



Notes



CLIMATE

You have studied India's shape, size, location, and latitudinal extent in previous lesson. You have also learnt that how India's relief characteristics contrast strikingly. These variations have led to climatic variations between regions. The climatic conditions in southern India differ slightly from those in the northern regions.

Now, let us have a closer look at these climatic variations. During Summer, the north-western plains experience high temperatures around 45°C while areas of the Rajasthan desert may record day temperatures around 55°C . At the same time the temperatures around Gulmarg or Pahalgam in Kashmir are hardly around 20°C . Similarly, in December, the people of Kargil or Dras (in Ladakh, UT) experience biting cold because the night temperatures drop to -40°C , while the inhabitants of Thiruvananthapuram experience temperatures around 27°C .

In this lesson, we will look for several variables that contribute to these climatic fluctuations through time and space.



OUTCOMES

After studying this lesson, learner:

- describes the factors that influence the climate;
- explains the mechanism of monsoon and its significance in the Indian economy;
- becomes familiar with the seasons; and
- describes the distributional patterns of temperature and rainfall.

12.1 FACTORS INFLUENCING THE CLIMATE OF INDIA

You may have observed the diversity in Indian climatic conditions while visiting to different places. Such diversity is possible due to various factors influencing the climate of India. These factors are:

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A. Location and Latitudinal Extent

India is located roughly between latitudes 6°N and 37°N . The Tropic of Cancer passes through the middle of the country. Due to their proximity to the equator, the southern regions have hot temperatures all year round. On the other hand, the northern regions are located in warm temperate regions. They consequently endure cold conditions, especially throughout the winter. The climate is milder near the coast of peninsular India because of the water bodies surrounding it.

B. Distance from the Sea

Southern or peninsular India is surrounded by the Arabian Sea, the Indian Ocean, and the Bay of Bengal. Hence the climate of coastal regions of India is equable or maritime. The climate of the regions in the country's interior is cut off from the oceanic influence. As a result, they have an extreme or continental type of climate.

C. The Northern Mountain Ranges

India and the rest of Asia are divided by the Himalayan and nearby mountain ranges, which stretch from Kashmir in the north west to Arunachal Pradesh in the north east. During winter, these hills shield India from the savagely chilly and dry winds of Central Asia. Additionally, they serve as a strong physical barrier that prevents rain-bearing southwest monsoon winds from entering India's northern borders. These ranges act as a climate barrier between Central Asia and the Indian Subcontinent.

D. Physiography

In various regions of the nation, physical characteristics affect the air temperature, atmospheric pressure, wind speed, and rainfall. Look at the physical feature map of India from the previous lesson, and using the climatic maps from this lesson, determine for yourself the link between the relief, temperatures, wind direction, and rainfall amounts. It will clarify why the interior regions of Karnataka and Tamil Nadu, located east of the Western Ghats, have less rainfall than the western coastal plains. Additionally, you will comprehend why the Bay of Bengal branch of the South west monsoon splits into two portions, one travelling down the Ganga Valley to the west and the other along the Brahmaputra Valley to the east.

E. Monsoon Winds

The complete reversal in the direction of winds over India brings about a sudden change in seasons - the harsh summer season suddenly giving way to the eagerly awaited monsoon or rainy season. These winds, which change their direction completely, are called monsoon winds. The word 'monsoon' is derived from the Arabic word 'Mousim,' which means 'season.' These winds have such a far-reaching influence on India's climate



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that it is termed a 'monsoon type of climate.' The nature of these winds can be described concerning the surface distribution of pressure in different regions of India during the winter and summer seasons.

- (a) **The North east Monsoon and its Effect:** During winter, the weather conditions are influenced by high pressure developed over the North western subcontinent. It results in blowing cold, dry winds from this region towards southern low-pressure areas lying over water bodies surrounding peninsular India. Since these winds are cold and dry, they do not cause rainfall, and weather conditions under their influence remain cold and dry. However, wherever these North east monsoon winds collect moisture while passing over the Bay of Bengal, they bring rain along the Coromandel Coast. Strictly speaking, these winds are planetary winds known as Northeast Trades. In India, they are essentially land-bearing winds.
- (b) **The South west Monsoon and its Effect:** During summer, the northwestern parts of India become very hot due to high temperatures. It is ascribed to the apparent shift of the sun in the northern hemisphere. It results in the reversal of air pressure conditions in north western India and water bodies surrounding the peninsular plateau. As a result, North east Trade winds are replaced by South west monsoon winds. Since these winds are sea-bearing and blow over warm water bodies before reaching land, they are moisture-laden, causing widespread rain over most parts of India. This period of the south west monsoon, from June to September, is known as the rainy season for most parts of the country.

E. Upper-Air Circulation

The changes in the upper air circulation over the Indian landmass are yet another cause for the sudden outbreak of monsoons in India. Jet streams in the upper air system influence the climate of India in the following ways:

- (a) **The Westerly Jet Stream and its Impact:** During winter, at about 8 km. above sea level, a westerly jet stream blows at a very high speed over the subtropical zone. The Himalayan ranges bifurcate this jet stream. This jet stream's northern branch blows along the northern edge of this barrier. The southern branch blows eastwards south of the Himalayan ranges along 25° N latitude. Meteorologists believe that this branch of the jet stream significantly influences India's winter weather conditions. This jet stream is responsible for bringing western disturbances from the Mediterranean region into the Indian subcontinent. Winter rain and hail storms in north western plains and occasional heavy snowfall in hilly regions are caused by these disturbances. Cold waves generally follow these in the whole of the northern plains.



- (b) **Easterly Jet and its Influence:** Due to the apparent shift of the sun in the northern hemisphere during the summer, the upper air circulation is reversed. The easterly jet stream, created due to the Tibetan plateau's heating, takes the place of the westerly stream. It caused the formation of an easterly, chilly jet stream that was blowing over peninsular India and was focused at 15°N latitude. It aids in the monsoons' quick arrival.

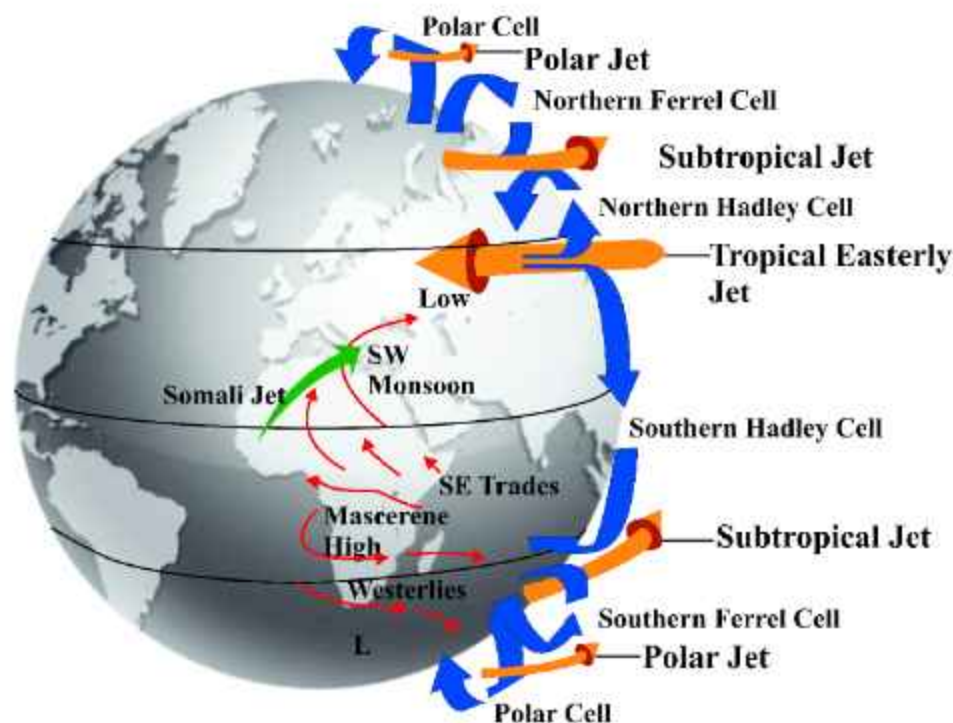


Fig. 12.1 Upper-Air Circulation

G Western Disturbances and Tropical Cyclones

Westerly jet streams from the Mediterranean Sea impact the entrance of western disturbances. It affects most of the Northern Plains and Western Himalayan region's winter weather conditions. In the winter, it doesn't rain much. The northern plains' wheat harvests are thought to benefit significantly from this rain.

Additionally, the Bay of Bengal is where tropical cyclones form. In October, November, and December, these cyclones' frequency and trajectory have an impact on the weather along the eastern coast.



Fig. 12.2 Emergence of Western Disturbances

H. El-Nino Effect

Weather conditions in India are also influenced by El-Nino, which causes widespread floods and droughts in tropical regions of the world. El-Nino is a narrow warm current that sometimes appears off the coast of Peru in South America. It is a temporary replacement for the cold Peru current, which generally flows along this coast. Sometimes, becoming more intense, it increases the surface water temperatures of the sea by 10° C. This warming of tropical Pacific waters affects the global pattern of pressure and wind systems, including the monsoon winds in the Indian Ocean. It is believed that El-Nino caused the severest drought of 1987 over India.

I. Southern Oscillation and its Effect

The southern oscillation is a pattern of meteorological changes often observed between the Indian and Pacific oceans. It has been noticed that whenever the surface level pressure is high over the Indian Ocean, it is low over the Pacific Ocean and vice-versa. When the pressure is increased over the Pacific Ocean and low over the Indian Ocean, the South west monsoons' in India tend to be weaker. In the reverse case, the monsoons are most likely to be stronger.

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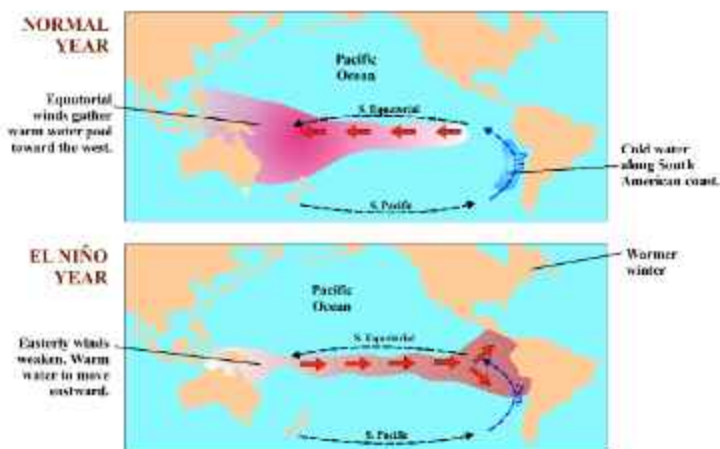


Fig. 12.3 The El Niño Phenomenon

**INTEXT QUESTIONS 12.1**

1. Name any three factors influencing the climate of India.
2. Name the current appearing off the coast of Peru.
3. Fill in the blanks:
 - i. The word 'monsoon' is derived from the Arabic word
 - ii. The tropical cyclones form in
 - iii. The jet stream is bifurcated by

12.2 MECHANISM OF MONSOON

The term "monsoon" describes a tropical wind pattern in which the direction of the wind entirely changes from summer to winter. In this system, the winds alternate between winter and summer directions, blowing from land to sea. As a result, the monsoon-influenced regions receive most of their rainfall throughout the summer, while the winter is often dry.

According to traditional belief, the monsoon is caused by the differential heating of land and sea. Due to a higher temperature over the land in summer, a low-pressure area develops over the continents, and the winds blow from neighbouring oceans toward the land. These winds are of maritime origin and hence cause ample rainfall in summer. On the other hand, the continents become colder than the neighbouring oceans in winter. As a result, a high-pressure area is developed over the continents. Therefore, winds blow from land to sea in winter. These winds, being of continental origin, are dry and do not cause rain. This traditional theory of the monsoon has been criticised by the German meteorologist Flohn. He argues that the differential heating of land and sea is not enough to cause a seasonal reversal of winds at a global scale. He has explained the origin of the monsoon on the basis of the seasonal shift of the pressure and wind belts under the influence of the shift of the sun's vertical rays.



According to this theory, as the sun's vertical rays shift northwards over the Tropic of Cancer in the summer season, the Inter-Tropical Convergence Zone (ITCZ) also moves to the north. It forms a low-pressure area over the northwestern parts of India. The high temperatures in this region further intensify this low pressure. This low-pressure area sucks the air from the Indian Ocean towards the Indian landmass in the form of South west monsoons. In the winter, the ITCZ shifts southwards, and a mild high pressure is produced over northern parts of India. This high pressure is further intensified by the equatorward shift of the sub-tropical high-pressure belt. Due to high pressure over north India, the winds start blowing from the northeast as retreating monsoons. According to recent observations, the origin of the Indian monsoon is influenced by several other factors besides the differential heating of land and sea and the seasonal shifts of pressure and wind belts.

One of the most important factors is the sub-tropical westerly and tropical easterly jet streams. The sub-tropical westerly jet streams blowing over India in winter cause high pressure over northern India. It thus intensifies the northeast monsoons. This jet stream shifts northwards beyond India in the summer season, and tropical easterly jets develop over India in this season. The behaviour of these jet streams is partly responsible for the variations in the time of onset of south west monsoons over India.

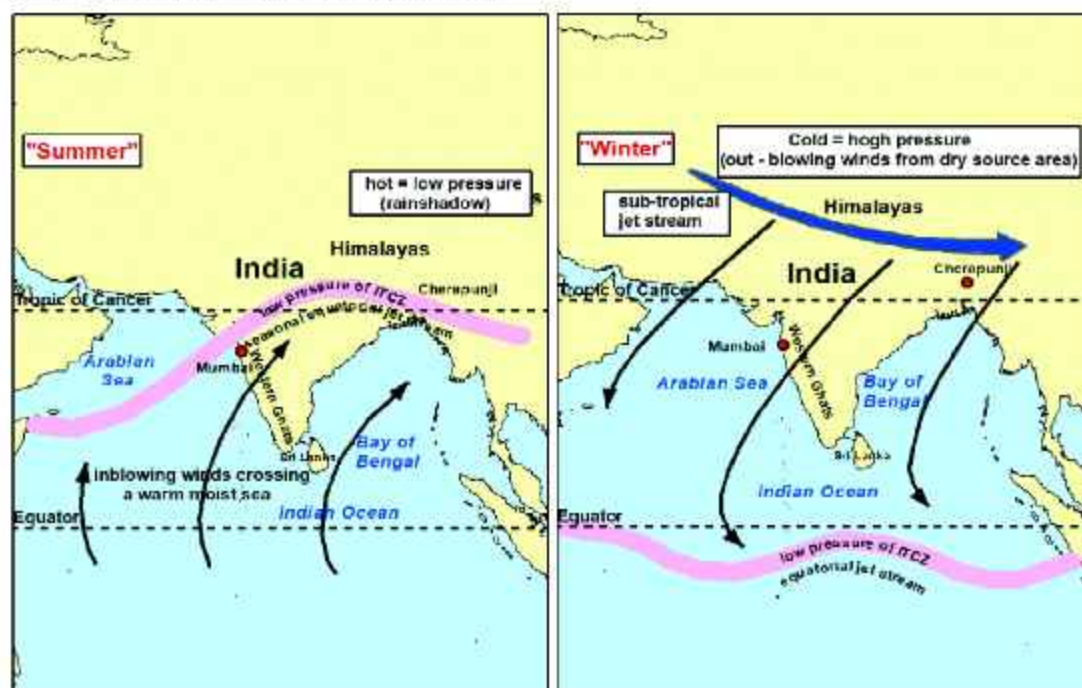


Fig. 12.4 Mechanism of Monsoon

Significance of monsoon in the Indian economy

The Indian climate is called the 'monsoon climate.' It explains how much influence the monsoon winds have in bringing climatic unity. This unity in climatic conditions results from the combined influence of regular movements of monsoons (seasonal winds) and the bounding role of the Himalayan mountain system.

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The monsoonal unity of India caused by these twin factors is discernible. It reflects upon the lifestyles and activities of the common masses in India. The sequence of hot, wet, and cold seasons affects the lifestyles and economic activities of the people throughout India in the following ways:

Farmers all over India start their agricultural activities like ploughing fields, sowing seeds, transplantation, etc., with or just before the onset of monsoons. Kharif crops - rice and millet, cotton and sugarcane in different areas - express the amount of rainfall they receive. During winter, wheat is the major rabi crop in cool and irrigated areas, whereas barley, gram, and oil seeds are common crops in unirrigated regions of northern and central India.

Clothes are also affected by the seasons. During summer, people wear cotton clothes, whereas woollen clothes are used in the winter, especially in the north and central India.

- Most parts of India have to bear a long dry season; on the contrary, the season of life-giving rains is limited to only a few months. It has a far-reaching effect on the lifestyle of the Indian people. The monsoon clouds fall on the thirsty parched land. Their music and fragrance come out of the land to generate similar emotional responses all over India. It is reflected in the Kajari of Bhojpuri and Malhar of Brij and their counterparts in other regions of India. Most Indian festivals are closely linked with seasons. In north India, Baisakhi is celebrated when the rabi crop is ready for harvesting. During winter, when the sun shines vertically over the Tropic of Capricorn, and extremely cold weather conditions prevail over the northern plains, Lohri and Makar Sankranti are celebrated in the north and west. At the same time, Pongal distinctly is its southern counterpart. Holi is celebrated in spring after bidding goodbye to the prolonged cold winter, especially in the north.
- Rainfed subsistence farming has been the oldest response of the village community. Its entire economy is based on it, however meagre rain it may be.
- The seasonal and regional variations in weather conditions have made different regions capable of producing different crops in varying quantities making all regions completely interdependent. This is not a contribution of the monsoons in promoting underlying unity despite all pervasive diversity.

**INTEXT QUESTIONS 12.2**

Fill in the blanks:

1. The traditional theory of the monsoon was criticised by the German meteorologist
2. is the major rabi crop during winter.
3. During summer, people wear ... clothes, whereas clothes are used in the winter.

12.3 CYCLE OF SEASONS IN INDIA

By now, you have understood that the complete reversal of the direction of winds is the most striking feature of monsoons. These changing monsoon winds result in the change of seasons over the year. It is, therefore, essential to understand, in detail, the prevailing weather conditions throughout India during different seasons.

Climatically, the year is divided into the following four seasons in India:

- The cold weather season - December to February;
- The hot weather season - March to May in the south and up to June in the north;
- The advancing south west monsoon season - June to September;
- The retreating southwest monsoon season - October and November.

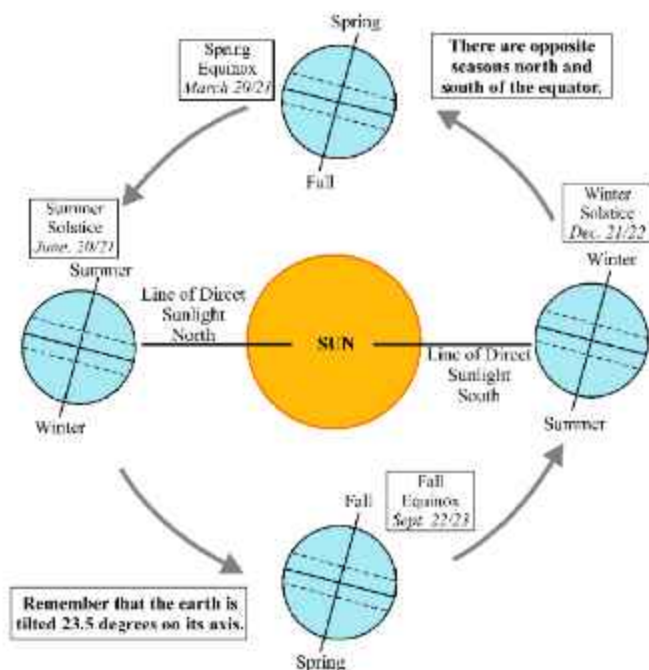


Fig. 12.5 Cycle of Seasons

i. The Cold Weather Season

In northern India, this season often starts in late November. As the sun shines vertically over the Tropic of Capricorn in the southern hemisphere, January is the coldest month for most of the nation. Over northern plains and mountain regions, the typical daily temperatures during these months stay below 21°C . Sometimes the night time lows are below freezing, which causes widespread frost damage to the standing crops. As one travels from the north to the south, the temperature rises. Low temperatures cause a weak high-pressure region to form over areas of northern India. This modest high pressure brings on the off-shore North east monsoon winds. Due to the relief, they are moving westward on the Northern Plains. These chilly breezes carry dry cold winds.



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The succession of depressions is another feature of this season. These low-pressure systems are called "Western disturbances" as they originate in the Mediterranean region. These depressions move with the westerly jet streams. Covering a long distance over Iraq, Iran, and Pakistan, they reach India around mid-December. Their arrival results in the increase of temperature and light rains over northern plains. They cause widespread snowfall over the western Himalayas and the adjoining ranges. At times hailstorms cause widespread damage to the standing rabi crops in north western plains. The meagre rainfall caused by these disturbances is essential to the standing crops, particularly wheat, in irrigated areas. These depressions are followed by cold waves, which bring down temperatures considerably.

Peninsular India has no well-defined winter season. The mean monthly temperatures in January are above 20°C in this part. Moreover, the coastal plains hardly experience any seasonal change, as is clear from the mean monthly temperature above 27°C at Thiruvananthapuram. But Chennai records a temperature of 25°C during December and early January owing to the rains caused by North east monsoon winds.

The essential characteristics of cold weather season are:

- Low temperatures in the north and their gradual increase towards southern parts of India.
- The blowing of cold and dry northeast monsoon resulted in dry weather conditions in most parts. Coromandel coast receives rainfall during winter.
- Western disturbances cause light rain in the northern plains and snowfall over the Himalayan ranges.

ii. The Hot Weather Season

The sun's apparent movement towards the north increases the temperatures in the northern plains. As a result, spring sets in soon, giving way to the hot weather season, which lasts till the end of June in this region. The temperatures increase northwards and reach around 45°C in mid-May in most parts of the northern plains. The characteristic features of this season are afternoon dust storms and 'Loo,' a hot, dry wind that blows during May and June, mainly over the northern plains. These winds cause heat stroke resulting in the deaths of hundreds of people every year. The day temperatures rise above 45°C in some northwestern parts of the country.

During this season of the year, the wind direction changes. Generally speaking, the nation has hot and dry weather. However, on the Northern Plains, dust storms result in rain. Also seeing light rains are West Bengal, Assam, and Kerala. These pre-monsoon showers are referred to as "Mango Showers" in Kerala. They are referred to as



Northwesters or 'Kal Baisakhi' in West Bengal and Assam. Sometimes these Northwesters inflict significant loss of life and property because of the tremendous wind speeds.

iii. The Advancing South west Monsoon Season

It is the rainy season for most parts of India. It starts with the inflow of Southwest monsoons which generally strike the coast of Kerala in the first week of June and cover most of India by mid-July. This weather continues till September. The arrival of these warm, moisture-laden winds brings a total change in weather conditions. Their arrival causes sudden rains, which bring down the temperatures considerably. The decline in temperature is between 5°C to 10°C. The sudden onset of rain is called a break of monsoons or a burst of monsoons. The arrival of these winds may be delayed by a week or two depending upon the pressure conditions over the northern plains and the Indian ocean. The peninsular shape of India divides these Southwest monsoons into two branches - the Arabian Sea branch and the Bay of Bengal branch.

- (a) Arabian Sea branch of South west monsoons strikes the western coast of India and causes heavy rains on the western slopes of the Western Ghats. After crossing the Western Ghats, these winds cause less rainfall on the eastern slopes as they gain temperature while descending. This area is, therefore, known as the rain shadow zone. It explains why interior parts of Maharashtra, Karnataka, and Telangana get light rains from these winds. South west monsoons strike along the coast of Saurashtra and Kuchchh and pass over Rajasthan and beyond to meet the Bay of Bengal branch. These winds cause widespread rain in these states and the western Himalayan region.
- (b) After encountering the eastern Himalayas, the Bay of Bengal branch splits into two sub-branches. One branch goes in an east-northeasterly direction, causing heavy rainfall across India's north eastern highlands and Brahmaputra valley. The other branch spreads heavy and extensive rain across huge regions as it goes toward the northwest through the Ganga River and the Himalayan peaks. Due to the progressively declining humidity of these winds, rainfall in this area diminishes from east to west.

The characteristics of Southwest Monsoons:

- (i) These winds generally strike the Indian coast in the first week of June. But their arrival and departure may be before time or even delayed.
- (ii) There may be dry spells in between rainy periods. Such long dry spells may even lead to the failure of crops.

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- (iii) At times, these winds skip over certain regions without any cause.
- (iv) The amount and timing of rainfall and the intervening duration of wet and dry spells vary yearly. It is known as the vagaries of the monsoons.
- (v) The spatial distribution of rainfall is uneven - some regions may receive heavy rains while others will have to be content with meagre or scanty rains.
- (vi) Generally, these winds start retreating by the end of September. But, sometimes, their departure may be delayed till October, or they may retreat much earlier.

The main features of the advancing South west monsoon season are:

- Low-pressure conditions over north western parts of India and high-pressure conditions overseas.
- The general wind direction, particularly on the Arabian Sea and the Bay of Bengal, is southwest to northeast. They cause widespread rain interspersed with dry spells.
- The onset of monsoons is in the first week of June, and withdrawal is by the end of September.
- The weather is generally hot and humid during this season.

iv The Retreating Monsoon Season

The Southwest monsoons start retreating from the Pakistan border in Northwest India in the first week of September. Thus, these winds withdraw earlier from the regions where they reach the last. The retreat of these winds occurs due to the weakening of low-pressure areas over the north western parts. It happens due to low temperatures caused by the apparent shift of the sun towards the equator and also owing to the widespread rains bringing down temperatures perceptibly. Consequently, the air pressure starts decreasing. Such changes in the patterns of atmospheric pressure cause monsoons to withdraw. Hence, this period is known as the season of retreating South West monsoons. By the end of October, these winds retreat from most of northern India. As a result, fair weather conditions prevail over this region.

The low-pressure area lying over Northwest India will be transferred to the middle of the Bay of Bengal by the end of October. As a result of these unstable conditions, severe cyclonic storms originate in the Bay of Bengal. These cyclonic storms strike along the eastern coast of India, causing widespread rain in the coastal regions. Sometimes very severe storms cause damage to standing crops, cattle, property, lines of transport, communication, and even electricity. Tamil Nadu coast receives the maximum rainfall during October and November - the period of retreating monsoons.

The main characteristic features of the retreating monsoon season are:



- Weakening of low-pressure area over Northwest India;
- Fall in temperatures throughout India;
- Shifting of the low-pressure area to the south; and
- Origin of cyclonic storms in the Bay of Bengal, causing heavy rains and damage to crops and property along the eastern coast of India.



INTEXT QUESTIONS 12.3

1. Name the four seasons of India.
2. What is the name of pre-monsoon showers in West Bengal and Assam?
3. Fill in the blanks:
 - i. The duration of the cold weather season is from to
 - ii. The low-pressure systems are called "....."
 - iii. coast receives the maximum rainfall during October and November.

12.4 DISTRIBUTION OF TEMPERATURE AND ANNUAL RAINFALL

Now, let us have a closer look on the distribution of temperature in India. During June, the north western plains experience high temperature around 45°C when areas of Rajasthan desert record day temperatures around 55°C , while the temperatures around Gulmarg or Pahalgam in Kashmir are hardly around 20°C . Similarly, in the month of December, the people of Kargil (in Laddakh) experience biting cold because the night temperatures drop to -40°C , while the inhabitants of Thiruvananthapuram experience temperatures around 27°C .

The range of temperature increases as one moves away from coastal areas to interior parts of the country. As a result, the people living along Konkan and Malabar coasts do not experience extremes of temperatures or marked change in seasons. On the other hand, people living in north western parts of India, experience sharp seasonal contrasts.

Study the map of rainfall distribution carefully. You may find that the regional variations in average annual rainfall are well-pronounced. The rainfall distribution map shows that northeastern parts of Jammu Kashmir and extreme western Rajasthan receive less than 20 cm. On the other hand, the western coastal plains, and Sub-Himalayan areas of northeast India, including the Shillong plateau, receive more than 200 cm. of annual rainfall. Mawsynram gets the most rainfall in India. Mawsynram has a world record of receiving 26,000 millimetres

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(1,000 in) of rain in 1985, making it the wettest place on the Earth. It receives 11,872 millimetres (467.4 in) of rain annually on average. Starting from the southern coast of Gujarat, the isohyet of 200 cm. runs somewhat parallel to the coast of Western Ghats up to Kanyakumari. The rainfall drops abruptly below 60 cm to the east of the Western Ghats over interior Maharashtra and Karnataka. Most parts of Punjab, Haryana, central and eastern Rajasthan, and western Gujarat also receive rainfall below 60 cm. Starting from the southwestern parts of Jammu and Kashmir, the isohyet of 100 cm. moves eastwards up to the east of Allahabad, from where it bends to the west and south west, running over western Madhya Pradesh, eastern Maharashtra, and northern Andhra Pradesh, it joins eastern coast near Visakhapatnam. To the west and south west of this isohyet, the areas receive less rainfall. Some parts of the Coromandel coast receive rainfall of more than 100 cm. The areas receiving less than 100 cm. of rainfall depend on means of irrigation for agricultural activities.

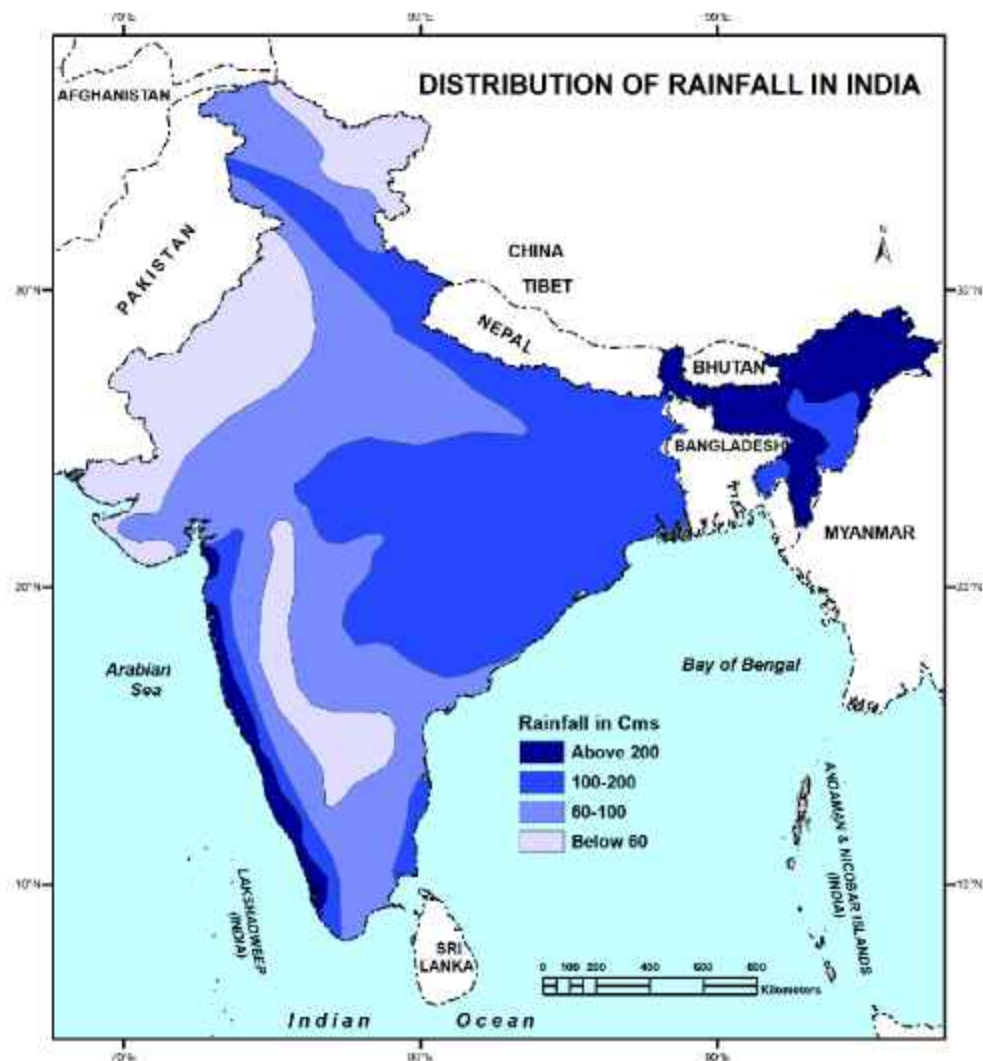


Fig. 12.6 Distribution of Rainfall in India

In India, rainfall distribution, particularly of the south west monsoon, is closely related to the relief. Hence it is even described as "relief" or "orographic" rainfall. By and large, places with higher altitudes have a greater chance of catching more rain than places with less altitude. The

direction of moist winds also matters.

The distribution of annual rainfall in different parts of India shows the following trends:

- The rain decreases as one moves from Kolkata to Amritsar.
- It shows the declining trend towards the interior from the coastal areas on the Deccan Plateau.
- North eastern parts receive more rainfall than north western parts of India.
- Areas lying on the windward side receive more rain than those on the leeward side.



INTEXT QUESTIONS 12.4

1. Fill in the blanks:

- i. gets most rainfall in India.
- ii. and extreme western receive less than 20 cm rainfall.
- iii. In India, rainfall distribution, particularly of the south west monsoon, is closely related to the



WHAT YOU HAVE LEARNT

- India is a country of climatic diversities expressed in the variations in the distribution of temperature, pressure, winds, and amount of precipitation.
- The factors responsible for determining the climate of different regions of India include her location and latitudinal extent, physiography, the role of Himalayan ranges as a climatic divide, the monsoon winds, upper air circulation, western disturbances, and cyclonic storms.
- Derived from the Arabic word 'mousim,' monsoon implies the rhythm of the season and seasonal reversal of winds.
- Meteorologically, the year in India is divided into four seasons, namely the cold weather season, the hot weather season, the advancing southwest monsoon season, and the retreating southwest monsoon season.
- These seasons have different characteristics of weather conditions.



TERMINAL QUESTIONS

1. How do western disturbances influence the weather conditions of north west India?



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2. Distinguish between:
 - (i) The cold weather season and hot weather season;
 - (ii) The southwest and northeast monsoons.
3. Describe five major factors which influence the climate of India. Illustrate your answer with examples.
4. Explain with suitable examples the uneven distribution of rainfall in India.
5. Identify the characteristics of monsoons in India.

**ANSWERS TO INTEXT QUESTIONS****12.1**

1. Location and Latitudinal Extent, Distance from the Sea, The Northern Mountain Ranges, Physiography, Monsoon Winds etc (Any three)
2. El Nino
3. Fill in the blanks:
4. Mousim
5. Bay of Bengal
6. Himalayas

12.2

Fill in the blanks:

1. Flohn
2. Wheat.
3. Cotton, Woolen

12.3

4. Four seasons in India:
 - i. The cold weather season - December to February;
 - ii. The hot weather season - March to May in the south and up to June in the north;
 - iii. The advancing southwest monsoon season - June to September;
 - iv. The retreating southwest monsoon season - October and November.
5. Kal Baisakhi
6. Fill in the blanks:
 - iv. December, February
 - v. Western disturbances
 - vi. Tamil Nadu

12.4

2. Fill in the blanks:
 - iv. Mawsynram
 - v. Jammu Kashmir, western Rajasthan
 - vi. Relief