Notes of “Climate”

Weather is the condition of the atmosphere at a particular place and time. It may change from hour to hour or day to day. For example, a day may be hot, rainy, or windy.

Climate, on the other hand, refers to the average weather conditions of a large area over a long period of time, usually many years. Climate does not change quickly like weather.

Elements such as temperature, rainfall, wind, and air pressure play an important role in both weather and climate.

Difference between Weather and Climate

Weather: Short-term condition of the atmosphere (changes daily). Weather is a day-to-day state of the atmosphere of an area at any given point of time. Weather changes on a daily basis.

Climate: Long-term pattern of weather of a place (changes over many years). Climate is the total of weather conditions of a given place over a longer period of time. Climate of a given place remains constant for over 30 to 40 years.

The Climate of India

India has a monsoon type of climate. This means that the climate of India is strongly influenced by monsoon winds. However, the climate is not the same everywhere in the country. India experiences regional variations in climate.

For example:

- Western Rajasthan and Gujarat receive less than 20 cm of rainfall annually.
- Assam and Arunachal Pradesh receive more than 250 cm of rainfall.
- In winter, temperature in some parts of India can fall below –45°C, while places like Thiruvananthapuram may experience a temperature of around 25–30°C on the same day.

These climatic differences have a strong impact on the lifestyle, food habits, clothing, and occupations of people living in different parts of India.

Factors Affecting the Climate of India

1. Latitude

- The Tropic of Cancer (23°26'N) passes through India.
- It divides India into two climatic regions:

1) Sub-tropical region (north of the Tropic of Cancer)
2) Tropical region (south of the Tropic of Cancer)

- Due to this, northern India experiences extreme temperatures, while southern India has a moderate climate.

2. Altitude

- As we go higher above sea level, the temperature decreases.
- There is a decrease of 1°C for every 166 metres of rise in altitude.
- This is why hill stations like Shimla and Darjeeling are cooler than the plains, even during summers.

3. Air Pressure and Surface Winds
    - India lies in the region of northeast trade winds.
    - During winters, high-pressure areas develop north of the Himalayas. Cold winds blow from land to sea, so they carry very little moisture and cause dry weather.
    - During summers, low-pressure areas develop over Central Asia and the Indian mainland. Winds reverse their direction and blow from sea to land, bringing moisture and rainfall.
4. Jet Streams

- Jet streams are fast-flowing air currents high up in the atmosphere.
- Their speed ranges from 110 km/h in summer to 184 km/h in winter.
- The sub-tropical westerly jet stream brings western disturbances to north and northwest India, causing winter rainfall and snowfall.

The Indian Monsoon

The monsoon plays a very important role in India's climate. Before understanding the monsoon, some key points must be kept in mind:

1) Land heats up and cools faster than water, creating low pressure over land and high pressure over seas.
2) The Inter Tropical Convergence Zone (ITCZ) is a low-pressure area near the equator.
3) A high-pressure area near Madagascar affects the monsoon winds.
4) Movement of jet streams also influences rainfall.

Southern Oscillation (SO)

Sometimes, pressure conditions over the Indian Ocean and the Pacific Ocean change. This periodic change is known as the Southern Oscillation, which affects the strength and timing of monsoons in India.

Onset and Withdrawal of Monsoon

- The monsoon season in India usually lasts from June to mid-September.
- The sudden increase in rainfall at the beginning of the monsoon is called the “burst of the monsoon.”
- Monsoon first arrives in Kerala by early June.
- It divides into two branches:
  1) Arabian Sea branch
  2) Bay of Bengal branch
- By mid-June, the monsoon reaches central India.
- By early July, it covers northern India.
- Withdrawal of monsoon starts from north-western India in September and completely retreats by early December.

The Seasons of India

India experiences four main seasons due to its monsoon type of climate.

1)Cold Weather Season (Winter)

- Begins in mid-November and lasts till February.
- December and January are the coldest months.
- Days are warm, nights are cold.
- Frost is common in northern India.
- Western disturbances bring winter rainfall, which is helpful for rabi crops.

2)Hot Weather Season (Summer)

- Begins in March and lasts till May.
- Temperature may rise up to 45°C in north-western India.
- Hot winds called “loo” blow in northern India.
- Dust storms and light rain may occur.
- In West Bengal, storms called Kaal Baisakhi occur.
- Mango showers in Kerala and Karnataka help in early ripening of mangoes.

3)Advancing Monsoon

- Begins in June.
- Moist winds bring heavy rainfall.
- Western Ghats receive heavy rainfall.
- North-eastern India also receives very heavy rainfall.
- Rainfall decreases from east to west.
- Monsoon rainfall is irregular, with dry and wet spells.

4)Retreating Monsoon

- Occurs during October and November.
- Clear skies and rise in temperature cause October heat.
- Cyclonic depressions form in the Bay of Bengal.
- Eastern coast receives heavy rainfall due to cyclones.
- Coromandel Coast gets most of its rain during this season.

Distribution of Rainfall in India

- Rainfall is unevenly distributed.
- North-eastern India and Western Coast receive heavy rainfall.
- Western Rajasthan, Gujarat, Punjab, and Haryana receive scanty rainfall.
- Western Ghats receive more rainfall than Eastern Ghats.
- Leh and interior Deccan Plateau receive very little rainfall.
- Unequal rainfall leads to floods in eastern India and droughts in western India.

Monsoon as a Unifying Bond

The monsoon acts as a unifying force in India. Farmers depend on rainfall for agriculture. The arrival of monsoon is celebrated with festivals, songs, and dances across the country. Thus, despite being uncertain, the monsoon plays a vital role in India's economy and culture.