

ESPON Climate
Climate Change and Territorial Effects on
Regions and Local Economies

Applied Research Project 2013/1/4

Final Report

Annex 8

Glossary



Annex: Glossary

This report presents the final results of an Applied Research Project conducted within the framework of the ESPON 2013 Programme, partly financed by the European Regional Development Fund.

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Glossary

Adaptation

Adjustment in natural or *human systems* in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. Various types of adaptation can be distinguished, including anticipatory, autonomous and planned adaptation.

Adaptive capacity (in relation to climate change impacts)

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

Aggregate impacts

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

Aquifer

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

Baseline/reference

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

Biodiversity

The total diversity of all organisms and *ecosystems* at various spatial scales (from genes to entire *biomes*).

Capacity building

In the context of *climate change*, capacity building is developing the technical skills and institutional capabilities in developing countries and economies in transition to enable their participation in all aspects of *adaptation* to, *mitigation* of, and research on *climate change*, and in the implementation.

Carbon dioxide (CO₂)

A naturally occurring gas fixed by *photosynthesis* into organic matter. A by-product of fossil fuel combustion and *biomass* burning, it is also emitted from land-use changes and other industrial processes. It is the principal *anthropogenic greenhouse gas* that affects the Earth's radiative balance. It is the reference gas against which other greenhouse gases are measured, thus having a Global Warming Potential of 1.

Catchment

An area that collects and drains rainwater.

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. These quantities are most often surface variables such as temperature, precipitation, and wind. Climate in a wider sense is the state, including a statistical description, of the *climate system*. The classical period of time is 30 years, as defined by the World Meteorological Organization (WMO).

Climate change

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

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 all or some of its known properties. The climate system can be represented by models of varying complexity (i.e., for any one component or combination of components a hierarchy of models can be identified, differing in such aspects as the number of spatial dimensions, the extent to which physical, chemical, or biological processes are explicitly represented, or the level at which empirical parameterisations are involved. Coupled *atmosphere/ ocean/sea-ice General Circulation Models (AOGCMs)* provide a comprehensive representation of the climate system. More complex models include active chemistry and biology. Climate models are applied, as a research tool, to study and simulate the climate, but also for operational purposes, including monthly, seasonal, and interannual *climate predictions*.

Climate prediction

A climate prediction or climate forecast is the result of an attempt to produce an estimate of the actual evolution of the climate in the future, e.g., at seasonal, interannual or long-term time scales. See also *climate projection* and *climate (change) scenario*.

Climate projection

The calculated response of the *climate system* to *emissions* or concentration *scenarios* of *greenhouse gases* and *aerosols*, or *radiative forcing scenarios*, often based on simulations by *climate models*. Climate projections are distinguished from *climate predictions*, in that the former critically depend on the emissions/concentration/*radiative forcing* scenario used, and therefore on highly uncertain assumptions of future socio-economic and technological development.

Climate (change) scenario

A plausible and often simplified representation of the future *climate*, based on an internally consistent set of climatological relationships and assumptions of *radiative forcing*, typically constructed for explicit use as input to climate change impact models. A climate change scenario' is the difference between a climate *scenario* and the current climate.

Downscaling

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

Drought

The phenomenon that exists when precipitation is significantly below normal recorded levels, causing serious hydrological imbalances that often adversely affect land resources and production systems.

Ecosystem

The interactive system formed from all living organisms and their abiotic (physical and chemical) environment within a given area. Ecosystems cover a hierarchy of spatial scales and can comprise the entire globe, *biomes* at the continental scale or small, well-circumscribed systems such as a small pond.

Ecosystem services

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

Emissions scenario

A plausible representation of the future development of emissions of substances that are potentially radiatively active (e.g., *greenhouse gases*, *aerosols*), based on a coherent and internally consistent set of assumptions about driving forces (such as demographic and socio-economic development, technological change) and their key relationships. In 1992, the IPCC presented a set of emissions scenarios that were used as a basis for the *climate projections* in the Second Assessment Report. These emissions scenarios are referred to as the IS92 scenarios. In the IPCC Special Report on Emissions Scenarios (*SRES*) (Nakićenović et al., 2000), new emissions scenarios – the so-called SRES scenarios – were published.

Ensemble

A group of parallel model simulations used for *climate projections*. Variation of the results across the ensemble members gives an estimate of *uncertainty*. Ensembles made with the same model but different initial conditions only characterise the uncertainty associated with internal *climate variability*, whereas multi-model ensembles including simulations by several models also include the impact of model differences.

Evaporation

The transition process from liquid to gaseous state.

Extreme weather event

An event that is rare within its statistical reference distribution at a particular place. Definitions of 'rare' vary, but an extreme weather event would normally be as rare as or rarer than the 10th or 90th percentile. By definition, the characteristics of what is called 'extreme weather' may vary from place to place. Extreme weather events may typically include floods and *droughts*.

Greenhouse gas

Greenhouse gases are those gaseous constituents of the *atmosphere*, both natural and *anthropogenic*, that absorb and emit radiation at specific wavelengths within the spectrum of infrared radiation emitted by the Earth's surface, the atmosphere, and clouds. This property causes the *greenhouse effect*. Water vapour (H₂O), *carbon dioxide* (CO₂), nitrous oxide (N₂O), methane (CH₄) and *ozone* (O₃) are the primary greenhouse gases in the Earth's atmosphere. As well as CO₂, N₂O, and CH₄, the *Kyoto Protocol* deals with the greenhouse gases sulphur hexafluoride (SF₆), hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs).

Heat island

An urban area characterised by ambient temperatures higher than those of the surrounding non-urban area. The cause is a higher absorption of solar energy by materials of the urban fabric such as asphalt.

(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*.

(climate change) Impacts

The effects of *climate change* on natural and *human systems*. Depending on the consideration of *adaptation*, one can distinguish between potential impacts and residual impacts:

Potential impacts: all impacts that may occur given a projected change in climate, without considering adaptation.

Residual impacts: the impacts of climate change that would occur after adaptation.

Integrated assessment

An interdisciplinary process of combining, interpreting and communicating knowledge from diverse scientific disciplines so that all relevant aspects of a complex societal issue can be evaluated and considered for the benefit of decision-making.

Mitigation

An *anthropogenic* intervention to reduce the anthropogenic forcing of the *climate system*; it includes strategies to reduce *greenhouse gas sources* and emissions and enhancing *greenhouse gas sinks*.

No regrets policy

A policy that would generate net social and/or economic benefits irrespective of whether or not *anthropogenic climate change* occurs.

Non-linearity

A process is called 'non-linear' when there is no simple proportional relation between cause and effect.

Resilience

The ability of a social or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self-organisation, and the capacity to adapt to stress and change.

Runoff

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

Salt-water intrusion / encroachment

Displacement of fresh surface water or groundwater by the advance of salt water due to its greater density. This usually occurs in coastal and estuarine areas due to reducing land-based influence (e.g., either from reduced *runoff* and associated *groundwater recharge*, or from excessive water withdrawals from *aquifers*) or increasing marine influence (e.g., *relative sealevel rise*).

Scenario

A plausible and often simplified description of how the future may develop, based on a coherent and internally consistent set of assumptions about driving forces and key relationships. Scenarios may be derived from *projections*, but are often based on additional information from other sources, sometimes combined with a 'narrative storyline'.

Sea-level rise

An increase in the mean level of the ocean. *Eustatic sea-level rise* is a change in global average sea level brought about by an increase in the volume of the world ocean. *Relative sea-level rise* occurs where there is a local increase in the level of the ocean relative to the land, which might be due to ocean rise and/or land level subsidence. In areas subject to rapid land-level uplift, relative sea level can fall.

Sensitivity

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

Socio-economic scenarios

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

Threshold

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

Uncertainty

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

Vulnerability

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

Sources

IPCC (2007): Climate Change 2007 - Impacts, Adaptation and Vulnerability. Contribution of working group II to the Forth Assessment report of the Intergovernmental Panel on Climate Change: Glossary