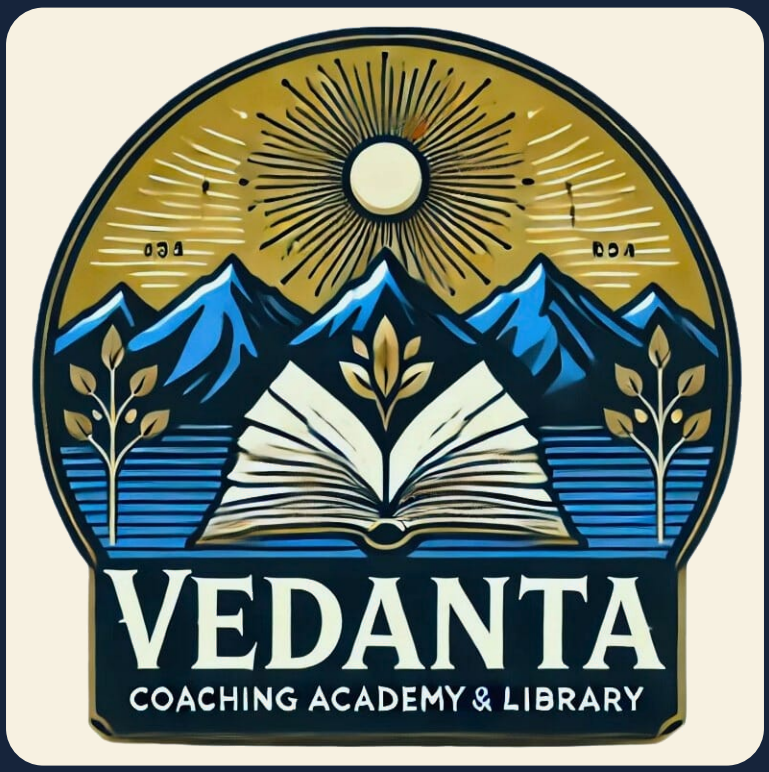


INDIAN GEOGRAPHY

Complete UPSC / NCERT Study Guide

Seven Chapters • 140 Practice MCQs with Explanations

VEDANTA COACHING ACADEMY & LIBRARY

Original study material • For educational use

Contents

About this guide. This is original study material prepared for the students of Vedanta Coaching Academy & Library. It explains the core Indian Geography topics of the UPSC / NCERT syllabus in clear language, supported by original diagrams, and provides twenty practice multiple-choice questions with full answer explanations at the end of every chapter.

CHAPTER

1

INDIA – LOCATION

IN THIS CHAPTER

Covers India’s size and situation in the world, its land and water frontiers, neighbouring countries, latitudinal and longitudinal extent, the standard meridian, and the implications of India’s location for trade, climate and strategy.

CHAPTER 1

India – Location

India occupies a commanding position in the southern part of the Asian continent, projecting boldly into the Indian Ocean. With an area of about 3.28 million square kilometres, it is the seventh-largest country on Earth and accounts for roughly 2.4 per cent of the world's total land surface. The towering Himalayas guard the north, while the Arabian Sea, the Bay of Bengal and the Indian Ocean embrace the peninsula on the west, east and south respectively.

India and the World

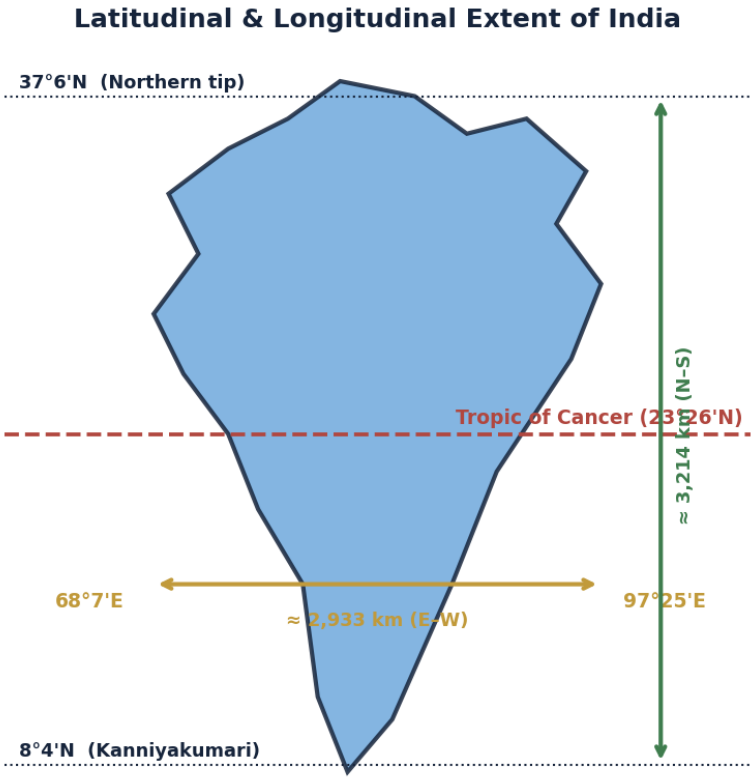
India's situation between West Asia and East Asia has historically made it a natural meeting ground of land and sea routes. The trans-Indian-Ocean routes that join Europe in the west with the lands of East Asia pass close to the Indian coast, giving the country a central and strategically valuable location. The southward thrust of the Deccan Peninsula has allowed India to maintain close maritime contact with East Africa and West Asia on one side and with South-East and East Asia on the other.

★ KEY FACTS

- No other country possesses as long a coastline on the Indian Ocean as India — a fact reflected in the ocean being named after it.
- The opening of the Suez Canal in 1869 reduced the sea distance between India and Europe by roughly 7,000 km.
- India's land frontier measures about 15,200 km and the total coastline of the mainland and islands is about 7,517 km.

Latitudinal and Longitudinal Extent

The mainland of India lies entirely in the northern and eastern hemispheres. From south to north it stretches between latitudes 8°4′ N and 37°6′ N — a distance of nearly 3,214 km. From west to east it extends between longitudes 68°7′ E and 97°25′ E, a span of about 2,933 km. Including the Andaman and Nicobar Islands, the southernmost point of Indian territory, Indira Point, lies even further south near 6°45′ N.



Original schematic: the latitudinal and longitudinal spread of India.

An interesting consequence of this shape is that although the north-south and east-west distances are almost equal in kilometres, the longitudinal extent produces a time gap of nearly two hours between the easternmost point in Arunachal Pradesh and the westernmost edge of Gujarat. The sun rises in the far east of the country well before it does in Kutch.

The Tropic of Cancer and the Standard Meridian

The Tropic of Cancer (23°26′ N, conventionally taken as 23°30′ N) passes almost through the middle of the country, dividing it into a tropical south and a sub-tropical north. It runs through eight states: Gujarat, Rajasthan, Madhya Pradesh, Chhattisgarh, Jharkhand, West Bengal, Tripura and Mizoram. To avoid the confusion of many local times, India adopted a single Indian Standard Time based on the standard meridian of 82°30′ E, which passes near Mirzapur in Uttar Pradesh. Indian Standard Time is 5 hours 30 minutes ahead of Greenwich Mean Time.

> **◆ POINTS TO PONDER**
>
> *Because the standard meridian lies far to the east of Gujarat and far to the west of the north-east, clock time and solar time diverge widely across India. This has prompted periodic debate about whether the country should adopt two time zones. What advantages and difficulties might such a change bring?*

India and its Neighbours

India shares land boundaries with seven countries. Pakistan and Afghanistan lie to the north-west; China, Nepal and Bhutan to the north; and Myanmar and Bangladesh to the east. Across the seas to the south lie the island nations of Sri Lanka and the Maldives. Sri Lanka is

separated from the Indian mainland by the narrow Palk Strait and the Gulf of Mannar, while the Maldives lie to the south of the Lakshadweep group.

- Landlocked neighbours: Afghanistan, Nepal and Bhutan have no direct access to the sea.
- Maritime neighbours: Sri Lanka and the Maldives are separated from India only by water.
- India's long and varied frontiers have shaped centuries of cultural, commercial and political exchange with all these lands.

Administrative Spread

For governance, India is organised into a number of States and Union Territories. The federal structure reflects the country's immense diversity of language, landscape and culture. Its enormous size means that conditions at the northern mountain frontier differ dramatically from those of the tropical southern coast, making India almost a sub-continent in its own right.

India's Frontiers in Detail

India's long land boundary is shared unevenly among its seven neighbours, and each frontier has its own character — from the high, sparsely populated mountain borders of the north to the densely settled, riverine border with Bangladesh in the east. The table below summarises which neighbour lies in which direction and the kind of terrain that marks the boundary.

Neighbouring Countries of India

Neighbour	Direction	Nature of boundary
Pakistan	North-west	Plains, desert and the line in the Himalayas
Afghanistan	Extreme north-west	Short, high mountain frontier
China	North	High Himalayan and Trans-Himalayan ranges
Nepal	North	Central Himalayan, open and friendly
Bhutan	North	Eastern Himalayan, forested
Myanmar	East	Forested Purvanchal hills
Bangladesh	East	Longest border, mostly riverine plains
Sri Lanka	South (sea)	Across the Palk Strait & Gulf of Mannar
Maldives	South-west (sea)	Across the Arabian Sea

Implications of India's Size and Location

A country of India's dimensions enjoys real advantages but also faces genuine difficulties. Its tropical-to-temperate spread gives it a remarkable variety of crops, climates and natural resources, while its central position on the Indian Ocean has made it a hub of maritime trade for thousands of years. At the same time, governing such a vast and varied territory, guarding long and often difficult frontiers, and overcoming the friction of distance for transport and administration all demand enormous effort.

- Resource variety: from the snowfields of the Himalayas to coral reefs in the south, India contains an exceptional range of physical environments within one country.
- Cultural diversity: the size of the land has nurtured a great mosaic of languages, religions and traditions.
- Strategic depth: peninsular India sits astride the busiest sea lanes of the Indian Ocean.
- Administrative challenge: distance, varied terrain and a huge population make uniform governance demanding.

Why a Single Standard Time?

If every town kept its own ‘sun time’, a train timetable spanning the country would be hopelessly confusing, since local noon at the eastern border occurs nearly two hours before local noon in the west. By fixing one clock to the 82°30′ E meridian, India ensures that schedules, communications and commerce run on a single, shared time. The cost is that in the far north-east the sun rises and sets unusually early by the clock, which is the main argument made by those who favour a second time zone.

★ KEY FACTS

› India is sometimes called a ‘sub-continent’ because its size, relief and isolation by mountains and sea set it apart almost like a small continent.
› The Suez route, the Cape route and the trans-Pacific links all keep India close to world shipping lanes.
› The 82°30′ E meridian was chosen because it lies close to the centre of the country’s east-west span.

Practice MCQs — Chapter 1

Q1. India accounts for about what percentage of the world’s total land area?

(a) 1.2 per cent
(b) 2.4 per cent
(c) 4.2 per cent
(d) 7.0 per cent

Answer: (b) 2.4 per cent
Explanation: India covers roughly 3.28 million sq km, which is about 2.4 per cent of the world’s land surface, making it the seventh-largest country.

Q2. The latitudinal extent of the Indian mainland lies between:

(a) 6°45′ N and 35°6′ N
(b) 8°4′ N and 37°6′ N
(c) 8°4′ S and 37°6′ N
(d) 6°4′ N and 38°6′ N

Answer: (b) 8°4′ N and 37°6′ N
Explanation: The mainland stretches from 8°4′ N near Kanniyakumari to 37°6′ N in the north. Indira Point in the Andamans (about 6°45′ N) is the southernmost point of Indian territory but lies off the mainland.

Q3. The standard meridian of India is:

(a) 68°7′ E
(b) 82°30′ E
(c) 97°25′ E
(d) 88°30′ E

Answer: (b) 82°30′ E
Explanation: Indian Standard Time is based on 82°30′ E, which passes near Mirzapur, giving IST a fixed offset of GMT +5:30.

Q4. How many countries share a land boundary with India?

(a) Five
(b) Six
(c) Seven
(d) Nine

Answer: (c) Seven
Explanation: Pakistan, Afghanistan, China, Nepal, Bhutan, Myanmar and Bangladesh — seven nations — share land frontiers with India.

Q5. Which canal, opened in 1869, shortened India's sea route to Europe by about 7,000 km?

(a) Panama Canal
(b) Kiel Canal
(c) Suez Canal
(d) Grand Canal

Answer: (c) Suez Canal
Explanation: The Suez Canal links the Red Sea to the Mediterranean and dramatically cut the sailing distance between India and Europe.

Q6. The Tropic of Cancer does NOT pass through which of these states?

(a) Madhya Pradesh
(b) Jharkhand
(c) Odisha
(d) Tripura

Answer: (c) Odisha
Explanation: The Tropic of Cancer passes through eight states — Gujarat, Rajasthan, Madhya Pradesh, Chhattisgarh, Jharkhand, West Bengal, Tripura and Mizoram — but not Odisha.

Q7. The approximate east-west extent of India is:

(a) 2,933 km
(b) 3,214 km
(c) 3,500 km
(d) 1,500 km

Answer: (a) 2,933 km
Explanation: India extends about 2,933 km from west (68°7′ E) to east (97°25′ E), while the north-south extent is around 3,214 km.

Q8. Which two neighbours are separated from India only by sea?

(a) Nepal and Bhutan
(b) Sri Lanka and the Maldives
(c) Myanmar and Bangladesh
(d) Pakistan and Afghanistan

Answer: (b) Sri Lanka and the Maldives
Explanation: Sri Lanka and the Maldives are island nations to the south; the others share land borders.

Q9. Sri Lanka is separated from the Indian mainland by the:

(a) Strait of Malacca
(b) Palk Strait and Gulf of Mannar
(c) Ten Degree Channel
(d) Gulf of Khambhat

Answer: (b) Palk Strait and Gulf of Mannar
Explanation: The Palk Strait and the Gulf of Mannar lie between India and Sri Lanka.

Q10. Indian Standard Time is ahead of Greenwich Mean Time by:

(a) 4 hours 30 minutes
(b) 5 hours
(c) 5 hours 30 minutes
(d) 6 hours

Answer: (c) 5 hours 30 minutes
Explanation: IST is GMT +5:30, fixed by the 82°30′ E meridian.

Q11. Indira Point, the southernmost point of Indian territory, is located in the:

(a) Lakshadweep Islands
(b) Andaman & Nicobar Islands
(c) Gulf of Kutch
(d) Sundarbans

Answer: (b) Andaman & Nicobar Islands
Explanation: Indira Point lies in the Nicobar group of the Andaman & Nicobar Islands.

Q12. The time difference between the easternmost and westernmost longitudes of India is about:

(a) 30 minutes
(b) 1 hour
(c) 2 hours
(d) 3 hours

Answer: (c) 2 hours
Explanation: The roughly 30° of longitude across India translate into about a two-hour gap in local solar time.

Q13. India lies in which hemisphere(s)?

(a) Southern only
(b) Northern and Eastern
(c) Western only
(d) Northern and Western

Answer: (b) Northern and Eastern
Explanation: The Indian mainland lies entirely in the Northern and Eastern hemispheres.

Q14. Which landlocked country is NOT a neighbour of India?

(a) Nepal
(b) Bhutan
(c) Afghanistan
(d) Mongolia

Answer: (d) Mongolia
Explanation: Nepal, Bhutan and Afghanistan are landlocked neighbours; Mongolia does not border India.

Q15. The Deccan Peninsula projects into which ocean?

(a) Pacific Ocean
(b) Atlantic Ocean
(c) Indian Ocean
(d) Arctic Ocean

Answer: (c) Indian Ocean
Explanation: The southward-projecting Deccan Peninsula extends into the Indian Ocean, aiding maritime contact in all directions.

Q16. India is the ___ largest country in the world by area.

(a) Fifth
(b) Sixth
(c) Seventh
(d) Tenth

Answer: (c) Seventh
Explanation: By land area India ranks seventh in the world.

Q17. The Maldives lie to the south of which Indian island group?

(a) Andaman Islands
(b) Nicobar Islands
(c) Lakshadweep Islands
(d) Sundarban Islands

Answer: (c) Lakshadweep Islands
Explanation: The Maldives are situated south of the Lakshadweep Islands in the Arabian Sea.

Q18. The Tropic of Cancer divides India into:

(a) A wet north and dry south
(b) A tropical south and sub-tropical north
(c) An eastern and western half
(d) A coastal and inland half

Answer: (b) A tropical south and sub-tropical north
Explanation: Passing through the middle of the country, the Tropic of Cancer separates a tropical zone in the south from a sub-tropical zone in the north.

Q19. Approximately how long is India’s total mainland-and-island coastline?

(a) 5,000 km
(b) 6,100 km
(c) 7,517 km
(d) 9,200 km

Answer: (c) 7,517 km
Explanation: The total coastline of the mainland and the islands is about 7,517 km.

Q20. Which body of water lies to the WEST of the Indian peninsula?

(a) Bay of Bengal
(b) Arabian Sea
(c) Andaman Sea
(d) South China Sea

Answer: (b) Arabian Sea
Explanation: The Arabian Sea washes the western coast, while the Bay of Bengal lies to the east.

CHAPTER

2

STRUCTURE AND PHYSIOGRAPHY

IN THIS CHAPTER

Covers the geological evolution of the Indian landmass, the theory of plate tectonics as applied to India, and the six great physiographic divisions — the Himalayas, the Northern Plains, the Peninsular Plateau, the Indian Desert, the Coastal Plains and the Islands.

CHAPTER 2

Structure and Physiography

The physical landscape of India is the product of an immensely long geological history. Three broad structural units can be recognised: the ancient and stable Peninsular Block, the young and still-rising Himalayan mountains, and the Indo-Gangetic plain that lies between them. Understanding how these units came into being explains the variety of relief seen across the country today.

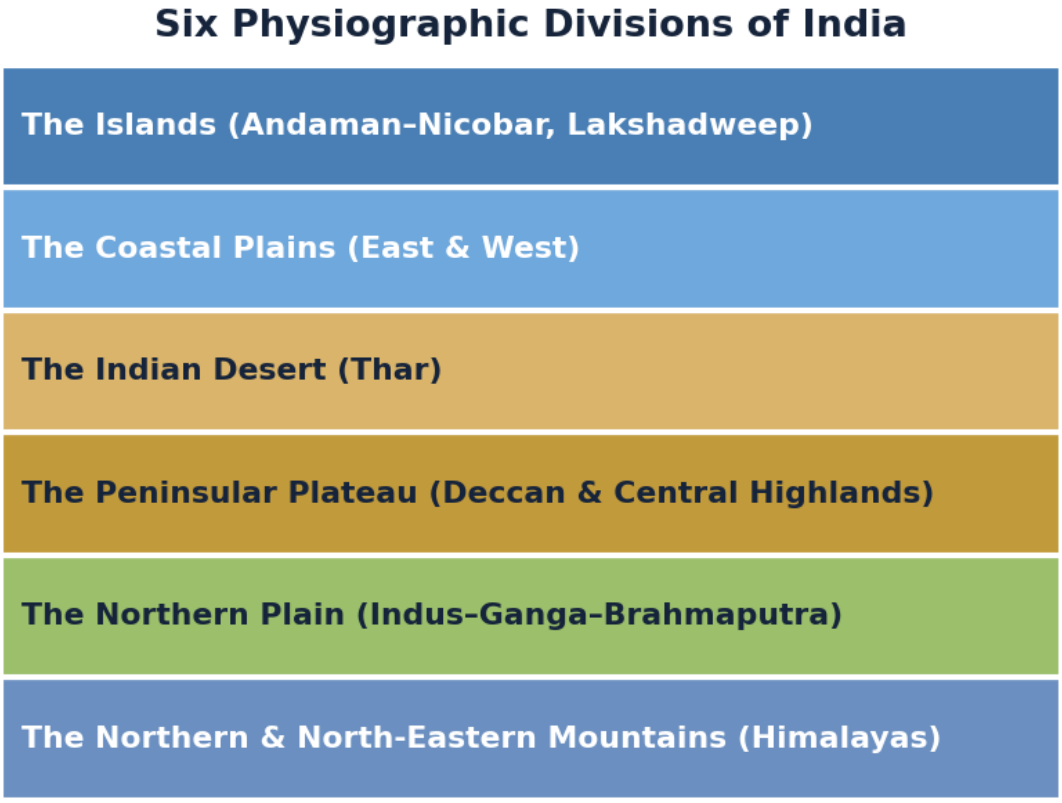
Geological Evolution

According to the theory of plate tectonics, the Earth’s crust is broken into large plates that drift slowly over the mantle. The Indian Plate was once part of the ancient super-continent of Gondwana. As it broke away and drifted north-east, it eventually collided with the Eurasian Plate. The sediments that had accumulated in the intervening Tethys Sea were crumpled and uplifted to form the Himalayas. The Peninsular Block, by contrast, is one of the oldest and most stable parts of the Earth’s surface.

★ KEY FACTS

- The Peninsular Plateau is largely composed of ancient igneous and metamorphic rocks.
- The Himalayas are ‘fold mountains’ still rising today, which is why the region is seismically active.
- The Northern Plains are formed entirely of alluvium deposited by rivers — among the most fertile soils on Earth.

The Six Physiographic Divisions



Original diagram: the six major physiographic divisions of India.

▸ 1. The Northern and North-Eastern Mountains

The Himalayas form a great arc some 2,400 km long. They are arranged in three roughly parallel ranges: the Greater Himalayas (Himadri) with the loftiest peaks and permanent snow; the Lesser Himalayas (Himachal) with popular hill stations; and the Outer Himalayas (Shiwaliks), the youngest and lowest. Longitudinally the mountains are divided into the Punjab, Kumaon, Nepal and Assam Himalayas. The eastern hills and mountains, running north-south, include the Patkai, Naga and Mizo ranges.

▸ 2. The Northern Plain

Built by the alluvium of the Indus, the Ganga and the Brahmaputra and their tributaries, this plain stretches about 2,400 km from west to east. It can be subdivided into the bhabar (a porous belt at the foot of the hills), the terai (a marshy zone), the bhangar (older alluvium) and the khadar (newer, flood-renewed alluvium). Its level, fertile expanse supports the densest agricultural population in the country.

▸ 3. The Peninsular Plateau

This is the oldest landmass of India, a roughly triangular tableland made up of the Central Highlands north of the Narmada and the Deccan Plateau to the south. The plateau is flanked by the Western Ghats (Sahyadris) and the lower, broken Eastern Ghats. The black soils of the Deccan trap region formed from ancient lava flows are particularly important for cotton cultivation.

▸ 4. The Indian Desert

To the west of the Aravalli hills lies the Thar Desert, an arid landscape of shifting sand dunes that receives less than 150 mm of rainfall a year. Streams here are seasonal, and the Luni is the only river of any significance.

▸ 5. The Coastal Plains

Two coastal strips fringe the peninsula. The narrow Western Coastal Plain runs from Gujarat to Kerala and is marked by estuaries and lagoons. The broader Eastern Coastal Plain is built up by the deltas of great rivers such as the Mahanadi, Godavari, Krishna and Kaveri.

▸ 6. The Islands

Two island groups complete the picture. The Andaman and Nicobar Islands in the Bay of Bengal are the exposed tops of submarine mountains, while the coral Lakshadweep Islands lie in the Arabian Sea. India's only active volcano, on Barren Island, is found in the Andaman group.

> **◆ POINTS TO PONDER**
> *The Himalayas, the plains and the plateau formed at very different times and by very different processes, yet together they make a single landmass. How does each division influence the rivers, climate and agriculture of the regions around it?*

The Himalayan Ranges in Greater Detail

Beyond the familiar three-fold division into Himadri, Himachal and Shiwaliks, the far north of India also contains the Trans-Himalayan ranges — the Karakoram, Ladakh and Zaskar mountains — which lie north of the Great Himalayas and hold some of the largest glaciers outside the polar regions. The mountains are crossed by a number of high passes that have served as trade and military routes for centuries.

Three Longitudinal Belts of the Himalayas

Range	Other name	Key features
Greater Himalayas	Himadri	Highest peaks, perpetual snow, core of crystalline rock
Lesser Himalayas	Himachal	Hill stations and valleys such as Kashmir and Kangra
Outer Himalayas	Shiwaliks	Youngest, lowest; enclose flat valleys called 'duns'

▸ The Eastern Hills (Purvanchal)

Where the Himalayas bend sharply southward beyond the Dihang gorge, they continue as a series of low, forested hills running along the eastern edge of the country. These Purvanchal ranges — the Patkai Bum, the Naga Hills, the Manipur Hills and the Mizo Hills — are composed largely of soft sedimentary rock and are clothed in dense forest.

Divisions of the Northern Plain

The Northern Plain is not a single uniform surface. Moving down from the foothills, one passes through several belts created by the way rivers deposit their load. Understanding these belts explains the pattern of springs, marshes and farmland across the plain.

Belts of the Northern Plain

Belt	Position	Character
Bhabar	Foot of the Shiwaliks	Pebbly, porous; streams sink underground
Terai	South of the bhabar	Re-emerging water makes a wet, marshy, forested strip

Belt	Position	Character
Bhangar	Older alluvium	Higher ground; may contain lime nodules (kankar)
Khadar	Newer alluvium	Flood plains renewed yearly; most fertile

The Peninsular Plateau

The plateau is really a group of smaller plateaus and hill ranges. North of the Narmada lie the Central Highlands, including the Malwa Plateau, the Bundelkhand uplands and the mineral-rich Chota Nagpur Plateau in the east. South of the Narmada spreads the great Deccan Plateau, tilted gently eastward so that most of its rivers drain to the Bay of Bengal. The Meghalaya Plateau in the north-east is a detached fragment of the same ancient block.

Western Ghats vs. Eastern Ghats

Feature	Western Ghats	Eastern Ghats
Continuity	Continuous, crossed only by passes	Broken by river deltas
Height	Higher (often above 1,000 m)	Lower and irregular
Rainfall	Very heavy on the windward side	Comparatively dry
Rivers	Source of major east-flowing rivers	Cut through by those rivers

◆ POINTS TO PONDER

The Western Ghats are continuous and high while the Eastern Ghats are low and broken. How does this single difference help explain why the west coast is so wet and the rivers of the peninsula flow mainly eastward?

★ KEY FACTS

› The Trans-Himalayan Karakoram contains the second-highest peak on Earth and vast glaciers.
› ‘Duns’ are flat valleys lying between the Lesser Himalayas and the Shiwaliks.
› The Chota Nagpur Plateau is India’s richest storehouse of minerals.

Practice MCQs — Chapter 2

Q1. The Himalayas are best described as:

(a) Block mountains
(b) Fold mountains
(c) Volcanic mountains
(d) Residual mountains

Answer: (b) Fold mountains

Explanation: The Himalayas are young fold mountains created by the collision of the Indian and Eurasian plates; they are still rising.

Q2. The oldest landmass of the Indian sub-continent is the:

(a) Northern Plain
(b) Himalayas
(c) Peninsular Plateau
(d) Coastal Plain

Answer: (c) Peninsular Plateau
Explanation: The Peninsular Plateau is a stable, ancient block of igneous and metamorphic rock — the oldest part of India.

Q3. The Indian Plate was originally part of which ancient super-continent?

(a) Laurasia
(b) Pangaea only
(c) Gondwana
(d) Angara

Answer: (c) Gondwana
Explanation: India was part of Gondwana before drifting north to collide with Eurasia.

Q4. The sediments of which ancient sea were uplifted to form the Himalayas?

(a) Tethys Sea
(b) Sargasso Sea
(c) Caspian Sea
(d) Aral Sea

Answer: (a) Tethys Sea
Explanation: Sediments deposited in the Tethys Sea were folded and raised during the plate collision.

Q5. The highest range of the Himalayas is the:

(a) Shiwaliks
(b) Lesser Himalayas
(c) Greater Himalayas (Himadri)
(d) Purvanchal

Answer: (c) Greater Himalayas (Himadri)
Explanation: The Greater Himalayas, or Himadri, contain the loftiest, perpetually snow-clad peaks.

Q6. The youngest and lowest of the three Himalayan ranges is the:

(a) Himadri
(b) Himachal
(c) Shiwaliks
(d) Karakoram

Answer: (c) Shiwaliks
Explanation: The Shiwaliks (Outer Himalayas) are the youngest and lowest range.

Q7. The narrow porous belt at the foot of the Shiwaliks is called the:

(a) Khadar
(b) Bhangar
(c) Bhabar
(d) Terai

Answer: (c) Bhabar
Explanation: The bhabar is a porous belt where streams disappear; below it lies the marshy terai.

Q8. Newer alluvium that is renewed by floods almost every year is termed:

(a) Bhangar
(b) Khadar
(c) Bhabar
(d) Regur

Answer: (b) Khadar
Explanation: Khadar is the new, fertile flood-deposited alluvium; bhangar is the older alluvium.

Q9. The Peninsular Plateau is divided by the Narmada into the Central Highlands and the:

(a) Malwa Plateau
(b) Deccan Plateau
(c) Chotanagpur Plateau
(d) Meghalaya Plateau

Answer: (b) Deccan Plateau
Explanation: North of the Narmada lie the Central Highlands; to the south lies the Deccan Plateau.

Q10. The Western Ghats are also known as the:

(a) Sahyadris
(b) Aravallis
(c) Vindhyas
(d) Satpuras

Answer: (a) Sahyadris
Explanation: The Western Ghats are called the Sahyadris and run parallel to the west coast.

Q11. The black soil of the Deccan formed mainly from:

(a) River alluvium
(b) Ancient lava flows
(c) Coral deposits
(d) Wind-blown sand

Answer: (b) Ancient lava flows
Explanation: The black regur soil developed from weathered basaltic lava of the Deccan Trap.

Q12. The only significant river of the Thar Desert is the:

(a) Luni
(b) Sabarmati
(c) Mahi
(d) Tapi

Answer: (a) Luni
Explanation: The Luni is the chief, largely seasonal river of the arid Thar region.

Q13. The Thar Desert lies to the west of which range?

(a) Vindhya
(b) Aravalli
(c) Satpura
(d) Nilgiri

Answer: (b) Aravalli
Explanation: The Thar Desert stretches westward from the Aravalli hills.

Q14. Which coast is broader and built up by large river deltas?

(a) Western Coastal Plain
(b) Eastern Coastal Plain
(c) Konkan Coast
(d) Malabar Coast

Answer: (b) Eastern Coastal Plain
Explanation: The Eastern Coastal Plain is wider and formed by the deltas of the Mahanadi, Godavari, Krishna and Kaveri.

Q15. India’s only active volcano is located on:

(a) Barren Island
(b) Minicoy Island
(c) Car Nicobar
(d) Pamban Island

Answer: (a) Barren Island
Explanation: Barren Island in the Andaman group hosts India’s only active volcano.

Q16. The Lakshadweep Islands are made up of:

(a) Volcanic rock
(b) Coral
(c) Folded sediment
(d) Granite

Answer: (b) Coral
Explanation: The Lakshadweep Islands are coral atolls and reefs in the Arabian Sea.

Q17. The Eastern Ghats, compared with the Western Ghats, are:

(a) Higher and continuous
(b) Lower and discontinuous
(c) Equal in height
(d) Volcanic

Answer: (b) Lower and discontinuous
Explanation: The Eastern Ghats are lower and broken by the deltas of east-flowing rivers.

Q18. The Northern Plain has been formed by the deposition of:

(a) Lava
(b) Alluvium
(c) Coral
(d) Loess

Answer: (b) Alluvium
Explanation: River-borne alluvium from the Indus, Ganga and Brahmaputra built the fertile Northern Plain.

Q19. The Purvanchal hills lie in which part of India?

(a) North-west
(b) North-east
(c) South
(d) West

Answer: (b) North-east
Explanation: The Purvanchal (eastern hills), including the Patkai, Naga and Mizo ranges, lie in the north-east.

Q20. Plate tectonics explains the seismic activity of the Himalayas because the region is:

(a) Geologically dead
(b) Still being uplifted
(c) Below sea level
(d) Made of coral

Answer: (b) Still being uplifted
Explanation: Ongoing collision of the Indian and Eurasian plates keeps the Himalayan belt rising and earthquake-prone.

CHAPTER

3

DRAINAGE SYSTEM

IN THIS CHAPTER
Covers the concept of drainage and drainage patterns, the distinction between Himalayan and Peninsular rivers, the major river systems of India, lakes, the usefulness of rivers, and the problem of river pollution.

CHAPTER 3 Drainage System

The flow of water through well-defined channels is called drainage, and the network of such channels is a drainage system. The area drained by a single river system is its drainage basin, and the elevated boundary separating one basin from another is a water divide. India's rivers are conventionally grouped into two great families: the Himalayan rivers and the Peninsular rivers.

Himalayan and Peninsular Rivers Compared

Himalayan vs. Peninsular Rivers

Feature	Himalayan Rivers	Peninsular Rivers
Flow	Perennial (snow + rain fed)	Mostly seasonal (rain fed)
Origin	High Himalayas / glaciers	Plateau & Western Ghats
Valleys	Deep gorges, V-shaped	Shallow, broad, mature
Course	Long, meandering	Short, fixed, straighter
Deltas	Large fertile deltas	Deltas + some estuaries
Examples	Ganga, Yamuna, Brahmaputra	Godavari, Krishna, Narmada

Original comparison chart of Himalayan and Peninsular rivers.

Himalayan rivers are perennial because they are fed both by monsoon rain and by melting snow and glaciers. They have long courses, carve deep gorges in their mountainous upper reaches, and build broad, fertile deltas where they meet the sea. Peninsular rivers, in contrast, are largely seasonal and depend on rainfall; they flow in shallow, mature valleys along comparatively fixed courses.

The Himalayan River Systems

▸ The Indus System

The Indus rises near Lake Mansarovar in Tibet and flows north-west before turning south into Pakistan. Its chief tributaries on the Indian side include the Jhelum, Chenab, Ravi, Beas and Satluj. Under the Indus Waters Treaty, the waters are shared between India and Pakistan.

▸ The Ganga System

The Ganga rises as the Bhagirathi from the Gangotri glacier and is joined by the Alaknanda at Devprayag, from where it is known as the Ganga. Major tributaries include the Yamuna, the Ghaghara, the Gandak and the Kosi from the Himalayas, and the Chambal, Betwa and Son from the peninsula. Together with the Brahmaputra it forms the world's largest delta, the Sundarbans.

▸ The Brahmaputra System

Known as the Tsangpo in Tibet, the Brahmaputra enters India in Arunachal Pradesh and flows through Assam, where it carries an enormous load of silt and is notorious for shifting its channel and causing floods. It joins the Ganga in Bangladesh.

The Peninsular River Systems

Most large peninsular rivers — the Mahanadi, Godavari, Krishna and Kaveri — rise in the Western Ghats and flow eastward to the Bay of Bengal, building deltas along the way. The Godavari, the largest of them, is often called the 'Dakshin Ganga'. Two important rivers, the Narmada and the Tapi, are exceptions: they flow westward through rift valleys to the Arabian Sea and form estuaries rather than deltas.

★ KEY FACTS

› Largest peninsular river: the Godavari.
› West-flowing rift-valley rivers: the Narmada and the Tapi.
› Largest delta in the world: the Sundarbans, built by the Ganga and Brahmaputra.

Lakes, Uses and Pollution

India has many lakes of differing origins — tectonic, glacial, oxbow and lagoon. Some, such as Wular in Kashmir, are natural; others, like Govind Sagar, are reservoirs created by dams. Rivers are invaluable for irrigation, drinking water, hydro-electricity, navigation and fisheries. Yet rising population and industry have made river pollution a serious concern, prompting clean-up programmes for several major rivers.

◆ POINTS TO PONDER

A single river often flows through several states and even countries before reaching the sea. How should the use of its water be shared fairly between upstream and downstream users, especially in years of poor rainfall?

Drainage Patterns

The shape a river network takes on the land depends on the slope and the underlying rock. Geographers recognise several typical patterns. A dendritic pattern, resembling the branches of a tree, develops where the rock offers uniform resistance, as on the plains. A trellis pattern, with tributaries meeting the main stream at right angles, forms in folded country. A radial pattern spreads outward from a central high point such as a dome, while a centripetal pattern converges inward into a basin.

- Dendritic – tree-like; the commonest pattern, seen across the northern plains.

- Trellis – rectangular branching, controlled by ridges and valleys.
- Radial – streams flow outward from a high central mass, as around a volcano or dome.
- Centripetal – streams flow inward toward a central low or lake.

Major Rivers at a Glance

Selected Major Rivers of India

River	Source region	Drains into
Indus	Near Lake Mansarovar, Tibet	Arabian Sea (via Pakistan)
Ganga	Gangotri glacier (as Bhagirathi)	Bay of Bengal
Brahmaputra	Near Mansarovar (as Tsangpo)	Bay of Bengal
Narmada	Amarkantak plateau	Arabian Sea (westward)
Tapi	Satpura ranges	Arabian Sea (westward)
Godavari	Western Ghats near Nashik	Bay of Bengal
Krishna	Western Ghats near Mahabaleshwar	Bay of Bengal
Kaveri	Western Ghats (Brahmagiri)	Bay of Bengal

Tributaries of the Ganga and the Indus

The Ganga gathers strength from both Himalayan and peninsular tributaries. From the mountains come the Yamuna (its longest tributary), the Ghaghara, the Gandak and the Kosi; from the plateau to the south come the Chambal, the Betwa and the Son. The Indus, meanwhile, is fed on the Indian side by the five rivers that give Punjab its name — the Jhelum, the Chenab, the Ravi, the Beas and the Satluj.

Lakes and Their Origins

Types of Lakes

Type	How it forms	Example kind
Tectonic	Movement of the Earth’s crust	Rift-valley lakes
Glacial	Scooping or damming by ice	High Himalayan lakes
Oxbow	A cut-off river meander	Plains of north India
Lagoon	A coastal bar enclosing sea water	East-coast lagoons
Artificial	A dam across a river	Large reservoirs

Rivers, People and Pollution

India’s rivers irrigate its fields, turn its turbines, carry its boats and support its fisheries, but rapid growth of population, farming and industry has loaded many of them with sewage,

chemicals and waste. Cleaning and protecting major rivers has therefore become a national priority, pursued through pollution-control measures, treatment of waste water, and public-awareness campaigns. The idea of linking rivers to move water from surplus to deficit basins has also been widely discussed as a way of tackling floods and droughts together.

★ KEY FACTS

› The Yamuna is the longest tributary of the Ganga.
› A dendritic drainage pattern looks like the branching of a tree.
› Lagoons such as those on the east coast hold brackish (slightly salty) water.

Practice MCQs — Chapter 3

Q1. The area drained by a single river and its tributaries is called a:

(a) Water divide
(b) Drainage basin
(c) Watershed line
(d) Confluence

Answer: (b) Drainage basin
Explanation: A drainage basin is the entire area drained by a river system; the boundary between basins is the water divide.

Q2. Himalayan rivers are perennial mainly because they are fed by:

(a) Rain only
(b) Snowmelt and rain
(c) Groundwater only
(d) Lakes only

Answer: (b) Snowmelt and rain
Explanation: Both monsoon rainfall and melting Himalayan snow and glaciers keep these rivers flowing all year.

Q3. Which river is known as the ‘Dakshin Ganga’?

(a) Krishna
(b) Kaveri
(c) Godavari
(d) Mahanadi

Answer: (c) Godavari
Explanation: The Godavari, the largest peninsular river, is called the Dakshin Ganga (Ganga of the South).

Q4. The Ganga is formed at Devprayag by the union of the Bhagirathi and the:

(a) Yamuna
(b) Alaknanda
(c) Mandakini
(d) Pindar

Answer: (b) Alaknanda
Explanation: At Devprayag the Bhagirathi meets the Alaknanda, and the combined stream is called the Ganga.

Q5. Which two rivers flow westward through rift valleys?

(a) Godavari and Krishna
(b) Narmada and Tapi
(c) Mahanadi and Kaveri
(d) Ganga and Yamuna

Answer: (b) Narmada and Tapi
Explanation: The Narmada and the Tapi are exceptions, flowing west through rift valleys to the Arabian Sea.

Q6. The Brahmaputra is known in Tibet as the:

(a) Tsangpo
(b) Dihang
(c) Siang
(d) Luni

Answer: (a) Tsangpo
Explanation: The Brahmaputra is called the Tsangpo in Tibet; it becomes the Dihang/Siang on entering India.

Q7. The world’s largest delta, the Sundarbans, is formed by the Ganga and the:

(a) Indus
(b) Brahmaputra
(c) Godavari
(d) Mahanadi

Answer: (b) Brahmaputra
Explanation: The combined Ganga–Brahmaputra system builds the Sundarbans, the largest delta on Earth.

Q8. Which of the following is NOT a tributary of the Indus?

(a) Jhelum
(b) Chenab
(c) Gandak
(d) Satluj

Answer: (c) Gandak
Explanation: The Gandak is a tributary of the Ganga; the Jhelum, Chenab, Ravi, Beas and Satluj feed the Indus.

Q9. The Indus rises near which lake in Tibet?

(a) Wular
(b) Mansarovar
(c) Chilika
(d) Sambhar

Answer: (b) Mansarovar
Explanation: The Indus originates near Lake Mansarovar in Tibet.

Q10. Most large peninsular rivers drain into the:

(a) Arabian Sea
(b) Bay of Bengal
(c) Indian Ocean directly
(d) Gulf of Kutch

Answer: (b) Bay of Bengal
Explanation: The Mahanadi, Godavari, Krishna and Kaveri all flow east to the Bay of Bengal.

Q11. The Narmada and Tapi empty into the:

(a) Bay of Bengal
(b) Arabian Sea
(c) Indian Ocean near Sri Lanka
(d) Gulf of Mannar

Answer: (b) Arabian Sea
Explanation: Both west-flowing rivers reach the Arabian Sea, forming estuaries.

Q12. The Kosi river is notorious for:

(a) Drying up
(b) Frequent floods and shifting course
(c) Salinity
(d) Being navigable

Answer: (b) Frequent floods and shifting course
Explanation: The Kosi, the ‘sorrow of Bihar’, frequently changes course and causes severe floods.

Q13. Which is a natural freshwater lake in Jammu & Kashmir?

(a) Govind Sagar
(b) Wular
(c) Sambhar
(d) Chilika

Answer: (b) Wular
Explanation: Wular is a large natural lake; Govind Sagar is a man-made reservoir and Chilika is a lagoon.

Q14. Chilika lake is best described as a:

(a) Glacial lake
(b) Oxbow lake
(c) Lagoon
(d) Tectonic lake

Answer: (c) Lagoon
Explanation: Chilika, on the east coast, is a brackish coastal lagoon.

Q15. Peninsular rivers generally have valleys that are:

(a) Deep and V-shaped
(b) Shallow and mature
(c) Below sea level
(d) Glaciated

Answer: (b) Shallow and mature
Explanation: Long-established peninsular rivers flow through shallow, broad, mature valleys.

Q16. The Indus Waters Treaty governs sharing of river water between India and:

(a) China
(b) Bangladesh
(c) Pakistan
(d) Nepal

Answer: (c) Pakistan
Explanation: The treaty allocates the use of the Indus and its tributaries between India and Pakistan.

Q17. An oxbow lake is typically formed by a:

(a) Glacier
(b) Meandering river
(c) Volcano
(d) Tectonic fault

Answer: (b) Meandering river
Explanation: When a meander loop of a river is cut off, the abandoned curve becomes an oxbow lake.

Q18. Which river is the largest among the peninsular rivers by length and basin?

(a) Krishna
(b) Kaveri
(c) Godavari
(d) Tapi

Answer: (c) Godavari
Explanation: The Godavari is the longest and largest of the peninsular rivers.

Q19. The elevated boundary separating two drainage basins is the:

(a) Delta
(b) Confluence
(c) Water divide
(d) Estuary

Answer: (c) Water divide
Explanation: A water divide is the high ground (such as a mountain range) that separates adjacent drainage basins.

Q20. River water in India is used for all of the following EXCEPT:

(a) Irrigation
(b) Hydro-electricity
(c) Navigation
(d) Increasing earthquakes

Answer: (d) Increasing earthquakes
Explanation: Rivers support irrigation, power, navigation, drinking water and fisheries; they do not cause earthquakes.

CHAPTER

4

CLIMATE

IN THIS CHAPTER

Covers the meaning of weather and climate, the factors controlling India’s climate, the monsoon and its mechanism, the seasons of the year, the distribution of rainfall, and the unity and diversity of the Indian climate.

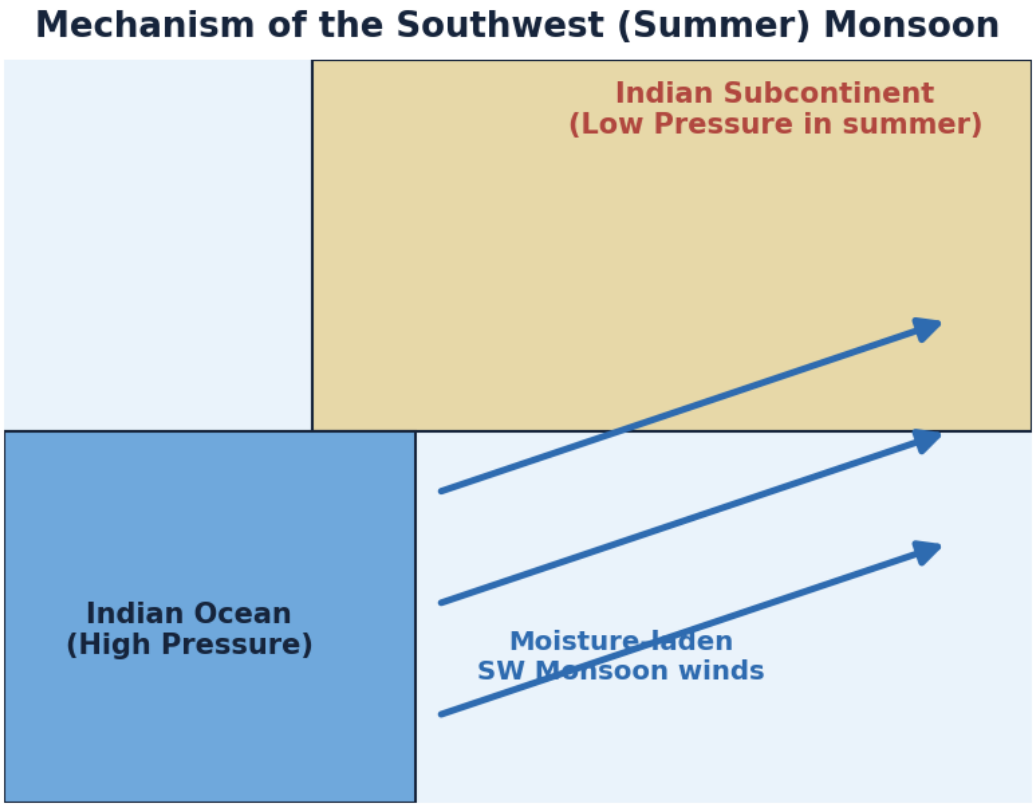
CHAPTER 4 Climate

Weather is the state of the atmosphere at a particular place and time, while climate is the average of weather conditions over a long period. India is described as having a ‘monsoon’ type of climate, a pattern shared with much of South and South-East Asia, in which the wind reverses direction with the seasons and rainfall is heavily concentrated in a few months of the year.

Factors Controlling India’s Climate

- Latitude — the Tropic of Cancer divides India into a tropical south and a sub-tropical north.
- Altitude — the Himalayas keep out cold Central Asian winds and influence rainfall.
- Pressure and wind systems — including the monsoon winds, jet streams and western disturbances.
- Distance from the sea — coastal areas have an equable climate while the interior is more extreme.
- Relief — windward slopes receive heavy rain while leeward sides remain dry.

The Indian Monsoon



Original diagram: mechanism of the southwest summer monsoon.

The word monsoon derives from a term meaning ‘season’. In summer the landmass of India heats rapidly and develops a region of low pressure, while the comparatively cool ocean retains higher pressure. Winds blow from the sea towards the land, picking up moisture and bringing the south-west monsoon rains. In winter the pattern reverses: the land cools, pressure rises

over the interior, and dry north-east monsoon winds blow out towards the sea.

★ KEY FACTS

› The south-west monsoon normally reaches the southern tip of India around the first week of June.
› The monsoon ‘bursts’ — arriving suddenly with heavy rain rather than gradually.
› Mawsynram and Cherrapunji in Meghalaya are among the wettest places on Earth.

The Seasons

▸ The Cold Weather Season (Winter)

From roughly December to February, clear skies, low temperatures and dry north-east winds prevail over most of the country. Western disturbances bring light rain to the north-west, valuable for the wheat crop, while the Tamil Nadu coast receives rain from the retreating monsoon.

▸ The Hot Weather Season (Summer)

From March to May temperatures rise sharply and a low-pressure trough develops over the north. Localised dust storms and thunderstorms occur, known by names such as the ‘loo’ (hot dry winds), ‘kalbaisakhi’ in Bengal and ‘mango showers’ in the south, which help the coffee and mango crops.

▸ The Advancing Monsoon (Rainy Season)

From June to September the south-west monsoon sweeps across the country in two branches — the Arabian Sea branch and the Bay of Bengal branch — bringing the bulk of India’s annual rainfall. This is the lifeline of Indian agriculture.

▸ The Retreating Monsoon

During October and November the monsoon withdraws from the north. The weather becomes humid and oppressive (‘October heat’), and this is the season of tropical cyclones along the eastern coast.

Distribution of Rainfall

Rainfall is very unevenly distributed. The west coast and the north-east receive over 400 cm a year, while large parts of Rajasthan, the interior Deccan and Ladakh receive less than 60 cm. This variability makes some regions flood-prone and others drought-prone, often in the same year.

◆ POINTS TO PONDER

Despite enormous regional differences in temperature and rainfall, the monsoon gives India a sense of climatic unity. Why is the timely arrival of the monsoon so important to the country’s economy and food security?

Pressure, Winds and the Jet Streams

India’s weather is steered by shifting belts of pressure and by fast, high-altitude winds called jet streams. In winter a westerly jet stream sits over the subcontinent and guides the ‘western disturbances’ that bring rain to the north-west. In summer this jet retreats north of the Himalayas and an easterly jet stream appears, helping the monsoon establish itself. The seasonal march of the pressure belts and of the zone of converging trade winds (the Inter-Tropical Convergence Zone) lies at the heart of the monsoon.

El Niño, La Niña and the Monsoon

The strength of the Indian monsoon is also linked to conditions far away in the Pacific Ocean. During an El Niño, when the central and eastern Pacific grows unusually warm, the Indian monsoon often weakens and rainfall tends to fall short. During the opposite phase, La Niña, the monsoon is frequently stronger than average. This is why meteorologists watch the Pacific closely when forecasting the season.

The Seasons of India

Season	Months	Main features
Cold weather	Dec–Feb	Clear skies, dry NE winds, western disturbances in the north
Hot weather	Mar–May	Rising heat, low-pressure trough, local storms (loo, kalbaisakhi)
Advancing monsoon	Jun–Sep	SW monsoon, bulk of annual rainfall
Retreating monsoon	Oct–Nov	Humid ‘October heat’, cyclones on the east coast

Why Rainfall Varies So Much

Three influences together explain India’s patchy rainfall map: the path of the two monsoon branches, the position of mountains that force air to rise, and distance from the sea. The windward slopes of the Western Ghats and the hills of the north-east, standing directly in the path of moist winds, are drenched; the leeward Deccan interior, sheltered in their rain shadow, stays dry; and the far north-west, reached by the monsoon only weakly, remains arid.

- Heavy rain (over 200 cm): west coast, Western Ghats, sub-Himalayan north-east.
- Moderate rain (100–200 cm): much of the northern plain and the eastern peninsula.
- Low rain (under 60 cm): western Rajasthan, the Deccan rain shadow and Ladakh.
- Variability: the lower the average rainfall, the more it tends to swing from year to year, making dry regions drought-prone.

◆ POINTS TO PONDER

Two places at the same latitude can have completely different climates — wet Mumbai and dry Pune lie close together, separated only by the Western Ghats. What does this teach us about the power of relief in shaping local climate?

★ KEY FACTS

› El Niño years are often (though not always) years of weak monsoon and drought risk in India.
› Western disturbances are rain-bearing systems that arrive from the west in winter.
› Pune lies in the rain shadow of the Western Ghats and so is far drier than nearby Mumbai.

Practice MCQs — Chapter 4

Q1. Climate is best defined as:

(a) The atmosphere at one moment
(b) Average weather over a long period
(c) Daily temperature
(d) Rainfall on one day

Answer: (b) Average weather over a long period
Explanation: Climate is the average of weather conditions taken over a long span of time, whereas weather is the momentary state of the atmosphere.

Q2. The word ‘monsoon’ originally means:

(a) Rain
(b) Season
(c) Wind
(d) Storm

Answer: (b) Season
Explanation: Monsoon comes from a word meaning ‘season’, reflecting the seasonal reversal of winds.

Q3. In summer, the Indian landmass develops a region of:

(a) High pressure
(b) Low pressure
(c) No pressure change
(d) Constant pressure

Answer: (b) Low pressure
Explanation: Rapid heating of the land in summer creates low pressure, drawing in moist winds from the sea.

Q4. The south-west monsoon usually reaches southern India around:

(a) Early April
(b) Early May
(c) Early June
(d) Early July

Answer: (c) Early June
Explanation: The monsoon typically arrives at the southern tip in the first week of June.

Q5. Which is among the wettest places on Earth?

(a) Jaisalmer
(b) Mawsynram
(c) Leh
(d) Bikaner

Answer: (b) Mawsynram
Explanation: Mawsynram (and nearby Cherrapunji) in Meghalaya record some of the world's highest rainfall.

Q6. Western disturbances bring winter rain mainly to:

(a) South India
(b) North-western India
(c) The east coast
(d) Central India

Answer: (b) North-western India
Explanation: Western disturbances from the Mediterranean bring light winter rain to north-west India, aiding wheat.

Q7. The hot, dry local wind of north India in summer is called the:

(a) Loo
(b) Kalbaisakhi
(c) Mango shower
(d) Norwester

Answer: (a) Loo
Explanation: The 'loo' is a hot, dry, often dangerous wind that blows over northern India in summer.

Q8. 'Mango showers' are pre-monsoon showers that benefit which crops?

(a) Wheat and barley
(b) Coffee and mangoes
(c) Rice and jute
(d) Cotton and millet

Answer: (b) Coffee and mangoes
Explanation: These pre-monsoon showers in the south help the coffee and mango crops ripen.

Q9. The south-west monsoon has two branches: the Arabian Sea branch and the:

(a) Indian Ocean branch
(b) Bay of Bengal branch
(c) Pacific branch
(d) Tibetan branch

Answer: (b) Bay of Bengal branch
Explanation: The monsoon advances in the Arabian Sea branch and the Bay of Bengal branch.

Q10. Tropical cyclones strike the eastern coast mainly during the:

(a) Cold season
(b) Hot season
(c) Advancing monsoon
(d) Retreating monsoon

Answer: (d) Retreating monsoon
Explanation: October-November, the season of the retreating monsoon, brings cyclones to the east coast.

Q11. 'October heat' refers to weather that is:

(a) Cold and dry
(b) Hot and humid
(c) Snowy
(d) Windy and cool

Answer: (b) Hot and humid
Explanation: As the monsoon retreats, high temperature combined with humidity produces oppressive 'October heat'.

Q12. The Himalayas affect India's climate by:

(a) Blocking the monsoon entirely
(b) Keeping out cold Central Asian winds
(c) Lowering rainfall everywhere
(d) Causing deserts in the east

Answer: (b) Keeping out cold Central Asian winds
Explanation: The Himalayas shield India from frigid Central Asian winds and force the monsoon to shed its rain.

Q13. Areas on the leeward (rain-shadow) side of mountains generally receive:

(a) Heavy rain
(b) Little rain
(c) Snow only
(d) No wind

Answer: (b) Little rain
Explanation: Windward slopes get heavy rain; the leeward rain-shadow side remains comparatively dry.

Q14. Coastal areas have an equable climate chiefly because of:

(a) High altitude
(b) Nearness to the sea
(c) Latitude alone
(d) Forest cover

Answer: (b) Nearness to the sea
Explanation: The moderating influence of the sea keeps coastal temperatures from reaching extremes.

Q15. The Tamil Nadu coast receives much of its rain from the:

(a) South-west monsoon
(b) Retreating (north-east) monsoon
(c) Western disturbances
(d) Mango showers

Answer: (b) Retreating (north-east) monsoon
Explanation: Tamil Nadu gets significant rainfall from the retreating north-east monsoon in winter.

Q16. Most of India’s annual rainfall is received during:

(a) December–February
(b) March–May
(c) June–September
(d) October–November

Answer: (c) June–September
Explanation: The June-to-September south-west monsoon delivers the bulk of India’s rain.

Q17. Which region receives less than 60 cm of rainfall a year?

(a) West coast
(b) North-east
(c) Interior Rajasthan and Ladakh
(d) Western Ghats

Answer: (c) Interior Rajasthan and Ladakh
Explanation: Parts of Rajasthan, the interior Deccan and Ladakh are dry, receiving under 60 cm.

Q18. ‘Kalbaisakhi’ storms occur mainly in:

(a) Punjab
(b) West Bengal and Assam
(c) Kerala
(d) Gujarat

Answer: (b) West Bengal and Assam
Explanation: Kalbaisakhi (Norwesters) are violent pre-monsoon thunderstorms in Bengal and Assam.

Q19. The ‘burst’ of the monsoon refers to its:

(a) Gradual onset
(b) Sudden arrival with heavy rain
(c) Withdrawal
(d) Failure

Answer: (b) Sudden arrival with heavy rain
Explanation: The monsoon ‘bursts’ — it sets in abruptly with sudden, heavy downpours.

Q20. The factor that gives India climatic UNITY is the:

(a) Latitude
(b) Monsoon
(c) Relief
(d) Distance from the sea

Answer: (b) Monsoon

Explanation: Despite great regional variety, the all-pervading rhythm of the monsoon binds the country into a single climatic whole.

CHAPTER

5

NATURAL HAZARDS AND DISASTERS

IN THIS CHAPTER

Covers the difference between a hazard and a disaster, the main natural disasters affecting India — earthquakes, tsunamis, cyclones, floods, droughts and landslides — their causes and effects, and the framework of disaster management in India.

CHAPTER 5 Natural Hazards and Disasters

A natural hazard is a potentially damaging natural event, such as an earthquake or a cyclone. It becomes a disaster only when it strikes a vulnerable community and causes serious loss of life, property or livelihood that exceeds the community's own capacity to cope. India, because of its size, geology and climate, is exposed to almost the entire range of natural disasters.

Earthquakes

An earthquake is a sudden shaking of the ground caused by the release of energy along faults in the Earth's crust. Because the Himalayan region lies along the active collision zone of the Indian and Eurasian plates, northern and north-eastern India fall in the highest seismic-risk zones. India is divided into seismic zones (II to V) according to the level of risk.

Tsunamis

A tsunami is a series of very long ocean waves generated by an undersea earthquake, landslide or volcanic eruption. The devastating Indian Ocean tsunami of December 2004 struck the coasts of Tamil Nadu, Kerala, Andhra Pradesh and the Andaman and Nicobar Islands and led India to set up an early-warning system.

Cyclones

Tropical cyclones are intense low-pressure storms with violent winds and torrential rain that form over warm seas. The eastern coast, facing the Bay of Bengal, is far more cyclone-prone than the western coast. Storm surges, in which the sea rises and floods low-lying coastal land, cause much of the damage.

★ KEY FACTS

- The east coast of India is more vulnerable to cyclones than the west coast.
- The 2004 tsunami prompted the creation of an Indian Ocean early-warning system.
- The Disaster Management Act was enacted in 2005, setting up the National Disaster Management Authority (NDMA).

Floods and Droughts

Floods occur when rivers overflow their banks, commonly in the Ganga and Brahmaputra plains during the monsoon. Droughts, by contrast, arise when rainfall is far below normal for a long period, devastating agriculture and water supply in regions such as the interior Deccan and Rajasthan. Both are closely linked to the behaviour of the monsoon.

Landslides

Landslides are the rapid downhill movement of rock, soil and debris, common in the young, unstable Himalayas and the Western Ghats. Heavy rain, earthquakes, deforestation and

unplanned construction all increase the risk.

Disaster Management

Original diagram: the four phases of the disaster management cycle.

Modern disaster management treats a disaster as a cycle rather than a single event. The phases of mitigation (reducing risk before the event), preparedness (planning and training), response (relief during and immediately after) and recovery (rebuilding) form a continuous loop. In India this work is coordinated by the National Disaster Management Authority under the Disaster Management Act of 2005.

◆ POINTS TO PONDER

The same earthquake can cause far greater loss in a crowded, poorly-built city than in a sparsely-populated countryside. What does this tell us about reducing disasters by reducing vulnerability rather than by trying to stop the hazard itself?

Classifying Disasters

It helps to sort disasters by their origin. Some are atmospheric or climatic, such as cyclones, floods and droughts; some are geological, such as earthquakes, tsunamis and landslides. Many of the worst events are really a chain reaction — an undersea earthquake triggering a tsunami, or torrential monsoon rain triggering both floods in the plains and landslides in the hills.

Major Natural Disasters and Their Causes

Disaster	Chief cause	Most affected parts of India
Earthquake	Movement along crustal faults	Himalayan belt, Kutch, north-east
Tsunami	Undersea earthquake/landslide	East coast and island groups
Cyclone	Intense low pressure over warm seas	Eastern (Bay of Bengal) coast
Flood	Heavy monsoon rain, overflowing rivers	Ganga–Brahmaputra plains
Drought	Failure or deficit of the monsoon	Interior Deccan, Rajasthan
Landslide	Slope failure in hills	Himalayas, Western Ghats

Understanding Droughts

Drought is not a single thing. A meteorological drought is simply a serious shortfall of rainfall. If that shortfall lasts long enough to dry up rivers, reservoirs and groundwater, it becomes a hydrological drought. When the lack of water begins to wither crops and threaten food supply, it has become an agricultural drought. India's heavy dependence on the monsoon makes all three closely linked.

The Disaster-Management Framework

After the Disaster Management Act of 2005, India built a three-tier institutional structure. At the top sits the National Disaster Management Authority (NDMA), supported by specialised response forces; each state has its own State Disaster Management Authority, and each district a District Disaster Management Authority. The aim is to shift the emphasis from merely reacting to disasters towards reducing risk and preparing communities in advance.

- Mitigation – building codes, embankments, afforestation and zoning to cut future losses.
- Preparedness – early-warning systems, evacuation plans, drills and stockpiles.
- Response – search, rescue, relief and emergency medical care during and just after the event.
- Recovery – rebuilding homes, restoring services and livelihoods, and building back safer.

◆ POINTS TO PONDER

Engineers can rarely stop an earthquake or a cyclone from occurring, yet good planning can dramatically cut the death toll. Why is 'reducing vulnerability' often more achievable than 'reducing the hazard'?

★ KEY FACTS

› Disasters are classified broadly as climatic/atmospheric or geological in origin.
› Meteorological, hydrological and agricultural droughts form a worsening sequence.
› India's disaster bodies work at three levels — national, state and district.

Practice MCQs — Chapter 5

Q1. A natural hazard becomes a disaster only when it:

(a) Occurs in the ocean
(b) Causes serious loss to a vulnerable community
(c) Happens at night
(d) Is predicted in advance

Answer: (b) Causes serious loss to a vulnerable community
Explanation: A hazard turns into a disaster when it strikes a vulnerable population and causes losses beyond their coping capacity.

Q2. Earthquakes in northern India are frequent because the region lies along the:

(a) Equator
(b) Indian–Eurasian plate collision zone
(c) Coastline
(d) Desert belt

Answer: (b) Indian–Eurasian plate collision zone
Explanation: The ongoing collision of the Indian and Eurasian plates makes the Himalayan belt seismically very active.

Q3. India is divided into seismic zones numbered:

(a) I to III
(b) II to V
(c) I to X
(d) A to D

Answer: (b) II to V
Explanation: Seismic zoning ranges from Zone II (least risk) to Zone V (highest risk).

Q4. A tsunami is most commonly triggered by:

(a) A cyclone
(b) An undersea earthquake
(c) A drought
(d) A heatwave

Answer: (b) An undersea earthquake
Explanation: Tsunamis are usually generated by undersea earthquakes (or landslides/eruptions) that displace large volumes of water.

Q5. The great Indian Ocean tsunami occurred in:

(a) December 2001
(b) December 2004
(c) December 2008
(d) December 2011

Answer: (b) December 2004
Explanation: The catastrophic tsunami struck in December 2004, affecting southern India and the Andaman & Nicobar Islands.

Q6. Which coast of India is more prone to cyclones?

(a) Western coast
(b) Eastern coast
(c) Both equally
(d) Neither

Answer: (b) Eastern coast
Explanation: The eastern coast facing the Bay of Bengal experiences far more tropical cyclones than the western coast.

Q7. The destructive rise of sea level during a cyclone is called a:

(a) Tsunami
(b) Storm surge
(c) Tide
(d) Flood pulse

Answer: (b) Storm surge
Explanation: A storm surge is the abnormal rise of sea water driven ashore by cyclonic winds, flooding coastal land.

Q8. Floods are most common in which Indian plains during the monsoon?

(a) Thar Desert
(b) Ganga and Brahmaputra plains
(c) Deccan plateau
(d) Coromandel coast

Answer: (b) Ganga and Brahmaputra plains
Explanation: The low-lying Ganga and Brahmaputra plains regularly flood during the monsoon.

Q9. A drought is best described as:

(a) A sudden flood
(b) A long period of much below-normal rainfall
(c) A landslide
(d) An earthquake

Answer: (b) A long period of much below-normal rainfall
Explanation: Drought is a prolonged shortage of rainfall well below the normal, harming agriculture and water supply.

Q10. Landslides are most common in which regions?

(a) Coastal plains
(b) Himalayas and Western Ghats
(c) Thar Desert
(d) Deccan trap

Answer: (b) Himalayas and Western Ghats
Explanation: Steep, unstable slopes in the Himalayas and Western Ghats are most landslide-prone.

Q11. The Disaster Management Act in India was passed in:

(a) 1995
(b) 2001
(c) 2005
(d) 2010

Answer: (c) 2005
Explanation: The Disaster Management Act of 2005 established the institutional framework, including the NDMA.

Q12. NDMA stands for the National Disaster Management:

(a) Ministry
(b) Authority
(c) Association
(d) Academy

Answer: (b) Authority
Explanation: NDMA is the National Disaster Management Authority, the apex body coordinating disaster management.

Q13. Which is NOT one of the four phases of the disaster management cycle?

(a) Mitigation
(b) Preparedness
(c) Response
(d) Taxation

Answer: (d) Taxation
Explanation: The cycle comprises mitigation, preparedness, response and recovery — not taxation.

Q14. Reducing risk BEFORE a disaster strikes is called:

(a) Response
(b) Recovery
(c) Mitigation
(d) Relief

Answer: (c) Mitigation
Explanation: Mitigation involves measures taken in advance to reduce the impact of future disasters.

Q15. Rebuilding and restoring a community after a disaster is the phase of:

(a) Mitigation
(b) Preparedness
(c) Response
(d) Recovery

Answer: (d) Recovery
Explanation: Recovery (or rehabilitation) focuses on restoring normal life and rebuilding after the event.

Q16. Which human activity increases the risk of landslides?

(a) Afforestation
(b) Deforestation and unplanned construction
(c) Terrace farming
(d) Building check dams

Answer: (b) Deforestation and unplanned construction
Explanation: Removing vegetation and reckless construction destabilise slopes and raise landslide risk.

Q17. A cyclone is a system of:

(a) High pressure with calm winds
(b) Low pressure with violent winds and rain
(c) Dry descending air
(d) Stable cold air

Answer: (b) Low pressure with violent winds and rain
Explanation: A tropical cyclone is an intense low-pressure system with strong winds and heavy rainfall.

Q18. Drought and flood in India are both closely linked to the behaviour of the:

(a) Jet stream
(b) Monsoon
(c) Trade winds
(d) Sea breeze

Answer: (b) Monsoon
Explanation: Because the monsoon dominates rainfall, both floods (excess) and droughts (deficit) follow its behaviour.

Q19. Early-warning systems are most useful for which of the following?

(a) Earthquakes (no warning possible)
(b) Cyclones and tsunamis
(c) Slow soil erosion
(d) Long-term climate change

Answer: (b) Cyclones and tsunamis
Explanation: Cyclones and tsunamis can often be detected in advance, allowing warnings and evacuation; earthquakes generally cannot be predicted.

Q20. The key idea of modern disaster management is to view a disaster as:

(a) A one-time event
(b) A continuous cycle of phases
(c) A purely natural matter
(d) An unavoidable fate

Answer: (b) A continuous cycle of phases
Explanation: Treating disaster as a cycle of mitigation, preparedness, response and recovery allows continuous risk reduction.

CHAPTER

6

SOILS

IN THIS CHAPTER

Covers what soil is and how it forms, the factors of soil formation, the major soil types of India — alluvial, black, red and yellow, laterite, arid and forest soils — the problem of soil degradation, and methods of soil conservation.

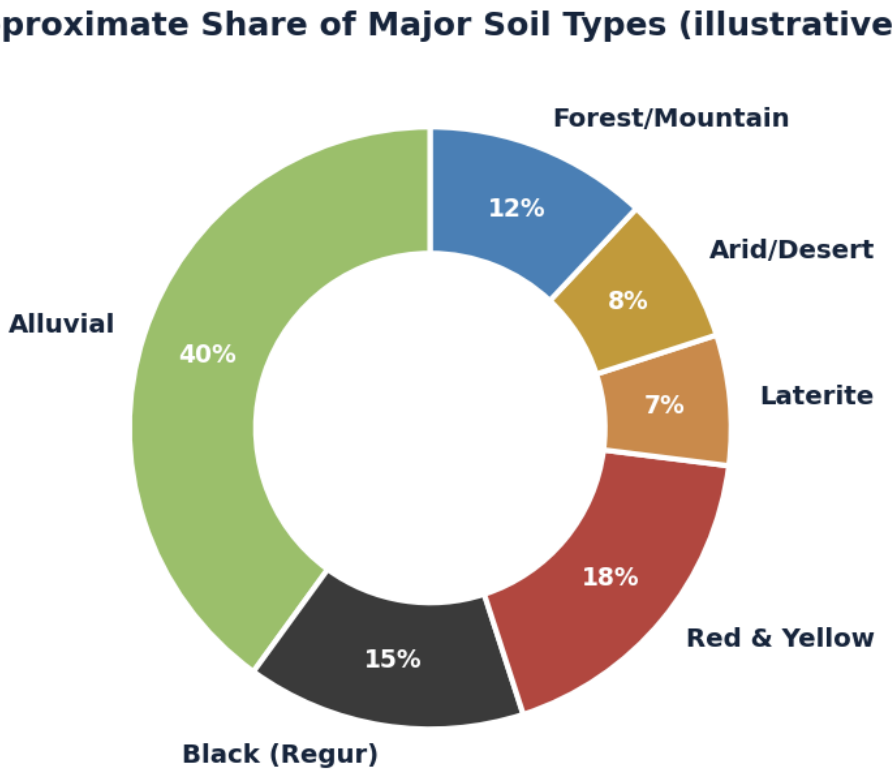
CHAPTER 6 Soils

Soil is the thin, loose upper layer of the Earth's crust made up of mineral particles, organic matter (humus), water and air. It forms slowly over thousands of years through the weathering of rock and the action of living organisms. Soil is a vital natural resource: it supports plant life and therefore all agriculture.

Factors of Soil Formation

- Parent rock — determines the mineral content and colour of the soil.
- Climate — temperature and rainfall control the rate of weathering.
- Relief and time — slope affects erosion, and mature soils take long to develop.
- Living organisms — plants, microbes and earthworms add humus and improve fertility.

Major Soil Types of India



Original chart: approximate share of major soil types (illustrative).

▸ Alluvial Soil

The most widespread and agriculturally important soil, alluvial soil is deposited by rivers across the Northern Plains and the coastal deltas. It is rich in potash and lime, ideal for wheat, rice, sugarcane and pulses. The newer khadar alluvium is more fertile than the older bhangar.

▸ Black Soil (Regur)

Formed from the weathering of the Deccan lava, black soil is found mainly in Maharashtra, Madhya Pradesh, Gujarat and parts of the south. It retains moisture well, develops cracks in the

dry season, and is famous for growing cotton — hence the name ‘black cotton soil’.

▸ Red and Yellow Soil

Developing on ancient crystalline rocks in areas of low rainfall in the eastern and southern Deccan, this soil owes its red colour to iron oxide. It turns yellow when hydrated. It is generally less fertile but responds well to fertilisers.

▸ Laterite Soil

Laterite soil forms in regions of high temperature and heavy rainfall where intense leaching washes away soluble bases. It is found in the Western Ghats, parts of the eastern hills and the north-east. Poor in fertility but useful for crops like cashew and tea, it also hardens into building blocks.

▸ Arid and Forest Soils

Arid (desert) soils of Rajasthan are sandy and saline, low in humus and moisture. Forest and mountain soils form on the hill slopes and vary with altitude; they are often acidic with low humus on the higher reaches.

★ KEY FACTS

› Most widespread soil in India: alluvial soil.
› Best soil for cotton: black (regur) soil.
› Soil formed by intense leaching in hot, wet climates: laterite soil.

Soil Degradation and Conservation

Soil is being lost and degraded through erosion by wind and water, over-cultivation, overgrazing, deforestation and the build-up of salts. Conservation methods include contour ploughing, terrace farming on slopes, planting shelter belts of trees, building check dams, and crop rotation. Protecting soil is essential for long-term food security.

◆ POINTS TO PONDER

Soil takes thousands of years to form but can be washed away in a single heavy storm if the land is left bare. Why should soil be treated as a non-renewable resource within a human lifetime, and how can farmers be encouraged to conserve it?

The Soil Profile

If a pit is dug into mature soil, distinct layers, or horizons, become visible. The dark topsoil, rich in humus and roots, is the most fertile layer. Beneath it lies the subsoil, where minerals washed down from above accumulate. Below that comes weathered parent rock, and finally the solid bedrock. The thickness and quality of these horizons decide how productive the soil will be.

Soils and the Crops They Favour

Because each soil holds water and nutrients differently, certain crops thrive on certain soils. Matching crop to soil is one of the oldest skills of Indian farming.

Major Soils and Their Crops

Soil	Main regions	Suited crops
Alluvial	Northern plains, deltas	Wheat, rice, sugarcane, pulses
Black (regur)	Deccan lava region	Cotton, oilseeds, jowar
Red & yellow	Eastern & southern Deccan	Millets, pulses, groundnut
Laterite	Western Ghats, NE hills	Cashew, tea, coffee
Arid / desert	Rajasthan	Drought-hardy millets, barley
Mountain / forest	Himalayan slopes	Tea, spices, orchard fruit

How Soil Is Lost

Soil erosion takes several forms. Rain washing evenly over bare ground removes a thin layer in ‘sheet’ erosion. Concentrated run-off cuts small channels in ‘rill’ erosion, which deepen into destructive ‘gullies’ — the badlands of the Chambal are a famous example. Wind erosion strips dry, loose soil in arid regions. Salinity and waterlogging from poor irrigation quietly poison the soil from within.

- Sheet erosion – uniform removal of the topsoil layer by rain wash.
- Rill and gully erosion – channels that deepen until the land is cut into ravines.
- Wind erosion – loose, dry soil blown away in arid areas.
- Salinisation and waterlogging – caused by over-irrigation and poor drainage.

Conserving the Soil

Conservation works with the land rather than against it. On slopes, contour ploughing and terracing slow the downhill rush of water; strips of grass and rows of trees (shelter belts) tame the wind; check dams and gully plugging halt the growth of ravines; and crop rotation, along with adding organic manure, keeps the soil alive and fertile. Treating soil as the irreplaceable resource it is lies at the heart of sustainable farming.

★ KEY FACTS

› The fertile, humus-rich top layer of soil is the most valuable horizon.
› Gully erosion has carved the ravines (badlands) along the Chambal.
› Shelter belts of trees are a classic defence against wind erosion.

Practice MCQs — Chapter 6

Q1. Soil is made up of mineral particles, water, air and:

(a) Plastic
(b) Humus (organic matter)
(c) Cement
(d) Salt only

Answer: (b) Humus (organic matter)
Explanation: Humus — decayed organic matter — is a key component of fertile soil along with minerals, water and air.

Q2. The most widespread soil type in India is:

(a) Black soil
(b) Red soil
(c) Alluvial soil
(d) Laterite soil

Answer: (c) Alluvial soil
Explanation: Alluvial soil covers the vast Northern Plains and deltas and is the most extensive soil of India.

Q3. Black soil is best suited for growing:

(a) Tea
(b) Cotton
(c) Cashew
(d) Coffee

Answer: (b) Cotton
Explanation: Black regur soil retains moisture and is famous for cotton, earning the name ‘black cotton soil’.

Q4. Black soil is formed from the weathering of:

(a) River alluvium
(b) Deccan lava (basalt)
(c) Coral
(d) Sandstone

Answer: (b) Deccan lava (basalt)
Explanation: Black soil developed from the basaltic lava of the Deccan Trap.

Q5. The red colour of red soil is due to the presence of:

(a) Lime
(b) Iron oxide
(c) Potash
(d) Salt

Answer: (b) Iron oxide
Explanation: Iron oxide gives red soil its colour; it turns yellow on hydration.

Q6. Laterite soil forms in regions with:

(a) Low rainfall and cold
(b) High temperature and heavy rainfall
(c) Desert conditions
(d) Frozen ground

Answer: (b) High temperature and heavy rainfall
Explanation: Intense leaching in hot, wet climates produces laterite soil.

Q7. Which soil hardens and can be cut into bricks for building?

(a) Alluvial
(b) Black
(c) Laterite
(d) Arid

Answer: (c) Laterite
Explanation: Laterite soil hardens on exposure and is used as building blocks (laterite bricks).

Q8. Newer, more fertile alluvium is called:

(a) Bhangar
(b) Khadar
(c) Regur
(d) Bhabar

Answer: (b) Khadar
Explanation: Khadar is the new, fertile flood-renewed alluvium; bhangar is older and less fertile.

Q9. Arid (desert) soils are typically:

(a) Rich in humus
(b) Sandy and saline with little moisture
(c) Highly fertile
(d) Black in colour

Answer: (b) Sandy and saline with little moisture
Explanation: Desert soils of Rajasthan are sandy, saline and low in humus and moisture.

Q10. Which crop is especially associated with laterite soil?

(a) Wheat
(b) Cashew and tea
(c) Cotton
(d) Sugarcane

Answer: (b) Cashew and tea
Explanation: Though low in fertility, laterite soil supports plantation crops such as cashew and tea.

Q11. Black soil develops deep cracks in the dry season because it:

(a) Has no clay
(b) Swells when wet and shrinks when dry
(c) Is sandy
(d) Contains coral

Answer: (b) Swells when wet and shrinks when dry
Explanation: The high clay content makes black soil swell when moist and crack when it dries.

Q12. Which factor does NOT influence soil formation?

(a) Parent rock
(b) Climate
(c) Living organisms
(d) Ocean currents

Answer: (d) Ocean currents
Explanation: Parent rock, climate, relief, time and organisms shape soil; ocean currents do not.

Q13. Alluvial soil is rich in which nutrients?

(a) Potash and lime
(b) Sulphur only
(c) Iron oxide only
(d) None

Answer: (a) Potash and lime
Explanation: Alluvial soil is generally rich in potash and lime, making it highly productive.

Q14. Red and yellow soils are mainly found in areas of:

(a) Heavy rainfall plains
(b) Low rainfall on crystalline rocks
(c) Desert dunes
(d) River deltas

Answer: (b) Low rainfall on crystalline rocks
Explanation: Red and yellow soils develop on old crystalline rocks in the drier parts of the Deccan.

Q15. Terrace farming on hill slopes helps to:

(a) Increase erosion
(b) Reduce soil erosion
(c) Lower fertility
(d) Cause floods

Answer: (b) Reduce soil erosion
Explanation: Terracing slows water flow down slopes and checks soil erosion.

Q16. Ploughing along the natural contours of a slope is called:

(a) Strip cropping
(b) Contour ploughing
(c) Mono-cropping
(d) Slash and burn

Answer: (b) Contour ploughing
Explanation: Contour ploughing follows the land's contours to slow run-off and reduce erosion.

Q17. Shelter belts of trees are planted mainly to control:

(a) Water erosion
(b) Wind erosion
(c) Salinity
(d) Flooding

Answer: (b) Wind erosion
Explanation: Rows of trees act as shelter belts that reduce wind speed and check wind erosion, especially in arid regions.

Q18. The build-up of salts that harms soil fertility is called:

(a) Leaching
(b) Salinisation
(c) Humification
(d) Weathering

Answer: (b) Salinisation
Explanation: Salinisation, the accumulation of salts, degrades soil and reduces its fertility.

Q19. Over-cultivation and overgrazing lead to:

(a) Soil enrichment
(b) Soil degradation
(c) More humus
(d) Higher yields forever

Answer: (b) Soil degradation
Explanation: Repeated over-use without rest depletes nutrients and degrades the soil.

Q20. Soil should be treated almost as a non-renewable resource because it:

(a) Forms instantly
(b) Takes thousands of years to form
(c) Cannot be eroded
(d) Is man-made

Answer: (b) Takes thousands of years to form
Explanation: Soil forms extremely slowly over thousands of years, so within a human lifetime it is effectively non-renewable.

CHAPTER

7

NATURAL VEGETATION

IN THIS CHAPTER

Covers the meaning of natural vegetation and flora, the factors affecting vegetation, the major vegetation types of India — tropical evergreen, tropical deciduous, thorn, montane and mangrove forests — the importance of forests and wildlife, and conservation efforts.

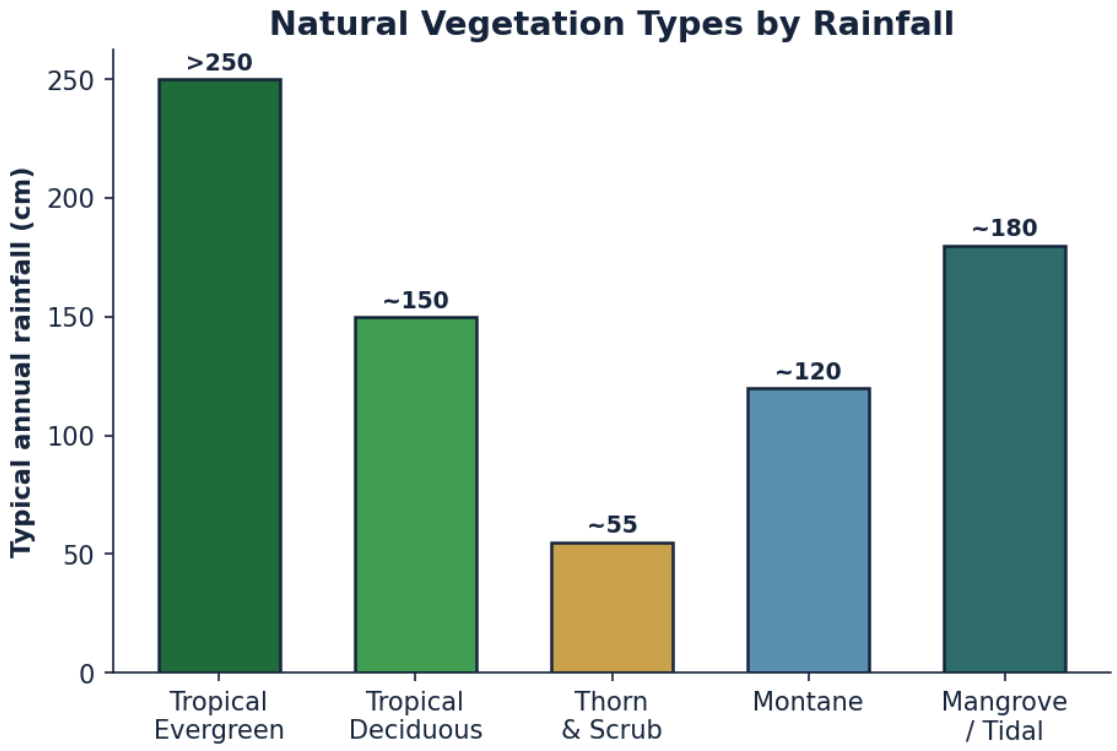
CHAPTER 7 Natural Vegetation

Natural vegetation refers to the plant community that has grown naturally without human help and has been left undisturbed over a long time. The term flora refers to the plants of a particular region, and fauna to its animals. India is one of the most biologically diverse countries in the world, owing to its great range of relief, soil, temperature and rainfall.

Factors Affecting Vegetation

- Temperature and sunlight — vary with latitude, altitude and season.
- Rainfall — the single most important control on the type of forest.
- Soil — different soils support different plant communities (for example, mangroves in tidal mud).
- Relief — land and altitude determine the species found on mountains and plains.

Major Vegetation Types



Original chart: natural vegetation types arranged by rainfall.

▸ Tropical Evergreen Forests

Found in areas with very heavy rainfall (above about 200 cm) such as the Western Ghats, the north-east and the Andaman and Nicobar Islands, these dense forests remain green throughout the year because the trees do not shed their leaves all at once. Valuable species include rosewood, mahogany and ebony.

▸ Tropical Deciduous Forests

These are the most widespread forests of India, occurring in regions of moderate rainfall (about 70-200 cm). They are called ‘monsoon forests’ because the trees shed their leaves for several

weeks in the dry season to conserve water. Important trees include teak, sal and sandalwood.

▸ Thorn Forests and Scrub

In dry regions receiving less than about 70 cm of rainfall, such as Rajasthan and parts of the Deccan, vegetation thins out into thorny trees and scrub. Plants like acacia and cactus have long roots, thick bark and waxy or spiny leaves to reduce water loss.

▸ Montane Forests

On mountains, vegetation changes with altitude in clear belts: broad-leaved evergreen forests in the lower slopes give way to coniferous trees such as pine and deodar higher up, then to alpine grasslands, and finally to bare rock and snow.

▸ Mangrove (Tidal) Forests

Along coasts and in river deltas where the land is flooded by tides, salt-tolerant mangrove forests grow. The Sundarbans delta of the Ganga and Brahmaputra has the most famous mangroves, dominated by the sundari tree, and is home to the Royal Bengal Tiger.

★ KEY FACTS

› Most widespread forest type: tropical deciduous (monsoon) forest.
› Evergreen forests need rainfall above about 200 cm.
› The Sundarbans mangroves are the natural home of the Royal Bengal Tiger.

Importance and Conservation

Forests provide timber, fuel, fodder, medicines and raw materials, protect soil and water, store carbon and shelter wildlife. Yet they face pressure from clearing, grazing and fire. India protects its forests and animals through national parks, wildlife sanctuaries and biosphere reserves, and through programmes such as Project Tiger. Conserving biodiversity is essential for ecological balance and for future generations.

◆ POINTS TO PONDER

Each vegetation type is closely matched to its climate and soil, so the loss of a forest is rarely undone by simply planting any tree anywhere. Why is it important that afforestation use species native to the local environment?

Vegetation Types at a Glance

Because rainfall is the master control on vegetation, India’s forests can be arranged neatly along a scale from the wettest to the driest. The summary table draws together the rainfall each type needs, where it is found, and its characteristic trees.

Natural Vegetation of India

Type	Rainfall	Where found / typical trees
Tropical evergreen	Over 200 cm	Western Ghats, NE, islands; rosewood, ebony
Tropical deciduous	70–200 cm	Most of India; teak, sal, sandalwood
Thorn & scrub	Under 70 cm	Rajasthan, dry Deccan; acacia, cactus

Type	Rainfall	Where found / typical trees
Montane	Varies with height	Mountains; oak, pine, deodar, alpine meadow
Mangrove / tidal	Coastal deltas	Sundarbans, deltas; sundari, salt-tolerant trees

Forests and Wildlife as Resources

Forests are far more than collections of trees. They yield timber, fuelwood, bamboo, gums, resins and medicines; they hold the soil together on slopes and feed springs and rivers; they soak up carbon dioxide and release oxygen; and they shelter a wealth of animal life. Protecting this living wealth is both an ecological necessity and an economic investment for the future.

Conserving India’s Biodiversity

India conserves its plants and animals through a graded network of protected areas. National parks give the strictest protection to whole landscapes; wildlife sanctuaries protect particular species while allowing some regulated human activity; and biosphere reserves take in entire ecosystems, balancing conservation with the needs of local people. Targeted programmes, most famously the effort to save the tiger, focus attention on flagship species whose survival safeguards many others.

Categories of Protected Areas

Category	Level of protection	Human activity
National Park	Highest	Strictly limited
Wildlife Sanctuary	High	Some regulated activity allowed
Biosphere Reserve	Whole-ecosystem	Conservation balanced with local use

◆ POINTS TO PONDER

Saving a single flagship animal such as the tiger requires protecting its entire forest, its prey and its water. How does conserving one well-chosen species end up protecting a whole ecosystem?

★ KEY FACTS

› Rainfall is the single strongest control on which forest type grows where.
› National parks offer stricter protection than wildlife sanctuaries.
› Biosphere reserves aim to balance conservation with the livelihoods of local communities.

Practice MCQs — Chapter 7

Q1. Natural vegetation is plant growth that has developed:

(a) With heavy human help
(b) Without human interference over a long time
(c) Only in gardens
(d) Only in deserts

Answer: (b) Without human interference over a long time
Explanation: Natural vegetation grows on its own, undisturbed by people, over a long period.

Q2. The term ‘flora’ refers to:

(a) Animals of a region
(b) Plants of a region
(c) Soil of a region
(d) Rivers of a region

Answer: (b) Plants of a region
Explanation: Flora means the plant life of a region; fauna means its animal life.

Q3. The single most important factor controlling vegetation type is:

(a) Soil colour
(b) Rainfall
(c) Wind direction
(d) Day length

Answer: (b) Rainfall
Explanation: Rainfall is the dominant control that decides whether a region has evergreen, deciduous, thorn or other vegetation.

Q4. Tropical evergreen forests are found in areas with rainfall above about:

(a) 50 cm
(b) 100 cm
(c) 200 cm
(d) 20 cm

Answer: (c) 200 cm
Explanation: Evergreen forests need very heavy rainfall, generally above 200 cm a year.

Q5. The most widespread forests of India are:

(a) Tropical evergreen
(b) Tropical deciduous (monsoon)
(c) Thorn forests
(d) Mangroves

Answer: (b) Tropical deciduous (monsoon)
Explanation: Tropical deciduous or monsoon forests are the most extensive in India.

Q6. Why are deciduous forests called ‘monsoon forests’?

(a) They grow only in winter
(b) Trees shed leaves in the dry season
(c) They are evergreen
(d) They grow underwater

Answer: (b) Trees shed leaves in the dry season
Explanation: These trees shed their leaves in the dry season to conserve water, hence ‘monsoon’ forests.

Q7. Teak and sal are characteristic trees of which forest type?

(a) Evergreen
(b) Deciduous
(c) Thorn
(d) Mangrove

Answer: (b) Deciduous
Explanation: Teak, sal and sandalwood are typical of tropical deciduous forests.

Q8. Thorn forests and scrub occur where rainfall is:

(a) Above 200 cm
(b) Between 100–200 cm
(c) Below about 70 cm
(d) Always 150 cm

Answer: (c) Below about 70 cm
Explanation: Thorny vegetation dominates dry regions receiving less than about 70 cm of rainfall.

Q9. Plants of thorn forests reduce water loss with:

(a) Broad leaves
(b) Thick bark, spines and waxy leaves
(c) Shallow roots
(d) Soft stems

Answer: (b) Thick bark, spines and waxy leaves
Explanation: Adaptations like long roots, thick bark and spiny or waxy leaves help these plants survive aridity.

Q10. Rosewood, mahogany and ebony are valuable timbers of:

(a) Thorn forests
(b) Tropical evergreen forests
(c) Mangroves
(d) Alpine meadows

Answer: (b) Tropical evergreen forests
Explanation: These hardwoods come from the dense tropical evergreen forests.

Q11. On mountains, coniferous trees such as pine and deodar grow:

(a) At sea level
(b) On lower slopes only
(c) At higher altitudes above broad-leaved forests
(d) Underwater

Answer: (c) At higher altitudes above broad-leaved forests
Explanation: In montane forests, conifers occupy higher altitudes above the lower broad-leaved belt.

Q12. Mangrove (tidal) forests grow mainly in:

(a) Deserts
(b) Mountain tops
(c) Coastal deltas flooded by tides
(d) Dry plateaus

Answer: (c) Coastal deltas flooded by tides
Explanation: Salt-tolerant mangroves thrive in tidal mudflats and river deltas along the coast.

Q13. The dominant tree of the Sundarbans is the:

(a) Teak
(b) Sundari
(c) Deodar
(d) Acacia

Answer: (b) Sundari
Explanation: The sundari tree dominates the Sundarbans, which is named after it.

Q14. Which famous animal lives in the Sundarbans mangroves?

(a) Asiatic lion
(b) Royal Bengal Tiger
(c) One-horned rhino
(d) Snow leopard

Answer: (b) Royal Bengal Tiger
Explanation: The Sundarbans is the natural habitat of the Royal Bengal Tiger.

Q15. Above the alpine grasslands on high mountains lies:

(a) Dense forest
(b) Bare rock and permanent snow
(c) Mangroves
(d) Desert

Answer: (b) Bare rock and permanent snow
Explanation: At the highest altitudes vegetation gives way to bare rock and perpetual snow.

Q16. Areas protected specifically for animals are called:

(a) National highways
(b) Wildlife sanctuaries
(c) Industrial zones
(d) Reservoirs

Answer: (b) Wildlife sanctuaries
Explanation: Wildlife sanctuaries (along with national parks and biosphere reserves) protect animals and their habitats.

Q17. 'Project Tiger' is an example of:

(a) A dam project
(b) A wildlife conservation programme
(c) A mining scheme
(d) A road project

Answer: (b) A wildlife conservation programme
Explanation: Project Tiger is a conservation programme launched to protect the tiger and its habitat.

Q18. Forests are valuable because they provide all of the following EXCEPT:

(a) Timber and fuel
(b) Soil and water protection
(c) Wildlife habitat
(d) Increased pollution

Answer: (d) Increased pollution
Explanation: Forests give timber, fuel, protect soil and water and shelter wildlife; they reduce, not increase, pollution.

Q19. A region set aside to conserve whole ecosystems with their plants, animals and people is a:

(a) Botanical garden
(b) Biosphere reserve
(c) Zoo
(d) Quarry

Answer: (b) Biosphere reserve
Explanation: Biosphere reserves protect entire ecosystems, balancing conservation with human use.

Q20. Afforestation should preferably use which species?

(a) Any fast-growing exotic tree
(b) Species native to the local environment
(c) Only fruit trees
(d) Only ornamental plants

Answer: (b) Species native to the local environment
Explanation: Planting native species suited to the local climate and soil restores the natural ecological balance more effectively.