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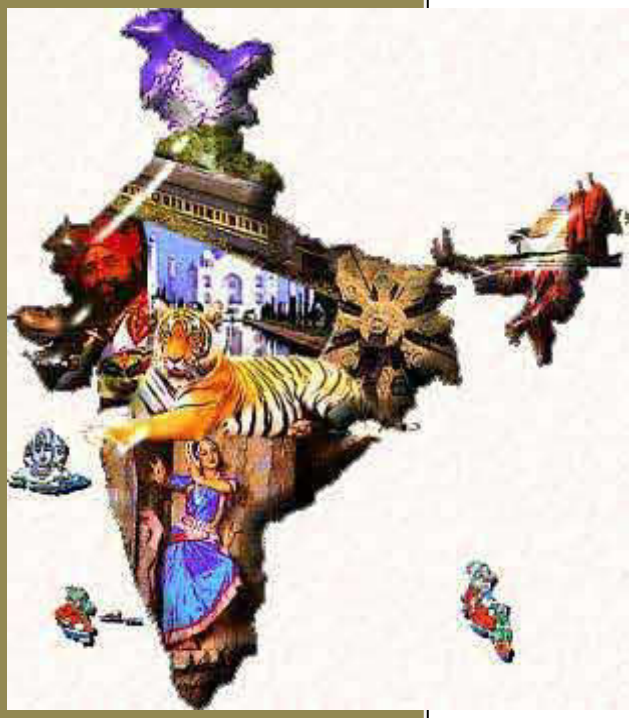

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Geography of India

India is the seventh largest country in the world in terms of area which makes it an obvious place to have vast geographical features. It lies on the Indian Plate, a northern portion of the Indo-Australian Plate. The Indian subcontinent is surrounded by three different water bodies and is easily recognisable on the world map.

Geographical Features

The country covers an area of about 3.28 million sq km. The mainland of India extends between 8°4' and 37°6' N latitude and 68°7' and 97°25' E longitude. The Tropic of Cancer 23°30' N divides India into almost two halves. The land frontier of the country is 15,200 km and the total length of the coastline is 7,517 kilometers. Indian peninsula tapers southward resulting in the division of the Indian Ocean into two water bodies – the Bay of Bengal and the Arabian Sea. In India, there is a great diversity of landforms such as lofty mountains, deep valleys, extensive plains, and a number of islands.

Location

- The Union of India is the seventh largest country in the world covering an area of 32,87,590 square kilometers and it is an important country of south Asia.
- South Asia has a total area of about 4.488 million sq. km out of which India has the largest area (3.287 sq. km). It occupies 73.2 % of total area.
- It is 4 times largest than Pakistan which is second largest in South Asia. India is 12 times largest that UK and 8 times largest than Japan.
- The mainland stretches from latitude 8°4' north to 37°6' north and from longitude 68°7' east to 97°25' east of Greenwhich. The latitudinal and longitudinal extent of the country is almost same in degrees i.e. about 30 degrees.
- The southernmost point in Indian Territory, (in Great Nicobar Islands) is the Indira Point (6°45), while Kanyakumari, also known as Cape Comorin, is the southernmost

point of Indian mainland. The country thus lies wholly in the northern and eastern hemispheres.

- The 82°30' E longitude is taken as Standard Time Meridian of India, as it passes through the middle of India (from Naini, near Allahabad.) Hence Naini, Near Allahabad is the Standard Time of India.
- The country is of a vast size and measures about 3,214 kilometers from north to south and about 2,933 kilometers from west to east.
- Indian Standard Time:- GMT +05:30
- Telephone Country Code:- +91
- Coastline:- 7,516.6 km encompassing the mainland, Lakshadweep Islands, and the Andaman & Nicobar Islands

India Facts	
Territorial Sea	12 nm (nautical miles)
Contiguous Zone	24 nm
Exclusive economic Zone	200 nm
Continental Shelf	200 nm or to the edge of the continental margin
Longest River	Ganga
Largest Lake	Lake Chilka
Highest Point	Mt. K^2 (8611 m)
Highest Point of Himalaya	Kanchan Junga (8,598 m)
Lowest Point	Kuttanad (-2.2 m)
Northernmost Point	Siachen Glacier near Karakoram
Southernmost Point	Indira Point, Great Nicobar, Andaman & Nicobar Islands
Southernmost Point of India (Mainland)	Cape Comorin (Kanya Kumari)
Westernmost Point	West of Ghuar Mota, Gujarat
Easternmost Point	Kibithu, Arunachal Pradesh
Highest Altitude	Kanchenjunga, Sikkim
Lowest Altitude	Kuttanad (Kerala)

PHYSIOGRAPHIC REGIONS

On the basis of relief features, tectonic history and stratigraphy, India can be divided into several physical units.

1. **The Great Mountains of the North:**

India comprises the Himalayas in the North and Northeastern region, which divides the country from the Tibetan plateau. The Himalayan range is further divided into different ranges:

- **Pir Panjal Range:** This is the largest range of the lower Himalayas and runs from the east-southeast to west-northwest. The Pir Panjal pass lies to the west of Srinagar and comprises Banihal Pass, Sinthal Pass, Rohtang La, Munawar Pass and Haji Pir Pass.
- **Ladakh Range:** This range extends from the northern side of Leh to the Tibetan border. It comprises Digar La Pass and Khardung La Pass. Considered as a segment of the Karakoram mountain range, the Ladakh range has an extreme climate with the main town called Leh regarded as the trade centre for fine pashmina wool..
- **Zanskar Range:** This range is spread over an area that starts from southeastern boundaries of Kashmir and extends to the eastern limit of Baltistan. Singge La Pass, Runrang La Pass, Fotu (Fatu) La Pass, Marbal Pass and Zoji La Pass are some of the passes of this range.
- **Dhauladhar Range:** This range rises from the plains of India to the north of Mandi and Kangra. Hanuman ji Ka Tiba or the 'White Mountain' is the highest peak of this range.
- **East Karakoram Range:** This range separates India from the Central Asia and is also one of the laeger ranges of Asia. It is home to the second highest peak of the world, K2.

2. **Indo-Gangetic Plain**

The Indo-Gangetic Plain is also known as Indus-Ganga and the North Indian River Plain. It is dominated by three major rivers - the Ganges, the Indus and the Brahmaputra. It covers a large area of about 7,00,000 sq km in the Northern and Eastern India. The plain is divided into four divisions:

- **The Bhabhar Belt:** It is a narrow belt that lies in the foothills of Himalayas and comprises pebbles and rocks brought down by the streams.
- **The Terai Belt:** It is located next to the Bhabhar region and is made up of newer alluvium.
- **The Bangar Belt:** It includes older alluvium and has a low upland in the Gangetic plains which is covered by the laterite deposits.

- **The Khadir Belt:** It lies on the lowland areas after the Bangar belt and is made up of newer alluvium which is brought down by the rivers which flow down to this plain.

3. **The Peninsular Plateau**

The Peninsular Plateau is a tableland and its characteristic features include shallow valleys and rounded hills. It is broadly divided into three different plateaus:

- **The Deccan Plateau:** It is a triangular shaped plateau and is bounded by the Vindhyas and the Western and Eastern Ghats. It stretches to eight states of India and covers a total area of 1.9 million sq km.
- **The Malwa Plateau:** The Malwa Plateau is spread across the parts of Gujarat, Rajasthan and Madhya Pradesh. Chambal River and its tributaries find their way in this plateau and Mahi River also flows through its Western region.
- **The Chota Nagpur Plateau:** Situated in the eastern India, Chota Nagpur Plateau covers the parts of Jharkhand, Bihar, Odisha and Chhattisgarh.

4. **The Coastal Plains**

The Coastal India spans Arabian Sea in the West to the Bay of Bengal in the East. The Eastern Coastal Plains lie between the Eastern Ghats and the Bay of Bengal; and stretches from Tamil Nadu to West Bengal. The rivers which flow through it are Krishna, Kaveri, Godavari and Mahanadi. It is divided into six different areas- the Southern Andhra Pradesh, the Kanyakumari coast, the Mahanadi delta, the Coromondel coast and sandy coast.

The Western Coastal Plains is sandwiched between the Western Ghats and the Arabian Sea and extends from Gujarat in the north and covers the regions of Maharashtra, Goa, Kerala and Karnataka. There are numerous rivers and backwaters in this region. It is divided into two parts – the Malabar Coast and the Konkan.

5. **The Thar Desert**

The Thar Desert is one of the largest deserts of the world. It extends across Gujarat, Haryana and Punjab and covers over 60% of the geographical area of Rajasthan. It also extends to Pakistan and is known as Cholistan Desert there. Luni is the only river in this desert and it receives very little rainfall. Major portion of this desert consists of craggy

rocks, sand dunes and compacted salt-lake bottoms. The speedy winds that flow with force make the nature of the soil get eroded more often. It has arid climate and the vegetation is scanty.

6. **The Islands**

There are two major groups of islands in India which are also classified as the union territories- the Andaman and Nicobar Islands, and the Lakshadweep Islands. Lakshadweep is located in the Arabian Sea and covers an area of 32 sq km. It has a total of about 35 islands and islets. The Andaman and Nicobar Islands is larger in size and comprises 572 islands. Andaman is located in the north and Nicobar is located in the south. Some of the other important islands in India are Daman and Diu, Majuli, Salsette Island and Sriharikota.

MAJOR MOUNTAIN RANGES IN INDIA

- **The Himalayan Range:** This is the world's highest mountain range and the tallest peak of the world, Mt. Everest, is also a part of it. It acts as a barrier against the frigid katabatic winds which flow down from Central Asia and protects India from its effects.

- **Patkai Range:** Patkai or Purvanchal lies on the east of India-Burma border. It comprises three hill ranges- Garo-Khasi-Jaintia in Meghalaya, Lushai hills and Patkai-Bum.
- **Karakoram Range:** It lies in the disputed areas of Jammu and Kashmir and comprises more than 60 peaks. K2, the second highest peak of the world, is also a part of this range. Besides, the Hindu Kush range, Siachen and Biafo Glacier also a part of this range.

- **Shivalik Hills:** The literal meaning of Shivalik is 'tresses of India'. It extends from Arunachal Pradesh to West Bengal and from Uttarakhand to Kashmir and Himachal Pradesh. Jammu, Kangra and Vaishno Devi are a part of this range.

- **Vindhya Range:** This range spreads across central India and extends across 1,050 km. It is believed to be formed from the Aravalli Mountains. Due to its geographical location in central India, it separates Northern and Southern India.

- **Aravalli Range:** This is India's oldest mountain range and spreads across the parts of Rajasthan, Delhi and Haryana. Guru Shikhar in Mount Abu is the highest peak of this range, which rise to 1,722 m.

- **Satpura Range:** This range stretches from Gujarat and runs to Maharashtra, Madhya Pradesh and Chhattisgarh.

- **Western and Eastern Ghats:** Western Ghats are also known as Sahyadri Mountains and runs parallel to Indian peninsula's western coast. Eastern Ghats or Purva Ghat is a discontinuous range of mountains which runs along the eastern coast of India.

STATES AND UNION TERRITORIES

There are 29 states in India, located in the total area of 3,287,263 sq km. The largest of all Indian states is Rajasthan, which covers an area of 3,42,239 sq km. It shares its border with Pakistan on its west, Gujarat on its southwest, Madhya Pradesh on its southeast and Punjab on its north.

Goa is the smallest state in India, located merely in 3,702 sq km. The state is located to the southwest of India. Uttar Pradesh lying to the northeast of the country is the most populous state. Gujarat, lying on the extreme west of the country, is one of the most prosperous of all Indian states. The strikingly beautiful Jammu and Kashmir is the northernmost state in the country. India's eastern border is bordered by states of Manipur, Meghalaya, Assam,Mizoram, Nagaland, Tripura and Arunachal Pradesh. All these states together are located in the 7% of the total area of the country. The union territories in India are seven in numbers. Delhi, the capital of India, also falls under this category. The other union territories of the country include Chandigarh, in the north; Dadra and Nagar Haveli and Daman and Diu, in the west; Lakshadweep, in the southwest; and Puducherry and Andaman and Nicobar Islands, in the southeast of the country.

WATER RESOURCES

India is surrounded by water from three sides – Arabian Sea in the west, Bay of Bengal in the east and Indian Ocean in the south. There are many water bodies in India in the form of rivers, canals, gulfs, backwaters etc. There are 12 major rivers in the country and they originate from any one of the three watersheds. There is a large reserve of rivers – big and small, and all these rivers are revered in the country other than merely being the sources of

water. The river Brahmaputra is a trans-boundary river. It originates in Tibet and enters India in Arunachal Pradesh and passes through Assam before finally making its way through Bangladesh. The river Ganga is the longest river in India and is considered to be the most pious river in the country. It has several tributaries including river Yamuna, which is the only water body near the national capital - New Delhi. River Chambal, a tributary of Yamuna passes through Madhya Pradesh, Rajasthan and Uttar Pradesh. The other major rivers in India include Narmada River, originating at Amarkantak in Madhya Pradesh, river Godavari, originating at Trayambakeshwar in Maharashtra, river Krishna originating at Mahabaleshwar, river Kaveri passing through Karnataka and Tamil Nadu, Mahanadi River flowing through Chhattisgarh and Odisha. The other rivers in the country include Mahi, Betwa, Penner, Kosi, Tungabhadra and several others. Gulf of Mannar, Gulf of Kutch and Gulf of Cambay are the major gulfs of the country. More...

POLITICAL BOUNDARIES

India shares its international borders with Pakistan on its west, and Nepal, China and Bhutan on its northeast. It is surrounded by Burma and Bangladesh on its east. Sri Lanka lies to the south of India and the union territory Andaman and Nicobar Islands lie close to Thailand and Indonesia. The political boundaries of Pakistan and Bangladesh with India are traced according to the Radcliffe Line. The Line of Control (LoC) delineates the borders of India and Pakistan and serves as a boundary between the administered areas of Kashmir in both the countries. The MacMohan Line is a border that divides India and China and runs along the states of Arunachal Pradesh, Himachal Pradesh, Uttarakhand, Jammu and Kashmir and Sikkim. India-Bangladesh border is one of the longest borders of world and touches Indian states like Assam, Meghalaya, Manipur, Tripura and Arunachal Pradesh.

CLIMATE

India has a variety of climates, varying from arid desert in the west, alpine climate in the Himalayan north to the humid tropical regions which support the island territories along with the rainforests in the southwest.

The climate is altered by the Thar Desert and the Himalayas. Some areas in the north have severe summers with extreme winters, with the temperature reaching to freezing point. The country encounters four different types of seasons - winter, summer, monsoon, and post-monsoon. In some states, the temperature in summers rise up to 45°C and minimum

temperature decreases to 15°C only. In winters, the average temperature is about 10-15°C. The highest temperature recorded in India so far is 50.6°C in Alwar, Rajasthan. The lowest temperature was recorded in Kashmir at -45°C.

The map will help you locate all these and more. All the international boundaries of the country are marked in pink lines. Grey dotted lines stand for the state boundaries and will help you to be familiar with all the Indian states and their neighbours. The blue lines scattered throughout the map represent all the major rivers in the country.

Locational Advantage:- India is a unique country as it is easily accessible to other parts of Asia, Africa, Europe and Americas. Its cultural influences have crossed its border from time immemorial and reached far off lands. It acts as a bridge head between developed and developing countries of the world and between the East and the West. India's strength lies in its geography as much as in its culture. Since the opening of the Suez Canal in 1869, distance between India and Europe has been reduced by 7000 kms. India enjoys a favourable ocean routes from East and South-East Asia and Australia to Africa and Europe pass through Indian Ocean. India is connected with the Cape of Good Hope and the Suez Canal. India can also reach Canada and the USA through the Strait of Malacca after crossing the Pacific Ocean.

INDIA GEOLOGICAL ERA

India has its own geological eras and periods. The standard geological eras are

1. The Pre-Cambrian (over 570 million years old)
2. The Paleozoic (245-570 million years old)
3. The Mesozoic (66-245 million years old)
4. The Cenozoic (66 million years old to the present)

<>

The Indian Geological eras are

1. The Archean or Early Pre-Cambrian
2. The Purana or Late Pre Cambrian
3. The Dravidian (400-570 million years old)
4. The Aryan (400 million years old to the present)

The Pre Cambrian derives its names from Wales in the United Kingdom. The periods got their names from places where rock formations of that period were formed. The Pre-

Cambrians do not contain fossils of plants and animals. The Paleozoic have the fossils of very early lives, the Mesozoic have middle lives and the Cenozoic recent lives.

Major Geological Formations of India

Indian Era	Standard Geological Eras and Periods	Duration of Period (in million years)	Age from beginning (in million years)	Major Formation in Peninsula	Major Formations in Extra Peninsula
Aryan	Cenozoic Quaternary (Recent Pleistocene) Tertiary (Pliocene Miocene) Eocene Mesozoic Cretaceous Jurassic Triassic	Less than 2	2 or 3	Newer Alluvial deserts, laterites	Formation of Ganga Plains
Dravidain	Paleozoic Permian Carboniferous Devonian Silurian Ordovician	64	-	Tertiary Coastal Deposits	Formation of Himalayas
Purana	Pre-Cambrian Late Pre-Cambrian	-	570	Vindhayan Cuddaph Dharwar Aravalli Archean systems	Archean Gneis

AREA WISE

Rank	State	Area (km^2)
1	Rajasthan	342239
2	Madhya Pradesh	308252
3	Maharashtra	307713
4	Uttar Pradesh	240928

5	Jammu and Kashmir	222236
6	Gujarat	196021
7	Karnataka	191791
8	Andhra Pradesh	160205
9	Odisha	155707
10	Chhattisgarh	135191

INDIA AND BOUNDARIES

Following are the India Area and Boundaries details :-

- India stretches 3,214 km from N to S & 2933 km from E to W.
- Area:- 32,87,263 sq. km. Accounts for 2.4 % of total world area and 16 % of the population
- Mainland India has a coastline of 6,100 km. Including the Lakshadweep and Andaman and Nicobar, the coastline measures about 7516. km
- In India, total land mass is
    1. Plains : - 43.3 %
    2. Plateaus :- 27.7 %
    3. Hills :- 18.6 %
    4. Mountains:- 10.7 %
- In the south, on the eastern side, the Gulf of Mannar & the Palk Strait separate India from Sri Lanka
- Total land neighbours of India are 7 . These are
    1. Pakistan
    2. Afghanistan
    3. China
    4. Nepal
    5. Sri Lanka
    6. Bhutan
    7. Bangladesh and
    8. Myanmar
- Indias Islands include the Andaman & Nicobar Islands in Bay of Bangal & Lakshadweep, Minocy & Amindive Islands in the Arabian Sea

POSITION OF STATES

- Uttar Pradesh border maximum number of states:- 8 (Uttarakhand, Himachal

Pradesh, Haryana, Rajasthan, MP, Chhattisgarh, Jharkhand and Bihar)

- Tropic of Cancer passes through 8 (Eight) states:- Gujara, Rajasthan, MP, Chhattisgarh, Jharkhand, West Bengal, Tripura and Mizoram.
- India standard Meridian ($82^0 30$ E meridian) passes through UP, MP, Chhattisgarh, Orissa and Andhra Pradesh.

INDIAN STATES ON INTERNATIONAL BOUNDARIES

Bordering Pakistan	**Jammu and Kashmir, Punjab, Rajasthan and Gujrat**
Bordering China	Jammu and Kashmir, Himachal Pradesh, Uttarakhand, Sikkim and Arunachal Pradesh
Bordering Nepal	Bihar, Uttarakhand, Uttar Pradesh, Sikkim and West Bengal
Bordering Bangladesh	West Bengal, Mizoram, Meghalaya, Tripura and Asom
Bordering Bhutan	West Bengal, Sikkim, Arunachal Pradesh and Asom
Bordering Myanmar	Arunachal Pradesh, Nagaland, Manipur and Mizoram
Bordering Afghanistan	Jammu and Kashmir (Pakistan-Occupied Area).

RIVERS OF INDIA

Rivers are natural flowing water bodies, generally of fresh water, that flow towards either an ocean, a lake, a sea or another river. They are a part of the hydrological cycle and the water in the rivers comes from different sources. They begin as small streams and gradually expand in size as more water gets added to them. Rivers are the source of water for many purposes such as drinking, irrigation, transportation, drainage, hydro-electricity, food and other activities.

The subcontinent of India has many rivers. The rivers in India that flow into the sea along the coast that begins from the Bay of Bengal in the east move along the Indian coast and then northward along the Arabian Sea. There are many rivers in the country that flow into the Bay of Bengal or the Arabian Sea. There are rivers in the country that flow to the neighbouring countries. The lengths of the rivers vary depending upon the area they cover. The Indus River is the longest river in India and flows through Pakistan. The Ganges is also one of the longest rivers in the country and considered the most sacred river in India due to the mythological beliefs associated with it. The Yamuna River is a tributary of Ganges and

has sacred values. The Brahmaputra River is another major river of the continent of Asia as well as India.

The above map will give you an insight into the top 10 rivers in India. In the above physical map of the Indian subcontinent, the rivers are marked in blue colour highlighting the places where they flow, including other countries as well. To know more about the state from where they pass, you can check the state borders marked with black dotted lines. The international boundaries are marked in purple dotted lines.

Top 10 Rivers in India by Length

Sl. No.	Name	Length (km)	Originates From	Ends in	Places Benefitted
1	Indus	2900	In Tibet Kalish Range 5080 mts.	Arabian sea	India and Pakistan
2	Brahmaputra	2900	Lake Manasarovar	Bay of Bengal	North Eastern state
3	Ganga	2510	Gangothri	Bay of Bengal	Uttar Pradesh, Uttarakhand, Bihar, West Bengal
4	Godavari	1450	Nasik Hills	Bay of Bengal	South-easterly part of Andhra Pradesh
5	Narmada	1290	Amarkantak hill in Madhya Pradesh	Arabian sea	Madhya Pradesh and Maharashtra
6	Krishna	1290	Near Mahabaleshwar in Maharashtra	Bay of Bengal	Maharastra & Andhrapradesh
7	Yamuna	1211	Garhwall in Yamunotri	Bay of Bengal	Delhi, Haryana and UP
8	Mahanadi	890	Amarkantak Plateau	Bay of Bengal	Jharkhand, Chhattisgarh, Orissa
9	Kaveri	760	Hills of Coorg, Karnataka	Bay of Bengal	Karnataka and Tamilnadu
10	Tapi	724	Bettul	Arabian sea	Madhya Pradesh and Maharashtra

FOLLOWING ARE THE IMPORTANT RIVERS OF INDIA

Name	Origin From	Fall into	Length (km)
Ganges	Combined Sources	Bay of Bengal	2525
Satluj	Mansarovar Rakas Lakes	Chenab	1050
Indus	Near Mansarovar Lake	Arabian Sea	2880
Ravi	Kullu Hills near Rohtang Pass	Chenab	720
Beas	Near Rohtang Pass	Satluj	470
Jhelum	Verinag in Kashmir	Chenab	725
Yamuna	Yamunotri	Ganga	1375
Chambal	M.P.	Yamuna	1050
Ghagra	Matsatung Glacier	Ganga	1080
Kosi	Near Gosain Dham Park	Ganga	730
Betwa	Vindhyanchal	Yamuna	480
Son	Amarkantak	Ganga	780
Brahmaputra	Near Mansarovar Lake	Bay of Bengal	2900
Narmada	Amarkantak	Gulf of Khambat	1057
Tapti	Betul Distt. Of MP	Gulf of Khambat	724
Mahanadi	Raipur Distt. In Chattisgarh	Bay of Bengal	858
Luni	Aravallis	Rann of kuchchh	450
Ghaggar	Himalayas	Near Fatehabad	494
Sabarmati	Aravallis	Gulf of Khambat	416
Krishna	Western ghats	Bay of Bengal	1327
Godavari	Nasik distt. In Maharashtra	Bay of Bengal	1465
Cauvery	Brahmagir Range of Western Ghats	Bay of Bengal	805
Tungabhadra	Western Ghats	Krishna River	640

IMPORTANT NATIONAL HIGHWAYS

National Highway	Route	Distance
NH-1	Jalandhar Uri	663
NH-1A	New Delhi-Ambala-Jalandhar-Amritsar	456
NH-2	Delhi-Mathura-Agra-Kanpur-Allahabad-Varanasi-Kolkata	1465
NH-3	Agra-Gwalior-Nasik-Mumbai	1161
NH-4	Thane and Chennai via Pune and Belgaun	1235

NH-5	Kolkata - Chennai	1533
NH-6	Kolkata Dhule	1949
NH-7	Varanasi Kanyakumari	2369
NH-8	Delhi-Mumbai-(vai Jaipur, Baroda and Ahmedabad)	1428
NH-9	Mumbai-Vijaywada	841
NH-10	Delhi-Fazilka	403
NH-11	Agra- Bikaner	582
NH-12	Jabalpur-Jaipur	890
NH-13	Sholapur-Mangalore	691
NH-15	Pathankot-Samakhiali	1526
NH-17	Panvel-Edapally	1269
NH-22	Ambala-Shipkitr	459
NH-28	Lucknow-Barauni	570
NH-31	Barhi-Guwahati	1125
NH-37	Panchratna (near Goalpara) Saiknoaghat	680
NH-44	Shillong-Sabroom	630
NH-49	Cochin-Dhanshkodi	440
NH-52	Baihata-Junction NH-47 (near Saikhoaghat)	850
NH-58	Delhi-Mana	538
NH-65	Ambala-Pali	690
NH-75	Gwalior-Ranchi	955
NH-76	Pindwara-Allahabad	1007
NH-78	Katni-Gumla	559
NH-86	Kanpur-Dewas	674
NH-91	Ghaziabad-Kanpur	405
NH-150	Aizawl-Kohima	700
NH-200	Raipur-Chandikhal	740
NH-205	Ananthapur-Chennai	442
NH-209	Dindigul-Bengaluru	456
NH-211	Solapur-Dhule	400
NH-217	Raipur-Gopalpur	508
NH-220	Kollam (Quilon)-Teui	265

LIST OF MAJOR EARTHQUAKES IN INDIA

Date	Location	Magnitude
June 16, 1819	Kutch, Gujarat	8
Jan 10, 1869	Near Cachar, Assam	7.5
May 30, 1885	Sopore, Jammu and Kashmir	7
June 12, 1897	Shillong Plateau, Meghalaya	8.7
April 4, 1905	Kangra, Himachal Pradesh	8
July 8, 1918	Srimangal, Assam	7.6
July 2, 1930	Dhubri, Assam	7.1
Jan 15, 1934	Bihar-Nepal Border	8.3
June 26, 1941	Andaman Islands	8.1
Oct 23, 1943	Assam	7.2
Aug 15, 1950	Arunachal Pradesh-China Border	8.5
July 21, 1956	Anjar, Gujarat	7
Dec 10, 1967	Koyna, Maharashtra	6.5
Jan 19, 1975	Kinnaur, Himachal Pradesh	6.2
Aug 06, 1988	Manipur-Myanmar Border	6.6
Aug 21, 1988	Bihar-Nepal Border	6.4
Oct 20, 1991	Uttarkashi, up hills	6.6
Sept 30, 1993	Latur-Osmanabad, Maharashtra	6.3
May 20, 1997	Jabalpur,Madhya Pradesh	6
Mar 29, 1999	Chamoli District, Uttar Pradesh	6.8
Jan 26, 2001	Bhuj, Gujarat	7.7

NATIONAL PARKS IN INDIA AND WILD LIFE SANCTUARIES

Following are the National Parks in India with their location

Gir Forests	Home of Asiatic Lion, In Gujrat
Kaziranga Sanctuary	One horned rhino, in Asom,
Manas Sanctuary	One horned rhino, in Asom,
Chandraprabha Sanctuary	Home of Asiatic Lion, in UP
Ghana or Keoladeo Bird Sanctuary	In Bharatpur, Home of tiger
Dachigam Sanctuary	For Hangul, In Kashmir
Corbett National Park	In Uttarakhand, Home of tiger
Kanha National Park	In MP

Shiv Puri National Park	In MP
Hazaribagh National Park	In Jharkhand
Pariyar Game Sanctuary	In Kerala
Dudhwa National Park	In UP
Vedanthangal Bird Sanctuary	In TN
Nokrek National Park	In Meghalaya
Sariska Sanctuary	In Rajasthan
Ranthambhor National Park	In Rajasthan
Namdapha National Park	In Arunachal Pradesh
Kelbut Lmjo Floating National Park	In Manipur
Palamau tiger project	In Bihar
Simlipal National Park	In Orrisa
Ranganthittoo Bird Sanctuary	In Mysur, Karnataka
Nagarhore National Park	In Karnataka
Mudumalai Sanctuary	In TN.
Balpakaram Sanctuary	In Meghalaya
Bandipur Sanctuary	Along the Karnataka- Tamil Nadu Border
Jaldapara Sanctuary	In West Bengal. For rthinos
Wild Ass Sanctuary	In Rann of Kutch, Gujarat, for wild ass.

STATES HAVING LARGEST FOREST COVER IN INDIA

Rank	States with Highest Forest Cover 2013	Total Forest Cover in Sq kms
1	Madhya Pradesh	77,522
2	Arunachal Pradesh	67,321
3	Chhattisgarh	55,621
4	Maharashtra	50,632
5	Odisha	50,347
6	Andhra Pradesh	46,116
7	Karnataka	36,132
8	Assam	27,671
9	Uttarakhand	24,508
10	Tamil Nadu	23,844

SEISMIC ZONES

The Geological Survey of India (G. S. I.) first published the seismic zoning map of the country in the year 1935. With numerous modifications made afterwards, this map was

initially based on the amount of damage suffered by the different regions of India because of earthquakes. Color coded in different shades of the color red, this map shows the four distinct seismic zones of India. Following are the varied seismic zones of the nation,

- Zone – II: This is said to be the least active seismic zone.
- Zone – III: It is included in the moderate seismic zone.
- Zone – IV: This is considered to be the high seismic zone.
- Zone – V: It is the highest seismic zone.

MAJOR PORTS IN INDIA

Following are the major Ports in India.

Western Coast	Eastern Coast
Kandla (child of partition)	Kolkata-Haldia (riverine port)
Mumbai (busiest and biggest)	Paradip (exports raw iron to Japan)
Jawahar Lal Nehru (fastest growing)	Vishakjapatnam (deepest port)
Marmugao (naval base also)	Chennai (oldest and artifical)
Mangalore (exports Kudremukh iron-ore)	Ennore (most modern-in private hands)
Cochin (natural Harbour)	Tuticorin (southernmost)

Few Facts about some port:- Among major ports, Mumbai is the biggest. Kandla is a tidal port. Marmugao enjoys the second position by value of the tonnage of the bulk of which is export of Iron core. Vishakhapatnam is the deepest land-locked and protected port. Chennai has an artificial harbour, Kolkata is a riverine port, Haldia has a fully equipped containerised berth.

Shipping:- Overseas shipping has an extremely important role to play in Indias international trade. The country has the largest merchant shipping fleet among developing countries and ranks 17th in the world in shipping tonnage. There were 102 shipping companies in country operating as on 31 March 2000, includes shipping corporation of India, a public sector undertaking.

ABOUT INDIA

India is the seventh largest country in the world and covers a total area of 3,287,263 sq km. The shoreline of the country extends for 7,517 km and the longest river of the country is the holy Ganga or Ganges which is 2,510 km long. You will notice four separate regions in the country – the plains, the mountains, the southern peninsula and the desert.

The eastern and middle portion of India is made up of productive Indo-Gangetic plains. The

Thar Desert in Rajasthan is located to the northwest. The terra firma in southern India is nearly wholly made up of the Deccan plateau. There are two important mountain ranges in South India that are closely located to the seashores and they are the Western Ghats and Eastern Ghats mountain ranges. The Aravallis and the Vindhyachal are the other well-known mountain ranges of India.

The country offers ample moneymaking opportunities to the real estate agents since the international travelers are frequently keen to purchase or hire hill resorts, bungalows, beach houses, and these are offered by the regional inhabitants on mortgage. India shares its international boundaries with Afghanistan, Pakistan, Nepal, Bhutan, China, Myanmar and Bangladesh.

The Ganges, Son, Brahmaputra, Chambal, Yamuna, and Gogra are the major rivers of India. All these rivers contribute to the agricultural growth of the country.

Physiologically, the country can be divided into the following areas:

- The northern mountains of the Himalayas
- The Indo-Gangetic Plain
- The Peninsular or Deccan Plateau
- Central Highlands
- West Coast (Kankara, Konkan, and Malabar coasts)
- East Coast (The Coromandel coast to the south)
- The Great Indian Desert (also named as Thar Desert in Rajasthan) and Rann of Kutch
- The Northeastern mountain ranges bordering Assam Valley
- The Brahmaputra River Valley in Assam
- The Islands of the Bay of Bengal and Arabian Sea.

The major peaks in India are the Nanda Devi (25,645 feet/7,817 meters), Kanchenjunga (28,208 feet/8,598 meters), the third highest peak in the globe located on the boundary between Nepal and Sikkim, Badrinath (23,420 feet/7,138 meters), Kamet (25,447 feet/7,756 meters) and Dunagiri (23,179 feet/7,065 meters). The Andaman and Nicobar and the Lakshadweep Islands are the two major groups of island in the country.

IMPORTANT RIVER VALLEY PROJECTS IN INDIA

Following are the important river valley projects in India

Bhakra Nangal Project	**On Sutlej in Punjab. Highest in India.Ht. 226m. Reservoir is called Gobind Sagar Lake.**

Mandi Project	On Beas in HP
Chambal Valley Project	On Chambal in MP & Rajasthan, 3 dams are there:- Gandhi Sagar Dam, Rana Pratap Sagar Dam and Jawahar Sagar Dam
Damodar Valley Project	On Damodar in Bihar, Based on Tennessee Valley Project USA
Hirakud Project	On Mahanadi in Orrisa, Worlds Longest Dam: 4801m
Rihand Project	On Son in Mirzapur, Reservoir is called Gobind Vallabh Pant reservoir.
Kosi Project	On Kosi in N.Bihar
Mayurkashi Project	On Mayurkashi in West Bengal
Kakrapara Project	On Tapi in Gujrat
Nizamsagar Project	On Manjra in Andhra Pradesh
Nagarjuna Sagar Project	On Krishna in Andhra Pradesh
Tugabhadra Project	On Tugabhadra in Andhra Pradesh & Karnataka
Shivasamudram Project	On Cauvery in Karnataka. It is the older river valley project in India.
Tata Hydel Scheme	On Bhima in Maharashtra
Sharavathi Hydel Project	On Jog Falls in Karnataka
Kundah & Periyar Project	In Tamil Nadu
Farakka Project	On Ganga in WB. Apart from power and irrigation it helps to remove silt for easy navigation.
Ukai Project	On Tapti in Gujarat
Mahi Project	On Mahi in Gujarat
Salal Project	On Chenab in J&K
Mata Tila Multipurpose Project	On Betwa in Uttar Pradesh and Madhya Pradesh
Thein Project	On Ravi, Punjab.
Pong Dam	On Beas, Punjab
Tehri Dam	On Bhgirathi, Uttarakhand
Sardar Sarovar Project	On Narmada, Gujarat/MP.

INDIAN TOWNS ON RIVERS

Town	River
Allahabad	At the confluence of the Ganga and Yamuna
Patna	Ganga
Varansi	Ganga
Kanpur	Ganga
Haridwar	Ganga
Badrinath	Alaknanda
Agra	Yamuna
Delhi	Yamuna
Mathura	Yamuna
Ferozpur	Satluj
Ludhiana	Satluj
Srinagar	Jhelum
Lucknow	Gomti
Jaunpur	Gomti
Ayodhya	Saryu
Bareillly	Ram ganga
Ahmedabad	Sabarmati
Kota	Chambal
Jabalpur	Narmada
Panji	Mandavi
Ujjain	Kashipra
Surat	Tapti
Jamshedpur	Swarnarekha
Dibrugarh	Brahmaputra
Guwahati	Brahmaputra
Kolkata	Hooghly
Sambalpur	Mahanadi
Cuttack	Mahanadi
Serirangapatnam	Cauvery
Hyderabad	Musi
Nasik	Godavari
Vijayawada	Krishna
Curnool	Tungabhadra
Tiruchirapalli	Cauvery

The 50 highest summits of India with at least 500 meters of topographic prominence

Rank	Mountain	Height (M)	Range	Prominence	State Name
1	Kangchenjunga	8586	Kangchenjunga Himalaya	3922	Sikkim
2	Nanda Devi	7816	Garhwal Himalaya	3139	Uttarakhand
3	Kamet	7756	Garhwal Himalaya	2825	Uttarakhand
4	Saltoro Kangri/K10	7742	Saltoro Karakoram	2160	Jammu and Kashmir
5	Saser Kangri I/K22	7672	Saser Karakoram	2304	Jammu and Kashmir
6	Mamostong Kangri	7516	Rimo Karakoram	1803	Jammu and Kashmir
7	Saser Kangri II E	7513	Saser Karakoram	1450	Jammu and Kashmir
8	Saser Kangri III	7495	Saser Karakoram	850	Jammu and Kashmir
9	Teram Kangri I	7462	Siachen Karakoram	1702	Jammu and Kashmir
10	Jongsong Peak	7462	Kangchenjunga Himalaya	1298	Sikkim
11	K12	7428	Saltoro Karakoram	1978	Jammu and Kashmir
12	Kabru N	7412	Kangchenjunga Himalaya	780	Sikkim
13	Ghent Kangri	7401	Saltoro Karakoram	1493	Jammu and Kashmir
14	Rimo I	7385	Rimo Karakoram	1438	Jammu and Kashmir
15	Teram Kangri III	7382	Siachen Karakoram	520	Jammu and Kashmir
16	Kirat Chuli	7362	Kangchenjunga Himalaya	1168	Sikkim
17	Mana	7272	Garhwal	730	Uttarakhand

			Himalaya		
18	Apsarasas Kangri	7245	Siachen Karakoram	635	Jammu and Kashmir
19	Mukut Parbat	7242	Garhwal Himalaya	840	Uttarakhand
20	Rimo III	7233	Rimo Karakoram	615	Jammu and Kashmir
21	Singhi Kangri	7202	Siachen Karakoram	790	Jammu and Kashmir
22	Hardeol	7161	Garhwal Himalaya	1291	Uttarakhand
23	Chaukhamba I/Badrinath	7138	Garhwal Himalaya	1594	Uttarakhand
24	Nun-Kun	7135	Zanskar Himalaya	2404	Jammu and Kashmir
25	Pauhunri	7128	Sikkim Himalaya	2035	Sikkim
26	Pathibhara/The Pyramid	7123	Kangchenjunga Himalaya	900	Sikkim
27	Trisul I	7120	Garhwal Himalaya	1616	Uttarakhand
28	Satopanth	7075	Garhwal Himalaya	1250	Uttarakhand
29	Tirsuli	7074	Garhwal Himalaya	674	Uttarakhand
30	Chong Kumdang Ri	7071	Rimo Karakoram	851	Jammu and Kashmir
31	Dunagiri	7066	Garhwal Himalaya	1346	Uttarakhand
32	Kangto	7060	Assam Himalaya	2195	Arunachal Pradesh
33	Nyegyi Kansang	7047	Assam Himalaya	1752	Arunachal Pradesh
34	Padmanabh	7030	Rimo Karakoram	870	Jammu and Kashmir
35	Shudu Tsempa	7024	Sikkim Himalaya	524	Sikkim
36	Chamshen Kangri/Tughmo	7017	Saser Karakoram	657	Jammu and Kashmir

	Zarpo				
37	Aq Tash	7016	Rimo Karakoram	1176	Jammu and Kashmir
38	Chong Kumdang Ri II	7004	Rimo Karakoram	624	Jammu and Kashmir
39	Rishi Pahar	6992	Garhwal Himalaya	622	Uttarakhand
40	Thalay Sagar	6984	Garhwal Himalaya	1004	Uttarakhand
41	Mt. Lakshmi	6983	Rimo Karakoram	800	Jammu and Kashmir
42	Kedarnath Peak	6968	Garhwal Himalaya	1400	Uttarakhand
43	Langpo	6965	Sikkim Himalaya	560	Sikkim
44	Saraswati Parvat I/Saraswati Peak	6940	Garhwal Himalaya	900	Uttarakhand
45	Shahi Kangri	6934	Central Tibetan Plateau	1644	Jammu and Kashmir
46	Sri Kailas	6932	Garhwal Himalaya	1092	Uttarakhand
47	Kalanka	6931	Garhwal Himalaya	850	Uttarakhand
48	Chorten Nyima Ri	6927	Sikkim Himalaya	807	Sikkim
49	Saf Minal/Pk 6911	6911	Garhwal Himalaya	531	Uttarakhand
50	Panchchuli II	6904	Garhwal Himalaya	1614	Uttarakhand

NICK NAME OF INDIAN PLACES

Nick Name	Place
Golden City	Amritsar
Manchester of India	Ahmedabad
City of seven islands	Mumbai
Sorrow of Bengal	Damoda river
Sorrow of Bihar	Kosi River
Blue Mountains	Nilgiri
Queen of Arabian Sear	Kochi

Space City	Bengaluru
Garden City of India	Bengaluru
Silicon valley of India	Bengaluru
Electronic City of India	Bengaluru
Pink City	Jaipur
Gateway of India	Mumbai
Twin City	Hyderabad-Sikandarabad
City of festivals	Mudurai
Deccan Queen	Pune
City of Buildings	Kolkata
Dakshin Ganga	Godavari
Old Ganga	Godavari
Egg bowls of Asia	Andhra Pradesh
Soya region	Madhya Pradesh
Manchester of the South	Coimbator
City of Nawabs	Lucknow
Venice of the east	Kochi
Queen of the Mountains	Mussoorie (Uttarkhand)
Sacred river	Ganga
Hollywood of India	Mumbai
City of Castles	Kolkata
State of five rivers	Punjab
City of weavers	Panipat
City of lakes	Srinagar
Steel city of India	Jamshedpur (called Tatanagar)
City of Temples	Varanasi
Manchester of the north	Kanpur
City of Rallies	New Delhi
Heaven of India	Jammu & Kashmir
Boston of India	Ahmedabad
Garden of spices of India	Kerala
Switzerland of India	Kashmir
Abode of the God	Prayag (Allahabad)
Pittsburg of India	Jamshedpur

INDIA'S RIVER SYSTEM COMPRISES

The Himalayan Rivers,

The Deccan Rivers,

The coastal rivers and

The rivers of the inland drainage basin.

The snow-fed rivers of the Himalayas are perennial and they flood during the winter.

The rain-fed rivers of the Deccan Plateau are non-perennial and have an uncertain flow.

Also most of the western coastal rivers are non-perennial because they have limited catchments area. Many of them are non-perennial.

The fourth type consists of rivers of western Rajasthan and is very few, like the Sambhar, which is lost in the desert sands, and the Loni, that drains into the Rann of Kutch.

The largest river basin of India is the Ganga basin, receiving water from an area bounded by the Himalayas in the north and the Vindhyas in the South. The Ganga, the Yamuna, the Ghagra, Gandak and Kosi are the main constituents. The second is the Godavari basin; the third is the Krishna basin, which is the second largest river in peninsular India. The Mahanadi traverses through this basin. The Narmada basin, and that of the Tapti and the Panner are smaller ones, though they are agriculturally important.

In India, rivers are considered holy with lot of reverence. People take bath in these holy rivers during special occasions with a belief that their sins would be wiped off! Of all, the Ganges is the longest with a length of 2500 kms. It rises in the Himalayas and empties into the Bay of Bengal. The Brahmaputra rises in Tibet and ends up in the Bay of Bengal after traveling a distance of around 2900 kms. The Mahanadi, the Godaveri, the Krishna and the Kaveri of Peninsular India flow into the Bay of Bengal while the Narmada and the Tapti end up in the Arabian Sea.

The Indian River system is classified as Himalayan, peninsular, coastal, and inland-drainage basin rivers.

The largest river basin of India is the Ganga basin, which receives water from Himalayas in the north and the Vindhyas in the South. The Ganga, the Yamuna, the Ghagra, Gandak and Kosi are the main constituents of this basin.

The Brahmaputra has the greatest volume of water of all the rivers in India. It is the source of the Indus and the Satluj and flows throughArunachal Pradesh and Assam

The Mahanadi is an important river in the state of Orissa. This river flows slowly for 900 kms and deposits more silt than any other river in the Indian subcontinent.

The Godavari River System has second longest course within India. The banks of this river have many pilgrimage sites like Nasik, Triyambak and Bhadrachalam.

The Krishna is the third longest river in India with a length of about 1300 kms. It rises in the Western Ghats and flows east into the Bay of Bengal

The source of the Kaveri is located in the Western Ghats. It has many tributaries including Shimsha, Hemavati River, Arkavathy, Kapila, Honnuhole, Lakshmana Tirtha, Kabini, Lokapavani, Bhavani, Noyyal and famousAmaravati. Kaveri is a major source of irrigation in Tamil Nadu.

The Narmada and the Tapti are the only major rivers that flow into the Arabian Sea. The total length of Narmada through the states of Madhya Pradesh,Maharashtra, and Gujarat amounts to 1312 kms. The Tapti follows a parallel course to the south of the Narmada, flowing through the states of Maharashtra and Gujarat on its way into the Gulf of Khambhat.

The rivers of India provide irrigation, cheap transportation, electricity, and livelihoods for a large number of people. The river system of India also holds significance from a religious point of view.

RIVER SYSTEM OF 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
Brahmaputra	725	2,40,000 Sq.Km.	Lake Manasarovar	Bay of Bengal	North Eastern state
Kaveri (Dakshina Ganga" or Ganges of the south)	805	87,900 Sq.Km.	Hills of Coorg, Karnataka	Bay of Bengal	Karnataka and Tamilnadu
Godavari	1465	3,12,812 Sq.Km.	Nasik Hills	Bay of Bengal	South-easterly part of Andhra Pradesh
Krishna	1400	2,59,000 Sq.Km.	Near Mahabaleshwar in Maharashtra	Bay of Bengal	Maharastra & Andhrapradesh
Narmada	1312	98,796 Sq.Km.	Amarkantak hill in Madhya Pradesh	Arabian sea	Madhya Pradesh and Maharastra
Tapti	724	65,145 Sq.Km.	Bettul	Arabian sea	Madhya Pradesh and Maharastra
Mahanadi	858	1,41,600 Sq.Km.	Amarkantak Plateau	Bay of Bengal	Jharkhand, Chhattisgarh, Orissa
Vaigai	240	7,000 Sq.Km.	Cardaman Hills	Bay of Bengal	Madurai and Ramanathapuram in Tamil Nadu
Periyar	244	5,398 Sq.Km.	Cardaman Hills	Bay of Bengal	Tamil Nadu and Kerala
Thamiraparani	123	4,400 Sq.Km.	Agasthiyar Hills	Gulf of Mannar	Thirunelveli in Tamil Nadu

RIVERS OF INDIA

Almost all the important Indian cities are situated on the banks of the rivers of India. Rivers of India also have a crucial role in Hindu mythology and are regarded sacred by all the followers of Hindu religion in India. There are nine important rivers of India and they are: The Ganges, Yamuna (a tributary of Ganges), Brahmaputra, Mahanadi, Narmada, Godavari, Tapi, Krishna, and Kaveri. Parts of the Indus River also flow over Indian soil.

Eight important rivers together with their various tributaries comprise the river system of India. Majority of the rivers discharge their waters into the Bay of Bengal; nevertheless, a number of the rivers whose itineraries take them across the western end of India and in the direction of the east of the state of Himachal Pradesh pour into the Arabian Sea. Northern portions of the Aravalli range, portions of Ladakh, and the barren areas of the Thar Desert have inland drainage.

All the important rivers of India have their sources at any of the three principal watersheds:

- Chotanagpur plateau and Vindhya and Satpura ranges in central India
- The Himalaya and the Karakoram mountain ranges
- Western Ghats or Sahyadri in western India

Rivers running into the interiors of India include the following:

- Musi River at Hyderabad, India
- Ghaggar-Hakra River in Haryana, Rajasthan
- Samir River, India/Gujarat

Categories of Rivers of India

The rivers of India can be broadly categorized into the following:

- Peninsular rivers
- Himalayan rivers
- Inland-drainage basin rivers
- Coastal rivers

Rivers like the Ganges (with its tributaries Kameika, Yamuna, Chambal, Gomti), Brahmaputra, Godavari, Mahanadi, Kaveri, Krishna and their principal tributaries flow into the Bay of Bengal. The Indus, Tapti, and Narmada Rivers together with their key tributaries flow into the Arabian Sea. The Himalayan rivers are snow-fed and perennial rivers. The other rivers are either coastal rivers or they flow into the interiors of India.

Go to any place in India and you will be moved to see how much the rivers control the economy and indigenous cultures. Definitely, Indians have revered rivers as a shape of Mother Goddess from the prehistoric era.

Holiness of the Rivers of India

Rivers of India are regarded sacred. Indian rivers have plenty of spiritual importance. Respected, worshipped, and cared for, these rivers form an integral part of every Indian life. Nothing progresses in their absence. They are as special as the Indian temples for a devotee. You can visit some of these rivers to understand what they imply to a common Indian man.

Ganga or the Ganges

The Ganga and its tributaries such as Son, Yamuna, Budhi Khandak, Gandak, and Sabazpati have been omitted from the list, which originally creates the largest cultivable plains of northern and eastern India, named as the Gangetic plains. The principal river, the sacred Ganga is formed by the union of Andha and Alaknanda. Ganga originates from Gangotri glaciers (Gaumukh – 13,858 ft) in the Himalayan mountain range and gushes from Uttar Pradesh and Bihar, and then comes into West Bengal and Bangladesh. It finally finishes in the Bay of Bengal in Bangladesh, where the name of the river is Padma.

The Brahmaputra River System

The Brahmaputra starts off from the Mansarovar lake, which is also the place from where the Sutlej and the Indus have originated. It is somewhat longer than the Indus, however the greater portion of its itinerary is situated outside India. It runs to the east in China, adjacent to the Himalayas, known as Tsang-Po. When it arrives at Namcha Barwa (2900 m), it takes an about turn close to it and moves into India in Arunachal Pradesh and is named as Dihang.

The Indus River System

The source of Indus River is located in the northern sides of the Kailash mountain range close to Lake Mansarovar in Tibet. In spite of the fact that the maximum portion of the river's itinerary flows across bordering Pakistan, a part of the river flows across Indian soil, similar to portions of the itineraries of its five important tributaries mentioned below. The tributaries of Indus River played a key role behind the origination of the name " Punjab". The word "Punjab" has originated from the Persian words Punj ("five") and aab ("water"), therefore the blend of the words (Punjab) signifies "land of five waters" or "five waters". The tributaries of Indus River are as follows:

- Beas
- Chenab
- Jhelum
- Ravi
- Sutlej (Satluj)

The Narmada River System

The Narmada' or Nerbudda is a river situated in central India. It creates the conventional frontier between South India and North India. The overall length of the river is 1,289 km (801 miles). The Narmada, the Mahi, and the Tapti are the important rivers of peninsular India that flow from east to west. The source of Narmada is Amarkantak.

The Taapi River System

The Taapi is a river situated in central India. It is one of the important rivers of the Indian peninsula and is approximately 724 km long. It climbs in the eastern Satpura range of Southern Madhya Pradesh, prior to pouring into the Gulf of Cambay of the Arabian Sea in Gujarat.

The Godavari River System

Godavari is a river, which has the second biggest itinerary in India and is frequently named as the Dakshin (South) Ganga or the Vriddh (Old) Ganga. The length of the river is approximately 1,450 km (900 mi). It climbs at Trimbakeshwar, close to Mumbai (erstwhile

Bombay) and Nasik in Maharashtra about 380 km away from the Arabian Sea, and pours into the Bay of Bengal. At Rajahmundry, 80 km from the seashore, the river is divided into two watercourses (Vasista which runs to Narsapur and Gautami which runs to other side pasarlapudi), therefore creating an extremely productive delta.

The Krishna River System

The Krishna is one of the biggest Rivers in India (approximately 1,300 km long). It starts off from Mahabaleswar, Maharashtra and joins the sea in the Bay of Bengal at Hamasaladeevi, Andhra Pradesh. The river runs across the states of Karnataka, Maharashtra, and Andhra Pradesh.

The Kaveri River System

The Kaveri (also known as Kavery or Cauvery) is one of the major rivers in India and is regarded as holy by the Hindus. It is a sacred river for the South Indians. The origin of the Kaveri River is known as Dakshin Kashi. There are two temples: Caveri temple at Talakaveri and God Shiva Temple known as Bhagandeshwar at Bhagamandala. The sources of the river are located in the Western Ghats mountain range of Karnataka, and from Karnataka across Tamil Nadu. The Kaveri pours into the Bay of Bengal.

The Mahanadi River System:

The delta of Mahanadi River in India is a significant drainage area, which drains big areas of the Indian subcontinent into the Bay of Bengal. The alluvial basin is extensive and comparatively plane with a winding river waterway that alters its itinerary.

The Mahanadi River runs steadily for 560 miles (900 km) and features a projected catchment basin of 51,000 sq miles (132,100 square km). The river sediments higher amount of silt as compared to any other Indian river.

Rivers flowing into Bay of Bengal

Given below is a list of rivers flowing into the Bay of Bengal:

(1) Subarnarekha

- (a) Kharkai

(2) Karnaphuli River from Mizoram and Bangladesh
(3) Damodar
(4) Meghna River from India and Bangladesh

- (a) Titas River in Tripura
    - (i)Haora River in Agartala.

Brahmaputra River Basin

(1)Brahmaputra River

- Burhidihing River, also named Noa Dihing in the beginning of its itinerary through Namdapha National Park
- Lohit River
- Disang
- Kameng River
- Bhogdoi
- Dikhou
- Dhansiri River
- Kakodonga
- Kapili
- Subanshiri
- Manas River
- Pagladiya
- Yamuna
- Sankosh
- Teesta River
    - (a) Lachen River
    - (b) Rangeet River
    - (c) Lachung River
- Dharla River in Bangladesh
    - (a) Jaldhaka in Sikkim

Ganges River Basin

(1) Ganges River

- Hooghly River (distributary)
    - (a) River Churni
    - (b) Jalangi River
    - (c) Ichamati River
    - (d) Damodar River
        - (i) Barakar River
    - (e) Ajay River
    - (f) Rupnarayan River
    - (g) Tirap
    - (h) Siang
    - (i) Dwarakeswar River
    - (j) Mayurakshi River
    - (k) Mundeswari River
- Padma River (distributary)
- Meghna River (distributary)
- Kosi River
- Budhi Gandak
- Gandak at Patna
- Falgu River
- Son River
    - (a) Koel River
    - (b) Rihand River
    - (c) Gopad River
        - (i) Goini River
        - (ii) Neur River
    - (d) Banas River
- Yamuna River
    - (a) Ban Ganga River
    - (b) Betwa River
        - (i) Halali River
        - (ii) Dhasan River
        - (iii) Kaliasote River
    - (c) Sindh River
        - (i) Pahuj River in Bhind District Madhya Pradesh

        - (ii) Kwari River
    - (d) Chambal River
        - (i) Banas River
            - Berach River
            - Ahar River
        - (ii) Parbati River (Madhya Pradesh)
        - (iii) Kali Sindh River
        - (iv) Shipra River in Ujjain
    - (e) Gambhir River
        - (i) Parbati River (Rajasthan)
- Ghaghara River (Gogra) or Karnali River in Nepal
- Gomti River
- Ramganga River
    - (a) Kho River
        - (i) Surkho River
        - (ii) Malini River
- Mahakali River
- Mahananda River
- Alaknanda River
- Bhagirathi River
- Beson River
- Gangi River
- Bhainsai River
- Mangai River
- Karmanasha
- Tamsa River

West Bengal Coastal Rivers

- (a)Kangsabati River
    - (i)Bhagirathi
    - (ii)Hughli
- (b)Subarnarekha River
    - (i)Kharkai River

Mahanadi River Basin

- Brahmani River
- Mahanadi River

- South Koel River near Rourkela
- Baitarani River
- Devi River
- Sankh River
- Daya River
- Kusabhadra River
- Kadua River
- Bhargavi River

Godavari River Basin

Godavari River in the states Maharashtra and Andhra Pradesh,

- (a)Indravati River in Gadchiroli district of Maharashtra and also in Chhattisgarh state.
    - (i) Bandiya River in Gadchiroli
- (b)Kolab River in Orissa State

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:

Spring	Mid-Feb to April
Summer	May and June
Monsoon	July to September
Autumn	Sept to Mid-November
Pre-winter	Mid-Nov to December
Winter	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 is 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 Maharastra, 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	Bhuj	Gujarat

		lake		
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	Anantnag	Jammu and

		altitude, Oligotrophi c lake		Kashmir
Bellandur Lake (Bangalore)	Ponnaiyar River	N.A	Bengaluru	Karnataka
Ulsoor Lake (Bangalore)	N.A	Stalewater	Bengaluru	Karnataka
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-	Kollam	Kerala

		shaped		
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	Kolhapur	Maharasht

		lake		ra
Shivajisagar lake	Koyna River	Reservoir	Satara	Maharashtra
Talao Pali Lake	N.A	N.A	Thane	Maharashtra
Upvan Lake	N.A	N.A	Thane	Maharashtra
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	Gomati River	Reservoir	Kankroli	Rajasthan

Lake				
Sambhar Salt Lake	N.A	Salt Lake	Jaipur	Rajasthan
Ramgarh Lake	N.A	Artificial lake	Jaipur	Rajasthan
Siliserhlake, Alwar	N.A	Beautiful artificial lake	Alwar	Rajasthan
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	N.A	Artificial	Barua Sagar city	Uttar

Tal		lake		Pradesh
Sheikha Jheel	N.A	Fresh water perennial	Aligarh	Uttar Pradesh
Bhimtal Lake	N.A	Largest natural lake	Bhimtal	Uttarakhand
Dodital	N.A	Freshwater lake	Dehradun	Uttarakhand
Nainital Lake	N.A	Natural Freshwater	Nainital	Uttarakhand
Naukuchiatal	N.A	N.A	Nainital	Uttarakhand
Sat Tal	N.A	Freshwater lake		Uttarakhand
Rabindra Sarobar (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, Maharastra 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 Ranigunj 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, Maharastra 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, Maharastra 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 km2	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 km^2	Rohtang Pass	Sutlej	Himachal Pradesh, 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	Maharastra & 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
Tungabhandra	531	71,417 km^2	Bhadra River, Tunga River	Krishna River	Karnataka and Andhra Pradesh, Telangana
Pennar	597	55,213 km2	Nandidurg	Bay of Bengal	Karnataka and Andhra Pradesh, Telangana
Palar	348	N.A	Nandidurg	Bay of	Karnataka and

				Bengal	Andhra Pradesh, Tamilnadu
Ponnaiyar	400	3,690 km2	Nandidurg	Bay of Bengal	Karnataka and Tamilnadu
Kollidam	150	N.A	Kaveri River	Bay of Bengal	Tamil Nadu
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)
Mt Kanchenjunqa	8598 m (in India)
Mt Makalu	8481 m (in Nepal)
Mt Dhaulaqiri	8172 m (in Nepal)
Mt Cho Oyu	8153m (in Nepal)
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 Uttarankhand, 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, Zanskar, 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: Zanskar, 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 – Bhagirthi and Alaknanda, which combine at Devprayag to form Ganga.
- Before Alaknanda meets Bhagirthi at Devprayag, Mandakini meets Alaknanda at Rudraprayag.
- Sources: Bhagirthi 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: lb, 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)	Agastyamalai (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 & Mesta	In WB, Bihar, Asom
Tea	In Asom, West Bengal, Himachal Pradesh
Coffee	In Kamalaka, 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 Gujaral, 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
Ranganthittoo 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.)

INDIAN MINERAL RESOURCES

Coal Resources in India

West Bengal (Raniganj, Burdwan, Bankura, Purulio, Birbhum, Jalpaigudi, Darjeeling), Jharkhand (Jharia, Giridih, Kharhawadi, Bokaro, Hazaribagh, Kamapura, Rampur, Palamau), Orissa (Rampur, Hindgir, Talcher, Sambal), Madbyo Pradesh and Chhatisgarh (Rewa, Pench valley, Umaria, Korba, Sohagpur, Mand river area, Kanha valley, Betul), etc. Power sector is the largest consumer of coal in India followed by steel industry, cement industry, etc.

Manganese

Orissa, Maharashtra (Nagpur, Bhandara, Ratnagiri), Madhya Pradesh (Balaghat, Chhindawara), Karnataka (Keonjhar, Bonai, Kalahandi), Andhra Pradesh (Kadur, Garibadi).

Copper Minerals

Madhya Pradesh (Balaghat), Rajasthan (Khetri), Jharkhand (Singhbhum, Masobani, Surda), Karnataka (Chitradurg, Hassan).

Mica Minerals

Jharkhand (Hazaribagh, Giridih, Kodarma), Bihar (Goya, Bhagalpur), Andhra Pradesh (Guntur, Vizag, Kurnool), Rajasthan (Bhilwara, Udaipur, Jaipur).

Petroleum Resources in India

Assam (Digboi, Naharkatiya, Badarpur, Masinpur and Pallharia), Gujarat, (Ankleshwar, Khambat, Kalol), Mumbai High, Bassein (south of Mumbai High), etc. Recently oil has been discovered in Cauvery basin, Krishna and Godavary basin, Khambat basin, etc.

Iron Resources

India possesses Haematite, a very high – grade iron ore. In Madhya Pradesh (Bailadila, Jabalpur), Goa (North Goa), Karnataka (Bababudan hills, Chikmagalur, Hospet), Jharkhand (Singhbhum, Naomundi), Andhra Pradesh, Orissa.

India is the fifth largest exporter of iron ore in the world. Japan is the biggest buyer accounting for about 3/4th of India's total exports. Major ports handling iron ore export are Vishakhapatnam, Paradip, Marmagao and Mangalore.

Bauxite Resources

Chief ore for producing aluminium. In Orissa (Kalahandi, Koraput, Sundargarh, Bolangir, Sambalpur), Jharkhand (Lohardaga, Gumla), Madhya Pradesh (Jabalpur, Mandla, Shahdol, Kami, Balaghat), Maharashtra, Andhra Pradesh, Gujarat, Tamil Nadu.

Gold Resources in India

Karnataka (Kolar, Hutti, Raichur), Andhra Pradesh (Ramgiri and Yeppamanna goldfields in Chittor and Anantapur districts).

Silver, Zinc & Lead

Rajasthan (Zawar mines near Udaipur), Andhra Pradesh (Mysore, Chitradurg), Karnataka (Kolar mines).

Uranium Resources in India

Jharkhand (Jaduguda), Rajasthan (Ajmer), Andhra Pradesh (Nellore, Nalgonda), Karnataka (Gulbarga).

Thorium Resources in India

Kerala coast (From Monazite sand), rocks of Aravallis in Rajasthan.

Oil Refineries

There are 19 refineries in India, 16 in public sector, one in joint sector and two in private sector. Public sector refineries are located at Digboi, Guwahati, Bongaigaon, Barauni, Haldia, Koyali, Mathura, Kochi, Chennai, Vishakhapatnam, Mumbai (2), Panipat, Narimanam, Numanigarh and Tatipaka. Joint sector refinery is at Mangalore. The private sector refinery of Reliance Limited is at Jamnagar, Gujarat and Essar Refinery at Vadinar, Gujarat.

1. Haldia Refinery (IOC)
2. Mumbai Refinery (HPCL)
3. Panipat Refinery (IOC)
4. Vishakhapatnam Refinery (HPCL)
5. Digboi Refinery (IOC)
6. Mumbai Refinery Mahaul (BPCL)
7. Gujarat Refinery (IOC)
8. Nagapattnam Refinery (CPCL)
9. Barauni Refinery (IOC)
10. Kochi Refinery (Kochi Refineries Ltd)
11. Guwahati Refinery (IOC)
12. Numaligarh Refinery (NRL)
13. Mathura Refinery (IOC)
14. Mangalore Refinery (MRPL)
15. Bongaigaon Refinery (IOC)
16. Tatipaka Refinery (ONGC)
17. Manali Refinery (IOC)

18. Essar Refinery (Essar)
19. Jamnagar Refinery (Reliance Petroleum)

INDIAN INDUSTRIES

Cotton Textile Industry in India

Most important industry in terms of employment and production of export goods. In Maharashtra (Mumbai, Sholapur, Pune, Kolhapur, Satara, Wardha, Hajipur), Gujarat (Ahmedabad, Vododara, Rajkot, Surat, Bhavnagar), Tamil Nadu (Coimbatore–Manchester of South India). Tamil Nadu has the largest number of cotton textile mills in India.

Silk Textile Industry in India

The location of silk industry is governed by two factors– prevalence of sericulture practices and availability of skilled labour. Karnataka is the leading producer, followed by West Bengal, Bihar, etc.

Woolen Textile Industries

In Punjab (Dhariwai, Amritsar, Ludhiana, Ferozpur), Maharashtra (Mumbai), UP (Kanpur, Mirzapur, Agra, Tanakpur), etc.

Jute Industries India

India manufactures the largest quantity of jute goods in the world. Mainly located in West Bengal, followed by Andhra Pradesh, Bihar, UP, MP.

Iron and Steel Industries

Located near the sources of raw materials and fuel (coal). In Jamshedpur (Jharkhand), Durgapur, Burnpur (W.B.), Bhadrawati (Karnataka), Bokaro (Jharkhand), Rourkela (Orissa), Bhilai (Chhatisgarh), Salem (T.N.), Vishakhapatnam (A.P.).

Aluminium Smelting in India

Located mainly near the sources of raw materials, means of transport and cheap electricity. In Hirakud, Koraput (Orissa), Renukoot (UP), Korba (MP), Ratnagiri (Maharashtra), Mettur (TN), Alwaye

Copper Smelting Industry

In Khetri, Alwar, Jhunjhunu (Rajasthan), Singhbhum (Jharkhand), Agnigundala (A.P.).

Heavy Machinery Industry

In Ranchi, Vishakapatnam, Durgapur, Tiruchirapalli, Mumbai, Kami.

Machine Tools Industry

It forms the basis for the manufacturing of industrial, defence equipments, automobiles, railway engines and electrical machinery.

In Bangalore, Pinjore (Haryana), Kalamassery (Kerala), Hyderabad, Secunderabad, Srinagar, Ajmer.

Heavy Electrical Equipments

Power generation equipments. In Bhopal, Tiruchirapalli, Jammu, Ramchandrapuram (Hyderabad), Hardwar, Bangalore and Jogdishpur (UP).

Railway Equipments

Locomotives in Indian Railways: In Chittaranjan (WB), Varanasi, Jamshedpur, Bhopal. Coaches: Perambur (TN), Kapurthala (Punjab), also at Bangalore and Kolkata.

Ship Building India

Hindustan Shipyard at Vishakhapatnam, Cochin Shipyard, Mumuai (Mazgaon Dock) and Kolkata (Garden Reach Workshop). For Indian Navy, only at Mazgaon.

Cycles India

In Mumbai, Asansol, Sonepat, Delhi, Chennai, Jalandhar and Ludhiana.

Tractors in India

At Faridabad, Pinjore, Delhi, Mumbai, Chennai.

Fertilizers in India

The location of fertilizer industry is closely related to petro-chemicals. About 70% of the plants producing nitrogenous fertilizers use naphtha as raw material.

Naphtha is a by-product of oil refineries. Phosphate plants are dependent on mineral phosphate found in UP and MP. Now natural gas based fertilizer plants are also being set up.

The Fertilizer Corporation of India (FCL) was set up in 1961. National Fertilizer Limited (NFL) was set up in 1974.

In Sindri (Bihar), Nangal, Trombay, Gorakhpur, Durgapur, Namrup, Cochin, Rourkela, Neyveli, Varanasi, Vadodara, Vishakhapatinam, Kota and Kanpur.

Pharmaceuticals and Drugs

Antibiotics are prepared at Pimpri and Rishikesh. The Indian Drugs and Pharmaceuticals Limited has 5 plants at Hyderabad, Rishikesh, Chennai, Gurgaon and Muzaffarpur. A number of other units are concentrated in Mumbai, Baroda, Delhi, Kolkata and Kanpur.

Pesticides in India

Delhi and Alwaye

Sugar Industry

JP, Maharashtra, AP, TN, Karnataka and Bihar.

Aircraft Industry in India

Hindustan Aeronautics India Ltd. was formed by merging two aircraft factories at Bangalore and Kanpur. Four other factories are at Nasik, Hyderabad, Koraput (Orissa), Lucknow.

Rubber Industry in India

Bareilly (UP), Baroda (Gujarat Synthetic Rubber Units, Mumbai, Ahmedabad, Amritsar-Reclaimed Rubber Units

NUCLEAR POWER STATIONS IN INDIA

Power station	State	Type	Operator	Units	Total capacity (MW)
Kaiga	Karnataka	PHWR	NPCIL	220 x 3	660
Kalpakkam	Tamil Nadu	PHWR	NPCIL	220 x 2	440

Kakrapar	Gujarat	PHWR	NPCIL	220 x 2	440
Rawatbhata	Rajasthan	PHWR	NPCIL	100 x 1 200 x 1 220 x 4	1180
Tarapur	Maharashtra	BWR (PHWR)	NPCIL	160 x 2 540 x 2	1400
Narora	Uttar Pradesh	PHWR	NPCIL	220 x 2	440
Total	**19**	**4560**			

Some of the nuclear power plant projects which are under construction can be listed below :

Power station	State	Type	Operator	Units	Total capacity (MW)
Kudankulam	Tamil Nadu	VVER – 1000	NPCIL	1000 x 2	2000
Kaiga	Karnataka	PHWR	NPCIL	220 x 1	220
Kalpakkam	Tamil Nadu	PFBR	NPCIL	500 x 1	500
Total	**4**	**2720**			

MAJOR THERMAL POWER PLANTS

Neyveli	**Tamil Nadu**
Korba	Chhatisgarh
Obra	UP
Harduaganj	UP
Rihand	UP
Singrauli	UP
Parichha	UP
Talcher	Orissa
Farakka	West Bengal
Satpura	MP
Ramagundam	AP
Vindhyanchal	MP

IMPORTANT RIVER VALLEY PROJECTS IN INDIA

Bhakra Nangal Project	On Satluj in Punjab. Highest in India. Ht 226 m. Reservoir is called Gobind Sagar Lake
Mandi Project	On Beas in H.P
Chambal Valley Project	On Chambal in M.P & Rajasthan. 3 dams are there: Gandhi Sagar Dam, Rana Pratap sagar Dam and Jawahar Sagar dam
Damodar Valley Project	On Damodar in Bihar. Based on Tennessee Valley Project, USA
Hirakud	On Mahanadi in Orissa. World's longest dam: 4801 m
Rihand	On Son in Mirzapur. Reservoir is called Govind Vallabh Pant reservoir
Kosi Project	On Kosi in N. Bihar
Mayurkashi Project	On Mayurkashi in W.B
Kakrapara Project	On Tapi in Gujarat
Nizamsagar Project	On Manjra in A.P
Nagarjuna Sagar Project	On Krishna in A.P
Tungabhadra	On Tungabhadra in A.P & Karnataka
Shivasamudram Project	On Cauvery in Karnataka
Sardar Sarovar Project	In Gujarat, M.P., Rajasthan Maharashtra
Tata Hydel Scheme	On Bhima in Maharashtra
Sharavathi Hydel Project	On Jog Falls in Karnataka
Kundah & Periyar Project	In TN
Farakka Project	On Ganga in W.B. Apart from power and irrigation it helps to remove silt for easy navigation
Ukai Project	On Tapti in Gujarat
Mahi Project	On Mahi in Gujarat
Ghat Prabha project	In Andhra Pradesh and Karnataka
Salal Project	On Chenab in J & K
Mata Tila Multipurpose Project	On Betwa in U.P & M.P

RAILWAYS OF INDIA

Indian railway system is the largest in Asia and the fourth largest in the world. It is the biggest departmental public undertaking in the country.

The first train ran in India between Bombay and Thane, a stretch of 34 km. on April 16 1853.
The Indian Railways celebrated its 150th anniversary on April 16, 2003. To commemorate the occasion, 16 January – Shatabadi inter – city express trains were announced to be inducted.

The second train ran between Howrah and Hooghly in 1854.

The headquarters of Indian Railway is in New Delhi.

The first electric train in India was 'Deccan Queen'. It was introduced in 1929 between Bombay and Poona.

Indian Railways has the second biggest electrified system in the world after Russia.

The fastest train in India is the Shatabadi Express whose maximum speed is 140 km/hr.

The total route covered is approx 63,000 km.

The total number of railway stations in India is 7,100.

The longest railway platform in India is at Kharagpur (W.B.).

Mumbai is the destination where maximum number of trains in India head for.

The longest train route is of 'Himsagar Express' from Jammu Tavi to Kanyakumari. It covers a distance of 3,726 km and passes through ten states.

The first Metro Rail was introduced in Kolkata (W.Bengal) on October 24, 1984. The two stations connected were Dumdum and Belgachhia.

The Indian Railways operate in three different gauges :

1. Broad Gauge Railway (Distance between rails is 1.67 m).
2. Metre Gauge Railways (Distance between rails is 1.00 m).
3. Narrow Gauge Railways India (Distance between rails is 0.762 or 0.610 m).

The broad gauge accounts for nearly 50% route followed by metre gauge (43%) and the remaining by narrow gauge.

Indian railways are divided into 16 zones, headed by a General Manager who is responsible to the Railway Board, for all matters.

Railway Zones	Head Quarters
Central	Mumbai VT
Eastern	Kolkata
Northern	New Delhi
North Eastern	Gorakhpur
North-East Frontier	Maligaon-Guwahati
Southern	Chennai
South Central	Secunderabad
South Eastern	Kolkata
Western	Mumbai Churchgate
East Coast	Bhubaneshwar
East Central	Hajipur
North Central	Allahabad
North Western	Jaipur
South Western	Bangalore (Hubli)
West Central	Jabalpur
South-East Central	Bilaspur

- Northern Railway (NR) is the largest railway zone having length of 10,995 km.
- North – East Frontier (NEF) is the smallest railway zone having just 3,860 km route length.
- **Konkan Railways India** : It is a project to shorten the distance between Maharashtra, Goa and Karnataka. The total route length is 786 km between Apta (Maharashtra) and Mangalore (Karnataka)

Railway Manufacturing Units :

- **Chittaranjan Locomotive Works** : Located in Chittaranjan (W.B) and manufactures electric engines.
- **Diesel Locomotive Works** : Located in Varanasi (U.P) and manufactures diesel engines.
- **Integral Coach Factory in India** : Located in Perambur (TN) and manufactures rail coaches.
- **Wheel and Axle Plant** : Locatedat Yalahaka (Bangalore, Karnataka) and manufactures wheels and axles.
- **Diesel Component Works** : Locatedat Patiala (Punjab) and manufactures components of diesel engines.
- **Rail Coach Factory in India** : Located at Kapurthala (Punjab) and manufactures rail coaches.

AIR TRANSPORT OF INDIA

1. J.R.D. Tata was the first person to make a solo flight from Mumbai to Karachi in 1931.
2. In 1935, the 'Tata Air Lines' started its operation between Mumbai and Thiruvananthapuram and in 1937 between Mumbai and Delhi.
3. In 1953, all the private Airline companies were nationalised and Indian Airlines and Air India came into existence.
4. Air India administers international flights while Indian Airlines caters to the domestic circuit.
5. Indian Airlines is now known by the name of 'Indian'.
6. Vayudoot Limited started in 1981 as a private air carrier and later on it merged with Indian Airlines.
7. Pawan Hans Limited operates helicopter support services to oil sector, hill stations and remote areas.
8. A number of private airlines also operates is India. They are Jet Airways, Sahara, etc.
9. The Civil Aviation Centre in Fursatgarh near Allahabad provided, among other things, ground training to the pilots.

AIRPORTS IN INDIA :

There are 12 International Airports in India :

- Begumpet Airport, Hyderabad
- Calicut International Airport, Calicut

- Chatrapati Shivaji International Airport, Mumbai
- Chennai International Airport, Chennai
- HAL Airport, Bangalore
- Goa Airport in Vasco da Gama city, Goa
- Lokpriya Gopinath Bordolio International Airport, Guwahati
- Indira Gandhi International Airport, Delhi
- Netaji Subhash Chandra Bose International Airport, Kolkata
- Rja Sansi International Airport, Amritsar
- Sardar Vallabhbhai Patel International Airport, Ahmedabad
- Thiruvananathapuram International Airport, Thiruvananathapuram

The Indira Gandhi International Airport and the Chatrapati Shivaji International Airport handle more than half of the air traffic in South Asia. Besides these airports several other domestic airports are located in India.

In total, there are more than 334 civilian airports in India – 238 with paved runways and 108 with unpaved runways.

WATER TRANSPORT OF INDIA

Most efficient, least costly and environment friendly means of transportation.
The total length of navigable waterways in Indian comprising rivers, canals, backwaters, etc, is 14,500 km out of which 3700 km is navigable by mechanised boats.

The government has recognised the following National Waterways of India:

- NW 1: Allahabad to Haldia – 1,629 km
- NW 2: Sadia to Dhubari (on Brahmaputra river) – 819 km
- NW 3: Kollam to Kottapuram – 186 km
- NW 4: Kakinada to Marakkanam (Along Godawari and Krishna river) – 1,100 km

PORTS IN INDIA

- The Waterways Authority in India divides Indian ports into three categories, major, minor and intermediate.
- India has about 190 ports in all, with 12 major and the rest intermediate and minor.
- The 12 Major Ports are:

Port	State

Kolkata (including Haldia)	West Bengal
Paradip	Orissa
Vishakhapatnam	Andhra Pradesh
Chennai	Tamil Nadu
Ennore	Tamil Nadu
Tuticorin	Tamil Nadu
Cochin	Kerala
New Mangalore	Karnataka
Mormugao	Goa
Jawaharlal Nehru	Maharashtra
Mumbai	Maharashtra
Kandla	Gujarat

- All these ports are administered by the respective Port Trusts, except the newly constructed Ennore port which is under the Ennore Port Ltd. Company.

Salient Features :

- **Kolkata Port (including Haldia)** : Kolkata is a riverine port, located about 128 km from the Bay of Bengal on the banks of river Hooghly. Haldia was developed because excessive silting prevented the entry of large marine vessels in Kolkata.

- **Paradip Port** : Located on the Orissa coast along the Bay of Bengal. India exports raw iron to Japan from here.

- **Vishakhapatnam Port** : The deepest port, located in Andhra Pradesh. It serves the Bhilai and Rourkela steel plants.

- **Chennai Port** : Oldest artificial harbour. This port ranks only second after Mumbai in terms of the traffic handling capacity.

- **Ennore Port** : Declared a major port in 2001. It is the first port with corporate participation. Provided with all the modern facilities for handling the thermal coal required for Tamil Nadu Electricity Board Power Station.

- **Tuticorin Port** : It came into existence during the reign of Pandya kings. It has an artificial deep sea harbour.

- **Cochin Port** : A fine natural harbour located on Kerala coast. Handles the export of tea, cofee and spices and import of petroleum and fertilisers.

- **New Mangalore Port** : The 'Gateway of Karnataka'. Handles the export of iron-ore of Kudremukh.

- **Marmugao Port** : It has a naval base. India's leading iron-ore port.

- **Mumbai Port** : A natural port, India's busiest. A new port, Nhava Sheva, is being developed near Mumbai port.
- **Jawaharlal Nehru Port** : Occupies the 5th position in the world's faster growing ports.

- **Kandla Port** : Called the 'offspring of partition' as it was developed after the partition as a substitute of Karachi port. It is a tidal port and a free trade zone located in the Rann of Kachchh.

FAMOUS HILL STATIONS IN INDIA

Hill Stations	Height From Sea Level (m)	States
Gulbarga	750	Karnataka
Gulmarg	2400	kashmir (Highest)
Uthagamandalam (Ooty)	2290	Tamil Nadu
Shimla	2210	Himachal Pradesh
Pahalgam	2200	Jammu & Kashmir
Darjeeling	2135	West Bengal
Kodaikanal	2120	Tamil Nadu
Lansdowne	2120	Uttarkhand
Dalhousie	2035	Himachal Pradesh
Mussoorie	2006	Uttarakhand
Mukteshwar	1975	Uttarakhand
Nainital	1940	Uttarakhand
Kasauli (Shimala)	1985	Himachal Pradesh
Yercaud	1500	Tamil Nadu
Hill Stations	Height From Sea Level (m)	States
Cherrapunji (Shillong)	3524	Meghalaya
Coonoor (Nilgiri hills)	1860	Tamil Nadu

Gangtok	1850	Sikkim
Manali	1830	Himachal Pradesh
Ranikhet	1830	Uttarkhand
Ranchi	1800	Jharkhand
Srinagar	1770	Jammu & Kashmir
Almora (Kumaon hills)	1650	Uttarakhand
Shillang (Khasi hills)	1500	Meghalaya
Mahabaleshwar	1370	Maharashtra
Kalimpong	1250	West Bengal
Mt. Abu	1220	Rajastan
Kullu Valley	1200	Himachal Pradesh
Panchgani	1200	Maharastra
Mannar	1160	Kerala
Panchmarhi	1065	Madhya Pradesh
Periyar	915	Kerala
Mandi	709	Himachal Pradesh
Lonawala	620	Maharastra
Khandala	620	Maharastra

TRIBAL GROUPS OF INDIA

Tribal Groups	Found in
Abhors	North-East
Adivasis	MP (Bastar distt.)
Angami	Manipur
Apatamis	Arunachal Pradesh
Badagas	Tamil Nadu
Baigas	M.P
Bakkarwals	J & K
Bhils	M.P & Rajastan
Bhotias	Uttarakhand
Bhuia	M.P
Birhors	M.P and Bihar
Chang	North - East

Chenchus	A.P and Orissa
Tribal Groups	Found in
Chutia	Assam
Gaddis	Himachal Pradesh
Gallong	North-East
Garos	Assam and Meghalaya
Gonds	M.P and Bihar
Gujlars	J & K and H.P
Irula	Tamil Nadu
Jaintias	Meghalaya
Jarawas	Little Andamans
Kanikar	Tamil Nadu
Katkari	M.P
Kharia	M.P
Khond	M.P
Khas	U.P
Khasis	Assam and Meghalaya
Khonds	Orissa
Kol	M.P
Kolam	A.P
Kotas	Tamil Nadu
Kuki	Manipur
Lahaulas	Himachal Pradesh
Lepchas	Sikkim
Lushai	Tripura
Murias	M.P
Minas	Rajastan
Moplahs	Kerala
Mundas	Bihar
Murias	M.P
Nishi	North - East
Nagas	Nagaland

Oarons	Bihar and Orissa
Onges	Andaman & Nicobar
Pho	North – East
Santhals	WB, Orissa and Bihar
Sangtam	North-East
Sema	Nagaland
Sentinelese	Andaman & Nicobar
Shompens	Andaman & Nicobar
Todas	Tamil Nadu
Uralis	Kerala
Wancho	North – East
Warlis	Maharashtra

INDIAN TOWNS ASSOCIATED WITH INDUSTRIES

Town	State	Industries
Ahmedabad	Gujarat	Cotton Textiles
Agra	Uttar Pradesh	Stoneware, Marble, Leather, & Carpets
Aligarh	Uttar Pradesh	Locks
Ankleshwar	Gujarat	Oil
Ambernath	Maharashtra	Machine Tools, Prototype Factory
Amritsar	Punjab	Shawls, acid, Carpet, Woollen
Anand	Gujarat	Butter, Cheese & Baby Foods
Alwaye	Kerala	Aluminium, Monazite, Rare Earths
Ambala	Haryana	Scientific goods
Aliabet	Gujarat	Oil Well
Arvi	Maharashtra	T.V. Reception Station
Avadi	Tamil Nadu	Heavy Vehicles Factory
Bokaro	Jharkhand	Steel Plant
Bangalooru	Karnataka	Hindustan Aeronautics Ltd., Indian Telephone Industries Ltd. & Hindustan Machine Tools
Batanagar	West Bengal	Shoes
Bareilly	Uttar Pradesh	Resin, Industries, Woodwork
Town	State	Industries
Bhilai	Chhattisgarh	Steel Plant

Barauni	Jharkhand	Silk
Burnpur	West Bengal	Iron & Steel
Bhurkunda	Jharkhand	Glass Industries
Bhagalpur	Bihar	Silk industries
Bhandara	Maharashtra	Explosives
Bhadravati	Karnataka	Alloy Steel
Bongaigaon	Assam	Petroleum
Bhadoi	Uttar Pradesh	Carpets
Bhopal	Madhya Pradesh	Heavy Electricals
Bailadila	Madhya Pradesh	Iron ore, Mechanised mine
Bodra	West Bengal	Oil Refinery
Churk	Madhya Pradesh	Cement
Cyberabad	Andhra Pradesh	Electronics, Computers, Information technology
Chittaranjan	West Bengal	Locomotives
Cochin	Kerala	Ship building, coconut oil, rubber
Calicut	Kerala	Coffee, coconut
Coimbatore	Tamil Nadu	Cotton industries
Cambay	Gujarat	Petroleum
Chindwara	Madhya Pradesh	Limestone, Coal
Chennai	Tamil Nadu	IT, Car Manufacturing
Dhariwal	Punjab	Woolen goods
Durgapur	West Bengal	Steel Plant, Dry Ice
Digboi	Assam	Petroleum
Delhi	Delhi	DDT, Textiles & Housing Factory
Dalmianagar	Bihar	Cement
Darjeeling	W. Bengal	Tea
Dindigul	Tamil Nadu	Cigar, Tobacco
Damanjodi	Orissa	Aluminium
Debari	Rajasthan	Zinc
Dhuvaran	Gujarat	Thermal Power
Digboi	Assam	Petroleum

Ernakulam	Kerala	Cables
Firozabad	Uttar Pradesh	Glass
Guntur	Andhra Pradesh	Cotton Manufacture, Tobacco
Gwalior	Madhya Pradesh	Pottery, Textiles
Gomia	Jharkhand	Explosives
Haridwar	Uttarakhand	Heavy electricals
Hatia	Jharkhand	Heavy Engineering Corporation
Haldia	W. Bengal	Chemical fertilizer
Hazira	Gujarat	Artificial Rayon
Hissar	Haryana	Indo – Australian sheep farm
Hirzapur	Uttar Pradesh	Carpet, pottery, stoneware
Hoshangabad	Madhya Pradesh	Security Paper Mill
Jamshedpur	Jharkhand	Iron & Steel goods
Jalandhar	Punjab	Surgical goods and sports articles
Jaipur	Rajasthan	Embroidery
Jharia	Jharkhand	Coal
Jabalpur	Madhya Pradesh	Bidi industry
Jainakot	Jammu & Kashmir	H.M.T watch
Japla	Jharkhand	Cement
Jaduguda	Jharkhand	Uranium Ore Mill
Jalsindhi	Maharashtra	Hydro – electric
Jalahalli	Karnataka	Machine Tool Factory
Jharia	Jharkhand	Coal
Kolkata	West Bengal	Jute Manufacture, Electric lamps
Kanpur	Uttar Pradesh	Leather, Shoes
Katni	Madhya Pradesh	Cement
Korba	Chhattisgarh	Coal Mine, Aluminium
Koyna	Maharashtra	Aluminium
Koyali	Maharashtra	Power Generation
Kolar	Karnataka	Gold mine

Kota	Rajasthan	Atomic power plant
Kanchipuram	Tamil Nadu	Silk clothes
Karnal	Haryana	Dairy product
Kandla	Gujarat	Fertilizer
Khetri	Rajasthan	Copper industries
Kakrapara	Gujarat	Atomic Power Plant
Kalol	Gujarat	Fertiliser
Kalpakkam	Tamil Nadu	Atomic Power Plant
Kavalur	Tamil Nadu	Telescopic Observatory
Khari	Rajasthan	Lignite
Kirloskarvadi	Maharashtra	Agricultural Implements
Kochi	Kerala	Ship building
koodankulam	Tamil Nadu	Atomic Power Plant
Kozhikode	Kerala	Calico, Rubber coir
Kurukunta	Karnataka	Cement Plant
Ludhiana	Punjab	Hosiery
Lucknow	Uttar Pradesh	Gold, Silver, Lac
Madurai	Tamil Nadu	Cotton and Silk Weaving
Mirzapur	Uttar Pradesh	Carpet, Pottery, Brass industries
Moradabad	Uttar Pradesh	Utensils
Mathura	U.P	Oil refinery
Mysooru	Karnataka	Silk
Meerut	U.P	Publication work, Sports goods, Scissors making
Mumbai	Maharashtra	Cotton Textile & Industries
Modinagar	U.P	Nylon thread
Moorie	Jharkhand	Aluminium
Majhagaon	Maharashtra	Ship building
Manali	Tamil Nadu	Fertiliser / Oil Refinery
Mithapur	Gujarat	Fertiliser
Motipur	Uttar Pradesh	Mechanised Farming
Nagpur	Maharashtra	Cotton mills, Oranges
Nepanagar	Madhya Pradesh	Newsprint
Nasik	Maharashtra	Security Printing Press
Neyveli	Tamil Nadu	Lignite
Noonmati	Assam	Oil refinery

Narora	Uttar Pradesh	Atomic Power Plant
Nangal	Punjab	Fertilizer, Heavy Water Plant
Nagapattinam	Tamil Nadu	Oil Refinery
Ogalewadi	Maharashtra	Hurricane lanterns, Stoves
Panna	M.P	Diamond mining
Pinjore	Haryana	Machines Tools
Perambur	Tamil Nadu	Integral coach factory
Pimpri, Pune	Maharashtra	Antibiotics
Pilani	Rajasthan	Thermal Power
Panki	Uttar Pradesh	Fertilizer
Pinjore	Haryana	Machine Tools
Ranigunj	Jharkhand	Coal mining
Rourkela	Orissa	Steel plant
Rana Pratap Sagar	Rajasthan	Hydro Power Plant
Renukoote	Uttarakhand	Aluminium
Roopnarayanpur	W. Bengal	Cables
Rishikesh	Uttarakhand	Antibiotic Plant
Rangapur	Andhra Pradesh	Observatory
Renukoot	Uttarkhand	Aluminium
Rupanagar	West Bengal	Telephone Cables
Saharanpur	Uttar Pradesh	Mangoes, Cigarette factory
Sindri	Jharkhand	Chemical fertilizers
Srinagar	Kashmir	Woolen shawl, embroidery
Surat	Gujarat	Textiles
Surajpur	Haryana	Cement factory
Suratgarh	Rajasthan	Agriculture implements
Singhbhum	Jharkhand	Copper
Singareni	Andhra Pradesh	Coal
Salem	Tamil Nadu	Stainless Steel
Samastipur	Bihar	Jute, Paper, Tobacco, Sugar
Sivakasi	Tamil Nadu	Fire Works, Printing
Sriharikota	Andhra Pradesh	Satellite Station
Suriyur	Tamil Nadu	Small Arms

Tarapur	Maharashtra	Nuclear Power
Titagarh	West Bengal	Paper
Thiruvananthapuram	Kerala	Wood Carving, Coir matting
Trombay	Maharashtra	Atomic Reactors, Plutonium, Fertilizer, Thorium Plant
Tiruchirapalli	Tamil Nadu	Cigar, B.H.E.L
Tirupati	Andhra Pradesh	Scooter
Tanjore	Tamil Nadu	Silk clothes
Thumba	Kerala	Rocket launching
Tirupur	Tamil Nadu	Textiles
Tiruverumbur	Tamil Nadu	Pressure Boiler
Tuticorin	Tamil Nadu	Fertilizer, Thermal Power, Copper smelter plant
Udaipur	Rajasthan	Zinc Project
Vijaypur	M.P	Fertilizers
Viiaynagar	Karnataka	Steel Plant
Visakhapatnam	Andhra Pradesh	Ship building
Varanasi	Uttar Pradesh	Rail Engines and Saari industries
Worli	Maharashtra	Baby food
Zainkot	Jammu & Kashmir	HMT Watches

IMPORTANT PLACES

Name	Place	Built by
Ajanta – Ellora Caves	Aurangabad (Mah.)	Gupta rulers
Aram Bagh	Agra (UP)	Babur
Agra Fort	Agra (UP)	Akbar
Akbar's Mausoleum	Sikandra (UP)	Akbar
Itmod – ud – daula Fort	Agra (UP)	Noorjahan
Anand Bhawan	Allahabad (UP)	Motilal Nehru
Bada Imambara	Lucknow (UP)	Asaf-ud-daula
Bharatpur Fort	Bharatpur (Raj.)	Raja Surajmal Singh
Bibi Ka Maqbara	Aurangabad (Mah.)	Aurongzeb
Char – Minor Hyderabad (AP)	Quli	Qutub Shah

Charar – e – Sharif	Jammu & Kashmir	Zainul Abedin
Chhota Imambara	Lucknow (UP)	Muhammad Ali Shah
Name	Place	Built by
Dargah Ajmer Sharif	Ajmer (Raj.)	Sultan Shyasuddin
Dilwara's Jain Temple	Mount Abu (Raj.)	Siddharaja
Deewan – e – Khas	Agra Fort (UP)	Shahjahan
Adhai Din Ka Jhopra	Ajmer (Raj.)	Qutubuddin Aibak
Elephanfa's cave	Mumbai (Mah.)	Rashtrakuta rulers
Fatehpur Sikri	Agra (UP)	Akbar
Ferozshah Kotla	Delhi	Ferozshah Tughlaq
Golghar	Patna (Bih.)	British Government
Gateway of India	Mumbai (Mah.)	British Government
Hauz Khas	Delhi	Alauddin Khilji
Hawa Mahal	Jaipur (Raj.)	Maharaja Pratap Singh
Humayun's Tomb	Delhi	Hymayun's wife
Jama Masjid	Agra (UP)	Shahjahan
Jama Masjid	Delhi	Shahjahan
Jagannath Temple	Puri (Ori.)	Anantvarmun Ganga
Jantar – Mantar	Delhi	Sawai Jai Singh
Jaigarh Fort	Jaipur (Raj.)	Sawai Jai Singh
Jim Corbett Park	Nainital (Uttar.)	Sir Malcom Hqilley
Jodhpur Fort	Jodhpur (Raj.)	Rao Jodhoji
Kanheri's Fort	Mumbai (Mah.)	Buddhists
Khirki Masjid	Delhi	Ghyasuddin Tughlaq
Lai Bagh	Bangalore (Kar.)	Hyder Ali
Lakshmi Narayan Temple	Delhi	Birla Family
Makka Masjid	Hyderabad (AP)	Quli Qutub Shah
Moti Masjid	Agra Fort (UP)	Shahjahan
Moti Masjid	Delhi Fort	Aurangzeb
Nahargarh Fort	Jaipur (Raj.)	Sawai Jai Singh
Nishat Garden	Srinagar (J & K)	Asaf Ali
Parana Qila	Delhi	Shershah Suri
Pathar Ki Masjid	Patna (Bih.)	Pervez Shah
President House	Delhi	British Government
Qutub Minor	Delhi	Qutubuddin Aibak
Red Fort	Delhi	Shahjahan

Safdar Jung Tomb	Delhi	Shuja-ud-daula
Sabarmati Ashram	Ahmadabad (Guj.)	Mahatma Gandhi
Shantiniketan	West Bengal	Rabindra Nath Tagore
Shish Mahal	Agra (UP)	Shahjahan
Shalimar Garden	Srinagar (J & K)	Jahangir
Shershah's Tomb	Sasaram (Bih.)	Shershah's son
Saint George Fort	Chennai (TN)	East India Company
Sati Burj	Mathura (UP)	Raja Bhagwan Das
Sun Temple	Konark (Ori.)	Narsimhadeva
Swarna Mandir (Golden Temple)	Amritsar (Pun.)	Guru Ramdas
Taj Mahal	Agra (UP)	Shahjahan
Vellure Math	Kolkata (WB)	Swami Vivekanand
Victoria Memorial	Kolkata (WB)	British Government
Vishnupad Temple	Gaya (Bih.)	Rani Ahiliabai
Viiaya Stambha	Chittorgarh (Raj.)	Maharana Kumbha

SANCTUARIES AND PARKS IN INDIA

Name	Location	Reserves for
Achanakmar Sanctuary	Bilaspur, (Chhattisgarh)	Tiger, Bear, Chital, Sambar, Bison
Badla Wildlife Sanctuary	Goa	Tiger, Elephant
Bandhavgarh National Park	Shahdol, (Madhya Pradesh)	Tiger, Panther, Chital, Nilgai, Wild bear
Bandipur Sanctuary	Border of Karnataka and Tamil Nadu	Elephant, Tigers, Panther, Sambar, Deer, Birds
Banerghatta National Park	Bangalore (Karnataka)	Elephant, Chital, Deer, Gray Partridges, Green pigeon
Bhadra Sancturary	Chikmagalur, (Karnataka)	Elephant, Chital, Panther, Sambar, Wild bear
Bhimabandh Sanctuary	Monger (Bihar)	Tiger, Leopard, Sambar, Wild bear, Chital, Water birds
Bori Sanctuary	Hoshangabad (Madhya Pradesh)	Tiger, Panther, Sambar, Chital, Wild bear, Barking Deer

Borivli National Park	Mumbai (Maharastra)	Panther, Sambar, Langur, Wild bear, Chinkara
Chandraprabha Sanctuary	Near Varanasi (Uttar Pradesh)	Lions, Chital and Sambar
Corbett National Park (named in memory of Jim Corbett, famous sportsman)	Nainital, (Uttarakhand)	Tiger, Leopards, Elephants, Sambar
Name	Location	Reserves for
Dachigam Sanctuary	Dachigam (Kashmir)	Kashmiri Stag
Datma Sanctuary	Singbhum (Jharkhand)	Elephants, Leopard, Wild bear, Barking deer
Dandeli Sanctuary	Dharwar (Karnataka)	Tiger, Panther, Elephant, Chital, Sambar, Wild bear
Dudhwa National Park	Lakhimpurkheri (U.P.)	Tiger, Panther, Sambar, Chital, Nilgai, Barking deer
Gandhi Sagar Sanctuary	Mandsaur (M.P.)	Chital, Sambar, Chinkara, Barking deer, Wild birds
Garampani Sanctuary	Diphu (Assam)	Elephant, Leopard, Wild Buffalo, Langur
Ghana Bird Sanctuary	Bharatpur, (Rajasthan)	Water birds, Black-buck, Chital, Sambar
Gir Forest	Junagarh (Gujarat)	India's biggest wildlife sanctuary famous for Gir Lions
Gautam Buddha Sanctuary	Gaya (Bihar)	Tiger, Leopard, Sambar, Chital, Barking deer
Hazaribagh Sanctuary	Hazaribagh (Jharkhand)	Tiger, Leopard, Chital, Nilgai, Sambar, Wild cat
Intangki Sanctuary	Kohima (Nagaland)	Elephant, Gaur, Tiger, Panther, Barking deer, Wild bear
Jaldapara Sanctuary	West Bengal	Rhinoceros
Kangiorghat National Park	Chattisgarh	Tiger, Panther, Sambar,Chital
Kawal Sanctuary	Adilabad (Andhara Pradesh)	Tiger, Panther, Gaur, Chital, Wild bear
Kaziranga National Park	Jorhat (Assam)	Horned rhinoceros, Gaur,

		Elephant, Leopard, Wild Buffalo
Khangchandzenda National Park	Gangtok (Sikkim)	Snow Leopard, Musk Deer, Himalayan bear
Kinnersani Sanctuary	Khamrsan (Andhra Pradesh)	Tiger, Panther, Gaur, Chital, Sambar, Nilgai
Kolleru Pelicanary	Elluru (Andhra Pradesh)	Pelicans, Painted stork
Nagerhole National Park	Coorg (Karnataka)	Elephant, Tiger, Panther, Sambar, Chital
Namdafa Sanctuary	Tirap (Arunachal Pradesh)	Elephant, Panther, Sambar, Tiger, Chital, King Cobra
Nawegaon National Park	Bhandara (Maharashtra)	Tiger, Panther, Sambar, Chital, Nilgai
Orang Sanctuary	Near Dispur (Assam)	Elephant, Panther, Sambar
Pachmarhi Sanctuary	Hoshangabad (Madhya Pradesh)	Tiger, Panther, Bear, Sambar, Nilgai, Barking Deer
Pakhal Sanctuary	Warangal (Andhara Pradesh)	Tiger, Panther, Sambar, Chital, Nilgai
Parambikulam Sanctuary	Palghat (Kerala)	Tiger, Leopard, Gaur, Elephant, Nilgai, Chital
Pench National Park	Nagpur (Maharashtra)	Tiger, Panther, Gaur, Sambar, Chital, Nilgai
Periyar Sanctuary	Idukki (Kerala)	Elephant, Tiger, Panther, Gaur, Nilgai, Sambar, Wild bear
Ranganthittoo Bird Sanctuary	Islands in Cauvery river in Karnataka	Various Kinds of Birds can be seen
Rohla National Park	Kulu (Himachal Pradesh)	Snow Leopard, Brown Bear, Musk Deer, Snow Cock, Snow Pigeon
Sariska Sanctuary	Alwar (Rajasthan)	Tiger, Panther, Sambar, Nilgai, Chital, Chinkara
Sharaswathy Valley Sanctuary	Shimoga (Karnataka)	Elephant, Tiger, Panther, Sambar, Gaur Chital, Wild Bear

Shikari Devi Sanctuary	Mandi (Himachal Pradesh)	Black Bear, Musk Deer, Panther, Leopard, Partridge
Shivpuri National Park	Shivpuri (Madhya Pradesh)	Tiger, Panther, Sambar, Hyena, Sloth Bear, Nilgai
Similipal Sanctuary	Mayurbhanj (Orissa)	Elephant, Tiger, Leopard, Gaur, Chital
Someshwara Sanctuary	Canara (Karnataka)	Tiger, Panther, Wild Boar, Leopard
Sunderban Tiger Reserve	South 24 parganas (West Bengal)	Tiger, Deer, Wild Bear, Crocodile, Gangetic Dolphin
Sonai Rupa Sanctuary	Tezpur (Assam)	Elephant, Sambar, Wild Bear, One-horned Rhinoceros
Tadoba National Park	Chandrapur (Maharashtra)	Tiger, Panther, Sambar, Nilgai, Chinkara, Chital
Tadwai Sanctuary	Warangal (Andhra Pradesh)	Tiger, Panther, Sambar, Gaur, Jungle Cat
Tansa Sanctuary	Thane (Maharashtra)	Panther, Sambar, Chital, Four-horned Antelope
Tungabhadra Sanctuary	Bellary (Karnataka)	Panther, Chital, Sloth bear, Four-horned Antelope
Ushakothi Wildlife Sanctuary	Orissa	Elephant, Tiger, Sambar
Valvadar National Park	Bhavnagar (Gujarat)	Wolf, Black buck
Vedanthangal Bird Sanctuary	Vedanthangal near Chingleput (Tamil Nadu)	Important bird sanctuary
Waynad Sanctuary	Cannanore and Kozhikode (Kerala)	Elephant, Gaur, Sambar, Chital, Wild bear, Deer
Wild Ass Sanctuary	Little Rann of Kutch (Gujarat)	Wild Ass, Wolf, Nilgai, Chinkara

HEIGHTS OF SOME IMPORTANT INDIAN PEAKS

S No	Peak	Height in metres above mean Sea Level
1	K2	8,611

2	Kanchen Junga	8,598
3	Nanga Parvat	8,126
4	Gasher Brum	8,068
5	Broad Peak	8,047
6	Disteghil Sar	7,885
7	Masher Brum E	7,821
8	Nanda Devi	7,817
9	Masher Brum W	7,806
10	**Rakaposhi**	**7,788**
11	Kamet	7,756
12	Saser Kangri	7,672
13	Skyang Kangri	7,544
14	Sia Kangri	7,422
15	Chaukhamba (Badrinath Peak)	7,138
16	Trisul West	7,138
17	Nunkun	7,135
18	Pauhunri	7,128
19	Kangto	7,090
20	Dunagiri	7,066

EARTH SOLAR SYSTEM

Earth solar system consists of :

- The Sun
- The Planets
- Dwarf Planets

and countless fragments of left – overs called asteroids, meteors, comets and satellites of the planets (called small solar system Bodies).

Origin of Solar System

Various theories have been given by different persons to explain the origin of Solar System.

Gaseous Hypothesis	**Kant**
Nebular Hypothesis	Laplace
Planetesimal Hypothesis	Chamberlin and Moulton
Tidal Hypothesis	James Jeans & Harold Jeffrey
Binary Star Hypothesis	H. N. Russel

Fission Hypothesis	Ross Gun
Cepheid Hypothesis	A.C. Banerji
Nova Hypothesis	Hoyle & Lyttleton
Electromagnetic Hypothesis	H. Alfven
Interstellar Dust Hypothesis	Schmidt
Nebular Cloud Hypothesis	Dr. Von Weizsacker
Protoplanet Hypothesis	G. Kuiper
Solar System Some Facts	
Biggest Planet	Jupiter
Smallest Planet	Mercury
Nearest Planet to Sun	Mercury
Farthest Planet from Sun	Neptune
Nearest Planet to Earth	Venus
Brightest Planet	Venus
Brightest star after Sun	Sirius
Planet with maximum satellites	Jupiter
Coldest Planet	Neptune
Hottest Planet	Venus
Heaviest Planet	Jupiter
Red Planet	Mars
Biggest Satellite	Gannymede
Smallest Satellite	Deimos
Blue Planet	Earth
Morning/Evening Star	Venus
Earth's Twin	Venus
Green Planet	Neptune
Planet with a big red spot	Jupiter
Lord of the Heavens	Jupiter
Greatest Diurnal Temperature	Mercury

EARTH MOVEMENTS

The Earth also called Blue Planet. It is the densest of all planets.

Earth Circumference : 40,232 Kilometers.

Earth Area : 510 million Square Kilometers Average distance from sun: 149 million-Kilometers.

Earth Perihelion : Nearest position of earth to sun. The earth reaches its perihelion on January 3 every year at a distance of about 147 million-Kilometers.

Aphelion : Farthest position of earth from sun. The earth reaches its aphelion on July 4, when the earth is at a distance of 152 million Kilometers.
The shape of the earth is oblate spheroid or oblate ellipsoid (i.e. almost spherical, flattened a little at the poles with a slight bulge at the centre).

2 Types of Earth Movements:

1. Rotation or daily movement.
2. Revolution or annual movement.

Earth Rotation

- Spins on its imaginary axis from west to east in 23 hrs, 56 min and 40.91 sec.
- Rotational velocity at equator is 1667 Kilometers/h and it decreases towards the poles, where it is zero.
- Earth's rotation results in

i . Causation of days and nights;
ii . A difference of one hour between two meridians which are 15° apart;
iii. Change in the direction of wind and ocean currents;

- Rise and fall of tides everyday.
- The longest day in North Hemisphere is June 21, while shortest day is on 22 Dec (Vice-versa in S. Hemisphere).
- Days and nights are almost equal at the equator.

Earth Revolution

- It is earth's motion in elliptical orbit around the sun. Earth's average orbital velocity is 29.79 Kilometers/s.
- Takes 365 days, 5 hrs, 48 min and 45.51 sec. It results in one extra day every fourth year.
- Revolution of the earth results in

i . Change of seasons
ii . Variation in the lengths of days and nights at different times of the year

iii . Shifting of wind belts

iv . Determination of latitudes.

- Inclined Axis: The axis is an imaginary line running from north to south and passing through the centre of the earth. It always remains inclined at an angle of 66½° to the plane of the earth's orbit, and is tilted 23½° from a line perpendicular to this plane. The two facts, i.e., a fixed angle of the earth's axis to the plane of the orbit and the axis always pointing in the same direction, when combined with the earth's movements, results in varying lengths of days and nights, seasonality and changes in the altitude of sun at different times of the year.
- Earth Seasons are periods into which the year can be divided as a result of the climatic conditions, largely due to the changes in the duration and intensity of solar radiation.

The 4 Earth Seasons are:

- **Spring**: On March 21, the sun is directly overhead the equator. This is the season of spring in the northern hemisphere.
- **Summer**: On June 21, the sun is directly overhead the Tropic of Cancer. Thus, the northern hemisphere experiences summer.
- **Autumn**: On September 23, the sun returns to the equator, and the northern hemisphere experiences autumn.
- **Winter**: On December 22, the sun is at the Tropic of Capricorn, and the northern hemisphere experiences winter.

EARTH SOME IMPORTANT FACTS

Age	**4,60,00,00,000 years**
Total surface area	51,01,00,500 Square Kilometers
Land area (29.08%)	14,89,50,800 Square Kilometers
Water area (70.92%)	36,11,49,700 Square Kilometers
Mean density	5.52 gm. per cc
Equatorial diameter	12,755 Kilometers
Polar diameter	12,712 Kilometers
Escape velocity	11.2 Kilometers/sec
Mass	5.880 1024 kg
Volume	10,83,20,88,40,000 kg3
Distance from Moon	3,82,200 Kilometers
Highest place on Earth	Mount Everest (8,850 m)

Deepest point in Ocean	Challenger Deep in Mariana Trench in Pacific Ocean near Philippines (11,033 m deep)
Deepest point on Land	Dead Sea (396 m deep)
Rotation time	23 hrs, 56 min, 40.91 sec
Revolution time	365 days, 5 hrs, 48 min, 45.51 sec
Satellite	1 (Moon)
Tilt of axis from Orbital Plane	23° 27
Distance from Sun	14,94,07,000 Kilometers
Equatorical circumference	40,075 Kilometers
Polar circumference	40,024 Kilometers
Average Ocean depth	3,554 m
Date of perihelion (minimum distance from Sun)	Jan 3
Date of aphelion (maximum distance from Sun)	July 4
Orbital circumference	924,375,700 Kilometers
Average Orbital speed	29.783 Kilometers/sec. (107,218 Kilometers/h)
Minimum surface temperature	88° C
Mean surface temperature	14° C
Maximum surface temperature	58° C

EARTH LATITUDE AND LONGITUDE

Earth Latitude

Imaginary lines drawn parallel to the equator. Measured as an angle whose apex is at the centre of the earth

The equator represents 0° latitude, while the North Pole is 90° N and the South Pole 90° S

23½° N represents Tropic of Cancer while 23½° S represents Tropic of Capricorn.

66½° N represents Arctic Circle while 66½° S represents Antarctic Circle.

There are total 181 latitudes including the equator. Each parallel of latitude is a circle, but they are not equal.

The circle becomes smaller towards the poles. Equator is the 'Greatest Circle' that can be drawn on the earth's surface.

The distance between any two parallels of latitude is always equal.

Earth Longitude

- It is the angular distance measured from die centre of the earth. On the globe the lines of longitude are drawn as a series of semicircles that extend from the North Pole to the South Pole through the equator. They are also called meridians.
- The distance between any two meridians is not equal. At the equator, 1 degree = 111 km. At 30°N or S, it is 96.5 km. It goes on decreasing this way until it is zero at the poles.
- There are 360 meridians of longitude. The prime meridian is a longitude of 00, passing through the Royal Observatory at Greenwich near London.
- This meridian is taken by geographers to divide the earth into the eastern and the western hemispheres.
- Each meridian of longitude is a semi-circle. 180° meridian (International Date Line) lies exactly opposite to ° meridian. Such points are called Antipodl Points.
- The earth is divided into 24 longitudinal zones, each being 15° or 1 hour apart in time (4 minutes / degree).

Longitude and Time

- Places that are on the same meridian have the same local (sun) time. Since the earth makes one complete revolution of 360° in 24 hours, it passes through 15° in one hour or 1° in 4 minutes.
- The earth rotates from west to east, hence places east of Greenwich see the sun earlier and gain time whereas places west of Greenwich see the sun later and lose time.
- A suitable memory acronym can be: East-Gain-Add (E.G.A.) and West-Lose-Subtract (W.L.S.). So, if it is noon in London (near 0°), 15° east will be one hour ahead of London or 1 p.m. and Chennai of 80°E will be 5 hours 20 minutes ahead. To avoid confusion about having many local times within one country, a particular Meridian is chosen for the whole country whose time is known as 'standard time'.
- Generally, the standard meridians are chosen to differ from the Greenwich meridian by the multiples of fifteen degree or seven and a half degree, i.e., by exact number of

hours or half hours. The world is thus divided into a number of time zones. Larger countries like Russia, Canada, USA etc., have greater east-west extension, so they adopt several time zones. Russia has 11 time zones while USA and Canada have 5 time zones.

- India, whose longitudinal extent is approx. 30°, has adopted only one time zone, selecting the 82.5°E for the standard time which is 5 hours and 30 minutes ahead of GMT (Greenwich Mean Time).

International Date Line

- It is the 180° meridian running over the Pacific Ocean, deviating at Aleutian Islands, Fiji, Samoa and Gilbert Islands.
- Travelers crossing the Date Line from west to east (i.e., from Japan to USA) repeat a day and travelers crossing it from east to west (i.e., from USA to Japan) lose a day.

EARTH LUNAR ECLIPSE

When earth comes between sun and moon.

Occurs only on a full moon day. However, it does not occur on every full moon day because the moon is so small and the plane of its orbit is tilted about 5° with respect to the plane of the earth's orbit. It is for this reason that eclipses do not occur every month.

EARTH SOLAR ECLIPSE

When moon comes between sun and earth.

Can be partial or total.

Occurs only on a new moon day when the moon is in line with the sun. However, due to the inclination of the moon's orbit, a solar eclipse doesn't occur on every new moon day.

EARTH CLIMATE

The average weather conditions over a large area is called the climate of a place. Weather conditions over a specific length of time, usually a period of 31 years, are taken into consideration.

On a large scale, the climate of a particular region is determined by:

i. Latitude and tilt of the earth's axis, which determines the amount of solar radiation received by the area

ii. The distribution of land and sea and proximity of ocean currents

iii. The altitude and topography of the area

iv. The location of the area in relation to the main circulation belts of the earth.

Climate can be classified on the basis of temperature, rainfall, evaporation, evapo transpiration and water balance. One of the universally accepted climate classifications is by Koeppen which is being described here.

TYPES OF CLIMATES

1. Tropical Rain Forest Climate

- Also called equatorial type of climate or Selvas.
- 5° – 10° of equator, nights and days equal.
- Average monthly temperature is 24° – 27°c, annual range least. Diurnal range of temperature far greater than the annual range. Here night is the winter.
- Called 'Belt of Calm' or Doldrums.
- Convectional rainfall. Annual rainfall is 250 cm.
- Broad-leaved evergreen dense forests. Trees are gregarious and there is competition for sunlight. Have more species of plants and animals than in all others combined.
- In Amazon basin, Congo basin, Indonesia.

2. Tropical Monsoon Climate

- Complete seasonal reversal of winds.
- Rainfall seasonal (generally in summers). Due to this vegetation is deciduous.
- Approx. 200 cm of rainfall.
- Occurs in Western Guinea coast of Africa, South-Eastern Asia, Northern Australia, some parts of Amazon valley and West Indies.

3. Tropical Grasslands/Savanna Climate

- Average annual temperature is 23°c. Annual rainfall is about 150 cm. Area- Africa, East and Central South America.
- Bounded by tropical rain forest climate towards the equator and dry climate towards the poles, the Savannah type is characteristic of grasslands in tropical and

subtropical latitudes. Grasslands are dotted with scattered trees and bushes that can survive the drought season.

- Rainfall in summer owing to convectional ascent of air. Distinct dry season in winter. Trees with longer roots, fire-resistant.

4. Tropical-Subtropical hot Desert

- Situated in the trade wind belt. Occupy the western margins of continents. The area includes North America – Colorado Desert, Mexican Desert; Africa-Sahara, Kalahari, Namib Desert; S W.Asia-Arabian, Iranian, Thar Desert; S.America-Atacama; Australia-Great Australian Desert.
- Average annual temperature is 38° c; annual summer temperature is 40° c, annual winter temperature is 15° c. average annual rainfall is about 25-40 cm. Greatest diurnal temperature.
- Highest insolation, as there is no clouds cover to scatter the insolation.
- Vegetation is xerophytic.

5. Middle Latitude Desert Climate

- Found between 35°-50° N and S.
- **Area**: Tarim, Gobi, Russian Turkistan and C. Iran. In Southern Hemisphere, only in Patagonia.
- Unlike the hot deserts, they have very cold winters because of their interior location.

6. Tropical and Subtropical Steppes

- Transition belt between hot deserts and humid climates. Occupy pole-ward margins of the tropical and subtropical deserts.
- Average annual temperature is 21° c.
- Semi-arid climate characterized by abundance of shrubs and grasses.
- Known by different names:
    - Prairies – North America
    - Pampas – South America
    - Veldt – South Africa
    - Downs – Australia
    - Steppes – Eurasia
    - Canterbury – New Zealand
    - Postaz – Hungary
    - Manchurian – Russia

7. Mediterranean Climate

- In the western coast of continents between 30°-45° N & S; Around the Mediterranean Sea, in South Europe, North Africa, California coast, Central Chile, Cape of Good Hope and South East Australia.
- Characterized by dry summer and humid winter. Off-shore trade winds blow in summer; they are dry and give no rainfall. Cyclonic rainfall in winter.
- Average annual temperature is 16° c. average winter temperature, 10° c, summer 25°c annual rainfall is 40-60 cm.
- Olives, grapevine and citrus family fruits are the chief products of these regions which are also known for grain farming.

8. China Type Climate

- Average annual temperature is 19° c, annual rainfall 120 cm.
- In the eastern coasts of continents between 25°- 45° N & S. Areas- China, South East USA, South Brazil, Eastern Argentina, South East Africa, South East Australia, South Japan. It is the eastern counterpart of the Mediterranean type.
- Characteristics-Hot summers and mild winters. Rainfall throughout the year.

9. West European Type Climate

- On the western side of continents between 40°-65° N & S. Areas- North West Europe including British Isles, West coat of Canada, South Chile, Southern New Zealand.
- Summers are moderate to cool (15°-18°); winters mild (2°-10°). Average annual temperature is 10° c.
- Annual Rainfall: 75-100 cm. No dry season as the westerly winds blow from the ocean throughout the year. Rainfall is mostly of cyclonic origin.

10. Cool East Coast Climate

- The Corn Belt of US has this type of climate; that is why it is known as 'Corn-Belt' climate.
- Average summer temp is 21°-24°c; it is long, warm and humid.
- Winter temp average-4° to 1.7° for a period of 3-5 months.

11. Continental Type Climate

- Coldest winter month average -12° to -6.7°c.
- Hottest summer months average 18°c to 21°c.
- In the interior parts of big continents.

12. Taiga Climate

- Taiga means snow forests or coniferous forests; needle shaped leaves, composed of evergreen spruce, fir and pine. Extends in two large belts in east-west direction from Alaska to Newfoundland in North America and from Norway to Kamchatka Peninsula in Eurasia.
- Cool and short summers (around 10°c) and very cold and long winters (below 0°c).
- Annual range of temperature highest. (In Verkhoyansk, Jan temp is -50°, annual range being 64°c)
- Total annual precipitation below 50 cm.
- These forests are the most important source of softwood and fur bearing animals.

13. Tundra Climate

- Summers are warm enough to melt the thin snow cover or small water bodies, with the result that land is water soaked and marshes, swamps are common.
- Precipitation less than 30 cm.
- Blizzards blow.
- Lichens and mosses common.

14. Highland Climate

- Experienced in the mountainous regions.
- Determined by elevation, shape of the highland, exposure to winds and location.
- Here winds are much stronger than at low levels.
- Vegetation varies as we move up.

IMPORTANT DESERTS OF THE WORLD

- Sahara – N. Africa (Includes the Libyan and the Nubian Desert)
- Australian – Australia (Includes Gibson, Simpson, Victorian, Great Sandy)
- Arabian – Arab Countries (Includes Rub'al Khali & An-Nafad of S. Arabia and Dast-e-Lut & Dast-e-Kavir of Iran)
- Kalahari – Africa (mainly in Botswana)
- Gobi – Mongolia
- Atacama – Central Chile
- Patagonian – Argentina
- Nabib – Namibia
- TaklaMakan – Sinkiang, China
- Karakum – Turkmenistan

- Sonoran – Arizona and California (USA)
- Thar – India

Isopleth

- Lines drawn on map along which the value of a particular phenomenon is uniform.

Some Important Isopleths are:

Isopleth	Reactions
Isobars	Equal pressure
Isobaths	Equal depth in sea
Isobronts	Thunder-storm at the same time
Isohaline	Salinity
Isohels	Sunshine
Isohyets	Rainfall
Isohypse (or Contour Lines)	elevation above sea-level
Isonif	Snow
Isotherms	Temperature
Isoneph	Cloudiness
Isodapan	Equal transportation cost distance
Isocline	Slope

CORAL REEFS IN INDIA

- Corals are a kind of calcareous rocks chiefly made of the skeletons of minute sea organisms called 'polyps'. They are formed due to accumulation and compaction of skeletons of these lime secreting organisms.
- Corals are found mainly in the tropical oceans and seas because they require high mean annual temperature ranging around 20° c. They cannot survive at a greater depth than 60-77m below sea level. Muddy or very saline water is injurious for their growth.
- The coral reefs are classified on the basis of nature, shape and mode of occurrence into the following three:
    1. **Fringing Reef**: Coral reefs that develop along the continental margins or along the islands are called fringing reefs. The seaward slope is steep and vertical while the landward slope is gentle. Sometimes there is a lagoon or

shallow channel between the fringing reef and the land. Such reefs are found near Rameshwaram in the Gulf of Mannar.

2. **Barrier Reef**: They are the largest, most extensive, highest and widest reefs of all. They are formed off the coastal platforms and parallel to them. There is an extensive but shallow lagoon between the coastal land and the barrier reef. The Great Barrier Reef of Australia is the largest barrier reef in the world.
3. **Atoll**: A reef of narrow growing corals of horse shoe shape and crowned with palm trees is called an atoll. It is generally formed around an island or in an elliptical form on a submarine platform. There is a lagoon in the middle of the coral ring. E.g. Fiji Atoll.

EARTH TIDES

Refer to the phenomenon of regular rise and fall of the sea water. Though both sun and moon exert gravitational force on earth, resulting in the production of tides, the moon, by nature of its closeness to the earth, has greater control over the timings of the tidal rises and falls.

The interval between two tides is 12 hrs and 26 minutes.

Spring Tide

When the sun, moon and the earth are in a straight line, the gravitational force is at its greatest because tide producing forces of both sun and moon complement each other and they pull together. This produces tides of unusually great range, called the spring tide.

These occur about twice a month: at new moon when the sun and the moon are in conjugation and at full moon when they are in opposition.

Neap Tide

Lowest magnitude as the tide producing forces of sun and moon act opposite to each other, as they form a triangle.

This happens during phases of first and third quarter, i.e., at half moon, the sun's tide producing force tends to balance the tide producing force of the moon., resulting in tides of unusually small range known as neap tides

INTERNAL STRUCTURE OF EARTH

The Crust of Earth

- It is the outermost and the thinnest layer of the earth's surface, about 8 to 40 km thick. The crust varies greatly in thickness and composition – as small as 5 km thick in some places beneath the oceans, while under some mountain ranges it extends up to 70 km in depth.
- The crust is made up of two layers- an upper lighter layer called the Sial (Silicate + Aluminium) and a lower density layer called Sima (Silicate + Magnesium).
- The average density of this layer is 3 gm/cc.

The Mantle of Earth

- This layer extends up to a depth of 2900 km.
- **Mantle is made up of 2 parts**: Upper Mantle or Asthenosphere (up to about 500 km) and Lower Mantle. Asthenosphere is in a semi-molten plastic state, and it is thought that this enables the lithosphere to move about it. Within the asthenosphere, the velocity of seismic waves is considerably reduced (Called 'Low Velocity Zone').
- The line of separation between the mantle and the crust is known as Mohoviricic Discontinuity.

The Core of Earth

- Beyond a depth of 2900 km lies the core of the earth.
- The outer core is 2100 km thick and is in molten form due to excessive heat out there. Inner core is 1370 km thick and is in plastic form due to the combined factors of excessive heat and pressure. It is made up of iron and nickel (Nife) and is responsible for earth's magnetism. This layer has the maximum specific gravity.
- The temperatures in the earth's core lie between 2200°c and 2750°c.
- The line of separation between the mantle and the core is called Gutenberg-Wiechert Discontinuity.

Note:

Temperature Inside the Earth: In the first 100 km, 12° increase per km. In the next 300 km, 2° increase per km. After that it is 1° increase per km.

Composition of Earth

- Made up of over 100 elements.
- The following 8 are important:

Oxygen	46.5%
Silicon	27.72%
Aluminium	8.13%
Iron	5 01%
Calcium	3.63%
Sodium	2.85%
Potassium	2.62%
Magnesium	2.09%
Magnesium	2.09%

ROCKS OF EARTH

Any aggregate of material particles that forms part of the earth's crust is called a rock.

There are 3 major types of rock types :

Igneous Rocks

Formed by the solidification of molten magma from the interior of the earth.

Most abundant of the three types of rocks (95%).

They do not occur in layers. Most of them are crystalline and do not contain fossils.

All other types of rocks originate from these rocks, thus called Primary rocks.

They are classified on several grounds as mentioned below:

1. On the basis of mode of occurrence

- **Intrusive Igneous Rocks**: They are formed by the solidification of magma beneath the earth's surface. They are further divided into plutonic and hypabyssal igneous rocks. Plutonic rocks cool deep beneath the earth. E.g., Granite. Hypabyssal rocks cool just beneath the earth's surface. E.g., Batholith, laccolith, phacolith, sills, dykes, etc.
- **Extrusive Igneous Rocks**: They are formed due to cooling and solidification of hot and molten lava at the earth's surface. E.g., Basalt, gabbro, etc

2. On the basis of Silica Content

- Acidic igneous rocks having more silica. E.g. Granite.
- Basic igneous rocks having less silica. E.g. Gabbro.

Sedimentary Rocks

- Made up of weathered remains of igneous rocks. Also contains fossils of plants and animals.
- Comprise only about 5% of the earth's crust but cover about 75% of the total land surface.
- The layers of sedimentary rocks hold all reserve of coal, oil and natural gas.
- Also known as Stratified Rocks because of the layers.
- Sedimentary rocks fall into three main groups:

1. **Mechanically Formed**: These are called clastic sedimentary rocks; the sediments are largely derived from pre-existing rocks that have been broken down and then transported by water, wind or ice to form rocks.
2. **Organically Formed Rocks**: These rocks are derived from remains of plants (e.g. peat, lignite, bituminous coal), or animals (e.g., chalk and coral).
3. **Chemically Formed**: E.g., Gypsum, salt rock, etc.

Metamorphic Rocks

- Sometimes igneous or sedimentary rocks metamorphize or change due to great 'pressure, intense temperature or the action of water and chemical activity.
- Examples of metamorphic rocks formed from different rocks are:

Metamorphic Rock	Made From
Slate	Shale and mudstone
Quartzite	Sandstone
Gneiss	Aranite
Marble	Limestone, dolomite or chalk
Schist	Shale
Anthracite	Coal

EARTHQUAKES

Tremors or vibrations of earth's surface produced by internal forces.

The point of origin of earthquake is called Seismic focus. Most of the earthquakes originate at the depth of 50-100 km inside the earth

The point on the earth's surface vertically above the earth's surface is called Epicentre.

The passage of earthquake waves is recorded by Seismograph.

The magnitude of waves is measured on Richter's scale. For measurement of the intensity of the earthquake (damage caused), the Modified Mercalli Intensity Scale is used.

Types of Waves Earthquakes

1. **Primary Waves (P-Waves)**: Travel from the point of happening by the displacement of surrounding particles. They are transmitted through solids, liquids and gases. Travels fastest.
2. **Secondary Waves (S-Waves)**: Travels through solids only. Thus they cannot pass through core.
3. **Surface Waves or Long Waves (L-Waves)**: Travels on earth's surface and causes maximum destruction. They are recorded after the P and S waves.

Distribution of Earthquakes

- Around the Pacific Ocean along a belt of volcanoes known as the Ring of Fire. 68 per cent of the volcanoes are experienced in this region.
- From the middle of Asia (Himalayas, Caspian Sea) through the Mediterranean Sea to West Indies. 21 per cent earthquakes are experienced in the region.
- Mid-Atlantic ridge belt which accounts for 11 per cent of the earthquakes.

Earth Volcanoes

A volcano is a vent or opening usually circular in form through which heated materials consisting of gases, water, liquid lava and fragments of rocks are ejected from the highly heated interiors to he surface of the earth.

Volcanic eruptions are closely associated with several interconnected processes such as

- The gradual increase in temperature with increasing depth at a rate of 1°c per 32 m due to heat generated by degeneration of radioactive elements inside the earth
- Origin of magma because of lowering of melting point caused by reduction in pressure of overlying rocks due to fractures caused by splitting of plates
- Origin of gases and water – vapour due to heating of water
- Ascent of magma due to pressure from gases and vapour
- Occurrence of volcanic eruptions. These eruptions are closely associated with plate boundaries.

Classification of Volcanoes

Volcanoes are classified under different schemes:

1. Classification on the basis of Periodicity of Eruptions:

- **Active Volcano**: Volcano which erupt periodically. E.g. Maona Loa in Hawaii, Etna in Sicily, Vesuvius in Italy, Stromboli in Mediterranean Sea, etc.
- **Dormant Volcano**: Volcano which has been quiescent for a long time but in which there is a possibility of eruption. E.g. Fujiyama in Japan, Krakatoa in Indonesia, Barren island Volcano in Andamans, etc.

2. Classification on the basis of Mode of Eruption

- **Central Eruption Type or Explosive Type**: E.g. Hawaiian type, Strombolian type, Volcanian type, Pelean type, Vesuvius type, etc.
- **Fissure Eruption or Quiet Eruption Type**: Large quantities of lava quietly flow up from fissures and spread out over the surrounding areas. Successive lava flow results in the growth of a lava plateau. E.g. Deccan Plateau, etc.

Distribution of Volcanoes in the World

- About 15% of world's active volcanoes are found along the **"Constructive or Divergent"** plate margins, whereas 80% volcanoes are associated with the **"Destructive or Convergent"** plate boundaries.
    1. The Circum – Pacific belt or the 'Ring of Fire'. It extends across the Kamchatka Peninsula, Kurile Islands, the Islands of Japan, Philippines, New Guinea, New Zealand and the Soloman Islands. It also passes through the Antarctica and the western coast of America.
    2. The Mid – Continent belt includes volcanoes of Alpine mountain chain, the Mediterranean Sea and the fault zone of eastern Africa. E.g. Stromboli, Vesuvius, Etna, Kilimanjaro, etc.
    3. The Mid – Atlantic belt in which the volcanoes are fissure eruption type. E.g. Iceland, Canary Islands, Cape Verde, Azores, etc.

EARTH MOUNTAINS

Types of Mountains

Fold Mountains of the World

They are formed when the rocks of the crust of the earth folded under stress, mainly by forces of compression (as a result of series of earthquakes).

E.g. – All big mountain systems: Himalayas, Alps, Andes, Rockies, Atlas, etc.

On the basis of age, fold mountains are grouped into: Young / New Fold Mountains

Came into existence after the continental drift. E.g. Himalayas, Andes, Rockies, Alps. Himalayas are regarded the youngest mountains in the world.

Old Mountains

They belong to pre-drift era, then subjected to denudation and uplift; many faults were formed; occur as relict mountains today. E.g. Pennines (Europe), Appalachians (US), Aravallis (India).

Block Mountains of the World

These are formed when great blocks of earth's crust may be raised or lowered. During the uplift of structural mountains, sometimes magma flows upwards into the crust.

On its cooling and hardening beneath the surface, it contracts and the overlying rock may crack into large blocks moving up or down. An intense folding of rocks is generally followed by faulting of strata due to horizontal forces of tension.

The land between the two parallel faults either raises forming Block Mountains or Horsts, or subsides into a depression termed as Rift Valley or Graben.
Eg: Narmada, Tapti and Damodar valley in India, the Vosges in France and Black forest in Germany (through which Rhine River flows).

Volcanic Mountains of the World

Formed as a result of volcanic eruption & the outflow of lava (through crater, the opening). Also called Mountains of Accumulation. Have a gentle slope.
E.g: Cotopaxi in Andes, Vesuvius and Etna in Italy, Fujiyama in Japan, Mauna Loa and Kilauea (Most active volcano) in Hawaii, Ojos del Salado in Argentina / Chile (Highest active volcano), Popocatepeti in Mexico, Raineer of Washington, Stromboli in Mediterranean (called Lighthouse of the Mediterranean), Mirapi and Krakatao in Indonesia, etc.

Relict Mountains
Sometimes, the mountains are carved out as a result of erosion of plateaus & high planes by various agents of erosion. E.g., Highlands of Scotland, Sierras of Spain, Catskill mountains of New York and Nilgiri, Parasnath, Girnar, Rajmahal of India.

MAJOR MOUNTAIN RANGES

Andes	**South America**	**6,960**
Himalayas-Karakoram-Hindukush	South Central Asia	8,850
Rockies	North America	4,401
Great Dividing Range	East Australia	2,228
Western Ghats	Western India	2,637
Caucasus	Europe, Asia	5,642
Alaska	USA	6,194
Alps	Europe	4,808
Apennines	Europe	2,912
Ural	Asia	1,895
Pennines	Europe	893
Pyrenees	Europe	3,404

Appalachian	North America	2,040

EARTH WEATHERING AND EROSION

Earth Weathering

Weathering refers to the disintegration and decomposition of rocks. It involves no transportation of the broken material. Thus, weathering involves simply the breaking or crumbling down of the rocks in situ.

Three Types of Earth Weathering:

Mechanical or Physical Weathering

In this, the rocks are broken down into progressively smaller segments and the chemical composition of the rocks remains unchanged. It is prominent in hot and dry/moist climatic regions because of high diurnal range of temperature.

This type of weathering takes place in different ways:

Frost Action Weathering: In cold climatic region, where water fills the pores, cracks and crevices in rocks and freezes, it expands and exerts a bursting pressure. Thus, the rocks are ruptured and fragmented.

Thermal Expansion and Contraction Weathering: In the area of hot deserts, the tremendous diurnal range of temperature brings the expansion and contraction of the surface rocks, leading to their disintegration into smaller pieces.

Exfoliation Weathering: This is the expansion by unloading process. Unloading occurs when large igneous bodies are exposed through the erosional removal of overlying rocks and the subsequent reduction in pressure.

On being exposed to the surface they expand slightly in volume. This leads to breaking of thick shells like an onion's layers from the parent mass just lying below.

Chemical Weathering

It changes the basic properties of the rocks. Since most of the chemical changes occur in the presence of water, this type of weathering is more potent in hot and humid regions.

Principal processes of chemical weathering are:

Solution Weathering: Here the rocks are completely dissolved. It leads to the evolution of Karst Topography where the water dissolves the rock structure of limestone, salt, gypsum, chalk, etc.

Oxidation Weathering: The presence of dissolved oxygen in water, when comes in contact with mineral surface, leads to oxidation (esp. in rocks containing iron).

Hydration Weathering: Most of the rock forming minerals absorbs water. This not only increases their volume but also produces chemical changes resulting in the formation of new minerals which are softer and more voluminous.

Carbonation Weathering: Water combining with Carbon dioxide produces carbonic acid which dissolves several elements of minerals and the rock is weakened and broken into pieces.

Biological Weathering

Plants and animals also contribute to weathering through various activities. Man is perhaps, the most important agent of weathering today. Cultivation, mining and transportation are some of the activities of man leading to weathering of rocks.

Plants also contribute to weathering as the penetration of roots into rocks loosens the joints. Decaying organic matter combines with rain-water and acts as a mild acid on the rocks, thus helping in weathering.

Earth Erosion

Erosion means wearing down of the earth's surface. It involves removal of rock material from higher areas.

As it involves transportation of rocks, erosion is performed by mobile agents such as streams, glaciers, winds, waves and the underground water.

Each agent of erosion tends to erode rocks from the higher areas and tends to deposit the eroded and transported matter elsewhere, usually in the lower areas, thus transforming die uneven surface of the earth into an even surface. The erosional and depositional activity results in the formation of a variety of land form features.

EARTH ATMOSPHERE

The atmosphere is a mixture of a layer of gases enveloping the earth, held to it by gravitational force. Almost all the atmosphere (97 per cent) lies within 29 km of the earth's surface.

Beyond about 100 km, recent data from satellites suggest that the lightest gases separate out, forming several concentric layers around the earth. The innermost of these is the nitrogen layer (between 100-200 km); then comes oxygen (200-1100 km); helium (1100-3500) and then hydrogen only, to which there is really no clearly defined upper limit.

Up to about 50 km the atmosphere is composed of:

- Nitrogen – 78 09%
- Oxygen – 20 95%
- Argon – 0.93%
- Carbon dioxide – 0.03%
- (Others are Neon, Helium, Ozone, Hydrogen etc.,)

Water vapour, besides being the immediate cause of condensation and precipitation, absorbs the insolation coming from the sun, reducing the amount reaching the earth's surface.

Carbon dioxide is important for absorption of heat from the sun as well as from the earth. A high concentration of carbon dioxide leads to Greenhouse Effect.

Dust particles scatter and diffuse insolation and also act as hygroscopic nuclei for condensation (for the formation of clouds).

Layers of ATMOSPHERE

Atmosphere Troposphere

- Layer nearest to earth's surface. Thickness varies from 8 km at the poles to 16 km at the equator.
- All weather phenomenons occur here.
- Densest of all and contains water vapour, moisture and dust.

- Dust particles present in this layer hold the water vapour and contribute to the occurrence of twilight and the red colours of sunlight and sunset.
- In this, at every 165 m there is a drop of 1°c (or 6.4°c per km). This is called Normal Lapse Rate of Temperature.
- Tropopause separates troposphere from stratosphere.

Atmosphere Stratosphere

- Extends from 16 km to 50 km ht. The temperature ceases to fall with the increase of height in this layer.
- Little weather is generated here as there is very little water vapour and virtually no dust present.
- Stratosphere provides ideal conditions for flying large airplanes.
- Contains ozone (25-30 km from earth's surface), region being called Ozonosphere. It absorbs the ultra-violet rays from the sun. This layer has a comparatively higher temperature due to the absorption of ultra-violet radiation from the sun (temperature increases as we go up).

Atmosphere Mesosphere

- Up to a height of about 80 km.
- In this, the temp decreases with height and falls to about -100°c at 80 km ht.

Atmosphere Ionosphere

- Extends to about 500-600 km.
- Called so as it contains electrically charged particles (ions) that reflect the radio waves back to the earth thus making radio communication possible.
- Also protects earth from harmful radiation. This causes increase in temperature with height in this layer.
- It also protects earth from falling meteorites, as most of them burn out in this region.

Exosphere

- Here the earth's gravity is extremely weak.
- Upper limit quite uncertain.
- The outer part is called Magnetosphere.

- The ionized particles increase in frequency with increasing heights. There are 2 belts in the upper atmosphere having a high concentration of ionized particles. They are known as Van Allen's Radiation Belts. The inner belt lies about 2600 km from the earth's surface, while the outer lies at about 13,000 to 19,000 km from it. These belts represent concentrations of highly charged particles, protons and electrons from the sun, trapped within lines of force of the earth's external magnetic field– the Magnetosphere.
- The final boundary between the earth and the outer space is called 'Magnetopause'.

Note:

The auroras are produced by the charged particles from the sun captured by earth's magnetic field at heights of about 100 km. it is a luminous phenomenon seen in the sky at night in high latitudes.

It may be visible as arcs of light or as coloured curtains, streamers or rays. Auroras occur most frequently during the intense periods of the 11-year sunspot cycle.

In the Northern Hemisphere, they are called aurora borealis and in the Southern Hemisphere as aurora australis

EARTH PRESSURE AND WINDS

Air moving in a particular direction is called wind. The principal cause of winds is difference in pressure. Air always moves from areas of high pressure to those with low pressure. The slope of the pressure from high to low is known as Pressure Gradient and the direction of this direction decides the direction of winds

Wind velocity is directly related to the steepness of the pressure gradient.

In addition, the direction of winds is affected by the Coriolis Force, which is caused by the rotation of the earth. Under the influence of this effect, winds are deflected to their right in the Northern Hemisphere and to their left in the Southern Hemisphere.

This is referred to as Parrel's Law. Coriolis force is absent at the equator and increases towards the poles. Due to this, the winds, which would blow at right angles to the isobars under the pressure gradient, blow obliquely to them.

Global Pressure Belts

Equatorial Low Pressure Belt (or Doldrums)

- From 5°N to 5°S.
- Tremendous heat, thus warm air rises creating low pressure. Also, the centrifugal force is very high at the equator, where the velocity of rotation is high. Hence, the air masses tend to be thrown out, resulting in low pressure.
- Wind speed low, that's why called Doldrums (Belt of Calm).

Tropical High Pressure Belt (or Horse Latitudes)

- From 30° to 35° N and S.
- Apart from 2 months, usually high temperature.
- Here the pressure is high, although high temperature, because here pressure depends on the rotation and movement of air (as winds from Doldrums belt rises up and accumulate here. Also winds from Sub-Polar Low Pressure Belt accumulate here).

Sub-Polar Low Pressure Belt

- From 60° to 65°N and S
- Here the low pressure is created because of intense high pressure at the poles.

Winds and Their Types

- **3 broad categories are:**
  1. **Regular Winds/Prevailing Winds/Planetary Winds**: (E.g.: Trade winds, Westerlies and Polar Easterlies).
  2. **Periodical Winds (which blow seasonally)**: Monsoons

Trade Winds

- Trade in German means Track. To blow trade means to blow steadily in the same direction and in a constant course'.
- These are steady currents of air blowing from the sub-tropical high pressure belts towards the equatorial low pressure areas (doldrums). Under the influence of the Coriolis force they blow from the north-east in the northern hemisphere and from the south-east in the southern hemisphere.

Westerlies

- Blows from subtropical high pressure to sub-polar low pressure belt.
- In the northern hemisphere, land masses cause considerable disruption in the westerly wind belt. But between 40° and 60° S lies the almost unbroken ocean belt. Westerlies are strong and persistent here, giving rise to mariner's expressions- 'Roaring Forties', Furious Fifties' and 'Shrieking Sixties'.

Polar Easterlies

- Move from high pressure poles to sub-polar low pressure areas.
- These are deflected by the Earth's rotation to become east winds, or the polar easterlies.

LOCAL WINDS

Land and Sea Breeze	They are experienced in coastal areas. Due to differential heating, the atmospheric pressure over the land mass is lower than over the neighboring sea during the day. Therefore, winds blow from sea to land (sea breeze). At night the air pressure over land is higher due to a lower temperature than over the adjacent ocean and the wind starts blowing from land to sea (land breeze). Land breeze is not as strong as sea breeze.
Chinook	Hot, dry wind in Rockies, also called 'snow eater'.
Foehn	Hot, dry wind in the Alps.
Khamsin	Hot, dry wind in Egypt.
Sirocco	Hot, moist wind from Sahara to Mediterranean Sea.
Solano	Hot, moist wind for Sahara towards Iberian Peninsula.
Harmattan	Hot, dry wind blowing outwards from the interior of West Africa, also called 'Guinea Doctor'.
Bora	Cold, dry wind blowing outwards from Hungary to the north of Italy (near AdriaticSea).
Mistral	Very cold wind, which blows down from the Alps over France.
Punas	Cold, dry wind blowing down towards the western side of Andes.
Blizzard	Very cold winds in Tundra region.
Brickfielder	Hot wind in Australia.
Purga	Cold wind in Russian tundra.
Levanter	Cold wind in Spain.
Norwester	Hot wind in New Zealand.
Santa Ana	Hot wind in Southern California in USA.

CYCLONES IN WORLD

It is a system of very low pressure in the center surrounded by increasingly high pressure outwards.

In this, the winds blows in a circular manner in Anticlockwise direction in Northern Hemisphere. Clockwise direction in Southern Hemisphere.

In the temperate region, they occur due to the coming close and imperfect mixing of two masses of air of contrasting temperature and humidity conditions. Cycles of this type are also known as Wave Cyclones or Temperate Cyclones.

On the other hand, in the tropical regions, they occur due to intense heating up of air in some regions causing very low pressure in these

These are known as:

- Cyclones – in the Indian Ocean
- Hurricanes – in the Caribbean Islands
- Typhoons – in the China Sea
- Willy-Willies – in the North West Australia
- Tornadoes – in coastal US.
- Twisters – in Mississippi Valley, USA

Tornadoes are very strong tropical cyclones of a smaller size. They are especially feared in the Mississippi Valley in US and here they are called Twisters. They differ from cyclones in that they generally develop over land. They are more destructive than cyclones as the speed of winds is very high, exceeding 320 km per hour.

Anticyclones

- They are opposite to cyclones in all respects. They are the centers of high pressure with gentle outward flow of air.
- The air circulation is clockwise in the northern hemisphere and anticlockwise in the southern hemisphere.
- Weather associated with an anticyclone is fair weather.

EARTH CLOUDS

Earth Clouds are masses of minute water droplets and / or ice crystals formed by the condensation of water vapour and held in suspension in the atmosphere. Condensation, which results from cooling, usually takes place around nuclei such as dust, smoke particles and salt. Such particles are called condensation nuclei.

Earth Clouds are of different types and they can be classified on the basis of their form and altitude.

On the basis of form, there are two major groups:

1. Stratiform or layered types, and
2. Cumuliform or massive types.

Stratiform Clouds

- These clouds, which are fairly thin and blanket like, are sub-divided into three main categories on the basis of altitude.
- High Clouds (mean ht 5-13 km)
    1. **Cirrus Clouds:** Indicates fair weather.
    2. **Cirrocumulus Clouds:** Forms the mackerel sky.
    3. **Cirrostratus Clouds:** Produces a halo around sun and moon.
- Middle Clouds (mean ht 2-7 km)
    - **Altocumulus Clouds:** Indicate fine weather.
    - **Alto-stratus Clouds:** Associated with development of bad weather.
- Low (mean ht up to 2 km)
    1. **Stratus Clouds:** Brigs dull weather, usually accompanied with a drizzle.
    2. **Nimbostratus Clouds:** If rain or snow is falling from a stratus cloud, it is called nimbostratus.
    3. **Stratocumulus Clouds:** Indicators of fair or clearing weather.

Cumulus Clouds

- They are massive clouds having a vertical extent from 1,500 to 9,000 m. They resemble the head of a cauliflower. When these clouds are sunlit, they are brilliantly white and are called 'wool-clouds'. They occur mainly in summer and are produced by convection.

- **Cumulonimbus Clouds**: Under different weather conditions, a cumulus cloud may develop into cumulonimbus, the thunderstorm cloud mass of enormous size which brings heavy rainfall, thunder and lightning and gusty winds.

Precipitation Clouds

- It refers to falling of water, snow or hail from the clouds and results when condensation is occurring rapidly within a cloud.
- The most common form of precipitation is rain and it is formed when many cloud droplets coalesce into drops too large to remain suspended in the air. Rainfall occurs when the dew point of air is above the freezing point.
- Sometimes the raindrops freeze before reaching the ground and precipitation occurs in the form of ice pellets, called sleet.
- Snow is produced when condensation takes place at a temperature below freezing point, so that the minute crystals (spicules) of ice form directly from the water vapour.
- Hail consists of masses of ice with a layered structure. It occurs when there are very strong updrafts in the clouds carrying raindrops up to a high altitude, causing them to freeze. Hail stone is a rounded lump of ice having concentric layers.

Conditions for Precipitation

- There are three possible ways by which precipitation is produced

Convectional Precipitation

- It is caused by heating of moist air in the lower layers of atmosphere which rises, expands, and is cooled adiabatically to its dew point. Convection rain is often accompanied by lightening and thunder. It occurs in regions near the equator in the afternoon as a result of the constant high temperature and high humidity.

Orographic Precipitation

- In this, precipitation is caused by moisture-laden air being forced to rise over a relief barrier (mountain ranges). As the air rises in the windward side, it is cooled at the adiabatic rate. If sufficiently cooled, precipitation results; when the air descends on the leeward side, it gets warmed and dry, having no source from which to draw up moisture. A belt of dry climate, often called a rain shadow, may exist on the leeward side.

Cyclonic frontal Precipitation

- When the air is caused to rise upwards due to cyclonic circulation, the resulting precipitation id said to be of the cyclonic type

EARTH OCEAN CURRENTS

Actual transportation of water from one part of ocean to another. Because of differences in density, salinity, temperature of ocean waters, rotation of earth, shape of coastline and the prevailing winds.Currents circulate in clockwise direction in Northern Hemisphere and in anti-clockwise direction in Southern Hemisphere.

CURRENTS IN PACIFIC OCEAN

a. North-Equatorial Current (Warm): Flows across from east to west, i.e., from North America it reaches the Philippines.

b. Kuroshio Current (Warm): N. Eq. current along the Philippines, Taiwan & Japan coast form this current. From the S.E. Japan the current, under the influence of prevailing westerlies, flows right across the ocean.

c. After reaching the west coast of N. America, it bifurcates into 2 branches :

Alasca Current (Warm): Along the coast of British Columbia & Alasca.
ii. California Current (Cold): It moves southward along the coast of California

d. Oyashio Current (Cold): Flows along the east coast of Kamchatka peninsula.

e. Okhotsk Current (Cold): Comes from the N. Pole & merges with the Oyashio current.

f. East Australian Current (Warm): Flows from east to west in S. Pacific Ocean.

g. Peru Current (Cold): Cold current near the west coast of S. America.

Currents of Atlantic Ocean

a. Guinea Current (Warm): Flows off the W. African coast (hot).b. Florida Current (Warm): Along the coast of US up to the cape Hatterus.

c. Gulf Stream (Warm): Beyond the Cape Hatterus up to the Grand Banks of New Found Land, florida current is known as Gulf Stream. From the Grand Banks the Gulf Stream moves eastward across the Atlantic as the Atlantic Drift.

d. Atlantic Drift divides into 2 branches:

i . Norwagian Current: The main current passes along the Norway coast & enters the Arctic Ocean.

ii . Canary Current: The south branch of N. Atlantic drift flows near Spain by this name.

e. 2 Cold Currents: The East Greenland Current & the Labrador Current flows from the Arctic Ocean into the Atlantic Ocean.The Labrader Current meets the Gulf Stream. The influence of these 2 currents produces the famous fogs around New Found Land. [Most busy fishing ground of the world].

Brazil Current (Warm): Flows along the S. American coast from North to South

g. **Benguela Current (Cold)**: Cold current from S. to N near the 'Cape of Good Hope',

h. **Falkland Current (Cold)**: Cold flowing along the S.E. coast of S. America from S. to N. (meets the Brazil current)

Currents of the Indian Ocean

- The currents in the N. Indian Ocean differ entirely from the general pattern of circulation. They change their direction from season to season in response to the seasonal rhythm of the monsoons.
- In winters the N. Equatorial current & the S. Equatorial current flows from East to West.
- **Mozambique Current**: Warm current flowing through the Mozambique Channel.
- **Agulhas Current**: Warm current at the South-East coast of Africa

WORLD CONTINENTS

Asia, Africa, North America, South America, Europe, Australia and Antarctica are the seven continents of the world.

These seven continents were believed to be part of Pangaea which was a single landmass around 250 million years ago.

Due to the tectonic movement, the landmass broke up and the component continents separated and moved away to its present position. All these took around 1 million years to complete.

Pangaea was surrounded by a sea, the Panthalassa.

The continents of the world map will give you information about the geographical positions of the continents as well as their political divisions

The Continents of the World,

World Continents: Some Facts

Continents	Biggest Country	Highest Peak	Longest River
Asia	China	Mt. Everest (8850 m)	Yangtze Kiang
Africa	Sudan	Mt. Kilimanjaro (5895 m)	Nile
North America	Canada	Mt. Mckinley (6194 m) Mississippi	Missouri
South America	Brazil	Mt. Aconcagua (6960 m)	Amazon
Europe	Russia	Mt. Elbrus (5642 m)	Ob
Australia	Australia	Mt. Coscuisco (2228 m)	Darling
Antarctica	-	Vinson Massif (5140 m)	-

SEVEN CONTINENTS OF THE WORLD

Name	Area in sq.km	Approx. % of the world's land
Asia	44,493,000	29.6
Africa	30,293,000	20.2
North America	24,454,000	16.3
South America	17,838,000	11.9
Antarctica	13,975,000	9.3
Europe	10,245,000	6.7
Oceania	8,945,000	6.0

MAJOR RIVERS

River	Origin	Falls in	Length
Nile	Victoria lake	Mediterranean Sea	6,650
Amazon	Andes (Peru)	Atlantic Ocean	6,428
Yangtze	Tibetan Kiang Plateau	China Sea	6,300
Mississippi Missouri	Itaska lake (USA)	Gulf of Mexico (USA)	6,275
Yenisei	Tannu-Ola Mts	Arctic Ocean	5,539
Huang Ho	Kunlun Mts	Gulf of Chibli	5,464
Ob	Altai Mts., Russia	Gulf of Ob	5,410
Congo	Lualaba & Luapula rivers	Atlantic Ocean	4,700
Amur	Northeast China	Sea of Okhotsk	4,444
Lena	Baikal Mts	Laptev Sea	4,400
Mekong	Tibetan.Highlands	South China Sea	4,350
Mackenzie	Great Slave Lake	Beaufort Sea	4,241
Niger	Guinea	Gulf of Guinea	4,200

MAJOR LAKES

Largest Lake	**Caspian Sea**
Highest lake	Lake Titicaca in Bolivia
Largest saline water lake	Caspian Sea
Deepest lake	Lake Baikal in Siberia
Largest fresh water lake	Lake Superior
India's largest lake	Chilka lake in Orissa

IMPORTANT LAKES OF THE WORLD

Lake	Location	Area (Sq.Km)
Caspian	Russia and CIS	371000
Superior	Canada and USA	82414
Victoria	Tanzania (Africa)	69485
Huron	Canada and USA	59596
Michigan	USA	58016
Tanganyika	Africa	32892
Baikal	Russia (CIS)	31502
Great Bear	Canada	31080
Malawi	Malawi (Tanzania)	30044
Great Slave	Canada	28438

Note:

- More than 60% of the world's lakes are in Canada; this is because of the deranged drainage system that dominates the country.
- Finland is known as "The land of Thousand Lakes".
- The US State of Minnesota is known as 'The Land of Ten Thousand Lakes'.
- The world's lowest lake is the Dead Sea, bordering Israel, Jordan at 395 m below sea level.
- Lake Huron has the longest lake coastline in the world: about 2980 km, excluding the coastline of its many inner islands.

OCEANS OF THE WORLS

Names	Area (Sq.Km)	Greatest Depth
Pacific	166,240000	Mariana Trench
Atlantic	86,560000	Puerto Rico Trench
Indian	73430000	Java Trench
Arctic	13230000	-

Major Gulfs of the World

Names	Area (Sq. Km)
Gulf of Mexico	15,44,000
Gulf of St. Lawrence	2,37,000
Gulf of Hudson	12,33,000
Gulf of California	1,62,000
Arabian Gulf	2,38,000
English Channel	89,900

PRINCIPAL PLATEAUS OF THE WORLD

Plateau	Situation
Tibetan Plateau	Between Himalayas and Quinloo Mountains
Deccan Plateau	Southern India
Arabian Plateau	South - West Asia
Plateau of Brazil	Central - Eastern South America
Plateau of Mexico	Mexico
Plateau of Colombia	USA
Plateau of Madagascar	Madagascar

Plateau of Alaska	North - West North America
Plateau of Bolivia	Andes Mountain
Great Basin Plateau	South of Colombia Plateau, USA
Colorado Plateau	South of Great Basin Plateau, USA

MAJOR PENINSULAS OF THE WORLD

Peninsulas	Areas (Sq. Km)
Arabia	32,50,000
Labrador	13,00,000
Southern India	20,72,000
Scandinavia	8,00,000
Alaska	15,00,000
Iberian	584,000

IMPORTANT STRAITS OF THE WORLD

Straits	Water Bodies joined	Area
Bab-al-Mandeb	Red Sea & Arabian Sea	Arabia & Africa
Bering	Arctic Ocean & Bering Sea	Alaska & Asia
Bosphorus	Black Sea & Marmara Sea	Turkey
Dover	North Sea & Atlantic Ocean	England & Europe
Florida	Gulf of Mexico & Atlantic Ocean	Florida & Bahamas Islands
Gibralter	Mediterranean Sea & Atlantic Ocean	Spain & Africa
Malacca	Java Sea & Bay of Bengal	India & Indonesia
Palk	Bay of Bengal & Indian Ocean	India & Sri Lanka
Magellan	South Pacific & South Atlantic Ocean	Chile
Sunda	Java Sea & Indian Ocean	Indonesia

WORLD'S GEOGRAPHICAL SURNAMES

Surname	Name
Bengal's Sorrow	Damodar River
Blue Mountains	Nilgiri Hills
City of Sky-scrapers	New York
City of Seven Hills	Rome
City of Dreaming Spires	Oxford
City of Palaces	Kolkata
City of Golden Gate	San Francisco

Gity of Magnificent Buildings	Washington D.C
City of Eternal Springs	Quito (S. America)
China's Sorrow	Hwang Ho
Emerald Isle	Ireland
Eternal City	Rome
Empire City	New York
Forbidden City	Lhasa (Tibet)
Garden City	Chicago
Gate of Tears	Strait of Bab-el-Mandeb
Gateway of India	Mumbai
Gift of the Nile	Egypt
Granite City	Aberdeen (Scotland)
Hermit Kingdom	Korea
Herring Pond	Atlantic Ocean
Holy Land	Jerusalem
Island Continent	Australia
Island of Cloves	Zanzibar
Isle of Pearls	Bahrein (Persian Gulf)
Key to the Mediterranean	Gibralter
Land of Cakes	Scotland
Land of Golden Fleece	Australia
Land of Maple Leaf	Canada
Land of Morning Calm	Korea
Land of Midnight Sun	Norway
Land of the Thousand Lakes	Finland
Land of the Thunderbolt	Bhutan
Land of White Elephant	Thailand
Land of Five Rivers	Punjab
Land of Thousand Elephants	Laos
Land of Rising Sun	Japan
Loneliest Island	Tristan De Gunha (Mid-Atlantic)
Manchester of Japan	Osaka
Pillars of Hercules	Strait of Gibraltar
Pearl of the Antilles	Cuba
Playground of Europe	Switzerland
Quaker City	Philadelphia
Queen of the Adriatic	Venice

Roof of the World	The Pamirs, Central Asia
Rose Pink City	Jaipur
Sugar bowl of the world	Cuba
Venice of the North	Stockholm
Windty City	Chicago
Whiteman's grave	Guinea Coast of Africa
Yellow River	Huang Ho (China)

FAMOUS TRIBES OF THE WORLD

Abhors	People of Mongolian blood living between Assam and Eastern tribes
Afridis	Tribes residing in the North-west Frontier (Pakistan)
Bantus	Negroes living in the Central and South Africa
Boers	The Dutch settlers of South Africa
Cossacks	People living in the southern and eastern frontiers of Russia
Eskimos	Inhabitants of Greenland and of Arctic regions
Flemings	A term used for the people of Belgium
Hamites	Inhabitants of North-West Africa
Khirgiz	People Living in Central Asia
Kurds	Tribes living in Kurdistan (Iraq)
Magyars	Inhabitants of Hungary
Maoris	Inhabitants of New Zealand
Negroes	Mostly found in Africa
Pygmies	Short sized people found in Congo basin in Africa
Red Indians	Original inhabitants of North America
Semites	Caucasian people of ancient times
Zulus	People of South Africa living in certain part of Natal

FAMOUS SITES IN THE WORLD

Site	Location
Bastille Prison	Paris
Brandenburg Gate	Berlin
Big Ben	London
Broadway	New York
Buckingham Palace	London
Colosseum	Rome
Downing Street	London

Eiffel Tower	Paris
Empire State Building	New York
Fleet Street	London
Grand Canyon	Arizona (U.S.A)
Harley Street	London
Hyde Park	London
India House	London
Jodrell Bank	Manchester (U.K)
Kaaba	Mecca (Saudi Arabia)
Kremlin	Moscow (Russia)
Leaning Tower	Pisa (Italy)
Louvre	Paris
Merdeca Palace	Djakarta
Oval	London
Pentagon	Washington D.C
Porcelain Tower	Nanking
Potala	Lhasa
Red Square	Moscow
Pyramids	Egypt
Scotland Yard	London
Shiwe Dragon Pagoda	Yangoon
Sphinx	Egypt
Statue of Liberty	New York
Vatican City	Rome
Wall Street	New York
Wailing Wall	Jerusalem
Wambley	London
White Hall	London
White House	Washington D.C

BIGGEST, HIGHEST, LARGEST, LONGEST IN THE WORLD

Tallest Animal in the World	Giraffe
Largest Archipelago in the World	Indonesia
Fastest Bird in the World	Swift
Largest Bird in the World	Ostrich

Smallest Bird in the World	Humming Bird
Longest Railway Bridge in the World	Huey P. Long Bridge, Louisiana (U.S.A)
Tallest Building in the world	Burj Dubai, UAE
Canal, Longest Irrigational	The Kalakumsky Canal
Longest Canal in the World	Suez Canal
Highest Capital in the World	La Paz (Bolivia)
Biggest City in Area in the World	Mount Isa (Australia)
Largest City in Population in the World	Tokyo
Costliest City in the World	Tokyo
Highest City in the World	Van Chuan (China)
Largest Continent in the World	Asia
Smallest Continent in the World	Australia
Biggest Country in the World by Area	Russia
Largest Country in the World by Population	China
Largest Country in the World by Electorate	India
Largest Creature in the World	Blue whale
Largest Delta in the World	Sunderban (Bangladesh & India)
Largest Desert in the World	Sahara (Africa)
Largest Desert in Asia	Gobi
Largest Dam in the World	Grand Coulee Dam (U.S.A)
Dam Highest in the World	Hoover Dam (U.S.A)
Diamond Largest in the World	The Cullinan
Largest Dome in the World	Astrodome, in Housten (U.S.A)
Largest Epic in the World	Mahabharat
Largest Irrigation Scheme in the World	Lloyd Barrage, Sukkhur (Pakistan)
Largest Island in the World	Greenland
Largest Sea in the World	Mediterranean Sea
Deepest Lake in the World	Baikal (Siberia)
Largest Lake (Artificial) in the World	Lake Mead (Boulder Dam)
Highest Lake in the World	Titicaca (Bolivia)
Largest Lake (Fresh water) in the World	Superior
Largest Lake (Salt water) in the World	Caspian
Largest Library in the World	United States Library of Congress, Washington D.C
Highest Mountain Peak in the World	Everest (Nepal)
Longest Mountain Range in the World	Andes (S. America)

Largest Museum in the World	British Museum, London
Largest Ocean in the World	Pacific
Biggest Palace in the World	Vatican (Italy)
Largest Park in the World	Yellow Stone National Park (U.S.A)
Largest Peninsula in the World	Arabia
Coldest Place (Habitated) in the World	Verkhoyansk (Siberia)
Dryest Place in the World	Iqique (in Atacama Desert, Chile)
Hottest Place in the World	Azizia (Libya, Africa)
Rainiest Place in the World	Mausinram (Meghalaya, India)
Biggest Planet in the World	Jupiter
Brightest Planet in the World	Venus
Smallest Planet in the World	Mercury
Highest Plateau in the World	Pamir (Tibet)
Longest Platform in the World	Kharagpur (India)
Longest Railway in the World	Trans - Siberian railway
Largest Railway Station in the World	Grand Central Terminal, Chicago (U.S.A)
Longest River in the World	Nile (Africa)
Largest River in the World	Amazon (S. America)
Largest Sea-bird in the World	Albatross
Brightest Star in the World	Sirius
Tallest Statue in the World	Statue of Motherland, Volgograd (Russia)
Largest Telescope Radio in the World	New Mexico (U.S.A)
World's Tramway first in the World	New York
Longest Tunnel (Railway) in the World	Tanna (Japan)
Longest Tunnel (road) in the World	Mont Blanc Tunnel between France and Italy
Highest Volcano	Ojos del Salado (Andes, Ecuador)
Most Volcano Active in the World	Maunaloa (Hawaii - U.S.A)
Longest Wall in the World	Great Wall of China
Highest Waterfall in the World	Angel (Venezuela)
Lowest Water body in the World	Dead Sea
Largest Zoo in the World	Kruger National Park, South Africa

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