

Glossary

Notes: This glossary is provided for reference only and as per standard IPCC procedure is not of itself part of the expert/government review. Comments can, of course, be made on how glossary terms are used in the various chapters but these should be referenced to specific chapter lines. This is a preliminary draft of the glossary and thus definitions may not be fully consistent with corresponding term usage in the chapters. Placeholders have been inserted where terms await definition.

Date of Draft: 06/01/18

1.5°C warmer world

Our world with 1.5°C global mean warming above pre-industrial times. This world will look different depending on the mitigation and adaptation measures and pathways chosen, with and without temporary overshoots. These choices are overlaid on differential vulnerabilities of natural and human systems, producing distinct risks, opportunities, and synergies and trade-offs with other societal objectives.

Acceptability of policy or system change

The extent to which a policy or system change is evaluated unfavourably or favourably.

Adaptability

See Adaptive capacity.

Adaptation

The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects.

Incremental adaptation

Adaptation actions where the central aim is to maintain the essence and integrity of a system or process at a given scale¹.

Transformational adaptation

Adaptation that changes the fundamental attributes of a system in response to climate and its effects.

See also Adaptation options, Adaptive capacity, Maladaptive actions (Maladaptation).

¹ This definition builds from the definition used in Park et al. (2012).

Adaptation limits

Points at which an actor's objectives or system's needs cannot be secured from intolerable risks through adaptive actions (soft limit: no actions currently available or implemented; hard limit: no actions possible generally).

Adaptation options

The array of strategies and measures that are available and appropriate for addressing adaptation needs. They include a wide range of actions that can be categorized as structural, institutional, ecological or behavioural.

Adaptive capacity

The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences².

Aerosol

A suspension of airborne solid or liquid particles, with a typical size between a few nanometres and 10 µm that reside in the atmosphere for at least several hours. For convenience the term aerosol, which includes both the particles and the suspending gas, is often used in this report in its plural form to mean aerosol particles. Aerosols may be of either natural or anthropogenic origin. Aerosols may influence climate in several ways: directly through scattering and absorbing radiation, and indirectly by acting as cloud condensation nuclei or ice nuclei, modifying the optical properties and lifetime of clouds. Atmospheric aerosols, whether natural or anthropogenic, originate from two different pathways: emissions of primary particulate matter (PM), and formation of secondary PM from gaseous precursors. The bulk of aerosols are of natural origin. Some scientists use group labels that refer to the chemical composition, namely: sea salt, organic carbon, black carbon (BC), mineral species (mainly desert dust), sulphate, nitrate, and ammonium. These labels are, however, imperfect as aerosols combine particles to create complex mixtures.

See also Short-lived climate forcers (SLCF).

Afforestation

Planting of new forests on lands that historically have not contained forests.

For a discussion of the term forest and related terms such as afforestation, reforestation and deforestation, see the IPCC Special Report on Land Use, Land-Use Change, and Forestry (IPCC, 2000a), information provided by the United Nations Framework Convention on Climate Change (UNFCCC, 2013) and the report on Definitions and Methodological Options to Inventory Emissions from Direct Human-induced Degradation of Forests and Devegetation of Other Vegetation Types (IPCC, 2003).

See also Deforestation, Reforestation, Land use.

² This glossary entry builds from definitions used in previous IPCC reports and the Millennium Ecosystem Assessment (MEA, 2005).

Agreement

In this report, the degree of agreement is the level of concurrence in the literature on a particular finding as assessed by the authors.

See also Evidence, Confidence, Likelihood, and Uncertainty.

Air pollution

[Definition]

See also Aerosols.

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 and vegetation-covered surfaces and oceans have a low albedo. The Earth's planetary albedo varies mainly through varying cloudiness, snow, ice, leaf area and land cover changes.

Anomaly

The deviation of a variable from its value averaged over a reference period.

See also Reference period.

Anthropocene

An emerging concept in stratigraphy that defines significant human impacts on natural processes since mid-20th Century, for example resulting in climate change. But there is also evidence of unprecedented human influence in the form of lithostratigraphic units associated with urbanization, agriculture, landscape modification, and mineral extraction as well as numerous materials of human origin, such as aluminium, concrete and plastics; particulates from fossil fuel combustion; radionuclides from the fallout of nuclear tests, resulting in the proposal that the Holocene period has given way to a new geological epoch the Anthropocene. While the Anthropocene is still undergoing the required formalization process within the stratigraphic community it is widely used across disciplines to better understand the drivers and dynamics of human impacts and challenges in responding to these impacts at multiple scale levels.

Anthropogenic

Resulting from or produced by human activities.

Anthropogenic emissions

Emissions of greenhouse gases (GHGs), aerosols, and precursors of a GHG or aerosol caused by human activities. These activities include the burning of fossil fuels, deforestation, land use changes (LUC), livestock production, fertilisation, waste management, and industrial processes.

Atmosphere

The gaseous envelope surrounding the earth, divided into five layers — the troposphere which contains half of the earth's atmosphere, the stratosphere, the mesosphere, the thermosphere, and the exosphere, which is the outer limit of the atmosphere. The dry atmosphere consists almost entirely of nitrogen (78.1 % volume mixing ratio) and oxygen (20.9 % volume mixing ratio), together with a number of trace gases, such as argon (0.93 % volume mixing ratio), helium and radiatively active greenhouse gases (GHGs) such as carbon dioxide (CO₂) (0.035 % volume mixing ratio) and ozone (O₃). In addition, the atmosphere contains the GHG water vapour (H₂O), whose amounts are highly variable but typically around 1 % volume mixing ratio. The atmosphere also contains clouds and aerosols.

Atmosphere-Ocean General Circulation Model (AOGCM)

See Climate model.

Attribution

See Detection and attribution.

Baseline scenario

In the context of transformation pathways, the term baseline scenarios refers to scenarios that are based on the assumption that no mitigation policies or measures will be implemented beyond those that are already in force and/or are legislated or planned to be adopted. Baseline scenarios are not intended to be predictions of the future, but rather counterfactual constructions that can serve to highlight the level of emissions that would occur without further policy effort. Typically, baseline scenarios are then compared to mitigation scenarios that are constructed to meet different goals for greenhouse gas (GHG) emissions, atmospheric concentrations or temperature change. The term baseline scenario is used interchangeably with reference scenario and no policy scenario. In much of the literature the term is also synonymous with the term business-as-usual (BAU) scenario, although the term BAU has fallen out of favour because the idea of business as usual in century-long socio-economic projections is hard to fathom.

See also Emission scenario, Representative Concentration Pathways (RCPs), SRES scenarios.

Behaviour

In this report, behaviour refers to human decisions and actions that directly or indirectly influence mitigation or the effects of potential climate change impacts (adaptation). Human decisions and actions are relevant at different levels, from international, national, and sub-national actors, to NGO, tribe, or firm-level decision makers, to communities, households, and individual citizens and consumers.

See also Behavioural change.

Behavioural change

In this report, behavioural change refers to alteration of human decisions and actions in ways that mitigate climate change and/or reduce negative consequences of climate change impacts.

Biochar

Biomass stabilisation can be an alternative or enhancement to bioenergy in a land-based mitigation strategy. Heating biomass with exclusion of air produces a stable carbon-rich co-product (char). When added to soil a system, char creates a system that has greater greenhouse gas abatement potential than typical bioenergy. The relative benefit of biochar systems is increased if changes in crop yield and soil emissions of methane (CH₄) and nitrous oxide (N₂O) are taken into account.

Biodiversity

The variability among living organisms from terrestrial, marine and other ecosystems. Biodiversity includes variability at the genetic, species and ecosystem levels³.

Bioenergy

Energy derived from any form of biomass such as recently living organisms or their metabolic by-products.

Bioenergy and Carbon Dioxide Capture and Storage (BECCS)

The application of Carbon Dioxide Capture and Storage (CCS) technology to bioenergy conversion processes, which convert biomass to energy. Depending on the total lifecycle emissions, including total marginal consequential effects (from indirect land-use change (iLUC) and other processes), BECCS has the potential for net carbon dioxide (CO₂) removal from the atmosphere.

See also Sequestration, Biomass.

Biofuel

A fuel, generally in liquid form, produced from organic matter or combustible oils produced by living or recently living plants. Biofuel includes alcohol (bioethanol), black liquor from the paper-manufacturing process, and plant oils (biodiesel) derived from soybeans or jatropha, for example.

³ This glossary entry builds from definitions used in the Global Biodiversity Assessment (UNEP, 1995) and the Millennium Ecosystem Assessment (MEA, 2005).

Biological diversity

See Biodiversity.

Biomass

The total mass of living organisms in a given area or volume; dead plant material can be included as dead biomass. In the context of this report, biomass includes products, by-products, and waste of biological origin (plants or animal matter), excluding material embedded in geological formations and transformed to fossil fuels or peat.

Black carbon (BC)

Operationally defined aerosol species based on measurement of light absorption and chemical reactivity and/or thermal stability. It is sometimes referred to as soot. BC is mostly formed by the incomplete combustion of fossil fuels, biofuels, and biomass but it also occurs naturally. It stays in the atmosphere only for days or weeks. It is the most strongly light-absorbing component of particulate matter (PM) and has a warming effect by absorbing heat into the atmosphere and reducing the albedo when deposited on ice or snow.

Blue carbon

See Enhanced seagrass meadows.

Burden sharing (also referred to as Effort sharing)

In the context of mitigation, burden sharing refers to sharing the effort of reducing the sources or enhancing the sinks of greenhouse gases (GHGs) from historical or projected levels, usually allocated by some criteria, as well as sharing the cost burden across countries.

Business-as-usual (BAU)

See Baseline scenario.

Capacity

The combination of all the institutions, attributes, and resources available to an individual, community, society, or organization, which can be used to achieve established goals.

See also Adaptive capacity, Coping capacity, Mitigation capacity.

Carbon budget

The area under a greenhouse gas (GHG) emissions trajectory that satisfies assumptions about limits on cumulative emissions estimated to avoid a certain level of global mean surface temperature rise. Carbon budgets may be defined at the global level, national, or sub-national levels.

Threshold exceedance budgets (TEB)

[Definition]

Threshold avoidance budgets (TAB)

[Definition]

Threshold peak budget (TPB)

[Definition]

Threshold return budget (TRB)

[Definition]

Carbon cycle

The term used to describe the flow of carbon (in various forms, e.g., as carbon dioxide (CO₂)) through the atmosphere, ocean, terrestrial and marine biosphere and lithosphere. In this report, the reference unit for the global carbon cycle is GtCO₂ or GtC (Gigatonne of carbon = 1 GtC = 10¹⁵ grams of carbon. This corresponds to 3.667 GtCO₂).

Carbon Dioxide Capture and Utilization (CCU)

A process in which CO₂ is captured and then used to produce a new product. If the CO₂ is stored in a product for a climate-relevant time horizon, this is referred to as Carbon Dioxide Capture, Utilization and Storage (CCUS) and can potentially lead to carbon dioxide removal.

Carbon Dioxide Capture, Utilization and Storage (CCUS)

See Carbon Dioxide Capture and Utilization (CCU).

Carbon dioxide (CO₂)

A naturally occurring gas, also a by-product of burning fossil fuels from fossil carbon deposits, such as oil, gas and coal, of burning biomass, of land use changes (LUC) and of industrial processes (e.g., cement production). It is the principal anthropogenic greenhouse gas (GHG) that affects the earth's radiative balance. It is the reference gas against which other GHGs are measured and therefore has a Global Warming Potential (GWP) of 1.

Carbon Dioxide Capture and Storage (CCS)

A process in which a relatively pure stream of carbon dioxide (CO₂) from industrial and energy-related sources is separated (captured), conditioned, compressed and transported to a storage location for long-term isolation from the atmosphere.

See also Bioenergy and Carbon Dioxide Capture and Storage (BECCS), Sequestration.

Carbon Dioxide Removal (CDR)

Carbon Dioxide Removal methods refer to processes that remove CO₂ directly from the atmosphere by either increasing natural sinks of CO₂ or using chemical engineering to remove the CO₂ from the atmosphere. CDR methods involve the ocean, land and technical systems, including such methods as iron fertilisation, large-scale afforestation and direct capture of CO₂ from the atmosphere using engineered chemical means. In this report, CDR is classified as mitigation.

See also Mitigation (of climate change).

Carbon intensity

The amount of emissions of carbon dioxide (CO₂) released per unit of another variable such as Gross Domestic Product (GDP), output energy use or transport.

Carbon neutral

[Definition]

See Net-zero emissions, Net negative emissions.

Carbon price

The price for avoided or released carbon dioxide (CO₂) or CO₂-equivalent emissions. This may refer to the rate of a carbon tax, or the price of emission permits. In many models that are used to assess the economic costs of mitigation, carbon prices are used as a proxy to represent the level of effort in mitigation policies.

Carbon sequestration

See Sequestration, Sink.

Carbon sink

See Sink.

Clean Development Mechanism (CDM)

A mechanism defined under Article 12 of the Kyoto Protocol through which investors (governments or companies) from developed (Annex B) countries may finance greenhouse gas (GHG) emission reduction or removal projects in developing (Non-Annex B) countries, and receive Certified Emission Reduction Units (CERs) for doing so. The CERs can be credited towards the commitments of the respective developed countries. The CDM is intended to facilitate the two objectives of promoting sustainable development (SD) in developing countries and of helping industrialized countries to reach their emissions commitments in a cost-effective way.

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 for averaging these variables is 30 years, as defined by the World Meteorological Organization. The 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 a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcings such as modulations of the solar cycles, volcanic eruptions and persistent anthropogenic changes in the composition of the atmosphere or in land use. Note that the Framework Convention on Climate Change (UNFCCC), in its Article 1, 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'. The UNFCCC thus makes a distinction between climate change attributable to human activities altering the atmospheric composition and climate variability attributable to natural causes.

See also Climate variability, Detection and Attribution.

Climate change commitment

Due to the thermal inertia of the ocean and slow processes in the cryosphere and land surfaces, the climate would continue to change even if the atmospheric composition were held fixed at today's values. Past change in atmospheric composition leads to a committed climate 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 constant composition temperature commitment or simply committed warming or warming commitment. Climate change commitment includes other future changes, for example in the hydrological cycle, in extreme weather events, in extreme climate events, and in sea level change. The constant emission commitment is the committed climate change that would result from keeping anthropogenic emissions constant and the zero emission commitment is the climate change commitment when emissions are set to zero.

Constant emissions commitment

The constant emissions commitment is the committed climate change that would result from keeping anthropogenic emissions constant.

Zero emissions commitment

The zero emissions commitment is the climate change commitment when emissions are set to zero.

See also Climate change.

Climate-compatible development (CCD)

A form of development that seeks integrated mitigation, adaptation and development outcomes. Based upon a definition used by the Climate and Development Knowledge Network (CDKN). Successful integration facilitates triple-win outcomes.

Climate engineering

See Geoengineering.

Climate feedback

An interaction in which a perturbation in one climate quantity causes a change in a second and the change in the second quantity ultimately leads to an additional change in the first. A negative feedback is one in which the initial perturbation is weakened by the changes it causes; a positive feedback is one in which the initial perturbation is enhanced. The initial perturbation can either be externally forced or arise as part of internal variability.

Climate governance

Mechanisms and measures aimed at steering social systems towards preventing, mitigating, or adapting to the risks posed by climate change (Jagers and Striiple, 2003).

Climate model

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 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 spectrum or 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 General Circulation Models (AOGCMs) provide a representation of the climate system that is near or at the most comprehensive end of the spectrum currently available. There is an evolution towards more complex models with interactive chemistry and biology. Climate models are applied as a research tool to study and simulate the climate and for operational purposes, including monthly, seasonal and interannual climate predictions.

Climate projection

A climate projection is the simulated response of the climate system to a scenario of future emission or concentration of greenhouse gases (GHGs) and aerosols, generally derived using climate models. Climate projections are distinguished from climate predictions by their dependence on the emission/concentration/radiative forcing scenario used, which is in turn based on assumptions concerning, for example, future socioeconomic and technological developments that may or may not be realized.

See also Climate scenario.

Climate-resilient pathways

Iterative processes for managing change within complex systems in order to reduce disruptions and enhance opportunities associated with climate change.

See also Pathways, Development pathways, Transformation pathways.

Climate response

Transient responses

[Definition]

Short-term stabilisation responses

[Definition]

Long-term equilibrium stabilisation

See also Climate sensitivity, Stabilisation (of GHG or CO₂-equivalent concentration).

Climate sensitivity

In IPCC reports,

equilibrium climate sensitivity (units: °C) refers to the equilibrium (steady state) change in the annual global mean surface temperature following a doubling of the atmospheric equivalent carbon dioxide (CO₂) concentration. Owing to computational constraints, the equilibrium climate sensitivity in a climate model is sometimes estimated by running an atmospheric general circulation model coupled to a mixed-layer ocean model, because equilibrium climate sensitivity is largely determined by atmospheric processes. Efficient models can be run to equilibrium with a dynamic ocean. The climate sensitivity parameter (units: °C (W m⁻²)⁻¹) refers to the equilibrium change in the annual global mean surface temperature following a unit change in radiative forcing.

effective climate sensitivity (units: °C) is an estimate of the global mean surface temperature response to doubled carbon dioxide (CO₂) concentration that is evaluated from model output or observations for evolving non-equilibrium conditions. It is a measure of the strengths of the climate feedbacks at a particular time and may vary with forcing history and climate state, and therefore may differ from equilibrium climate sensitivity.

Climate services

Climate services refers to information and products that enhance users' knowledge and understanding about the impacts of climate change and/or climate variability so as to aid decision-making of individuals and organizations and enable preparedness and early climate change action.

Climate system

The climate system is the highly complex system consisting of five major components: the atmosphere, the hydrosphere, the cryosphere, the lithosphere 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 anthropogenic forcings such as the changing composition of the atmosphere and land-use change.

Climate target

Climate target refers to a goal to limit dangerous anthropogenic interference with the climate change. It is sometimes called by different terms such as a Climate stabilisation target, temperature limit, temperature goal and warming level.

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.

CMIPs

The Coupled Model Intercomparison Project (CMIPs) coordinates and archives climate model simulations based on shared model inputs by modeling groups from around the world. The CMIP3 multi-model data set includes projections using SRES scenarios. The CMIP5 data set includes projections using the Representative Concentration Pathways.

Co-benefits

The positive effects that a policy or measure aimed at one objective might have on other objectives, irrespective of the net effect on overall social welfare. Co-benefits are often subject to uncertainty and depend on local circumstances and implementation practices, among other factors. Co-benefits are also referred to as ancillary benefits.

CO₂-equivalent*CO₂-equivalent (CO₂-eq) concentration*

The concentration of carbon dioxide (CO₂) that would cause the same radiative forcing as a given mixture of CO₂ and other forcing components. Those values may consider only greenhouse gases (GHGs), or a combination of GHGs, aerosols and surface albedo change. CO₂-equivalent concentration is a metric for comparing radiative forcing of a mix of different forcing components at a particular time but does not imply equivalence of the corresponding climate change responses nor future forcing. There is generally no connection between CO₂-equivalent emissions and resulting CO₂-equivalent concentrations.

CO₂-equivalent (CO₂-eq) emission

The amount of carbon dioxide (CO₂) emission that would cause the same integrated radiative forcing, over a given time horizon, as an emitted amount of a greenhouse gas (GHG) or a mixture of GHGs. The CO₂-equivalent emission is obtained by multiplying the emission of a GHG by its Global Warming Potential (GWP) for the given time horizon. For a mix of GHGs it is obtained by summing the CO₂-equivalent emissions of each gas. CO₂-equivalent emission is a common scale for comparing emissions of different GHGs but does not imply equivalence of the corresponding climate change responses. There is generally no connection between CO₂-equivalent emissions and resulting CO₂-equivalent concentrations.

CO₂-forcing equivalent (CO₂-fe) concentration

[Definition]

CO₂-forcing equivalent (CO₂-fe) emission

[Definition]

See also Global Warming Potential (GWP), Equivalent carbon dioxide concentration.

Conference of the Parties (COP)

The supreme body of the United Nations Framework Convention on Climate Change (UNFCCC), comprising countries with a right to vote that have ratified or acceded to the convention.

See also United Nations Framework Convention on Climate Change (UNFCCC).

Confidence

The validity of a finding based on the type, amount, quality and consistency of evidence (e.g., mechanistic understanding, theory, data, models, expert judgment) and on the degree of agreement. In this report, confidence is expressed qualitatively (Mastrandrea et al., 2010). See Section 1.6.1 for the levels of confidence and Section 1.6.2 for the list of likelihood qualifiers.

See also Agreement, Evidence, Likelihood, and Uncertainty.

Constant composition commitment

See Climate change commitment.

Coping capacity

The ability of people, institutions, organizations, and systems, using available skills, values, beliefs, resources, and opportunities, to address, manage, and overcome adverse conditions in the short to medium term⁴.

Cost-benefit analysis (CBA)

Monetary assessment of all negative and positive impacts associated with a given action. CBA enables comparison of different interventions, investments or strategies and reveal how a given investment or policy effort pays off for a particular person, company or country. CBA's representing society's point of view are important for climate change decision making, but there are difficulties in aggregating costs and benefits across different actors.

Cost-effectiveness

A measure of the cost at which policy goal or outcome is achieved. The lower the cost the greater the cost-effectiveness. Integrated models approximate cost-effective solutions, unless they are specifically constrained to behave otherwise.

Cumulative emissions

[Definition]

See also Carbon budget, Transient Climate Response to Cumulative CO₂ Emissions (TCRE).

Decarbonisation

The process by which countries or other entities aim to achieve low-carbon existence, or by which individuals aim to reduce their consumption of carbon. Typically refers to a reduction of the carbon emissions associated with electricity and transport.

Deforestation

Conversion of forest to non-forest. For a discussion of the term forest and related terms such as afforestation, reforestation and deforestation, see the IPCC Special Report on Land Use, Land-Use Change, and Forestry (IPCC, 2000a).

See also information provided by the United Nations Framework Convention on Climate Change (UNFCCC, 2013) and the report on Definitions and Methodological Options to Inventory Emissions from Direct Human-induced Degradation of Forests and Devegetation of Other Vegetation Types (IPCC, 2003).

Detection and attribution

Detection of change is defined as the process of demonstrating that climate or a system affected by climate has changed in some defined statistical sense, without providing a reason for that change. An identified

⁴ This glossary entry builds from the definition used in UNISDR (2009) and IPCC (2012a).

change is detected in observations if its likelihood of occurrence by chance due to internal variability alone is determined to be small, for example, <10%. Attribution is defined as the process of evaluating the relative contributions of multiple causal factors to a change or event with an assignment of statistical confidence (Hegerl et al., 2010).

Developed/developing countries

See Industrialized countries/developing countries.

Development pathways

An evolution based on an array of technological, economic, social, institutional, cultural, and biophysical characteristics that determine the interactions between human and natural systems, including consumption and production patterns in all countries, over time at a particular scale.

Climate-resilient development pathways (CDRPs)

Trajectories that strengthen sustainable development and efforts to eradicate poverty and reduce inequalities while promoting fair and cross-scalar resilience in a changing climate. They foreground the ethics, equity, and feasibility aspects of the deep societal transformation needed to drastically reduce emissions to limit global warming to 1.5°C and achieve desirable and liveable futures and well-being for all.

Low emissions development pathways

Development pathways that ensure a low-carbon trajectory, including zero net emissions before the end of the 21st century.

Sustainable development pathways (SDPs)

Trajectories aimed at attaining the Sustainable Development Goals (SDGs) in the short term and the goals of sustainable development in the long term. In the context of climate change, such pathways denote trajectories that address social, environmental, and economic dimensions of sustainable development, adaptation and mitigation, and transformation, in a generic sense or from a particular methodological perspective such as integrated assessment models and scenario simulations.

See also Pathways, Climate-resilient pathways, Transformation pathways.

Direct air carbon capture and storage (DACCS)

Chemical process by which a pure carbon dioxide (CO₂) stream is produced by capturing CO₂ from the ambient air. Also known as Direct air capture and storage (DACs).

Disaster

Severe alterations in the normal functioning of a community or a society due to hazardous physical events interacting with vulnerable social conditions, leading to widespread adverse human, material, economic or environmental effects that require immediate emergency response to satisfy critical human needs and that may require external support for recovery.

Disaster Risk Management (DRM)

Processes for designing, implementing, and evaluating strategies, policies, and measures to improve the understanding of disaster risk, foster disaster risk reduction and transfer, and promote continuous improvement in disaster preparedness, response, and recovery practices, with the explicit purpose of increasing human security, well-being, quality of life, and sustainable development.

Disaster Risk Reduction (DRR)

Denotes both a policy goal the measures employed for anticipating future disaster risk; reducing existing exposure, hazard, or vulnerability; and improving resilience. DRR can involve the transfer of risk to more resilient entities⁵.

Discounting

A mathematical operation making monetary (or other) amounts received or expended at different times (years) comparable across time. The discounter uses a fixed or possibly time-varying discount rate (>0) from year to year that makes future value worth less today.

Discount rate

See Discounting.

Disruptive innovation

A significant innovation that creates a new market or value network by introducing a combination of new technology, new information or new processes. Disruptive innovation eventually disrupts existing markets and value networks and leads to significant system changes.

Double dividend

The extent to which revenue-generating instruments, such as carbon taxes or auctioned (tradable) emission permits can (1) contribute to mitigation and (2) offset at least part of the potential welfare losses of climate policies through recycling the revenue in the economy to reduce other taxes likely to cause distortions.

Downscaling

Downscaling is a method that derives local- to regional-scale (10 to 100 km) information from larger-scale models or data analyses. Two main methods exist: dynamical downscaling and empirical/statistical downscaling. The dynamical method uses the output of regional climate models, global models with variable

⁵ The Sendai Framework for Disaster Risk Reduction (DRR) 2015-2030 outlines seven clear targets and four priorities for action to prevent new, and to reduce existing disaster risks. The voluntary, non-binding agreement recognizes that the State has the primary role to reduce disaster risk but that responsibility should be shared with other stakeholders including local government, the private sector and other stakeholders, with the aim for the substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries.

spatial resolution, or high-resolution global models. The empirical/statistical methods develop statistical relationships that link the large-scale atmospheric variables with local/ regional climate variables. In all cases, the quality of the driving model remains an important limitation on quality of the downscaled information.

Drought

A period of abnormally dry weather long enough to cause a serious hydrological imbalance. Drought is a relative term; therefore any discussion in terms of precipitation deficit must refer to the particular precipitation-related activity that is under discussion. For example, shortage of precipitation during the growing season impinges on crop production or ecosystem function in general (due to soil moisture drought, also termed agricultural drought) and during the runoff and percolation season primarily affects water supplies (hydrological drought). Storage changes in soil moisture and groundwater are also affected by increases in actual evapotranspiration in addition to reductions in precipitation. A period with an abnormal precipitation deficit is defined as a meteorological drought. A megadrought is a very lengthy and pervasive drought, lasting much longer than normal, usually a decade or more.

Early warning system

The set of capacities needed to generate and disseminate timely and meaningful warning information to enable individuals, communities and organizations threatened by a hazard to prepare to act promptly and appropriately to reduce the possibility of harm or loss⁶.

Earth system feedbacks

See Climate feedback.

Earth System Model (ESM)

A coupled atmosphere–ocean general circulation model in which a representation of the carbon cycle is included, allowing for interactive calculation of atmospheric CO₂ or compatible emissions. Additional components (e.g., atmospheric chemistry, ice sheets, dynamic vegetation, nitrogen cycle, but also urban or crop models) may be included.

See also Climate model.

Ecosystem

An ecosystem is a functional unit consisting of living organisms, their non-living environment and the interactions within and between them. The components included in a given ecosystem and its spatial boundaries depend on the purpose for which the ecosystem is defined: in some cases they are relatively sharp, while in others they are diffuse. Ecosystem boundaries can change over time. Ecosystems are nested within other ecosystems and their scale can range from very small to the entire biosphere. In the current era,

⁶ This glossary entry builds from the definitions used in UNISDR (2009) and IPCC (2012a).

most ecosystems either contain people as key organisms, or are influenced by the effects of human activities in their environment.

Ecosystem services

Ecological processes or functions having monetary or non-monetary value to individuals or society at large. These are frequently classified as (1) supporting services such as productivity or biodiversity maintenance, (2) provisioning services such as food, fibre or fish, (3) regulating services such as climate regulation or carbon sequestration and (4) cultural services such as tourism or spiritual and aesthetic appreciation.

Effective climate sensitivity

See Climate sensitivity.

Effective radiative forcing

See Radiative forcing.

El Niño-Southern Oscillation (ENSO)

The term El Niño was initially used to describe a warm-water current that periodically flows along the coast of Ecuador and Peru, disrupting the local fishery. It has since become identified with a basin-wide warming of the tropical Pacific Ocean east of the dateline. This oceanic event is associated with a fluctuation of a global-scale tropical and subtropical surface pressure pattern called the Southern Oscillation. This coupled atmosphere–ocean phenomenon, with preferred time scales of two to about seven years, is known as the El Niño-Southern Oscillation (ENSO). It is often measured by the surface pressure anomaly difference between Tahiti and Darwin or the sea surface temperatures in the central and eastern equatorial Pacific. During an ENSO event, the prevailing trade winds weaken, reducing upwelling and altering ocean currents such that the sea surface temperatures warm, further weakening the trade winds. This event has a 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, through global teleconnections. The cold phase of ENSO is called La Niña.

Emission scenario

A plausible representation of the future development of emissions of substances that are potentially radiatively active (e.g., greenhouse gases (GHGs), aerosols) based on a coherent and internally consistent set of assumptions about driving forces (such as demographic and socio-economic development, technological change, energy and land use) and their key relationships. Concentration scenarios, derived from emission scenarios, are used as input to a climate model to compute climate projections. In IPCC (1992) a set of emission scenarios was presented which were used as a basis for the climate projections in IPCC (1996). These emission scenarios are referred to as the IS92 scenarios. In the IPCC Special Report on Emissions Scenarios (IPCC, 2000b) emission scenarios, the so-called SRES scenarios, were published, some of which were used, among others, as a basis for the climate projections presented in Chapters 9 to 11 of IPCC WGI

TAR (IPCC, 2001b) and Chapters 10 and 11 of IPCC WGI AR4 (IPCC, 2007) as well as in the IPCC WGI AR5 (IPCC, 2013).

See also Baseline/reference, Climate scenario, Mitigation scenario, Shared socio-economic pathways, Scenario, Socio-economic scenario, stabilisation, Transformation pathway.

Emission trajectories

A projected development in time of the emission of a greenhouse gas (GHG) or group of GHGs, aerosols, and GHG precursors.

See also Pathways

Emissions

Direct emissions

Emissions that physically arise from activities within well-defined boundaries of, for instance, a region, an economic sector, a company, or a process.

Indirect emissions

Emissions that are a consequence of the activities within well-defined boundaries of, for instance, a region, an economic sector, a company or process, but which occur outside the specified boundaries. For example, emissions are described as indirect if they relate to the use of heat but physically arise outside the boundaries of the heat user, or to electricity production but physically arise outside of the boundaries of the power supply sector.

See also Net emissions.

Emissions trading

A market-based instrument used to limit emissions. The environmental objective or sum of total allowed emissions is expressed as an emissions cap. The cap is divided in tradable emission permits that are allocated - either by auctioning or handing out for free (grandfathering) - to entities within the jurisdiction of the trading scheme. Entities need to surrender emission permits equal to the amount of their emissions (e.g., tonnes of CO₂). An entity may sell excess permits. Trading schemes may occur at the intra-company, domestic, or international level and may apply to carbon dioxide (CO₂), other greenhouse gases (GHGs), or other substances. Emissions trading is also one of the mechanisms under the Kyoto Protocol.

Enabling conditions

[Definition]

Energy balance

The difference between the total incoming and total outgoing energy. If this balance is positive, warming occurs; if it is negative, cooling occurs. Averaged over the globe and over long time periods, this balance

must be zero. Because the climate system derives virtually all its energy from the Sun, zero balance implies that, globally, the absorbed solar radiation, that is, incoming solar radiation minus reflected solar radiation at the top of the atmosphere and outgoing longwave radiation emitted by the climate system are equal.

See also Energy budget.

Energy efficiency

The ratio of output or useful energy or other useful physical outputs obtained from a system, conversion process, transmission or storage activity to the input of energy (measured as kWh kWh⁻¹, tonnes kWh⁻¹ or any other physical measure of useful output like tonne-km transported). Energy efficiency is a component of energy intensity. In economics, the term may describe the ratio of economic output to energy input. Most commonly energy efficiency is measured as input energy over a physical or economic unit, i.e. kWh USD⁻¹ (energy intensity), kWh tonne⁻¹. For buildings, it is often measured as kWh m⁻², and for vehicles as km liter⁻¹. Very often in policy "energy efficiency" is intended as the measures to reduce energy demand through technological options such as insulating buildings, more efficient appliances, lighting, etc.

Energy security

The goal of a given country, or the global community as a whole, to maintain an adequate, stable and predictable energy supply. Measures encompass safeguarding the sufficiency of energy resources to meet national energy demand at competitive and stable prices and the resilience of the energy supply; enabling development and deployment of technologies; building sufficient infrastructure to generate, store and transmit energy supplies and ensuring enforceable contracts of delivery.

Energy system

The energy system comprises all components related to the production, conversion, delivery, and use of energy.

Enhanced seagrass meadows

Enhance the carbon fixed by vegetated coastal ecosystems including seagrasses.

Enhanced weathering

The gradual removal of atmospheric CO₂ through dissolution of silicate and carbonate rocks— this process can be enhanced by grinding these minerals and actively applying them to soils or oceans.

Ensemble

A collection of model simulations characterizing a climate prediction or projection. Differences in initial conditions and model formulation result in different evolutions of the modelled system and may give information on uncertainty associated with model error and error in initial conditions in the case of climate

forecasts and on uncertainty associated with model error and with internally generated climate variability in the case of climate projections.

Environmental services

See Ecosystem services.

Equality

A principle that ascribes equal worth to all human beings, including equal opportunities, rights, and obligations, irrespective of origins.

Inequality

Uneven opportunities and social positions, and processes of discrimination within a group or society, based on gender, class, ethnicity, age, and (dis)ability, often produced by uneven development. Income inequality refers to a gap between highest and lowest income earners within a country and between countries.

Equilibrium climate sensitivity

See Climate sensitivity.

Equity

Equity is the principle of being fair and impartial and is a basis for understanding how the impacts and responses to climate change, including costs and benefits, are distributed in and by society in more or less equal ways. It is often aligned with ideas of equality, fairness and justice and applied with respect to equity in the responsibility for, and distribution of, climate impacts and policies across society, generations, and gender, and in the sense of who participates and controls the processes of decision making.

Distributive equity

Equity in the consequences, outcomes, costs and benefits of climate change or climate policies for different people, places and countries, including equity aspects of burden sharing for mitigation and adaptation.

Gender equity

Women and men have the same rights, resources and opportunities and recognizes that women are often more vulnerable to the impacts of climate change and may be disadvantaged in the process and outcomes of climate policy. Gender equity implies that the unequal impacts of climate change on men and women are addressed through policy, including finance, mitigation and adaptation, that is equitable with regard to gender.

Intergenerational equity

Equity in the impacts of climate change and climate policy between different generations that acknowledges that the effects of past and present emissions, vulnerabilities and policies impose costs and benefits for people in the future and that equity principles should include consideration of future generations including their right to a better world.

Procedural equity

Equity in the process of decision making including equity and inclusiveness in participation to include equal representation, bargaining power, voice and equitable access to knowledge and resources to participate.

See also Fairness.

Ethics

Moral principles that guide what is considered right and wrong, including what is just and who and what is valued and who has rights, including all people, future generations and non-human nature.

Evidence

Information indicating the degree to which a belief or proposition is true or valid. In this report, the degree of evidence reflects the amount, quality, and consistency of scientific/technical information on which the Lead Authors are basing their findings.

See also Agreement, Confidence, Likelihood, Uncertainty.

Exposure

The presence of people, livelihoods, species or ecosystems, environmental functions, services, and resources, infrastructure, or economic, social, or cultural assets in places and settings that could be adversely affected.

Extreme weather event

An extreme weather event is an event that is rare at a particular place and time of year. Definitions of rare vary, but an extreme weather event would normally be as rare as or rarer than the 10th or 90th percentile of a probability density function estimated from observations. By definition, the characteristics of what is called extreme weather may vary from place to place in an absolute sense. When a pattern of extreme weather persists for some time, such as a season, it may be classed as an extreme climate event, especially if it yields an average or total that is itself extreme (e.g., drought or heavy rainfall over a season).

Fairness

Impartial and just treatment without favouritism or discrimination in which each person is considered of equal worth with equal opportunity.

Feasibility

The degree to which climate goals, response options, transformations, or societal futures are considered possible, plausible and/or desirable. Feasibility is multi-dimensional and entails geophysical, technological, economic and social dimensions. Conditions underpinning feasibility are dynamic, spatially variable, and may vary between different groups. Because an understanding of feasibility is contingent upon its framing, options considered feasible under one set of conditions may be rendered infeasible when opened to other

considerations. For example, technically feasible climate response options may conflict with other societal goals, rendering such options socially undesirable and therefore politically infeasible.

Geophysical feasibility

[Definition]

Technological feasibility

[Definition]

Environmental feasibility

[Definition]

Economic feasibility

[Definition]

Social and institutional feasibility

Institutional feasibility has two key parts: (1) the extent of administrative workload, both for public authorities and for regulated entities, and (2) the extent to which the policy is viewed as legitimate, gains acceptance, is adopted, and is implemented.

Feedback

See Climate feedback.

Fluorinated gases (F-gas)

[Definition]

See also Halocarbons

Flood

The overflowing of the normal confines of a stream or other body of water, or the accumulation of water over areas not normally submerged. Floods include river (fluvial) floods, flash floods, urban floods, pluvial floods, sewer floods, coastal floods and glacial lake outburst floods.

Food security

A state that prevails when people have secure access to sufficient amounts of safe and nutritious food for normal growth, development, and an active and healthy life⁷.

⁷ This glossary entry builds on definitions used in FAO (2000) and previous IPCC reports.

Food wastage

Food wastage is the sum of food loss (the loss of food during production and transportation) and food waste (the waste of food by the consumer). Food wastage corresponds to 1/3 of all the food produced on the planet (FAO, 2013).

Forecast

See Climate projection.

Forest

A vegetation type dominated by trees. Many definitions of the term forest are in use throughout the world, reflecting wide differences in biogeophysical conditions, social structure and economics. For a discussion of the term forest and related terms such as afforestation, reforestation and deforestation, see the IPCC Special Report on Land Use, Land-Use Change, and Forestry (IPCC, 2000a). See also information provided by the United Nations Framework Convention on Climate Change (UNFCCC, 2013) and the Report on Definitions and Methodological Options to Inventory Emissions from Direct Human-induced Degradation of Forests and Devegetation of Other Vegetation Types (IPCC, 2003).

Fossil fuels

Carbon-based fuels from fossil hydrocarbon deposits, including coal, peat, oil, and natural gas.

Framework Convention on Climate Change

See United Nations Framework Convention on Climate Change (UNFCCC).

General purpose technologies (GPT)

A drastic innovation qualifies as General Purpose Technology if it has the potential for pervasive use in a wide range of sectors in ways that drastically change their modes of operation (Helpman, 1998).

Geoengineering

Geoengineering refers to a broad set of methods and technologies that aim to deliberately alter the climate system in order to alleviate the impacts of climate change. It previously encompassed both Solar Radiation Management (SRM) and Carbon Dioxide Removal (CDR). This report separates SRM from CDR. Because of this separation, this report refrains from using the term ‘geoengineering’, which some of the literature uses to cover SRM, CDR, or both.

See also Carbon Dioxide Removal (CDR), Solar Radiation Management (SRM) and Radiation Modification Measures (RMM).

Glacier

A perennial mass of land ice that originates from compressed snow, shows evidence of past or present flow (through internal deformation and/or sliding at the base) and is constrained by internal stress and friction at the base and sides. A glacier is maintained by accumulation of snow at high altitudes, balanced by melting at low altitudes and/or discharge into the sea. An ice mass of the same origin as glaciers, but of continental size, is called an ice sheet. For the purpose of simplicity in this Assessment Report, all ice masses other than ice sheets are referred to as glaciers.

Global climate model (also referred to as general circulation model, both abbreviated as GCM)

See Climate model.

Global mean surface temperature (GMST)

An estimate of the global mean surface air temperature. However, for changes over time, only anomalies, as departures from a climatology, are used, most commonly based on the area-weighted global average of the sea surface temperature anomaly and land surface air temperature anomaly.

See also Land surface air temperature, Sea Surface Temperature (SST).

Global warming

Global warming refers to the gradual increase, observed or projected, in global surface temperature, as one of the consequences of radiative forcing caused by anthropogenic emissions.

Total warming

[Definition]

Human-attributable warming

[Definition]

Global Warming Potential (GWP)

An index, based on radiative properties of greenhouse gases (GHGs), measuring the radiative forcing following a pulse emission of a unit mass of a given GHG in the present-day atmosphere integrated over a chosen time horizon, relative to that of carbon dioxide (CO₂). The GWP represents the combined effect of the differing times these gases remain in the atmosphere and their relative effectiveness in causing radiative forcing.

GWP-100

The Kyoto Protocol is based on GWPs from pulse emissions over a 100-year time frame. Unless stated otherwise, this report uses GWP values calculated with a 100-year time horizon which are often derived from the IPCC Second Assessment Report.

See also CO₂-equivalent emission.

Governance

A comprehensive and inclusive concept of the full range of means for deciding, managing, and implementing policies and measures. Whereas government is defined strictly in terms of the nation-state, the more inclusive concept of governance recognizes the contributions of various levels of government (global, international, regional, local) and the contributing roles of the private sector, of nongovernmental actors, and of civil society to addressing the many types of issues facing the global community.

Adaptive governance

An emerging term in literature for the evolution of formal and informal institutions of governance that prioritize social learning in planning, implementation and evaluation of policy affecting the use and protection of natural resources, eco-system services and common pool natural resources, particularly in situations of complexity and uncertainty⁸.

Deliberative governance

Deliberative governance involves decision making through inclusive public conversation which allows opportunity for developing policy options through public discussion rather than collating individual preferences through voting or referenda (although the later governance mechanisms can also be proceeded and legitimated by public deliberation processes).

Flexible governance

Strategies of governance at various levels, which prioritize the use of social learning and rapid feedback mechanisms in planning and policy making, often through incremental, experimental and iterative management processes.

Participatory Governance

A form variant of governance which puts emphasis on engagement of a wide range of community members or stakeholders in decision making and policy implementation and evaluation, at all levels, often through deliberative forums.

Governance capacity

The ability of governance institutions, leaders, and non-state and civil society to plan, co-ordinate, fund, implement, evaluate and adjust policies and measures over the short, medium and long term, adjusting for uncertainty, rapid change and wide ranging impacts and multiple actors and demands.

Greenhouse gas (GHG)

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 terrestrial radiation emitted by the earth's surface, the atmosphere itself, and by clouds. This property causes the greenhouse effect. Water vapour (H₂O), carbon dioxide (CO₂), nitrous oxide (N₂O), methane (CH₄) and ozone (O₃) are the primary GHGs in the earth's atmosphere. Moreover, there are a number of entirely human-made GHGs in the atmosphere, such as the halocarbons and other chlorine- and bromine-containing substances, dealt with under the Montreal Protocol. Beside CO₂, N₂O and CH₄, the Kyoto Protocol deals with the GHGs sulphur hexafluoride (SF₆), hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs).

⁸ (Chaffin et al., 2014); (Karpouzoglou et al., 2016)

Greenhouse gas removal (GGR)

Greenhouse gas removal options are “options for removing carbon dioxide (CO₂) and other greenhouse gases from the atmosphere at a climatically-relevant scale.” (NERC, 2018).

See also Carbon dioxide removal (CDR).

Gross domestic product (GDP)

The sum of gross value added, at purchasers' prices, by all resident and non-resident producers in the economy, plus any taxes and minus any subsidies not included in the value of the products in a country or a geographic region for a given period, normally one year. GDP is calculated without deducting for depreciation of fabricated assets or depletion and degradation of natural resources.

Halocarbons

A collective term for the group of partially halogenated organic species, which includes the chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), hydrofluorocarbons (HFCs), halons, methyl chloride and methyl bromide. Many of the halocarbons have large Global Warming Potentials. The chlorine and bromine-containing halocarbons are also involved in the depletion of the ozone layer.

See also Fluorinated gases.

Hazard

The potential occurrence of a natural or human-induced physical event or trend or physical impact that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems and environmental resources. In this report, the term hazard usually refers to climate-related physical events or trends or their physical impacts.

Heat wave

A period of abnormally and uncomfortably hot weather.

Holocene

The Holocene Epoch is the latter of two epochs in the Quaternary System, extending from 11.65 ka (thousand years before 1950) to the present. It is also known as Marine Isotopic Stage (MIS) 1 or current interglacial.

Human rights

Rights that are inherent to all human beings, universal, inalienable, and indivisible, typically expressed and guaranteed by law. They include, inter alia, the right to life, economic, social, and cultural rights, and the right to development and self-determination⁹.

Procedural rights

Rights to a legal procedure to enforce substantive rights.

Substantive rights

Basic human rights, including the right to the substance of being human such as life itself, liberty and happiness.

Human security

Human security can be said to have two main aspects. It means, first, safety from such chronic threats as hunger, disease, and repression. And second, it means protection from sudden and hurtful disruptions in the patterns of daily life - whether in homes, in jobs, or in communities. Such threats can exist at all levels of national income and development.

Human system

Any system in which human organizations and institutions play a major role. Often, but not always, the term is synonymous with society or social system. Systems such as agricultural systems, political systems, technological systems, and economic systems are all human systems in the sense applied in this report.

Heating, ventilation, and air conditioning (HVAC)

Heating, ventilation and air conditioning technology to maintain controlled temperature and humidity in an indoor environment, be it in buildings or in vehicles, which provide thermal comfort and healthy air quality to the occupants. HVAC system can be designed for an isolated space, individual building or for a distributed heating and cooling network within a building structure or district heating. Latter provides economies of scale and also scope for integration with solar heat, natural seasonal cooling/heating etc.

Hydrological cycle

The cycle in which water evaporates from the oceans and the land surface, is carried over the Earth in atmospheric circulation as water vapour, condenses to form clouds, precipitates over ocean and land as rain or snow, which on land can be intercepted by trees and vegetation, provides runoff on the land surface, infiltrates into soils, recharges groundwater, discharges into streams, and ultimately, flows out into the oceans, from which it will eventually evaporate again. The various systems involved in the hydrological cycle are usually referred to as hydrological systems.

⁹ Based upon the definition by the UN Office of the High Commissioner.

Ice sheet

A mass of land ice of continental size that is sufficiently thick to cover most of the underlying bed, so that its shape is mainly determined by its dynamics (the flow of the ice as it deforms internally and/or slides at its base). An ice sheet flows outward from a high central ice plateau with a small average surface slope. The margins usually slope more steeply, and most 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 ice sheets in the modern world, one on Greenland and one on Antarctica. During glacial periods there were others.

(climate change) Impact assessment

The practice of identifying and evaluating, in monetary and/or non-monetary terms, the effects of climate change on natural and human systems.

Impacts (consequences, outcomes)

Effects on natural and human systems. In this report, the term impacts is used primarily to refer to the effects on natural and human systems of extreme weather and climate events and of climate change. Impacts generally refer to effects on lives, livelihoods, health, ecosystems, economies, societies, cultures, services and infrastructure due to the interaction of climate changes or hazardous climate events occurring within a specific time period and the vulnerability of an exposed society or system. Impacts are also referred to as consequences and outcomes. The impacts of climate change on geophysical systems, including floods, droughts and sea level rise, are a subset of impacts called physical impacts.

Indigenous knowledge

Indigenous knowledge is knowledge that has been passed down over the generations, and is also closely linked to livelihoods and cultural/social identity (Díaz et al., 2015).

See also Local knowledge, Traditional knowledge.

Indigenous peoples

Indigenous peoples and nations are those that, having a historical continuity with pre-invasion and pre-colonial societies that developed on their territories, consider themselves distinct from other sectors of the societies now prevailing on those territories, or parts of them. They form at present principally non-dominant sectors of society and are often determined to preserve, develop, and transmit to future generations their ancestral territories, and their ethnic identity, as the basis of their continued existence as peoples, in accordance with their own cultural patterns, social institutions, and common law system¹⁰.

¹⁰ This glossary entry builds on the definitions used in Cobo (1987) and previous IPCC reports.

Industrial Revolution

A period of rapid industrial growth with far-reaching social and economic consequences, beginning in Britain 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 (CO₂).

Industrialized countries/developing countries

There are a diversity of approaches for categorizing countries on the basis of their level of development, and for defining terms such as industrialized, developed, or developing. Several categorizations are used in this report. (1) In the United Nations system, there is no established convention for designating of developed and developing countries or areas. (2) The United Nations Statistics Division specifies developed and developing regions based on common practice. In addition, specific countries are designated as Least Developed Countries (LCD), landlocked developing countries, small island developing states, and transition economies. Many countries appear in more than one of these categories. (3) The World Bank uses income as the main criterion for classifying countries as low, lower middle, upper middle, and high income. (4) The UNDP aggregates indicators for life expectancy, educational attainment, and income into a single composite Human Development Index (HDI) to classify countries as low, medium, high, or very high human development.

Institution

Institutions are rules and norms held in common by social actors that guide, constrain and shape human interaction. Institutions can be formal, such as laws and policies, or informal, such as norms and conventions. Organizations — such as parliaments, regulatory agencies, private firms, and community bodies — develop and act in response to institutional frameworks and the incentives they frame. Institutions can guide, constrain and shape human interaction through direct control, through incentives, and through processes of socialization.

Institutional capacity

Institutional capacity comprises building and strengthening individual organizations and providing technical and management training to support integrated planning and decision-making processes between institutions, as well as empowerment, social capital, and an enabling environment, including the culture, values and power relations (Willems and Baumert, 2003)

Integrated assessment

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

See also Integrated models.

Integrated assessment models (IAMs)

See Integrated models.

Integrated models

Integrated models explore the interactions between multiple sectors of the economy or components of particular systems, such as the energy system. In the context of transformation pathways, they refer to models that, at a minimum, include full and disaggregated representations of the energy system and its linkage to the overall economy that will allow for consideration of interactions among different elements of that system. Integrated models may also include representations of the full economy, land use and land-use change (LUC) and the climate system.

See also Integrated assessment.

Intended nationally determined contributions (INDCs)

A term used under the United Nations Framework Convention on Climate Change (UNFCCC) for reductions in greenhouse gas emissions that all countries that signed the UNFCCC were asked to publish in the lead up to the 2015 United Nations Framework Convention on Climate Change 21st Conference of Parties held in Paris. It identifies the actions countries intend to take under the Paris Agreement in for reducing emissions, taking into account its domestic circumstances and capabilities. Some countries also address how they'll adapt to climate change impacts, and what support they need from, or will provide to, other countries to adopt low-carbon pathways and to build climate resilience. The word “intended” was used because countries were communicating proposed climate actions ahead of the Paris Agreement being finalized.

See also Nationally determined contributions (NDCs), Paris Agreement.

Internal variability

See Climate variability.

Iron fertilisation

See Ocean fertilisation.

Irreversibility

A perturbed state of a dynamical system is defined as irreversible on a given timescale, if the recovery timescale from this state due to natural processes is substantially longer than the time it takes for the system to reach this perturbed state. In the context of this report, the time scale of interest is centennial to millennial.

See also Tipping point.

Justice

Concept that sets out the moral or legal principles of fairness in the way people are treated, often based on the ethics and values of society.

Distributive justice

Justice in the allocation of costs and benefits across society.

Inter-generational justice

Justice in the distribution of costs and benefits across generations.

Procedural justice

Justice in who participates and is heard in the processes of decision making.

Social justice

Just or fair relations within society that seek to address the distribution of wealth, access to resources, opportunity, and support according to principles of justice and fairness.

Kyoto Protocol

The Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) was adopted in 1997 in Kyoto, Japan, at the Third Session of the Conference of the Parties (COP) to the UNFCCC. It contains legally binding commitments, in addition to those included in the UNFCCC. Countries included in Annex B of the Protocol (most Organisation for Economic Cooperation and Development countries and countries with economies in transition) agreed to reduce their anthropogenic greenhouse gas (GHG) emissions (carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF₆)) by at least 5 % below 1990 levels in the commitment period 2008-2012. The Kyoto Protocol entered into force on 16 February 2005.

See also UNFCCC.

Land surface air temperature

The surface air temperature as measured in well-ventilated screens over land at 1.5 m above the ground.

Land use and land-use change

Land use is the modification of natural environments into built environments and settlements. Land is used when a transition occurs from natural towards pastures, arable fields and wood management regions. The term land use is also used in the sense of the social and economic purposes for which land is managed (e.g., grazing, timber extraction and conservation). In urban settlements it is related to land uses within cities and their hinterlands. Urban land use has implications on city management, structure and form and thus on energy demand, greenhouse gas (GHG) emissions and mobility, among other aspects.

Land-use change (LUC)

Land-use change refers to 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 surface albedo,

evapotranspiration, sources and sinks of greenhouse gases (GHGs), or other properties of the climate system and may thus give rise to radiative forcing and/or other impacts on climate, locally or globally.

See also the IPCC Special Report on Land Use, Land-Use Change, and Forestry (IPCC, 2000b).

Indirect land-use change (iLUC)

Indirect land-use change refers to shifts in land use induced by a change in the production level of an agricultural product elsewhere, often mediated by markets or driven by policies. For example, if agricultural land is diverted to fuel production, forest clearance may occur elsewhere to replace the former agricultural production.

See also Afforestation, Deforestation and Reforestation.

Lifecycle analysis (LCA) (also referred to as Lifecycle assessment (LCA))

LCA aims to compare the full range of environmental damages of any given product, technology, or service. LCA usually includes raw material input, energy requirements, and waste and emissions production. This includes operation of the technology/facility/ product as well as all upstream processes (i.e., those occurring prior to when the technology/facility/product commences operation) and downstream processes (i.e., those occurring after the useful lifetime of the technology/ facility/product), as in the 'cradle to grave' approach.

Likelihood

The chance of a specific outcome occurring, where this might be estimated probabilistically. Likelihood is expressed in this report using a standard terminology (Mastrandrea et al., 2010), defined in Section 1.6.2.

See also Agreement, Evidence, Confidence, and Uncertainty.

Livelihood

The resources used and the activities undertaken in order to live. Livelihoods are usually determined by the entitlements and assets to which people have access. Such assets can be categorized as human, social, natural, physical, or financial.

Local knowledge

Local knowledge is any kind of knowledge held by people who inhabit a place. For instance, knowing which places in your town flood most regularly (Yeh, 2016).

See also Indigenous knowledge and Traditional knowledge.

Lock-in

Any dynamic that produces path dependency, including technologies, institutions, and behavioural norms that rely on past knowledge, outcomes, and trajectories and hence constrain the realization of alternative future trajectories and/or system states.

Long-lived climate forcers (LLCF)

[Definition]

Long-lived gases

See Long-lived climate forcers (LLCF), greenhouse gas (GHG), short-lived gases, Short-lived climate forcers (SLCF).

Loss and damage

Impacts from climate change that will not or cannot be avoided through adaptation, resulting in harm to human and natural systems that is either reversible (damage) or irreversible (loss). Damages and losses can be direct and quantifiable, or indirect and intangible and hence difficult to assess and measure.

Maladaptive actions (Maladaptation)

Actions that may lead to increased risk of adverse climate-related outcomes, increased vulnerability to climate change, or diminished welfare, now or in the future. Maladaptation is often the result of unintended consequences.

Malmitigation

Mitigation efforts that unwittingly reduce the concentration of greenhouse gases in the atmosphere while reducing them from a particular project, sector location.

Market failure

When private decisions are based on market prices that do not reflect the real scarcity of goods and services but rather reflect market distortions, they do not generate an efficient allocation of resources but cause welfare losses. A market distortion is any event in which a market reaches a market clearing price that is substantially different from the price that a market would achieve while operating under conditions of perfect competition and state enforcement of legal contracts and the ownership of private property. Examples of factors causing market prices to deviate from real economic scarcity are environmental externalities, public goods, monopoly power, information asymmetry, transaction costs, and non-rational behaviour.

Measures

In climate policy, measures are technologies, processes or practices that contribute to mitigation, for example renewable energy (RE) technologies, waste minimization processes, public transport commuting practices.

See also policies.

Methane (CH₄)

One of the six greenhouse gases (GHGs) to be mitigated under the Kyoto Protocol and is the major component of natural gas and associated with all hydrocarbon fuels. Significant emissions occur as a result of animal husbandry and agriculture and their management represents a major mitigation option.

See also Global Warming Potential (GWP).

Millennium Development Goals (MDGs)

A set of eight time-bound and measurable goals for combating poverty, hunger, disease, illiteracy, discrimination against women and environmental degradation. These goals were agreed to at the UN Millennium Summit in 2000 together with an action plan to reach the goals by 2015.

Mitigation (of climate change)

A human intervention to reduce emissions or enhance the sinks of greenhouse gases, therefore encompassing also Carbon Dioxide Removal (CDR) options.

See also Carbon Dioxide Removal (CDR).

Mitigation capacity

The ability to reduce anthropogenic greenhouse gas (GHG) emissions or to enhance natural sinks, where ability refers to skills, competencies, fitness, and proficiencies attained which depends on technology, institutions, wealth, infrastructure, and information. Mitigation capacity is rooted in a sustainable development (SD) path.

Mitigation scenario

A plausible description of the future that describes how the (studied) system responds to the implementation of mitigation policies and measures.

See also Baseline/reference, Climate scenario, Emission scenario, Representative Concentration Pathways (RCPs), Scenario, Shared socio-economic pathways, Socio-economic scenarios, SRES scenarios, stabilisation, Transformation pathways.

Mitigation pathway

See Pathways.

Monitoring and evaluation (M&E)

Monitoring and evaluation refers to mechanisms put in place at national to local scales to respectively monitor and evaluate efforts to reduce greenhouse gas emissions and/or adapt to the impacts of climate change with the aim of identifying and characterizing progress over time. M&E is important for assessing progress towards meeting climate policy goals, pressuring laggards, identifying best practices, and understanding what factors determine the success of adaptation and mitigation policies.

Motivation

An individual's reason or reasons for acting in a particular way; individuals may consider various consequences of actions, including financial, social, affective, and environmental consequences. Motivation can arise from outside (extrinsic) or inside (intrinsic) the individual.

Multi-gas

Next to carbon dioxide (CO₂), there are other forcing components taken into account in, e.g., achieving reduction for a basket of greenhouse gas (GHG) emissions (CO₂, methane (CH₄), nitrous oxide (N₂O), and fluorinated gases) or stabilisation of CO₂-equivalent concentrations (multi-gas stabilisation, including GHGs and aerosols).

Nationally determined contributions (NDCs)

As countries ratified the Paris Agreement and work on implementation of their climate actions, the word "intended" is dropped and an INDC is converted into a Nationally Determined Contribution (NDC). NDCs embody efforts by each country to reduce national emissions and adapt to the impacts of climate change. According to Article 4 paragraph 2 of the Paris Agreement, each Party shall prepare, communicate and maintain successive nationally determined contributions (NDCs) that it intends to achieve.

See also Intended nationally determined contributions (INDCs), Paris agreement.

Near-term climate forcers (NTCFs)

See Short-lived climate forcers (SLCFs).

Net emissions

[Definition]

Natural system

[Definition]

See also Human system.

Near-surface air temperature (SAT)

[Definition]

See also Land surface air temperature.

Negative emissions

A situation of net negative emissions is achieved when, as result of human activities, more greenhouse gases (GHGs) are sequestered or stored than are released into the atmosphere.

See also Carbon dioxide removal.

Net negative emissions

See Negative emissions.

Net-zero emissions

[Definition]

Nitrous oxide (N₂O)

One of the six greenhouse gases (GHGs) to be mitigated under the Kyoto Protocol. The main anthropogenic source of N₂O is agriculture (soil and animal manure management), but important contributions also come from sewage treatment, fossil fuel combustion, and chemical industrial processes. N₂O is also produced naturally from a wide variety of biological sources in soil and water, particularly microbial action in wet tropical forests.

See also Global Warming Potential (GWP).

Ocean acidification (OA)

Ocean acidification refers to a reduction in the pH of the ocean over an extended period, typically decades or longer, which is caused primarily by uptake of carbon dioxide (CO₂) from the atmosphere, but can also be caused by other chemical additions or subtractions from the ocean. Anthropogenic ocean acidification refers to the component of pH reduction that is caused by human activity (IPCC, 2011, p. 37).

Ocean fertilisation

Deliberate introduction of iron to the upper ocean intended to enhance biological productivity which can sequester additional atmospheric carbon dioxide into the oceans.

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 (smog). Tropospheric ozone acts as a greenhouse gas. In the stratosphere, it is created by the interaction between solar ultraviolet radiation and molecular oxygen (O₂). Stratospheric ozone plays a dominant role in the stratospheric radiative balance. Its concentration is highest in the ozone layer.

Paris Agreement

[Definition]

See also Nationally determined contributions (NDCs), Intended nationally determined contributions (INDCs).

Paris targets

See Paris Agreement.

Pathways

The temporal evolution of natural and/or human systems towards a future state. Pathway concepts range from sets of quantitative and qualitative scenarios or narratives of potential futures to solution-oriented decision-making processes to achieve desirable societal goals. Pathway approaches typically focus on biophysical, techno-economic, and/or socio-behavioural trajectories and involve various dynamics, goals, and actors across different scales.

Stabilisation pathways

[Definition]

Non-overshoot pathways

[Definition]

Overshoot pathways

Emissions, concentration or temperature pathways in which the metric of interest temporarily exceeds, or overshoots the long-term goal.

Continued warming pathways

[Definition]

Adaptation pathways

A series of adaptation choices involving trade-offs between short-term and long-term goals and values. These are processes of deliberation to identify solutions that are meaningful to people in the context of their daily lives and to avoid potential maladaptation.

Mitigation pathways

A mitigation pathway is a temporal evolution of a set of mitigation scenario features, such as GHG emissions and socioeconomic development.

Adaptive policy pathways

[Definition]

See also Baseline/reference, Climate-resilient pathways, Development pathways, Transformation pathways, Representative concentration pathways (RCPs), Shared socio-economic pathways (SSPs), Stabilisation (of GHG or CO₂-equivalent concentration), Stabilisation (of temperature).

Peak warming

[Definition]

Peri-urban areas

Peri-urban areas are typically adjacent to cities or towns. They interact with urban centres through resource flows (including food production), labour and tourism but are not formally part of urban planning processes, land-use management or public transport services. In low-income cities peri-urban areas can be large and are often associated with informality and high exposure to risk.

Permafrost

Ground (soil or rock and included ice and organic material) that remains at or below 0°C for at least two consecutive years.

pH

pH is a dimensionless measure of the acidity of water (or any solution) given by its concentration of hydrogen ions (H^+). pH is measured on a logarithmic scale where $pH = -\log_{10}(H^+)$. Thus, a pH decrease of 1 unit corresponds to a 10-fold increase in the concentration of H^+ , or acidity.

Phenology

The relationship between biological phenomena that recur periodically (e.g., development stages, migration) and climate and seasonal changes.

Policies

Policies are taken and/or mandated by a government - often in conjunction with business and industry within a single country, or collectively with other countries - to accelerate mitigation and adaptation measures. Examples of policies are support mechanisms for renewable energy supplies, carbon or energy taxes, fuel efficiency standards for automobiles, etc.

Poverty

Poverty is a complex concept with several definitions stemming from different schools of thought. It can refer to material circumstances (such as need, pattern of deprivation or limited resources), economic conditions (such as standard of living, inequality or economic position) and/or social relationships (such as social class, dependency, exclusion, lack of basic security or lack of entitlement).

Poverty eradication

A set of measures to end poverty in all its forms everywhere.

Precipitation

[Definition]

Precursors

Atmospheric compounds that are not greenhouse gases (GHGs) or aerosols, but that have an effect on GHG or aerosol concentrations by taking part in physical or chemical processes regulating their production or destruction rates.

Pre-industrial

[Definition]

See also Industrial Revolution.

Projection

A projection is a potential future evolution of a quantity or set of quantities, often computed with the aid of a model. Unlike predictions, projections are conditional on assumptions concerning, for example, future socioeconomic and technological developments that may or may not be realized.

See also Climate projection.

Radiation management

See Solar Radiation Management (SRM).

Radiation modification

See Radiation modification measures.

Radiation modification measures (RMM)

Radiation modification measures refer to all intentional modifications of the Earth's radiative budget with the aim to limit climate change according to a given metric (e.g., surface temperature, precipitation, regional impacts, etc.). Examples include artificial injection of stratospheric aerosols, cloud brightening and cirrus cloud thinning. RMMs do not fall within the usual definitions of mitigation and adaptation (IPCC, 2012b, p. 2). As an unintended side-effect, RMMs may slightly reduce greenhouse gas concentrations.

Radiative forcing

Radiative forcing is the change in the net, downward minus upward, radiative flux (expressed in $W m^{-2}$) at the tropopause or top of atmosphere due to a change in an external driver of climate change, such as a change in the concentration of carbon dioxide or the output of the Sun. Sometimes internal drivers are still treated as forcings even though they result from the alteration in climate, for example aerosol or greenhouse gas

changes in paleoclimates. The traditional radiative forcing is computed with all tropospheric properties held fixed at their unperturbed values, and after allowing for stratospheric temperatures, if perturbed, to readjust to radiative-dynamical equilibrium. Radiative forcing is called instantaneous if no change in stratospheric temperature is accounted for. The radiative forcing once rapid adjustments are accounted for is termed the effective radiative forcing. For the purposes of this report, radiative forcing is further defined as the change relative to the year 1750 and, unless otherwise noted, refers to a global and annual average value. Radiative forcing is not to be confused with cloud radiative forcing, which describes an unrelated measure of the impact of clouds on the radiative flux at the top of the atmosphere.

Reasons For Concern (RFCs)

Elements of a classification framework, first developed in the IPCC Third Assessment Report, which aims to facilitate judgments about what level of climate change may be “dangerous” (in the language of Article 2 of the UNFCCC) by aggregating impacts, risks, and vulnerabilities.

Reducing Emissions from Deforestation and Forest Degradation (REDD)

An effort to create financial value for the carbon stored in forests, offering incentives for developing countries to reduce emissions from forested lands and invest in low-carbon paths to sustainable development (SD). It is therefore a mechanism for mitigation that results from avoiding deforestation. REDD+ goes beyond reforestation and forest degradation and includes the role of conservation, sustainable management of forests and enhancement of forest carbon stocks. The concept was first introduced in 2005 in the 11th Session of the Conference of the Parties (COP) in Montreal and later given greater recognition in the 13th Session of the COP in 2007 at Bali and inclusion in the Bali Action Plan which called for 'policy approaches and positive incentives on issues relating to reducing emissions from deforestation and forest degradation in developing countries (REDD) and the role of conservation, sustainable management of forests and enhancement of forest carbon stock in developing countries'. Since then, support for REDD has increased and has slowly become a framework for action supported by a number of countries.

Reference scenario

See Baseline scenario.

Reference period

The period relative to which anomalies are computed.

See also Anomalies.

Reforestation

Planting of forests on lands that have previously contained forests but that have been converted to some other use.

For a discussion of the term forest and related terms such as afforestation, reforestation and deforestation, see the IPCC Special Report on Land Use, Land-Use Change, and Forestry (IPCC, 2000a), information provided

by the United Nations Framework Convention on Climate Change (UNFCCC, 2013), the report on Definitions and Methodological Options to Inventory Emissions from Direct Human-induced Degradation of Forests and Devegetation of Other Vegetation Types (IPCC, 2003).

See also Deforestation, Afforestation.

Region

A region is a territory characterized by specific geographical and climatological features. The climate of a region is affected by regional and local scale features like topography, land use characteristics and lakes, as well as remote influences from other regions.

See also Teleconnection.

Representative Concentration Pathways (RCPs)

Scenarios that include time series of emissions and concentrations of the full suite of greenhouse gases (GHGs) and aerosols and chemically active gases, as well as land use/land cover (Moss et al., 2008). The word representative signifies that each RCP provides only one of many possible scenarios that would lead to the specific radiative forcing characteristics. The term pathway emphasizes that not only the long-term concentration levels are of interest, but also the trajectory taken over time to reach that outcome (Moss et al., 2010).

RCPs usually refer to the portion of the concentration pathway extending up to 2100, for which Integrated Assessment Models produced corresponding emission scenarios. Extended Concentration Pathways (ECPs) describe extensions of the RCPs from 2100 to 2300 that were calculated using simple rules generated by stakeholder consultations and do not represent fully consistent scenarios.

RCP2.6

One pathway where radiative forcing peaks at approximately 3 W m^{-2} and then declines to be limited at 2.6 W m^{-2} in 2100 (the corresponding ECP assuming constant emissions after 2100).

RCP4.5 and RCP6.0

Two intermediate stabilisation pathways in which radiative forcing is limited at approximately 4.5 W m^{-2} and 6.0 W m^{-2} in 2100 (the corresponding ECPs assuming constant concentrations after 2150).

RCP8.5

One high pathway which leads to $>8.5 \text{ W m}^{-2}$ in 2100 (the corresponding ECP assuming constant emissions after 2100 until 2150 and constant concentrations after 2250).

Resilience

The capacity of social, economic and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity and structure, while also maintaining the capacity for adaptation, learning and transformation¹¹.

¹¹ This definition builds from the definition used in Arctic Council (2013).

Risk

The potential for consequences where something of value is at stake and where the outcome is uncertain, recognizing the diversity of values. Risk is often represented as probability or likelihood of occurrence of hazardous events or trends multiplied by the impacts if these events or trends occur. In this report, the term risk is often used to refer to the potential, when the outcome is uncertain, for adverse consequences on lives, livelihoods, health, ecosystems and species, economic, social and cultural assets, services (including environmental services) and infrastructure.

Risk assessment

The qualitative and/or quantitative scientific estimation of the likelihood and the seriousness of a threat.

Risk management

The plans, actions, strategies or policies to reduce the likelihood and/or consequences of threats or to respond to negative consequences.

Risk perception

The subjective judgment that people make about the characteristics and severity of a threat.

Runoff

That part of precipitation that does not evaporate and is not transpired, but flows through the ground or over the ground surface and returns to bodies of water.

See also Hydrological cycle.

Scenario

A plausible 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 technological change (TC), prices) and relationships. Note that scenarios are neither predictions nor forecasts, but are useful to provide a view of the implications of developments and actions.

See also Baseline/reference, Climate scenario, Emission scenario, Mitigation scenario, Pathways, Representative Concentration Pathways (RCPs), Shared socio-economic pathways, Socioeconomic scenarios, SRES scenarios, stabilisation, and Transformation pathway.

Sea ice

Ice found at the sea surface that has originated from the freezing of seawater. Sea ice may be discontinuous pieces (ice floes) moved on the ocean surface by wind and currents (pack ice), or a motionless sheet attached to the coast (land-fast ice). Sea ice concentration is the fraction of the ocean covered by ice. Sea ice less than

one year old is called first-year ice. Perennial ice is sea ice that survives at least one summer. It may be subdivided into second-year ice and multi-year ice, where multiyear ice has survived at least two summers.

Sea level change

Sea level can change, both globally and locally due to (1) changes in the shape of the ocean basins, (2) a change in ocean volume as a result of a change in the mass of water in the ocean, and (3) changes in ocean volume as a result of changes in ocean water density. Global mean sea level change resulting from change in the mass of the ocean is called barystatic. The amount of barystatic sea level change due to the addition or removal of a mass of water is called its sea level equivalent (SLE). Sea level changes, both globally and locally, resulting from changes in water density are called steric. Density changes induced by temperature changes only are called thermosteric, while density changes induced by salinity changes are called halosteric. Barystatic and steric sea level changes do not include the effect of changes in the shape of ocean basins induced by the change in the ocean mass and its distribution.

Sea Surface Temperature (SST)

The sea surface temperature is the subsurface bulk temperature in the top few meters of the ocean, measured by ships, buoys, and drifters. From ships, measurements of water samples in buckets were mostly switched in the 1940s to samples from engine intake water. Satellite measurements of skin temperature (uppermost layer; a fraction of a millimeter thick) in the infrared or the top centimeter or so in the microwave are also used, but must be adjusted to be compatible with the bulk temperature.

Sendai Framework for Disaster Risk Reduction

See Disaster risk reduction.

Sequestration

The uptake (i.e., the addition of a substance of concern to a reservoir) of carbon containing substances, in particular carbon dioxide (CO₂), in terrestrial or marine reservoirs. Biological sequestration includes direct removal of CO₂ from the atmosphere through land-use change (LUC), afforestation, reforestation, revegetation, carbon storage in landfills and practices that enhance soil carbon in agriculture (cropland management, grazing land management). In parts of the literature, but not in this report, (carbon) sequestration or geosequestration is used to refer to Carbon Dioxide Capture and Storage (CCS).

See also Uptake.

Shared socio-economic pathways (SSPs)

Shared socio-economic pathways (SSPs) have been developed as a basis for new emissions and socio-economic scenarios. An SSP is one of a collection of pathways that describe alternative futures of socio-economic development in the absence of climate policy intervention. The combination of SSP-based socio-economic scenarios and Representative Concentration Pathway (RCP)-based climate projections provides an integrative frame for climate impact and policy analysis.

SSP1

[Definition]

SSP2

[Definition]

SSP3

[Definition]

SSP4

[Definition]

SSP5

See also Representative concentration pathways (RCPs).

Shared Climate Policy Assumptions (SPAs)

See Shared socio-economic pathways (SSPs).

Short-lived climate forcers (SLCF)

Short-lived climate forcers refer to those compounds whose impact on climate occurs primarily within the first decade after their emission. This set of compounds is primarily composed of those with short lifetimes in the atmosphere compared to well-mixed greenhouse gases, and are also referred to as near-term climate forcers or short-lived climate pollutants. However, the common property that is of greatest interest to a climate assessment is the timescale over which their impact on climate is felt. This set of compounds includes methane, which is also a well-mixed greenhouse gas, as well as ozone and aerosols, or their precursors, and some halogenated species that are not well-mixed greenhouse gases. These compounds do not accumulate in the atmosphere at decadal to centennial timescales, and so their effect on climate is predominantly in the near term following their emission.

Short-lived gases

See Short-lived climate forcers (SLCF).

Sink

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

Social cost of carbon (SCC)

The net present value of climate damages (with harmful damages expressed as a positive number) from one more tonne of carbon in the form of carbon dioxide (CO₂), conditional on a global emissions trajectory over time.

Social costs

The full costs of an action in terms of social welfare losses, including external costs associated with the impacts of this action on the environment and on the society as a whole, among which the level and distribution of income (or wealth).

Social inclusion

A process of improving the terms of participation in society, particularly for people who are disadvantaged, through enhancing opportunities, access to resources, and respect for rights (UN, 2016).

Social learning

A process of social interaction through which people learn new behaviours, capacities, values, and attitudes.

Social value of mitigation activities (SVMA)

Social, economic and environmental value of mitigation activities that include in addition to their climate benefits, their co-benefits to adaptation and sustainable development.

Social welfare function (SWF)

[Definition]

Socio-economic scenario

A scenario that describes a possible future in terms of population, gross domestic product (GDP), and other socio-economic factors relevant to understanding the implications of climate change.

See also Baseline/reference, Climate scenario, Emission scenario, Mitigation scenario, Representative Concentration Pathways (RCPs), Scenario, Shared socio-economic pathways, SRES scenarios, stabilisation, Transformation pathway.

Soil carbon sequestration (SCS)

See sequestration.

Soil moisture

Water stored in the soil in liquid or frozen form.

Solar energy

Energy from the sun. Often the phrase is used to mean energy that is captured from solar radiation either as heat, as light that is converted into chemical energy by natural or artificial photosynthesis, or by photovoltaic panels and converted directly into electricity.

Solar Radiation Management (SRM)

Solar Radiation Management refers to the intentional modification of the Earth's shortwave radiative budget with the aim to reduce climate change according to a given metric (e.g., surface temperature, precipitation, regional impacts, etc.). Artificial injection of stratospheric aerosols and cloud brightening are two examples of SRM techniques. Methods to modify some fast-responding elements of the long wave radiative budget (such as cirrus clouds), although not strictly speaking SRM, can be related to SRM. SRM techniques do not fall within the usual definitions of mitigation and adaptation (IPCC, 2012b, p. 2).

See geoengineering and radiation modification measures (RMM).

SRES scenarios

SRES scenarios are emission scenarios developed by IPCC (2000b) and used, among others, as a basis for some of the climate projections shown in Chapters 9 to 11 of IPCC WGI TAR (IPCC, 2001b), Chapter 2 of IPCC WGIII TAR (IPCC, 2001a), Chapters 10 and 11 of IPCC WGI AR4 (IPCC, 2007), as well as in the IPCC WGI AR5 (IPCC, 2013).

Stabilisation (of GHG or CO₂-equivalent concentration)

A state in which the atmospheric concentrations of one greenhouse gas (GHG) (e.g., carbon dioxide) or of a CO₂-equivalent basket of GHGs (or a combination of GHGs and aerosols) remains constant over time.

See also Stabilisation of temperature.

Stabilisation (of temperature)

[Definition]

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.

Stratosphere

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

Subnational actor

Subnational actor include state/provincial, regional, metropolitan and local/municipal governments as well as non-party stakeholders, such as civil society, the private sector, financial institutions, cities and other subnational authorities, local communities and indigenous peoples who individually and collectively could mobilize stronger and more ambitious climate action in support of and to uphold and promote regional and international cooperation under the Paris Agreement.

Surface air temperature

See Near-surface air temperature (SAT)

Surface temperature

See Global mean surface temperature, Land surface air temperature, Sea Surface Temperature (SST).

Sustainability

A dynamic process that guarantees the persistence of natural and human systems in an equitable manner.

Sustainable development (SD)

Development that meets the needs of the present without compromising the ability of future generations to meet their own needs (WCED, 1987).

See also Development pathways.

Sustainable development goals (SDGs)

The 17 global goals for development for all countries established by the United Nations through a participatory process and elaborated in the 2030 Agenda for Sustainable Development, including ending poverty and hunger; ensuring health and wellbeing, education, gender equality, clean water and energy, and decent work; building and ensuring resilient and sustainable infrastructure, cities and consumption; reducing inequalities; protecting land and water ecosystems; promoting peace, justice and partnerships; and taking urgent action on climate change.

See also Sustainable development (SD), Development Pathways.

Technology transfer

The exchange of knowledge, hardware and associated software, money and goods among stakeholders, which leads to the spread of technology for adaptation or mitigation. The term encompasses both diffusion of technologies and technological cooperation across and within countries.

Temperature stabilisation

See Stabilisation (of temperature), Pathways.

Tipping point

A level of change in system properties beyond which a system reorganizes, often abruptly, and does not return to the initial state even if the drivers of the change are abated. For the climate system, it refers to a critical threshold when global or regional climate changes from one stable state to another stable state. The tipping point event may be irreversible.

See also Irreversibility.

Traditional knowledge

The knowledge, innovations, and practices of both indigenous and local communities around the world that are deeply grounded in history and experience. Traditional knowledge is dynamic and adapts to cultural and environmental change, and also incorporates other forms of knowledge and viewpoints. Traditional knowledge is generally transmitted orally from generation to generation. It is often used as a synonym for indigenous knowledge, local knowledge, or traditional ecological knowledge.

See also Indigenous knowledge and Local knowledge.

Transformation

A change in the fundamental attributes of natural and human systems.

Societal (social) transformation

A profound and often deliberate shift toward sustainability, facilitated by changes in individual and collective values and behaviours, and a fairer balance of political, cultural, and institutional power in society.

Transformation pathways

The trajectory taken over time to meet different goals for greenhouse gas (GHG) emissions, atmospheric concentrations, or global mean surface temperature change that implies a set of economic, technological and behavioural changes. This can encompass changes in the way energy and infrastructure are used and produced, natural resources are managed and institutions are set up and in the pace and direction of technological change (TC).

See also Baseline/reference, Emission scenario, Mitigation scenario, Representative Concentration Pathways (RCPs) and SRES scenarios.

Transient climate response

See Climate sensitivity.

Transient Climate Response to Cumulative CO₂ Emissions (TCRE)

The transient global average surface temperature change per unit cumulated CO₂ emissions, usually 1000 PgC. TCRE combines both information on the airborne fraction of cumulated CO₂ emissions (the fraction of the total CO₂ emitted that remains in the atmosphere) and on the transient climate response (TCR).

Tropical cyclone

A strong, cyclonic-scale disturbance that originates over tropical oceans. Distinguished from weaker systems (often named tropical disturbances or depressions) by exceeding a threshold wind speed. A tropical storm is a tropical cyclone with 1-minute average surface winds between 18 and 32 m s⁻¹. Beyond 32 m s⁻¹, a tropical cyclone is called a hurricane, typhoon, or cyclone, depending on geographic location.

Uncertainty

A state of incomplete knowledge that can result from a lack of information or from disagreement about what is known or even knowable. It may have many types of sources, from imprecision in the data to ambiguously defined concepts or terminology, or uncertain projections of human behaviour. Uncertainty can therefore be represented by quantitative measures (e.g., a probability density function) or by qualitative statements (e.g., reflecting the judgment of a team of experts) (see IPCC, 2004; Mastrandrea et al., 2010; Moss and Schneider, 2000).

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 'stabilisation 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 principle of 'common but differentiated responsibilities'. Under the Convention, Parties included in Annex I aimed to return greenhouse gas (GHG) emissions not controlled by the Montreal Protocol to 1990 levels by the year 2000. The convention entered in force in March 1994. In 1997, the UNFCCC adopted the Kyoto Protocol.

Vulnerability

The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt.

Water cycle

See Hydrological cycle.

Watts per square meter ($W m^{-2}$)

See Radiative forcing.

Wellbeing

A good or satisfactory condition of existence, a state characterized by a healthy, pleasant, good and meaningful life.

Well-mixed greenhouse gas (WMGHG)

See Greenhouse gas (GHG).

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