

SOCIAL STUDIES (GEOGRAPHY)
CHAPTER 04: CLIMATE
(Textbook Q&A)

1. What are the controls affecting the climate of India?

There are six major controls of the climate of any place which include latitude, altitude, pressure and wind system, distance from the sea (continentality), ocean currents and relief features

2. Why does India have a monsoon type of climate?

The monsoon type of climate is based on the seasonal reversal of monsoon winds. India has a monsoon type of climate because of its position in the subtropical zone from 30°N to 30°S. India's closer proximity to equator and variation in distance from the sun due to earth's rotation and revolution, creates different pressure gradients at different places of Indian landmass and its surrounding water bodies. It results in the flow of south-western trade winds from sea to Indian landmass and back which is known as seasonal reversal of winds. Therefore, India has monsoon type of climate. Besides, Jet Stream, Coriolis Force, Inter Tropical Convergence Zone (ITCZ) and El Nino are the other factors which contribute towards the intensity and direction of winds.

3. Which part of India does experience the highest diurnal range of temperature and why?

In the Thar Desert in Rajasthan experiences the highest diurnal range of temperature i.e. 50°C during the day. It is because:

- It is distantly located from the sea thereby lacks any moderating effect of sea and experiences extreme temperatures;
- Sand present in this region quickly becomes hot during day and cools down rapidly during night.

4. Which winds account for rainfall along the Malabar coast?

South-West Monsoon winds

5. What are Jet streams and how do they affect the climate of India?

Jet streams are fast blowing westerly winds that blow above 12,000 metres, over the troposphere. Their velocity ranges from 110 km/h in summer to about 200 km/h in winter. They blow at the mid-latitude and over sub-tropical regions (north half of India).

- Sub-tropical Westerly Jet Streams pulls the cyclonic disturbances, called, western disturbances to the east which causes rainfall in the north India (Punjab, Haryana, U.P., Delhi, Gujarat and Mumbai) during winters;
- In summer, these move towards extreme north and therefore, replaced by an easterly jet stream called the tropical easterly jet. These do heavy rain over peninsular India consisting of coastal plains. Western and Eastern Ghats, Central Highland and Deccan plateau block.

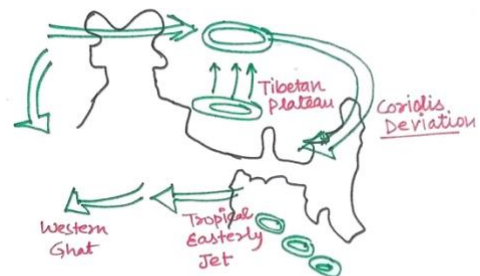
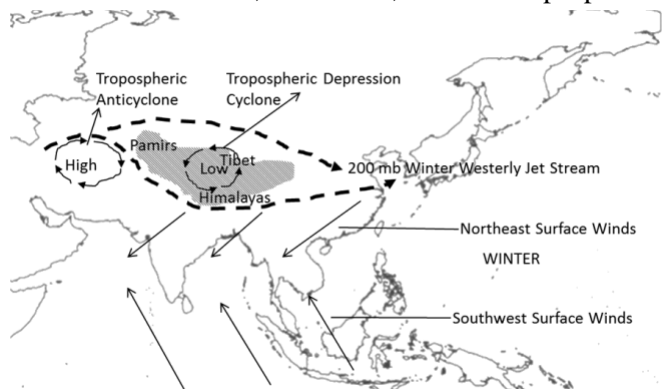


Figure - Tropical Easterly Jet

6. Define monsoons. What do you understand by “break” in 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 monsoon rains take place only for a few days at a time which is known as “break” in monsoon.

7. Why is the monsoon considered a unifying bond?

It is so because:

- (i) The “Monsoon wind” bind the whole country by providing water for the agricultural activities;
- (ii) Inter-connectivity of rivers which carry the rainfall water also signifies unification;
- (iii) India’s folk songs, festivals, stories, dresses, food etc. are related to the monsoon;
- (iv) Entire agricultural calendar is based on monsoon and farmers eagerly wait for monsoon to sow their kharif crops.

8. Why does the rainfall decrease from the east to the west in Northern India?

As the Arabian sea branch of south-west monsoon winds proceed towards Meghalaya in the east it causes heavy rainfall in the regions of Mawsynram and Cherapunji because of the obstruction caused by the hills like Garo-Khasi etc. With the left moisture, it proceeds towards Punjab and Haryana in the west and gradually shed off the remaining moisture in the way. Thus the rainfall decreases from the east towards west in Northern India.

9. Give reasons as to why:

(i) Seasonal reversal of wind direction takes place over the Indian subcontinent.

It is because of differential pressure conditions over the Indian landmass and its surrounding water bodies. In summer, a low-pressure area develops over the northwestern India which causes winds to blow over the warm oceans, gather moisture and bring widespread rainfall over the mainland of India. During winter, there is a high-pressure area north of the Himalayas. This causes complete reversal of winds over India as cold dry winds blow from this region to the low-pressure areas over the oceans to the south.

(ii) The bulk of rainfall in India is concentrated over a few months.

Rainfall received by India is due to the South-west monsoon winds. The duration of monsoon is between 100 to 120 days because of the variations in the pressure gradient. Hence, the bulk of rainfall in India is concentrated over a few months.

(iii) The Tamil Nadu coast receives winter rainfall.

During winters, Indian mainland has high pressure compared to the oceans in the south. The northeast trade winds prevail over the country thereby flows from land towards the sea (high to low pressure region). When these winds blow over the Bay of Bengal they collect moisture, and shed it off in the eastern parts of Tamil Nadu. Therefore, Tamil Nadu receives winter rainfall.

(iv) The delta region of the eastern coast is frequently struck by cyclones.

The cyclonic depressions that originate over the Andaman sea are brought by the sub-tropical easterly jet stream blowing over the peninsular India during the monsoon as well as during winter months. Therefore, these depressions form cyclones in the Bay of Bengal which often hit the delta region at eastern coast of India.

(v) Parts of Rajasthan, Gujarat and the leeward side of the Western Ghats are drought-prone.

- a) In Rajasthan and Gujarat, the south-western monsoon winds after deflecting from Western Ghats run almost parallel to the Aravallis and don’t find any obstruction to shed off the remaining moisture content. Secondly, humidity of the Bay of Bengal monsoon

branch also decreases progressively from east to west thereby causes less rainfall in these states;

- b) South-western monsoon winds when struck with Western Ghats rises upwards, moisture in them condenses and give good amount of rainfall to the windward side of Western Ghats. When these winds reach the leeward side of Western Ghats, they have very less moisture insufficient for causing rainfall.

10. Describe the regional variations in the climatic conditions of India with the help of suitable examples.

- (i) In winter, the months of December and January are the coldest in Northern India where the temperature ranges between 10° - 15° .
- (ii) During winters, Drass in Jammu and Kashmir experiences as low as -40°C while Thiruvananthapuram on the other hand may have a temperature of 22° ;
- (iii) In summer, the temperature occasionally touches 50°C in some parts of the Rajasthan desert, whereas it might be around 20°C in Pahalgam in Jammu and Kashmir;
- (iv) Annual precipitation varies from over 400 cm in Meghalaya to less than 10 cm in Ladakh and western Rajasthan. In the Himalayas precipitation is in the form of snowfall;
- (v) Coastal region does not experience much variation in temperature pattern due to the moderating influence of the sea.

11. Discuss the mechanisms of the monsoon.

Unique geographic features of Indian subcontinent including atmospheric, oceanic and physical features influence the pattern of Monsoon in India. All these factors together are responsible for creating a differential pressure or pressure gradient on the Indian landmass thereby causes seasonal reversal of winds. This is referred as Monsoon. Mechanism of monsoon has following features:

- (i) Its duration is around 100-120 days from early-June to mid-September;
- (ii) South-western monsoon winds divide into two branches – Arabian sea branch which causes rainfall in Mumbai and other areas on the western areas and Bay of Bengal branch causes rainfall in the east (Assam and Meghalaya) and then deflects towards the western region;
- (iii) Rainfall during monsoon has both wet and dry spells because of the shift in monsoon trough (lowest-pressure region) and intensity of rainfall varies at different places because of the moisture content in them as well as other dynamic geographical factors;
- (iv) The southern Indian islands receive the very first monsoon showers usually in last April-May. By mid-July, monsoon showers cover the entire country;
- (v) During Oct-Nov due to the change in pressure gradient, monsoon winds start withdrawing from Indian landmass and moves towards southern oceans. These winds pick some moisture from Bay of Bengal and cause rainfall in Chennai. By December, the entire monsoon is completely withdrawn from India.

12. Explain the factors affecting Indian Monsoon.

Factors that Influence Indian Monsoon:

- (i) The differential heating & cooling of land & water (lands get heated and cooled faster as compared to water) creates low pressure on landmass of India while seas experience comparatively high pressure;
- (ii) ITCZ in summer shift over Ganga plain causing rainfall in the northern plains of India;
- (iii) Presence of high-pressure area around the East of Madagascar, approximately at 20°S over the Indian Ocean. The intensity & position of high-pressure area affects south-western monsoon winds;
- (iv) Intense heating of Tibetan plateau during summer results in strong vertical air currents & formation of low pressure over the plateau at about 9 km above sea level.
- (v) 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;

- (vi) Changes in pressure conditions over southern oceans (ENSO phenomenon) also affect the monsoons.

13. Give an account of weather conditions and characteristics of the cold season.

- (i) The cold weather season begins from mid-November in northern India and stays till February. December and January are the coldest months in the northern part of India;
- (ii) During this season, the north-east trade winds blow from land to sea and hence for most parts of the country it is a dry season. Some amount of rainfall occurs on the Tamil Nadu coast from these winds as they carry moisture from Bay of Bengal while retreating and shed it off at the coastal region of Tamil Nadu;
- (iii) Inflow of cyclonic disturbances occurs in the northern plains from the west and the north-west. The low-pressure systems originate over the Mediterranean Sea moves into India along with the westerly flow. They cause the much-needed winter rains (known as 'Mahawat') over the plains and snowfall in the mountains. It is crucial for the cultivation of Rabi crops.;
- (iv) The peninsular region does not have a well-defined cold season. There is hardly any noticeable change in temperature pattern during winter due to the moderating influence of the sea.

14. Give the characteristics and effects of the monsoon rainfall in India.

Characteristics of the Monsoon:

- (i) The climate of India is described as the 'monsoon' type due to the seasonal reversal in the wind direction during the year;
- (ii) The duration of monsoon is between 100-120 days from early-June to mid-September. At the time of its arrival, the normal rainfall increases suddenly and continues constantly for several days. This is known as 'burst' of the monsoon;
- (iii) Monsoon has few dry spells too due to the shift of low-pressure zones i.e. monsoon trough. This is known as "Breaks in the monsoon". The alternation of dry and wet spells vary in intensity, frequency and duration;
- (iv) The monsoon is known for its uncertainties and it is difficult to estimate it with precision;
- (v) Distribution of Rainfall Parts of the western coast and north-eastern India receive over 400 cm of rainfall; however, it is less than 60 cm in western Rajasthan and parts of Gujarat, Haryana and Punjab. Kashmir also receives low rainfall;
- (vi) The withdrawal of the monsoon begins when the south-west monsoon winds weaken and start withdrawing gradually. Monsoon withdraws completely from the northern plains by the beginning of October, from the northern half of the peninsula by mid-October and from the rest of India by early December.

Effects of the Monsoon:

- (i) India has traditionally been an agricultural country with more than 50% of its population dependent on agriculture.
- (ii) A large part of the country's agriculture is mainly dependent upon the monsoon rains.
- (iii) There is great variation in the rainfall received by the different parts of the country, somewhere it leads to floods and its absence in other parts leads to drought like conditions.
- (iv) The Indian landscape, its animal and plant life, the entire agricultural calendar and the life of the people, including their festivities revolve around this phenomenon (monsoon).
- (v) The monsoon winds bind the whole country by providing water to set the agricultural activities in motion. It is often irregular in its arrival and its retreat sometimes disturbs the farming schedule of millions of farmers all over the country.