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Geography of India – Part 2

CLIMATE

The Indian climate is a cycle of six seasons. There are areas where the distinction of the seasons is felt, but in most areas the six seasons overlap.

The Indian seasons in the Christian calendar are:

<i>Spring</i>	Mid-Feb to April
<i>Summer</i>	May and June
<i>Monsoon</i>	July to September
<i>Autumn</i>	Sept to Mid-November
<i>Pre-winter</i>	Mid-Nov to December
<i>Winter</i>	Mid-December to Mid-February

It is quite possible to tour India the year round, avoiding blistering heat and the monsoons, provided we choose the area. While it is roasting in the South, it would be mild in the north and the Himalayan peaks will be covered with snow most of the year. The plains of India are at their freshest in the winter. The optimum season to travel in northern India, from Rajasthan to Delhi is between September and March, although it would be quite chilly from December to January. To the east, the more extreme combination of heat, humidity and monsoon leaves only November to February fairly comfortable. Southern India is always hot but again, it is at its best between November and February.

The green strip of Kerala down the Malabar Coast is more temperate, with a much gentler climate.

The scorching pre-monsoon heat, the monsoon deluge and the post-monsoon humidity strike almost everywhere some time between May and September. The stultifying pre-monsoon heat is to be avoided throughout the country. But when the rains come, they have their own attraction, provided the humidity between showers is bearable. It is a repeated agony-ecstasy cycle.

The winter is more or less pleasant throughout the country. In the north temperatures falls steeply; in western, southern and eastern India, the winter is cool.

The summer is hot in most parts of the country. But there are a number of hill resorts to provide cool retreats for the tourists.

The southwest monsoon begins on the west coast in early June and spreads to other parts. In most of India it rains from June to September. But the southeastern regions experience greater rainfall during November to January, due to the advent of the northeast monsoon.

Cool spots are mostly British -built retreats from the boiling Madras and Bombay, such as Ootacamund and Kodaikanal in the Nilgiris and the Cardamom hills dividing Tamilnadu and Kerala states, Mahabaleshwar and Pune in the Western Ghats of Maharashtra, and Mount Abu on the Rajasthan-Gujarat border.

Rainfall in India is variable. The northeastern region, the western slopes of the Western Ghats and parts of the Himalayas have very high rainfall of around 2000mm annually. The eastern part of the peninsula extending up to the northern plains receive around 1000 to 2000mm rainfall, while the area from the Western Deccan up to the Punjab plain gets around 100mm to 500mm rainfall. Kutch and Ladakh areas have hardly any rainfall. Chirapunji in Assam is said to receive the highest amount of rainfall in the whole world.

ABOUT FLOODS IN INDIA

India, being a peninsular country and surrounded by the Arabian Sea, Indian Ocean and the Bay of Bengal, is quite prone to flood. As per the Geological Survey of India (GSI), the major flood prone areas of India cover almost 12.5% area of the country.

Every year, flood, the most common disaster in India causes immense loss to the country's property and lives.

India Flood Prone Areas

The states falling within the periphery of "India Flood Prone Areas" are West Bengal, Orissa, Andhra Pradesh, Kerala, Assam, Bihar, Gujrat, Uttar Pradesh, Haryana and Punjab. The intense monsoon rains from southwest causes rivers like Brahmaputra, Ganga, Yamuna etc. to swell their banks, which in turn floods the adjacent areas.

Over the past few decades, central India has become familiar with precipitation events like torrential rains and flash floods. The major flood prone areas in India are the river banks and deltas of Ravi, Yamuna-Sahibi, Gandak, Sutlej, Ganga, Ghaggar, Kosi, Teesta, Brahmaputra, Mahanadi, Mahananda, Damodar, Godavari, Mayurakshi, Sabarmati and their tributaries.

An over-view about state-wise flood prone areas can be gained by checking the following table

State-wise Flood Prone Areas	
State	Area liable to Floods (million Ha.)
Uttar Pradesh	7.336
Bihar	4.26
Punjab	3.7
Rajasthan	3.26
Assam	3.15
West Bengal	2.65
Haryana	2.35
Orissa	1.4
Andhra Pradesh	1.39
Gujarat	1.39
Kerala	0.87
Tamil Nadu	0.45
Tripura	0.33
Madhya Pradesh	0.26
Himachal Pradesh	0.23
Maharashtra	0.23
Jammu & Kashmir	0.08
Manipur	0.08

Delhi	0.05
Karnataka	0.02
Meghalaya	0.02
Pondichery	0.01
Total	33.516

Highest flood prone areas in India

Though the north-Indian plains prone to flood more, the "India flood prone areas" can be broadly categorized in three divisions:

- Ganga Basin:** The Ganga Basin gets flooded mostly in the northern part by its northern tributaries. The badly affected states of the Ganga basin are West Bengal, Bihar and Uttar Pradesh.
 Besides the Ganga, rivers like Sarada, Rapti, Gandak and Ghagra causes flood in eastern part of Uttar Pradesh. The Yamuna is famous for flooding Haryana and Delhi. Bihar experiences massive dangerous flood every year. River Burhi, Bagmati, Gandak, Kamla along with many small rivers contribute to that. In West Bengal, rivers like Mahananda, Bhagirathi, Damodar, Ajay etc. causes floods because of tidal effects and insufficient river channels.
- Brahmaputra and Barak Basins:** The river banks of Brahmaputra and Barak gets flooded due to the Surplus water found in the Brahmaputra basin and the Barak basin. These rivers along with their tributaries flood the northeastern states like West Bengal, Assam and Sikkim. Jaldakha, Teesta and Torsa in northern West Bengal and rivers in Manipur often overflow their banks.
- Central India and Deccan Rivers Basin:** In Orissa, spilling over of river banks by Mahanadi, Baitarni and Brahmani causes havoc. The deltaic area formed by these three rivers is thickly populated. Even some small rivers of Kerala and mud stream from the nearby hills add on to the destruction. Southern and central India observes floods caused by Narmada, Godavari, Tapi, Krishna and Mahanadi due to heavy rainfall. Cyclonic storms in the deltaic regions of Godavari, Mahanadi and Krishna even floods the coastal regions of Andhra Pradesh, Orissa and Tamil Nadu occasionally.

Refer to the table given below to get an idea about the damage caused in the India flood prone areas:

Average Annual Flood Damage (1953 - 1999)	
State	Area liable to Floods (million Ha.)
Total Damage	Rs.13,400 million
Area Affected	8.11 million hectare
Crop Area Affected	3.57 million hectare
Human Lives Lost	1579 Nos.
Cattle Lost	95,000 Nos.

LIST OF LAKES IN INDIA

Lakes Name	River Name	Type	Location	State Name
Kolleru Lake	Krishna and Godavari	Fresh water	Vijayawada	Andhra Pradesh
Pulicat Lake	Arani River, Kalangi River and Swarnamukhi River	Brackish to salty	Chennai, Sriharikota, Sullurpeta	Andhra Pradesh
Deepor Beel	Brahmaputra River	Fresh water	Guwahati	Assam
Chandubi Lake	Kulsi River	N.A	Guwhatai	Assam
Haflong Lake	N.A	High altitude lake	Silchar	Assam
Son Beel	Kakra River	Fresh water Tectonic lake	Karimganj	Assam
Kanwar Lake	Gandak River	N.A	Begusarai	Bihar
Hamirsar Lake	N.A	Artificial lake	Bhuj	Gujarat
Kankaria Lake	N.A	Artificial lake	Ahmedabad	Gujarat
Nal Sarovar	Bhogawo River	N.A	Ahmedabad-West	Gujarat
Narayan Sarovar	N.A	Artificial lake	Bhuj	Gujarat

Thol Lake	N.A	Artificial lake	Ahmedabad-West	Gujarat
Vastrapur Lake	Narmada River	Fresh waters	Ahmedabad-West	Gujarat
Lakhota Lake	N.A	N.A	Jamnagar	Gujarat
Sursagar Lake	N.A	Artificial lake	Vadodara	Gujarat
Brighu Lake	N.A	High altitude lake	Kullu	Himachal Pradesh
Dashir Lake	N.A	High altitude lake	Keylong	Himachal Pradesh
Dhankar Lake	N.A	High altitude lake	Kullu	Himachal Pradesh
Kareri (Kumarwah) lake	N.A	Freshwater, High altitude lake	Dharamsala	Himachal Pradesh
Khajjiar Lake	Ravi River	Mid altitude lake	Chamba	Himachal Pradesh
Macchial Lake	N.A	Low altitude lake	Mandi	Himachal Pradesh
Maharana Pratap Sagar	Beas River	N.A	Kangra	Himachal Pradesh
Manimahesh Lake	N.A	High altitude	Chamba	Himachal Pradesh
Nako Lake	N.A	High altitude lake	Kinnaur	Himachal Pradesh
Pandoh Lake	Beas River	N.A	Mandi	Himachal Pradesh
Prashar Lake	N.A	Holomictic	Mandi	Himachal Pradesh
Renuka Lake	N.A	Low altitude lake	Sirmour	Himachal Pradesh
Rewalsar Lake	N.A	Mid altitude lake	Mandi	Himachal Pradesh
Seruvalsar Lake	N.A	High altitude lake	Chamba	Himachal Pradesh
Manimahesh Lake	N.A	High altitude lake	Chamba	Himachal Pradesh

Suraj Taal	Chandra River	High altitude lake	Lahaul and Spiti	Himachal Pradesh
Chandra Taal	N.A	Sweet Water lake	Lahaul and Spiti	Himachal Pradesh
Badkhal Lake	N.A	Natural Water	Faridabad	Haryana
Brahma Sarovar	Rajwaha River	Ancient Water Tank	Thanesar	Haryana
Karna Lake	N.A	Landscaped	Uchana	Haryana
Sannihit Sarovar	Seven Sacred Sarasvatis of Rig Veda	Holy Water Tank	Thanesar	Haryana
Surajkund Lake	N.A	Ancient Reservoir	Sunam	Haryana
Tilyar Lake	N.A	N.A	Rohtak	Haryana
Blue Bird Lake	N.A	N.A	Hisar	Haryana
Dal Lake	Jhelum River	Warm monomictic	Srinagar	Jammu and Kashmir
Pangong Tso	N.A	Soda lake	Jammu	Jammu and Kashmir
Tso Moriri	N.A	Brackish	Jammu	Jammu and Kashmir
Wular Lake	Jhelum River	Fresh-Water lake	Srinagar	Jammu and Kashmir
Manasbal Lake	Jhelum River	Mixing Monomictic	Srinagar	Jammu and Kashmir
Mansar Lake	N.A	Holocene mono-mictic, Oligotropic	Jammu	Jammu and Kashmir
Sheshnag Lake	Lidder River	Alpine high altitude, Oligotrophic lake	Anantnag	Jammu and Kashmir
Bellandur Lake (Bangalore)	Ponnaiyar River	N.A	Bengaluru	Karnataka
Ulsoor Lake	N.A	Stalewater	Bengaluru	Karnataka

(Bangalore)				
Sankey Lake (Bangalore)	N.A	Artificial lake or tank	Bengaluru	Karnataka
Hebbal Lake (Bangalore)	N.A	N.A	Bengaluru	Karnataka
Lalbagh Lake (Bangalore)	N.A	N.A	Bengaluru	Karnataka
Puttenahalli Lake (Bangalore)	N.A	N.A	Bengaluru	Karnataka
Madiwala Lake (Bangalore)	N.A	Artificial tropical lake	Bengaluru	Karnataka
Agara Lake (Bangalore)	N.A	Artificial lake	Bengaluru	Karnataka
Karanji lake (Mysore)	N.A	N.A	Mysore	Karnataka
Kukkarahalli lake (Mysore)	N.A	Freshwater, Recreational and Fisheries	Mysore	Karnataka
Lingambudhi Lake (Mysore)	Kaveri River	Perennial freshwater	Mysore	Karnataka
Pampa Sarovar	Tungabhadra River	Sacred Pond (Holy Pond for Hindus epic)	Koppal	Karnataka
Ashtamudi Lake	Kallada River	Unique wetland ecosystem, a palm- shaped	Kollam	Kerala
Maanaanchira Lake	N.A	Artificial, freshwater lake	Kozhikode	Kerala
Padinjare chira Lake	N.A	Artificial pond	Thrissur	Kerala

Paravur Kayal	Ithikkara River	Fresh and backwater	Kollam	Kerala
Punnamada Lake (Vembanad lake)	Achenkovil, Manimala, Meenachil, Muvattupuzha, Pamba, Periyar Rivers	N.A	Alappuzha	Kerala
Shasthamkotta lake	Kallada River	Largest freshwater lake	Kollam	Kerala
Vadakkechira	N.A	Artificial pond	Thrissur	Kerala
Vellayani Lake	Karamana River	N.A	Thiruvananthapuram	Kerala
Upper Lake (Bhopal)	Kolans River	N.A	Bhopal	Madhya Pradesh
Lower Lake, Bhopal	N.A	N.A	Bhopal	Madhya Pradesh
Moti Jheel, Kanpur	N.A	Artificial lake	Kanpur	Uttar Pradesh
Gorewada Lake	Pili River	Fresh water lake	Nagpur	Maharashtra
Lonar Lake	N.A	Impact crater lake, salt lake	Lonar	Maharashtra
Pashan Lake	Ram Nadi	Artificial lake	Pune	Maharashtra
Powai Lake	N.A	Artificial lake	Mumbai	Maharashtra
Rankala Lake	N.A	Picturesque lake	Kolhapur	Maharashtra
Shivajisagar lake	Koyna River	Reservoir	Satara	Maharashtra
Talao Pali Lake	N.A	N.A	Thane	Maharashtra
Upvan Lake	N.A	N.A	Thane	Maharashtra

ra				
Venna Lake	N.A	N.A	Mahabaleshwar	Maharashtra
Umiam Lake	Umiam River	N.A	Shillong	Meghalaya
Loktak Lake	Manipur River	Fresh water (lentic)	Moirang	Manipur
Palak Dil Lake	N.A	Lentic Lake	Saiha	Mizoram
Tam Dil Lake	N.A	Reservoir	Aizawl	Mizoram
Anshupa Lake	Mahanadi River	Fresh water lake	Cuttack	Odisha
Chilka Lake	Daya River	Brackish water	Puri	Odisha
Kanjia lake	Mahanadi River	Natural lake	Bhubaneswar	Odisha
Kanjli Wetland	Bien River	Freshwater lake	Kapurthala	Punjab
Harike Wetland	Beas River and Sutlej River	Freshwater lake	Tarn Taran Sahib	Punjab
Ropar Wetland	Sutlej River	Man-made freshwater	Rupnagar	Punjab
Dhebar Lake	Gomati River	Reservoir	Udaipur	Rajasthan
Kaylana Lake	N.A	Artificial lake	Jodhpur	Rajasthan
Nakki Lake	N.A	Artificial lake	Sirohi	Rajasthan
Pachpadra Lake	N.A	Saline lake	Barmer	Rajasthan
Pushkar Lake	Luni River	Artificial lake	Ajmer	Rajasthan
Ana Sagar Lake	N.A	Artificial lake	Ajmer	Rajasthan
Rajsamand Lake	Gomati River	Reservoir	Kankroli	Rajasthan
Sambhar Salt Lake	N.A	Salt Lake	Jaipur	Rajasthan
Ramgarh Lake	N.A	Artificial lake	Jaipur	Rajasthan
Siliserhlake,	N.A	Beautiful	Alwar	Rajasthan

Alwar		artificial lake		
Man Sagar lake	N.A	Freshwater - Recreational	Jaipur	Rajasthan
Lake Salusagar				Rajasthan
Dudh Talai	N.A	Small water tank	Udaipur	Rajasthan
Fateh Sagar Lake	Ayad River	Artificial, fresh water, polymictic lake	Udaipur	Rajasthan
Pichola lake	N.A	Freshwater lake	Udaipur	Rajasthan
Rangsagar lake	N.A	Small artificial lake	Udaipur	Rajasthan
Swaroopsagar lake	Ayad River	Small artificial lake	Udaipur	Rajasthan
Gurudongmar Lake	N.A	Fresh water lake	North Sikkim	Sikkim
Khecheopalri Lake	N.A	Sacred lake	Pelling, West Sikkim	Sikkim
Lake Tsongmo	N.A	Glacial lake	East Sikkim	Sikkim
Lake Cholamu	N.A	Glacial, fresh-water lake	North Sikkim	Sikkim
Hussain Sagar	Musi River	Artificial lake	Hyderabad	Telangana
Osman Sagar	Musi River	Artificial lake	Hyderabad	Telangana
Himayat Sagar	Musi River	Artificial lake	Hyderabad	Telangana
Shamirpet Lake	N.A	Artificial lake	Hyderabad	Telangana
Mir Alam Tank	Musi River	Artificial lake	Hyderabad	Telangana

Durgam Cheruvu (Secret Lake)				
	N.A	Freshwater	Hyderabad	Telangana
Saroornagar Lake	N.A	Artificial lake	Hyderabad	Telangana
Alwal Cheruvu Lake				
	N.A	Artificial lake	Secunderabad	Telangana
Berijam Lake	N.A	Freshwater	Dindigul	Tamil Nadu
Chembarambakkam Lake				
	Adyar River	Artificial lake	Chennai	Tamil Nadu
Kodaikanal Lake	N.A	Fresh-water, Artificial lake	Kodaikanal	Tamil Nadu
Ooty Lake				
	N.A	Artificial lake	Udhagamandalam	Tamil Nadu
Red Hills Lake (Puzhal lake)	N.A	Artificial lake	Chennai	Tamil Nadu
Singanallur Lake				
	N.A	N.A	Coimbatore	Tamil Nadu
Sholavaram Lake	N.A	N.A	Thiruvallur	Tamil Nadu
Veeranam Lake				
	N.A	Artificial, intermittent lake	Cuddalore	Tamil Nadu
Ramgarh Taal Lake	N.A	N.A	Gorakhpur	Uttar Pradesh
Keetham Lake				
	N.A	Scenic lake	Agra	Uttar Pradesh
Belasagar Lake	N.A	Artificial lake	Kulpahar	Uttar Pradesh
Barua Sagar Tal				
	N.A	Artificial lake	Barua Sagar city	Uttar Pradesh
Sheikha Jheel	N.A	Fresh water perennial	Aligarh	Uttar Pradesh
Bhimtal Lake				
	N.A	Largest natural lake	Bhimtal	Uttarakhand
Dodital	N.A	Freshwater	Dehradun	Uttarakhand

		lake		d
Nainital Lake	N.A	Natural Freshwater	Nainital	Uttarakhan d
Naukuchiatal	N.A	N.A	Nainital	Uttarakhan d
Sat Tal	N.A	Freshwater lake		Uttarakhan d
Rabindra Saroobar (Dhakuria Lake)	N.A	Artificial lake	Kolkata	West Bengal
Senchal Lake	N.A	Artificial lake	Darjeeling	West Bengal
East Calcutta Wetlands	N.A	Natural and human- made wetlands	Kolkata	West Bengal
Santragachhi Lake	N.A	N.A	Santragachhi	West Benga

MINERAL RESOURCES

India has a large number of economically useful minerals and they constitute one-quarter of the world's known mineral resources. About two-thirds of its **iron deposits** lies in a belt along Odisha and Bihar border.

Other haemaite deposits are found in Madhya Pradesh, Karnataka, Maharashtra and Goa. Magnetite iron-ore is found in Tamilnadu, Bihar and Himachal.

India has the world's largest **deposits of coal**. Bituminous coal is found in Jharia and Bokaro in Bihar and Raniganj in West Bengal. Lignite coals are found in Neyveli in Tamilnadu.

Next to Russia, India has the largest supply of **Manganese**. The manganese mining areas are Madhya Pradesh, Maharashtra and Bihar-Odisha area. **Chromite deposits** are found in Bihar, Cuttack district in Odisha, Krishna district in Andhra and Mysore and Hassan in Karnataka. **Bauxite deposits** are found in western Bihar, southwest Kashmir, Central Tamilnadu, and parts of Kerala, U.P, Maharashtra and Karnataka.

India also produces third quarters of the world's **mica**. Belts of high quality mica are, Bihar, Andhra and Rajasthan. **Gypsum** reserves are in Tamilnadu and Rajasthan. **Nickel ore** is found in Cuttack in Bihar and Mayurbanj in Odisha. **Ileminite** reserves are in Kerala and along the east and the west coastal beaches.

Silimanite reserves are in Sonapahar of Meghalaya and in Pipra in M.P. **Copper ore** bearing areas are Agnigundala in Andhra, Singhbum in Bihar, Khetri and Dartiba in Rajasthan and parts of Sikkhim and Karnataka.

The Ramagiri field in Andhra, Kolar and Hutti in Karnataka are the important **gold mines**.

The Panna **diamond belt** is the only diamond producing area in the country, which covers the districts of Panna, Chatarpur and Satna in Madya Pradesh, as well as some parts of Banda in Uttar Pradesh.

Petroleum deposits are found in Assam and Gujarat. Fresh reserves were located off Bombay. The potential oil bearing areas are, Assam, Tripura, Manipur, west Bengal, Punjab, Himachal, Kutch and the Andamans.

India also possesses the all-too valuable nuclear **uranium** as well as some varieties of **rare earths**.

SOILS

Soil-types in India can be classified into three groups. The first group comprises of the **alluvial, black and red soils**, which are basically fertile and are arable and cultivatable.

The second group consists of the peaty and marshy, the **saline and alkaline** soils which are potentially arable.

The third group is the **laterite and forest and hill soils**, which are not at all suitable for cultivation.

The main alluvial area is found in the Indo-Gangetic plain and the Peninsular regions. The main crops are rice, sugarcane and wheat. Black soil is found in the northwestern regions and in the Deccan lava areas and Tamilnadu.

Black soil is especially suited for cotton. Red soil is particularly rich in potash and is found in northern and central India. The peaty and marshy soils are found in the Bengal deltas, Saline and alkaline soils in the semi-arid regions of Bihar, U.P, Gujarat, Punjab and Rajasthan. Desert soils are found in the minimum rain receiving areas of Gujarat, Punjab and Rajasthan. Laterite soil is common in the low hills of Andhra, Karnataka, Kerala, Madhya Pradesh, Odisha and Assam.

There are two crop seasons: Kharif, Rabi. The major Kharif crops are rice, jowar, maize, cotton, sugarcane, sesame and groundnut. The Rabi crops are wheat, jowar, barley, gram, rapeseed and mustard and the summer crops are rice, maize, groundnut and some cash crops.

MAJOR RIVER IN NORTH INDIA

Name	Length (km)	Area	Originates From	Ends in	Places Benifited
Indus	3100	3,21,290 Sq.Km.	In Tibet Kalish Range 5080 mts.	Arabian sea	India and Pakistan
Ganga (Bhagirati)	2480	3,37,00 Sq.Km.	Gangothri	Bay of Bengal	Uttar Pradesh, Uttarakhand, Bihar, West Bengal
Yamuna (Jamuna)	1370	3,59,000 Sq.Km.	Garhwall in Yamunotri	Bay of Bengal	Delhi, Haryana and UP
Gomati	900	N.A	Gomat Taal	Ganges	Uttar Pradesh
Ghaghara	1080	127,950 km ²	Himalayas	Ganges	Uttar Pradesh
Indus	3200	1,165,000 km ²	Tibetan Plateau	Arabian sea	Jammu and Kashmir (India) , Pakistan, China
Chenab	960	N.A	Bara-lacha la	Indus	Himachal Pradesh, Jammu and Kashmir (India) , Pakistan
Jhelum	813	N.A	Pir Panjal Range	Chenab River	Jammu and Kashmir (India) , Pakistan
Beas	470	20,303	Rohtang Pass	Sutlej	Himachal Pradesh,

		km ²			Punjab (India) , Pakistan
Sutlej	1450	66,317 km ²	Mount Kailash	Arabian sea	Himachal Pradesh, Punjab (India) , Pakistan
Ravi	720		Himachal Pradesh	Chenab River	Himachal Pradesh, Punjab (India) , Pakistan

Major River in South India

River Name	Length (km)	Area	Originates From	Ends in	Places Benifited
Krishna	1400	2,59,000 Sq.Km.	Near Mahabaleshwar in Maharashtra	Bay of Bengal	Maharashtra & Andhrapradesh
Periyar	244	5,398 Sq.Km.	Sivagiri Hills	Bay of Bengal	Tamil Nadu and Kerala
Godavari	1465	3,12,812 Sq.Km.	Nasik Hills	Bay of Bengal	South-easterly part of Andhra Pradesh
Bhima	861	70,614 km ²	Bhimashankar Temple	Krishna River	Maharashtra, Karnataka, and Telangana
Tungabhadra	531	71,417 km ²	Bhadra River, Tunga River	Krishna River	Karnataka and Andhra Pradesh, Telangana
Pennar	597	55,213 km ²	Nandidurg	Bay of Bengal	Karnataka and Andhra Pradesh, Telangana
Palar	348	N.A	Nandidurg	Bay of Bengal	Karnataka and Andhra Pradesh, Tamilnadu
Ponnaiyar	400	3,690 km ²	Nandidurg	Bay of Bengal	Karnataka and Tamilnadu
Kollidam	150	N.A	Kaveri River	Bay of	Tamil Nadu

				Bengal	
Kaveri River	765	72,000 km ²	Western Ghats	Bay of Bengal	Karnataka and Tamilnadu

INDIAN PHYSIOGRAPHY

Physiographically, India can be divided into 3 units.

1. Mountains in the North
2. Plains in the Northern India & the Coast
3. Plateau region of the South

To these can be added the fourth, namely, the coasts and islands

MOUNTAINS OF INDIA

The Himalayas in India

Means 'Abode of Snow'. They are one of the youngest fold mountain ranges in the world and comprise mainly sedimentary rocks.

They stretch from the Indus River in the west to the Brahmaputra River in the east. Total length is about 5000 km. The width of the Himalayas varies from 500 km in Kashmir to 200 km in Arunachal Pradesh. Their average height is 2000m.

The Eastern Himalayas – made up of Patkai Hills, Naga Hills, Mizo Hills and the Garo, Khasi and Jaintia Hills – are also known as Purvanchal.

The Pamir, popularly known as the Roof of the World, is the connecting link between the Himalayas and the high ranges of Central Asia.

Can be divided into 3 parallel or longitudinal zones, each with separate features

The Great Himalayas or The Himadri

- Average elevation extends upto 6000m & some of the world's highest peaks are here

Mt Everest (or Sagarmatha or Chomo Langma)	8850 m (in Nepal)
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Mt Kanchenjunga	8598 m (in India)
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Mt Makalu	8481 m (in Nepal)
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Mt Dhaulagiri	8172 m (in Nepal)
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Mt Cho Oyu	8153m (in Nepal)
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Mt Nanga Parbat	8126m (in India)
Mt Annapurna	8078 m (in Nepal)
Mt Nanda Devi	7817 m (in India)

- There are few passes and almost all of them have a height above 4,500 m. they include Shipki La and Bara Lapcha La in Himachal Pradesh, Burzil and Zozi La in Kashmir, Niti, Lipulekh and Thag La in Uttaranchal, and Jelep La and Nathu La in Sikkim.

Lesser Himalayas or The Himachal

- Average height of mountains is 3700 – 4500 m.
- Mountains and valleys are disposed in all direction (mountains rising to 5000 m and the valleys touching 1000 m).
- **Its important ranges are** : Dhauladhar, Pir Panjal, Nag Tibba, Mussoorie.
- **Important hill resorts are** : Shimla, Chhail, Ranikhet, Chakrata, Mussoorie, Nainital, Almora, Darjeeling.

Outer Himalayas or The Shiwaliks

- Lowest range (average elevation is 900 – 1200 m).
- Forms the foothills and lies between the Lesser Himalayas and the plains. It is the newest range.

Trans – Himalayan Zone

- This range lies to the north of the Great Himalayas. It has some important ranges like Karakoram, Laddakh, Zaskar, etc. the highest peak in this region is K2 or Godwin Austin (8611m, in Pak occupied Kashmir). Other high peaks are Hidden Peak (8068 m), Broad Peak (8047 m) and Gasherbrum II (8035 m).
- The longest glacier is Siachin in the Nubra valley, which is more than 72 km long (biggest glacier in the world). Biafo, Baltaro, Batura, Hispar are the other important glaciers in this region.
- This area is the largest snow-field outside the Polar Regions.

Peninsular Mountains

- While the Himalayas are Fold Mountains, they are not.
- **The Aravalli Mountains (Rajasthan)** : World's oldest. Guru Shikhar is the highest peak on which Mount Abu (1,722 m) is situated.
- The Vindhya Mountains

- The Satpura Mountains (highest point at Dhupgarh [1,350 m] near Pachmarhi)
- **The Western Ghats or Sahyadris** : Average height 1200mtrs, 1600km long. Its southern part is separated from the main Sahyadri range by Palghat Gap (link between Tamil Nadu & Kerala). Other passes are Thalghat (connects Nasik to Mumbai) and Bhorghat (connects Pune to Mumbai).
- **The Eastern Ghats (Highest peak** : Mahendra Giri (1501 m)).
- **The Nilgiris or The Blue Mountains** : Meeting place of the Western and the Eastern Ghats. Two highest peaks are Dodda Betta and Makurti.
- The highest peak of Peninsular India is Anaimudi (2695 m) in Anaimalai Hills.
- Cardamom hills or Ealaimalai is the southernmost mountain range of Indi

Facts about position of states

- UP borders the maximum number of States – 8 (Uttarakhand, HP, Haryana, Rajasthan, MP, Chhattisgarh, Jharkhand, Bihar). After UP is Assam, which touches the border of 7 States.
- **Tropic of Cancer passes through 8 States** : Gujarat, Rajasthan, MP, Chhattisgarh, Jharkhand, WB, Tripuro, Mizoram.
- **Indian Standard Meridian passes through 5 States** : UP, MP, Chhattisgarh, Orissa, AP.
- **9 States form the coast of India. They are** : Gujarat, Maharashtra, Goa, Karnataka, Kerala, Tamil Nadu. Andhra Pradesh, Orissa and West Bengal.
- 2 Union Territories, viz. Daman & Diu and Pondicherry are also on the coast.
- The Union Territories of Andaman and Nicobar Islands and Lakshadweep are made up of islands only.

The Plains of India

- To the south of the Himalayas and to the north of the Peninsula lies the great plains of North India. They are formed by the depositional works of three major river systems, Indus, Ganga and Brahmaputra. The vast plains of north India are alluvial in nature and the westernmost portion is occupied by the Thar Desert.
- The thickness of the alluvium is maximum in the Ganga plains and minimum in the Western Plains.
- In the Kerala plains are the backwaters or ‘Kayak’, which are the shallow lagoons or inlets of the sea, lying parallel to the coastline. The largest among these is the Vembanad Lake.
- The plains consist of four divisions.
- **Bhabar** : Along the foothills of Shiwaliks. Highly porous
- **Tarai** : Re – emergence of streams. Zone of excessive dampness

- **Bhangar** : Older alluvium of the plains. Studded with calcareous formations called 'kankar'
- **Khadar** : New alluvium and forms the flood plains along the river banks.

Peninsular Plateau of India

- Spreads south of the Indo – Gangetic plains flanked by sea on three sides. This plateau is shaped like a triangle with its base in the north. The Eastern Ghats and the Western Ghats constitute its eastern and western boundaries, respectively.
- Narmada, which flows through a rift valley, divides the region into two parts: The Malwa Plateau in the north & the Deccan Plateau in the south.
- Most of the rocks are of the igneous type.
- Vindhya Plateau is situated south of Malwa plateau.
- Chhota Nagpur Plateau lies to the west of Bengal basin, the largest and most typical part of which is the Ranchi plateau.
- The Deccan Plateau is the largest plateau in India. It is made up of lava flows in the Cretaceous – Eocene era through the fissure eruptions.

Islands of India

- **Total coastline of India** : 7516 km. Longest coastline: Gujarat (Second longest is of Andhra Pradesh).
- Indian territorial limits include 248 islands.

The Andaman and Nicobar Group

- Andamans is a group of 204 islands of which the largest is Middle Andaman.
- The Andamans are believed to be extensions of mountains system in the N.E. part of the country.
- Saddle Peak (737 m) in N.Andaman is the highest peak.
- The Nicobars is a group of 19 islands of which the largest is Great Nicobar. Most of them are volcanic in nature.
- Great Nicobar is the southernmost island and is only 147 km away from Sumatra island of Indonesia.
- **Volcanic Islands**: Barren and Narcondam Islands. Barren is in the process of eruption these days after lying dormant for 200 years.

The Arabian Sea Group

- All the islands in the Arabian Sea (Total 25) are coral islands and are surrounded by Fringing Reefs (North : Lakshadweep, South: Minicoy).

Note :

- Ten Degree Channel separates Andamans from Nicobars (Little Andaman from Car Nicobar)
- Duncan Passage lies between South Andaman and Little Andaman.
- Nine Degree Channel separates Kavaratti from Minicoy Island.
- Eight Degree Channel separates Minicoy Island (India) from Maldives.

Name of the Rivers in India

The Indian Rivers can be divided into two main groups :

1. Himalayan Rivers of India
2. Peninsular Rivers of India

Himalayan Rivers of India

In this three major river systems are there:

The Indus System

- It has a total length of 2880 km (709 km in India). Rises in Tibet (China) near Mansarovar Lake.
- In Jammu and Kashmir, its Himalayan tributaries are: Zaskar, Dras, Gartang, Shyok, Shigar, Nubra, Gilgit, etc.
- Its most important tributaries, which join Indus at various places, are: Jhelum (725 km), Chenab (1800 km), Ravi (720 km), Beas (470 km) & Sutlej (1050 km).
- Sources: Jhelum from Verinag (SE Kashmir), Chenab from Bara Lacha Pass (Lahaul – Spiti, H.R), Ravi from Kullu Hills near Rohtang Pass in H. R, Beas from a place near Rohtang Pass in H.E and Satluj from Mansarovar – Rakas lakes in W. Tibet.
- In Nari Khorsan province of Tibet, Satluj has created an extraordinary canyon, comparable to the Grand Canyon of Colorado (US).
- According to the Indus Water Treaty signed between India and Pakistan in 1960, India can utilize only 20% of the total discharge of Indus, Jhelum and Chenab

The Ganga System

- It is 2525 km long of which 1450 km is in Uttarakhand and UP, 445 km in Bihar and 520 km in West Bengal.
- The Ganga, the head stream is constituted of two main rivers – Bhagirathi and Alaknanda, which combine at Devprayag to form Ganga.
- Before Alaknanda meets Bhagirathi at Devprayag, Mandakini meets Alaknanda at Rudraprayag.

- Sources: Bhagirathi from Gaumukh, Alaknanda from Badrinath, Mandakini from Kedarnath (all from Uttarakhand).
- Yamuna (1375 km) is its most important tributary (on right bank). It rises at the Yamunotri glacier in Uttarakhand. It runs parallel to Ganga for 800km and joins it at Allahabad. Important tributaries of Yamuna are Chambal (1050 km), Sind, Betwa (480 km) and Ken (all from south).
- Apart from Yamuna, other tributaries of Ganga are Ghaghra (1080 km), Son (780 km), Gandak (425 km), Kosi (730 km), Gomti (805 km), Damodar (541 km). Kosi is infamous as ‘Sorrow of Bihar’, while Damodar gets the name ‘Sorrow of Bengal’ as these cause floods in these regions.
- Hooghli is a distributory of Ganga flowing through Kolkata.

The Brahmaputra system

- It has a total length of 2900 km. It rises in Tibet (from Chemayungdung glacier), where it is called Tsangpo, and enters the Indian territory (in Arunachal Pradesh) under the name Dihang.
- Important Tributaries : Subansiri, Kameng, Dhansiri, Manas, Teesta.
- In Bangladesh, Brahmaputra is known by the name of Jamuna while Ganga gets the name Padma. Their combined stream is known as Padma only. Meghna is the most important distributory before it enters the Bay of Bengal.
- The combined stream of Ganga and Brahmaputra forms the biggest delta in the world, the Sundarbans, covering an area of 58,752 sq. km. Its major part is in Bangladesh.
- On Brahmaputra is the river island, Majuli in Assam, the biggest river island in the world.
- Brahmaputra, or the Red River, is navigable for a distance of 1384 km up to Dibrugarh and serves as an excellent inland water transport route.

Rivers of the Peninsula in India

- Different from the Himalayan rivers because they are seasonable in their flow (while Himalayan rivers are perennial).
- They can be divided into two groups:

A. East Flowing Rivers of India (or Delta forming rivers)

- **Mahanadi River (858 km)** : Rises in Raipur distt. in Chhattisgarh. Main tributaries: Ib, Seonath, Hasdo, Mand, Jonk, Tel, etc.

- **Godavari River (1465 km)** : Also called Vriddha Ganga or Dakshina Ganga. It is the longest peninsular river. Rises in Nasik. Main tributaries : Manjra, Penganga, Wardha, Indravati, Wainganga, Sabari, etc.
- **Krishna River (1327 km)** : Rises in Western Ghats near Mahabaleshwar. Main tributaries: Koyna, Dudhganga, Panchganga, Malprabha, Ghatprabha, Bhima, Tungabhadra, Musi, etc.
- **Cauvery River (805 km)** : It is the largest peninsular river (maximum amount of water). Infact, it is the only peninsular river which flows almost throughout the year. Known as the ‘Ganga of the South’. It rises from the Brahmagir range of Western Ghats. Main tributaries : Hemavati, Lokpawni, Shimsa. It is less seasonal than others as its upper catchment area receives rainfall during summer by the S.W monsoon and the lower catchment area during winter season by the retreating N.E. monsoon. Its 90% – 95% irrigation and power production potential is already being harnessed.
- **Swarnarekha River (395 km) and Brahmani (705 km)** : Rises from Ranchi Plateau.

B. West Flowing Rivers in India

- **Narmada River (1057 km)** : Has only 1 / 10th part in Gujarat. Rises in Amarkantak Plateau and flows into Gulf of Khambat. It forms the famous Dhuan Dhar Falls near Jabalpur. Main tributaries: Hiran, Burhner, Banjar, Shar, Shakkar, Tawa, etc.
- **Tapti River (724 km)** : Rises from Betul distt in MR Also known as twin or handmaid of Narmada. Main tributaries: Purna, Betul, Arunavati, Ganjal, etc.
- **Sabarmati River (416 km)** : Rises from Aravallis in Rajasthan.
- **Mahi River (560 km)** : Rises from Vindhyas in MR
- **Luni River (450 km)** : Rises from Aravallis. Also called Salt River. It is finally lost in the marshy grounds at the head of the Rann of Kuchchh.

- **Sharavathi River** is a west flowing river of the Sahyadris. It forms the famous Jog or Gersoppa or Mahatma Gandhi Falls (289 m), which is the highest waterfall in India.

INLAND DRAINAGE

Some rivers of India are not able to reach the sea and constitute inland drainage. Ghaggar (494 km) is the most important of such drainage.

It is a seasonal stream which rises on the lower slopes of the Himalayas and gets lost in the dry sands of Rajasthan near Hanumangarh. It is considered the old Saraswati of the Vedic times.

Note.

- The largest man-made lake in India is Indira Sagar Lake, which is the reservoir of Sardar Sarovar Project, Onkareshwar Project and Maheshwar Project in Gujarat – MP.
- Chilka Lake (Orissa) is the largest brackish water lake of India. Otherwise also, it is the largest lake of India.
- Wular Lake (J & K) is the largest fresh water lake of India. Dul Lake is also there in J & K.
- From Sambhar and Didwana Lake (Rajasthan), salt is produced.
- Other important lakes are Vembanad in Kerala and Kolleru & Pulicat in AP.
- The three important Gulfs in the Indian Territory are:
- **Gulf of Kuchch (west of Gujarat)** : Region with highest potential of tidal energy generation
- **Gulf of Cambay or Gulf of Khambat (Gujarat)** : Narmada, Tapti, Mahi and Sabarmati drain into it.
- **Gulf of Mannar (south east of Tamil Nadu)** : Asia's first marine biosphere reserve.

The Climate of India

India has tropical monsoon type of climate. It is greatly influenced by the presence of the Himalayas in the north as they block the cold the cold air masses from Central Asia. It is because of them only that the monsoons have a watershed in India.

The Tropic of Cancer divides India into two almost equal climatic zones, namely, the northern zone and the southern zone. The warm temperate or the subtropical climate of the northern zone gives it cold winter seasons and the hot summer seasons.

The southern tropical climatic zone is warmer than the north and does not have a clear – cut winter season.

The northern zone does not have the midday sun vertically overhead during any part of the year; the southern zone has the midday sun almost vertically overhead at least twice every year.

Climate Seasons in India

- In India, the year can be divided into four seasons, resulting from the monsoons which occur mainly due to the differential heating of land and movement of the sun's vertical rays.
- The vertical rays of the sun advance towards Tropic of Cancer from mid – March, due to which hot and dry weather arrives. As temperatures rise over most of northern and Central India, a vast trough of low pressure is created. The highest temperature experienced in South is in April while in North it is in May and June.
- This part of the year is marked by a dry spell and the north – western parts of the country experience hot, dry winds, called loo. In this period, the country also experience storms / dust storms at various places.
 1. Tornado like dust storms in Punjab and Haryana, called 'Andhis' in UP and 'Kalbaisakhis' in West Bengal. They involve strong convectional movements causing some precipitation.
 2. The 'Norwesters' originate over the Chhotanagpur Plateau and blow in the north-east direction which brings about 50 cm of rainfall in Assam and about 10 cm rainfall in West Bengal and Orissa. This rainfall is very useful for Assam tea and spring rice crops of West Bengal.
 3. Similarly, 'Cherry Blossoms' are there in Karnataka, beneficial to coffee plantation and 'Mango showers' in elsewhere South India, which are beneficial to mango crops.
- This weather is followed by hot, wet weather from June to September. In May, the south – west monsoon sets in. The normal dates of onset of the monsoon are May 20 in the Andaman and Nicobar Islands, June 3 in the Konkan, June 15 in Kolkata and June 29 in Delhi.

- The south – west monsoon enters the country in two currents, one blowing over the Bay of Bengal and the other over the Arabian Sea. This monsoon causes rainfall over most of the country (except Tamil Nadu and Thar Desert area). The S.W monsoon entering from Western Ghats causes heavy rainfall over Kerala coast, but Tamil Nadu falls on the leeward side. In the Thar area, the winds blow parallel to the Aravallis and do not cause rain. The Bay of Bengal current causes heavy rainfall in the north east parts of the country and a part of it turns west along the Himalayas over the Indo – Gangetic plains causing rainfall in this region. But the Bay of Bengal current, by the time it reaches W Rajasthan, runs out of moisture.
- The Bay of Bengal branch after crossing the deltaic region enters the Khasi valley in Meghalaya and gets entrapped in it due to funnel shape of the region. It strikes Cherrapunji in a perpendicular direction causing heavies rainfall in Mawsinram (Approx. 1400 cm).
- From mid – Sept to mid-Dec, the monsoon retreats. As the sun’s vertical rays start shifting towards the Tropic of Capricorn, the low pressure area starts moving south and winds finally start blowing from land to sea. This is called north – east monsoon. The withdrawal of monsoon is a much more gradual process than its onset. It causes rainfall in Tamil Nadu as the winds pick some moisture from Bay of Bengal. This explains the phenomenon why Tamil Nadu remains dry when the entire country receives rain and why it gets rain when practically the entire country is dry.
- The cold and dry weather starts in early December. In this, the average temperature in south is 24 – 25c, and while in the north is 10 – 15c. In the latter part of December and in January, the dry spell is broken by the westerly depressions (temperate cyclones) from Mediterranean Sea, which causes some rain in north – west India.

CLIMATIC REGIONS OF INDIA

India can be divided into a number of climatic regions.

- **Tropical Rain Forests in India** : Found in the west coastal plains, the Western Ghats and parts of Assam. Characterized by high temperatures throughout the year. Rainfall, though seasonal, is heavy- about 200 cm annually during May–November.
- **Tropical Savanna Climate** : In most of the peninsula region except the semi – arid zone in the leeward side of the Western Ghats. It is characterized by long dry weather throughout winter and early summer and high temperature (above 18.2c); annual rainfall varies from 76 cm in the west to 150 cm in the east.

- **Tropical Semi – Arid Steppe Climate** : It prevails in the rain – shadow belt running southward from Central Maharashtra to Tamil Nadu in the leeward side of the Western Ghats and the Cardamom Hills. It is characterized by low rainfall which varies from 38 cm to 80 cm, high temperature between 20 and 30.
- **Tropical and Subtropical Steppes** : Large areas in Punjab, Haryana and Kutch region. Temperature varies from 12–35c. The maximum temperature reaches up to 49c. The annual rainfall, varying from 30.5 – 63.5 cm, is also highly erratic.
- **Tropical desert** : This climate extends over the western parts of Banner, Jaisalmer and Bikaner districts of Rajasthan and parts of Kutch. It is characterized by scanty rainfall (30.5 cm), which is highly erratic. Rains are mostly in the form of cloud-burst. Mean monthly temperature is uniformly high (about 35c).
- **Humid Subtropical Climate with Dry Winters** : This area includes south of the Himalayas, east of the tropical and subtropical steppes and north of tropical savannah. Winters are mild to severe while summers are extremely hot. The annual rainfall varies from 63.5 cm to more than 254 cm, most of it received during the south west monsoon season.
- **Mountain Climate** : Such type of climate is seen in mountainous regions which rise above 6,000 m or more such as the Himalayas and the Karakoram Range.

INDIA MAJOR SOILS

- Indian Council of Agricultural Research (ICAR) has divided Indian soils into eight major groups :

1. Alluvial Soil in India

- They are by far the largest and the most important soil group of India. They are composed of sediments deposited by rivers and the waves. Their chemical composition makes them one of the most fertile in the world. Usually deficient in nitrogen and humus (thus fertilizers are needed).

- Occupy the plains (from Punjab to Assam) and also occur in the valleys of Narmada and Tapti in M.P. & Gujarat, Mahanadi in the MP and Orissa, Godawari in A.R and Cauvery in T.N.
- Can be divided into Khadar (new) and Bhangar (older, more clayey and kankary) alluvium.

2. Black Soil in India

- Also called Regur and is ideal for cotton crop. These soils have been formed due to the solidification of lava spread over large areas during volcanic activity in the Deccan Plateau, thousands of years ago.
- They are black due to compounds of iron and aluminium (also because of titaniferous magnetite).
- Mainly found in Deccan Plateau – Maharashtra, Gujarat, M.P, Karnataka, Andhra Pradesh, Tamil Nadu.
- Apart from cotton cultivation, these fertile soils are suitable for growing cereals, oilseeds, citrus fruits and vegetables, tobacco and sugarcane.
- They have high moisture retention level.
- Lack in phosphorus, nitrogen and organic matter

3. Red Soil in India

- They are mainly formed due to the decomposition of ancient crystalline rocks like granites and gneisses and from rock types rich in minerals such as iron and magnesium. The term ‘red soil’ is due to the wide diffusion of iron oxides through the materials of the soil.
- Covers almost the whole of Tamil Nadu, Karnataka, Andhra Pradesh, S.E. Maharashtra, Chhatisgarh, parts of Orissa, Jharkhand and Bundelkhand.
- Generally deficient in nitrogen, humus and phosphorus, but rich in potash.
- Suitable for rice, millets, tobacco and vegetables (also groundnuts and potatoes at higher elevations).

4. Laterite Soil in India

- Found in typical monsoon conditions – under conditions of high temperature and heavy rainfall with alternate wet and dry periods. The alterations of wet and dry season leads to the leaching away of siliceous matter and lime of the rocks and a soil rich in oxides of iron and aluminium compounds is left behind.
- Found in parts of Western Ghats, Eastern Ghats, Rajmahal hills, Maharashtra, Karnataka, Kerala, Orissa, West Bengal, Assam, Tamil Nadu, etc.

- Poor in nitrogen and minerals.
- Best for tea, coffee, rubber, cinchona, coconut and suitable for rice and millet cultivation if manured.

5. Forest and Mountain Soils

- Such soils are mainly found on the hill slopes covered by forests. The formation of these soils is mainly governed by the characteristic deposition of organic matter derived from forest growth.
- In the Himalayan region, such soils are mainly found in valley basins, depressions and less steeply inclined slopes. Apart from the Himalayan region, the forest soils occur in higher hills in south and the peninsular region.
- Very rich in humus but are deficient in Potash, phosphorous and lime and needs fertilizers.
- Plantation of tea, coffee, spices and tropical fruits.

6. Arid and Desert Soils

- A large part of the arid and semi – arid region in Rajasthan and adjoining areas of Punjab and Haryana lying between the Indus and the Aravallis receiving less than 50 cm of annual rainfall is affected by desert conditions.
- This area is covered by a mantle of sand which inhibits soil growth.
- The phosphate content of these soils is as high as in normal alluvial soils. Nitrogen is originally low but its deficiency is made up to some extent by the availability of nitrogen in the form of nitrates. Thus the presence of phosphates and nitrates make them fertile soils wherever moisture is available.
- The changes in the cropping pattern in the Indira Gandhi Canal Command Area are a living example of the utility of the desert soils.

7. Saline and Alkaline Soils

- In the drier parts of Bihar, Up Haryana, Punjab, Rajasthan and Maharashtra, are the salt – impregnated or alkaline soils. Known by different names : Reh, kallar, USAR, etc.
- Some of the salts are transported in solution by the rivers and canals, which percolates in the sub – soils of the plains.
- The accumulation of salts makes the soil infertile and renders it unfit for agriculture.

8. Peaty and Marshy Soils

- Originate in the humid regions as a result of accumulation of large amounts of organic matter in the soil. They contain considerable amounts of soluble salts and 10 – 40% of organic matter.
- Peaty soils are found in Kottayam and Alappuzha districts of Kerala, where it is called Kari.
- Marshy soils, high in vegetable matter, are found in northern Bihar, coastal parts of Orissa, Tamil Nadu and West Bengal and parts of UP

SOIL EROSION IN INDIA

- Acute in hilly and dry regions
- Causes – depletion of forests, wrong use of lands such as cultivation on very steep slopes, cattle rearing. It ultimately leads to Badland Topography.
- Remedy – Afforestation, contour cultivation etc.

Natural Vegetation in India – National Parks and Wild life Sanctuaries

Tropical Wet Evergreen Forests

- In areas over 250cm rainfall. In Western Ghats, hilly areas in N.E. India and Andaman and Nicobar Islands.
- Trees are rosewood, shisham, ebony, ironwood, etc.

Tropical Moist Deciduous Forests

- In areas having rainfall between 100 – 200 cm. In peninsular region and along the foothills of Himalayas in Shivaliks, Bhabhar and Tarai.
- The trees of these forests drop their leaves for about 6–8 weeks during the spring and early summer when sufficient moisture isn't available.
- Trees are teak, sal, bamboo, sandalwood, rosewood, etc.

Thorn Forests

- In areas having rainfall between 25 and 80cm. In arid regions of Rajasthan, Punjab, Haryana and Gujarat.
- Trees are palm, acacia, etc.

Hill Forests

- In hills of S.India and the Himalayas.
- **The type of trees depends upon the height of the mountain** : Sal and bamboo below 1000 m; oaks, chestnuts and other fruit trees, and chir forests between 1000 and

2000 m; pine, deodar, silver fern and spruce between 1600 and 3300 m; above 3600 m alpine forests with trees like silver firs, pines, birches, etc. Alpine forests give way to Alpine grasslands and scrubs as we move up further.

Tidal or Mangrove Forests

- Also known as Littoral or Swamp Forests.
- Occur along the sea coast and in the estuaries of rivers, especially in Sunderbans and the Andamans.
- Most important tree is Sundari. It provides hard and durable timber which is used for construction and building purposes as well as for making boats.

Note :

- According to the National Forest Policy, the minimum desired area which is considered safe for a tropical country like India is about 33%.
- Madhya Pradesh has the largest area under forests followed by Maharashtra, Andhra Pradesh, Orissa and Arunachal Pradesh.
- As per percentage of forest area to total area, first is Andaman and Nicobar Islands, followed by Mizoram, Manipur, Himachal Pradesh, Arunachal Pradesh, Tripura and Nagaland. They are in a very comfortable position as more than half of their area is under forests.
- Arunachal Pradesh has the highest per capita forest area.
- In Mangrove forests, West Bengal holds the first position, followed by Gujarat and Andaman and Nicobar Islands.
- The lowest forest percentage is in Haryana and Punjab, because of the extensive agriculture.

Biosphere Reserves in India

- The biosphere reserve program was launched by the UNESCO in 1971 under the aegis of its Man and Biosphere (MAB) Program, to provide a global network of protected areas for conserving natural communities.
- In India, the first biosphere reserve – Nilgiri biosphere reserve – came into being in 1986. So far, 14 biosphere reserves have been set up in the country.

Nilgiri (Western Ghats)	Similipal (Orissa)
Nanda Devi (Uttarakhand)	Dibru–Daikhowa (Asom)
Nokrek (Meghalaya)	Dehong Dabang (Arunachal Pradesh)
Manas (Asom)	Panchmarhi (MP)
Sunderbans (West Bengal)	Kanchanjunga (Sikkim)

Gulf of Mannar (Tamil Nadu)	Agastiyamalai (Kerala)
Great Nicobar (Andaman and Nicobar Islands)	Achaanak maar-Amarkantak (Madhya Pradesh)

Note :

- Out of these 14, Nilgiri, Sunderbans, Manas and Gulf of Mannar have been recognized on World Network of Biosphere Reserves by UNESCO.

Project Tiger

- It was launched on April 1, 1973 to ensure maintenance of viable population of the tigers in India.
- There are 29 tiger reserves in the country:

Name of Tiger Reserve	State
Bandipur	Karnataka
Corbett	Uttarakhand
Kanha	Madhya Pradesh
Manas	Asom
Melghat	Maharashtra
Palamau	Jharkhand
Ranthambhore	Rajasthan
Similipal	Orissa
Sunderbans	West Bengal
Periyar	Kerala
Sariska	Rajasthan
Buxa	West Bengal
Indravati	Chattisgarh
Nagariunsagar	Andhra Pradesh
Namdapha	Arunachal Pradesh
Dudhwa	Uttar Pradesh
Kalakad-Mundanthurai	Tamil Nadu
Valmiki	Bihar
Pencil	Madhya Pradesh
Tadoba-Andhari	Maharashtra
Bandhavgarh	Madhya Pradesh
Panna	Madhya Pradesh
Dampha	Mizoram
Bhadra	Karnataka

Pench	Maharashtra
Pakhui-Nameri	Arunachal Pradesh-Asom
Bori, Satpura, Pachmari	Madhya Pradesh
Nagarhole	Karnataka
Katarniaghat	Uttar Pradesh
Nameri	Asom
Kaziranga	Asom

Note :

- Nagarjunasagar Tiger Reserve in AP is the largest, while Pench in Maharashtra is the smallest. Bandipur in Karnataka was the first (1973-74), while Kaziranga is the latest (2006).

Project Elephant

- It was launched in February 1992, to assist States having wild elephants to ensure long term survival of identified viable populations of elephants in their natural habitat.
- There are 14 Elephant Reserves in India.

IMPORTANT CROPS OF INDIA – AGRICULTURE IN INDIA

Rice	In West Bengal, Punjab, UP
Wheat	In UP, Punjab, Haryana
Maize	In Madhya Pradesh, Andhra Pradesh, Karnataka
Bajra	In Rajasthan, Gujarat, Maharashtra
Jowar	In Maharashtra, Karnataka, MP, AP
Total Pulses	In UP, MP, Punjab
Total Food Grains	In UP, Punjab, West Bengal
Oilseeds	
Groundnut	In Gujarat, Tamil Nadu, Andhra Pradesh
Rapeseed & Mustard	In Rajasthan, UP, Haryana
Soyabean	In Madhya Pradesh, Maharashtra, Rajasthan
Sunflower	In Karnataka, Andhra Pradesh, Maharashtra
Total Oil Seeds	In MP, Maharashtra, Rajasthan

Cash Crops

Sugarcane In UP, Maharashtra, Karnataka

Cotton In Maharashtra, Gujarat, Andhra Pradesh

Jute & In WB, Bihar, Asom

Mesta

Tea In Asom, West Bengal, Himachal Pradesh

Coffee In Karnataka, Kerala, Tamil Nadu

Rubber In Kerala, Tamil Nadu, Karnataka

Silk In Karnataka, Jammu and Kashmir, Andhra Pradesh. In India all 4 varieties of silk are available: Mulberry, tussar, eri and muga. Mulberry is the main variety, while tussar is mainly found in Bihar.

Tobacco In Gujarat, Andhra Pradesh, Karnataka

Jhum

- Shifting type of cultivation practiced in the hill slopes of Asom, Arunachal Pradesh, Mizoram and Nagaland.
- In this, the trees are felled and set on fire. The ash of the burnt trees and the other vegetation adds to the fertility of soil. This land is used for 2–3 years till the soil gets exhausted and the jhum is abandoned. The cultivators then move onto the other patch of forest land.
- **Known by different names**: Ladang (Malaysia), Chengin (Philippines), Milpa (Mexico), Konuko (Venezuela), Masole (Zaire basin), Chena (Sri Lanka).

NATIONAL PARKS AND WILD LIFE SANCTUARIES – NATURAL VEGETATION OF INDIA

- There are 96 National Parks and 510 Wildlife Sanctuaries in India.
- Madhya Pradesh and Andaman and Nicobar Islands have the maximum number of National Parks (9 each) while Andaman and Nicobar Islands has 96 and Maharashtra has 36 Wildlife Sanctuaries (maximum in India).

Gir Forests Home of Asiatic lion. In Gujarat

Kaziranga Sanctuary One horned rhino. In Asom

Manas Sanctuary One horned rhino. In Asom

Ghana or Keoladeo Bird Sanctuary In Bharatpur, Rajasthan

Dachigam Sanctuary For Hangul. In Kashmir

Corbett National Park (formerly Hailey National Park) In Uttarakhand. Home of tiger

Chandraprabha Sanctuary II home of Asiatic lion. In UP

Kanha National Park	In MP
Shiv Puri National Park	In MP
Hazaribagh National Park	In Jharkhand
Periyar Game Sanctuary	In Kerala. For elephants
Dudhwa National Park	In UP
Vedanthangal Bird Sanctuary	In Tamil Nadu
Nokrek National Park	In Meghalaya
Sariska Sanctuary	In Rajasthan
Ranthambhor National Park	In Rajasthan
Namdapha National Park	In Arunachal Pradesh
Keibul Lamjo Floating National Park	In Manipur
Palamau Tiger Project	In Bihar
Simlipal National Park	In Orissa
Ranganthitoo Bird Sanctuary	In Mysore, Karnataka
Nagarhole National Park	In Karnataka
Mudumalai Sanctuary	In Tamil Nadu
Balpakram Sanctuary	In Meghalaya
Bandipur Sanctuary	Along the Kamataka-Tamil Nadu border
Jaldapara Sanctuary	In West Bengal. For rhinos
Wild Ass Sanctuary	In Rann of Kutch, Gujarat. For Wild ass

Cropping Seasons in India

Kharif Crops of India

- Sown in summers between May and July, and harvested after the rains, in September and October.
- Eg : Rice, Jowar, Bajra, Maize, Cotton, Jute, Sugarcane, Tobacco, Groundnut, Pulses, etc.

Rabi Crops of India

- Sown at the beginning of winter and harvested before the onset of the summer season, between Feb and April.
- Eg: Wheat, barley, oilseeds, gram, potatoes, etc.
- They are raised between April and June.
- E.g. : Melon, watermelon, cucumber, toris, leafy and other vegetables.

Cash Crops of India (Commercial Crops)

- Grown mainly for the market, only a small portion of the product is consumed by the farmers themselves (cotton, sugarcane etc.)

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