Glossary[1]

absolute humidity: The mass of water vapour in a given volume of air.

acclimatization: Physiological and/or behavioural adaptation to climate.

acid rain (deposition): Precipitation that has a **pH** lower than about 5.0, the value produced when naturally occurring **carbon dioxide**, sulfate and **nitrogen oxide** dissolve into water droplets in clouds. Increases in acidity may occur naturally (e.g. following emissions of aerosols during volcanic eruptions) or as a result of human activities (e.g. emission of sulfur dioxide during **fossil fuel combustion**).

acute effect: Short-lived effect (in contrast to **chronic effect**).

adaptability: *See adaptive capacity.*

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

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

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

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

aeroallergen: Any of various airborne substances, such as pollen or spores, which can cause an allergic response.

aerosol: A collection of airborne solid or liquid particles with a typical size of 0.01–10 μm which are present in the atmosphere. Aerosols are an important source of negative **radiative forcing** and **acid rain**.

age related macular degeneration (AMD): An acquired degenerative disease which affects the central retina of patients most commonly over the age of 60.

air mass: Synoptic meteorological characterization of the entire body of air and its qualities. Air masses can be determined empirically using a combination of meteorological variables which include temperature, **relative humidity**, wind speed, wind direction, and barometric pressure.

albedo (whiteness): The fraction of solar radiation reflected by a surface or object, often expressed as a percentage. Snow covered surfaces have a high

[1] The glossary was prepared by Katrin Kuhn, London School of Hygiene and Tropical Medicine, London, England.

albedo; the albedo of soils ranges from high to low; vegetation covered surfaces and oceans have a low albedo. The Earth's albedo varies mainly through varying cloudiness, snow, ice, leaf area, and land cover changes.

algal blooms: Abnormally increased **biomass** of algae in a lake, river, or ocean.

amoebiasis: An infection of the large intestine by the protozoan parasite *Entamoeba histolytica*. The disease is frequently asymptomatic and varies from **dysentery** with fever, chills, and bloody or mucoid diarrhoea to mild abdominal discomfort with diarrhoea containing blood or mucus alternating with periods of constipation or remission.

amplification: The sharp increase in the size of a pathogen population, usually occurring in an amplifying host. *See also reservoir host.*

Annex I countries: Group of countries included in Annex I (as amended in 1998) to the **UNFCCC**, including all the developed countries in the Organisation for Economic Cooperation and Development, and economies in transition. By default, the other countries are referred to as non-Annex I countries.

anomaly: An event which is a deviation from normal behaviour that has a finite but very low probability of occurring.

***a posteriori*:** *See a priori.*

***a priori*:** Type of knowledge which is obtained independently of experience. A proposition is known *a priori* if one does not refer to experience to declare it true or false. Conversely, *a posteriori*, means knowledge gained through the senses and experience.

anthropogenic: Caused or produced by human activity. For example sulfate aerosols which are present in the troposphere due to the industrial emission of sulfur dioxide are called **anthropogenic**.

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

anthroponosis: A disease of humans which can be transmitted to other animals.

arbovirus: Viruses transmitted by arthropods (arbo = arthropod borne). Examples include the **dengue** virus, St. Louis encephalitis, Western equine encephalitis and **yellow fever**.

arid region/zone: Ecosystem which receives less than 250 mm precipitation per year.

atmosphere: The gaseous envelope surrounding the Earth. The dry atmosphere consists almost entirely of nitrogen and oxygen, together with a number of trace gases such as argon, helium and radiatively active **greenhouse gases** such as **carbon dioxide** and **ozone**. In addition, the atmosphere contains water vapour, clouds, and **aerosols**.

AOGCMs: Atmosphere-Ocean general circulation models. *See climate models*.

atopic eczema: Excess inflammation (dermatitis) of the skin and linings of the nose and lungs. It is very common in all parts of the world, mainly affecting infants and young adults.

attribution: *See detection and attribution.*

AIMS: Australian Institute of Marine Science.

autoimmune diseases: Any disorder in which the immune system mistakenly attacks the cells, tissues, and organs of a person's own body. There are many different autoimmune diseases, and they can each affect the body in different ways. For example, the autoimmune reaction is directed against the brain in multiple sclerosis and the gut in Crohn's disease.

basal metabolic rate: The minimal caloric requirements needed to sustain life in a resting person (i.e. a measure of the energy used by the body to maintain those processes necessary for life).

basic reproduction rate (R_0): A quantitative measure of the ability of a **vector-borne disease** to spread through a population. It is defined as the number of new cases of a disease which will arise from one current case when introduced into a non-immune host population during a single transmission cycle. A disease with a basic reproduction rate less than 1 will not spread in the community (i.e. become endemic). This rate will apply during the initial stages of spreading as the rate of disease spread will slow once the population has acquired some immunity.

billion: One thousand million, or 10^9.

biodiversity: The numbers and relative abundances of different genes (genetic diversity), species, and **ecosystems** (communities) in a particular area.

biofuel: A fuel produced from dry organic matter or combustible oils produced by plants.

biological model: a mathematical approach to determine the relationship between environmental variables and an outcome of interest (e.g. the distribution of disease vectors) using biological associations between the environment and aspects of population dynamics (e.g. how insect development rates change with temperature). Unlike **statistical models**, this approach requires detailed understanding of disease population dynamics.

biomass: The total mass of living organisms in a given area or volume: recently dead plant material is often included as dead biomass.

biome: A grouping of similar plant and animal communities that reflects the ecological and external character of the fauna in question. Biomes correspond approximately climatic regions, e.g. tropical rain forest biome, desert biome, and tundra biome.

biosphere: The part of the Earth's system comprising all **ecosystems** and living organisms in the atmosphere, on land (terrestrial biosphere), or in the oceans (marine biosphere), including derived dead organic matter such as litter, soil organic matter, and oceanic detritus.

biotoxin: Toxin produced by a living organism.

capacity building: In the context of **climate change**, capacity building is a process of developing the technical skills and institutional capability in developing countries and economies in transition to enable them to participate in all aspects of **adaptation** to, **mitigation** of, and research on climate change.

carbon dioxide (CO_2): A naturally occurring gas as well as a by-product of burning **fossil fuels** and land-use changes and other industrial processes. It is the principal **greenhouse gas** which affects the Earths **radiative balance** and the reference gas against which other greenhouse gases are measured.

carbon sink: Repository for **carbon dioxide** removed from the atmosphere. Oceans appear to be major sinks for storage of atmospheric CO_2.

carrying capacity: The number of individuals in a population that the resources of a habitat can support at a given point in time.

cataract: A clouding of the natural lens (the part of the eye responsible for focusing light and producing clear, sharp images) which is a natural result of the ageing process. Cataracts are the leading cause of visual loss in adults of 55 years and older.

CDC: Centers for Disease Control and Prevention.

chlorofluorocarbons (CFCs): Halogenated chemicals which are used for refrig-

eration, air conditioning, packaging, insulation, solvents, or aerosol propellants. They are all covered under the 1987 **Montreal Protocol**. Since they are not destroyed in the lower **atmosphere**, CFCs drift into the upper atmosphere where, given suitable conditions, they break down **ozone**. These gases are being replaced by other compounds, including hydrochlorofluorocarbons, covered under the **Kyoto Protocol**.

chloroquine: Medication used to treat and prevent **malaria**.

cholera: An intestinal infection, caused by the bacterium *Vibrio cholerae*, which results in frequent watery stools, cramping abdominal pain, and eventual collapse from dehydration. It is thought that **zooplankton** in cold waters may carry large number of cholera vibrios on their bodies. Zooplankton feed by grazing on **phytoplankton** which bloom with sunshine and warm conditions. Thus, a phytoplankton (algal) bloom may lead to an increase in the population of zooplankton which carry the vibrios.

chronic effect: Long-lasting effect (in contrast to **acute effect**).

CI: Conservation International (a non-governmental organisation).

ciguatera fish poisoning: Food-borne disease caused by ingestion of neurotoxins in certain fish. The toxins may become concentrated in higher predators, such as reef fish, which may remain toxic for more than two years after becoming contaminated. The symptoms of acute poisoning include gastrointestinal distress, followed by neurological and cardiovascular problems which are rarely fatal. Ciguatera is considered a major health and economic problem on many tropical islands where fish forms a large part of the diet.

CITES: Convention on International Trade in Endangered Species of Wild Fauna and Flora.

climate: Usually defined as the "average weather" or more rigorously as the statistical description in terms of the mean and variability of relevant quantities over a period of time ranging from months to thousands or millions of years. The classical period is 30 years as defined by the **WMO**. These relevant quantities are most often surface variables such as temperature, precipitation and wind.

climate change: Refers to a statistically significant variation in either the mean state of the climate or in is variability, persisting for an extended period (typically decades or longer). Climate change may be due to natural internal processes or external **forcings**, or to persistent **anthropogenic** changes in the composition of the **atmosphere**. The **UNFCC** defines climate change as "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods". *See also climate variability.*

climate models: 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, differing in such aspects as number of spatial dimensions and the extent to which physical, chemical, or biological processes are represented. Coupled **atmosphere–ocean general circulation models** (AOGCMs) provide a comprehensive representation of the climate system. There is an evolution towards more complex models with active chemistry and biology. Climate models are applied as a research tool to study and simulate the climate but also for operational purposes including climate **predictions**.

climate system: The highly complex system consisting of five major components: the **atmosphere**, the **hydrosphere**, the **cryosphere**, the land surface, and the **biosphere** and the interactions between them. The climate system evolves in time under the influence of its own internal dynamics and because of external (e.g. volcanic eruptions) and human **forcings** (e.g. changing composition of the atmosphere).

climate variability: Variations in the mean state and other statistics (e.g. standard deviations, the occurrence of **extreme events** etc) of the climate on all temporal and spatial scales beyond that of individual weather events. Variability may be due to natural internal processes within the **climate system** or to variations in natural or **anthropogenic** external forcing.

confidence interval: An estimated range of values which is likely to include an unknown population parameter, the estimated range being calculated from a given set of sample data. If independent samples are taken repeatedly from the same population, and a confidence interval calculated for each sample, then a certain percentage (confidence level) of the intervals will include the unknown population parameter. Confidence intervals are usually calculated so that this percentage is 95%.

confounding factors: Any factor associated with the **exposure** under study and considered risk factors for the disease in their own right (i.e. not just intermediate variables on the pathway between exposure and disease).

copepods: Small crustaceans which are the most numerous multi-celled animals in the aquatic community. Their habitats range from the highest mountains to the deepest ocean trenches, and from the cold polar ice-water interface to the hot active hydrothermal vents. Copepods may be free-living, symbiotic, or internal or external parasites on almost every phylum of animals in water. They also have the potential to control malaria by consuming mosquito larvae and are thought to be intermediate hosts for many human and animal parasites.

coping ability/capacity: The variation in climatic stimuli that a system can absorb without producing significant impacts.

coral bleaching: The paling in colour of corals resulting from a loss of symbiotic algae. Bleach occurs in response to physiological shock in response to abrupt changes in temperature, salinity, and turbidity. Mass-bleaching events have been associated with small changes in sea temperature.

Coriolis force: A bending force causing any movement on the Northern hemisphere to be diverted to the right when the globe is rotating (in the Southern hemisphere it is bent to the left).

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

CRED: The Centre for Research on the Epidemiology of Disasters.

cryosphere: The component of the climate system consisting of all snow, ice, and **permafrost** on and beneath the surface of the earth and ocean.

cryptosporidium: Genus of parasites of the intestinal tracts of fishes, reptiles, birds, and mammals. A particular species isolated in humans has been identified as *Cryptosporidium parvum*. Cryptosporidiosis, or Cryptosporidium infection, is today recognized as an important opportunistic infection, especially in immunocompromised hosts.

CMM: Cutaneous malignant melanoma.

Cytomegalovirus (CMV): A virus related to the herpes virus. It is so common that almost 100 percent of adults in developing countries and 50 percent to

85 percent of adults in developed world are infected. Usually the virus causes no serious problems, however in immunocompromised hosts and newborns of infected mothers cytomegalovirus can be fatal.

demography: The study of populations, especially with reference to size and density, fertility, mortality, growth, age distribution, migration, and the interaction of all these factors with social and economic conditions.

dengue/dengue haemorrhagic fever (DHF): An acute febrile syndrome caused by dengue arbovirus type 1–4, commonly transmitted by the mosquitoes *Aedes aegypti* and *Ae. albopictus* which breed in small water bodies in containers, car tyres etc. Dengue is often called breakbone fever because it is characterized by severe pain in joints and back. Subsequent infections of dengue virus may lead to dengue haemorrhagic fever which can be fatal.

desert: An **ecosystem** which receives less than 100 mm precipitation per year.

detection and attribution: Detection of climate change is the process of demonstrating that climate has changed in some defined statistical sense, without providing a reason for that change. Attribution of causes and effects of climate change is the process of establishing the most likely causes for the detected change or effect with some defined level of confidence.

diphtheria: An acute toxin-mediated bacterial disease which usually affects the tonsils, throat, nose and/or skin. It is passed from person to person by droplet transmission, usually by breathing in diphtheria bacteria after an infected person has coughed, sneezed or even laughed. Diphtheria can lead to breathing problems, heart failure, paralysis and sometimes death.

direct transmission: Transmission of an infectious disease from human to human (or animal to animal), without the involvement of **intermediate** hosts or **reservoirs** (e.g. **TB**, sexually transmitted diseases).

Disability Adjusted Life Year (DALY): An indicator of life expectancy combining mortality and morbidity into one summary measure of population health to account for the number of years lived in less than optimal health. It is a health measure developed for calculating the global burden of disease which is also used by WHO, the World Bank and other organizations to compare the outcomes of different interventions.

diurnal temperature range: The difference between minimum and maximum temperature over a period of 24 hours.

dose-response: Association between dose and the incidence of a defined biological effect in an exposed population. Dose-response relationships are used to determine the probability of a specific outcome or disease, or risk of a disease, by extrapolating from high doses to low doses and from laboratory animals to humans, and using **mathematical models** that define risk as a function of exposure dose.

drought: The phenomenon that exists when precipitation has been significantly below normal recorded levels, causing serious hydrological imbalances.

dysentery: An infection of the gut caused by shigella bacteria. Symptoms include acute bloody diarrhoea, vomiting, stomach pains and fever.

early warning systems (EWS): A system consisting of **Mathematical models** and **surveillance** measures designed for the early detection, prevention and control of an **epidemic** of infectious disease or other abnormal event (e.g. famine or heat waves).

economies in transition: A type of national economy in the process of changing from a planned economic system to a market economy.

ecological study: Study in which the analysis of a relationship is based on aggregate or grouped data (such as **rates**, proportions and means)—i.e. no data are collected at the individual level.

ecological system/ecosystem: A system of living organisms together in their physical environment, with specific interactions and exchange of matter, energy and information. The boundaries of an ecosystem depend on the focus of interest and can range from very small **spatial scales** to the entire Earth.

effect modifier: A factor that modifies (alters), by variation in intensity or magnitude, the effect of a risk factor under study; a generic term which includes interaction, synergism, and antagonism.

El Niño/Southern Oscillation (ENSO): El Niño, in its original sense, is a warm water current that periodically flows along the coast of Ecuador and Peru. This event is associated with a fluctuation of the intertropical surface pressure patterns and circulation in the Indian and Pacific Oceans, called the Southern Oscillation. This coupled atmosphere–ocean phenomenon is collective known as the El Niño Southern Oscillation or ENSO. During an El Niño event, the prevailing trade winds weaken and the equatorial counter current strengthens, causing warm surface waters in the Indonesian area to flow eastward to overlie the cold waters of the Peru current. This event has great impact on the wind, **sea surface temperature**, and precipitation patterns in the tropical Pacific. It has climatic effects throughout the Pacific region and in many other parts of the world. The opposite of an El Niño event is called La Niña.

EM-DAT: The Emergency Events Database—EM-DAT, created and maintained by the Université Catholique de Louvain in Belgium. The main objective of the database is to serve the purposes of humanitarian action at national and international levels. For example, it allows one to decide whether floods in a given country are more significant in terms of humans impact than are earthquakes, or whether a country is more vulnerable than another.

emerging infectious disease: A disease which is new in the population or rapidly increasing in **incidence** or expanding in geographical range.

emission: In the **climate change** context, the release of **greenhouse gases** and/or **aerosols** into the atmosphere over a specified area and period of time.

emission scenario: A possible pattern of net **greenhouse gas** and **aerosol** emissions for the next hundred years or more. Emission scenarios provide input for **climate models** and contribute to the evaluation of future radiative forcing on the atmosphere. Emission scenarios are not predictions of the future but illustrate the effect of a wide range of economic, demographic, and policy assumptions. *See also SRES*.

endemic: Term applied to describe sustained, relatively stable transmission pattern of an infection within a specified population in a certain locality or region.

entomological inoculation rate (EIR): The number of infectious mosquito bites a person is exposed to in a certain time period, typically a year.

enzootic disease: An **endemic** and **zoonotic** disease—i.e. affecting mainly animals but with an occasional spill-over to humans such as **Rift Valley Fever, West Nile virus**.

epidemic: Occurrence in a community or region of cases of an illness, specific health-related behaviour, or other health-related events clearly in excess of normal expectancy. The community or region and the period in which the cases occur are specified precisely. The number of cases indicating the presence of an epidemic varies according to the agent, size, and type of popula-

tion exposed; previous experience or lack of exposure to the disease; and time and place of occurrence. *See also outbreak.*

epidemiology: Study of the distribution and determinants of health-related states or events in specified populations. Epidemiology is the basic quantitative science of public health.

epizootic: An out break (**epidemic**) of disease in an animal population, often with the implication that it may also affect humans. *See also enzootic.*

erythema: Reddening of the skin.

evaporation: The process by which a liquid becomes a gas.

evapotranspiration: The sum total of water lost from land through physical **evaporation** and plant transpiration.

exposure: Amount of a factor to which a group or individual was exposed; sometimes contrasted with dose (the amount that enters or interacts with the organism). Exposures may be either beneficial or harmful.

extreme event: A weather event that is rare within its statistical reference distribution at a particular place. Definitions of "rare" vary, but an extreme event would normally be as rare or rarer than the 10^{th} or 90^{th} percentile. By definition, the characteristics may vary from place to place. An extreme **climate** event is an average of a number of weather events over a certain period of time, an average which is itself extreme.

extrinsic incubation period: In blood-feeding arthropod vectors, the time between acquisition of the infectious blood meal and the time when the vector becomes capable of transmitting the agent. In the case of **malaria**, this is the life stages of the parasite spent within the female mosquito vector.

falciparum malaria: *See* Plasmodium falciparum *and malaria.*

FAO: Food and Agricultural Organisation of the United Nations.

feedback: an interaction mechanism between processes in the **climate system** is called a climate feedback when the result of an initial process triggers changes in a second process that in turn influences the initial one. A positive feedback intensifies the original process, and a negative feedback reduces it.

first principle: The first law of thermodynamics says that the total *quantity* of energy in the universe remains constant. This is the principle of the conservation of energy. The first principle establishes the equivalence of the different forms of energy (radiant, chemical, physical, electrical, and thermal), the possibility of transformation from one form to another, and the laws that govern these transformations. This first principle considers heat and energy as two magnitudes of the same physical nature.

flood: Temporary partial or complete inundation of normally dry areas caused by rapid runoff or overflow from lakes, rivers, or tidal waters.

forcings: *See climate system.*

forecast: *See prediction.*

fossil fuels: Carbon-based burning materials from fossil carbon deposits, including coal, oil and natural gas.

fossil CO_2 (carbon dioxide) emissions: The action of giving off **carbon dioxide** resulting from the combustion of fuels from fossil carbon deposits such as oil, natural gas and coal.

Fourier analysis (spectral analysis): A mathematical analysis that describes variations within a time series of data in terms of cycles, of different frequencies and amplitudes. It is often used for describing seasonal and longer-term cyclical variations in disease incidence.

free radical: Any highly reactive chemical molecule that has at least one unpaired electron.

fuzzy logic/suitability: An approach to mathematics and computing based on "degrees of truth" rather than the usual "true or false" (1 or 0) Boolean logic on which the modern computer is based. Fuzzy logic includes 0 and 1 as extreme cases of truth (or "the state of matters" or "fact") but also includes the various states of truth in between.

GEF: Global Environment Facility.

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

genetic engineering: The techniques used to manipulate genes in an organism in order to study their functions and their interactions in an environment different from the original one.

Geographical Information System (GIS): System of hardware, software and procedures designed for integrated storing, management, manipulation, analysing, modelling and display of spatially referenced data for solving planning and management problems.

glacier: A mass of land ice flowing downhill and constrained by the local topography. A glacier is maintained by accumulation of snow at high altitudes, balanced by melting at low altitudes or discharge into the sea.

Global Positioning System (GPS): A hand-held radio navigation system that allows land, sea, and airborne users to determine their exact location, velocity, and time 24 hours a day, in all weather conditions, anywhere in the world.

global warming: Observed and **projected** temperature increases.

gonotrophic cycle: For blood-feeding arthropods, the interval between blood meal and egg-laying.

GLWQA: Great Lakes Water Quality Agreement.

greenhouse effect: Greenhouse gases absorb **infrared radiation**, emitted by the Earth's surface, the **atmosphere** itself due to the same gases and by clouds. Atmospheric radiation is emitted to all sides, including downward to the Earth's surface. Thus greenhouse gases trap heat within the surface–troposphere system. This is called the "natural greenhouse effect". Atmospheric radiation is strongly coupled to the temperature of the level at which it is emitted. An increase in the concentration of greenhouse gases leads to an increased infrared opacity of the atmosphere and therefore to an effective radiation into space from a higher altitude at a lower temperature. This causes a radiative forcing, an imbalance that can only be compensated for by an increase of the temperature of the surface-troposphere system. This is the "enhanced greenhouse effect".

greenhouse gases (GHGs): Those gases in the **atmosphere** which absorb and emit radiation at specific wavelengths within the spectrum of **infrared radiation** emitted by the Earth's surface, the atmosphere and clouds. **Water vapour**, **carbon dioxide**, **nitrous oxide**, **methane** and **ozone** are the primary greenhouse gases in the atmosphere. Moreover, there are a number of entirely human-made gases in the atmosphere, such as the **halocarbons** and others dealt with under the **Montreal** and **Kyoto Protocols**.

Gross Domestic Product (GDP): The sum of gross value added, at purchaser's prices, by all resident and non-resident producers in the economy in a country or region for a given period of time (normally 1 year), plus any taxes and

minus any subsidies not included in the value of the products. GDP is an often used measure of welfare.

Gulf stream (thermohaline current): A well-defined western boundary current of the North Atlantic, which carries warm, saline tropical water north and north-eastward along the eastern coast of the United States, joining the Labrador Current at the Grand Banks, about 40°N and 50°W, to become the North Atlantic Current; generally swift and deep, it transports a very large volume of water.

haemorrhagic: Causing or characterised by haemorrhage or bleeding.

halocarbons: A group of human-made chemicals that contain carbon and members of the halogen family (fluorine, chlorine or bromide). Halocarbons include **chlorofluorocarbons**, substances that deplete stratospheric ozone.

hantavirus pulmonary syndrome: A recently identified **zoonotic** disease, caused by a virus (hantavirus), carried by rodents. Infection in humans occur via inhalation or ingestion of materials contaminated with rodent excreta, although a tick vector may be involved. Early symptoms include fever, fatigue and muscle aches while late symptoms consist of coughing and shortness of breath (hence the name).

hard ticks: Ticks of the family Ixodidae, characterised by the presence of a scutum (dorsal plate) and visible mouthparts from the dorsal side. *See also soft ticks.*

Health For All: A global health policy aimed at meeting the major challenges in health during the next decades, that has been developed by the World Health Organization in consultation with all its national and international partners. This policy for the 21st century evolves from the Health-For-All policy which has been a common aspirational goal since its inception in 1979.

health impact assessment (HIA): A combination of procedures, methods and tools by which a policy, project or hazard may be judged as to its potential effects on the health of a population, and the distribution of those effects within the population.

heat budget: Heat budgets are a way of studying atmospheric processes to indicate the sources and sinks of energy. The atmospheric heat budget shows where the atmospheric heat energy comes from and where it goes.

heat island effect: Local human-induced climate conditions (high temperatures) in urban areas caused by heat adsorption in concrete, brick and pavement surfaces, reduction of convective cooling due to presence of tall buildings, and reduced evaporative cooling.

helminths: Specific type of parasitic worm.

historical analogue studies: Studies that use a past event to elucidate factors pertaining to current or future events.

Humboldt current: A cold ocean current of the South Pacific, flowing north along the western coast of South America. Also called Peru Current.

hydrological cycle: Movement and circulation of water in the atmosphere, on land surfaces, and through the soils and subsurface of rocks. About 97% of the world's water is in the oceans and about 75% of its fresh water takes the form of glaciers and polar ice. Water vapour in the atmosphere condenses and appears as dew or precipitation. Liquid water, ice and snow evaporate.

hydroxyl ions/radicals: One of the most toxic and reactive type of free radicals.

hypothermia: Condition which occurs when the human body temperature drops below 35.5 °C or 96 °F due to exposure to cold. Symptoms include slow

or irregular speech, shallow or very slow breathing, fatigue, confusion, slow pulse, weakness or drowsiness, shivering, cold, pale skin.

ice sheet: A glacier of more than 50 000 km^2 in area forming a continuous cover over a land surface or resting on a continental shelf. There are only two large ice sheets in the modern world, on Greenland and Antarctica.

impacts: Consequences of **climate change** on natural systems and human health. Depending on the consideration of **adaptation**, we can distinguish between potential impacts and residual impacts:

- Potential impacts are all impacts that may occur given a projected change in **climate**, with no consideration of adaptation.
- Residual impacts are the impacts of climate change that can occur after adaptation.

immunosuppression: Reduction in the effectiveness of a person's immune system. Local immunosuppression occurs at the site of **exposure** or disturbance. Systemic immunosuppression involves a reduction of the body's immune response at a site distant from the exposure.

incidence: The number of cases of illness commencing, or of persons falling ill, during a given time period within a specified population. *See also prevalence.*

indirect transmission: transmission of an infectious disease with the involvement of **intermediate** hosts, **vectors** or **reservoirs** (e.g. **malaria**, **hantavirus**).

Industrial Revolution: A period of rapid industrial grown beginning in England during the second half of the 18th century and spreading to Europe and other countries. 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**.

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

infection rate: Proportion of all individuals in a population infected with a specific disease agent.

infrared radiation: Radiation emitted by the Earth's surface, the atmosphere, and clouds. It is also known as terrestrial or long-wave radiation. Infrared radiation has a distinctive range of wavelengths (spectrum) longer than the wavelength of the red colour in the visible part of the spectrum.

insecticide: A pesticide used for controlling or eliminating insects.

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

intermediate host: Host of a disease agent other than the one in which sexually mature forms of the pathogen occur. *See also reservoir host.*

Intergovernmental Panel on Climate Change (IPCC): A group of experts established in 1988 by the **World Meteorological Organization (WMO**) and the **United Nations Environment Programme (UNEP).** Its role is to assess the scientific, technical and socio-economic information relevant for the understanding of the risk of human-induced **climate change**, based mainly

on peer reviewed and published scientific/technical literature. The IPCC has three Working Groups and a Task Force.

interquartile range: The distance between the 75th percentile and the 25th percentile. The interquartile range is essentially the range of the middle 50% of the data.

in vitro: A process that takes place under artificial conditions or outside of the living organism.

in vivo: A process that takes place inside the living organism.

IHD: Ischaemic heart disease, i.e. heart problems caused by narrowed heart arteries (also called coronary artery disease and coronary heart disease). Often causes chest pain known as angina pectoris and can ultimately lead to heart attack.

Kyoto Protocol: An agreement which was adopted at the third session of the **UNFCCC** conference in Japan in 1997. It contains legally binding commitments, in addition to those included in the **UNFCCC**.

Landsat Thematic Mapper: A U.S. **remote sensing satellite** used to acquire images of the Earth's land surface and surrounding coastal regions.

La Niña: *See El Niño Southern Oscillation.*

leishmaniasis: Infection with *Leishmania* parasites, resulting in a group of diseases classified as cutaneous, mucocutaneous or visceral. Transmission is by sandflies of the genus *Phlebotomus* or *Lutzomyia*. In most regions, the transmission cycle involves **reservoir hosts** (primarily wild or domestic canines and rodents) but parasites can also be transmitted from person to person by the bite of sandflies.

leptospirosis: Bacterial infection of humans by the genus *Leptospira*. Symptoms include high fever, jaundice, severe muscular pains and vomiting. Transmission is associated with contact with infected animals or water contaminated with rat urine. Also known as Weil's disease.

Lyme disease: A zoonotic bacterial infection caused by the spirochaete *Borrelia burgdoferi* and transmitted by **hard ticks** of the genus *Ixodes*. The main animal **reservoir hosts** for Lyme disease are wild deer as well as domesticated pets.

lupus erythematosus: An auto-immune illness that affects the skin and internal organs.

lymphatic (Bancroftian) filariasis: Parasitic disease common in tropical and subtropical countries. Microscopic parasitic worms (*Wuchereria bancrofti* or *Brugia malayi*) are transmitted to humans by several mosquito species (including *Anopheles*, *Aedes* and *Culex*). The worms cause inflammation and eventual blocking of lymph vessels, resulting in a swelling of the surrounding tissue, often referred to as elephantiasis.

lymphocytes: White blood cells circulating in blood and lymph and involved in antigen-specific immune reactions. Lymphocytes are subdivided into B-lymphocytes, which produce circulating antibodies, and T-lymphocytes, which are primarily responsible for cell-mediated immunity. T-lymphocytes are divided into cytotoxic lymphocytes which bind to and kill foreign cells, helper T-lymphocytes which assist antibody production, and suppressor T-lymphocytes which inhibit this immune response.

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

malaria: Endemic or epidemic parasitic disease caused by four species of the protozoan genus *Plasmodium* which are transmitted to humans by the bite of female *Anopheles* mosquitoes. Disease is characterised by high fever attacks and systemic disorders and is responsible for approximately 2 million deaths every year, 90% of which occur in Sub-Saharan Africa. Malaria is the most serious and common vector-borne disease in the world.

MARA: Mapping Malaria Risk in Africa. A collaboration initiated to provide an atlas of African malaria, containing relevant information for rational and targeted implementation of malaria control.

MPAs: Marine Protected Areas.

mathematical models: Representation of a system, process or relationship in mathematical form in which equations are used to describe the behaviour of the system or process under study. See also **biological** and **statistical models** and **predictive modelling**.

melatonin: A hormone produced by the pineal gland in the brain which can help regulate the symptoms of jet lag or insomnia.

meningococcal meningitis: Cerebrospinal meningitis or fever, characterised by infection of the fluid (cerebrospinal fluid, or CSF) and tissues (meninges) that surround the brain and spinal cord. Meningococcal meningitis is caused by infection with the meningococcus bacteria.

mesosphere: Region of the Earth's **atmosphere** above the **stratosphere.**

meta analysis: Process of using statistical methods to combine the results of different independent studies.

methane (CH_4): A hydrocarbon that is a **greenhouse gas** produced through anaerobic (without oxygen) decomposition of waste in landfills, animal digestion, decomposition of animal wastes, coal production, and incomplete fossil-fuel combustion. It is one of the six gases to be mitigated under the **Kyoto Protocol**.

micro climate: (i) In climatology: localised climate, incorporating physical processed in the atmospheric boundary layer. The boundary layer is the lowest 100–200 m of the **atmosphere** and the part of the **troposphere** that is directly influenced by Earth's surface. For example, atmospheric humidity is influenced by vegetation, ambient air temperatures by building and roads etc. (ii) in ecology: climatic conditions in the environmental space occupied by a species, a community of species or an **ecosystem**. For example, on mountain slopes, temperatures experienced by plants differ depending on the direction of the slope. Similarly, in forests, air temperature varies according to canopy cover and height. In many cases, such differentials are crucial for species survival and longevity.

minimum erythemal dose (MED): Minimal dose of ultraviolet radiation sufficient to cause **erythema**.

mitigation: Human intervention to reduce emissions or enhance the sinks of **greenhouse gases**.

monitoring: Performance and analysis of routine measurements aimed at detecting changes in the environment or health status of populations. Not to be confused with **surveillance** although surveillance techniques may be used in monitoring.

Montreal Protocol: The international agreement signed in 1987 to limit the production and emission of substances that deplete stratospheric **ozone**. The Parties to the Protocol further agreed to the London and Copenhagen Adjustments and Amendments in 1990 and 1992, respectively, aimed

at accelerating the phasing out of ozone-depleting substances by 1 January 1996 (although concessionary delays have been applied to developing countries).

morbidity: Rate of occurrence of disease or other health disorder within a population, taking account of the age-specific morbidity rates. Health outcomes include: chronic disease incidence/prevalence, hospitalisation rates, primary care consultations and **Disability-Adjusted-Life-Years (DALYs).**

mortality: Rate of occurrence of death within a population within a specified time period.

Newton's second law of motion: A physics law which explains how an object will change velocity if it is pushed or pulled upon. Firstly, this law states that if you do place a force on an object, it will accelerate, i.e., change its velocity, and it will change its velocity in the direction of the force. Secondly, this acceleration is directly proportional to the force. For example, if you are pushing on an object, causing it to accelerate, and then you push, say, three times harder, the acceleration will be three times greater. Thirdly, this acceleration is inversely proportional to the mass of the object. For example, if you are pushing equally on two objects, and one of the objects has five times more mass than the other, it will accelerate at one fifth the acceleration of the other.

nitrous oxide (N_2O): A powerful **greenhouse gas** emitted through soil cultivation practices, especially the use of commercial and organic fertilizers, fossil fuel combustion, nitric acid production, and **biomass** burning. One of the six greenhouse gases to be curbed under the **Kyoto Protocol**.

non-Hodgkin's Lymphomas (NHL): A type of cancer of the lymphatic system. There are two main types of lymphoma: (1) Hodgkin's disease and (2) non-Hodgkin's lymphoma. The two are only distinguishable by microscopic examination. There are approximately 20 different types of non-Hodgkin's lymphoma each with a different characteristic and cell invasion behaviour.

Normalized Difference Vegetation Index (NDVI): A remotely sensed index which is used to classify the greenness (i.e. vegetation coverage) of an area. It is related to the proportion of photosynthetically absorbed radiation, and calculated from atmospherically corrected reflectances from the visible and near infrared channels detected by **remote sensing satellites**.

North Atlantic Oscillation (NAO): Opposing variations of barometric pressure near Iceland and the Azores. On average a westerly current between the Icelandic low pressure area and the Azores high pressure area carries cyclones with their associated frontal systems towards Europe. However, the pressure difference between Iceland and the Azores fluctuates and can be reversed at any time. It is the dominant mode of winter **climate variability** in the North Atlantic region.

onchocerciasis: Also known as river blindness. A parasitic disease in the tropical regions of Africa and America, caused by infestation by a filarial worm (usually *Onchocerca volvulus*) and transmitted by the bite of various species of blackfly. Infection causes subcutaneous nodules and, if worms migrate to the eye, very often blindness.

oropouche: A virus of the Orthobunyavirus genus causing disease in humans in the Caribbean and Central and South America. The pathogen is transmitted by the tiny biting midge *Culicoides paraensis* and causes a self-limiting, acute, dengue-like febrile illness called ORO fever.

outbreak: An **epidemic** limited to localised increase in the incidence of a disease, e.g., in a village, town or closed institution.

ozone: Form of the element oxygen with three atoms instead of the two that characterise normal oxygen molecules. Ozone is an important **greenhouse gas**. The **stratosphere** contains 90% of all the ozone present in the **atmosphere** which absorbs harmful ultraviolet radiation. In high concentrations, ozone can be harmful to a wide range of living organisms. Depletion of stratospheric ozone, due to chemical reactions that may be enhanced by **climate change**, results in an increased ground-level flux of **ultraviolet-B-radiation**.

ozone layer: *See stratospheric ozone layer.*

Pacific Decadal Oscillation (PDO): A long-lived **El Niño**-like pattern of Pacific **climate variability.** Two main characteristics distinguish PDO from **ENSO:** (1) PDO "events" persist for 20-to-30 years, while typical ENSO events persist for 6 to 18 months and (2) the climatic fingerprints of the PDO are most visible in the North Pacific/North American sector, while secondary signatures exist in the tropics—the opposite is true for ENSO.

PAHO: Pan American Health Organization.

paleoclimatology: Study of past climates based on data from fossils and ice cores.

pandemic: Epidemic occurring over a very wide area, crossing international boundaries and usually affecting a large number of people.

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

pH: Measure of the acidity or alkalinity of a solution, ranging from 0 (acidic) to 7 (neutral) to 14 (alkaline).

photochemical oxidants: *See secondary air pollutants.*

photoconjuctivitis: Acute inflammation of the conjunctiva caused by prolonged exposure to intense solar radiation.

photokeratitis: Acute reversible inflammation of the cornea caused by prolonged exposure to intense solar radiation, usually in highly reflective environments. Temporary visual loss associated with ultraviolet radiation reflected from the surface of snow is known as "snow blindness".

photoperiod: The period during every 24 hours when an organism is exposed to daylight.

photosynthesis: Process by which the energy of sunlight is used by green plants to build up complex substances from carbon dioxide and water.

phytoplankton: The plant form of **plankton** (e.g. diatoms). Phytoplankton are the dominant plants in the sea, and are the base of the entire marine food web. These single-celled organisms are the principal agents for photosynthetic carbon fixation in the ocean. *See also cholera and zooplankton.*

PICCAP: Pacific Islands Climate Change Assistance Programme.

(bubonic) plague: Infectious disease caused by the bacterium *Yersinia pestis* and transmitted from rodent to rodent by infected fleas. Rat-borne epidemics continue to occur in some developing countries, particularly in rural areas. Symptoms include fever, headache, and general illness, followed by the development of painful, swollen regional lymph nodes. Once a human is infected, a progressive and potentially fatal illness generally results unless specific antibiotic therapy is given.

plankton: Aquatic organisms that drift or swim weakly. *See also phytoplankton and zooplankton.*

***Plasmodium falciparum*:** One of the four species of *Plasmodium* that cause human malaria and the one associated with the highest morbidity and mortality. *See also malaria.*

***Plasmodium vivax*:** One of the four species causing human malaria, associated with less severe but prolonged symptoms. *See also malaria.*

polio (poliomyelitis): An inflammation of the grey matter of the spinal cord, caused by a virus which results in an acute infection. It is believed that the virus is transmitted by contact with the faeces of an already infected person. The majority of infected individuals experience only mild symptoms or non-paralytic polio. The virus penetrates the nervous system in a small number of cases, causing varying degrees of muscle weakness and paralysis—i.e. true polio.

population health: A measure of the health status of populations, proposed during the 1990s to selectively replace the use of the terms *human health* which is more restrictive, and *public health* which also encompasses preventive and curative measures and infrastructures.

positive radiative forcing: *See radiative forcing.*

ppb: Parts per billion. One ppb is 1 part in one billion by volume. *See also parts per million.*

ppm: Parts per million; unit of concentration often used when measuring levels of pollutants in air, water, body fluids, etc. One ppm is 1 part in one million by volume.

precautionary principle: The adoption of prudence when outcomes are uncertain but potentially serious.

prediction: In the context of climate, a prediction or forecast is the result of an attempt to produce a most likely description or estimate of the actual evolution of the climate in the future (e.g. at seasonal, interannual or long term time scales). *See also projection.*

prevalence: The number of events, e.g. instances of a given disease or other condition, in a given population at a designated time. *See also incidence.*

primary air pollutants: Air pollutants produced as a result of the combustion of **fossil** and **biomass** fuels. They include: carbon monoxide, nitrogen oxides and sulfur dioxide.

primary health care: Essential health care made accessible at a cost the relevant country and community can afford, incorporating methods that are practical, scientifically sound and socially acceptable. This may include community education, promotion of adequate food supplies, basic sanitation and water, family planning and the prevention and control of locally **endemic** diseases.

principal component analysis: A mathematical transformation of a sample of points in *N*-dimensional space, so that they are measured on axes (principal components) that maximize the amount of variation in the dataset. These principal components are usually weighted combinations of the original measured values (e.g. a combination of temperature and rainfall information).

projections: A potential future evolution of a quantity or set of quantities, often computed with the aid of a model. Projections are distinguished from "predictions" in order to emphasize that projections involve assumptions concerning, for example, future socio-economic and technological developments that may or may not be realised and are therefore subject to substantial uncertainty.

PROMED: Global Outbreak and Response Network Programme for Monitoring Emerging diseases, run by the Federation of American Scientists and spon-

sored by WHO. It provides a framework, via the Internet, for electronic data exchange on outbreaks of emerging diseases.

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

pterygium: Wing-shaped growth of the conjunctiva epithelium.

qualitative analysis: An attempt to describe the non-numerical relationship between an outcome of interest and possible **exposures**. *See also quantitative analysis.*

Quality Adjusted Life Year (QALY): The arithmetic product of life expectancy and a measure of the quality of the remaining life years. QALY places a weight on time in different health states. A year of perfect health is worth 1; however, a year of less than perfect health life expectancy is worth less than 1. Death is considered to be equivalent to 0, however, some health states may be considered worse than death and have negative scores. QALYs provide a common currency to assess the extent of the benefits gained from a variety of interventions in terms of health-related quality of life and survival for the patient.

quantitative analysis: An attempt to model (i.e. quantify) the numerical relationship between an outcome of interest and possible **exposures**. *See also qualitative analysis.*

radiative forcing: A simple measure of the importance of a potential climate change mechanism. Radiative forcing is the amount of perturbation of the energy balance of the Earth-atmosphere system (W/m^2) following, for example, a change in carbon dioxide concentrations or a change in the output of the sun. The climate system responds to radiative forcing so as to re-establish the energy balance. Positive radiative forcing tends to warm the Earth's surface and negative radiative forcing tends to cool it. Radiative forcing is normally quoted as a global or annual mean.

rangeland: Unimproved grasslands, shrublands, savannas, hot and cold deserts, tundra.

red tide: Algal bloom which causes the seawater to become discoloured by the sheer concentration of algae seeking the sunlight. This discolouration is a result of the various pigments the plants use to trap sunlight; depending on the species of algae present, the water may reflect pink, violet, orange, yellow, blue, green, brown, or red. Since red is the most common pigment, the phenomenon has come to be called red tide.

relative humidity: The ratio of the mass of water vapour in a given volume of air to the value of saturated air at the same temperature.

remote sensing satellites: Polar-orbiting satellites which observe the Earth's surface, producing images of various temporal and spatial resolutions. *See also Normalized Difference Vegetation Index and Sea Surface Temperatures.*

reservoir/reservoir host: Any animal, plant, soil or inanimate matter in which a pathogen normally lives and multiplies, and on which it depends primarily for survival; e.g. foxes are a reservoir for rabies. Reservoir hosts may be asymptomatic.

Rift Valley Fever: A viral zoonosis which mainly affects live stock in many areas of the world but which occasionally causes severe epidemics in humans, leading to high morbidity and mortality. The death of RVF-infected livestock

often leads to substantial economic losses. The virus is transmitted to animals and humans by a range of mosquitoes including *Aedes* and *Culex*.

river blindness: *See onchocerciasis.*

run-off: Water from precipitation or irrigation that does not evaporate or seep into soil but flows into rivers, streams or lakes, and that may carry sediment.

salinization: The accumulation of salts in the soil.

salmonellosis: Bacterial food-poisoning caused by *Salmonella* species, most frequently reported in North America and Europe. Most people become infected by ingesting foods contaminated with significant amounts of *Salmonella* and the poisoning typically occurs in outbreaks in the general population or hospitals, restaurants etc. Improperly handled or undercooked poultry and eggs are the foods which most frequently cause Salmonella food poisoning. Chickens are a major carrier of *Salmonella* bacteria, which accounts for its prominence in poultry products.

saturation deficit: The degree of saturation in the 1000–500 hPa layer. If the amount of moisture in a layer is held constant while the thickness decreases, the air will become more saturated until precipitation begins. The thickness at which precipitation is expected to begin for a given amount of moisture in the atmosphere is known as the saturation thickness. The difference between the saturation thickness and the actual thickness defines the saturation deficit.

scenarios: A plausible and often simplified description of how the future may develop, based on a coherent and internally consistent set of assumptions about key driving forces and relationships. Scenarios are neither predictions nor forecasts and may sometimes be based on a narrative storyline. *See also SRES scenarios and emission scenarios.*

schistosomiasis: A parasitic disease, also known as bilharziasis, caused by five species of flatworms, or blood flukes, known as schistosomes throughout the tropics. The eggs of the schistosomes in the excreta of an infected person hatch on contact with water and release larvae, the miracidia which penetrate a fresh water **intermediate** snail host and produce new parasites (cercariae). The cercariae are excreted by the snail into the water and penetrate human skin. Disease due to schistosomiasis is indicated either by the presence of blood in the urine (urinary schistosomiasis) leading eventually to bladder cancer or kidney problems or, in the case of intestinal schistosomiasis, by initial diarrhoea, which can lead to serious complications of the liver and spleen.

sea surface temperature (SST): The water temperature at 1 meter below the sea surface. However, there are a variety of techniques for measuring this parameter that can potentially yield different results because different things are actually being measured. **Remote sensing satellites** have been increasingly utilized to measure SST and have provided an enormous leap in our ability to view the spatial and temporal variation in SST. The satellite measurement is made by sensing the ocean radiation in two or more wavelengths in the infrared part of the electromagnetic spectrum which can be then be empirically related to SST.

seasonality/seasonal variation: Seasonal fluctuations in disease **incidence** or **prevalence** or other phenomena (e.g. abundance of **vectors**).

secondary air pollutants: Air pollutants formed by chemical and photochemical reactions of primary air pollutants and atmospheric chemicals.

sensitivity: Degree to which a system is affected by climate-related changes, either adversely or beneficially. The effect may be direct (e.g. a change in crop

yield in response to temperature change) or indirect (e.g. damages caused by increases in the frequency of coastal flooding).

sentinel site: Specific health facility, usually a general/family practice, which undertakes to maintain surveillance and report certain specific predetermined events such as cases of certain infectious diseases.

serotype: Identifiable factor or factors in blood serum detected by serological tests.

seroprevalence: Prevalence of a specified serotype in a specified population.

SIDS: Small Island Developing States.

snow blindness: *See photokeratitis.*

snowshoe hare virus (SHV): A **zoonotic** viral infection which persists in cycles of transmission among wild mammals and mosquitoes. A wide range of wild mammal species can be infected with SSH virus and the snowshoe hare is thought to be important in some areas of Canada. Disease in people, when it occurs, takes the form of infection and inflammation of the brain (meningitis and encephalitis).

soft ticks: Ticks of the family Argasidae, characterised by the absence of a scutum (dorsal plate) and lack of visible mouthparts from the dorsal view. *See also hard ticks.*

solar activity: Variations in the energy output of the sun, measurable as numbers of sun spots as well as radiative output, magnetic activity, and emissions of high energy particles.

solar radiation: Radiation emitted by the sun, also referred to as short-wave radiation.

spatial and temporal scale/resolution: Climate may vary on a large range of spatial and temporal scales. Spatial scales may range from local or high resolution (less than 100 000 km^2), to continental or low resolution (10 to 100 million km^2). Temporal scales may range from seasonal to geological (up to hundreds of millions of years).

spirochaete: Bacterium with a spiral shape. *See also Lyme disease.*

SRES: Emissions scenarios used as a basis for the climate projections in the IPCC TAR in 2001. There are four scenario families, comprising A1, A2, B1 and B2:

- A1: a future world of very rapid economic growth, low population growth, and the rapid introduction of new and more efficient technologies. Major underlying themes are convergence among regions, capacity building, and increased cultural and social interactions, with a substantial reduction in regional differences in per capita income.
- A2: a very heterogeneous world. The underlying theme is self-reliance and preservation of local identities. Fertility patterns across regions converge very slowly, which results in high population growth. Economic development is primarily regionally oriented and per capita economic growth and technological change are more fragmented and slower than in other storylines.
- B1: a convergent world with low population growth but rapid changes in economic structures toward a service and information economy. The emphasis is on global solutions to economic, social, and environmental sustainability, including improved equity, but without additional climate initiatives.
- B2: a world in which the emphasis is on local solutions to economic, social, and environmental sustainability. It is a world with moderate population

growth, intermediate levels of economic development, and less rapid and more diverse technological change.

stakeholder: Person or entity that has an interest or 'stake' in the outcome of a particular action or policy.

statistical model: a mathematical approach to determine the relationship between environmental factors and an outcome of interest (e.g. the distribution of disease vectors) using statistical procedures such as regression or discriminant analysis. In comparison to **biological models**, this approach requires extensive records of vector distribution through time and/or space.

stratosphere: The region of the atmosphere above the troposphere extending from about 10 km to about 50 km.

stratospheric ozone depletion: The reduction of the quantity of **ozone** contained in the **stratosphere** due principally to the release of halogenated chemicals, such as **Chlorofuorocarbons (CFCs)**.

stratospheric ozone layer: The stratosphere contains a layer in which the concentration of ozone is greatest, the "ozone layer". The layer extends from about 12 to 40 km. A very strong depletion of the ozone layer takes place over the Antarctic region, caused by human-made chlorine and bromine compounds.

stressor: Single condition or agent that contributes to stress of an organism, population or **ecosystem**.

surveillance: Continuous analysis, interpretation and feedback of systematically collected data for the detection of trends in the occurrence or spread of a disease, based on practical and standardized methods of notification or registration. Sources of data may be related directly to disease or factors influencing disease.

susceptibility: Probability that an individual or population will be affected by an external factor.

sustainability: A characteristic of human activity that is undertaken in such a manner that it does not adversely affect environmental conditions and which means that that activity can be repeated in the future.

synoptic: Any of the methods used to analyse relationships between total atmospheric conditions and the surface environment. Usually expressed in two forms: "**air mass** identification" which assesses the meteorological quality of the entire **atmosphere** and "weather type evaluation" which identifies various weather systems and their impact.

T helper cells: *See lymphocytes.*

TNC: The Nature Conservancy.

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

thermohaline circulation: Large-scale density driven circulation in the ocean, caused by differences in temperature and salinity.

threshold: Abrupt change in the slope or curvature of a **dose-response** graph.

tick-borne encephalitis (TBE): A viral infection of the central nervous system transmitted by the bite of *Ixodes ricinus* ticks. The disease occurs in Scandinavia, western, eastern and central Europe, and countries that made up the former Soviet Union. Initial symptoms include fever, headache, nausea and vomiting and in some cases the disease progresses into a neurological infection resulting in paralysis and coma.

tide gauge: A device at a coastal location which continuously measures the level of the sea with respect to the adjacent land.

time-series analysis: Statistical methods used to describe events that are measured in an ordered sequence at equally-spaced time intervals, and often to analyse their variations as functions of other variables (e.g. analyses of daily records of daily **mortality** rates, as a function of concurrent variation in temperature).

trachoma: A form of bacterial conjunctivitis caused by *Chlamydia trachomatis*.

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

troposphere: The lowest part of the atmosphere from the surface to about 10 km in altitude in mid-latitudes where clouds and "weather" phenomena occur. In the troposphere, temperatures generally decrease with height.

trypanosomiasis: Parasitic disease caused by protozoans of the genus *Trypanosoma*. In the Americas, American trypanosomiasis (Chagas disease) is caused by *T. cruzi* and transmitted by reduviid (kissing) bugs of the genus *Triatoma* and *Rhodnius*. In Africa, human African trypanosomiasis (sleeping sickness) is caused by *T. brucei rhodesiense* and *T. b. gambiense* and transmitted by **tsetse flies**.

tsetse fly: Any of several bloodsucking African flies of the genus *Glossina* which transmit African sleeping sickness (trypanosomiasis) to humans. The tsetse fly also carries the parasites that cause nagana in cattle and other diseases of wild and domestic animals.

tuberculosis (TB): A bacterial infection caused by *Mycobacterium tuberculosis*. TB is highly contagious, spreading through the air in infected droplets from coughing, sneezing, talking or spitting of infectious people.

typhoid: Infectious fever usually spread by food, milk, or water supplies which have been contaminated with *Salmonella typhi*, either directly by sewage, indirectly by flies, or as a result of poor personal hygiene.

UKCIP: The UK Climate Impacts Programme.

USEPA: United States Environmental Protection Agency.

ultraviolet radiation (UVR): Solar radiation within a certain wavelength, depending on the type of radiation (A, B or C). Ozone absorbs strongly in the UV-C (<280 nm) and solar radiation in these wavelengths does not reach the earth's surface. As the wavelength is increased through the UV-B range (280 nm to 315 nm) and into the UV-A (315 nm to 400 nm) ozone absorption becomes weaker, until it is undetectable at about 340 nm.

UN Framework Convention on Climate Change (UNFCCC): Convention signed at United Nations Conference on Environment and Development in 1992. Governments that become Parties to the Convention agree to stabilize **greenhouse gas** concentrations in the **atmosphere** at a level that would prevent dangerous **anthropogenic** interference with the **climate system.**

UNEP: United Nations Environment Programme.

uncertainty: An expression of the degree to which a value is unknown. This can result from lack of information or disagreement about what is known. Uncertainty can be represented by **quantitative** measures (e.g. a range of values calculated by mathematical models) or **qualitative** statements (e.g. reflecting the judgement of a team of experts).

unstable malaria: Haphazard transmission of malaria, occurring only during "favourable" episodes. *See also malaria.*

urban heat island: *See heat island effect.*

vector: An organism that acts as an essential **intermediate** host or definite host for a human pathogen and that plays an active role in its transmission; for example *Anopheles* mosquitoes are vectors of **malaria**. This definition excludes

mechanical carriers of infective materials (such as houseflies and cockroaches), strictly passive intermediate hosts (e.g. the snail hosts of **schistosomiasis**) and reservoir species (e.g. foxes carrying rabies).

vector-borne diseases: Range of infectious diseases which are transmitted between hosts by **vectors** such as mosquitoes or ticks (e.g. **malaria, dengue fever, Lyme disease**).

vivax malaria: See *Plasmodium vivax* and malaria.

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

watershed: The region draining into a river, river system or body of water.

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

water vapour: Also called humidity; the largest single greenhouse gas. Water vapour also forms an important link between the land and ocean; it is a carrying mechanism that transports energy around the globe and, therefore, a major driver of weather patterns—a fact demonstrated spectacularly by typhoons and hurricanes powered by tropical evaporation.

WHO: World Health Organization.

WMO: World Meteorological Organization.

West Nile Virus (WNV): A zoonotic virus transmitted by mosquitoes (normally *Culex*) and maintained in a wildlife cycle involving birds. Occasional spill-over to the human population results after virus **amplification** and can cause large epidemics. Symptoms may be mild and include fever, headache and malaise while symptoms of severe infection include high fever, neck stiffness, coma and paralysis.

WWF: World Wildlife Fund.

yellow fever: A mosquito-borne viral disease occurring in sub-Saharan Africa and tropical South Americ. Several different species of the *Aedes* and *Haemagogus* (S. America only) mosquitoes transmit the yellow fever virus. Infection causes a wide spectrum of disease, from mild symptoms to severe illness and death.

zoonosis: An infectious disease of vertebrate animals, such as rabies, which can be transmitted to humans.

zooplankton/zooxanthellae: The animal forms of **plankton**. They consume **phytoplankton** and other zooplankton.