

GEOGRAPHY



Climate

Weather is the state of the atmosphere over an area at a given point of time. Climate, on the other hand, refers to the total of weather conditions and variations occurring over a large area over a long period of time. Wind, rainfall, temperature and atmospheric pressure are some important elements of climate and weather. Two main differences between weather and climate:

Weather	Climate
Weather is a day-to-day state of the atmosphere of an area at any given point of time.	Climate is the total of weather conditions of a given place over a longer period of time.
Weather changes on a daily basis.	Climate of a given place remains constant for over 30 to 40 years.

The Climate of India

India has a 'monsoon' type of climate. It experiences several kinds of regional climatic variations. While there is hardly 20 cm of rainfall annually in the western parts of Rajasthan and Gujarat, Assam and Arunachal Pradesh receive more than 250 cm of rainfall. During winters, the night temperature may fall below -45°C , while on the same night, Thiruvananthapuram may experience a temperature of 45°C . These variations have resulted in different lifestyles of the people.

Factors Affecting the Climate of India

Factors which affect the climate of India are

Latitude

- Tropic of Cancer, a latitude, passes through India at $23^{\circ}26'\text{N}$ to the north of the equator. It passes through eight Indian states running from the Rann of Kutch of Gujarat to Mizoram in the east.
- The Tropic of Cancer divides the country into two halves. The areas in India which lie to the north of the Tropic of Cancer lie in the sub-tropical regions, while the areas to the south of the tropic lie in the tropical regions.
- The temperature remains high throughout the tropical regions.

Altitude: The temperature declines as we travel to places above the sea level. Thus, the temperature decreases with an increase in altitude.

- There is a decrease of 1°C for every 166 m rise in height. This is the reason that hill stations in India are cooler than the plain regions.

Air Pressure and Surface Winds

- India lies in the region of northeasterly winds. However, as these winds blow over land, they carry very little moisture and cause no rainfall.
- During winters, high pressure areas are created to the north of the Himalayas. Cold winds blow from this region to the low pressure areas to the south over the oceans.
- During summers, as low pressure areas develop over Central Asia, there is complete reversal of the direction of the winds. Winds move from a high pressure area over the Southern Indian Ocean. As these winds blow over the warm ocean, they gather moisture and bring rainfall to the country.
- The climate of India is also influenced by jet streams. The western cyclonic disturbances in the north and northwestern parts of the country are brought about by the sub-tropical westerly jet streams.

Jet streams are a narrow belt of high altitude westerly winds in the troposphere. Their speed varies from about 110 km/h in summers and to about 184 km/h during winters. The cyclonic disturbances which are experienced in the northern and northwestern parts of the country are brought in by the westerly flow.

The Indian Monsoon

India has a monsoon type of climate as its climate is strongly influenced by the monsoon winds. It is important to keep certain facts in mind before studying the monsoon season in India. These are

- The differences in heating and cooling of land and water results in the creation of low pressure on the Indian mainland. The seas at the same time experience high pressure conditions.
- Inter Tropical Convergent Zone (ITCZ)** is a broad trough of low pressure in the equatorial latitudes.
- The presence of high pressure area east of Madagascar over the Indian Ocean affects the Indian monsoon.
- The movement of the westerly jet stream to the north of the Himalayas and the tropical easterly jet stream over the Indian Peninsula also affect the rainfall in India.

It has been seen that apart from other factors, the changes in the pressure conditions over the southern oceans also affect the monsoons. Generally, when the tropical eastern South Pacific Ocean experiences high pressure, the tropical eastern Indian Ocean experiences low pressure. However, it has been noticed that there has been a reversal in the pressure conditions. While the eastern South Pacific Ocean has low pressure conditions, the eastern Indian Ocean has relatively high pressure conditions. This periodic change in pressure conditions is known as the **Southern Oscillation** or **SO**.

The Onset of the Monsoons and their Withdrawal

- In India, the duration of the monsoon is generally from the months of June to mid-September. When the monsoon arrives, the intensity of the rainfall increases which continues for several days; this is known as the '**burst**' of the monsoon.
- By the first week of June, the monsoon arrives in Kerala. It is then divided into two branches—the Bay of Bengal branch and the Arabian Sea branch.
- The Arabian Sea branch reaches Mumbai in the second week of June. The Bay of Bengal branch also arrives in Assam in the first week of June. The mountains in the region lead to the deflection of the monsoon winds over the North Indian Plains.
- By mid-June, the monsoon strikes the central parts of the country and the Saurashtra and Kutch regions.
- Uttar Pradesh, Punjab, Haryana and eastern Rajasthan receive rainfall by the first week of July.
- The monsoon winds begin to withdraw from the northwestern parts of India by early September. It withdraws from the peninsular region by mid-October and it completely withdraws from the country by the first week of December.

The Seasons

A country with a monsoon type of climate experiences distinct seasons. India experiences the following seasons:

The Cold Weather Season

- The cold weather season in India begins during mid-November in Northern India and stays till February. December and January are the coldest months.

- During the cold season, the days are warm and the nights are cold. When temperature decreases, frost is commonly experienced in Northern India.
- The cold season in most parts of the country is the dry season as northeast trade winds blow from land to sea.
- Many cyclonic disturbances occur over northern India during this time. These result in rainfall during winters and snowfall in the Himalayan regions. This winter rainfall helps in the cultivation of rabi crops.

The Hot Weather Season

- The hot weather season in India begins from March and continues till May. In May, the temperature rises to 45°C in the northwestern parts of the country.
- Because of high temperature, low air pressure is created in the northern parts of the country.
- One of the striking features of the hot weather season in India is the blowing of local winds known as 'loo'. It is a hot wind which may blow even during the evenings. Direct exposure to these winds may cause fever and anxieties.
- Sometimes, northern India experiences dust storms accompanied by light rainfall during May. This brings down the temperature.
- During this time, torrential downpours are accompanied by hail in West Bengal. These storms are known as Kaal Baisakhi.
- Towards the end of the summer season, rain showers are common in Kerala and Karnataka. They help in the early ripening of mangoes and thus are sometimes also referred to as 'mango showers'.

Advancing Monsoon

- By the first week of June, low pressure conditions get intensified over the North Indian Plains. These conditions attract the southeast trade winds which originate from the Southern oceans.
- These winds blow over the warm oceans and thus bring moisture and rainfall to the country.
- During the early monsoon season, the places located on the windward side of the Western Ghats receive heavy rainfall up to 250 cm.
- The northeastern parts of the country receive heavy rainfall. Mawsynram in Meghalaya receives the highest amount of rainfall in the world.
- As we go from the east to the west, the rainfall decreases. Rajasthan and Gujarat receive scanty rainfall.
- Rain does not fall continuously during the monsoon season. Thus, there are dry spells and wet spells. Monsoons are uncertain and irregular.

Retreating Monsoon

- During October and November, the southwest monsoon winds become weaker and start retreating from the Northern Plains by the beginning of October.
- The retreat is indicated by clear skies and an increase in the temperature in the northern plains. This increase in temperature is termed 'October heat'.
- At this time, the low pressure conditions shift to the Bay of Bengal, giving rise to cyclonic depressions. These cyclonic depressions often result in the destruction of life and property, generally on the eastern coast and the southern coast.
- Most of the rainfall in the Coromandel Coast is derived from depressions and cyclones.

Distribution of Rainfall

- Rainfall distribution is not the same for every part of the country. While northeastern India and the parts of the western coast receive about 400 cm of rainfall annually, western Rajasthan and the western parts of Gujarat, Punjab and Haryana receive less than 60 cm of rainfall.
- The winds which rise from the Arabian Sea are full of moisture. These winds strike the mountains on the western side resulting in heavy rainfall. By the time these winds reach the Eastern Ghats, they are already dry as they already shed their moisture. Hence, the Western Ghats receive more rainfall than the Eastern Ghats.
- Rainfall is also low in the Eastern Ghats, interior parts of the Deccan Plateau and the Leh region of Jammu and Kashmir.
- The other parts of the country receive moderate rainfall.
- Such a distribution of rainfall causes great climatic variations. While the eastern parts of the country almost get flooded every year, the western parts of the country experience drought like situations.

Monsoon as a Unifying Bond

Although the monsoon winds are irregular and uncertain, they unify the entire country. The farmers eagerly wait for the arrival of rainfall. Rainfall provides the water required to set agricultural activities in motion. Its arrival is welcomed with the celebration of festivals, singing and dancing.



Map showing direction of South west monsoon winds in India