GEOGRAPHY OF INDIA
GROUP 4

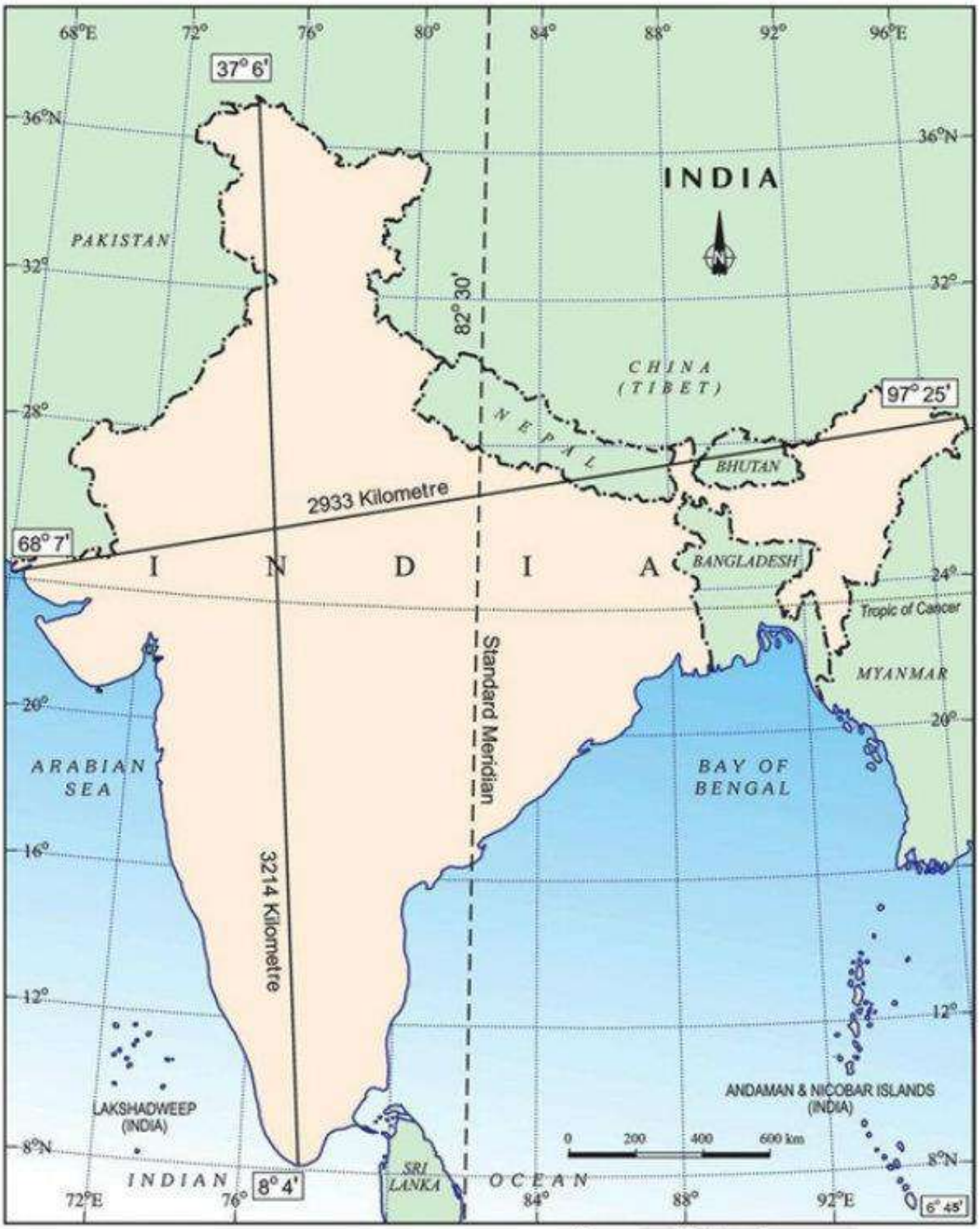
Contents

India - Location

- India is located entirely in the **northern hemisphere; specifically** in the south-central part of the continent of Asia.
- The mainland of India extends between latitudes 8° 4'N and 37°6N and longitudes 68°7'E and 97°25'E. The southern boundary extends up to 645'N latitude in the Bay of Bengal.

India - Size

- With an area of 3.28 million square km, India is the 7th largest country of the world.
- The **six** largest countries of the world in decreasing order are Russia, Canada, USA, China, Brazil, and Australia.
- India accounts for about **2.4 percent** of the total geographical area of the world.
- India has a total land boundary of about **15,200 km**.
- The coastline of India stretches along the Bay of Bengal in the east and the Arabian Sea in the west (as shown in the map given above).
- From Gujarat (westernmost) to Arunachal Pradesh (easternmost), there is about 30° **difference**; hence, because of this difference, there is a time difference of **two hours** between Gujarat and Arunachal Pradesh.
- The sun rises in Arunachal Pradesh about two hours earlier as compared to Jaisalmer in Rajasthan.
- The maximum length of the mainland from north to south is about **3214 km**.
- The maximum length of the mainland from east to west is about **2933 km**.
- India's total length of coastline is **6,100 km** of its mainland and after including Andaman and Nicobar, and Lakshadweep islands, it is about **7,516 km**.
- India's territorial limit further extends towards the sea up to **12 nautical miles** (i.e. about 21.9 km) from the coast.



Source noteblast.wordpress.com

Indian Standard Meridian

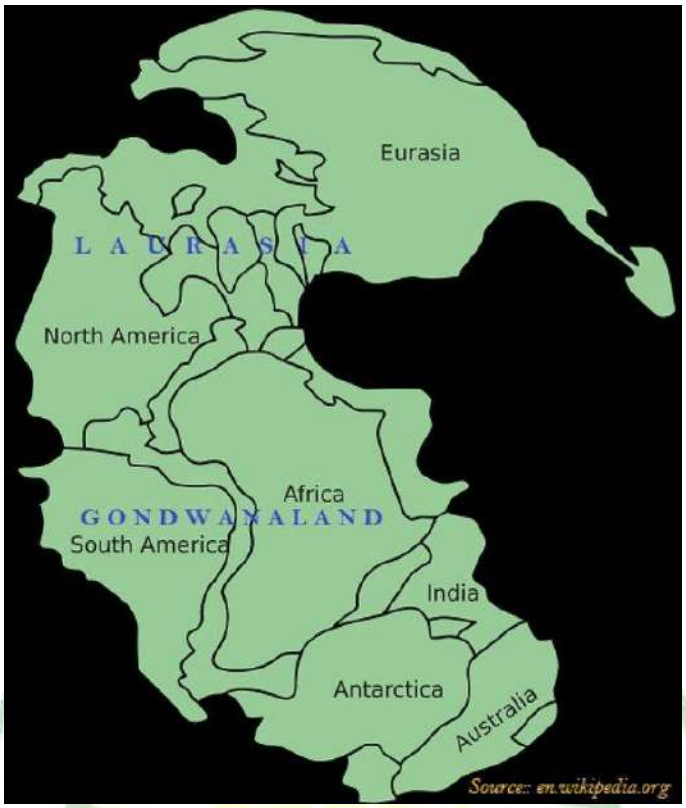
- 82°30'E **Meridian** crossing through the ***Mirzapur*** city of Uttar Pradesh is taken as India's Standard Meridian.
- Indian Standard Time is ahead of Greenwich (0° or Prime Meridian) Mean Time by **5 hours** and **30 minutes**
- Tropic of cancer 23°30'N passes through Gujarat, Madhya Pradesh, Chhattisgarh, Jharkhand, West Bengal, Tripura, and Mizoram.
- The difference in latitudinal extent influences the duration of day and night.

India and Neighbors

- India has total **29 States**, **6 Union Territories**, and **1 National Capital Territory**.
- India is bounded by young fold mountains (the Great Himalaya) in the North and North-East.
- Throughout the history, India's connections with other parts of the world have been heavily influenced by waterways and also the mountain passes.
- India shares its international boundaries with Afghanistan and Pakistan in the North-West; China, Tibet (China), Nepal, and Bhutan in the North and North East; and Myanmar and Bangladesh in the East.
- Island countries Sri Lanka and Maldives are India's neighbors across the sea.
- Sri Lanka is an island nation located off the southern coast of India in South Asia and it is bordered by the Indian Ocean. India and Sri Lanka are separated by a thin water body called the **Palk Strait**.
- Maldives is a chain of islands located south-west of Sri Lanka and India in the Indian Ocean.

India - Evolution

- As per the estimation, the earth is approximately 460 million years old.
- The **endogenic** and **exogenic** forces played a significant role in giving shape to various surface and subsurface features of the earth.
- The theory of **Plate Tectonics** defines the formation of physical aspects of the earth.



- Initially, all continents were united (there was one landmass), and known as **Pangea** or **Super Continent** (as shown in the image given below).
- The northern part of the ancient super continent Pangea was named as **'Angara Land'** or **Laurasia** and the southern part was named as **'Gondwana Land'**.
- The **Gondwana Land** includes India, Australia, South Africa, South America, and Antarctica.

India - Structure

- Based on geological history, India is divided into three regions. The regions are −
    - The Peninsular Block;
    - The Himalayas & other Peninsular Mountains; and
    - Indo-Ganga-Brahmaputra Plain.
- The **Peninsular Block** is formed essentially by a great complex of very ancient gneisses and granites.

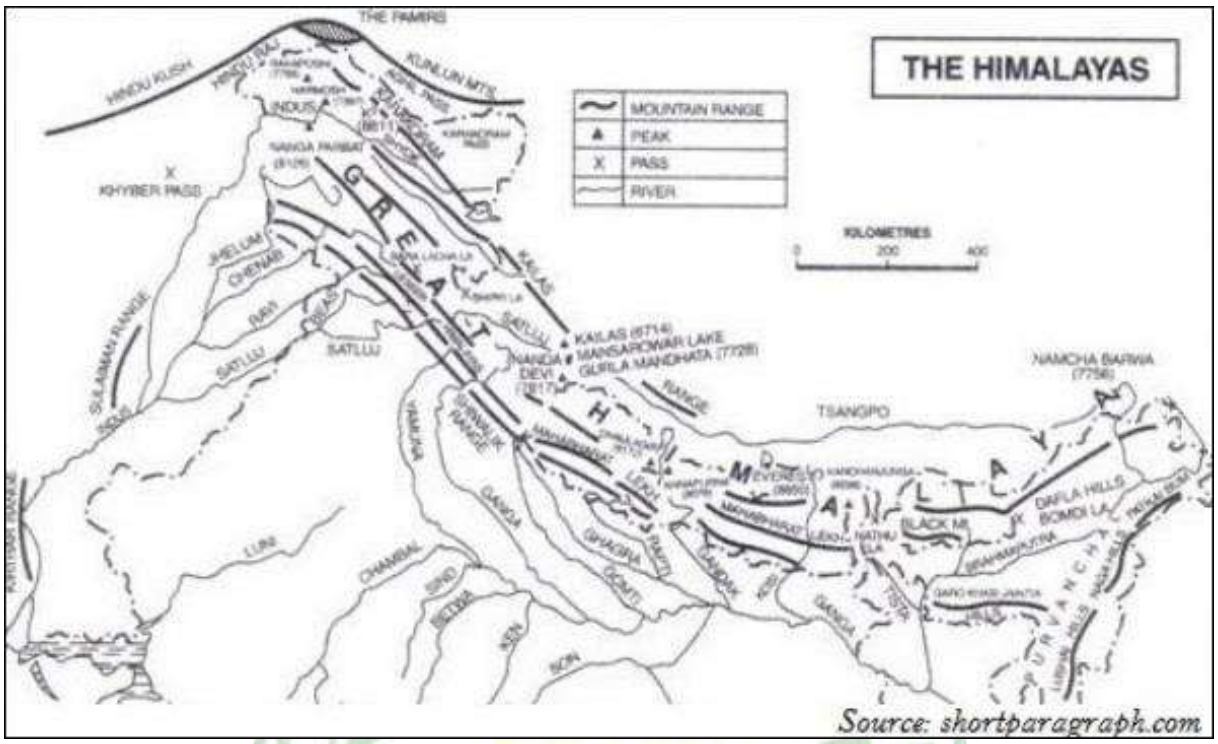
- The Peninsular Block mostly consists of relicts and residual mountains like the *Aravali* hills, the *Nallamala* hills, the *Javadi* hills, the *Veliconda* hills, the *Palkonda* range, the *Mahendragiri* hills, etc.
- Unlike the rigid and stable Peninsular Block, the **Himalayan Mountains** are young, weak, and flexible in their geological structure.
- **Indo-Ganga-Brahmaputra Plain** comprises the plains formed by the river Indus, the Ganga, and the Brahmaputra.
- In fact, Indo-Ganga-Brahmaputra Plain is a geo-synclinal depression, which attained its maximum development during the third phase of the Himalayan mountain formation, approximately about 64 million years ago.

Physiography

- India's physiography is divided into **six** following regions −
    - The Northern and Northeastern Mountains
    - The Northern Plain
    - The Peninsular Plateau
    - The Indian Desert
    - The Coastal Plains
    - The Islands

Northern and Northeastern Mountains

- The **Northern and the Northeastern Mountains** consist of the Himalayas and the Northeastern hills.
- The Himalayan Ranges include the **Greater Himalaya, Lesser/Middle Himalaya,** and the **Siwalik Range**.



Source: shortparagraph.com

- Based on relief, alignment of ranges and other geomorphological features, the Himalayas can be divided into the following sub-divisions −
    - Kashmir or Northwestern Himalayas
    - Himachal and Uttaranchal Himalayas
    - Darjeeling and Sikkim Himalayas
    - Arunachal Himalayas
    - Eastern Hills and Mountains.

Kashmir or Northwestern Himalayas

- Kashmir or Northwestern Himalayas consist of a series of ranges such as the *Karakoram, Ladakh, Zanskar*, and *Pir Panjal*.
- Important glaciers of South Asia, i.e., the *Baltoro* and *Siachen* are found in the Northwestern Himalayan region.
- The Kashmir Himalayas are also popular for the *Karewa* formations, which are useful for the cultivation of *Zafran*, a local variety of saffron.
- Karewas are the thick deposits of glacial clay and other materials embedded with moraines.

- Important passes of the Northwestern Himalayas are *Zoji La* on the Great Himalayas, *Banihal* on the Pir Panjal, and *Khardung La* on the Ladakh range.
- Important fresh lakes are *Dal* and *Wular* and salt water lakes are *Pangong Tso* and *Tso Moriri*.
- The southernmost part of the Northwestern Himalayas consists of longitudinal valleys locally known as *duns*.

Himachal and Uttaranchal Himalayas

- The Himachal and Uttarakhand Himalayas are located approximately between the rivers Ravi in the west and the Kali (a tributary of Ghaghara) in the east.

Darjeeling and Sikkim Himalayas

- The Darjeeling and Sikkim Himalayas are flanked by the Nepal Himalayas in the west and the Bhutan Himalayas in the east.

Arunachal Himalayas

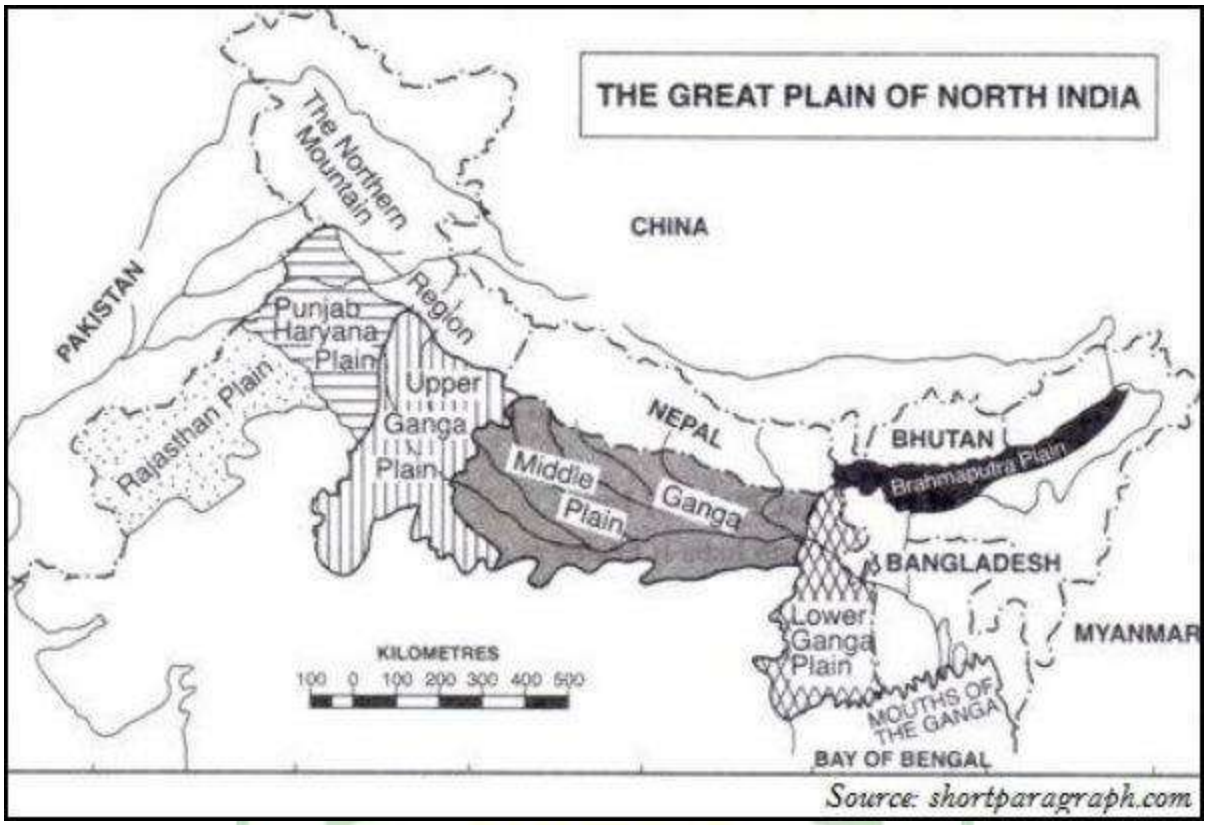
- The Arunachal Himalayas extend from the east of the Bhutan Himalayas up to the *Diphu* pass in the east.
- Some of the prominent tribes of Arunachal Himalayas from west to east are the *Monpa, Abor, Mishmi, Nyishi,* and the *Nagas*.

Eastern Hills and Mountains

- Located in the northeast India, the Eastern Hills i.e. parts of the Himalayan mountains are known by different local names. They are known as *Patkai Bum, Naga hills*, the *Manipur hills* in the North, and *Mizo* or *Lushai hills* in the South.

Northern Plains

- The **northern plains** are formed by the alluvial deposits brought by the rivers − the *Indus*, the *Ganga*, and the *Brahmaputra*.



- The northern plains are divided into three major zones − the *Bhabar*, the *Tarai*, and the *alluvial* plains.
- *Bhabar* is a narrow belt spread between 8-10 km parallel to the Shiwalik foothills at the break-up of the slope where all the rivers coming through this way deposit heavy materials of rocks and boulders and get disappeared.
- These streams again re-emerge in *Tarai* region.
- The south of *Tarai* is a belt consisting of old and new alluvial deposits known as the *Bhangar* and *Khadar* accordingly.
- The alluvial plains are further divided as the *Khadar* and the *Bhangar*.

Peninsular Plateau

- The Peninsular Block is made up of a series of *patland* plateaus such as the *Hazaribagh* plateau, the *Palamu* plateau, the *Ranchi* plateau, the *Malwa* plateau, the *Coimbatore* plateau, and the *Karnataka* plateau.

- Delhi ridge in the northwest, (extension of Aravalli's), the *Rajmahal* hills in the east, *Gir* range in the west and the *Cardamom* hills in the south are the peripheral parts of the Peninsular Block.
- The Peninsular plateau can be further divided into three broad groups i.e. the **Deccan Plateau**, the **Central Highlands**, and the **Northeastern Plateau**.
- Western Ghats is known by different local names. They are known as *Sahyadri* in Maharashtra; *Nilgiri* hills in Karnataka and Tamil Nadu; and *Anaimalai* hills, and *Cardamom* hills in Kerala.
- Located on the *Anaimalai* hills of the Western Ghats ***Anaimudi* (2,695 m)** is the highest peak of Peninsular plateau, followed by Dodabetta (2,637 m) on the *Nilgiri* hills.
- *Thal*, *Bhor*, and the *Pal* Ghats are the important passes of the Western Ghats.
- The Eastern Ghats stretch from the Mahanadi Valley in the north to the Nilgiris in the south.
- The Eastern Ghats are discontinuous and irregular and dissected by many rivers draining into the Bay of Bengal.
- *Mahendragiri* (1,501 meters) is the highest peak of the Eastern Ghats.
- The most distinct feature of the peninsular plateau is the black soil area known as **Deccan Trap**.
- Formed by a series of scarped plateaus on the south, the *Satpura* range is part of the Central Highlands.
- The general elevation of the Central Highlands ranges between 700 and 1,000 m above the mean sea level.
- *Rajmahal* hills and the *Meghalaya* plateau are the part of the Northeastern Plateau.

- The Meghalaya plateau is further sub-divided as the **Garo Hills**; the **Khasi Hills**; and the **Jaintia Hills**.
- Meghalaya plateau is rich in mineral resources. The most significant of these resources are coal, iron ore, sillimanite, limestone, and uranium.

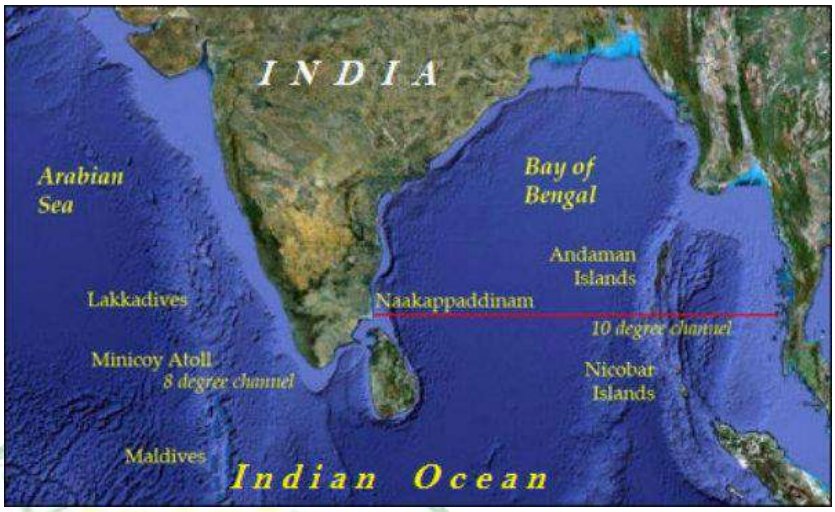
Indian Desert

- The Great Indian Desert, also known as the **Thar Desert**, lies in the northwest of the Aravalli hills.
- The *Aravali Hills* lie on the western and north western margins of the peninsular plateau. These are highly eroded hills and are found as broken hills between Gujarat and Delhi.

Coastal Plains

- The Indian coastal plains are divided as the western coastal plains and the eastern coastal plains.
- The western coastal plains are an example of **submerged** coastal plain.
- The western coast may be divided into the following divisions – the *Kachchh* and *Kathiawar* coast in Gujarat; *Konkan* coast in Maharashtra; *Goan* coast in Karnataka, and the *Malabar* coast in Kerala respectively.
- The Malabar Coast has certain distinctive features such as ***Kayals*** (backwaters), which are used for fishing, inland navigation, and these backwaters hold a special attraction for the tourists.
- In comparison to the western coastal plains, the eastern coastal plain is broader and is an example of an **Emergent** coast.
- The Eastern Coast is named as the *Northern Circar* (in the north part i.e. part of West Bengal, Odisha, etc.) and the southern part is known as the *Coromandel Coast* (part of Southern Andhra Pradesh and Tamil Nadu). The eastern coastal plain is known as the *Northern Circars* in the region between Krishna and Mahanadi rivers (West Bengal, Odisha, etc.) and as the *Coromandel Coast* in southern part between Krishna and Kaveri rivers (Andhra Pradesh and Tamil Nadu).

Islands



- There are two major island groups in India, i.e., one in the Bay of Bengal (Andaman and Nicobar) and the other in the Arabian Sea (Lakshadweep).
- The Bay of Bengal island group consists of about **572 islands/islets**.
- The two principal groups of islets include the **Ritchie's archipelago** and the **Labyrinth Islands**.
- However, the entire group of islands is divided into two broad categories − the Andaman in the north and the Nicobar in the south and they are separated by **Ten Degree Channel**.
- Situated in the Nicobar Islands, **Barren Island** is the only active volcano in India.
- Located on the North Andaman, **Saddle peak** (738 m) is the highest peak of the region.
- Lakshadweep and Minicoy are the islands of the Arabian Sea.
- The entire island group of Lakshadweep is built of coral deposits.
- There are approximately **36 islands**, among which, 11 are inhabited.
- The entire group of islands is broadly divided by the **Eleventh-degree channel**. The *Amini* Island lies to the north and the *Cannanore* Island lies to the south of the channel.

Climate

- Climate of India is affected by the factors of latitude, altitude, distance from the seas, monsoon wind, relief features and jet stream.

Latitude

- Latitudinally, India lies between 8°4'N and 37°6'N latitudes. The Tropic of cancer divides the country into two equal halves.
- The area located to the south of Tropic of cancer experiences high temperature and no severe cold season throughout the year whereas, the areas to the north of this parallel enjoys sub- tropical climate.

Altitude

- When the altitude increases, The temperature decreases. Temperature decreases at the rate of 6.50C for every 1000 metres of ascent.
- It is called normal lapse rate. Hence, places in the mountains are cooler than the places on the plains.
- Ooty and several other hill stations of south India and of the Himalayan ranges like Mussourie, Shimla etc., are much cooler than the places located on the Great Plains.

Distance from the Sea

- A large area of India, especially the peninsular region, is not very far from the sea and this entire area has a clear maritime influence on climate.
- This part of the country does not have a very clearly marked winter and the temperature is equal almost throughout the year.
- Areas of central and north India experience much seasonal variation in temperature due to the absence of influence of seas.
- Here, summers are hot and winters are cold. The annual temperature at Kochin does not exceed 30°C as its location is on the coast while it is as high as 40°C at Delhi, since it is located in the interior part.
- Air near the coast has more moisture and greater potential to produce precipitation.

- Due to this fact, the amount of rainfall at Kolkata located near the coast is 119 cm and it decreases to just 24 cm at Bikaner which is located in the interior part.

Monsoon Wind

- The most dominant factor which affects the climate of India is the monsoon winds.
- These are seasonal reversal winds and India remains in the influence of these winds for a considerable part of a year.
- Though, the sun's rays are vertical over the central part of India during the mid-June, the summer season ends in India by the end of May.
- It is because the onset of southwest monsoon brings down the temperature of the entire India and causes moderate to heavy rainfall in many parts of the country.
- Similarly, the climate of southeast India is also influenced by the northeast monsoon.
- Weather refers to the state of atmosphere of a place at a given point of time.
- Climate is the accumulation of daily and seasonal weather events of a given location over a period of 30-35 years.

Relief

- Relief of India has a great bearing on major elements of climate such as temperature, atmospheric pressure, direction of winds and the amount of rainfall.
- The Himalayas acts as a barrier to the freezing cold wind blows from central Asia and keep the Indian subcontinent warm.
- As such the north India experiences tropical climate even during winter.
- During southwest monsoon, areas on the western slope of the Western Ghats receive heavy rainfall.
- On the contrary, vast areas of Maharashtra, Karnataka, Telangana, Andhra Pradesh and Tamil nadu lies in the rain shadow or leeward side of the Western Ghats receiving very little rainfall.
- During this season, Mangalore, located on the coast gets the rainfall of about 280 cm whereas Bengaluru located on the leeward side receives only about 50 cm rainfall.

Jet Streams

- Jet streams are the fast-moving winds blowing in a narrow zone in the upper atmosphere.
- According to the Jet stream theory, the onset of southwest monsoon is driven by the shift of the subtropical westerly jet from the plains of India towards the Tibetan plateau.
- The easterly jet streams cause tropical depressions both during southwest monsoon and retreating monsoon.

Monsoon

- The word 'monsoon' has been derived from the Arabic word 'Mausim' which means 'season'.
- Originally, the word 'monsoon' was used by Arab navigators several centuries ago, to describe a system of seasonal reversal of winds along the shores of the Indian Ocean, especially over the Arabian Sea.
- It blows from the south-west to north-east during summer and from the north-east to south-west during winter.
- Meteorologists have developed a number of concepts about the origin of monsoons.
- According to the Dynamic concept, Monsoon wind originates due to the seasonal migration of planetary winds and pressure belts following the position of the sun.
- During summer solstice, The sun's rays fall vertically over the Tropic of cancer.
- Therefore, all the pressure and wind belts of the globe shift northwards. At this time, Inter -Tropical Convergence Zone (ITCZ) also moves northward, and a major part of Indian landmass comes under the influence of southeast trade winds.
- While crossing the equator this wind gets deflected and takes the direction of the southwest and becomes a south-west monsoon.
- During the winter season, the pressure and wind belts shift southward, thereby establishing the north-east monsoon (trade winds) over this region.
- Such systematic change in the direction of planetary winds is known as monsoon.

Seasons

- The meteorologists recognize the four distinct seasons in India. They are;

  1. Winter season (January - February).
  2. Summer season (March - May).
  3. Southwest monsoon or Rainy season (June - September).
  4. Northeast monsoon season (October - December).

1. Winter season

- During this period, the vertical rays of the sun falls over Tropic of Capricorn which is far away from India.
- Hence, India receives the slanting sun's rays which results in low temperature. The cold weather season is characterized by lear skies, fine weather, light northerly winds, low humidity and large day time variations of temperature.
- During this season a high pressure develops over north India and a north-westerly wind blows down the Indus and Ganges valleys.
- In south India, the general direction of wind is from east to west. The rain during this season generally occurs over the Western Himalayas, Tamil nadu and Kerala.
- Western disturbances and associated trough in westerlies are main rain bearing system in the northern part of the country.
- The jet stream plays a dominant role in bringing these disturbances to India.
- Western disturbances cause rainfall in Punjab, Haryana and Himachal Pradesh, and snowfall in the hills of Jammu and Kashmir.
- This rainfall is very useful for the cultivation of winter wheat.

2. Summer season

- During this season, the vertical rays of the sun falls over peninsular India. Hence, there is a steady increase in temperature from south to north.
- It is practically hot and dry in the entire country in the initial part of this season.
- Weather over the land areas of the country is influenced by thunderstorms associated with rain and sometimes with hail mostly in the middle and later part.

- During this season, temperature starts increasing all over the country and by April, the interior parts of south India record mean daily temperatures of 30°C–35°C. Central Indian land mass becomes hot with day-time maximum temperature reaching about 40°C at many locations.
- Because of the atmospheric pressure conditions, the winds blow from southwest to northeast direction in Arabian Sea and Bay of Bengal. They bring pre monsoon showers to the west coast during the month of May.
- There are few thunder showers called "Mango Showers" which helps in quick ripening of mangoes along the coast of Kerala and Karnataka. "Norwesters" or "Kalbaisakhis" are the local storms with thunder that blow from the north western part and rain lasting for short durations.
- It occurs over the eastern and north eastern parts over Bihar, West Bengal and Assam during April and May. They approach the stations from the northwesterly direction.

3. Southwest monsoon or Rainy Season

- The southwest monsoon is the most significant feature of the Indian climate.
- The onset of the southwest monsoon takes place normally over the southern tip of the country by the first week of June, advances along the Konkan coast in early June and covers the whole country by 15th July.
- The monsoon is influenced by global phenomena like ElNino.
- Prior to the onset of the southwest monsoon, the temperature in north India reaches upto 46°C.
- The sudden approach of monsoon wind over south India with lightning and thunder is termed as the 'break' or 'burst of monsoon'.
- The monsoon wind strikes against the southern tip of Indian land mass and gets divided into two branches.
- One branch starts from the Arabian sea and the other from Bay of Bengal.
- The Arabian Sea branch of southwest monsoon gives heavy rainfall to the west coast of India as it is located in the windward side of the Western Ghats.
- The other part which advances towards north is obstructed by Himalayan Mountains and results in heavy rainfall in the north.

- As Aravalli Mountain is located parallel to the wind direction, Rajasthan and western part do not get much rainfall from this branch.
- The Bay of Bengal branch moves towards northeast India and Myanmar.
- This wind is trapped by a chain of mountains namely Garo, Khasi and Jaintia are mainly responsible for the heaviest rainfall caused at Mawsynram located in Meghalaya.
- Later on, this wind travel towards west which results in decrease in rainfall from east to west.
- Overall about 75% of Indian rainfall is received from this monsoon.

4. Northeast monsoon season

- The southwest monsoon begins to retreat from north India by the end of September due to the southward shifting pressure belts.
- The southwest monsoon wind returns from Indian landmass and blows towards Bay of Bengal.
- The Coriolis force deflects this wind and makes it to blow from the northeast. Hence, it is known as Northeast monsoon or Post-monsoon season.
- The season is associated with the establishment of the north-easterly wind system over the Indian subcontinent.
- Andhra Pradesh, Tamil Nadu, Kerala and south interior Karnataka receive a good amount of rainfall accounting for 35% of their annual total.
- Many parts of Tamil nadu and some parts of Andhra Pradesh and Karnataka receive rainfall during this season due to the storms forming in the Bay of Bengal.
- Large scale losses to life and property occur due to heavy rainfall, strong winds and storm surge in the coastal regions.
- The day time temperatures start falling sharply all over the country.
- Mawsynram, the place which receives the highest rainfall (1141 cm) in the world. It is located in Meghalaya.

Distribution of rainfall

- The average annual rainfall of India is 118 cm. However, spatial distribution of rainfall in the country is highly uneven.
- The Western coast, Assam, South Meghalaya, Tripura, Nagaland and Arunachal Pradesh are the heavy rainfall areas which get more than 200 cm rainfall.
- The whole of Rajasthan, Punjab, Haryana, Western and Southwestern parts of Uttar Pradesh, Western Madhya Pradesh, the entire Deccan Trap or Plateau region east of Western Ghats except for a narrow strip along Tamil nadu coast receive a low rainfall of less than 100 cm.
- The rest of the areas receive a rainfall ranging between 100 and 200 cm.

Geography India - Drainage System

Introduction

- The flow of water through well-defined channels is known as **drainage** and the network of such channels is known as **drainage system**.
- The drainage pattern of an area is the result of the geological time period, nature, and structure of rocks, topography, slope, etc.
- About 77% of the drainage area consisting of the *Ganga*, the *Brahmaputra*, the *Mahanadi*, the *Krishna*, etc. is oriented towards the Bay of Bengal.
- On the other hand, 23% comprising the *Indus*, the *Narmada*, the *Tapi*, the *Mahi*, and the *Periyar* systems discharge their waters in the Arabian Sea.
- A river drain is a specific area, which is known as the **catchment area** of that river.
- An area drained by a river and its tributaries is known as a **drainage basin**.
- The boundary line separating one drainage basin from the other is called as the **watershed area**.

Drainage Pattern

- Following are the major drainage patterns −
    - Dendritic

- Radial
- Centripetal
- Trellis

- A drainage pattern which looks like tree branches with lots of twigs is known as **Dendritic drainage pattern**. For example, the rivers of northern plain.
- **Radial drainage patterns** form when rivers originate from a hill and flow in all directions. For example, the rivers originating from the *Amarkantak*.
- **Centripetal drainage pattern is formed** when rivers discharge their waters from all directions into a lake or a depression. For example, *Loktak* lake in Manipur.
- **Trellis drainage pattern is formed** when the primary tributaries of main rivers flow parallel to each other and secondary tributaries join them at right angles. For example, rivers in the upper part of the Himalayan region.

Classification of Drainage

- On the basis of the mode of origin, nature, and characteristics, the Indian drainage is classified as −
  - The **Himalayan drainage** and
  - The **Peninsular drainage**.

Himalayan Drainage

- Major Himalayan drainage systems are the **Indus**, the **Ganga**, and the **Brahmaputra** rivers.

The Indus

- The total length of the Indus River system is 2,880 km (in India 1,114 km).
- The Indus, which is also known as the **Sindhu**, is the westernmost of the Himalayan Rivers in India.
- The Indus originates from a glacier near Bokhar Chu in the Tibetan region at an altitude of 4,164 m in the Kailash Mountain range.
- In Tibet, the Indus is known as **Singi Khamban** or the Lion's mouth.

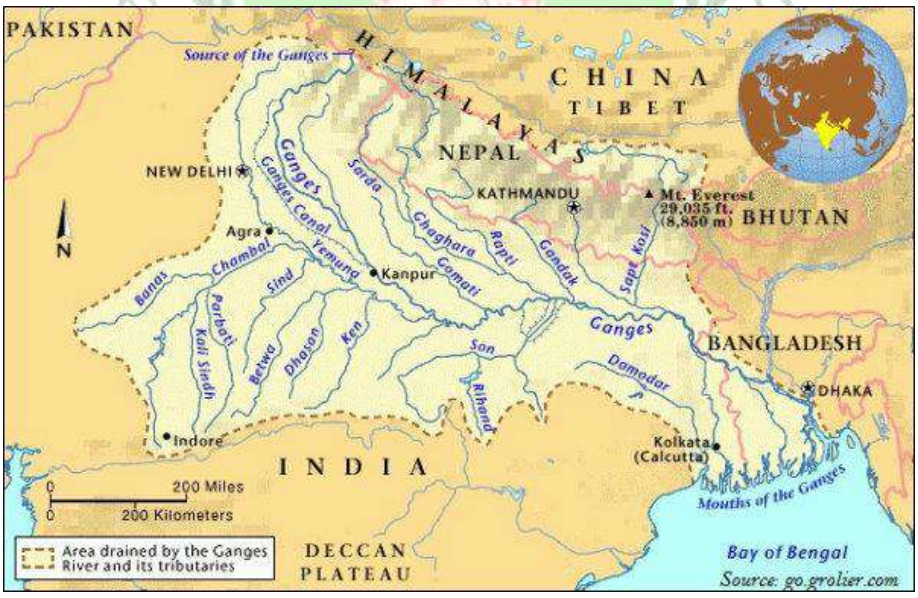
- The Indus enters into Pakistan near *Chillar* in the Dardistan region.
- Major tributaries of Indus are the *Shyok*, the *Gilgit*, the *Zaskar*, the *Hunza*, the *Nubra*, the *Shigar*, the *Gasting*, and the *Dras* in the upper part.
- In the lower part, the *Satluj*, the *Beas*, the *Ravi*, the *Chenab*, and the *Jhelum* are the major tributaries of the *Indus*.
- Finally, the *Indus* discharges into the *Arabian* Sea near Karachi in Pakistan.

- The *Jhelum*, an important tributary of the *Indus*, rises from a spring at *Verinag* situated at the foot of the *Pir Panjal*.
- The *Jhelum* flows through Srinagar and the *Wular* Lake before entering into Pakistan.

- *Jhelum* joins the *Chenab* near Jhang in Pakistan.
- Formed by two streams i.e. the *Chandra* and the *Bhaga*, the *Chenab* is the largest tributary of the Indus.
- Chenab is also known as *Chandrabhaga*.
- The *Chenab* flows about 1,180 km before entering into Pakistan.
- Originating from the *Rohtang* pass in the *Kullu* hills of Himachal Pradesh and flowing through the *Chamba* valley of the state, *Ravi* is one of the important tributaries of the Indus.
- Originating from the *Beas* Kund near the *Rohtang* Pass at an elevation of 4,000 m above the mean sea level, Beas is also an important tributaries of the Indus.
- Beas enters into the Punjab plains and meets with the *Satluj* near Harike.
- Also popular as **Langchen Khambab** (in Tibet), the *Satluj* originates from the *Rakas* lake near *Mansarovar* at an altitude of 4,555 m in Tibet.
- The *Satluj* passes through the *Shipki La* on the Himalayan ranges and enters into the Punjab plains.
- The *Satluj* is the river that feeds the canal system of the Bhakra Nangal project.

The Ganga

- The *Ganga* originates from the *Gangotri* glacier near Gaumukh (3,900 m) in the Uttarkashi district of Uttarakhand.

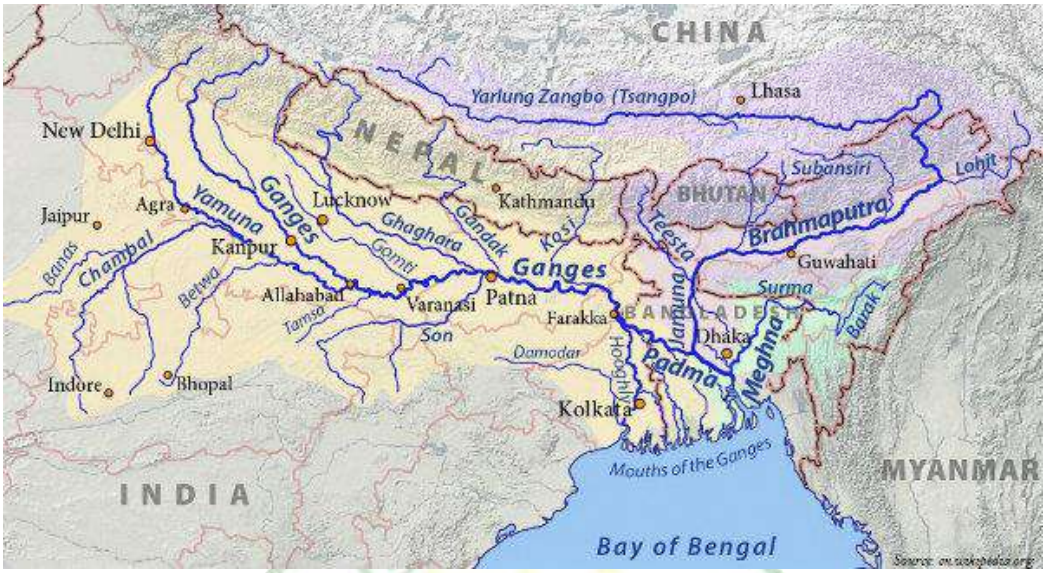


- However, the river, when it originates from the Gangotri glacier is known as the **Bhagirathi**.
- At **Devprayag**, the *Bhagirathi* merges with another river, i.e., the *Alaknanda;* and from here, it is known as the *Ganga*.
- The *Alaknanda* originates from the *Satopanth* glacier above Badrinath.
- The major tributaries of the Alaknanda are the Dhauli and the Vishnu Ganga; these two rivers meet at Joshimath/Vishnu Prayag.
- Some other tributaries of the *Alaknanda* are the *Pindar* (joins at Karna Prayag), the *Mandakini* or *Kali Ganga* (joins at Rudra Prayag).
- The total length of the Ganga in India is 2,525 km, which is shared by Uttarakhand (110 km); Uttar Pradesh (1,450 km); Bihar (445 km); and West Bengal (520 km).
- The Ganga river system is the largest river system in India.
- The *Son* is a major right bank tributary of the Ganga; however, major left bank tributaries are the *Ramganga*, the *Gomati*, the *Ghaghara*, the *Gandak*, the *Kosi*, and the *Mahananda*.
- Originating from the *Yamunotri* glacier on the western slopes of *Banderpunch* range (6,316 km), the *Yamuna* is the longest tributary of the Ganga.
- The Yamuna joins the Ganga at Allahabad (Prayag), Uttar Pradesh.
- The *Chambal*, the *Sind*, the *Betwa*, and the *Kenon* are the right bank tributaries of the Yamuna and the *Hindan*, the *Rind*, the *Sengar*, the *Varuna*, etc. are the left bank tributaries.
- The *Chambal* rises near **Mhow** in the Malwa plateau of Madhya Pradesh.
- The *Chambal* is famous for its badland topography, known as the **Chambal ravines** (as shown in the image given below).
- Originating from the Nepal Himalayas between the Dhaulagiri and Mount Everest, the *Gandak* consists of two streams, namely *Kaligandak* and *Trishulganga*.
- The *Gandak* joins the Ganga at *Sonpur* near Patna, Bihar.
- The *Ghaghara* originates from the *Mapchachungo* glaciers and joins the Ganga at Chhapra, Bihar.
- The *Kosi* originates from the north of Mount Everest in Tibet where it is known as the **Arun**.

- Originating from the *Garhwal* hills near Gairsain, the *Ramganga* joins the Ganga near Kannauj.
- The *Damodar* drains the eastern margins of the *Chottanagpur* plateau, where it flows through a rift valley and finally joins the *Hugli*.
- The *Barakar* is the main tributary of the *Damodar*.
- The *Sarda* or *Saryu* River rises from the *Milam* glacier in the Nepal Himalayas where it is known as the **Goriganga**. However, along the Indo-Nepal border, it is called as ***Kali*** or *Chauk*, where it joins the *Ghaghara*.
- Originating from the *Darjeeling* hills, the *Mahananda* joins the Ganga as its last left bank tributary in West Bengal.
- Originating from the *Amarkantak* plateau, the *Son* is a large south bank tributary of the Ganga; it joins the Ganga at Arrah, Bihar.

The Brahmaputra

- The ***Brahmaputra*** originates from the *Chemayungdung* glacier of the Kailash range near the *Mansarovar* Lake.
- In Tibet, the *Brahmaputra* is known as the ***Tsangpo*** (means 'the purifier').
- The *Rango Tsangpo* is the major right bank tributary of the Brahmaputra in Tibet.
- The Brahmaputra enters into India near the west of Sadiya town in Arunachal Pradesh.
- Major left bank tributaries of the Brahmaputra are *Lohit*, *Dibang* or *Sikang*, *Burhi Dihing*, and *Dhansari*.
- Major right bank tributaries of the Brahmaputra are the *Subansiri*, *Kameng*, *Manas*, and *Sankosh*.
- The *Tista* joins the Brahmaputra on its right bank in Bangladesh and from here, the river is known as the *Yamuna*.
- Finally, the Brahmaputra merges with the river *Padma* and falls in the Bay of Bengal.



Peninsular River System

- The Peninsular drainage system is older than the Himalayan Rivers.
- The *Mahanadi* originates from *Sihawa* in Raipur district of Chhattisgarh and runs through Madhya Pradesh and Odisha and finally discharges its water into the Bay of Bengal.
- The total length of Mahanadi is 851 km.
- Popularly known as the ***Dakshin Ganga***, the *Godavari* is the largest peninsular river system.
- The *Godavari* originates from Nasik district of Maharashtra and discharges its water into the Bay of Bengal.
- With total 1,465 km length, *Godavari* covers the areas of Maharashtra, Madhya Pradesh, Chhattisgarh, Odisha, and Andhra Pradesh.
- The *Penganga*, the *Indravati*, the *Pranhita*, and the *Manjra* are the major tributaries of Godavari.
- Originating from Mahabaleshwar in Sahyadri, the *Krishna* is the second largest east flowing Peninsular River.
- The *Koyna*, the *Tungabhadra*, and the *Bhima* are the major tributaries of the Krishna.
- Of the total catchment area of the *Krishna*, 27% lies in Maharashtra, 44% in Karnataka, and 29% in Andhra Pradesh.

- The *Kaveri* originates from the *Brahmagiri* hills (1,341m) located in Kogadu district of Karnataka.
- The river *Kaveri's* total course of 770 km commands a basin area of 8.8-million-hectare mha, of which, 3% lies in Kerala, 41% lies in Karnataka, and 56% lies in Tamil Nadu.
- Major tributaries of the *Kaveri* are the *Kabini*, the *Bhavani,* and the *Amravati*.
- The *Narmada* originates from the western flank of the *Amarkantak* plateau (1,057 m).
- Flowing through a rift valley located between the *Satpura* in the south and the *Vindhya* range in the north, the *Narmada* forms *Dhuandhar* waterfall and a picturesque gorge of marble rocks nearby Jabalpur.
- The total length of *Narmada* is 1,312 km.
- Flowing in the westward direction, *Narmada* finally empties into the Arabian Sea in the Bharuch district of Gujarat.
- Originating from *Multai* in the Betul district of Madhya Pradesh, *Tapi* is the other important westward flowing river emptying into the Arabian Sea.
- About 79% of the *Tapi* basin lies in Maharashtra, 15% in Madhya Pradesh, and the remaining 6% in Gujarat.
- *Luni* is the longest river system of Rajasthan.
- Primarily, *Luni* originates in the Pushkar valley of the Aravalli range, Rajasthan in two branches, i.e. the ***Saraswati*** and the ***Sabarmati***; which join each other at Govindgarh. From here, the river is known as *Luni*.
- Luni finally debouches into the Arabian Sea nearby the Rann of Kachchh.
- Some small rivers flowing towards the West are the *Shetruniji*, the *Bhadra*, *Dhadhar, Sabarmati, Mahi, Vaitarna, Kalinadi, Dedti, Sharavati, Mandovi, Juari, Bharathapuzha, Periyar,* etc.
- Some small rivers flowing towards the East are *Subarnarekha, Baitarni, Brahmani, Penner,* and *Palar*.

The following table illustrates the major differences between Himalayan and the Peninsular River system −

Characteristics	Himalayan River	Peninsular River
Place of origin	Himalayan mountains (covered with glaciers).	Peninsular plateau and central highland.
Nature of flow	Perennial; receive water from glacier and rainfall.	Seasonal; dependent on monsoon rainfall.
Type of drainage	Antecedent and consequent leading to dendritic pattern in plains.	Super imposed, rejuvenated resulting in trellis, radial, and rectangular patterns.
Nature of river	Long course, flowing through the rugged mountains experiencing head ward erosion and river capturing; In plains, meandering and shifting off course.	Smaller, fixed course with well-adjusted valleys.
Catchment area	Very large basin.	Relatively smaller basin.
Age of the river	Young and youthful, active and deepening in the valleys	Old rivers with graded profile, and have almost reached their base levels.

Geography India - Natural Vegetation

- Natural vegetation refers to a plant community that has been left undisturbed over a long period of time.

Classification of Vegetation

- Based on climatic conditions, forests are divided into categories. They are −
    - Tropical Evergreen and Semi Evergreen forests
    - Tropical Deciduous forests
    - Tropical Thorn forests
    - Montane forests
    - Littoral and Swamp forests

Tropical Evergreen Forests

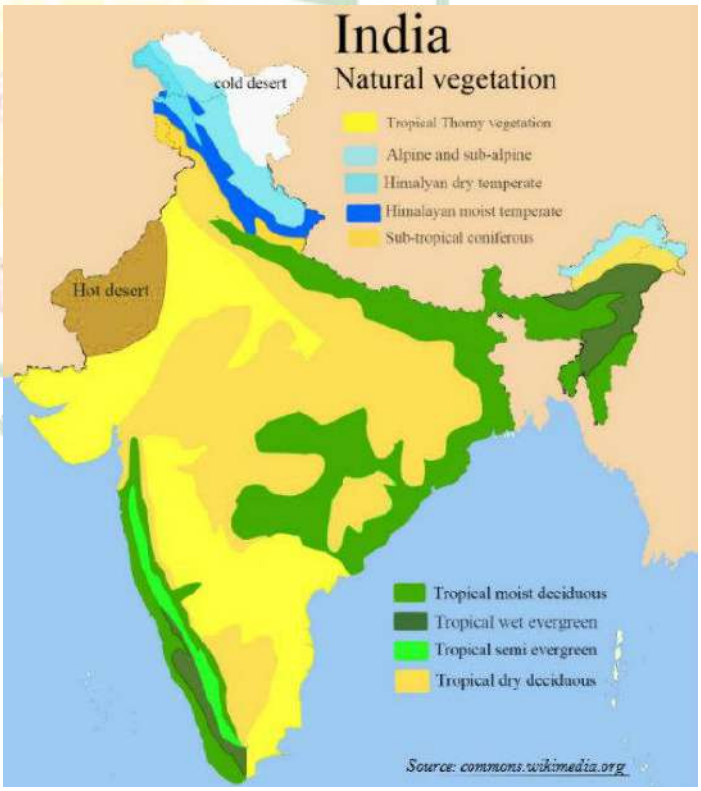
- Tropical evergreen forests are found in the regions that receive annual precipitation of over 200 cm and mean annual temperature above 22°C.
- Tropical evergreen forests are found in the western slope of the Western Ghats, hills of the northeastern region, and the Andaman and Nicobar Islands.
- In tropical evergreen forests, trees reach great heights, i.e., up to 60 m or even above. And, largely these trees do not have fixed time to shed their leaves.
- Major examples of evergreen forests are *rosewood, mahogany, aini, ebony*, etc.

Semi-evergreen Forests

- Semi-evergreen forests are a mixture of evergreen and moist deciduous trees, found in the regions that receive less precipitation than the evergreen forests.
- Main species of semi-evergreen forests are white *cedar, hillock,* and *kail*.

Tropical Deciduous Forests

- Tropical Deciduous Forests are the most widespread forests of India and are popularly as **Monsoon Forests**.
- Tropical deciduous forests are found in the regions, which receive rainfall between 70 and 200 cm.
- Tropical deciduous forests are further categorized as the **Moist deciduous forests** and **Dry deciduous forest**.
- The moist deciduous forests are found in the regions, which record rainfall between 100 and 200 cm.



- The moist deciduous forests are found along the foothills of the Himalayas, eastern slopes of the Western Ghats, and Odisha.
- *Teak, sal, shisham, hurra, mahua, amla, semul, kusum,* and *sandalwood* etc. are the main species of the moist deciduous forests.
- Dry deciduous forests are found in the regions that receive precipitation between 70 and 100 cm.
- As the dry season begins, the trees of deciduous forests shed their leaves completely.
- *Tendu, palas, amaltas, bel, khair, axlewood*, etc. are the major trees of dry **deciduous forests.**

Tropical Thorn Forests

- Tropical thorn forests are found in the areas, which receive rainfall less than 50 cm.
- Tropical thorn forests are found in the areas of south west Punjab, Haryana, Rajasthan, Gujarat, Madhya Pradesh, and Uttar Pradesh.
- *Babool, ber,* and wild date palm, *khair, neem, khejri, palas*, etc. are the important species of tropical thorn forests.

Mountain Forests

- Mountain forests in India are normally classified into two types, i.e. the northern mountain forests and the southern mountain forests.
- Deciduous forests are found in the foothills of the Himalayas.
- Temperate forests found between an altitude of 1,000 and 2,000 m.
- In the higher hill ranges of northeastern India; for example, hilly areas of West Bengal and Uttaranchal, evergreen broad leaf trees such as oak and chestnut are predominant.
- *Chir, deodar, pine*, etc. are the important species of temperate forests.
- Between 3,000 and 4,000 m, *Silver firs, junipers, pines, birch*, and *rhododendrons*, etc. are found.
- However, at higher altitude, the tundra vegetation is found and major species are mosses and lichens.

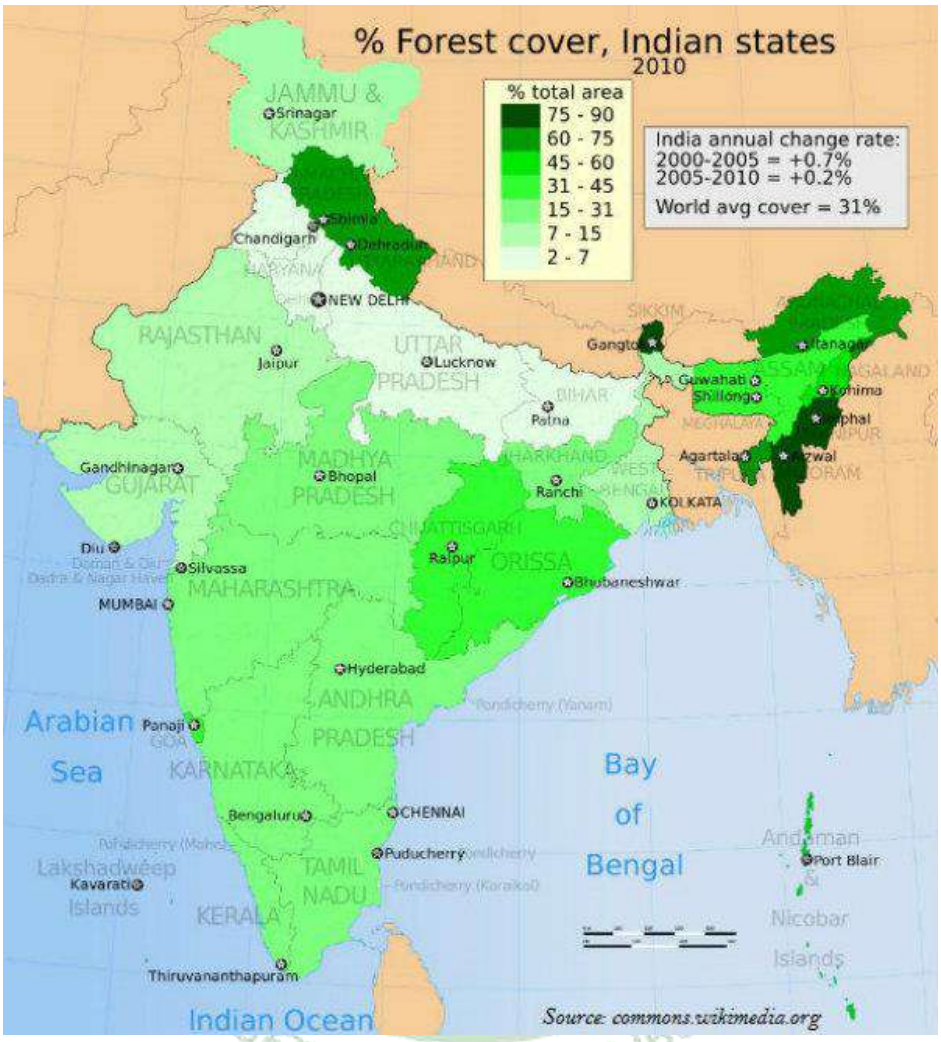
- At a higher altitude, the southern mountain forests largely belong to the temperate type, which are locally known as ***'Sholas'*** in the *Nilgiris, Anaimalai, and Palani* hills. Some of the trees of economic significance include *magnolia, laurel, cinchona*, and *wattle*.

Littoral and Swamp Forests

- India is rich in Littoral and Swamp Forests.
- *Chilika* Lake (in Odisha) and *Keoladeo* National Park (in Bharatpur, Rajasthan) are protected as water-fowl habitats under the Convention of Wetlands of International Importance (i.e. *Ramsar* Convention).
- Mangrove grows along the coasts in the salt marshes, tidal creeks, mud flats, and estuaries; and, it has a number of salt-tolerant species of plants.
- In India, the mangrove forests spread over 6,740 sq. km, which is 7% of the world's mangrove forests
- Mangroves are largely found in the Andaman and Nicobar Islands and the *Sunderbans* of West Bengal.

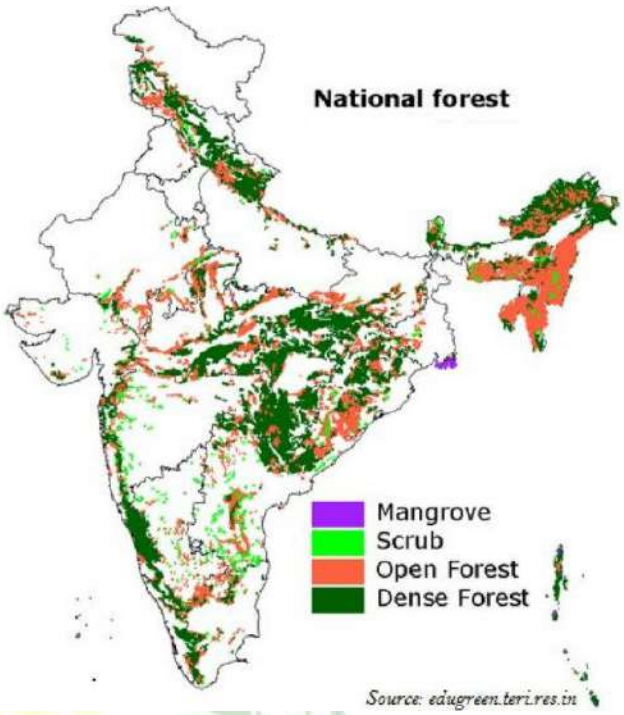
Geography India - National Forest

Introduction



- According to the India State of Forest Report 2011, the actual forest cover in India is 21.05%, of which, 12.29% are dense forests and 8.75% are open forests.
- Andaman and Nicobar Islands have 86.93% forest area; on the other hand, Lakshadweep has zero per cent forest area [details of forest cover (state-wise) shown in the image given below].
- With (about) 90 percent of forest cover, Mizoram has the highest percentage of forest area in India.
- Haryana, Punjab, Rajasthan, Uttar Pradesh, Bihar, and Gujarat have less than 10 percent area under forest cover.

Category of National Forest



- As shown in the map given below, national forest is broadly categorized as **Dense Forest, Open Forest, Scrub**, and **Mangrove**.
- Currently, there are 102 National parks and 515 wildlife sanctuaries. These collectively cover an area of 15.67 million hectares of India.
- The Government of India proposed to have a nation-wide forest conservation policy, and adopted a forest policy in 1952, and further amended in 1988.
- Out of a total of 593 districts, 188 districts have been identified as tribal districts.
- The tribal districts account for about 59.61% of the total forest cover of India, whereas the geographical area of 188 tribal districts constitutes only 33.63% of the total geographical area of India.

Social Forestry

- For the forest conservation and increase the forest area, the concept of **Social forestry** has been introduced.
- Social Forestry means the management and protection of forests and afforestation on barren lands with the purpose of helping in the environmental, social, and rural development.
- Further, in 1976, The National Commission on Agriculture has classified social forestry into three categories i.e. Urban forestry, Rural forestry, and Farm forestry.
- Farm forestry is a term applied to the process under which the farmers grow trees for commercial and non-commercial purposes on their farm lands.

Geography India – Wildlife

Introduction

- India is one of the 12 mega bio-diversity countries of the world.
- With approximately 47,000 plant species, India ranks 4th in Asia and 10th in the world (in terms of plant diversity).
- India has about 15,000 species of flowering plants and contributes 6 percent to world's total flowering plants.
- India has about 90,000 species of animals.

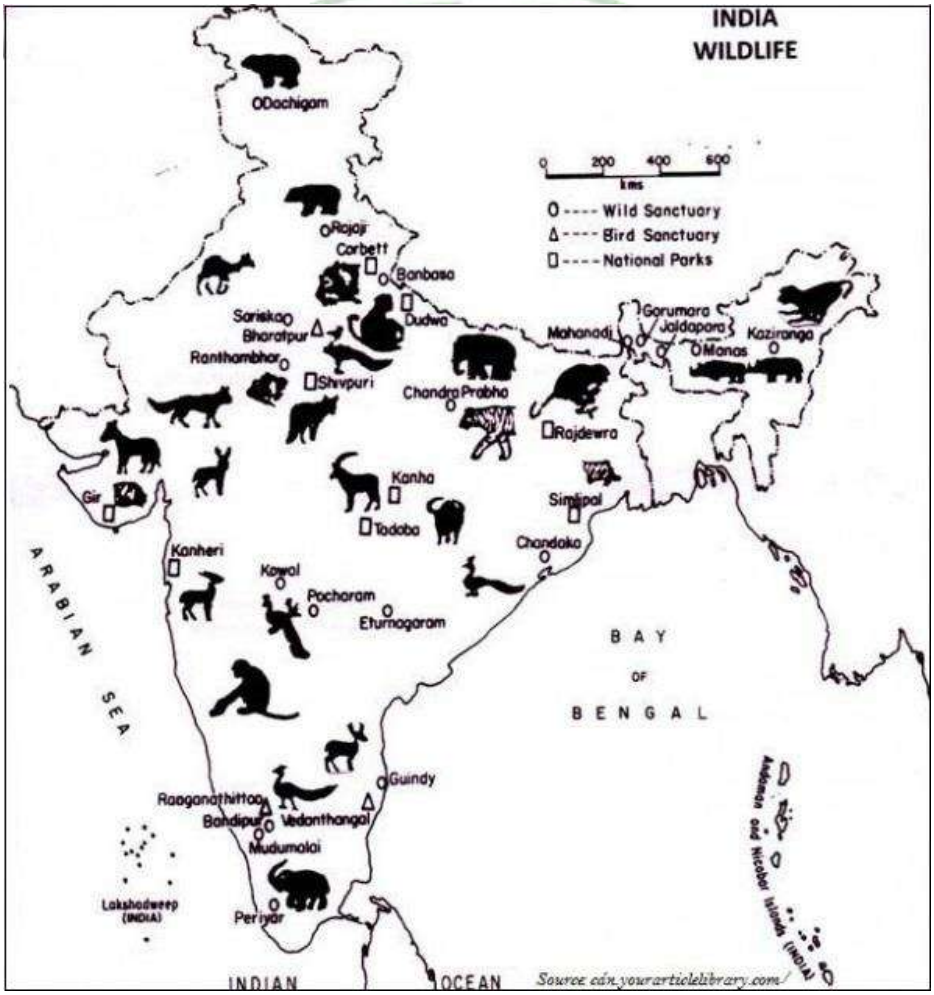
Wildlife Act

- In 1972, a comprehensive Wildlife Act was enacted, which instructed the main legal framework for conservation and protection of the wildlife in India.
- Further, in 1991, the Act of 1972 has been comprehensively amended.
- In the amendment, punishments have been made more stringent and provisions have also been made for the protection of specified plant species and conservation of endangered species of wild animals.
- Besides, some other special schemes such as **Project Tiger** (1973) and **Project Elephant** (1992) have been launched to conserve these species and their habitats.

Biosphere Reserve

- A **Biosphere** Reserve is a unique and representative ecosystem of terrestrial and coastal areas, which are internationally recognized within the framework of UNESCO's Man and Biosphere (MAB) Program.
- There are 18 Biosphere Reserves in India, out of which 9 Biosphere Reserves have been recognized by the UNESCO on World Network of Biosphere Reserves.
- Established in September 1986, the Nilgiri Biosphere Reserve is the first biosphere reserves of India.
- There are about 2,000 species of birds in India that account to 13 percent of the world's total.

- There are about 2,546 species of fish in India that account to 12 percent of the world's total.
- India has about 5 to 8 percent of the world's amphibians, reptiles, and mammals.
- India is the only country in the whole world where both tigers and lions are found.
- Gir forest in Gujarat is the natural habitat of lion in India.
- Tigers are found in the Sundarbans of West Bengal, and the forests of Madhya Pradesh and Himalayan region.
- About 1,300 plant species have been listed as endangered species in India; however, 20 species are already extinct.



- The threat on wildlife has increased because of excessive commercial activities, pollution, expansion of human settlement, and of course illegal trade of both animals and plants.

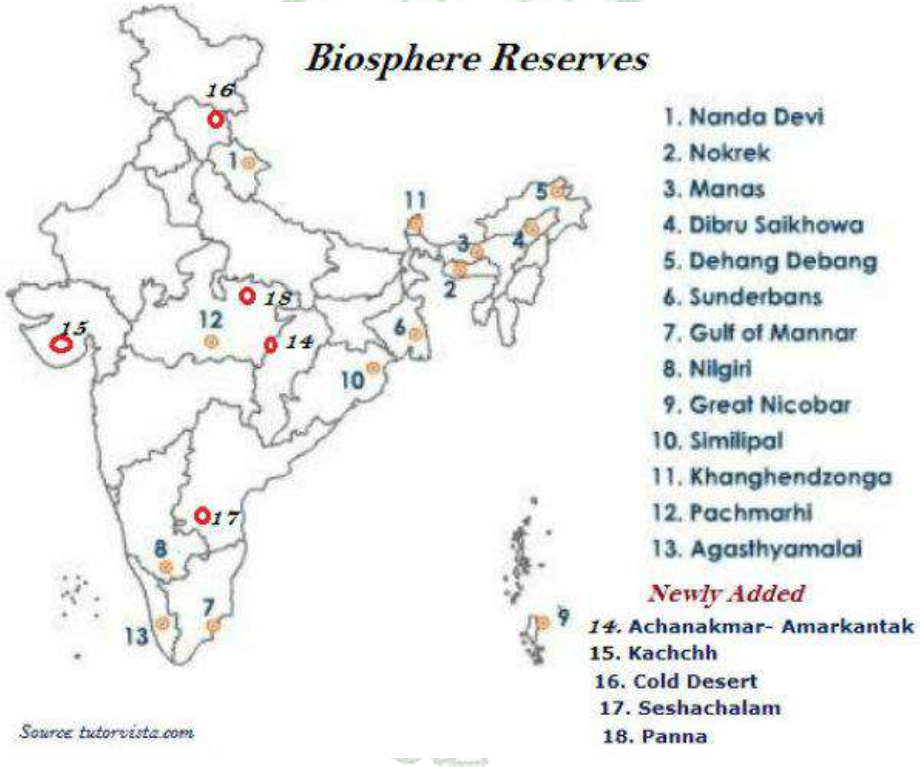
- To protect wildlife, the Government of India has established **18 biosphere reserves**; (list with details is given below − the data is prepared by the Ministry of Environment, Forest and Climate Change, Government of India) −

S.No	Name of the Biosphere Reserve & total geographical area (km)	Date of Designation	Location
1	**Nilgiri** (5520)	01.08.1986	Part of Wynad, Nagarhole, Bandipur and Madumalai, Nilambur, Silent Valley and Siruvani hills in Tamil Nadu, Kerala and Karnataka.
2	**Nanda Devi** (5860.69)	18.01.1988	Part of Chamoli, Pithoragarh and Almora districts in Uttarakhand.
3	**Nokrek** (820)	01.09.1988	Part of East, West and South Garo Hill districts in Meghalaya.
4	Manas (2837)	14.03.1989	Part of Kokrajhar, Bongaigaon, Barpeta, Nalbari, Kamprup and Darang districts in Assam
5	**Sunderban** (9630)	29.03.1989	Part of delta of Ganges & Brahamaputra river system in West Bengal.
6	**Gulf of Mannar** (10500)	18.02.1989	Indian part of Gulf of Mannar extending from Rameswaram island in the North to Kanyakumari in the South of Tamil Nadu.
7	**Great Nicobar** (885)	06.01.1989	Southernmost island of Andaman and Nicobar Islands.

8	**Similipal** (4374)	21.06.1994	Part of Mayurbhanj district in Odisha.
9	Dibru-Saikhova (765)	28.07.1997	Part of Dibrugarh and Tinsukia districts in Assam.
10	Dehang-Dibang (5111.5)	02.09.1998	Part of Upper Siang, West Siang and Dibang Valley districts in Arunachal Pradesh.
11	**Pachmarhi** (4981.72)	03.03.1999	Part of Betul, Hoshangabad and Chhindwara districts in Madhya Pradesh.
12	Khangchendzonga (2931.12)	07.02.2000	Part of North and West districts in Sikkim.
13	Agasthyamalai (3500.36)	12.11.2001	Part of Thirunelveli and Kanyakumari districts in Tamil Nadu and Thiruvanthapuram, Kollam and Pathanmthitta districts in Kerala.
14	**Achanakmar - Amarkantak** (3,835. 51)	30.03.2005	Part of Anuppur and Dindori districts of Madhya Pradesh and Bilaspur district of Chattisgarh.
15	Kachchh (12,454)	29.01.2008	Part of Kachchh, Rajkot, Surendranagar and Patan districts in Gujarat.
16	Cold Desert (7,770)	28.08.2009	Pin Valley National Park and surroundings; Chandratal & Sarchu; and Kibber Wildlife sanctuary in Himachal Pradesh.
17	Seshachalam (4755.997)	20.09.2010	Seshachalam hill ranges in Eastern Ghats encompassing part of Chittoor and

			Kadapa districts in Andhra Pradesh.
18	Panna (2998.98)	25.08.2011	Part of Panna and Chhattarpur districts in Madhya Pradesh.

- The above highlighted reserves have been included in the World Network of Biosphere Reserves of UNESCO.
- *Nanda Devi* in Uttarakhand, *Sunderbans* in the West Bengal, the *Gulf of Mannar* in Tamil Nadu, the *Nilgiris* between the states of Tamil Nadu, Kerala, and Karnataka, etc. have been included in the world network of Biosphere reserves.



- The plant species grown naturally without any human aid and remains undisturbed is known as **virgin vegetation**.
- The virgin vegetation, which are purely originated and grown in India is known as **endemic** or **indigenous species** but those which have come from outside India are termed as exotic plants.
- **Flora** simply refers to plant species and **Fauna** refers to animal species.

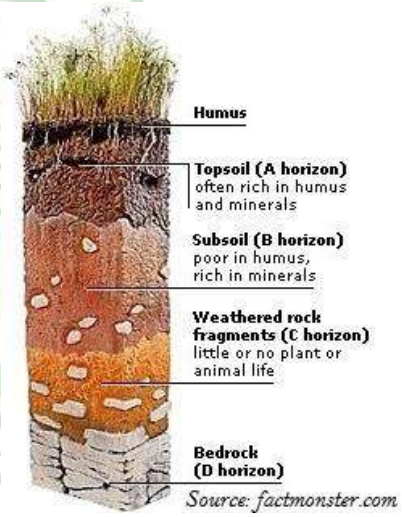
Geography India – Soil

Introduction

- Soil is very important and a valuable resource for every human being.
- Soil is the mixture of rock debris and organic materials, which develop on the earth's surface.
- The major factors that determine soils' characteristics are parent material, climate, relief, vegetation, time, and some other life-forms.
- Major constituents of the soil are mineral particles, humus, water, and air.
- A soil horizon is a layer generally parallel to the soil crust, whose physical characteristics differ from the layers above and beneath.

Soil Profile

- Soil Horizon is classified into **three** categories – Horizon A, Horizon B, and Horizon C; collectively known as **Soil Profile** (i.e. the arrangement of soil layers).
- Horizon A' is the topmost zone, where organic materials stored with the minerals, nutrients, and water, necessary for the growth of the plants.
- 'Horizon B' is the transition zone between the 'horizon A' and 'horizon C', and hence, it contains matter derived from 'horizon A' as well as from 'horizon C'.

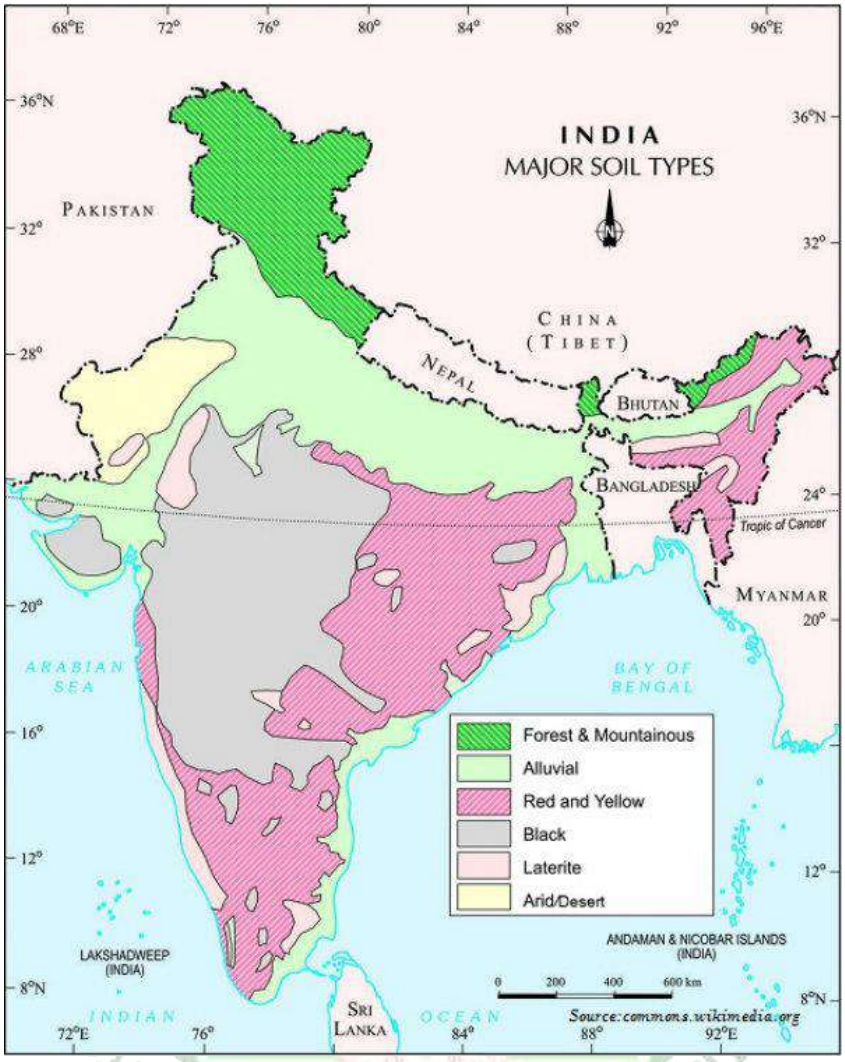


- 'Horizon C' is composed of loose parent material and hence, it is the layer of first stage of the soil formation process and eventually forms the above discussed two layers.

Classification of Soil

- Soils were classified on the basis of their inherent characteristics and external features including texture, color, slope of land, and moisture content in the soil.

- Soil Survey of India, established in **1956**, made comprehensive study of soils.



- On the basis of genesis, color, composition, and location, the soils of India have been classified as −
    - Alluvial soils
    - Black soils
    - Red and Yellow soils
    - Laterite soils
    - Arid soils
    - Forest soils
    - Saline soils
    - Peaty soils.

Alluvial Soils

- Alluvial soils are widespread in the northern plains and the river valleys and cover about 40% of total area of India.
- Alluvial soils are depositional soils, as transported and deposited by the rivers streams.
- Alluvial soils are normally rich in potash, but poor in phosphorous.
- In the Upper and Middle Ganga plain, two different types of alluvial soils are found i.e. ***Khadar*** (it is the new alluvium and is deposited by floods annually) and ***Bhangar*** (it is a system of older alluvium, deposited away from the flood plains).
- The alluvial soils normally vary in nature from sandy, loamy, to clayey and its color varies from light grey to ash grey.

Black Soils

- Also popular as **Regur Soil** or the **Black Cotton Soil**, Black soil covers most of the Deccan Plateau; for example, black soil is found in parts of Maharashtra, Madhya Pradesh, Gujarat, Andhra Pradesh, and Tamil Nadu.
- Black soil is usually clayey, deep, and impermeable; therefore, it can retain the moisture for a very long time (very useful for the crops especially cotton).
- Black soil is rich in lime, iron, magnesia, alumina, and also potash.
- The color of the black soil varies from deep black to grey.

Red & Yellow Soils

- Red soil develops on crystalline igneous rocks in the areas of low rainfall, especially, in the eastern and southern parts of the Deccan Plateau.
- Red soil develops a reddish color because of a wide diffusion of iron in crystalline and metamorphic rocks. On the other hand, it develops yellow color when it occurs in a hydrated form.
- The fine-grained red and yellow soils are usually fertile, whereas coarse-grained soils found in dry upland areas have poor fertility.
- The red and yellow soils normally have poor content of nitrogen, phosphorous and humus.

Laterite Soils

- The laterite soils develop in areas of high temperature and high rainfall.
- The laterite soils are commonly found in Karnataka, Kerala, Tamil Nadu, Madhya Pradesh, and the hilly areas of Odisha and Assam.
- Laterite soils are the result of intense leaching due to tropical rains; because of rain, lime and silica are leached away, and soils become rich in iron oxide and aluminum.
- Laterite soils however are poor in organic matter, nitrogen, phosphate, and calcium, but rich in iron oxide and potash.
- Laterite soils are normally infertile; however, it is widely to make bricks (used in building construction).
- Normally sandy in structure and saline in nature, arid soils vary from red to brown in color.

Arid Soils

- Lower horizons of the arid soils are occupied by *'kankar'* layers because of the increasing calcium content downwards.
- Arid soils have poor content of humus and organic matter.
- Arid soils are typically developed in western Rajasthan.

Saline Soils

- Saline soils contain a larger proportion of sodium, potassium, and magnesium, and thus, they are infertile, and do not support vegetation.
- Because of the dry climate and poor drainage system, saline soil contains more salt.
- Saline soils are normally found in arid and semi-arid regions, as well as in waterlogged and swampy areas.
- Deficient in nitrogen and calcium, saline soils are found in western Gujarat, deltas of the eastern coast, and in *Sunderban* areas of West Bengal.

Forests Soils

- Forest soils are usually formed in the forest areas where sufficient rainfall is available.

- Like other organism, soils are living systems, as they too develop and decay, get degraded, and respond to proper treatment if administered in time.

Peaty Soils

- In the areas of heavy rainfall and high humidity, large quantity of dead organic matter accumulates and enrich humus and organic content that forms the peaty soils.
- Peaty soils are normally heavy and black in color and widely found in the northern part of Bihar, southern part of Uttaranchal, and the coastal areas of West Bengal, Odisha, and Tamil Nadu.
- Decline in soil fertility because of any reason (either natural or human induced) is known as **soil degradation** (example shown in the image given below).

Geography India – Agriculture

Introduction

- There are three distinct cropping seasons in the northern and interior parts of India, namely *kharif, rabi, and zaid*.

Cropping Season	Major Crops Cultivated	
	Northern States	Southern States
Kharif (June-September)	Rice, Cotton, Bajra, Maize, Jowar, Toor	Rice, Maize, Ragi, Jowar, Groundnut
Rabi (October – March)	Wheat, Gram, Rapeseeds, and Mustard, Barley	Rice, Maize, Ragi, Groundnut, Jowar
Zaid (April–June)	Vegetables, Fruits, Fodder	Rice, Vegetables, Fodder

- Dryland farming is largely restricted to the regions having annual rainfall less than 75 cm. Major crops are *ragi, bajra, moong, gram,* and *guar* (fodder crops).

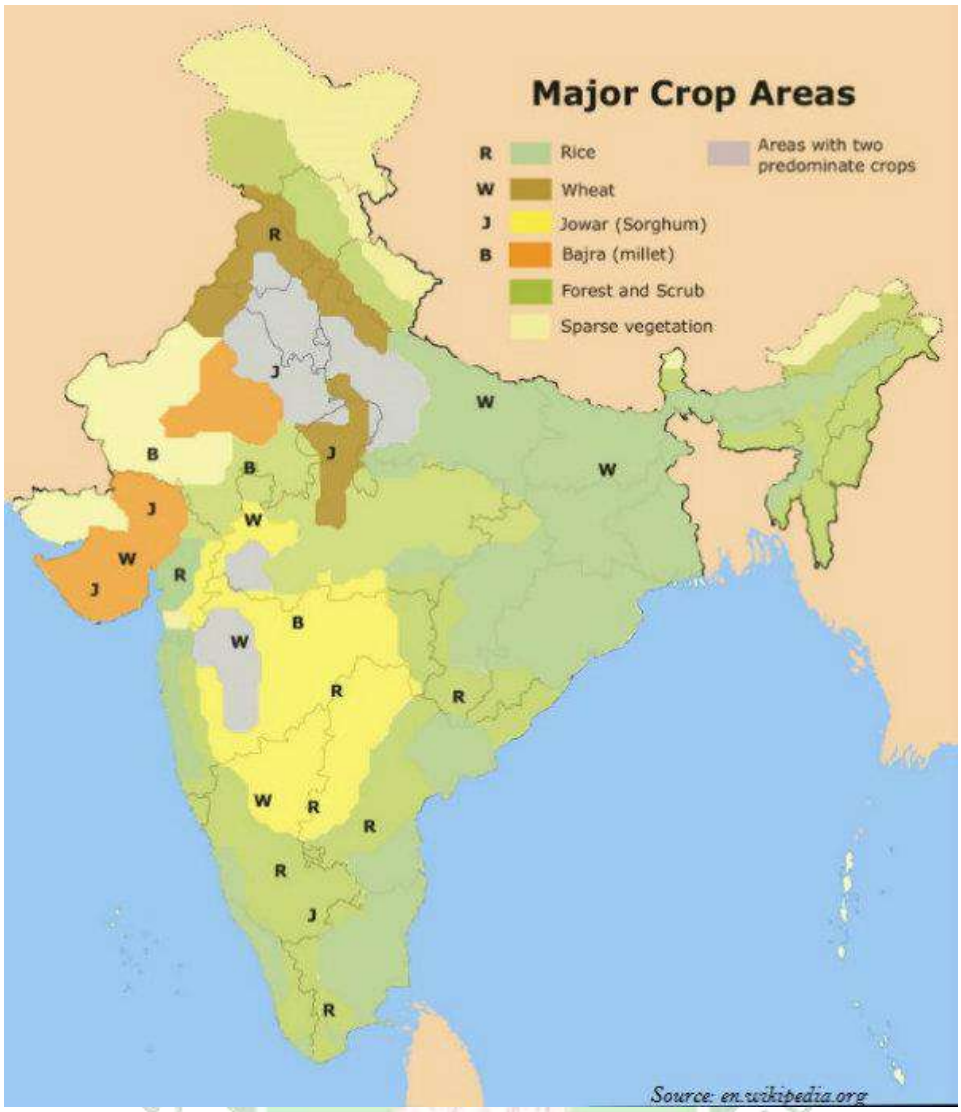
- The regions, which have rainfall in excess of soil moisture requirement of plants during the rainy season is known as wetland farming. Major crops are rice, jute, and sugarcane.
- The cereals occupy about 54% of total cropped area in India.
- India produces about 11% cereals of the world and ranks 3rd in production after China and U.S.A.
- Indian cereals are classified as **fine grains** (e.g. rice, wheat, etc.) and coarse grains (e.g. *jowar, bajra, maize, ragi*, etc.).

Types of Farming

- On the basis of main source of moisture for crops, the farming can be classified as irrigated and rainfed.
- On the basis of adequacy of soil moisture during cropping season, rainfed farming is further classified as **dryland** and **wetland** farming.

Major Crops

- In southern states and West Bengal, the climatic conditions facilitate the cultivation of two or three crops of **rice** in an agricultural year.
- In West Bengal farmers grow three crops of rice called *'aus', 'aman,'* and *'boro'*.
- India contributes more than 20% to world's **rice** production and ranks 2nd after China.
- About one-fourth of the total cropped area of India is under rice cultivation.
- West Bengal, Punjab, and Uttar Pradesh are the leading rice producing states.
- India produces about 12% of total wheat production of the world.
- About 85% of total area under this crop is concentrated in north and central regions of the country, i.e., the Indo-Gangetic Plain, *Malwa* Plateau, and the Himalayan regions especially up to 2,700 m altitude.



- About 14% of the total cropped area in the country is under **wheat** cultivation.
- Uttar Pradesh, Punjab, Haryana, Rajasthan, and Madhya Pradesh are wheat producing states.
- The coarse cereals together occupy about 16.50% of total cropped area in the country.
- Maharashtra alone contributes to more than half of the total **jowar** production of the country.
- **Bajra** occupies about 5.2% of total cropped area in the country.
- Maharashtra, Gujarat, Uttar Pradesh, Rajasthan, and Haryana are the leading **Bajra** producer states.

- **Maize** is a food as well as fodder crop grown under the semi-arid climatic conditions and over inferior soils.
- Maize occupies about 3.6% of the total cropped area of India.
- Madhya Pradesh, Andhra Pradesh, Telangana, Karnataka, Rajasthan, and Uttar Pradesh are the leading maize producers in the country.
- **Pulses** are the legume crops, which increase the natural fertility of soils through nitrogen fixation.
- With one-fifth of the total production of pulses in the world, India is a leading producer.
- Pulses occupy about 11% of the total cropped area in the country.
- The cultivation of pulses in the country is largely concentrated in the drylands of Deccan and central plateaus and northwestern parts.
- **Gram** and **Toor** are the main pulses cultivated in India.
- Gram covers only about 2.8% of the total cropped area in the country.
- Madhya Pradesh, Uttar Pradesh, Maharashtra, Andhra Pradesh, Telangana, and Rajasthan are the main producers of gram.
- **Toor** (Arhar) is also known as red gram or pigeon pea.
- Toor occupies only about 2% of total cropped area of India.
- Maharashtra alone contributes to about one-third of the total production of toor.
- Groundnut, rapeseed and mustard, soyabean, and sunflower are the main oilseed crops grown in India.
- **Oilseeds** occupy about 14% of total cropped area in the country.
- Drylands of Malwa plateau, Marathwada, Gujarat, Rajasthan, Telangana, Rayalseema region of Andhra Pradesh and Karnataka plateau are the major oilseeds growing regions of India.
- India produces about 18.8% of the total **groundnut** production in the world.
- Groundnut covers about 3.6% of total cropped area in the country.
- Gujarat, Tamil Nadu, Telangana, Andhra Pradesh, Karnataka, and Maharashtra are the leading groundnut producer states in India.
- Rapeseed and mustard comprise several oilseeds such as *rai*, *sarson*, *toria*, and *taramira*.

- Rapeseed and mustard oilseeds together occupy only 2.5% of total cropped area in the country.
- Rajasthan alone contributes to about one-third production (of oilseeds) while Uttar Pradesh, Haryana, West Bengal, and Madhya Pradesh other leading producers.
- **Sunflower** cultivation is concentrated in the regions of Karnataka, Andhra Pradesh, Telangana, and adjoining areas of Maharashtra.
- India grows both the short staple (Indian) cotton as well as the long staple (American) cotton called *narma* in north-western parts of the country.
- India accounts to about 8.3% of world's total production of **cotton**.
- India ranks 4^{th} in the world for production of cotton after China, U.S.A., and Pakistan.
- Cotton occupies about 4.7% of total cropped area in the country.
- The major cotton growing areas in India are parts of Punjab, Haryana, and northern Rajasthan in the north-west; Gujarat and Maharashtra in the west; and plateaus of Andhra Pradesh, Karnataka, and Tamil Nadu in the south.
- Maharashtra, Gujarat, Andhra Pradesh, Punjab, and Haryana are the leading cotton producing states.
- India produces about three-fifth of the total **jute** production of the world.
- West Bengal contributes about three-fourth of the total production of jute in the country.
- India is the second largest producer of **sugarcane** after Brazil.
- Sugarcane occupies 2.4% of total cropped area in the country and contributes about 23% to the world's production of sugarcane.
- Uttar Pradesh produces about two-fifth of sugarcane of the country; other leading producers are Maharashtra, Karnataka, Tamil Nadu, Telangana, and Andhra Pradesh.
- **Tea** is a plantation crop and used as a major beverage in India.
- Black tea leaves are fermented whereas green tea leaves are not fermented.
- Tea leaves have rich content of caffeine and tannin.
- Tea is grown over the undulating topography of hilly areas and well drained soils in humid and sub-humid tropics and sub-tropics.

- In India, tea plantation started in 1840s in the Brahmaputra valley of Assam, which still is a major tea growing area in the country.
- With 28% of the world's total production, India is a leading producer of tea.
- India ranks third among tea exporting countries in the world after Sri Lanka and China.
- Assam accounts for about 53.2% of the total cropped area and contributes more than half of total production of tea in the country; West Bengal, and Tamil Nadu are the other leading tea producers.
- There are three varieties of **coffee** − *arabica, robusta, and liberica*.
- India generally grows superior quality of coffee i.e. arabica, which is in great demand in the International market
- India produces only about 3.2% coffee of world's total production and ranks 7th after Brazil, Vietnam, Colombia, Indonesia, Ethiopia, and Mexico.
- Coffee in India is cultivated in the highlands of the Western Ghats in the states of Karnataka, Kerala, and Tamil Nadu.
- Karnataka alone contributes more than two-third to the total production of coffee in India.
- New seed varieties of wheat (from Mexico) and rice (from Philippines) known as high yielding varieties (HYVs) were introduced during mid-1960s in India (Green Revolution).

Agricultural Problems

- About 57% of the land is covered by crop cultivation in India; however, in the world, the corresponding share is only about 12%.
- On the other hand, the land-human ratio in the country is only 0.31 ha, which is almost half of that of the world as a whole i.e. 0.59 ha.
- However, major problems of the Indian agriculture system are −
    - Dependence on erratic monsoon;
    - Low productivity;
    - Constraints of financial resources and indebtedness;
    - Lack of proper land reforms;

    - Small farm size and fragmentation of landholdings;
    - Lack of commercialization; under-employment; and
    - Degradation of cultivable land.
- Further, lack of development of rural infrastructure, withdrawal of subsidies and price support, and impediments in availing of the rural credits may lead to interregional and inter-personal disparities in rural areas.
- **Intensive Agricultural District Program** (IADP) and **Intensive Agricultural Area Program** (IAAP) were launched to overcome the agricultural problems in India.
- **Planning Commission of India** initiated agro-climatic planning in 1988 to induce regionally balanced agricultural development in the country.

Geography India - Mineral Resources

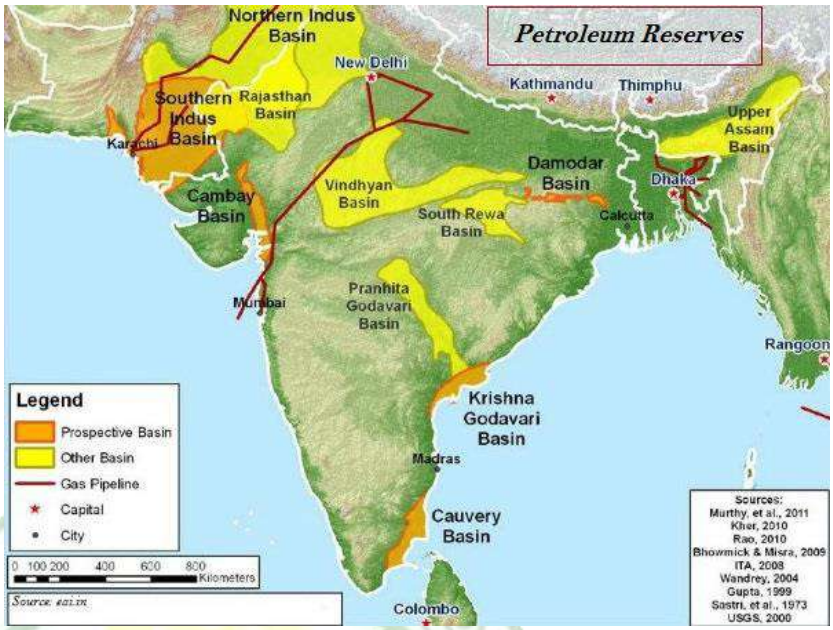
Introduction

- On the basis of chemical and physical properties, minerals are grouped as −
    - **Metallic** minerals and
    - **Non-metallic** minerals.
- Major examples of metallic minerals are iron ore, copper, gold, etc.
- Metallic minerals are further sub-divided as **ferrous** and **non-ferrous** metallic minerals.
- The minerals containing iron is known as ferrous and without iron is known as non-ferrous (copper, bauxite, etc.).
- Depending upon the origination, non-metallic minerals are either **organic** (such as fossil fuels also known as mineral fuels, which are derived from the buried animal and plant, e.g. such as coal and petroleum), or **inorganic** minerals, such as mica, limestone, graphite, etc.

Distribution of Minerals

- Minerals are unevenly distributed on the earth's surface.
- All minerals are exhaustible in nature, i.e., will exhaust after a certain time.

- However, these minerals take long time to form, but they cannot be replenished immediately at the time of need.
- More than 97% of **coal** reserves occur in the valleys of Damodar, Sone, Mahanadi, and Godavari rivers.



- **Petroleum** reserves in India are located in the sedimentary basins of Assam, Gujarat, and Mumbai High (i.e. off-shore region in the Arabian Sea – shown in the map given below).
- Some new petroleum reserves are also found in the Krishna-Godavari and Kaveri basins (shown in the image given above).

Mineral Belts in India

- Further, there are **three major mineral belts** in India namely –
    - The North-Eastern Plateau Region,
    - The South-Western Plateau Region, and
    - The North-Western Region.

North-Eastern Plateau Region

- The major areas of north-eastern plateau region are Chhotanagpur (Jharkhand), Odisha, West Bengal, and parts of Chhattisgarh.
- Iron ore, coal, manganese, bauxite, and mica are the major minerals of the north-eastern plateau region.

South-Western Plateau Region

- The south-western plateau region covers major parts of Karnataka, Goa, and contiguous Tamil Nadu uplands and Kerala.
- Major mineral resources of south-western plateau region are iron ore, manganese, and limestone.
- Kerala has deposits of monazite and thorium, and bauxite clay and Goa has deposits of iron ore.

North-Western Region

- The north-western region covers the areas of Aravalli in Rajasthan and parts of Gujarat.
- Major minerals of north-western regions are copper and zinc; other significant minerals include sandstone, granite, and marble, along with Gypsum and Fuller's earth deposits.
- In addition, Gujarat and Rajasthan, both have rich sources of salt.
- The **Himalayan belt** is also an important mineral belt, as it has rich deposits of copper, lead, zinc, cobalt, and tungsten.

Major Minerals

Following are the major minerals found in India −

Iron

- About 95% of total reserves of iron ore is found in the States of Odisha, Jharkhand, Chhattisgarh, Karnataka, Goa, Telangana, Andhra Pradesh, and Tamil Nadu.
- Sundergarh, Mayurbhanj, and Jhar are the major iron ore regions in Odisha and the important mines are Gurumahisani, Sulaipet, Badampahar (Mayurbhaj), Kiruburu (Kendujhar), and Bonai (Sundergarh).
- Noamundi (Poorbi Singhbhum) and Gua (Pashchimi Singhbhum) are important mines in Jharkhand.
- Dalli and Rajhara in Durg district are the important mines of Chhattisgarh.

- Sandur-Hospet area of Ballari district, Baba Budan hills, and Kudremukh in Chikkamagaluru district, and parts of Shivamogga are the important iron ore regions in Karnataka.
- The districts of Chandrapur, Bhandara, and Ratnagiri are the iron regions in Maharashtra.
- Other iron ore regions in India are Karimnagar and Warangal district of Telangana, Kurnool, Cuddapah, and Anantapur districts of Andhra Pradesh, and Salem and Nilgiris districts of Tamil Nadu.

Manganese

- Odisha is the leading producer of **Manganese**.
- Bonai, Kendujhar, Sundergarh, Gangpur, Koraput, Kalahandi, and Bolangir are the major manganese regions in Odisha.
- Dharwar, Ballari, Belagavi, North Canara, Shivamogga, Chitradurg, Tumkur, and Chikkmagaluru are major manganese regions in Karnataka.
- Nagpur, Bhandara, and Ratnagiri districts are the major regions of manganese in Maharashtra.
- Balaghat-Chhindwara-Nimar-Mandla, and Jhabua districts are the important manganese regions of Madhya Pradesh.

Bauxite

- Odisha is the largest producer of Bauxite in India.
- Kalahandi, Sambalpur, Bolangir, and Koraput are the leading producers of bauxite in Odisha.
- Lohardaga (Jharkhand) is rich in bauxite deposits.
- Amarkantak plateau has rich deposits of bauxite in Chhattisgarh.
- Katni-Jabalpur area and Balaghat are the major regions of bauxite in Madhya Pradesh.
- Kolaba, Thane, Ratnagiri, Satara, Pune, and Kolhapur in Maharashtra are important bauxite producers.

Copper

- Copper deposits are largely concentrated in Singhbhum district of Jharkhand, Balaghat district of Madhya Pradesh, and Jhunjhunu and Alwar districts of Rajasthan.

Mica

- Hazaribagh plateau of Jharkhand and Nellore district of Andhra Pradesh have deposits of high grade mica.
- Jaipur to Bhilwara and areas around Udaipur are the major mica-bearing regions of Rajasthan.
- Other mica-bearing regions are Mysore and Hasan districts of Karnataka; Coimbatore, Tiruchirapalli, Madurai, and Kanniyakumari of Tamil Nadu; Alleppey of Kerala; Ratnagiri of Maharashtra; Purulia and Bankura of West Bengal.

Geography India - Energy Resource

Introduction

- Major sources of energy in India are classified as −
    - Conventional sources (e.g. coal, petroleum, and nuclear power).
    - Non-conventional sources (e.g. solar energy, hydro energy, geo-thermal energy, etc.)
- Fossil fuel or conventional sources of energy are found exhaustible in nature and also not environment friendly; on the other hand, the non-conventional sources of energy such as solar energy, wind energy, geo-thermal energy, tidal energy, etc. are renewable sources of energy and they are also environment friendly (as they do not pollute environment).

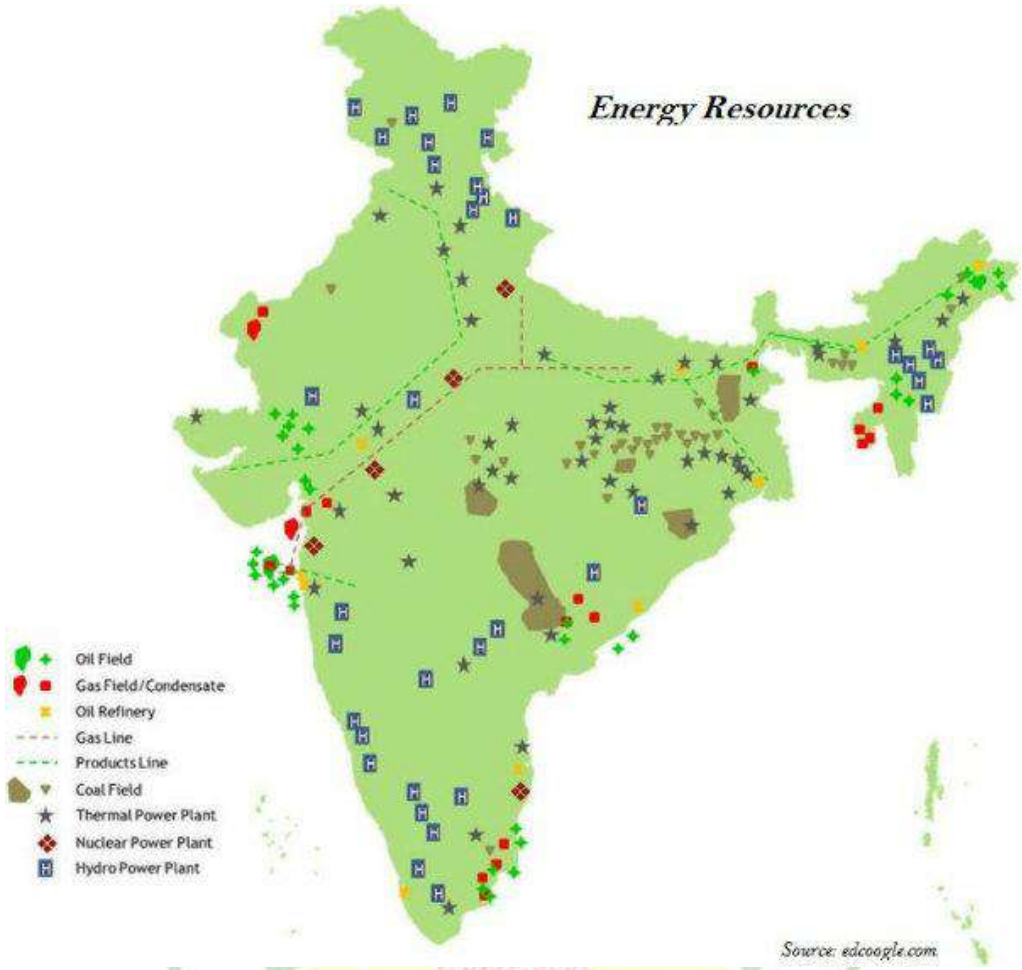
Coal

- About 80% of the coal deposits in India is of bituminous type and is of non coking grade.

- The most important *Gondwana* coal fields of India are located in Damodar Valley region.
- Raniganj, Jharia, Bokaro, Giridih, and Karanpura are major coalfields of Jharkhand-Bengal coal belt.
- Jharia is the largest coal field followed by Raniganj.
- Other important coal mines are Singrauli (partially in Madhya Pradesh and partially in Uttar Pradesh); Korba in Chhattisgarh; Talcher and Rampur in Odisha; Chanda–Wardha, Kamptee, and Bander in Maharashtra; Singareni in Telangana; and Pandur in Andhra Pradesh.
- Tertiary coalfields are largely located in Darangiri, Cherrapunji, Mewlong, and Langrin in Meghalaya; Makum, Jaipur, and Nazira in upper Assam; Namchik – Namphuk in Arunachal Pradesh; and Kalakot in Jammu and Kashmir.
- The brown coal or lignite are found in the coastal areas of Tamil Nadu, Pondicherry, Gujarat, and Jammu and Kashmir.

Petroleum

- Hydrocarbons of liquid and gaseous states varying in chemical composition, color, and specific gravity are collectively known as petroleum resource.
- Petroleum industries produce various by-products; for example, fertilizer, synthetic rubber, synthetic fiber, medicines, vaseline, lubricants, wax, soap, and cosmetics.
- Crude petroleum normally occurs in sedimentary rocks of the tertiary period.
- For the systematic oil exploration and production, the **Oil and Natural Gas Commission was set up in 1956**.
- Digboi, Naharkatiya, and Moran are important oil producing areas in Assam.
- Ankaleshwar, Kalol, Mehsana, Nawagam, Kosamba, and Lunej are the major petroleum producing regions in Gujarat.
- Located 160 km off Mumbai, Mumbai high, an offshore oilfield was discovered in 1973. Production of petroleum at the field was started in 1976.



- Krishna-Godavari and Kaveri basin on the east coast are significant regions of petroleum production.
- Oil extracted from the wells remains in crude oil form and contains many impurities; hence, it needs to be extracted in oil refineries.
- Based on destination, there are two types of oil refineries — oil-field based (e.g. Digboi) and market based (Barauni).
- To transport and develop the market for natural gas, the **Gas Authority of India Limited** was set up in 1984 (it is a **public sector undertaking**).
- Though natural gas reserves have been located along the petroleum reserves, but some exclusive natural gas reserves are found along the eastern coast of Tamil Nadu, Odisha, and Andhra Pradesh; as well as around Tripura, Rajasthan, and off-shore wells in Gujarat and Maharashtra.

Nuclear Energy

- Essential minerals used for the generation of nuclear energy are **uranium** and **thorium**.
- Geographically, uranium ores are found at many different locations along the Singbhum Copper belt.
- Other important uranium reserve regions are also found in Udaipur, Alwar, and Jhunjhunu districts of Rajasthan; Durg district of Chhattisgarh; Bhandara district of Maharashtra; and Kullu district of Himachal Pradesh.
- Thorium is mainly obtained from monazite and ilmenite, which is largely found along the coast of Kerala and Tamil Nadu.
- Palakkad and Kollam districts of Kerala have the world's largest monazite deposits (as shown in the image given above − larger view in insat image).
- **Atomic Energy Commission** was established in 1948 and the **Atomic Energy Institute at Trombay** was founded in 1954.
- However, the Atomic Energy Institute at Trombay was renamed as Bhabha Atomic Research Centre in 1967.
- The important nuclear power projects are located at Tarapur (Maharashtra); Rawatbhata near Kota (Rajasthan); Kalpakkam (Tamil Nadu); Narora (Uttar Pradesh); Kaiga (Karnataka); and Kakarapara (Gujarat).

Solar Energy

- Solar energy is 7% more effective than coal or oil-based plants and 10% more effective than nuclear plants.
- The western part of India has greater potential for the development of solar energy.

Other Sources of Energy

- The Ministry of Non-conventional Sources of Energy is responsible for the development of wind energy in India as the major source of renewable energy.
- **Ocean currents** are the store-house of infinite energy. Hence, India has great potential for the development of **tidal** energy.

- **Natural hot springs** and **geysers** are being used since medieval period, but in the present world, these could be potential sources of renewable energy.
- **Manikaran**, a hot spring in Himachal Pradesh is a major renewable source of energy in India.
- **Bio-energy** is the energy derived usually from the biological products, such as agricultural residues and other bio-waste.
- Bio-energy can be converted into electrical energy, heat energy, and gas for cooking.
- Okhla in Delhi presents a good example by producing bio energy from municipal waste.

Geography India – Industry

Introduction

- On the basis of size, capital investment, and labor force employed, industries are classified as large, medium, small scale, and cottage industries.
- On the basis of ownership, industries come under public sector, private sector, joint, and cooperative sector.
- Industries of strategic and national importance are usually in the public sector.
- Industries are also classified on the basis of the use of their products such as basic goods industries, capital goods industries, intermediate goods industries, and consumer goods industries.
- On the basis of raw materials used by the industries − industries are categorized as agriculture-based industries, forest-based industries, mineral-based industries, and industrially processed raw material-based industries.
- Location of industries is influenced by several factors like access to raw materials, power, market, capital, transport, and labor, etc.
- Establishment of iron and steel industry in Bhilai (Chhattisgarh) and Rourkela (Odisha) were based on decision to develop backward tribal areas of the country.

Iron and Steel Industry

- The major raw materials for the iron and steel industries are iron ore, coking coal, limestone, dolomite, manganese, and fire clay.
- Major iron and steel industries in India are −
    - The Tata Iron and Steel plant (TISCO);
    - The Indian Iron and Steel Company (IISCO);
    - Visvesvaraiya Iron and Steel Works Ltd. (VISL);
    - Rourkela Steel Plant;
    - Bhilai Steel Plant;
    - Durgapur Steel Plant; and
    - Bokaro Steel Plant.
- Some other major iron and steel industries are −
    - Vizag Steel Plant, in Vishakhapatnam in Andhra Pradesh is the first port based plant which started operating in 1992.
    - The Vijaynagar Steel Plant at Hosapete in Karnataka was developed by using indigenous technology.
    - The Salem Steel Plant in Tamil Nadu was commissioned in 1982.
- The **Rourkela Steel plant** was set up in the year 1959 in the Sundargarh district of Odisha in collaboration with Germany.
- The **Bhilai Steel Plant** was established in 1959 with Russian collaboration in Durg District of Chhattisgarh.
- **Durgapur Steel Plant** was established in 1962 in West Bengal, in collaboration with the government of the United Kingdom
- **Bokaro steel plant** was set up in 1964 at Bokaro with Russian collaboration.

Cotton Industry

- India was famous worldwide for the production of *muslin*, a very fine variety of cotton cloth, calicos, chintz, and other different varieties of fine cotton cloth.
- In **1854**, the first modern cotton mill was established in Mumbai.
- At present, the major centers of the cotton textile industry are Ahmedabad, Bhiwandi, Solapur, Kolhapur, Nagpur, Indore, and Ujjain.

- Tamil Nadu has the largest number of mills; however, most of them produce yarn rather than cloth.
- Davangere, Hubballi, Ballari, Mysuru, and Bengaluru are important cotton growing regions in Karnataka.

Sugar Industry

- With more than one-third of the total production, Maharashtra has emerged as a leading sugar producer in the country.
- Uttar Pradesh is the second largest producer of sugar.

Petrochemical Industry

- Many items are derived from crude petroleum, which provide raw materials for many new industries; hence, these are collectively known as petrochemical industries.
- Petrochemical industries are categorized as polymers, synthetic fibers, elastomers, and surfactant intermediate industries.
- Mumbai is the hub of petrochemical industries.
- Three organizations, which are working in the petrochemical sector under the administrative control of the **Department of Chemicals** and **Petrochemicals** are −
    - The Indian Petrochemical Corporation Limited (IPCL);
    - The Petrofils Cooperative Limited (PCL);
    - The Central Institute of Plastic Engineering and Technology (CIPET).
    - The **National Organic Chemicals Industries Limited** (NOCIL), established as private sector in 1961.

Information Technology

- The Information Technology (IT) revolution opened up new possibilities of economic and social transformation.
- The IT software and services industry account for almost 2% of India's GDP.

Industrial Policy

- The new **Industrial Policy** was implemented in **1991**.

- The new industrial policy has three main dimensions − liberalization, privatization, and globalization.
- Within this new industrial policy, measures initiated are − abolition of industrial licensing; free entry to foreign technology; foreign investment policy; access to capital market; open trade; abolition of phased manufacturing program; and liberalized industrial location program.
- Globalization means integrating the economy of the country with the world economy.

Industrial Regions

- India has **eight** major industrial regions namely (as shown on the map given below)−
    - Mumbai-Pune Region,
    - Hugli Region,
    - Bengaluru-Tamil Nadu Region,
    - Gujarat Region,
    - Chhotanagpur Region,
    - Vishakhapatnam-Guntur Region,
    - Gurgaon-Delhi-Meerut Region, and
    - Kollam-Thiruvananthapuram Region.

Geography India – Transport

Introduction

- People use various methods to move goods, commodities, and ideas from one place to another.
- Land, water, and air are the major modes of transportation.
- Land transportation includes road, rail, and pipeline.

Road

- With a total length of about 42.3 lakh km, India has one of the largest road networks in the world.
- About 85% of passenger and 70% of freight traffic are carried by roads.
- Sher Shah Suri built the *Shahi* (Royal) road to strengthen and consolidate his empire from the Indus Valley to the Sonar Valley in Bengal.
- This road was later renamed as the Grand Trunk (GT) Road during the British period, connecting Calcutta and Peshawar.
- At present, GT Road extends from Amritsar to Kolkata. It is bifurcated into 2 segments − (a) National Highway (NH)-1 from Delhi to Amritsar, and (b) NH- 2 from Delhi to Kolkata.
- Roads have been classified as National Highways (NH), State Highways (SH), Major District Roads, and Rural Roads.
- The National Highways Authority of India (NHAI), which is an autonomous body under the Ministry of Surface Transport was operationalized in 1995.
- The main roads connecting two or more states are constructed and maintained by the Central Government. These roads are known as the National Highways.
- The NHAI is responsible for the development, maintenance, and operation of National Highways.
- The National Highways constitute only 1.67 per cent of the total road length, but carry about 40 per cent of the road traffic.
- **Golden Quadrilateral** is 5,846 km long 4/6 lane, high density traffic corridor that connects India's four big metro cities : Delhi-Mumbai-Chennai-Kolkata.
- With 4,076 km long road, **North-South Corridor** aims at connecting Srinagar in Jammu and Kashmir with Kanyakumari in Tamil Nadu.
- With 3,640 km of road length, the **East-West Corridor** has been planned to connect Silchar in Assam with the port town of Porbandar in Gujarat.
- State Highways are constructed and maintained by the state governments.
- The State Highways join the state capitals with district headquarters and other important towns.

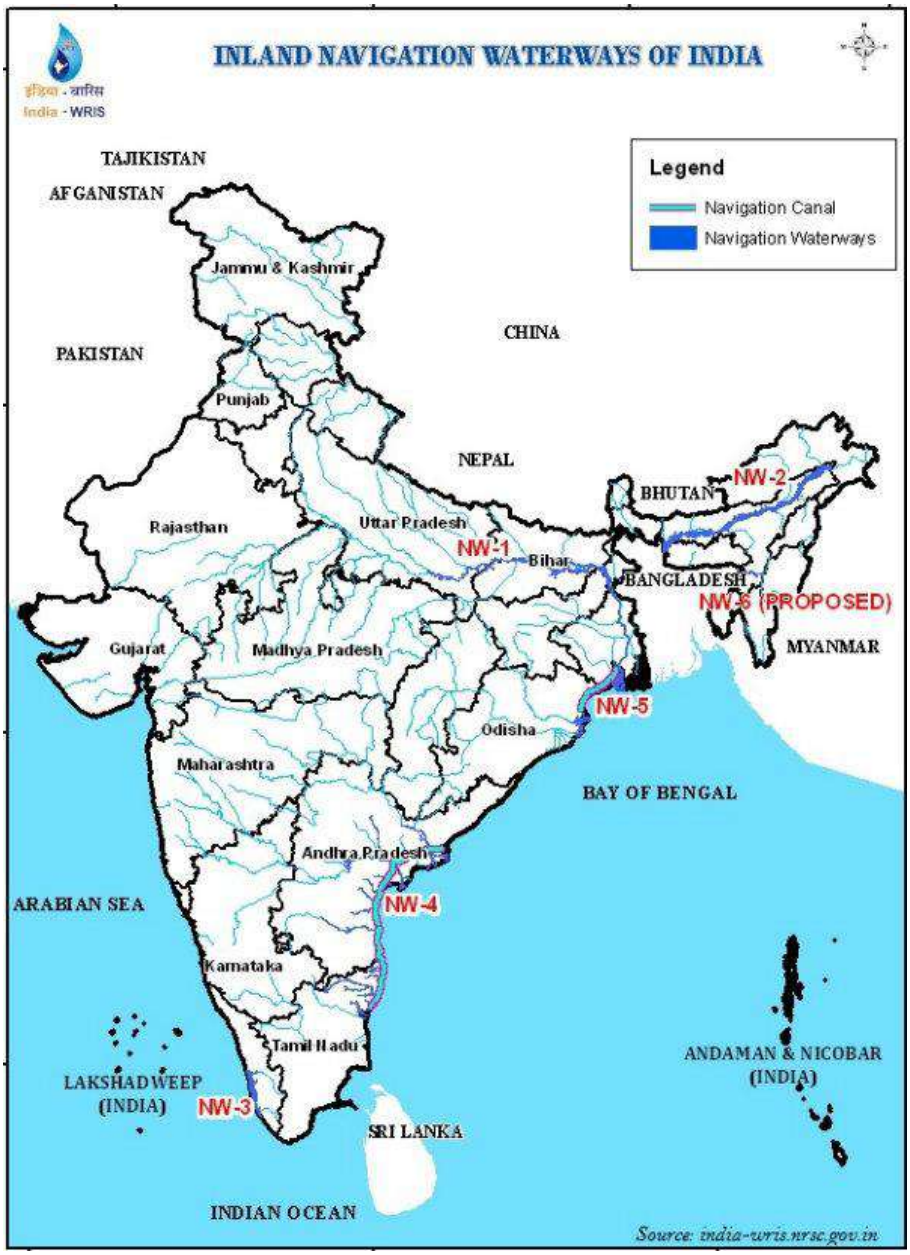
- All State Highways collectively constitute about 4 per cent of the total road length in the country.
- District roads are the roads connecting the District Headquarters and the other important nodes in the district.
- District roads account about 60.83 per cent of the total road length of the country.
- Further, about 80 per cent of the total road length in India come under rural roads.
- Other roads include Border Roads and International Highways.
- The **Border Road Organization** (BRO) was established in May 1960 for the acceleration of economic development and strengthening defense preparedness through rapid and coordinated improvement of strategically important roads along the northern and north-eastern boundary of the country.
- BRO has constructed roads in high altitude mountainous terrain joining Chandigarh with Manali (Himachal Pradesh) and Leh (Ladakh), which runs at an average altitude of 4,270 meters above the mean sea level.
- The road density is only 12.14 km in Jammu and Kashmir, whereas in Kerala it is 517.77 km.

Railways

- Railways was introduced to India in 1853, when a line was constructed from Bombay to Thane covering a distance of 34 km.
- The total length of Indian Railways network is 64460 km. (March 2011).
- Indian Railways system has been divided into sixteen zones (as shown in the map given below − the lines shown in different colors illustrate the regions of respective zones).
- India has three system of railways − broad gauge (the distance between rails is 1.676 meter); meter gauge (the distance between rails is one meter); and narrow gauge (the distance between the rails is 0.762 meter or 0.610 meter).
- Konkan Railway constructed along the western coast in 1998, is a landmark achievement of Indian Railway.
- Konkan Railway is 760 km long rail route connecting Roha in Maharashtra to Mangalore in Karnataka.

- Konkan Railway crosses 146 rivers, streams, nearly 2000 bridges, and 91 tunnels.
- Asia's largest tunnel which is about 6.5 km long, is constructed on the Konkan railway route near Ratnagiri in Maharashtra.

Waterways



- Water transport can be divided into two major categories – **inland waterways** and **oceanic waterways**.

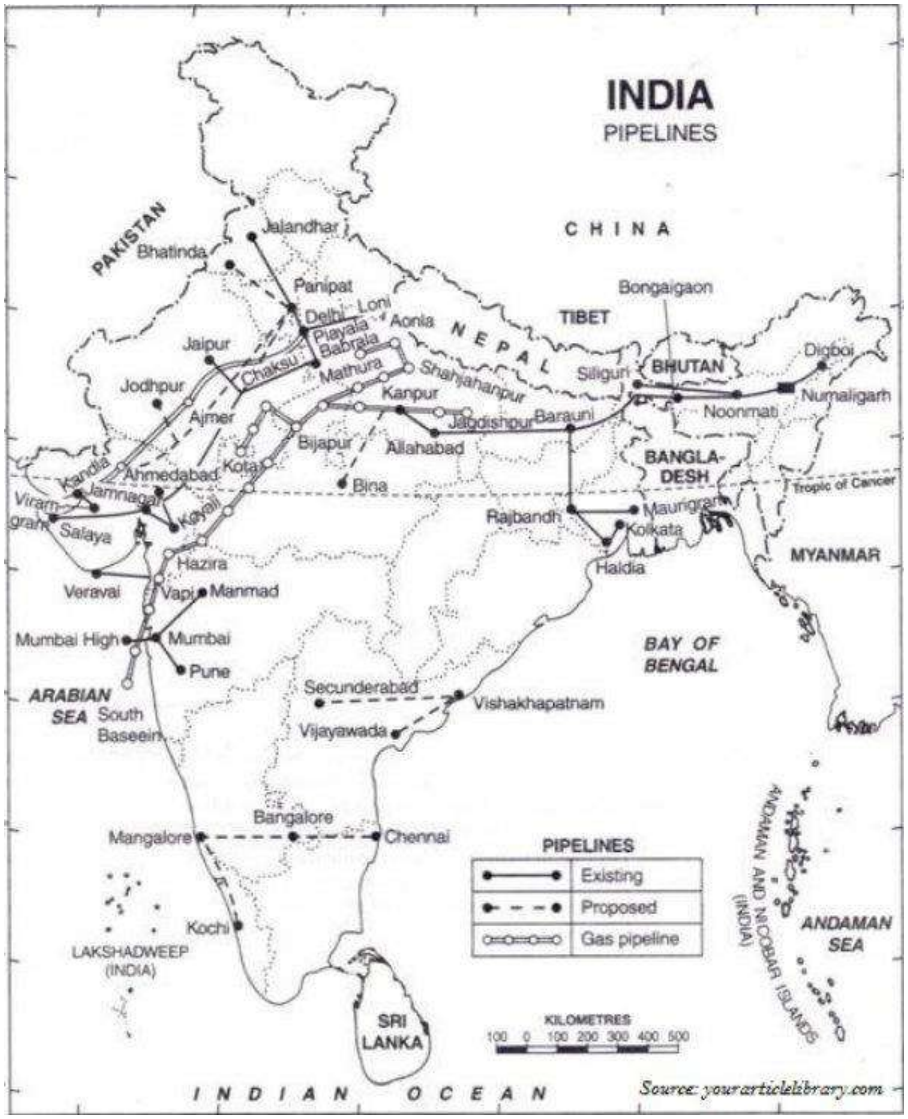
- India has 14,500 km of navigable waterways, contributing about 1% to the country's transportation.
- Currently, 5,685 km of major rivers is navigable by mechanized flat bottom vessels.
- **Inland Waterways Authority** was set up in 1986 for the development, maintenance, and regulation of national waterways in the country.
- Major National Waterways (NW) of India are **NW 1** (Allahabad-Haldia covers 1,620 km); **NW 2** (Sadiya-Dhubri covers 891 km); and **NW 3** (Kottapuram Kollam covers 205 km).
- Besides, **NW 4** covers specified stretches of rivers Godavari and Krishna along with Kakinada Puducherry; the total distance is 1078 km.
- **NW 5** covers specified stretches of river Brahmani along with Matai River, delta channels of Mahanadi and Brahmani rivers and East Coast canals; the total distance is 588 km.
- With 12 major and 185 minor ports, India has a vast coastline of approximate 7,517 km, including islands.
- Roughly 95% of India's foreign trade by volume and 70% by value moves through ocean routes.

Airways

- Air transport in India marked its beginning in 1911 with the commencement of airmail over a little distance of 10 km between Allahabad and Naini.

- The **Airport Authority of India** is accountable for providing safe, efficient air traffic, and aeronautical communication services in the Indian Air Space.
- **Pawan Hans** is the helicopter service operating in hilly areas and is widely used by tourists in north-eastern regions.

Pipe line



- Asia's first cross country pipeline covering a distance of 1,157 km was constructed by Oil India Limited (OIL) from **Naharkatiya oilfield in Assam to Barauni refinery in Bihar**, which further extended up to Kanpur in 1966.
- Mumbai High-Koyali and Hazira-Vijaipur-Jagdishpur (HVJ) are the most important pipelines in India.

- 1256 km long pipeline between *Salaya* (Gujarat) and *Mathura* (U.P.) has been constructed recently.

Geography India – Communications

Radio

- Radio broadcasting was started in India in 1923 by the **Radio Club of Bombay**.
- Government took control over radio broadcasting in **1930** and established the Indian Broadcasting System.
- **All India Radio** was constituted in 1936 and it came to be known as ***Akashwani*** from 1957.
- Over a period of time, **All India Radio** started broadcasting a variety of programs related to information, education, and entertainment.
- Among all programs, news bulletins were also broadcasted at specific occasions like the session of parliament and state legislatures.

Television

- Television first went on air in **1959**.
- Television broadcasting has emerged as an effective audio-visual medium for disseminating information as well as educating masses.
- By 1972, many Television broadcasting centers became operational throughout the country.
- In 1976, TV was separated from All India Radio (AIR) and got a separate identity as ***Doordarshan*** (DD).

Indian Satellites

- With the advent of satellites, the Indian Communication System has revolutionized the mode of communication.

- After **INSAT-IA** (National Television-DD1) became operational, Common National Programs (CNP) were started for the entire network. Services were also extended to the backward and rural areas of the country.
- On the basis of configuration and purposes, satellite system in India can be grouped as –
    - **Indian National Satellite System** (INSAT) and
    - **Indian Remote Sensing satellite system** (IRS).

- The INSAT, which was established in 1983, is a multipurpose satellite system specialized for telecommunication, meteorological observation, and for many other data and programs.
- The IRS satellite system became operational only after the launch of IRS-IA in March 1988 from **Vaikanour, Russia**.
- However, India has also developed its own Launch Vehicle **PSLV** (Polar Satellite Launch Vehicle).
- The National Remote Sensing Centre (NRSC) at Hyderabad is responsible for acquisition, processing, supply of aerial and satellite remote sensing data and continuously exploring the practical uses of remote sensing technology.

Geography India - Foreign Trade

Introduction

- In 1950-51, India's external trade was worth Rs.1, 214 crores, which rose to Rs. 22, 09,270 crores in 2009-10.
- Though an increase has been registered in floricultural products, fresh fruits, marine products, and sugar, there has been a great decline in the exports of traditional items such as coffee, spices, tea, pulses, etc.
- Engineering goods, gems, and jewelry contribute to a larger extent to India's foreign trade.

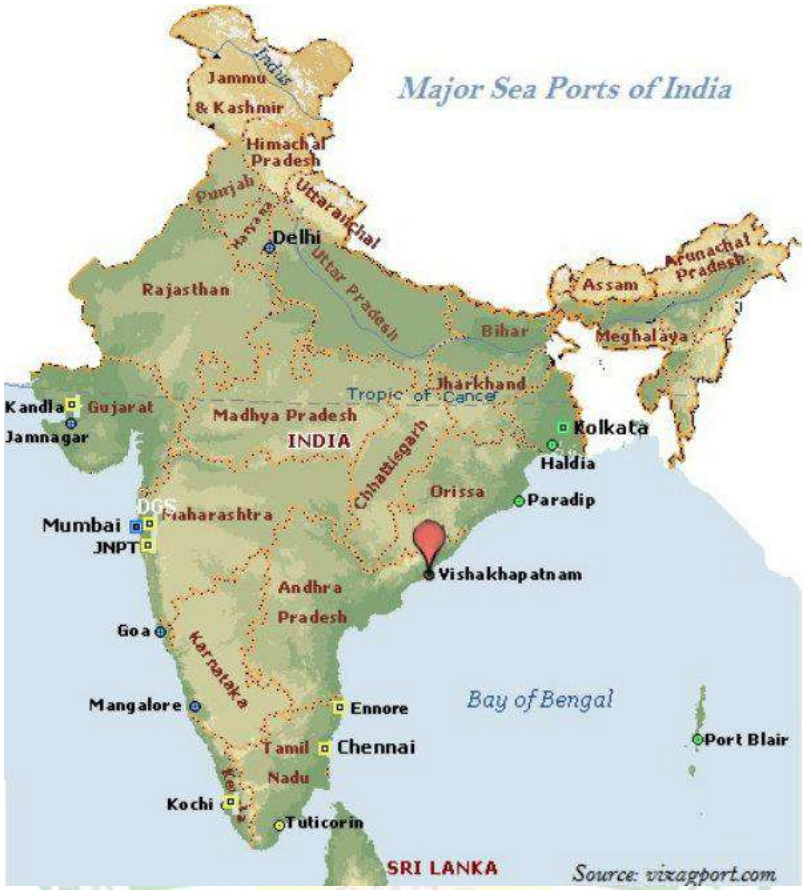
- With the Green Revolution in 1970s, the import of food grains declined, but it was replaced by fertilizers and petroleum.
- Other major items of India's import include pearls and semi-precious stones, gold and silver, metalliferous ores and metal scrap, non-ferrous metals, electronic goods, etc.

Trading Partners

- The share of Asia and ASEAN in total trade (with India) is increased from 33.3 per cent in 2000-01 to 57.3 per cent in the first half of 2011-12, while that of Europe and America fell from 42.5 per cent to 30.8 per cent respectively.
- The USA, which was in first position in 2003-04 has been relegated to third position in 2010-11.
- The UAE is becoming India's largest trading partner, followed by China (2010-11).
- Sea route is the major trading route for the Indian trade.

Sea-Ports

- At present, India has 12 major ports and 185 minor or intermediate ports.
- The **12 major ports** handled about 71 per cent of the country's oceanic traffic in the year 2008-09.
- The capacity of Indian ports increased from 20 million tons of cargo handling in 1951 to more than 586 million tons in 2008-09.
- Kandla Port located in the Gulf of Kachchh, on the west coast of Gujarat has been developed as a major port.
- Kandla port is specially designed to receive large quantities of petroleum and petroleum products and fertilizer.
- Mumbai has a natural harbor and it is the biggest seaport of the country.

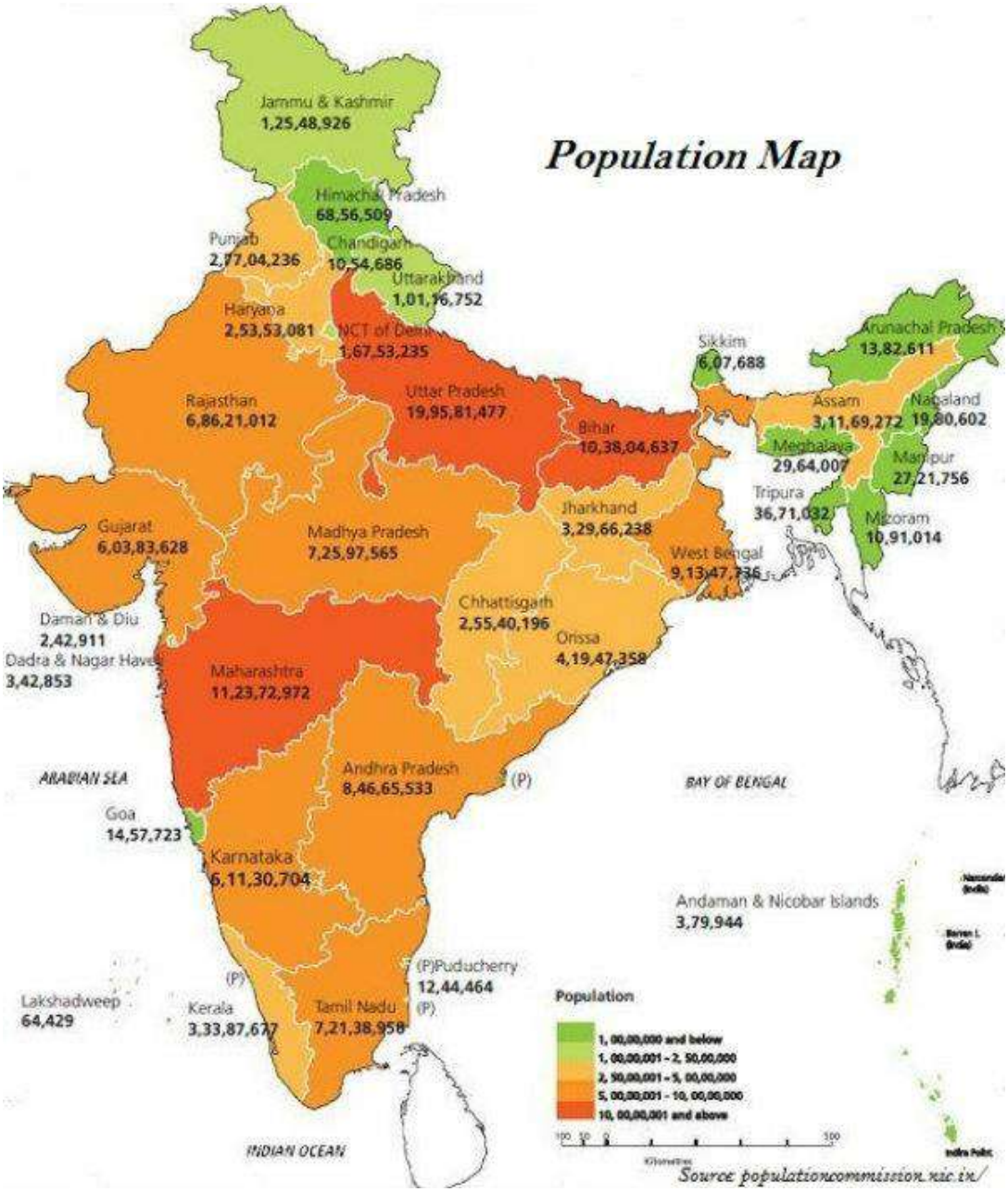


- Mumbai port is situated closer to the general routes from the countries of Middle East, Mediterranean countries, North Africa, Europe, and North America where the major share of country's overseas trade is carried out.
- Jawaharlal Nehru Port at Nhava Sheva, Maharashtra was developed as a **satellite port** to relieve the pressure on the Mumbai port.
- Jawaharlal Nehru Port is the largest container port in India.
- Marmagao Port, situated at the entrance of the Zuari estuary, is a natural harbor port in Goa.
- New Mangalore Port is located in the state of Karnataka; it caters to the export of iron-ore and iron-concentrates along with fertilizers, petroleum products, edible oils, coffee, tea, wood pulp, yarn, granite stone, molasses, etc.
- Kochchi Port, situated at the head of *Vembanad Kayal* is a natural harbor port; it is popularly known as the *"Queen of the Arabian Sea."*
- Kolkata Port is a **riverine port** located on the Hugli River; it is 128 km inland from the Bay of Bengal.

- Haldia Port is located 105 km downstream from Kolkata.
- Haldia Port has been constructed to reduce the congestion at Kolkata port.
- Haldia Port handles bulk cargo like iron ore, coal, petroleum, petroleum products and fertilizers, jute, jute products, cotton and cotton yarn, etc.
- Paradip Port is situated on the Mahanadi delta, about 100 km from Cuttack, Odisha.
- **Paradip Port** has the **deepest harbor** especially suited to handle very large vessels.
- Paradip Port handles large-scale export of iron-ore.
- Located in Andhra Pradesh, Visakhapatnam Port is a **land-locked harbor**, connected to the sea by a channel cut through solid rock and sand.
- Visakhapatnam Port handles iron-ore, petroleum, and general cargo.
- Chennai Port is one of the oldest ports on the eastern coast of India.
- Ennore is a newly developed port in Tamil Nadu. It has been constructed 25 km north of Chennai to relieve the pressure on Chennai port.
- Tuticorin Port is also an important port located in Tamil Nadu. It handles the movement of coal, salt, food grains, edible oils, sugar, chemicals, and petroleum products.
- There were **19** international airports functioning in the country (February 2013); however, currently, it is 20.
- Airways have the advantage of taking the least time for carriage and handling high value or perishable goods over long distances; however, it is expensive and hence not suitable for the heavy and other machinery products.

Geography India - The People

Introduction

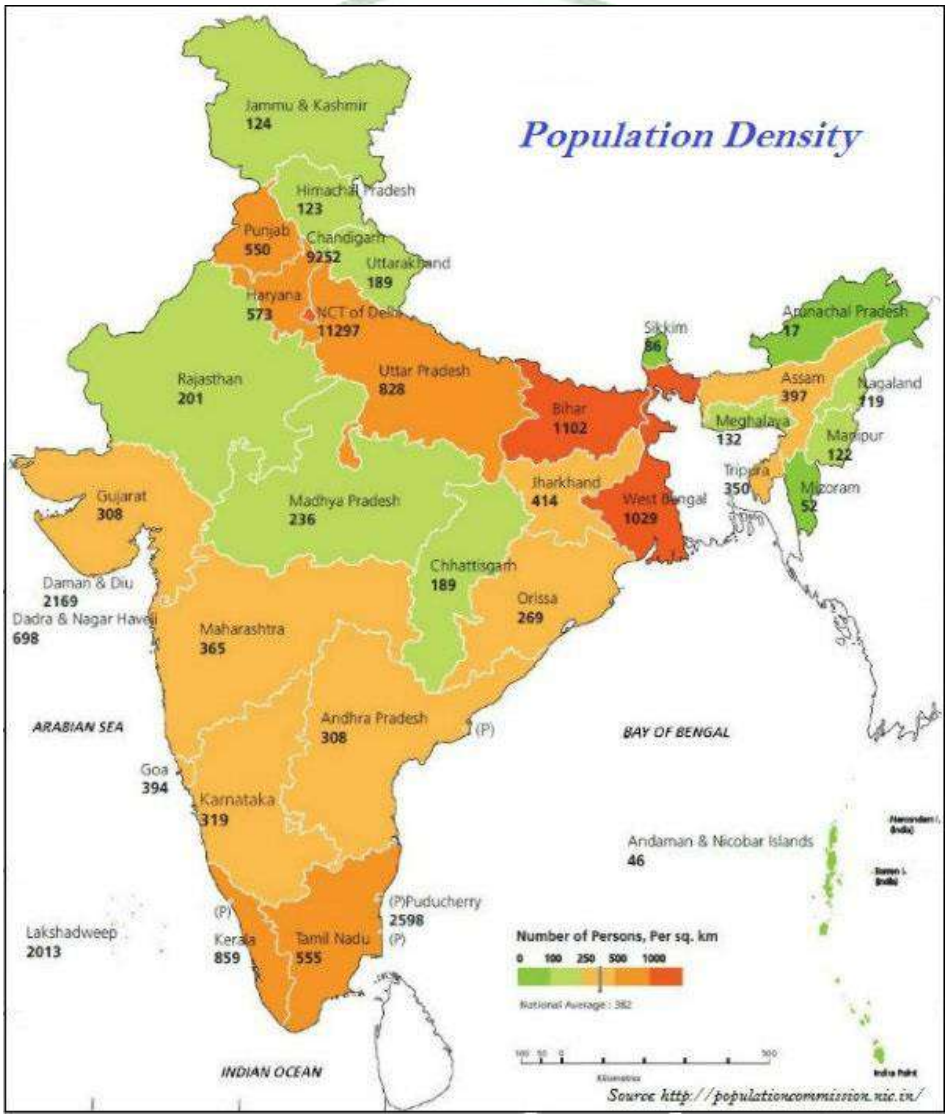


- Throughout the country, India has a highly uneven pattern of the population distribution.
- Uttar Pradesh has the highest population followed by Maharashtra, Bihar, and West Bengal.

- Terrain, climate, and availability of water largely determine the pattern of the population distribution. However, socio-economic and historical factors also affect the pattern of population distribution.
- As per the 2011 census, urban population of India was 31.16% (the details of major urban center is illustrated in the following map).
- As per census 2011, the annual population growth rate is **1.64** percent.

Population Density

- The **density** of population is expressed as the number of persons per unit area.



- The density of population in India as per 2011 census is **382 persons** per square km.

- Bihar with **1102** people per square km is the most densely populated state of India followed by West Bengal (1029) and Uttar Pradesh (828).
- **Physiological density** refers to the total population divided by the net cultivated area.
- **Agricultural density** refers to the total agricultural population divided by the net cultivable area.
- **Agricultural population** includes cultivators and agricultural laborers and their family members.

Phases of Population Growth

India's population can be analyzed in four phases −

- Phase I, the period between 1901 and 1921 − This period is known as **stagnancy period**, as the birth rate and death rate both were high and the population growth rate was very slow.
- Phase II, the period between 1921 and 1951 − It was the period of **steady population growth**.
- Phase III, the period between 1951 and 1981 − It was the period of **population explosion** in India.
- Phase IV, from 1981 to till date − Population growth rate though still high, but reflecting a decreasing trend.

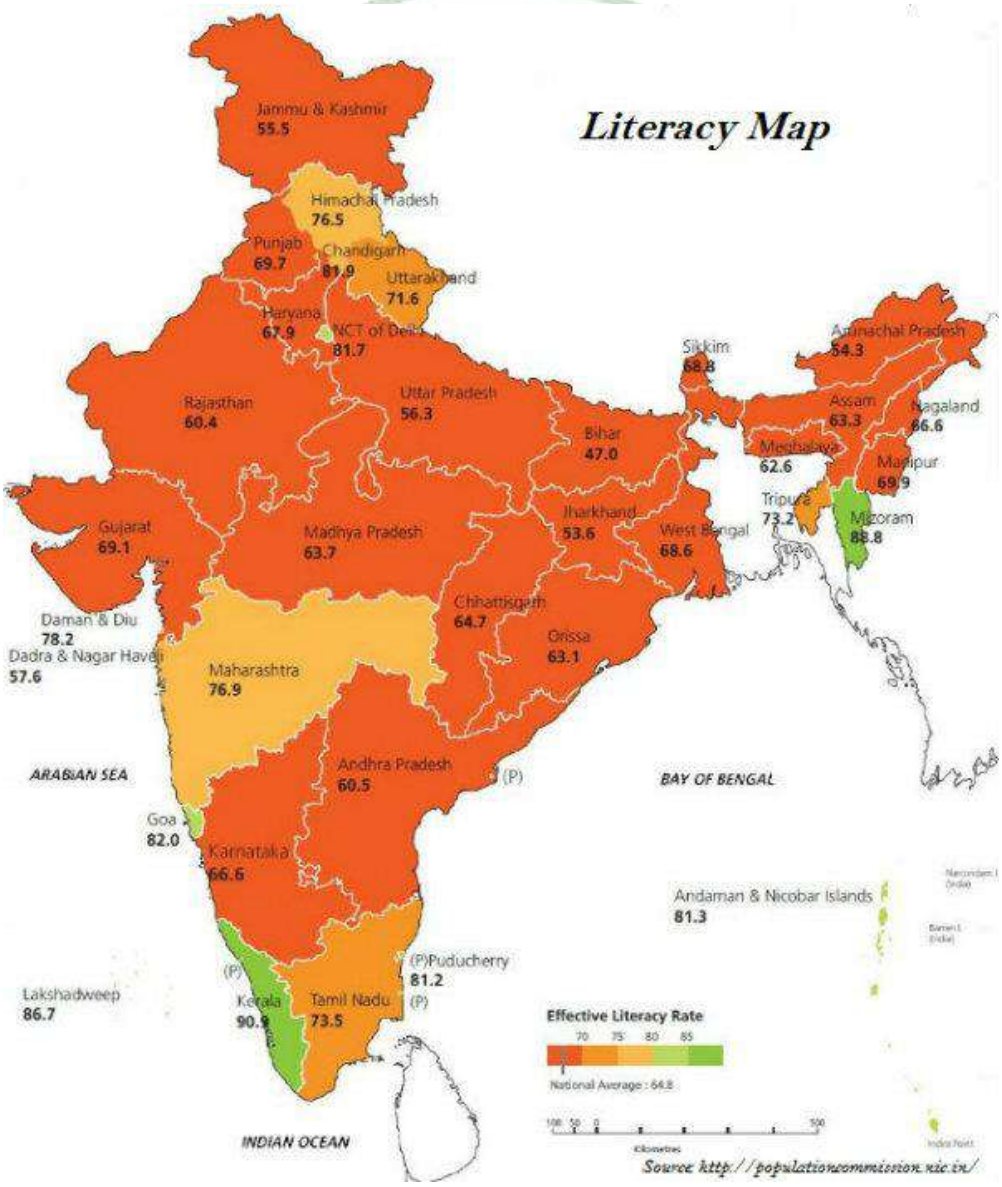
Population Composition

- As per census 2011, **68.8 per cent** of the total population lives in village and **31.2 per cent** of the population lives in urban areas.
- Considering the economic status, population can be divided into categories such as **main workers, marginal workers,** and **non-workers**.
- As per the census 2011, main workers and marginal workers collectively constitute only about 39.8 percent of total population; rest are non-workers.
- About **54.6 per cent** of the total working population are cultivators and agricultural laborers

- About 41.6 % are other workers, such as non-household industries, trade, commerce, construction, repair, and other services.
- The number of female workers is relatively high in the primary sector.
- The proportion of workers in agricultural sector in India has shown a declining trend over the last few decades; in 2001, it was 58.2%, whereas, in 2011, it was 54.6%.

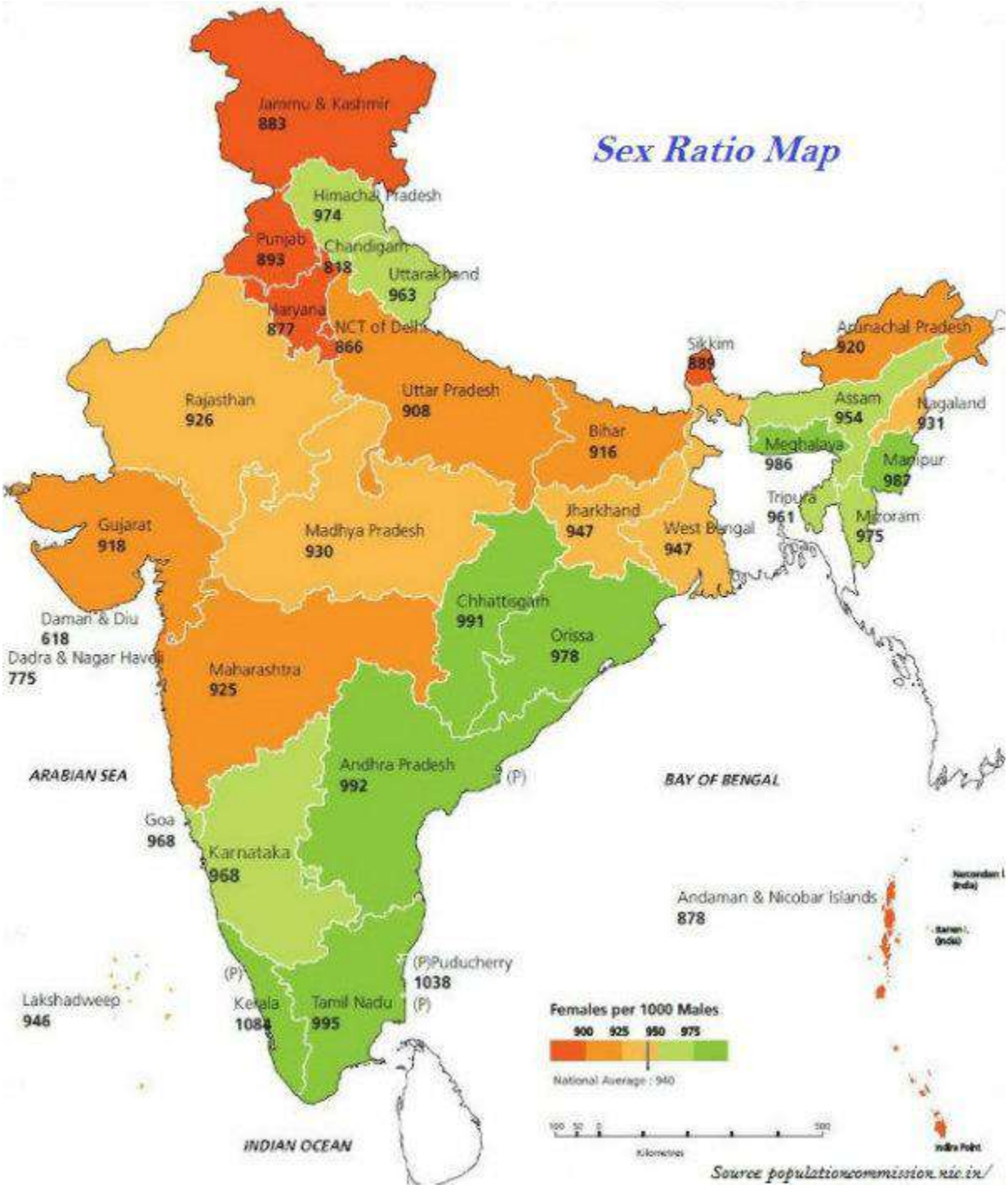
Literacy

- As per the 2011 census, literacy rate of India was 74.04% (the details of literacy rate is illustrated in the following map − state-wise).



Sex Ratio

- As per the 2011 census, sex ratio of India was 940 females per 1000 males (the details of sex ratio is illustrated in the following map − state-wise).



Languages

- In India, there are **22 scheduled languages** and hundreds of non-scheduled languages.
- Among the scheduled languages, Hindi is the highest spoken language and Kashmiri and Sanskrit have the least number of speakers.

Family	Sub-Family	Spoken Region
Austric (Nishada) 1.38%	Austro-Asiatic Austro-Nesian	Meghalaya, Nicobar Islands, West Bengal, Bihar, Odisha, Assam, Madhya Pradesh, Maharashtra
Dravidian (Dravida) 20%		Tamil Nadu, Karnataka, Kerala, Andhra Pradesh, M.P., Odisha, Maharashtra, Bihar
Sino-Tibetan (Kirata), 0.85%	Tibeto–Myanmari Siamese-Chinese	Jammu & Kashmir, Himachal Pradesh, Sikkim, Arunachal Pradesh, Assam, Nagaland, Manipur, Mizoram, Tripura, Meghalaya
Indo–European (Aryan) 73%	Indo-Aryan	Jammu & Kashmir, Jammu & Kashmir, Punjab, Himachal Pradesh, U.P., Rajasthan, Haryana, M.P., Bihar, Odisha, West Bengal, Assam, Gujarat, Maharashtra, Goa.

Religions

- Religion is one of the most integral parts of the population composition of India.
- More than 80 percent of the population comprises of Hindus followed by Muslims, Christians, Sikhs, Buddhists, and Jains.

Geography India – Settlement

Introduction

- A cluster of dwellings of any type and size where human beings live is known as human settlement.
- On the basis of size and type, patterns of human settlement are studied; hence, a settlement could be very small (e.g. hamlet) and could be very large (e.g. metropolitan city).
- The sparsely populated settlement whose main occupation is agricultural and other primary sector activities, is known as village.
- Large and densely populated settlement whose main occupational specialization is in tertiary activities is known as urban settlement.

Patterns of Settlement

The pattern of human settlement is practically influenced by −

- **Physical features** (e.g. relief feature, climate, and availability of water);
- **Cultural and ethnic factors** (e.g. social structure, caste, and religion);
- **Security factors** (e.g. defence against thefts, robberies, etc.).

Categories of Settlement

- Based on above discussed factors, human settlement is categorized as −
    - Clustered,
    - Agglomerated or nucleated,
    - Semi-clustered or fragmented,
    - Hamleted, and
    - Dispersed or isolated.
- The settlement in which the houses are closely built up and compact is known as **clustered settlement**. The shape of clustered settlement normally varies from rectangular, radial, to linear.
- Clustered settlement in India normally found in fertile alluvial plains and in the northeastern states.

- The settlement, clustering in a restricted area of dispersed settlement normally looks like **semi-clustered**. Examples of such settlement can be seen in Gujarat plain and some parts of Rajasthan.
- Some settlement is fragmented into several units and physically separated from each other is known as **hamleted** settlement. Examples of hamleted settlement can be seen in the middle and lower Ganga plain, Chhattisgarh and lower valleys of the Himalayas.
- The isolated settlement is known as **dispersed** settlement. Examples of such settlement can be seen in parts of Meghalaya, Uttaranchal, Himachal Pradesh and Kerala have this type of settlement.

Types of Urban Settlement

- Like rural settlement, urban settlements have also been developed during the ancient period itself.
- Based on **Time, Location,** and **Function,** Urban Settlement is categorized as −
    - Ancient City
    - Medieval City
    - Modern City
    - Administrative City/Town
    - Industrial City
    - Transport City
    - Commercial City
    - Mining City
    - Cantonment City
    - Educational City
    - Religious City
    - Tourists' City
- Varanasi, Prayag (Allahabad), Pataliputra (Patna), Madurai, etc. are the examples of ancient city.
- Delhi, Hyderabad, Jaipur, Lucknow, Agra, Nagpur, etc. are the examples of medieval city.

- Surat, Daman, Panaji, Pondicherry, etc. are the examples of modern city.
- Chandigarh, Bhubaneswar, Gandhinagar, Dispur, etc. are the cities developed after the independence of India.
- Ghaziabad, Rohtak, Gurgaon, etc. are the satellite towns that have been developed around Delhi.
- The town or cities performing administrative works are categorized as **administrative** towns/cities. For example, the national capital (New Delhi) and the capital of all states and Union Territories are the administrative towns/cities.
- The towns/cities that developed because of the industrial development are known as **industrial** towns/cities. For example, Mumbai, Salem, Coimbatore, Modinagar, Jamshedpur, Hugli, Bhilai, etc.
- The towns/cities primarily engaged in export and import activities are known as **transport** towns/cities. For example, Kandla, Kochchi, Kozhikode, Vishakhapatnam, etc.
- The towns/cities primarily engaged in trade and business are known as **commercial** towns. For example, Kolkata, Saharanpur, Satna, etc.
- The towns that developed because of the mining activities are known as **mining** towns. For example, Raniganj, Jharia, Digboi, Ankaleshwar, Singrauli, etc.
- The towns that developed as garrison towns are known as **Garrison Cantonment** towns. For example, Ambala, Jalandhar, Mhow, Babina, Udhampur, etc.
- The towns that developed because of the development of educational institutions are known as **educational** towns. For example, Roorkee, Varanasi, Aligarh, Pilani, Allahabad etc.
- Some towns mark their development with the existence of religious shrines. Such towns are known as **religious** towns. For example, Varanasi, Mathura, Amritsar, Madurai, Puri, Ajmer, Pushkar, Tirupati, Kurukshetra, Haridwar, Ujjain, etc.
- The towns that developed because of the influx of tourists are known as **tourists'** towns. For example, Nainital, Mussoorie, Shimla, Pachmarhi, Jodhpur, Jaisalmer, Udagamandalam (Ooty), Mount Abu, etc.

Modern Indian Cities

- Based on the population size, the census of India classifies urban centers into **six** classes (see the table given below).

S.No.	Classes & Population
1	**Class I** 100,000 and above
2	**Class II** 50,000 to 99,999
3	**Class III** 20,000 to 49,999
4	**Class IV** 10,000 to 19,999
5	**Class V** 5,000 to 9,999
6	**Class VI** less than 5000

- The cities with population beyond five million are known as **mega cities**.
- Urban agglomeration forms in a situation when a town and its adjoining urban areas outgrowth, or two or more contiguous towns with or without their outgrowth, or a city and one or more adjoining towns with their outgrowth together forming a contiguous spread.
- More than 60 per cent of urban population in India lives in Class I towns.
- Out of total 423 cities, 35 cities/urban agglomerations are metropolitan cities and six of them are mega cities.

Geography India – Migration

Introduction

- During colonial period (i.e. British period) millions of the indentured laborers were sent to Mauritius, Caribbean islands (Trinidad & Tobago and Guyana), Fiji, and South Africa by British Government largely from the states of Uttar Pradesh and Bihar.
- All such migrations were covered under time-bound contracts known as **Girmit Act** (Indian Emigration Act).
- The recent wave of migrants consists of professionals including software engineers, doctors, engineers, management consultants, financial experts, and media persons to countries like USA, Canada, UK, Australia, New Zealand, Germany, etc.

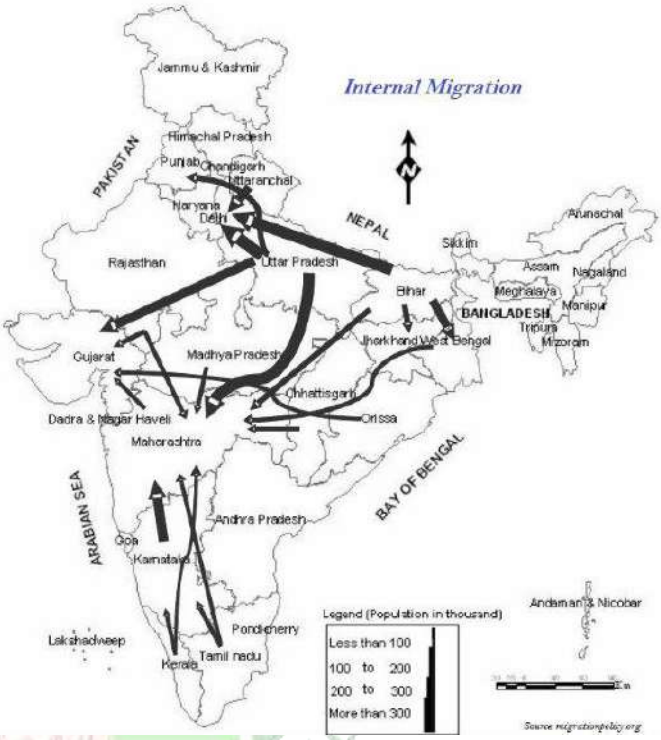
Migration Facts

- The first major modification was done in 1961 Census, as two additional components i.e. **place of birth** (village or town) and **duration of residence** (if born elsewhere) were added.
- Further, in 1971, another component added i.e. on place of last residence and duration of stay at the place of enumeration.
- In 1981, Information on reasons for migration were incorporated.
- According to 2001 census, out of total 1,029 million population, 307 million (30 per cent) were reported as migrants in terms of place of birth.
- Under the intra-state migration, numbers of female migrants are more than male (marriage related migration).
- As per the census 2001, India has recorded that more than 5 million persons have migrated to India from other countries; largely, from the neighboring countries including Bangladesh, Nepal, and Pakistan.
- As per the census 2001, there are about 20 million people of Indian Diaspora, spread across the 110 countries of the world.
- In terms of **in-migration**, Maharashtra occupied the first place (2.3 million net in-migrants), followed by Delhi, Gujarat, and Haryana.

- On the other hand, in terms of **out-migration**, Uttar Pradesh (-2.6 million) and Bihar (-1.7 million) were the top states.
- In terms of the **urban agglomeration** (UA), Greater Mumbai had received the maximum number of in-migrants.

Causes of Migration

- Causes of migration are categorized as **'push factor'** and **'pull factor'**.
- **Push factors** force people to migrate; for example, unemployment, lack of infrastructure (such as hospital, education institutions, etc.), natural disasters (such as flood, drought, earthquake, cyclone, etc.), local conflicts, war, etc.
- **Pull factors** attract people from different places; for example, better opportunities for education and employment; better health facilities; and various sources of entertainment, etc.



- Normally, the reason behind female migration throughout India is largely marriage related; however, Meghalaya has a reverse scenario.
- Remittances from the international migrants are one of the major sources of foreign exchange.
- For thousands of the poor villages of states like Bihar, Uttar Pradesh, Odisha, Andhra Pradesh, Himachal Pradesh, etc. remittance acts as life blood for their subsistence.

Impacts of Migration

- Development of slums in industrially developed states, such as Maharashtra, Gujarat, Karnataka, Tamil Nadu, and metropolitan areas, such as Delhi, Mumbai, Kolkata, etc. is a negative consequence of unregulated migration within the country.
- One of the major negative impacts of migration is imbalances in age and sex composition at both the places − sending region (out-migration) and receiving region (in-migration).
- Migration intermixes people of diverse cultural backgrounds
- Because of unbalanced migration, the receiving regions (especially urban areas) are facing many environmental problems, such as pollution, depletion of ground water, solid waste management problems, etc.

Geography India - Regional Development

Introduction

- India has centralized planning and the task of planning in India has been entrusted to the Planning Commission of India.
- Planning Commission of India is a statutory body headed by the Prime Minister and has a Deputy Chairman and other members.
- However, the Planning Commission of India is recently is now **"National Institution for Transforming India"** or simply **NITI Aayog**.
- The planning in the country is largely carried out through the array of **Five Year Plans**.
- At present, the **Twelfth** Five Year Plan is running, which was initiated in 2012 with a focus on 'Faster, More Inclusive and Sustainable Growth'.

Approaches of Planning

- Normally, there are two approaches of planning. They are −
    - **Sectoral planning**
    - **Regional planning.**

Sectoral Planning

- Sectoral planning means formulation and implementation of the sets of schemes or programs aimed at development of various sectors of the economy such as agriculture, irrigation, manufacturing, power, construction, transport, communication, social infrastructure, and services.

Regional Planning

- Since all the regions of India have not developed on the same lines, therefore, to reduce the regional imbalances, regional planning was introduced.

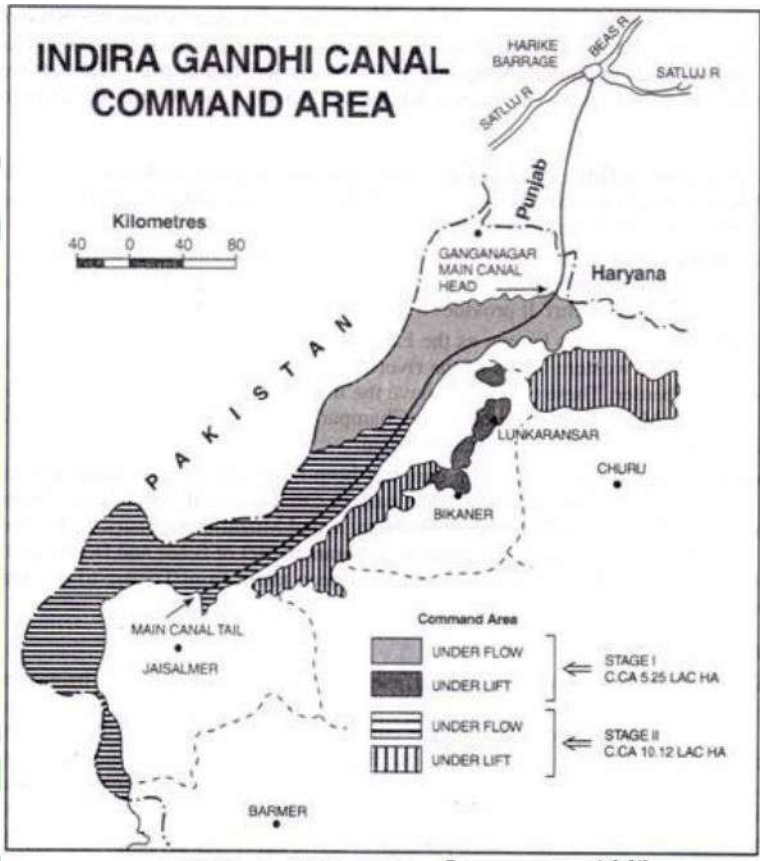
Target Area Planning

- In order to reduce the regional and social disparities, the Planning Commission introduced the **'target area'** and **'target group'** approaches to planning.
- Some of the examples of **target area planning** directed towards the development of target areas are −
    - Command Area Development Program;
    - Drought Prone Area Development Program;
    - Desert Development Program; and
    - Hill Area Development Program.
- The examples of **target area planning** are − the **Small Farmers Development Agency** (SFDA) and **Marginal Farmers Development Agency** (MFDA).
- **Hill Area Development Programs** were initiated during the **Fifth Five Year** Plan. The plan covers 15 districts comprising all the hilly districts of Uttarakhand, Mikir Hill and North Cachar hills of Assam, Darjeeling district of West Bengal and Nilgiri district of Tamil Nadu.
- Major aims of Hill Area Development Program were harnessing the indigenous resources of the hilly areas through the development of horticulture, plantation agriculture, animal husbandry, poultry, forestry, and small-scale and village industry.
- **Drought Prone Area Program** was initiated during the **Fourth Five-Year Plan** with the objectives of providing employment to the people in droughtprone areas and creating productive assets.

- The drought prone area in India largely covers semi-arid and arid tract of Rajasthan; Gujarat; Western Madhya Pradesh; *Marathwada* region of Maharashtra; *Rayalseema* and *Telangana* plateaus of Andhra Pradesh & Telangana; Karnataka plateau; and highlands and interior parts of Tamil Nadu.

Planning Facts

- In 1967, the Planning Commission of India identified **67 districts** (entire or partly) of the country prone to drought.
- In 1972, the Irrigation Commission introduced the criterion of 30% irrigated area and demarcated the drought prone areas.
- In 1970s, the phrases such as ***redistribution with growth*** and ***growth and equity*** were incorporated in the definition of development.



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- Over period of time, the meaning of 'Development' did not remain restricted to 'economic growth' rather it also includes the issues such as improving the wellbeing and living standard of the people; availing the health facilities; education; equality of opportunity; and ensuring political and civil rights.
- The concept of sustainable development emerged in the wake of general rise in the awareness of environmental issues in the late 1960s in the Western World.
- The publication of '***The Population Bomb***' by ***Ehrlich*** in 1968 and '***The Limits to Growth***' by **Meadows** *at al* in 1972 further raised the environmental concerns.

- The United Nations established a *World Commission on Environment* and *Development* (WCED) headed by the Norwegian Prime Minister **Gro Harlem Brundtland**. This is the reason that its report submitted in 1987 with the name '**Our Common Future**,' is also known as *Brundtland* Report.
- In this report, sustainable development is defined as − *"development that meets the needs of the present without compromising the ability of future generations to meet their own needs."*
- Likewise, Sustainable development takes care of ecological, social, and economic aspects of the development during the present times and pleads for conservation of resources to enable the future generations to use these resources.
- Indira Gandhi Canal, which previously was popular as the Rajasthan Canal, is one of the largest canal systems in India.
- The idea of Indira Gandhi Canal was proposed by **Kanwar Sain** in 1948; however, the canal project was launched on 31 March, 1958.
- The canal originates at *Harike* barrage in Punjab and runs parallel to Pakistan border and covers an average distance of 40 km in Thar Desert of Rajasthan.

Geography India – Disasters

Introduction

- Disaster is an undesirable catastrophe resulting from the forces that are largely beyond human control, strikes quickly with little or no warning, and causes or threatens serious disruption of life and property. For example, earthquake, tsunami, cyclone, flood, etc.
- Disasters are normally caused by nature (beyond human control); however, there are many human-induced disasters. For example, Bhopal Gas tragedy, Chernobyl nuclear disaster, wars, release of CFCs (Chlorofluorocarbons), releasing greenhouse gases, etc.
- Besides, some disasters are natural in occurence, but those are indirectly caused by human activities. For example, landslides in hilly regions, droughts, and floods due to deforestation and other environmental damage.

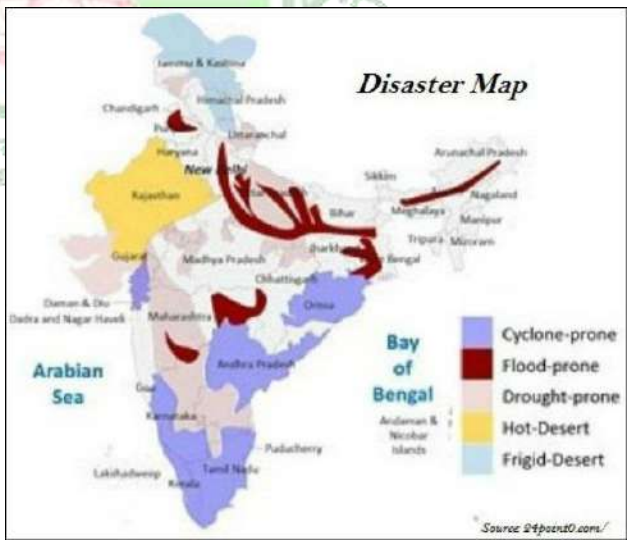
- On the other hand, Natural Hazards are the elements of circumstances in the Natural environment that have the potential to harm people or property or both.
- The disasters are global in nature; hence, to combat with it, the United Nations made a systematic strategy at the World Conference on Disaster Management held in **May 1994** at **Yokohama, Japan**.
- The Yokohama conference however, is popular as the ***"Yokohama Strategy and Plan of Action for a Safer World."***

Categories of Natural Disaster

- Natural Disasters are broadly categorized as −
    - Atmospheric Disasters
    - Terrestrial Disasters
    - Aquatic Disasters
    - Biological Disasters
- **Atmospheric disasters** include blizzard, thunderstorm, lightning, tropical cyclone, tornado, drought, hailstorm, frost, heat wave, cold waves, etc.
- **Terrestrial disasters** include earthquake, volcanic eruption, landslide, avalanches, subsidence, etc.
- **Aquatic disasters** include flood, tidal waves, storm surge, tsunami, etc.
- **Biological disasters** include fungal, bacterial, and viral diseases (e.g. bird flu, dengue, etc.).

Disasters' Zone

- **Very High Damage Earthquake Risk Zone** in India include the north-eastern regions, areas to the north of Darbhanga and Araria along the Indo-Nepal border in Bihar, Uttarakhand, Western



Himachal Pradesh (around Dharamshala) and Kashmir Valley in the Himalayan region, and the Kachchh (Gujarat).

- **High Damage Earthquake Risk Zone** in India are parts of Jammu and Kashmir, Himachal Pradesh, Northern parts of Punjab, Eastern parts of Haryana, Delhi, Western Uttar Pradesh, and Northern Bihar.
- **Earthquakes** and **volcanic eruptions** normally cause the sea-floor to move abruptly resulting in sudden displacement of ocean water in the form of high vertical waves, which are known as **tsunamis** (shown in the image given below).
- **Tsunamis** can be observed frequently along the Pacific ring of fire, particularly along the coast of Alaska, Japan, Philippines, and other islands of Southeast Asia, Indonesia, Malaysia, Myanmar, Sri Lanka, and India etc.
- **Tropical cyclones** are intense low-pressure areas, confined between 30N and 30S latitudes.
- The center of the cyclone is mostly a warm and low-pressure, cloudless core known as ***'eye of the storm'*** (as shown in the image below) −
- The ideal location of the tropical cyclone in India is Bay of Bengal.
- **Cyclones** in the Bay of Bengal normally develop in the months of October and November.
- *Rashtriya Barh Ayog* (National Flood Commission) identified 40 million hectares of land as flood-prone in India.
- Assam, West Bengal, and Bihar are the high flood-prone states of India.
- About **30 per cent** of India's total area comes under drought prone area, which affects about 50 million people.
- The western part of Rajasthan is categorized as Extreme Drought Affected Areas.
- Parts of eastern Rajasthan; many parts of Madhya Pradesh; eastern parts of Maharashtra; interior parts of Andhra Pradesh and Karnataka Plateau; northern parts of interior Tamil Nadu; southern parts of Jharkhand; and interior parts of Odisha are categorized as **Severe Drought Prone Area**.
- Young mountainous areas of North and north-eastern India (the Himalayan regions), Andaman and Nicobar; high rainfall regions with steep slopes in the Western Ghats

and Nilgiris; along with areas of frequent earthquakes, etc. are categorized as **Very High Landslide Vulnerability Zone**.

Disaster Management

- The **Disaster Management Bill, 2005**, defines disaster as *"a catastrophe, mishap, calamity or grave occurrence affecting any area, arising from natural or man-made causes, or by accident or negligence which results in substantial loss of life or human suffering or damage to, and destruction of, environment, and is of such nature or magnitude as to be beyond the coping capacity of the community of the affected area."*
- A situation when there is a prolonged period of inadequate rainfall is known as **Meteorological Drought**.
- When soil moisture that is necessary to support the crops, is low or insufficient to support crop cultivation, it is known as **Agricultural Drought**.
- When the productivity of a natural ecosystem fails because of the shortage of water and as a consequence of ecological distress, damages occur in the ecosystem, it is known as **Ecological Drought**.