI and A1T groups. All *scenario groups* are equally sound.

(Scenario) Marker: A *scenario* that was originally posted in draft form on the SRES website to represent a given *scenario family*. The choice of markers was based on which of the initial quantifications best reflected the *storyline*, and the features of specific models. Markers are no more likely than other



scenarios, but are considered by the SRES writing team as illustrative of a particular *storyline*. They are included in revised form in Nakicenovic et al. (2000). These *scenarios* have received the closest scrutiny of the entire writing team via the SRES open process. *Scenarios* have also been selected to illustrate the other two *scenario groups*.

(Scenario) Storyline: A narrative description of a *scenario* (or family of *scenarios*) highlighting the main *scenario* characteristics, relationships between key driving forces, and the dynamics of their evolution.

Stabilization

The achievement of stabilization of atmospheric concentrations of one or more *greenhouse gases* (e.g., *carbon dioxide* or a CO₂-equivalent basket of *greenhouse gases*).

Stakeholder

A person or an organization that has a legitimate interest in a project or entity, or would be affected by a particular action or policy.

Stated preference²⁵

Stated preference approaches, sometimes referred to as direct valuation approaches, are survey methods that estimate the value individuals place on particular non-market goods based on choices they make in hypothetical markets.

Stimuli (climate-related)

All the elements of *climate change*, including mean *climate* characteristics, *climate variability*, and the frequency and magnitude of extremes.

Storm surge

The temporary increase, at a particular locality, in the height of the sea due to extreme meteorological conditions (low atmospheric pressure and/or strong winds). The storm surge is defined as being the excess above the level expected from the tidal variation alone at that time and place.

Storyline

See *SRES scenarios*.

Stratosphere

The highly stratified region of the *atmosphere* above the *troposphere* extending from about 10 km (ranging from 9 km in high latitudes to 16 km in the tropics on average) to about 50 km.

Streamflow

Water within a river channel, usually expressed in m³ sec⁻¹.

Submergence

A rise in the water level in relation to the land, so that areas of formerly dry land become inundated; it results either from a sinking of the land or from a rise of the water level.

Subsidence

The sudden sinking or gradual downward settling of the Earth's surface with little or no horizontal motion.

Subsidy

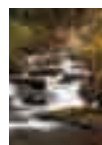
Direct payment from the government to an entity, or a tax reduction to that entity, for implementing a practice the government wishes to encourage. *Greenhouse gas emissions* can be reduced by lowering existing subsidies that have the effect of raising *emissions*, such as subsidies for *fossil fuel* use, or by providing subsidies for practices that reduce *emissions* or enhance *sinks* (e.g., for insulation of buildings or planting trees).

Sulfur hexafluoride (SF₆)

A colorless gas that is soluble in alcohol and ether, and slightly soluble in water. It is a very powerful *greenhouse gas* used primarily in electrical transmission and distribution systems, and as a dielectric in electronics.

Sustainable development

Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.



²⁵SAP 4.6.

T**Technological potential**

The amount by which it is possible to create a reduction in *greenhouse gas emissions* or an improvement in energy efficiency by implementing a *technology* or practice that has already been demonstrated.

Technology

A piece of equipment or a technique for performing a particular activity.

Thermal erosion

The *erosion* of ice-rich *permafrost* by the combined thermal and mechanical action of moving water.

Thermal expansion

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

Thermohaline circulation

Large-scale, density-driven circulation in the ocean, caused by differences in temperature and salinity. In the North Atlantic, the thermohaline circulation consists of warm surface water flowing northward and cold deepwater flowing southward, resulting in a net poleward transport of heat. The surface water sinks in highly restricted sinking regions located in high latitudes.

Threshold

The level of magnitude of a system process at which sudden or rapid change occurs. A point or level at which new properties emerge in an ecological, economic or other system, invalidating predictions based on mathematical relationships that apply at lower levels.

Time scale

The characteristic time it takes for a process to be expressed.

Time-series studies²⁶

Studies done using a set of data that expresses a particular variable measured over time.

Top-down models

The terms “top” and “bottom” are shorthand for aggregate and disaggregated models. The top-down label derives from how modelers applied macro-economic theory and econometric techniques to historical data on consumption, prices, incomes, and factor costs to model final demand for goods and services, and supply from main sectors, like the energy sector, transportation, agriculture, and industry. Therefore, top-down models evaluate the system from aggregate economic variables, as compared to *bottom-up models* that consider technological options or project specific *climate change mitigation* policies. Some *technology* data were, however, integrated into top-down analysis and so the distinction is not that clear-cut.

Total cost

All items of cost added together. The total cost to society is made up of both the *external cost* and the private cost, which together are defined as *social cost*.

Trade effects

Economic impacts of changes in the purchasing power of a bundle of exported goods of a country for bundles of goods imported from its trade partners. Climate policies change the relative production costs and may change terms of trade substantially enough to change the ultimate economic balance.

Transient climate response

The globally averaged surface air temperature increase, averaged over a 20-year period, centered at the time of CO₂ doubling (i.e., at year 70 in a 1 percent per year compound CO₂ increase experiment with a global coupled *climate model*).

²⁶ Modified from Millennium Ecosystem Assessment, 2005. “Time-Series Data.”



Transpiration

The process by which water vapor is lost to the *atmosphere* from living plants; the term can also be used to describe the quantity of water dissipated as such.

Troposphere

The lowest part of the *atmosphere* from the surface to about 10 km in altitude in mid-latitudes (ranging from 9 km in high latitudes to 16 km in the tropics on average) where clouds and “weather” phenomena occur. In the troposphere, temperatures generally decrease with height.

Tropopause

The boundary between the *troposphere* and the *stratosphere*.

Tundra

A treeless, level, or gently undulating plain characteristic of arctic and subarctic regions.

U

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). See Moss and Schneider (2000). See also *confidence* and *likelihood*.

Unique and threatened systems

Entities that are confined to a relatively narrow geographical range but can affect other, often larger entities beyond their range; a narrow geographical range points to *sensitivity* to environmental variables, including *climate*, and therefore attests to potential *vulnerability* to *climate change*.

United Nations Framework Convention on Climate Change (UNFCCC)

The Convention was adopted on 9 May 1992, in New York, and signed at the 1992 Earth Summit in Rio de Janeiro by more than 150 countries and the European Community. Its ultimate objective is the “*stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.*” It contains commitments for all Parties. Under the Convention, Parties included in Annex I aim to return *greenhouse gas emissions* not controlled by the *Montreal Protocol* to 1990 levels by the year 2000. The Convention entered into force in March 1994. See also *Kyoto Protocol*.

Uptake

The addition of a substance into a *reservoir*. For example, the uptake of carbon-containing substances is often called (carbon) *sequestration*.

Urban heat island effect²⁷

The urban *heat island* effect is a measurable increase in ambient urban air temperatures resulting primarily from the replacement of vegetation with buildings, roads, and other heat-absorbing *infrastructure*. The *heat island* effect can result in significant temperature differences between rural and urban areas.

Urbanization

The conversion of land from a natural state or managed natural state (such as agriculture) to cities; a process driven by net rural-to-urban migration through which an increasing percentage of the population in any nation or region come to live in settlements that are defined as “urban centers.”

²⁷ U.S. EPA. “Heat Island Glossary.” Retrieved November 21, 2007 from <http://www.epa.gov/hiri/resources/glossary.html#h>.



V**Valley fever (Coccidiomycosis)²⁸**

An infectious respiratory disease of humans and other animals caused by inhaling the fungus *Coccidioides immitis*. It is characterized by fever and various respiratory symptoms. Also called coccidiomycosis.

Valuation²⁹

The process of expressing a value for a particular good or service in a certain context (e.g., of decision-making) usually in terms of something that can be counted, often money, but also through methods and measures from other disciplines (sociology, ecology). See also *values*.

Value added

The net output of a sector after adding up all outputs and subtracting intermediate inputs.

Value of a statistical life (VSL)³⁰

The sum of what people would pay to reduce their risk of dying by small amounts that, together, add up to one statistical life.

Values

Worth, desirability, or utility based on individual preferences. The total value of any resource, is the sum of the values of the different individuals involved in the use of the resource. The values, which are the foundation of the estimation of costs, are measured in terms of the willingness to pay (WTP) by individuals to receive the resource, or by the willingness of individuals to accept payment (WTA) to part with the resource.

²⁸ *The American Heritage Dictionary of the English Language, Fourth Edition*. Retrieved November 21, 2007 from <http://dictionary.reference.com/browse/valley-fever>.

²⁹ Millennium Ecosystem Assessment, 2005 glossary.

³⁰ SAP 4.6.

Vector

An organism, such as an insect, that transmits a *pathogen* from one host to another. See also *vector-borne diseases*.

Vector-borne diseases

Disease that is transmitted between hosts by a *vector* organism such as a mosquito or tick (e.g., *malaria*, *dengue fever*, and *leishmaniasis*).

Volatile organic compounds (VOCs)³¹

Organic compounds that evaporate readily into the air. VOCs include substances such as benzene, toluene, methylene chloride, and methyl chloroform.

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*.

W**Waterborne diseases³²**

Diseases contracted through contact with water that is infected with any of numerous *pathogens* including *Vibrio cholerae*, *Campylobacter*, *Salmonella*, *Shigella*, and the diarrheogenic *Escherichia coli*.

Water consumption

Amount of extracted water irretrievably lost during its use (by *evaporation* and goods production). Water consumption is equal to *water withdrawal* minus return flow.

³¹ Agency for Toxic Substances & Disease Registry (ATSDR). "ATSDR Glossary of Terms." Retrieved November 21, 2007 from <http://www.atsdr.cdc.gov/glossary.html#G-T>.

³² Modified from CDC. "Preventing Bacterial Waterborne Diseases." Retrieved November 21, 2007 from http://www.cdc.gov/ncidod/dbmd/diseaseinfo/waterbornediseases_t.htm.



Watershed³³

The land area that drains into a particular watercourse or body of water. Sometimes used to describe the dividing line of high ground between two catchment basins.

Water stress

A country is water-stressed if the available freshwater supply relative to *water withdrawals* acts as an important constraint on development. Withdrawal exceeding 20 percent of renewable water supply has been used as an indicator of water stress.

Water-use efficiency

Carbon gain in *photosynthesis* per unit water lost in *evapotranspiration*. It can be expressed on a short-term basis as the ratio of photosynthetic carbon gain per unit *transpirational* water loss, or on a seasonal basis as the ratio of *net primary production* or agricultural yield to the amount of available water.

Water withdrawal

Amount of water extracted from water bodies.

Welfare

An economic term used to describe the state of *well-being* of humans on an individual or collective basis. The constituents of *well-being* are commonly considered to include materials to satisfy basic needs, freedom and choice, health, good social relations, and security.

Well-being³⁴

A context- and situation-dependent state, comprising basic material for a good life, freedom and choice, health and bodily well-being, good social relations, security, peace of mind, and spiritual experience.

West Nile virus³⁵

West Nile virus (WNV) is a single-stranded RNA virus of the family Flaviviridae, genus Flavivirus. The main lifecycle of WNV is between birds and insects. Humans are most often infected by a bite from an infected mosquito. Most people infected with WNV don't show any symptoms, whereas those that do are often diagnosed with West Nile fever which can last up to two weeks.

Z

Zoonoses

Diseases and infections which are naturally transmitted between vertebrate animals and people. See also *zoonotic disease*.

Zoonotic disease

A disease that normally exists in other vertebrates but also infects humans, such as *dengue fever*, avian flu, *West Nile virus* and bubonic plague.

³³ Millennium Ecosystem Assessment, 2005 glossary.

³⁴ Modified from the Millennium Ecosystem Assessment, Current State and Trends Assessment Glossary, 2005.

³⁵ Modified from CDC. "West Nile Virus." Retrieved November 21, 2007 from <http://www.cdc.gov/ncidod/dvbid/westnile/index.htm>.



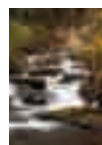
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6.2 ACRONYMS

AAG	Association of American Geographers
AAP	American Academy of Pediatrics
AIACC	Assessment of Impacts and Adaptations to Climate Change
AMR-A	North American Region
AR4	IPCC's Fourth Assessment Report
CCC	Canada Climate Center
CCP	ICLEI's Cities for Climate Protection
CCSP	Climate Change Science Program
CDC	Centers for Disease Control and Prevention
CLIMB	Climate's Long-Term Impacts on Metro Boston
CO₂	Carbon Dioxide
CVD	Cardiovascular Disease
DHS	Department of Homeland Security
ECHAM4	A model named after the European Centre for Medium Range Weather Forecasts (ECMWF), (giving it the first part of the name—EC), which was developed in Hamburg (HAM)
EHE	Extreme Heat Event
ENSO	El Niño Southern Oscillation
EPA	Environmental Protection Agency
FDA	Food and Drug Administration
FEMA	Federal Emergency Management Agency
GCM	General Circulation Model
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GIS	Geographic Information System
GISS	NASA Goddard Institute for Space Studies
ICLEI	International Council for Local Environmental Initiatives
IPCC	Intergovernmental Panel on Climate Change
MA	Millennium Assessment
MM5	Mesoscale Model
MSA	Metropolitan Statistical Area
NAAQS	National Ambient Air Quality Standards
NACC	U.S. National Assessment of Climate Change



NAS	National Academy of Sciences
NAST	National Assessment Synthesis Team
NEG/ECP	New England Governors and Eastern Canadian Premiers
NGO	Non-governmental Organization
NO	Nitric Oxide
NOAA	National Oceanic and Atmospheric Administration
NRC	National Research Council
NYCHP	New York Climate and Health Project
PM	Particulate Matter
PM_{2.5}	Particulate Matter (smaller than 2.5 micrometers)
PTSD	Post-traumatic Stress Disorder
RADM₂	Regional Acid Deposition Model, Version 2
RCM	Regional Climate Model
RGGI	Regional Greenhouse Gas Initiative
RMNP	Rocky Mountain National Park
RPS	Renewable Portfolio Standards
SAP	Synthesis and Assessment Product
SHELDUS	Spatial Hazard Events and Losses Database for the United States
SRES	Special Report on Emissions Scenarios
TAR	IPCC's Third Assessment Report
TBE	Tick-borne Encephalitis
UHI	Urban Heat Island Effect
UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme
USBEA	United States Bureau of Economic Analysis
USDA	U.S. Department of Agriculture
USGCRP	United States Global Change Research Program
VBZ	Vector-borne and Zoonotic
VEMAP	Virtual Earth Map
VOC	Volatile Organic Compounds
VSL	Value of Statistical Life
WHO	World Health Organization
WTP	Willingness to Pay