

chapter - 4

Climate

climate

climate refers to the sum total of weather conditions and variations over a large area for a long period of time (more than thirty years).

weather

weather refers to the state of the atmosphere over an area at any point of time.

Monsoon

- The word monsoon is derived from the Arabic word 'mausim' which literally means season.
- 'Monsoon' refers to the seasonal reversal in the wind direction during a year.
- The climate of India is described as the 'monsoon' type.
- In Asia, this type of climate is found mainly in the South and the Southeast.
- The annual precipitation varies from over 400 cm in Meghalaya to less than 10 cm in Ladakh and western Rajasthan.
- The Tamil Nadu coast gets a large portion of its rain during October & November.

* Do you know

- In the Thar Desert the day temperature may rise to 50°C and drop down to near 15°C the same night.
- There is hardly any difference in day and night temp. in the Andaman and Nicobar Islands or in Kerala.

Climatic Controls

- There are Six major controls of the climate of any place.
- latitude \Rightarrow Due to the curvature of the earth, the amount of solar energy received varies according to latitude. As a result, air temperature generally decreases from the equator towards the poles.

altitudes \Rightarrow As one goes from the surface of the earth to higher altitudes, the atmosphere becomes less dense and temperature decreases. The hills are therefore cooler during Summers.

Pressure and wind System \Rightarrow The Pressure and wind system of any area depend on the latitude and altitude of the place. Thus it influences the temperature and rainfall pattern.

Distance from the Sea \Rightarrow As the distance from the sea increases, its moderating influence decreases and the people experience extreme weather conditions.

This condition is known as continentality (i.e. very hot during summers and very cold during winters)

(v) Ocean Currents \Rightarrow Ocean currents along with onshore wind affect the climate of the coastal areas.

Ex * Any coastal area with warm or cold currents flowing past it, will be warmed or cooled if the winds are onshore.

(vi) Relief features \Rightarrow High mountains act as barriers for cold or hot winds, they may also cause precipitation if they are ~~too~~ high enough and lie in the path of rain bearing winds.

Factors Affecting India's Climate

(i) Latitude.

The Tropic of Cancer passes through the middle of the country from the Rann of Kutchh in the west of Mizoram in the east.

India's climate has characteristics of tropical as well as Subtropical climates.

Altitude

- * India has mountains to the north, which have an average height of about 6,000 metres.
- * The Himalayas prevent the cold winds from Central Asia from entering the Subcontinent.
- * Because of these mountains that this Subcontinent experiences comparatively milder winters as compared to Central Asia.

Pressure and Winds

- Pressure and Surface winds.
 - Upper air circulation and
 - western cyclonic disturbances and tropical cyclones
- * India lies in the region of north easterly winds
- * These winds originate from the Subtropical high-pressure belt of the northern hemisphere.
- * These winds carry little moisture as they originate and blow over land. Therefore, they bring little or no rain.
- * During winter, there is a high-pressure area north of the Himalayas. Cold dry winds blow from this region to the low-pressure areas over the oceans to the South.
- * In Summer, a low-pressure area develops over interior Asia, as well as, over northwestern India. This causes a complete reversal of the direction of wind during Summer.
- * Air moves from the high-pressure at low pressure area.
- * These are known as the Southwest Monsoon winds. These winds blow over the warm oceans, gather moisture and bring widespread rainfall over the mainland of India.



Coriolis force.

⇒ An apparent force caused by the earth's rotation. The Coriolis force is responsible for deflecting winds towards the right in the northern hemisphere and towards the left in the southern hemisphere. This is also known as 'Ferrel's Law'.

- The upper air circulation in this region is dominated by a westerly flow. An important component of this flow is the jet stream.
- These jet streams are located approximately over 27° - 30° north latitude, therefore they are known as Subtropical westerly jet streams.
- As easterly jet stream, called the Sub-tropical easterly jet stream blows over peninsular India, approximately over 15° N during the summer months.

The Indian Monsoon

- The sailors who came to India in historic times were one of the first to have noticed the phenomenon of the Monsoon.
- The Arabs, who had also come to India as traders named this seasonal reversal of the wind system 'Monsoon'.
- The monsoons are experienced in the tropical area roughly between 10° N and 20° S.

- To understand the mechanism of the monsoons, the following facts are important.
 - (a) The differential heating and cooling of land and water creates low pressure on the landmass of India while the seas around experience comparatively high pressure.
 - (b) The shift of the position of Inter Tropical Convergence zone in Summer, over the Ganga plain (this is the equatorial trough normally positioned about 5°N of the equator. It is also known as the monsoon trough during the monsoon season)
 - (c) The presence of the high-pressure area, east of Madagascar, approximately at 20°S over the Indian Ocean. The intensity and position of this high-pressure area affects the Indian Monsoon.
 - (d) The Tibetan plateau gets intensely heated during Summer, which results in strong vertical air currents and the formation of low pressure over the plateau at about 9km above sea level.
 - (e) The movement of the westerly jet stream to the north of the Himalayas and the presence of the tropical easterly jet stream over the Indian peninsula during Summer.

El Niño :- refers to the periodic development of a warm ocean current along the coast of Peru as a temporary replacement of the cold Peruvian current.

- It is Spanish word meaning 'the child' and refers to the body Christ.

The onset of the Monsoon

- The duration of the monsoon is between 100° to 120 days from early June to mid-~~September~~ September.
- Around the time of its arrival, the normal rainfall increases suddenly and continues constantly for several days, known as ~~burst~~ burst of monsoon arrives in
- It arrives at Southern tip of the Indian peninsula, generally by the first week of June.
- Delhi generally receives the monsoon shower ~~from~~ by the end of June
- By first week of July western UP, Punjab, Haryana experiences of Monsoon
- By Mid July, it reaches Himachal Pradesh and the rest of country

Withdrawal of Monsoon

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- Retreat of the ~~monsoon~~ Monsoon is the more gradual process
- It begins in the north western area States of India by early September.
- By mid October, it withdrawal completely from the northern half of the peninsula
- By early December, the monsoon has withdrawn from the rest of the country
- The island receive the first monsoon shower from April to May. the withdrawal take place from December to January.

Rukhsar
27/18

28/08/93

Notes

The Seasons

- four main seasons can be identified in India
- (i) The cold weather Season
- (ii) the hot weather Season
- (iii) the advancing monsoon
- (iv)

The Cold Weather Season (winter)

- The cold weather season begins from mid-November in northern India.
- December and January are the coldest months in the northern part of India.
- The average temperature of Chennai, on the eastern coast, is between $21^{\circ}-25^{\circ}$ Celsius.
- Day are warm and night is cold.
- The northeast trade winds prevail over the country. They blow from land to sea and hence, for most part of the country, it is a dry season.
- The weather is normally marked by clear sky, low temperatures and low humidity and feeble variable wind.
- A characteristic feature of the cold weather season over the northern plains is the inflow of northwest winds.
- The total amount of winter rainfall locally known 'mahurat' is small, they are of immense import for the cultivation of 'rabi' crops.

The Hot Weather Season (Summer)

- Due to the apparent northward movement of the Sun, the global heat belt shifts northwards.
- from March to May, it is hot weather Season.
- In March, the highest temperature is about 38° Celsius recorded on the Deccan plateau.
- In May, temperature of 45° Celsius is common in the northwestern parts of the country.
- The summer months experience rising temperature and falling air pressure in the northern part of the country.
- A striking feature of the hot weather season is the 'lou'. These are strong, gusty, hot, dry winds blowing during the day over the north and northwestern India.
- These storms bring temporary relief as they lower the temperatures and may bring light rain and cool breeze.
- In West Bengal, these storms are known as the 'Hool Baisakhi'.
- Pre-monsoon showers are common especially in Kerala and Karnataka.

- They help in the early ripening of mangoes, and are often referred to as mango showers.

Sun,

Advancing Monsoon (The Rainy Season)

- It attracts the trade winds of the Southern hemisphere.
- These South-east trade winds originate over the warm Subtropical areas of the Southern oceans.
- These winds are strong and blow at an average velocity of 30 km per hour.
- The windward side of the Western Ghats receives very heavy rainfall, more than 250 cm.
- ~~Record~~ Mausyoon in the Southern range of the Khasi Hills receives the highest average rainfall in the world.
- Rajasthan and parts of Gujarat get scanty rainfall.
- Another phenomenon associated with the monsoon is its tendency to have 'breaks' in rainfall.
- These breaks in monsoon are related to the movement of the monsoon trough.
- When the axis of the monsoon trough lies over the plains, rainfall is good in these parts.
- Whenever the axis shifts closer to the Himalayas, there are longer dry spells in the plains, and widespread rain occurs in the mountainous catchment areas.

of the Himalayan rivers.

- These heavy rains bring in their wake, devastating floods causing damage to life and property in the plains.
- While it causes heavy floods in one part, it may be responsible for droughts in the other.
- It sometimes disturbs the farming schedules of millions of farmers all over the country.

Retreating / Post Monsoons (The Transition Season)

- The monsoon trough or the low-pressure trough over the northern plains becomes weaker.
- By the beginning of October, the monsoon withdraws from the Northern plains.
- The months of October - November form a period of transition from hot rainy season to dry winter conditions.
- While day temperatures are high, nights are cool and pleasant.
- The weather becomes rather oppressive during the day. This is commonly known as 'October heat'.
- The low-pressure conditions over north-western India, get transferred to the Bay of Bengal by early November.

- This shift is associated with the occurrence of cyclonic depressions, which originate over the Andaman Sea.
- These tropical cyclones are often very destructive, which cause great damage to life and property.

Distribution of Rainfall.

- Parts of western coast and northeastern India receive over about 400 cm of rainfall annually.
- It is less than 60 cm in western Rajasthan and adjoining parts of Gujarat, Haryana and Punjab.
- A third area of low precipitation is around Leh in Jammu and Kashmir.
- Owing to the nature of monsoons, the annual rainfall is highly variable from year to year.
- Areas of high rainfall are liable to be affected by floods, areas of low rainfall are drought-prone.

Monsoon as a Unifying Bond

- The Himalayas protect the Subcontinent from extremely cold winds from central Asia.
- The peninsular plateau, under the influence of the Sun from three sides, has moderate temperatures.

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- The Seasonal alteration of the wind Systems and the associated weather conditions provide a rhythmic cycle of Seasons.
- The Indian landscape, its animal and plant are entire agricultural calendar and the life of the people, including their festivities, revolve around this phenomenon.
- People of India from north to south and from east to west eagerly await the arrival of the monsoon.
- The monsoon winds bind the whole country by providing water to set the agricultural activities in motion.