

Climate

Definition:

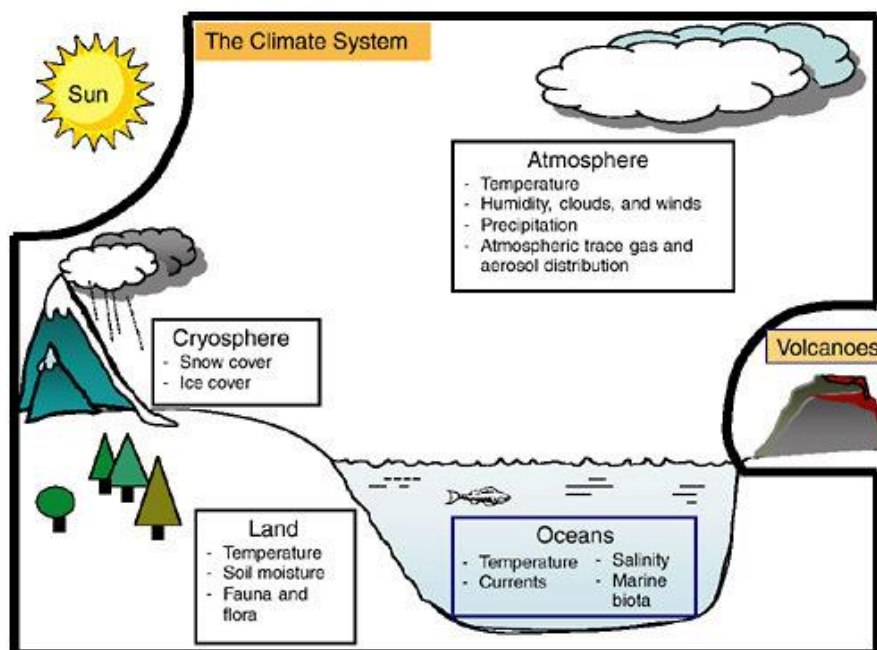
Climate is a measure of the average pattern of variation in temperature, humidity, atmospheric pressure, wind, precipitation, atmospheric particle count and other meteorological variables in a given region over long periods of time.

Climate (from Ancient Greek klima, meaning inclination) is commonly defined as the weather averaged over a long period. The standard averaging period is 30 years, but other periods may be used depending on the purpose. Climate also includes statistics other than the average, such as the magnitudes of day-to-day or year-to-year variations.

What is meant by Climate Change?

The term “climate change” is used by the media, funding agencies and in professional journals but without a clear and adequate definition as to what this term means. Here are a few definitions:

1. [Dictionary.com – climate change](https://www.dictionary.com/browse/climate-change) – a long-term change in the earth’s climate, especially a change due to an increase in the average atmospheric temperature: Melting glaciers imply that life in the Arctic is affected by climate change.



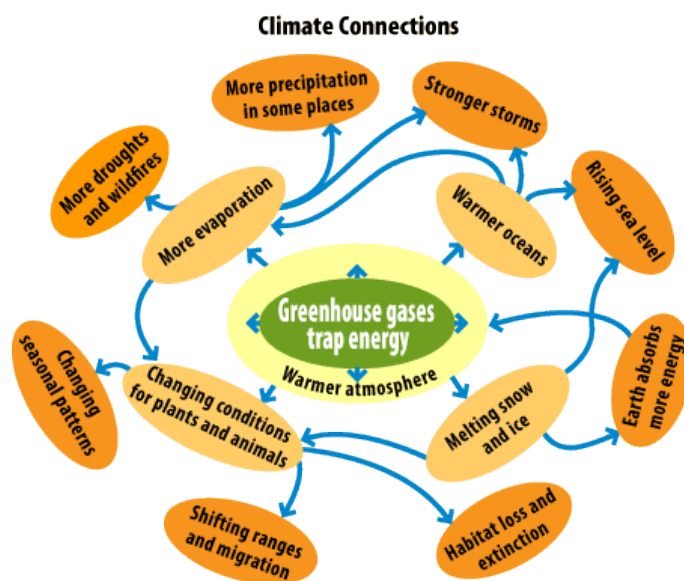
A change in global climate patterns apparent from the mid to late 20th century onwards, attributed largely to the increased levels of atmospheric carbon dioxide produced by the use of fossil fuels.

Climate change is the variation in global or regional climates over time. It reflects changes in the variability or average state of the atmosphere over time scales ranging from decades to millions of years. These changes can be caused by processes internal to the Earth, external forces (e.g. variations in sunlight intensity) or, more recently, human activities.

In recent usage, especially in the context of environmental policy, the term "climate change" often refers only to changes in modern climate, including the rise in average surface temperature known as global warming. In some cases, the term is also used with a presumption of human causation, as in the **United Nations Framework Convention on Climate Change (UNFCCC)**. The UNFCCC uses "climate variability" for non-human caused variations.

What are important concepts related to climate change?

There are three important concepts related to climate change, its impact and the responses of natural and human systems. These concepts are defined below.



1. **Vulnerability:** In the literature of climate change, vulnerability is defined as the combined measure of threats to a particular system. Vulnerability is the degree to which a system is susceptible to or unable to cope with the adverse effects of climate change, including climate variability and extremes (McCarthy et al., 2007).
2. **Adaptation:** Adaptation refers to the ability of a system to adjust to climate change in order to reduce its vulnerability, and enhance the resilience to observed and anticipated impacts of climate change.

IPCC (Intergovernmental Panel on Climate Change) defines adaptation as 'adjustment in natural or human systems to a new or changing environment. Adaptation to climate change refers to adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities'.

Adaptation occurs in physical, ecological, and human systems. It involves the following.

- Changes in social and environmental processes
- Perceptions of climate risk
- Practices and functions to reduce risk
- Exploration of new opportunities to cope with the changed environment

In other words, adaptation can be understood as an ongoing process addressing many factors and stresses, rather than just climate change in specific.

3. **Mitigation:** Mitigation refers to any strategy or action taken to remove the GHGs released into the atmosphere, or to reduce their amount.

IPCC defines mitigation as 'technological change and substitution that reduce resource inputs and emissions per unit of output with respect to climate change. Mitigation means implementing policies to reduce GHG emissions and enhance sinks'.

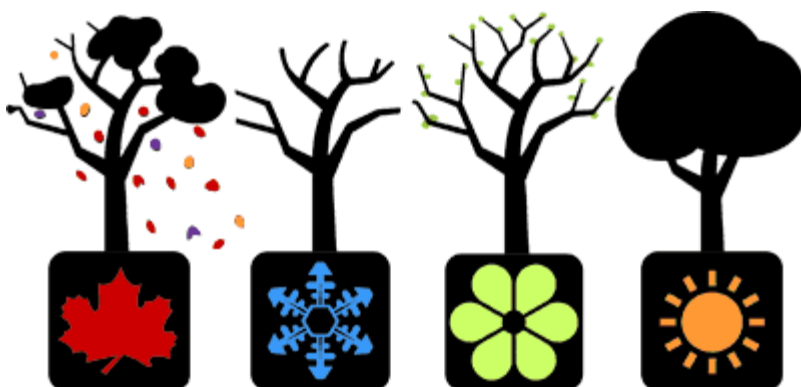
Adaptation and mitigation are complementary to each other. For example, if mitigation measures are undertaken effectively, lesser will be the impacts to which we will need to adapt. Similarly, if adaptation measures (or the degree of preparedness) are strong, lesser might be the impacts associated with any given degree of climate change.

What is the difference among climate, weather & season?

Key Change:

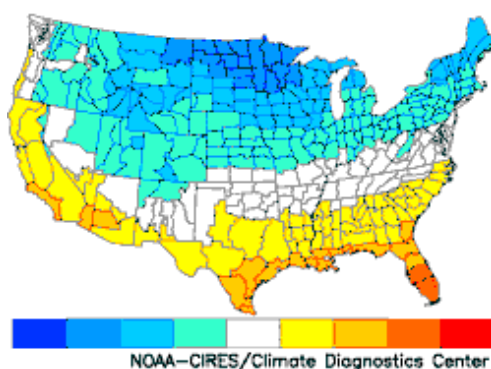
1. Weather is the conditions of the present time; Sunny, rainy, windy, snowy, etc. and temperature.
2. Climate is the average temperature and precipitation amount.
3. Season is; Summer, Autumn/Fall, Winter, Spring.

Weather changes in **cycles**. **Cycles of weather** changes are called **seasons**. There are four seasons: winter, spring, summer and autumn. Some seasons are hot. Some seasons are cold. Some seasons are wet. Some seasons are dry.



Winter is the cold season. Summer is the hot season, these seasons are often dry. Spring is the season between winter and summer. The air begins to warm in the spring. Autumn, or fall, is the season between summer and winter. The air begins to cool in the fall. Spring and fall are often wet.

Cycles of weather changes differ from place to place. The long-term pattern of weather in any part of the world is called **climate**.



There are three major climate zones: tropical, temperate, and polar. Climate zones differ in temperature and precipitation. Tropical climates are usually warm and wet most of the year. Much of Central and South America are in the tropical climate zone. Temperate climates cycle through all four seasons—winter, spring, summer, and autumn. Much of the United States is in a temperate climate zone. Polar climates are usually cold and dry most of the year. Antarctica is in a polar climate zone.

Weather is very important. It determines what clothes we should wear. It even affects what we can do for fun. For example, is it warm enough to wear shorts today? Is it cold enough to go ice skating now?

Weather forecasters tell us what the weather will be like. They find out from meteorologists. Meteorologists are scientists who study weather.

Weather happens every day. But what exactly is weather? Weather is made up of many parts. One part is temperature. Temperature is how hot or cold the air is. Another part of weather is precipitation. Precipitation is water that falls from the sky to Earth. The water can be a liquid. It can be a solid. Or it can be a mixture of the two. Rain, snow, sleet, and hail are types of precipitation. A third part of weather is wind. Wind can be a gentle breeze. It can also be a strong tornado. All of these parts are affected by air pressure. Air pressure is the fourth major part of weather. As the phrase implies, air pressure is the pressure that air exerts on Earth's surface.

“Weather reflects short-term conditions of the atmosphere while climate is the average daily weather for an extended period of time at a certain location.”

Comparison chart

	Climate	Weather
Definition	Describes the average conditions expected at a specific place at a given time. A region's climate is generated by the climate system, which has five components: atmosphere, hydrosphere, cryosphere, land surface, and biosphere.	Describes the atmospheric conditions at a specific place at a specific point in time. Weather generally refers to day-to-day temperature and precipitation activity
Components	Climate may include precipitation, temperature, humidity, sunshine, wind velocity, phenomena such as fog, frost, and hail storms over a long period of time.	Weather includes sunshine, rain, cloud cover, winds, hail, snow, sleet, freezing rain, flooding, blizzards, ice storms, thunderstorms, steady rains from a cold front or warm front, excessive heat, heat waves and more
Forecast	By aggregates of weather statistics over periods of 30 years	By collecting meteorological data, like air temperature, pressure, humidity, solar radiation, wind speeds and direction etc.
Determining factors	Aggregating weather statistics over periods of 30 years ("climate normal's").	Real-time measurements of atmospheric pressure, temperature, wind speed and direction, humidity, precipitation, cloud cover, and other variables
About	Climate is defined as statistical weather information that describes the variation of weather at a given place for a specified interval.	Weather is the day-to-day state of the atmosphere, and its short-term (minutes to weeks) variation
Time period	Measured over a long period	Measured for short term
Study	Climatology	Meteorology

What factors affect the climate of an area?

There are many different factors that affect climate around the world. It is the varying influence of these factors that lead to different parts of the Earth experiencing differing climates. The most important natural factors are:

1. Distance from the sea
2. Ocean currents
3. Direction of prevailing winds
4. Shape of the land (known as 'relief' or 'topography')
5. Distance from the equator
6. The El Niño phenomenon.

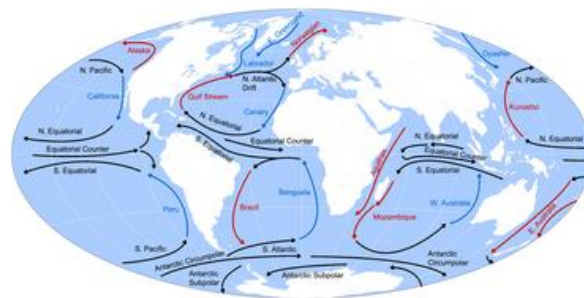
It is now widely accepted that human activity is also affecting climate, and that the impact is not the same everywhere. For example, changes appear to be happening faster near the poles than in many other places. In this tutorial we will look at some of these factors in more detail.

1. Distance from the sea (Continentality)

The sea affects the climate of a place. Coastal areas are cooler and wetter than inland areas. Clouds form when warm air from inland areas meets cool air from the sea. The centre of continents are subject to a large range of temperatures. In the summer, temperatures can be very hot and dry as moisture from the sea evaporates before it reaches the centre of the land mass.

2. Ocean currents

Ocean currents can increase or reduce temperatures. The diagram below shows the ocean currents of the world. The main ocean current that affects the UK is the Gulf Stream.



The Gulf Stream is a warm ocean current in the North Atlantic flowing from the Gulf of Mexico, northeast along the U.S coast, and from there to the British Isles.

The Gulf of Mexico has higher air temperatures than Britain as it is closer to the equator. This means that the air coming from the Gulf of Mexico to Britain is also warm. However, the air is also quite moist as it travels over the Atlantic ocean. This is one reason why Britain often receives wet weather.

The Gulf Stream keeps the west coast of Europe free from ice in the winter and, in the summer, warmer than other places of a similar latitude.

3. Direction of prevailing winds



Winds that blow from the sea often bring rain to the coast and dry weather to inland areas. Winds that blow to Britain from warm inland areas such as Africa will be warm and dry. Winds that blow to Britain from inland areas such as central Europe will be cold and dry in winter. Britain's prevailing (i.e. most frequently experienced) winds come from a south westerly direction over the Atlantic. These winds are cool in the summer, mild in the winter and tend to bring wet weather.

4. The shape of the land ('relief')



Climate can be affected by mountains. Mountains receive more rainfall than low lying areas because as air is forced over the higher ground it cools, causing moist air to condense and fall out as rainfall.

The higher the place is above sea level the colder it will be. This happens because as altitude increases, air becomes thinner and is less able to absorb and retain heat. That is why you may see snow on the top of mountains all year round.

5. Distance from the equator

The distance from the equator affects the climate of a place. At the poles, energy from the sun reaches the Earth's surface at lower angles and passes through a thicker layer of atmosphere than at the equator. This means the climate is cooler further from the Equator. The poles also experience the greatest difference between summer and winter day lengths: in the summer there is a period when the sun does not set at the poles; conversely the poles also experience a period of total darkness during winter. In contrast, daylength varies little at the equator.

6. El Niño

El Niño, which affects wind and rainfall patterns, has been blamed for droughts and floods in countries around the Pacific Rim. El Niño refers to the irregular warming of surface water in the Pacific. The warmer water pumps energy and moisture into the atmosphere, altering global wind and rainfall patterns. The phenomenon has caused tornadoes in Florida, smog in Indonesia, and forest fires in Brazil.

El Niño is Spanish for 'the Boy Child' because it comes about the time of the celebration of the birth of the Christ Child. The cold counterpart to El Niño is known as La Niña, Spanish for 'the girl child', and it also brings with it weather extremes.

Human influence



The factors above affect the climate naturally. However, we cannot forget the influence of humans on our climate. Early on in human history our effect on the climate would have been quite small. However, as populations increased and trees were cut down in large numbers, so our influence on the climate increased. Trees take in carbon dioxide and produce oxygen. A reduction in trees will therefore have increased the amount of carbon dioxide in the atmosphere.

The Industrial Revolution, starting at the end of the 19th Century, has had a huge effect on climate. The invention of the motor engine and the increased burning of fossil fuels have increased the amount of carbon dioxide (a greenhouse gas - more on that later) in the atmosphere. The number of trees being cut down has also increased, reducing the amount of carbon dioxide that is taken up by forests.

In Short:

1. Latitude & Longitude - Where you are positioned on the earth
2. Altitude - How high you are, higher = cooler
3. Prevailing Winds - depends where the winds come from, warm or cold areas
4. Distance from Oceans - Ocean's moderate climate, closer you are, less variation you get
5. Ocean Currents - Ocean currents can bring warm air from far away
6. Geography - What the area is like. Topography, vegetation, nearness to mountains etc all affect the climate.

How can we save our environment?

Tips

- Turn off the water tap when brushing your teeth. This simple action can save tons of water.
- Do not burn garbage. As it causes air pollution.
- If you or someone you know doesn't see the "point" of doing these things, watch or show him or her a movie like An Inconvenient Truth, Who Killed the Electric Car?, and The Day After Tomorrow to show them the effects of what will happen if we don't work to save our environment.
- Rather than buy a printed book consider the library, a book swap or if you want to purchase, purchase an eBook. Try EcoBrain.com for eBooks on green living and environmental education.
- Measure your eco-footprint online. There are many sites that offer this. Once it is measured, see what you can do to reduce your home's impact on the environment.
- Reduce your waste before recycling! Buy loose products and minimise packaging on the products you buy at the shops. Take a reusable bag with you.

What are the responsibilities of a society to conserve environment?

Principal achievements in 2012

- Successfully established diagnosis techniques for diseased Para rubber trees and completed genetic sequencing
- Tightened management of chemical substances across the entire Bridgestone Group
- Strengthened environmental management system aimed at further reducing our impacts on the environment
- Selected locations for a guayule research farm and associated process research centre
- Continued the zero waste to landfill status with regard to waste products at all plants in Japan
- Rolled out water management*1 measures in Japan, the United States, Europe and Thailand, etc.
- Developed TRISAVER in Japan, a manufacturing technology for truck and bus tire using our proprietary retread techniques that helps to reduce resource usage and achieve a greater degree of fuel-efficiency
- Reduced CO2 emission per sales from the company's total operations and also its products' "after-sales" by 17.9% of 2005 levels*2
- Bridgestone's Wilson Plant in the U.S. became the first tire factory in the world to obtain ISO 50001 certification for its energy management system, and the Bridgestone Technical Center Europe in Rome was the first in Italy to obtain this

Principal plans for 2013 and beyond

- Trialing policies designed to pave the way for procurement of sustainable materials*3
- Trialing water management policies with the goal of using water resources in a sustainable manner*4
- Aiming to reduce CO2 emission from manufacturing by 35% compared to 2005 levels by the year 2020 (per sales)
- Pursuing use of renewable energy
- Expanding energy-saving diagnostics at production bases and improving production equipment and methods to achieve greater energy and production efficiency

Contribution to the conservation of environment through products and services

Principal achievements in 2012

- Exhibited a concept tire of “100% sustainable materials” at the 2012 Paris Motor Show
- Accelerated research on sustainable materials (guayule, Russian dandelion, and biomass-derived synthetic rubber, etc.)
- Expanded the solutions business using retread tires
- Reduced the tire rolling resistance coefficient by 7.0% compared to 2005, while maintaining wet grip performance
- Expanded the lineup of ECOPIA fuel-efficient tires and increased supply globally (76 countries)
- Released fuel-efficient tire with the highest grade (AAA-a) given under Japan’s tire labeling system
- Rolled out “Criteria for Eco Products” globally

Principal plans for 2013 and beyond

- Developing products and technologies that contribute to improved resource productivity
- Developing technologies that contribute to the expanded use of sustainable materials*
- Further expanding the solutions business using retread tires
- Aiming to reduce the tire rolling resistance coefficient in 2020 by 25.0% compared to 2005, while maintaining wet grip performance
- Expanding Bridgestone's fuel-efficient tire line up and make it available worldwide
- Expanding availability of eco products in accordance with “Criteria for Eco Products”