STRICTLY BASED ON **NDA/NA EXAMINATION** CURRICULUM

Regional Geography

PARAMOUNT DEFENCE ACADEMY

This book provides students with a knowledge of Indian geography in an easy-to-read format. Basic geographic concepts of world and places are presented in concise manner for better understanding in simple way.

PARAMOUNT DEFENCE ACADEMY

Topics Covered

1. **Indian Physiographic**
2. **Indian Static**
3. **Indian Soil**
4. **Dams and Rivers of India**
5. **Minerals and Industries**
6. **Indian Agriculture**
7. **Natural Vegetation of India**
8. **Ports of India**
9. **National Waterways**

Section 'E' (Geography)

The Earth, its shape and size. Lattitudes and Longitudes, Concept of time. International Date Line. Movements of Earth and their effects. Origin of Earth. Rocks and their classification; Weathering—Mechanical and Chemical, Earthquakes and Volcanoes. Ocean Currents and Tides Atmosphere and its composition; Temperature and Atmospheric Pressure, Planetary Winds, Cyclones and Anti-cyclones; Humidity; Condensation and Precipitation; Types of Climate, Major Natural regions of the World. Regional Geography of India—Climate, Natural vegetation. Mineral and Power resources; location and distribution of agricultural and Industrial activities. Important Sea ports and main sea, land and air routes of India. Main items of Imports and Exports of India.

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Indian Physiographic

India can be divided into following physical divisions:

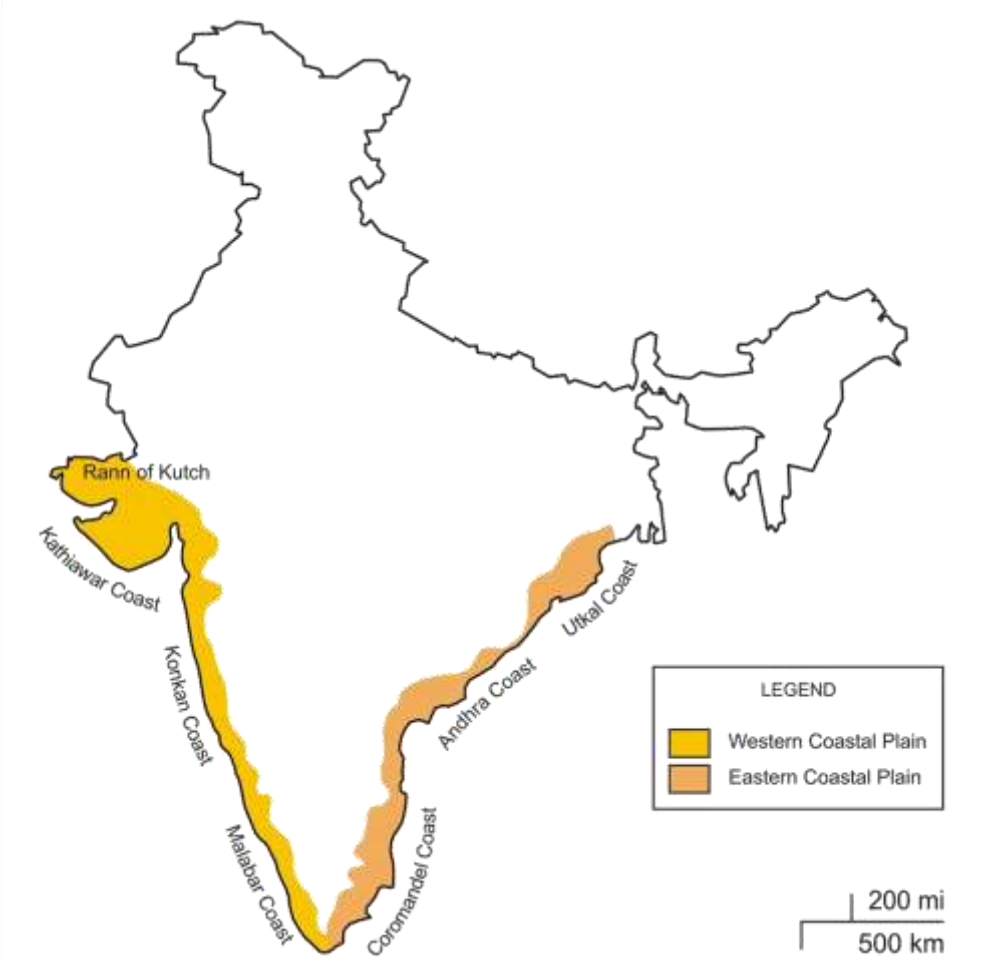
- The Northern Mountains
- The North Indian Plain
- The Peninsular Plateau
- Great Indian Desert
- The coastal Regions Islands

The Great Indian Desert

- Extends from the western margins of the Aravalli Hills.
- Luni is the only prominent river

The Coastal regions

- **Excluding the islands, the mainland of India has 6,100 kms length of coastline**
- Extends from Kutch in Gujarat in the west to the Gangetic delta in the east
- The coast of India is divided into western coast and eastern coastal plains.
- **The coastal regions of India are known for agriculture, trade, industrial centers, tourist centers, fishing and salt making**
- They also provide important hinterlands for the ports



- **Kathiawar Coast** → Kutch to Daman (Tapti, Narmada, Sabarmati & Mahi river deposit huge load of sediments in the Gulf of Cambay & form estuaries)
- **Konkan Coast** → Between Daman & Goa
- **Kannada Coast** → Goa to Cannanore
- **Kanyakumari Coast** → Cannanore to Cape Camorin
- **Malabar Coast** → Kannada + Kanyakumari Coast
- **Utkal coast** → Deltaic plains of Ganga to Mahanadi delta (Famous Chilka lake is located in this plain)
- **Andhra Coast** → Utkal plains to Pulicat lake (Contains deltas of Godavari & Krishna Rivers, & famous Kolleru lake)
- **Northern Circars** → Utkal Coast + Andhra Coast (Between Mahanadi & Krishna)
- **Coromandal Coast** → Between Krishna & Kanyakumari (Consist of Kaveri Delta)

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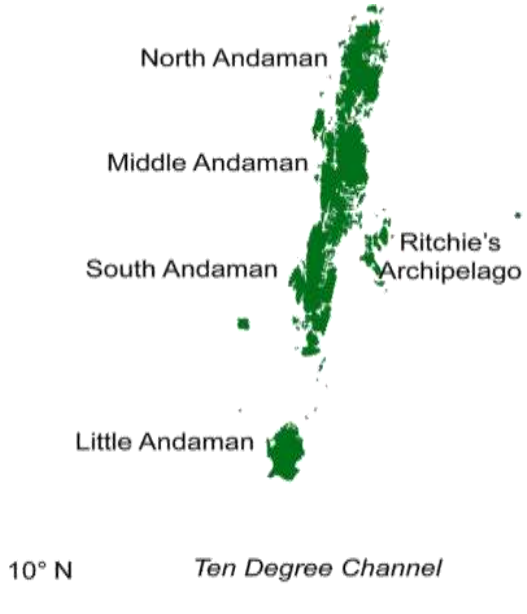

Division of Peninsular Plateau	
The Central Highland	**The Deccan Plateau**
• **Malwa Plateau**	• Deccan Trap
• **Bundelkhand**	• Western Ghats
• **Baghelkhand**	• Eastern Ghats
• **Chhotanagpur Plateau**	• North-East Extension

Western Ghats

- **Folded parts of Deccan Plateau**
- Also known as Sahyadri's
- More Continuous & higher than Eastern Ghats
- Separated from coast by narrow coastal plains
- Rich watersheds give birth to large peninsular rivers like Godavari and Krishna
- **Extends from Tapi in North to Kanyakumari in south**

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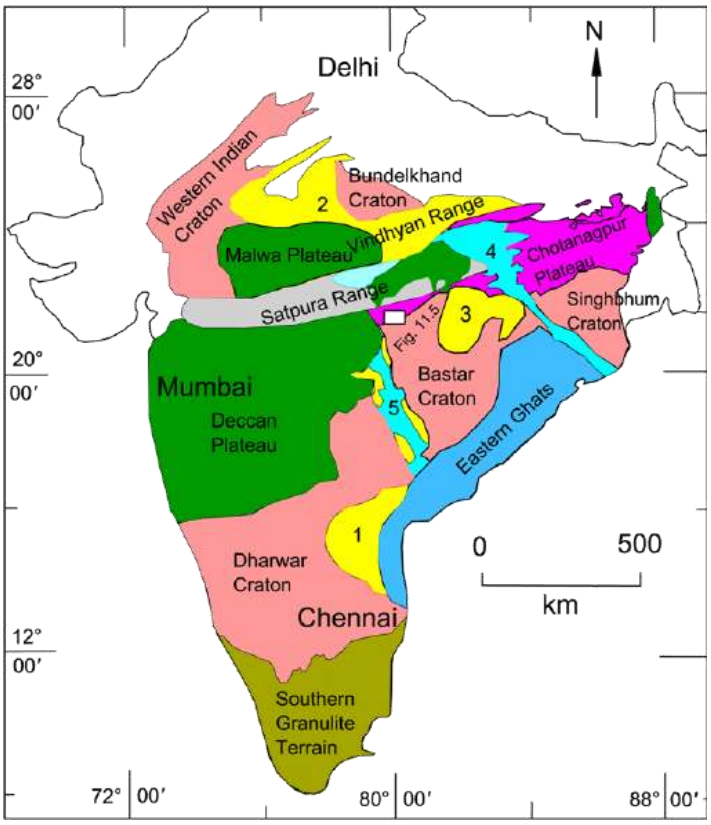
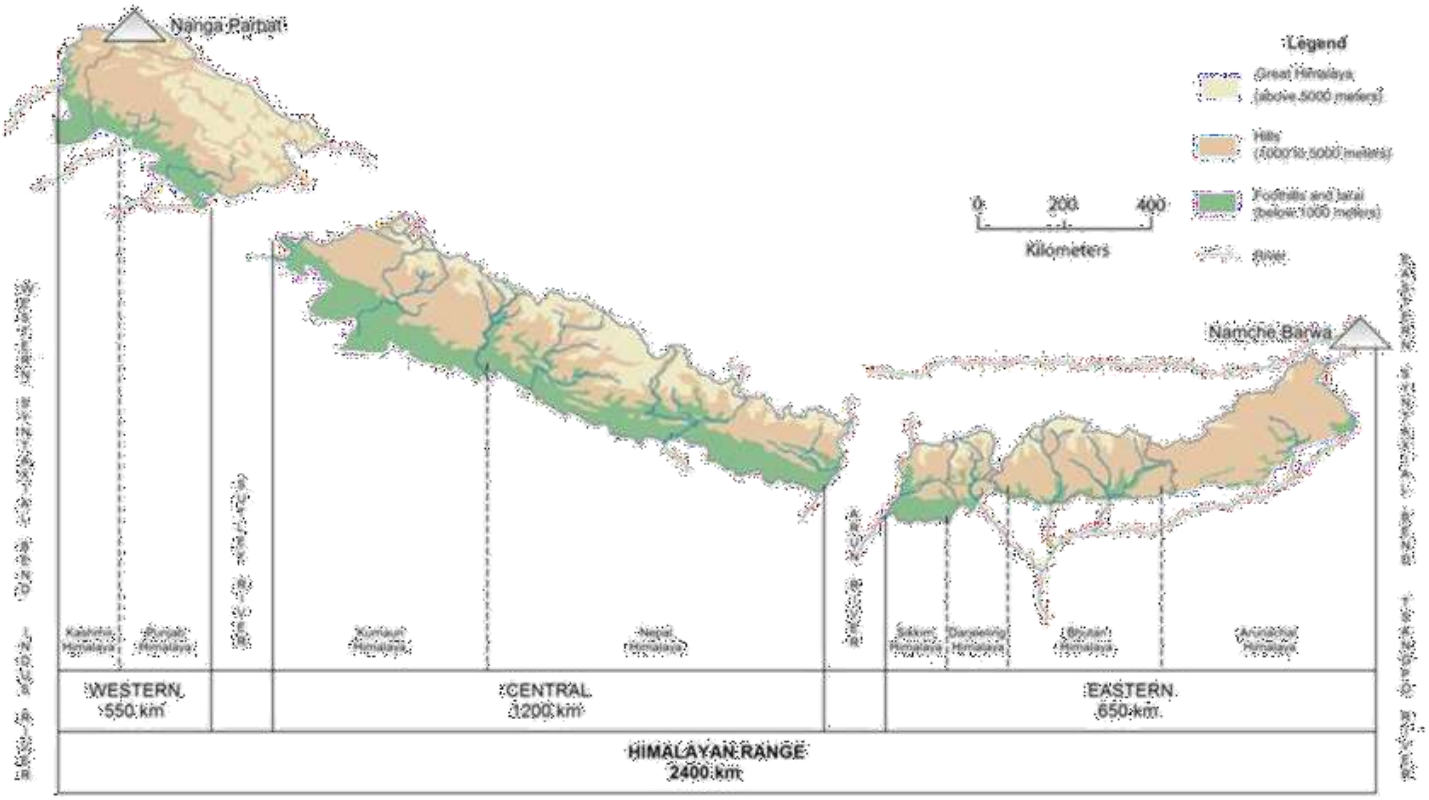
Deccan Plateau



- **Largest plateau in India; Lies to the south of the Narmada River; Shaped as inverted triangle.**
- **Surrounded by Satpura hills, Mahadeo hills, Maikala range, Amarkantak hills and Raajmahal hills i the north; Western Ghats in the west and the Eastern Ghats in the east**
- Volcanic in origin, made up of horizontal layers of solidified lava forming trap structure with step like appearance
- Sedimentary layers are also found in between the layers of solidified lava, making it inter-trapping in structure
- **Average elevation of Western Ghats is 900 – 1600 meters; compared to 600 meters of Eastern Ghats**
- Slopes towards east and south and descends abruptly towards west making Sahyadri ranges
- The plateau is suitable for the cultivation of cotton; home to rich mineral resources & a source to generate hydroelectric power

Himalayas Mountain Ranges



Trans Himalayas

- **Immediate to the north of the Great Himalayan Range**
- Most of the part of this Himalayan range lies in the Tibet and hence also called ***Tibetan Himalaya***
- **Ranges → Zaskar, K2 (Godwin Austin), Ladakh, Kailash and Karakoram Range**

Greater Himalaya (Inner Himalaya)

- **Always covered with snow → Known as Himadri**
- **Average height → 6000 mts**
- Most continuous range
- Core composed of granite
- Ranges → Mt. Everest, Kanchenjunga

Middle Himalaya

- **Average height → 3500 – 4500 mts**
- Most of the valleys & hill stations are located in this range e.g. Kashmir, Kathmandu, Nainital
- **Ranges → Pir Panjal, Dhaula Dhar, Mahabharat**
- Forests type → Broad leaved evergreen

Outer Himalaya (Shivalik Range/ Himachals)

- **Average height → 600 – 1200 mts**
- Most of the Dun & Duars are located in this range.
- **Ex. Dehradun, Patlidun (longitudinal valleys)**
- Deciduous type forests

Division of Himalayas Mountain ranges

- **Punjab Himalayas / Kashmir Himalaya / Himachal Himalaya** → Between the Indus and Sutlej
- **Kumaon Himalayas** → Between Sutlej and Kali rivers
- **Nepal Himalayas** → Between Kali and Tista rivers
- **Assam Himalayas** → Between Tista and Dihang rivers

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Indian Static

INDIA

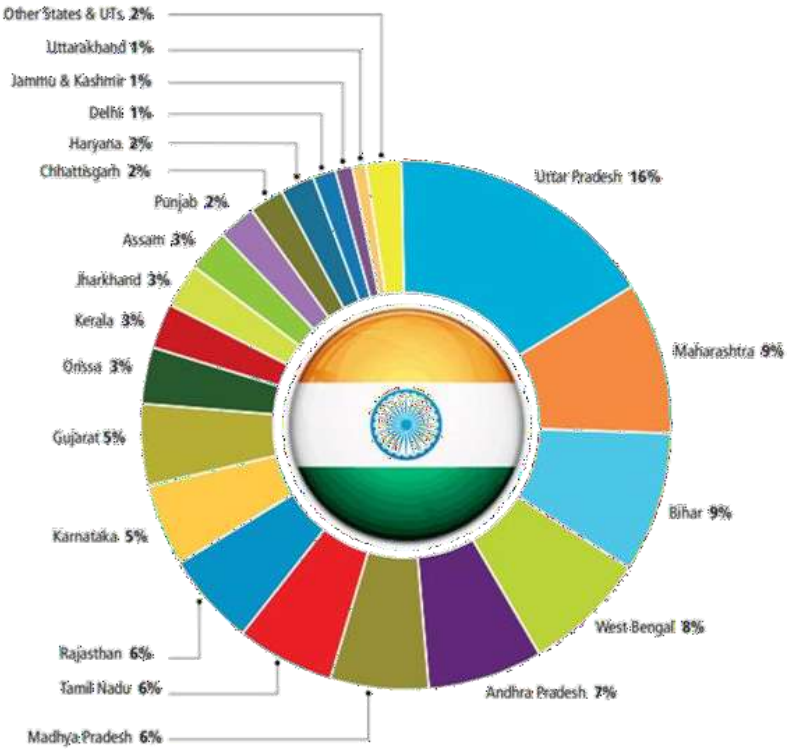
- **Latitude** (8*4' – 37*6') N
- **Longitude** (68*7' – 97*25') E
- **Population** 17.6 % of the world
- 7th Largest in Area (Area → 3.28 million sq km
- **Southernmost Point** → Indira Point (6*45') N
- **St. meridian** → Allahabad (82*5') E
- **Mainland Coastline** → 6100 km
- (Mainland + A & N + Lakshadweep coastline → 7517 km

SOME WORLD STATS

- Population → China > India > US > Indonesia > Brazil > Pakistan
- Area → Russia > Canada > US > China > Brazil > Australia > India

Indian State Stats

- **Most populous** → UP
- **Largest Area** → Rajasthan
- **Least Populous** → Sikkim
- **Least Area** → Goa
- **Female Population** → 48.46 %
- **Most literacy** → Kerala
- **Least Literacy** → Bihar
- **Least Sex ratio** → Haryana



Indian Population Census 2011

- Population 1.21 billion (17.5% of the world)
- Literacy 74.04%
- Male 82.14%
- Female 65.46%

Sex Ratio

- 940
- Highest (State) **Kerala** – 1084
- Lowest (State) **Haryana** – 877

Density of Population

- 382 per sq. km
- Highest Delhi > Bihar > WB > UP
- Most Populous State **UP**
- Least Populous State **Sikkim**
- Highest Growth of Population **Meghalaya**

India Roads

- **UP → Highest length of National Highways**

NH7	Varanasi – Cape – comrin
NH6	Surat – Kolkata
NH5	Jharkhand – Chennai
NH2	Delhi – Kolkata
NH48	Delhi – Chennai
NH4	Mumbai – Chennai
NH3	Agra – Mumbai

International Border Highways

- Responsibility lies with Border road organization (BRO)
- Financed by World Bank

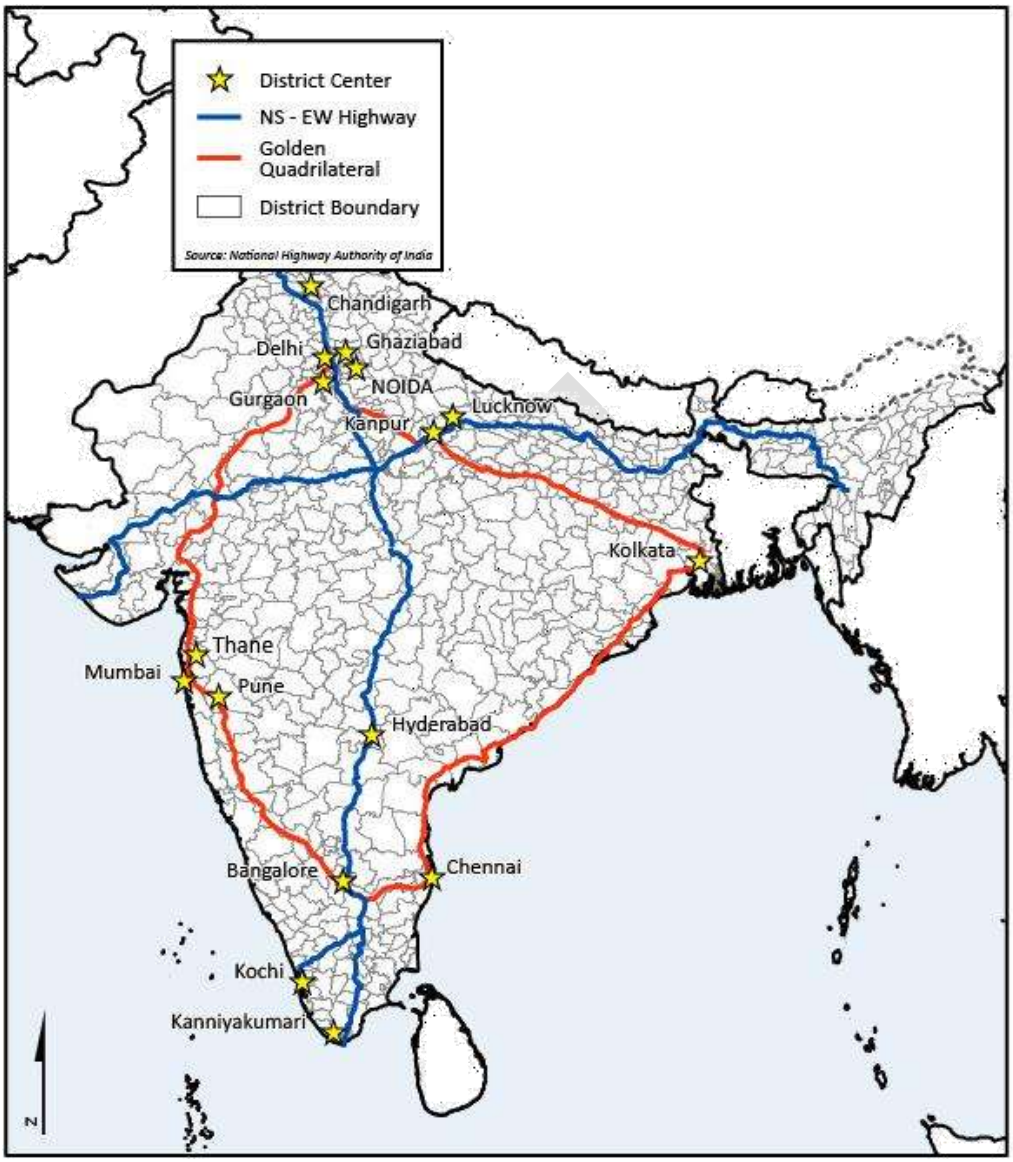
NH1	INDO – PAK BORDER (DELHI, HARYANA, PUNJAB)
NH22	INDO – CHINA BORDER (HARYANA, PUNJAB, HIMACHAL PRADESH)
NH35	INDO – BANGLADESH BORDER (WB)
NH39	INDO – BHUTAN BORDER (ASSAM, NAGALAND, MANIPUR)
NH28A	INDO – NEPAL BORDER (BIHAR)

Famous Highway Projects

- **Golden Quadrilateral** → 6 lane highway project connecting Delhi – Mumbai – Kolkata – Chennai
- **North – South Corridor** → Linking Srinagar – Kanyakumari
- **East – West Corridor** → Linking Silchar (Assam) – Porbandar
- **Mumbai – Pune Expressway** (1st expressway of country) is not under NHAI as it was built by state government

Project Bharatmala

- **A road built along India's vast west-to east land border, approx. 5300km, from Gujarat to Mizoram.**
- Linking it to a road network in coastal states, from Maharashtra to Bengal



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Indian Soil

Distribution in India

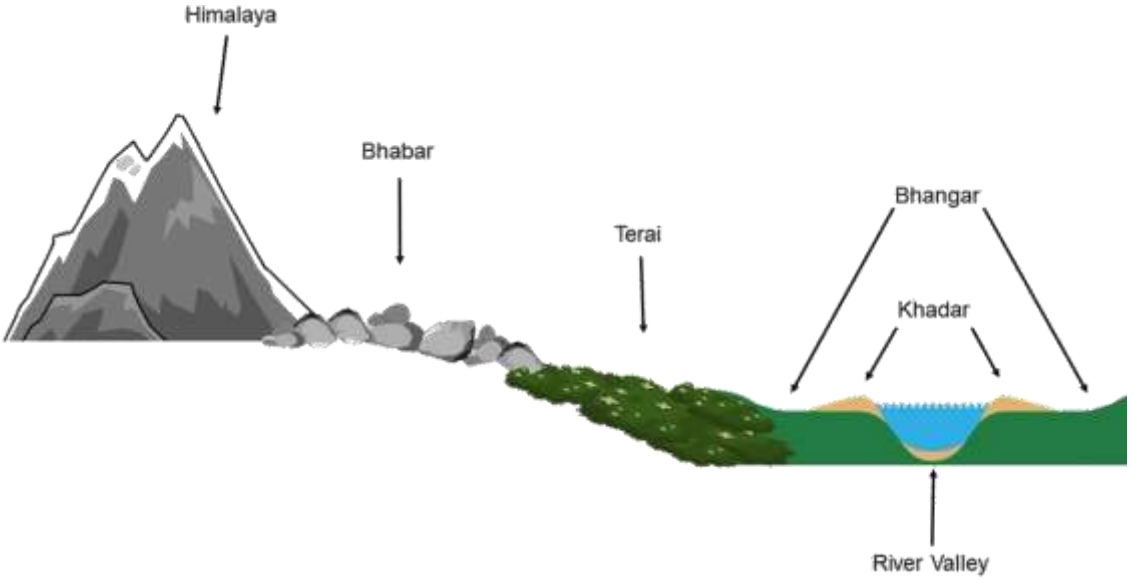
- **Alluvial soil [43%]**
- **Red soil [18.5%]**
- **Black / regur soil [15%]**
- Arid / desert soil
- Laterite soil
- Saline soil
- Peaty / marshy soil
- Forest soil
- Sub-mountain soil
- Snowfields

Alluvial soil

- **Formed by depositional work of rivers valleys, flood plains & deltas.**
- Highly fertile Riverine soils → Transported type
- occurs mainly in the Sutlej- Ganga- Brahmaputra Plains.
- In peninsular-India, they are mostly found in deltas and estuaries.
- Rich in Potash but deficient in Nitrogen & Humus content
- It is also found in the valleys of the Narmada, Tapi and in the Eastern and Western coastal plains.
- **The color of soil varies from light grey to ash.**
- This soil is suited for Rice, maize, wheat, sugarcane, oilseeds etc.
- Also, for Jute in delta region

Alluvial Type

- Khadar soil:
  - **enriched with fresh silts.**
  - **They are low lying,**
  - frequently inundated by floods during the rainy season. It occupies the flood plains of rivers.
  - The khaddar tracts called as kankar are rich in concentration.
- The Bhangar:
  - **This soil lies above the flood level.**
  - **It is well- drained but because of the calcium carbonate nodules.**
  - The texture of soil varies from the loamy soil to clayey soil.



Black soil / regur soil:

- Formed By solidification of Lava
- Mainly found in Deccan Plateau
- Also known as black **cotton soil or Regur soil**
- Black color is due to its iron content, derived from plutonic lava materials
- **Highly fertile (< Alluvial)**
- Residual type of Soil
- Deficient in organic content, phosphorus, nitrogen
- **Rich in lime and iron, magnesia and alumina; also contains Potash**
- Highly clayey and impermeable → Highly moisture retentive
- Ploughed in dry season as on evaporation cracks develop for better seed penetration
- Regions → Maharashtra, Gujrat, Madhya Pradesh, Andhra Pradesh, Parts of Tamil Nadu
- Forms 16.6 % of the total land area of the country
- **Regions → Periphery areas of Deccan Plateau viz. Chhotanagpur plateau, Telangana, Nilgiris, Tamil Nadu, Karnataka, Andhra Pradesh**
- Suitable for the cultivation of millets, pulses, Linseed, tobacco etc.
- Forms 10.6% of the total land area of the country
- Swells and will become sticky when wet and shrink when dried.
- Self-ploughing is a characteristic of the black soil as it develops wide cracks when dried.

Red soil:

- **Formed by weathering of Igneous (crystalline) & metamorphic rocks**
- **Less fertile than Alluvial & Black soils**
- Lacks water retentive capacity
- Reddish in color due to presence of FeO (Ferrous oxide)
- Looks Yellow in Hydrated form
- Transported type of soil
- Deficient in nitrogen, lime, magnesia, humus and phosphate
- Rich in potash and become fertile with the proper use of fertilizers and irrigation
- Are porous, aerated & friable in nature

Laterite soil:

- These soft, when they are wet and 'hard and cloddy' on drying. These are found mainly in the hills of the Western Ghats, Raj Mahal hills, Eastern Ghats, Satpura, Vindhya, Odisha, Chhattisgarh, Jharkhand, West Bengal, North Cachar hills, and the Garo hills
- Name from Latin word 'Later' which means Brick.
- Become so **soft when wet and so hard when dried.**
- In the areas of high temperature and high rainfall.
- Formed as a result of high leaching.
- Lime and silica will be leached away from the soil.
- Organic matters of the soil will be removed fast by the bacteria as it is high temperature and humus will be taken quickly by the trees and other plants. Thus, humus content is low.
- **Rich in: Iron and Aluminum**
- Deficient in: Nitrogen, Potash, Potassium, Lime, Humus
- **Colour: Red color due to iron oxide.**
- Rice, Ragi, Sugarcane and Cashew nuts are cultivated mainly.

Desert / arid soil:

- **Seen under Arid and Semi-Arid conditions.**
- Deposited mainly by wind activities.
- **High salt content.**
- Lack of moisture and Humus.
- Kankar or Impure Calcium carbonate content is high which restricts the infiltration of water.
- Nitrogen is insufficient and Phosphate is normal.
- **Texture: Sandy**
- **Colour: Red to Brown.**

Forest soil:

- Regions of high rainfall.
- **Humus content is less and thus the soil is acidic.**

Mountain soil:

- In the mountain regions of the country.
- **Immature soil with low humus and acidic.**

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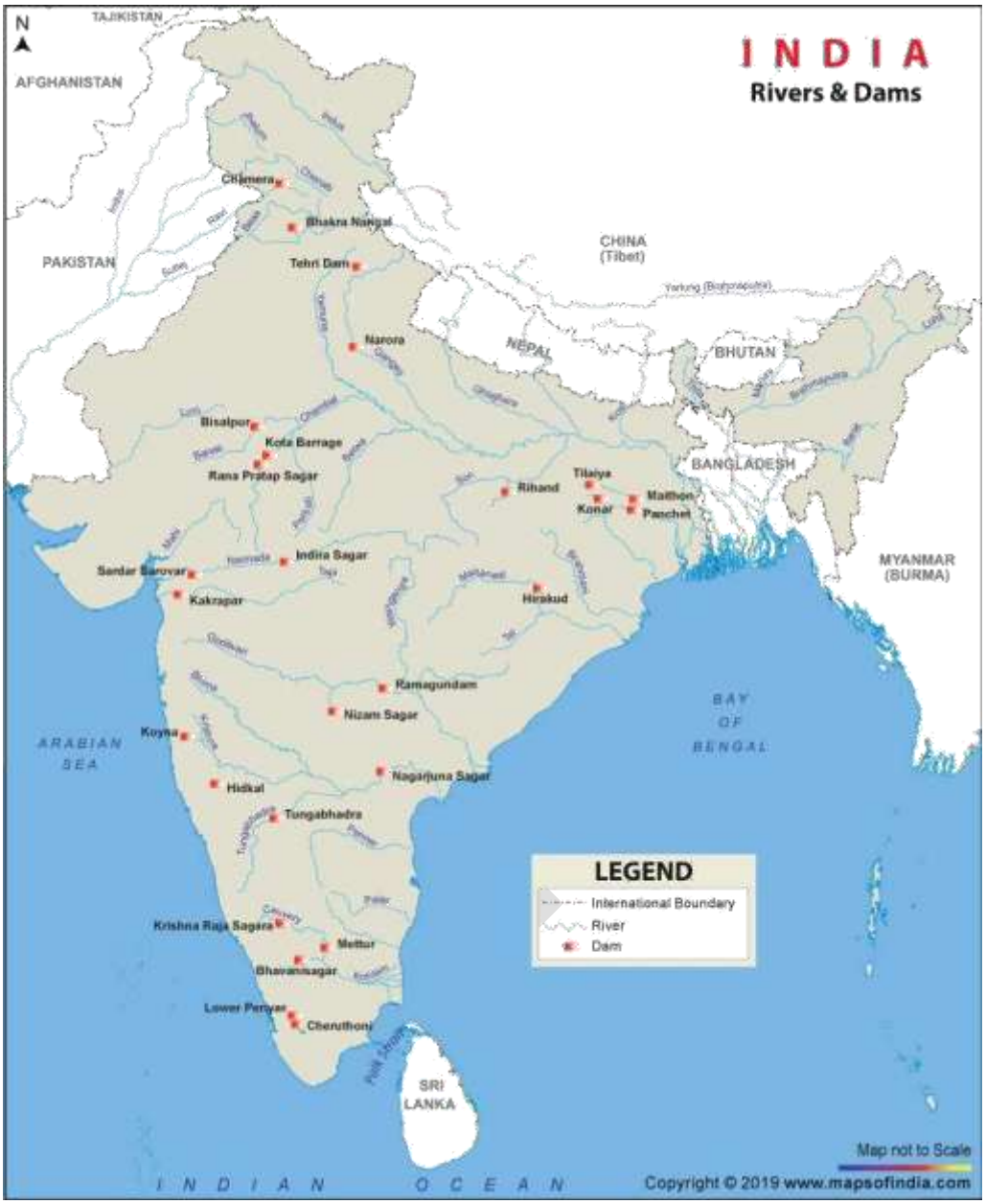
Dams and Rivers in India



Dams in India		
Highest Dam in India	Tehri Dam (Uttarakhand)	Height: 260.5 meters Length: 575 meters River: Bhagirathi River Location: Uttarakhand Year of completion:2006 (1st phase)
Longest Dam in India	Hirakud Dam (Odisha)	Total Length: 25.79 km (16.03 mi) Length of Main Dam:4.8 km (3.0 mi) River: Mahanadi Location: Odisha Year of completion:1953
Oldest Dam in India	Kallanai Dam (Tamil Nadu)	River: Kaveri Location: Tamil Nadu Year of completion: 100 BC –100 AD

List of Major Dams in India	State	River
Bhavani Sagar dam	Tamil Nadu	Bhavani
Tungabhadra Dam	Karnataka	Tungabhadra
Rihand Dam	Uttar Pradesh	Rihand
Maithon Dam	Jharkhand	Barakar
Koyna Dam	Maharashtra	Koyna
Bilaspur Dam	Rajasthan	Banas
Mettur Dam	Tamil Nadu	Kaveri
Krishnarajsagar Dam	Karnataka	Kaveri
Indira Sagar Dam	Madhya Pradesh	Narmada
Cheruthoni Dam	Kerala	Cheruthoni
Sardar Sarovar Dam	Gujarat	Narmada
Nagarjuna Sagar Dam	Telangana	Krishna
Hirakud dam	Odisha	Mahanadi
Bhakra Nangal Dam	Punjab-Himachal Pradesh Border	Sutlej
Tehri Dam	Uttarakhand	Bhagirathi

Tehri Dam

The Tehri Dam is located in the state of Uttarakhand. It is the highest Dam in India with a height of 260.5 metres. It is also listed in the top ten highest dams in the world. This Dam is situated on the river Bhagirathi.

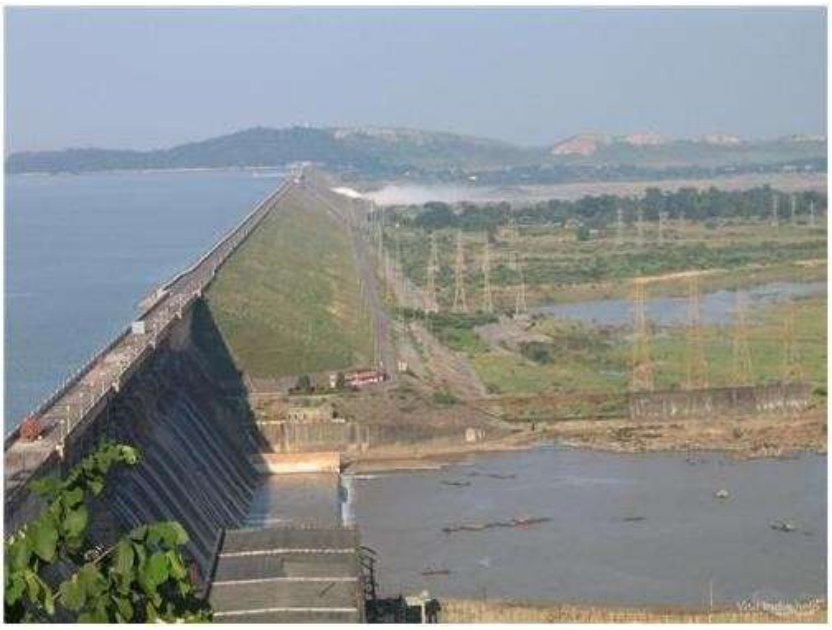
- **Height of the Dam-** 260.5 m
- **Length of the Dam-** 575 m
- **Type of Dam-** Rock fill
- **The reservoir capacity -** 21,00,000-acre feet
- **Capacity that is installed-** 1000 Megawatt

Bhakra Nangal Dam

The Bhakra Nangal Dam is located in the state of Himachal Pradesh and Punjab. It is the largest dam in India having a height of 225 metres and also in the second position in the largest dams in all over Asia. It is situated on the river Sutlej.

- **Height of the Dam-** 226 m
- **Length of the Dam-** 520m
- **Type of Dam-** Concrete Gravity
- **The reservoir capacity-** 75,01,775-acre feet
- **Capacity that is installed-** 1325 Megawatt

Hirakud Dam



The Hirakud Dam is located in the state of Orissa. It is the longest dam in India with a total length of 25.79 km. It is also in the list of the longest dams in the world. The Hirakud Dam is situated on the river Mahanadi.

- **Height of the Dam-** 61 m
- **Length of the Dam-** 4.8 km (Main Dam)
- **Type of Dam-** Composite Dam
- **The reservoir capacity-** 47,79,965-acre feet
- **Capacity that is installed-** 347.5 Megawatt

Nagarjuna Sagar Dam

The Nagarjuna Sagar Dam is located in the state of Telangana. It is India's largest Masonry Dams built till date. It is the largest manmade lake in the world. It has 26 gates and is 1.55 km in length. It is situated on the river Krishna.

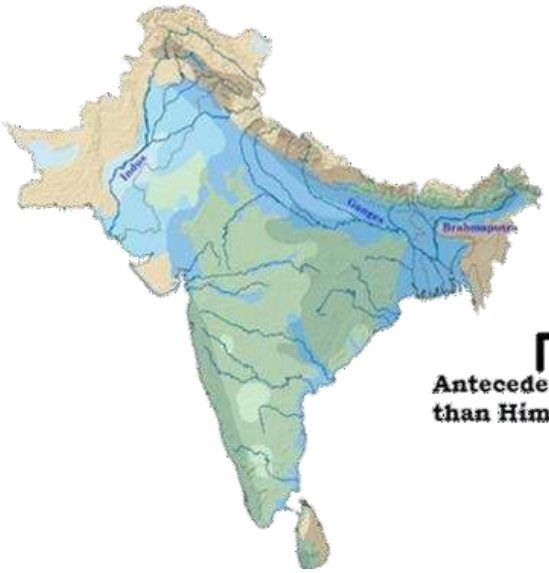
- **Height of the Dam-** 124m
- **Length of the Dam-** 4863 m (Total Length)
- **Type of Dam-** Masonry Dam
- **The reservoir capacity-** 93,71,845-acre feet
- **Capacity that is installed-** 816 Megawatt

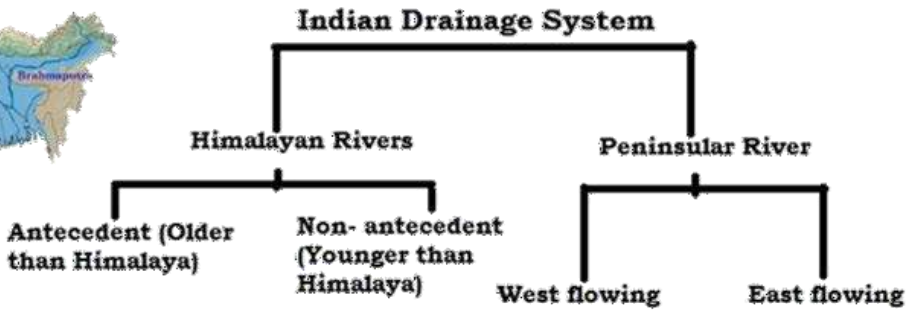
Sardar Sarovar Dam

The Sardar Sarovar Dam is located in the state of Gujarat. It is the largest dam in the Narmada Valley Project. This Dam is to benefit the other neighbouring states of Madhya Pradesh, Rajasthan and Maharashtra. It is situated on the river Narmada River.

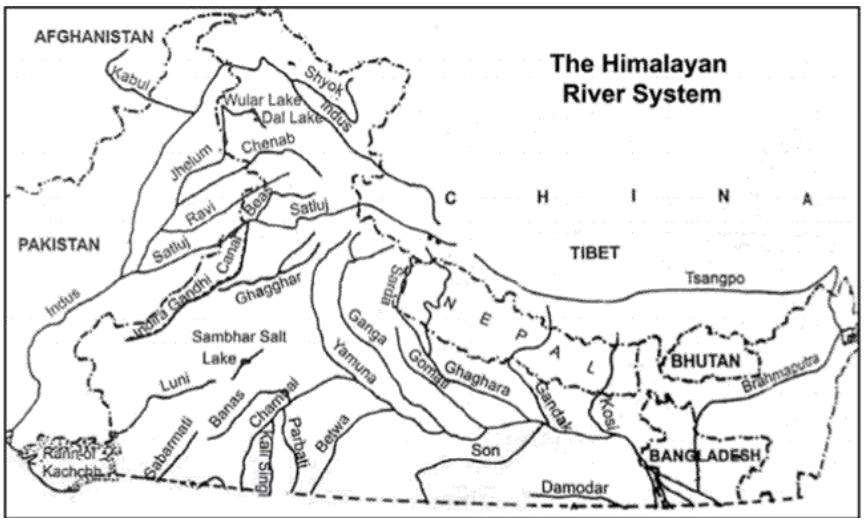
- **Height of the Dam-** 163m
- **Length of the Dam-** 1210m
- **Type of Dam-** Gravity Dam
- **The reservoir capacity-** 77,00,000 acre-feet
- **Capacity that is installed-** 1450 Megawatt

Drainage pattern In India





Himalayan Drainage



- **Antecedent drainage i.e. Himalayan rivers are older than lesser Himalayas and Shivalik's**
- Himalayan rivers are older than the structures they cut across
- Perennial flowing River → fed by rain and melting glaciers
- Flow through lose alluvial soils of northern plains
- Form deep valley and gorges due to intensive erosion
- Generate large quantities of sediment & cause annual flooding & form Deltas

Peninsular Drainage

- **Super-imposed drainage i.e. regional structures are older than the river valleys that cut through them.**
- **Nature of flow is seasonal i.e. majorly during south west monsoon**
- Shallow graded valleys with little erosion.
- Forms shallow valleys, small waterfalls, deltas and estuaries

West Flowing Rivers

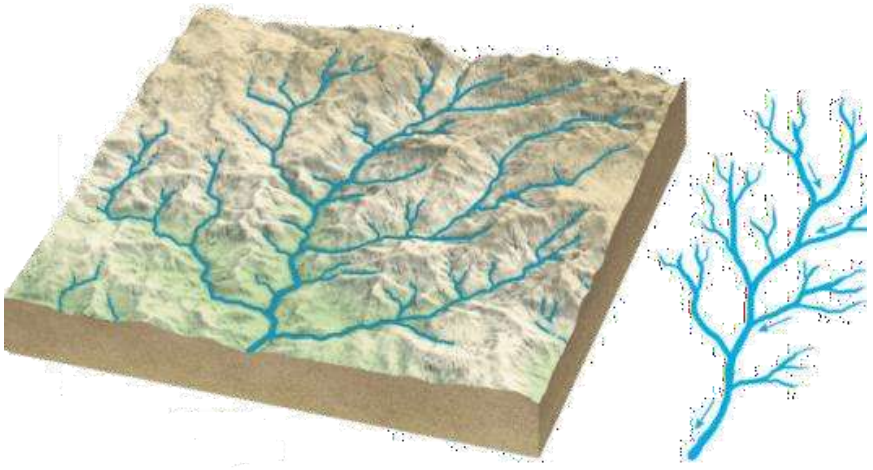
- **Flow into Arabian sea**
- **Flow through rift valley in straight linear course**
- Do not have extensive network of tributaries
- Generally, form estuaries and not deltas
- Flow swiftly into the sea

East Flowing Rivers

- **Flow into Bay of Bengal**
- Have extensive network of tributaries
- Geologically old
- Have large catchment areas and form deltas

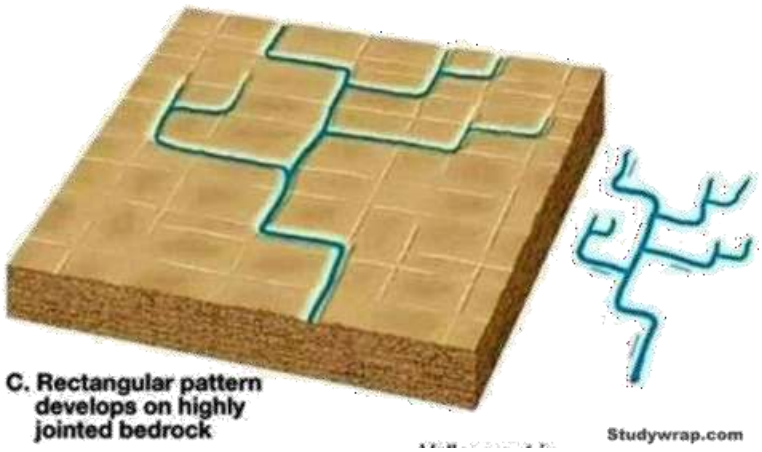
Dendritic River Pattern

- **Streams run in all directions without definite preference to any one particular region**
- Example → Indo – Gangetic Plains



Rectangular River Pattern

- **Streams Meet at right angle approx.**
- Develops on strongly joined rocky terrain
- Example → Vindhya Mountains of India



Top 5 largest rivers of India

- Ganga > Godavari > Krishna > Yamuna > Brahmaputra
- flows through China (Tibet region), India and Pakistan. In Tibet, it is known as Singi Khambai or Lion's mouth.

Indus River System

Left-bank tributaries –

- The Zaskar river, Suru river, Soan river, Jhelum river, Chenab river, Ravi river, Beas river, Sutlej river, Panjnad

Right-bank tributaries

- The Shyok river, Gilgit river, Hunza river, Swat river, Kunnar river, Kurram river and Kabul river are its major.

Source of origin

- originates from **a glacier near Bokhar Chu in the Tibetan region** in the Kailash Man Sarovar range near the Man Sarovar Lake.

Confluence or Mouth

- **drains into the Arabian Sea near the port city of Karachi, Pakistan after forming a huge delta.**

The Jhelum

- rises from the Sheshnag Lake near Verinag at the foot of Pir Panjal range.
- The river flows through Srinagar and the beautiful Wular Lake.
- It merges into Chenab in Pakistan.

The Chenab

- made up of two streams, the Chandra and the Bhaga, which merge at Tandi, near Keylong in the state of Himachal Pradesh.
- also known as **Chandrabagha.**
- largest tributary of Indus.

The Ravi

- **originates near the Rohtang Pass in Kullu hills in the state of Himachal Pradesh.**
- drains away the area lying between southeastern part of Pir Panjal and the Dhauladhar ranges.
- It merges into Chenab river near Sarai Sandhu in the Punjab region of Pakistan.

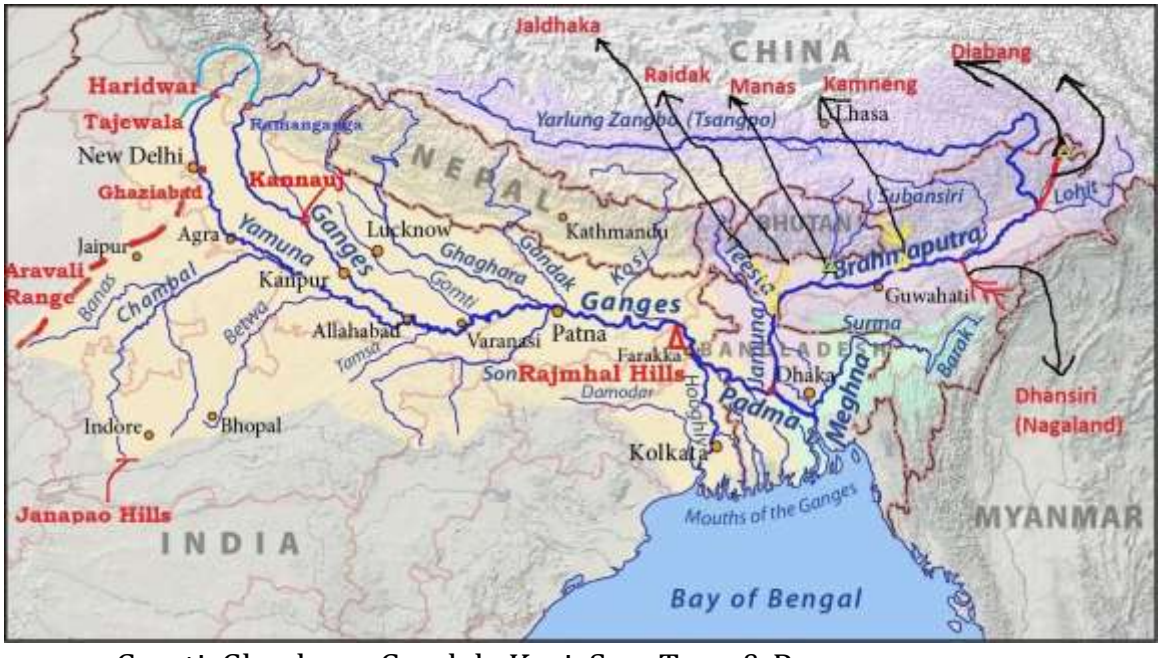
The Beas

- **rises from Beas Kund near the Rohtang Pass in the state of Himachal Pradesh.**
- The river flows through Kullu Valley.
- merges into the Sutlej river at Harike in the state of Punjab. Harike wetland is a Ramsar site, a wetland of international importance.

The Sutlej

- **rises from the Rakas Lake near the Man Sarovar Lake in the Tibet region.**
- In Tibet, the river is known by the name of Langchen Khambab.
- The Sutlej river flows parallel to the Indus river before entering India at Shipki La. It is an antecedent river. The Bhakra Nangal Project is constructed on the Sutlej river.

Ganga Tributaries



- Yamuna, Gomti, Ghaghara, Gandak, Kosi, Son, Tons & Punpun

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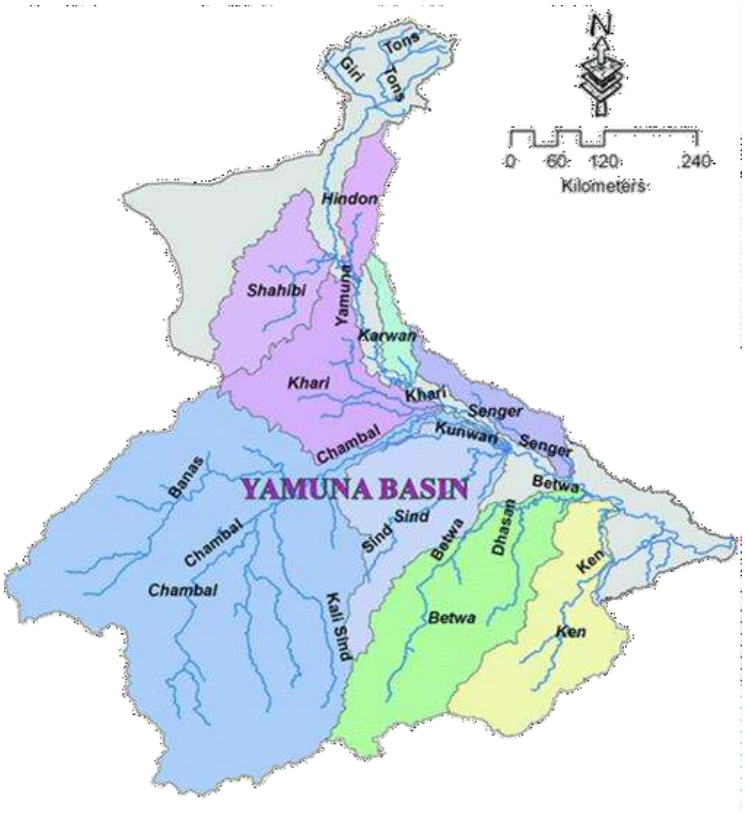
Yamuna Tributaries



- Chambal, Sind, Betwa & Ken
- **The Ganga river system outspreads in India, Tibet (China), Nepal and Bangladesh.**
- It covers states of Uttar Pradesh, Madhya Pradesh, Rajasthan, Bihar, West Bengal, Uttarakhand, Jharkhand, Haryana, Chhattisgarh, Himachal Pradesh and Union Territory of Delhi.
- total length of the Ganga is about 2,510 km.

Source of origin:

The Ganga rises from the **Gangotri glacier near Gomukh** in Uttarkashi district of the state of Uttarakhand.

The Five Prayags

Vishnuprayag = Alaknanda River + Dhauliganga River

Nandaprayag = Alaknanda River + Nandakini River

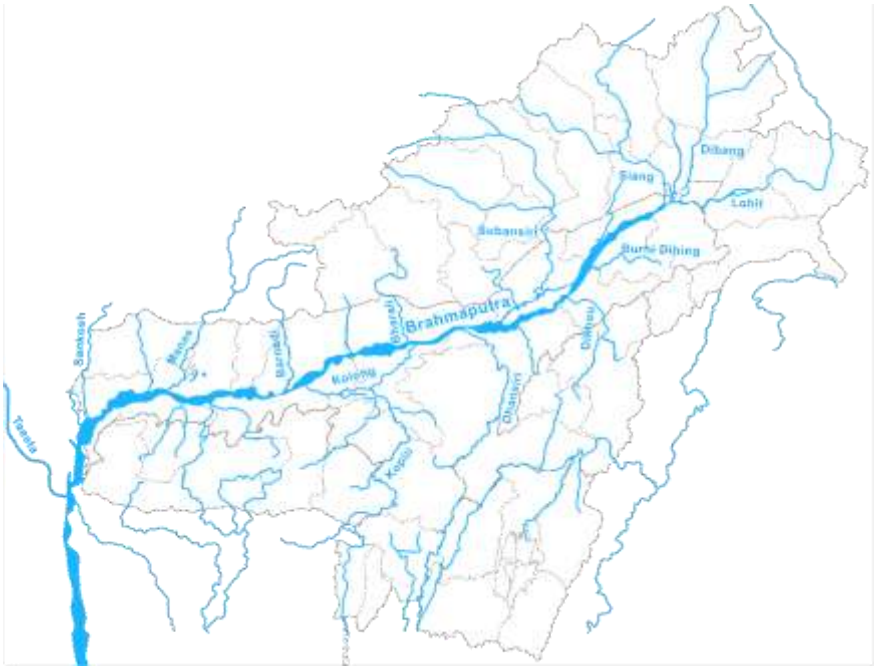
Karnaprayag = Alaknanda River + Pindar River

Rudraprayag = Alaknanda River + Mandakini River

Devprayag (Ganga) = Alaknanda River + Bhagirathi River

PARAMOUNT DEFENCE ACADEMY

Brahmaputra river

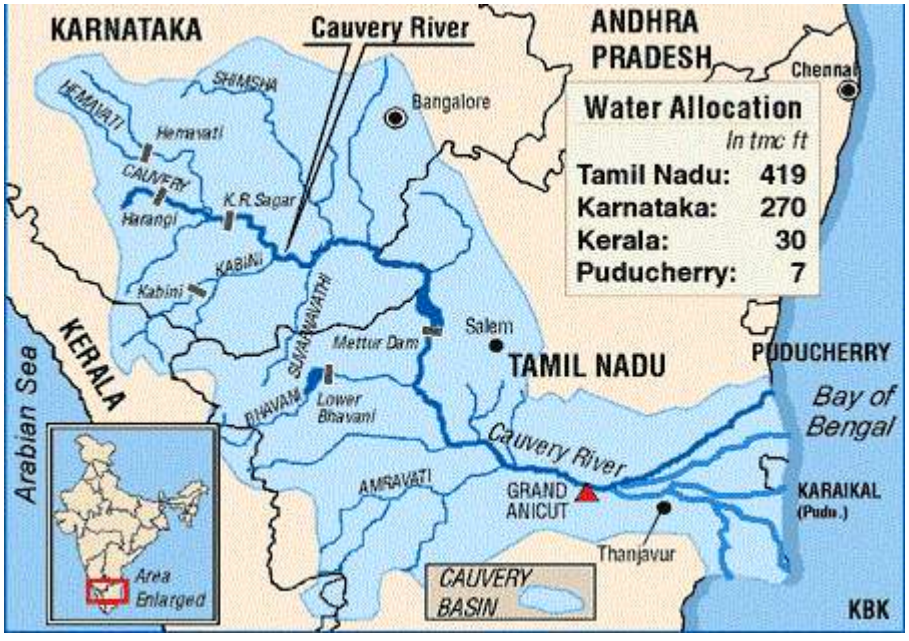


- one of the largest rivers of the world.
- In Tibet region, it is known by the name of Yarlung Tsangpo. It enters by the names of Siang and Dihang in India. And after it is joined by its two main tributaries, the Dibang and the Lohit, it is known by the name of Brahmaputra.
- It flows in Bangladesh by the name of Jumna. Finally, it merges with the Ganga river.

Source of origin:

The Brahmaputra river rises from Chemayundung glacier of the Kailash range near the Man Sarovar Lake to the north of the Himalayas in the southwest Tibet region.

Kaveri



- **third largest river after Godavari and Krishna in south India and the largest in Tamil Nadu which on its course, bisects the state into North and South.**
- The Kaveri river has water flow throughout the year because it gets rainwater from south-west monsoons in the upper-catchment area (located in Karnataka) and from the north-east monsoons in the lower-catchment area (located in Tamil Nadu).
- Kerala, Kar

Source of origin of the Kaveri river:

- The Kaveri river rises from Talakaveri in the hills of Brahmagiri in Coorg district in the state of Karnataka.
- Krishnarajsagar Dam

Krishna

Source of origin of the Krishna river:

- It rises from a water spring near Mahabaleshwar located in the Sahyadri hills region of the Western Ghats in the state of Maharashtra.
- The Krishna basin is surrounded by the Godavari basin on the north and the Eastern Ghats on the south and east and the Western Ghats on the west. The Krishna basin is roughly triangular in shape.

Godavari

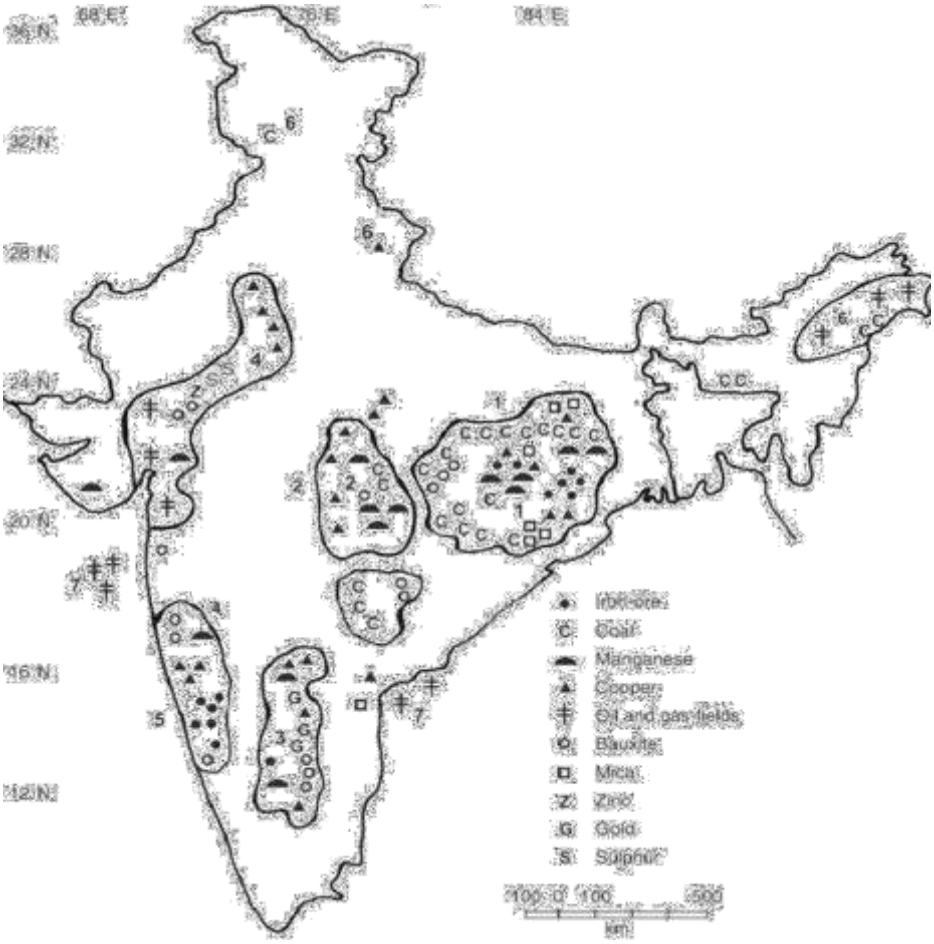
- **The Godavari river is the largest river of Peninsular India. It is known as the Dakshin Ganga or Vridha Ganga (old Ganga) because of its age, size and length. It is navigable in the delta region.**
- Source of origin of the Godavari river: It rises from a place called Trimbak located in the Western Ghats in Nashik district in the state of Maharashtra.

Western Flowing	Eastern Flowing
Luni	Damodar
Banas	Subaranlekha
Amardagi	Bhramani
Dhander	Mahanadi
Shetrunji	Vamsadhara
Upper Bhedra	Godavari
Mahi	Krishna
Narmada	Cavery
Tapi	Penna Kandu
Vaitana	Palar
Mandav Zuari	Pounaiyar
Kalinadi	Vallar
TadriGangavalli	Vaigai
Shravati	Gunar
Vetravati,Bharat	Vaipar
Puzha,Periyar,Pumba	

PARAMOUNT DEFENCE ACADEMY

India Minerals & Industries

- Northern belt
- Central belt
- Southern region
- SW region
- NW region



Chhotanagpur plateau

- **Kyanite (100%), Iron (90%), Chromium (90%), Mica (75%), coal (70%)**
- Manganese, copper, limestone

Assam petroleum reserve

- **Lignite coal**

Chhattisgarh region

- Extension of Chota Nagpur plateau
- **Iron, limestone in Chhattisgarh**
- Godavari- Wardha valley –coal field

Karnataka: Dharwad

- Shimoga, chitradurg, Tumkur, Chikmaglur
- **Iron, Manganese, limestone**
- Goa: iron
- MH: Ratnagiri - iron

Gujarat and Rajasthan

- Petroleum
- Salt from Kutch and pyala lake of RJ
- **Lake Sambhar, Lake Didwana – Gypsum, Borax**

IRON

- **India's iron ore mostly – Hematite**
- India -2nd largest producer of hematite after Russia
- Magnetite – Russia largest producer
- China – Hematite, Limonite

Iron & Coal Industries

Iron Ores

- **Magnetite → Best quality iron ore containing 72 % iron (Have magnetic properties)**
- Hematite → 60 – 70 % iron content
- Limonite → 40 – 60 % iron content
- Siderite → ~ 40 % iron content

Iron-coal industry

- **Iron ore + coke + limestone + heat → Pig iron**
- Pig iron ore processing → cast-iron, wrought iron, steel and variety of alloys

Steel Industries India

- **Jharkhand → Jamshedpur (TISCO), Bokaro**
- West Bengal → Durgapur, Burnpur
- Odisha → Rourkela
- Chhattisgarh → Bhilai
- Andhra Pradesh → Vishakhapatnam
- Karnataka → Visveswaraya
- Tamil Nadu → Salem

State	Mineral rich regions / mines
Jharkhand	Hazaribagh (Lohardaga) Singhbhum [Noamundi, Kariburi, Mahaburi, Gua] Daltongunj
Odisha	Bonai Sukinda, Badampahar, Gurumahisani
KN	Shimoga, Chitradurg, Chikmaglur, Tumkur Kemangundi and Kudremukh mines
Chhattisgarh	Dalli rajhara (to Bhilai steel plant) Bailadila (to Vishakhapatnam steel industries)
MH	Ratnagiri
AP	Kurnool, Anantapur

Manganese Reserves

Jharkhand	All the iron region Biggest mine: Chaibasa
MP	Balaghat

Copper Reserves

Jharkhand	Raka mines Mosabani mines
AP	Raka mines Mosabani mines
HP	Kangra valley, Kullu valley
WB	Kangra valley, Kullu valley

Mica

- **Mica is a naturally occurring non-metallic mineral that is based on a collection of silicates.**
- Mica is a very good insulator that has a wide range of applications in electrical and electronics industry.
- **It can withstand high voltage and has low power loss factor.**
- It is used in toothpaste and cosmetics because of its glittery appearance. It also acts as a mild abrasive in toothpaste.

- **India** is one of the foremost suppliers of mica to the world. Mica-bearing igneous rocks occur in AP, Bihar, Jharkhand, Maharashtra, Rajasthan.

States	Mineral rich regions
Odisha	Kodarma (largest in the world)
AP	Nellore (41%)
Bihar	Munger
KR	Alleppey

Limestone

- **Limestone rocks are composed of either calcium carbonate, the double carbonate of calcium and magnesium, or mixture of both.**
- Limestone also contains small quantities of silica, alumina, iron oxides, phosphorus and Sulphur.

States	Mineral rich regions
Odisha	Kodarma (largest in the world)
AP	Nellore
Bihar	Munger
KR	Alleppey

Bauxite

Aluminum Industry → India

- **UP** → Hindalco (Birla)
- **Odisha** → Hirakud (Birla), Jharsuguda (Vedanta)
- **Chhattisgarh** → Korba (Vedanta)
- BALCO → Ratnagiri, Maharashtra
- NALCO → Koratpur, Odisha
- MALCO → Mettur, TN

Copper Refineries → India

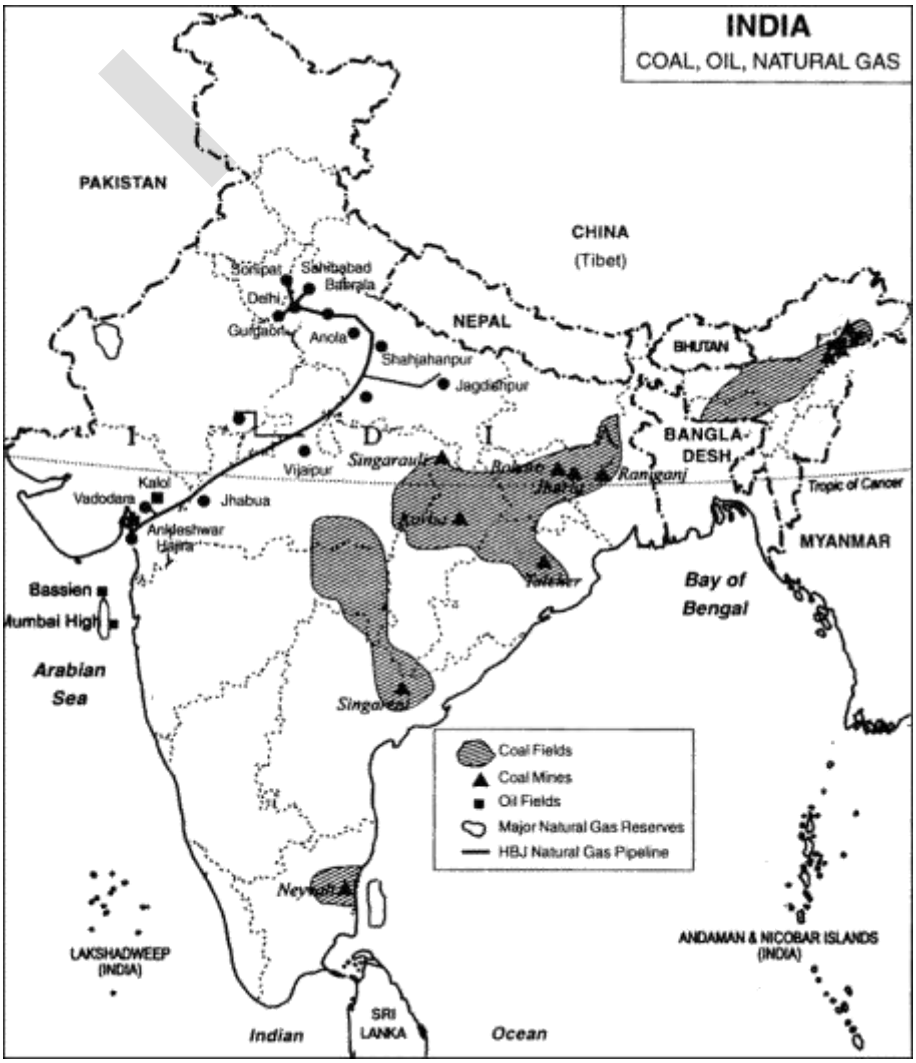
- **Hindustan Copper** → Khetri, Jhunjnu district, Rajasthan
- **BACLO** → Korba, Chhattisgarh
- **Hindalco (Birla)** → Dahej, Bharuch district of Gujarat
- **Sterlite Industries** → Tuticorin, Tamil Nadu

States	Mineral rich Region	Refineries
Assam	Digboi, Neharkatia, Sibsanagar, Dibrugarh	Digboi, Neharkatia, Sibsanagar, Dibrugarh
GJ	Kheda, Mehsana Gandhar oil filed Aliya bet	Sanand refinery Hazira, Koyali refineries
RJ	Barmer (by Cairns)	

States	Mineral Rich Region
MH	Nilam oil field (Bombay High) – 60% of India's production South Bessain (larger reserve than Nilam)
KG Basin	Rawa oil field (By Reliance and Niko) Off-shore Kaveri basin- Narimanam oil field

Petroleum Refining

- One of the 8 core industries of India
- India import crude oil
- **1st refinery in India: Digboi in Assam**
- **2nd Tarapur, in 1954**
- India exports refined petroleum products 10% of the production
- Public sector 17
- Private 3
- JV 2Total 22



		PSU Refineries
1	Guwahati	Indian Oil Corporation Limited
2	Barauni	
3	Koyali	
4	Haldia	
5	Mathura	
6	Digboi	
7	Panipat	
8	Bongaigaon	
9	Mumbai	Hindustan Petroleum Corporation Limited
10	Visakhapatnam	
11	Mumbai	Bharat Petroleum Corporation Limited
12	Kochi	
13	Manali	Chennai Petroleum Corporation Limited
14	Nagapattinam	
15	Numaligarh	Numaligarh Refinery Ltd.
16	Mangalore	MRPL
17	Tatipaka, AP	ONGC

- Reliance Jamnagar, GJ
- Yanam, Puducherry
- Essar Vadinar, GJ
- Cairn Amalpuram, AP
- Bina (MP): Bharat + Oman
- Bathinda: HPCL + Mittal

Natural Gas

- **In India natural gas found along with Oil reserve**
- India does not have exclusive natural gas reserve
- Not enough natural gas reserve
- Sometimes, Natural gas re-injected into the oilfield to maintain pressure which forces oil up to the surface
- **Mainly contains methane & found in association with mineral oil (75 % lies in Bombay high & Bassein oil fields)**

Largest share of NG –

- 40 % → Production of chemical fertilizers
- 30 % → Power generation
- 10 % → LPG (Cooking Gas)
- **Conventional sources** → Shale gas, Coal bed methane, Methane Hydrates, Tight sandstones

Production in India	Import from other countries
Bombay High	**Qatar (>80%)**
Gujarat	Egypt
Assam	Oman
KG Basin	Australia
Kaveri Basin	Saudi Arabia

Primary Industries

- Use natural raw material
- Examples → Hunting-gathering, pastoral activities, fishing, forestry, agriculture, mining

Secondary Industries

- **Make complex products using the material obtained from primary industry**
- Steel → Automobiles, Railway engines
- Wooden Pulp → Rayon
- Al + Cu → Electrical & Electronics products
- Fibers → Readymade Garments
- Secondary Industry can be sub classified into
    - Heavy Industries → Engineering, metal goods, heavy chemicals, shipbuilding, locomotives
    - Light industries → Electronics, plastic, textile, cosmetic etc.

Tertiary Industries

- **Not a branch of manufacturing but sells the product of primary and secondary industries via transport, trading, wholesale & retailing**
- Basically, include Service providers industry
- Provides services such as tourism, education, entertainment, advertisements, consultancy, Administration, healthcare etc.

Factors responsible for the location of industries

- Availability of Raw Material
- Power Resources
- Availability of water
- Labor
- Transportation
- Availability of Market
- Capital
- Government Policies

Timber industry

Near raw material

- Dependent on bamboo, softwood
- E.g. South Gujarat, Odisha, MP

Near market

- Kolkata → Raw material brought from North Eastern States, cheap labor, coal, water available
- Lucknow → Depend on bagasse (from sugar mills), rags, wheat bran & Sabai grass brought from Tarai region

Cotton and Textile Industry

- **Cotton as a raw material is lightweight & non-perishable**
- **Cotton changed to yarn/textile → Hardly any weight loss**
- Therefore, proximity to raw material site is not essential →doesn't offer great cost-saving in transportation (Unlike sugar, Cement or Steel industry)
- Result → other factors become more important in industrial location viz.
- nearness to market
- nearness to water body (for dyeing, bleaching)
- Energy to run power looms and textile machines
- cheap labor supply & availability of capital/finance

Cotton Industry locations in India

- Maharashtra (Mumbai – Cotton polish of India)
- Ahmadabad (Gujrat)
- Coimbatore (Tamil Nadu)

Silk Industry

- India has vast labor & market to match silk farming
- **India grows all important varieties of silk viz. Mulberry, Tasar, Oak Tasar, Eri and Muga**
- But **demand is greater than production**, so even we have to import from china (particularly bivoltine mulberry silk)
- Mulberry silk → Mainly in Southern states (Karnataka, Tamil Nadu, Andhra Pradesh) + WB + J & K
- Non – Mulberry → Jharkhand, Chhattisgarh, Odisha + North East

Indian woollen textile regions

Near Raw Material

- **Srinagar** Kashmiri Shawl using Kashmiri goats
- **Punjab** Raw material from Ludhiana, Dhaliwal, Amritsar
- **Jamnagar** Raw material from Kathiawar (and parts of Rajasthan)
- **Rajasthan** From Bikaner, Barmer

Near Market

- **Kanpur** in 1870s, Kanpur became major center of woolen textile to meet the requirements of British India Army
- **Mumbai**, Chennai Mostly use imported wool for making apparels

Jute Industry → West Bengal (India)

Raw material

- **90% of Jute is cultivated in the Kolkata hinterland**
- Jute is the only crop that can withstand flooding of this region

Rubber Plantations

Nature of Raw Material

- **Natural Rubber is obtained from latex of rubber trees**
- Latex is white milky liquid, collected by making cut on rubber tree bark
- Latex contains 30-40% rubber

Rubber → Kerala

- **In Kerala, Rubber grown on hill slops of W Ghats in Travancore, Kozhikode, Malabar, Kottayam districts.**
- Kerala → lot of coconuts → their shell is used as "cup" to collect latex

Sugar Industry

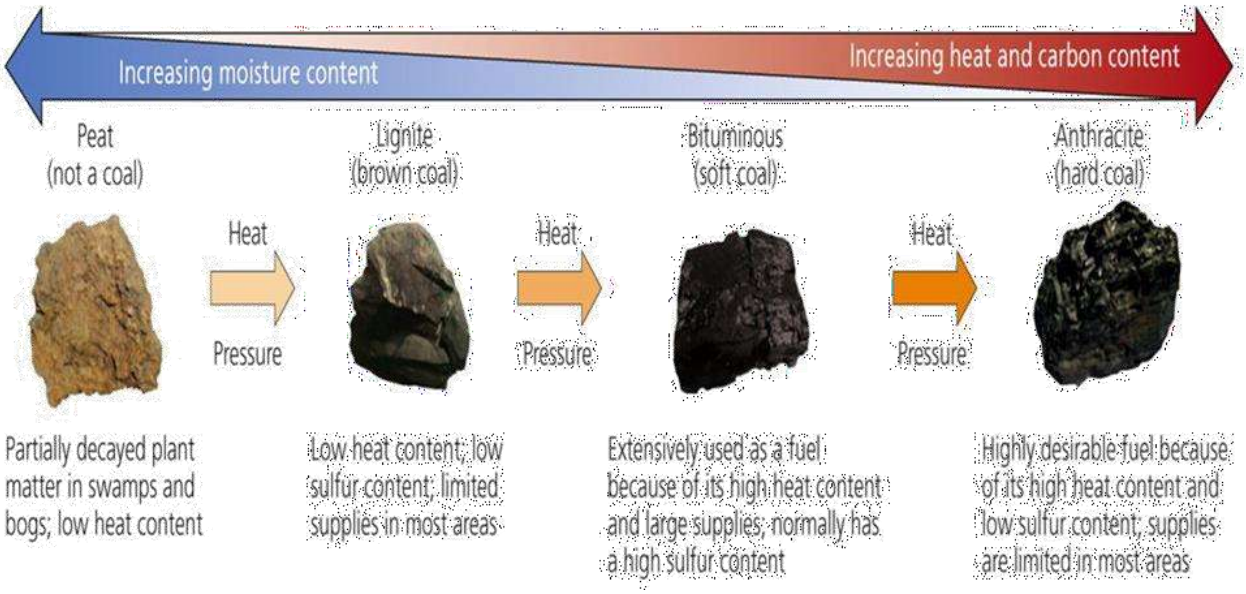
Nature of Raw material

- Sugar mills are located near sugar growing areas, because of two factors
  - Perishable → Sugarcane contains sucrose & once you cut the sugarcane, the sucrose content starts to decline. Hence raw material must be quickly transported.
  - Weight loss → Sugar accounts for only ~10% of the bulky sugarcane and therefore it is prohibitively expensive to transport sugarcane over long-distance in its original form.

Coal

- **Quality of coal is determined by its carbon content**
- Major coal producing areas in India → Jharkhand > Odisha > Chhattisgarh > West Bengal
- **Chota Nagpur Region → Hub of 90 % of Indian minerals (esp.in Coal & Iron → Ruhr of India)**

Major types of Coals



- Anthracite
  - Best quality coal
  - Approx. 90 % carbon content
  - **Found at J & K only in India**
  - Very little smoke & ash content
  - Burns without flames
- Bituminous
  - 70 – 90 % carbon content
  - Most common in India
  - **Used in making coke**
- Lignite
  - 40 – 70 % carbon content
  - **Known as brown coal**
- Peat
  - 1st transformation of wood into coal
  - ~ 40 % carbon content

States	Mineral rich regions
Jharkhand	Damodar valley [Bokaro, Jharia, Dhanbad, Giridih, Daltonganj]
WB	Extension of Damodar valley (raniganj and Barakar formation) Birbhum, Darjeeling (Pankhwali coal field, Darlin coalfield) Burdwan, Bankura
Odisha	Mahanadi basin Talcher valley (Talcher thermal plant)
Chhattisgarh	Narmada, Son rift valley
MP	Chindwara Jhilmil (cocking coal to Bhilai steel plant)
AP	Singreni coal field (Ramadugam Thermal plant) Kotagudam coal field
MH	Nagpur-kampti coal field

Coal: Lignite

States	Mineral rich regions
Assam	Makum
TN	Neyvelli
RJ	Palana
GJ	Umarsar (Kutch)

Coal: Anthracite & Peat

states	Mineral rich regions
Anthracite	
J&K	Kalakot
Peat	
KR	Mangrove-Karee soil
WB	Gangetic Delta

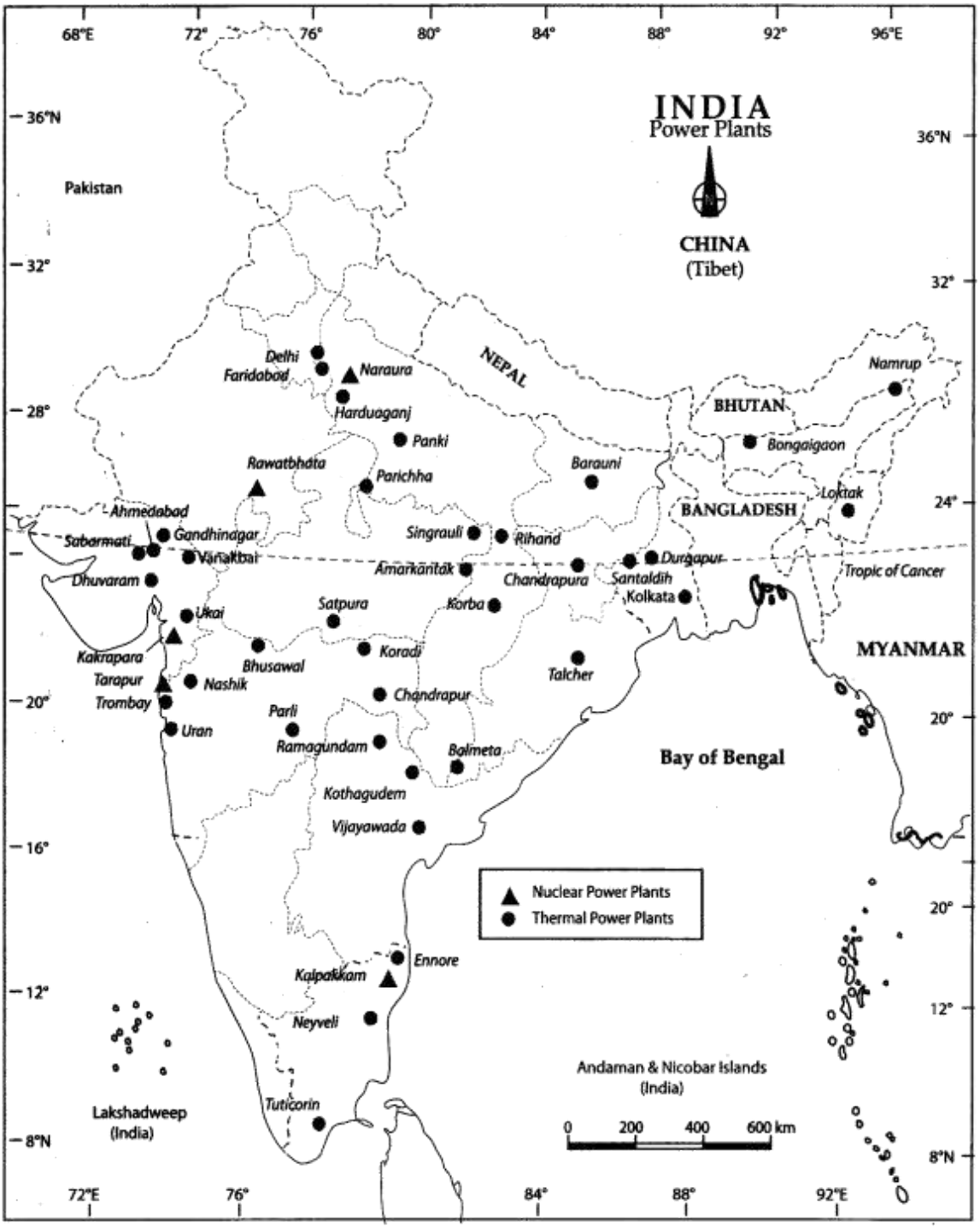
Natural Gas

- **Mainly contains methane & found in association with mineral oil (75 % lies in Bombay high & Bassein oil fields)**
- Largest share of NG –
  - 40 % → Production of chemical fertilizers
  - 30 % → Power generation
  - 10 % → LPG (Cooking Gas)
- **Conventional sources** → Shale gas, Coal bed methane, Methane Hydrates, Tight sandstones.

Electricity in India → Thermal > Hydro > Wind > Nuclear

- Thermal Energy
  - 67 % of total energy production
  - Generated by using fossil fuels (Coal, Petroleum, Natural gas)
  - Largest Producer → Maharashtra
- Hydroelectricity
  - **18 % of total energy production**
  - Eco-friendly, Clean & Renewable
  - Largest Producer → Andhra Pradesh

- Nuclear Energy
  - 26 % of total energy production
  - Energy obtained from atomic minerals viz. Uranium, Thorium, zircon, beryllium
  - Provide colossal energy through a small quantity of substance
  - Thorium → Found as monazite sand in lakes & sea beds
  - Thorium → AP > TN > Kerala > Orissa constitutes 30 % of world reserves
  - Largest Producer → Tamil Nadu



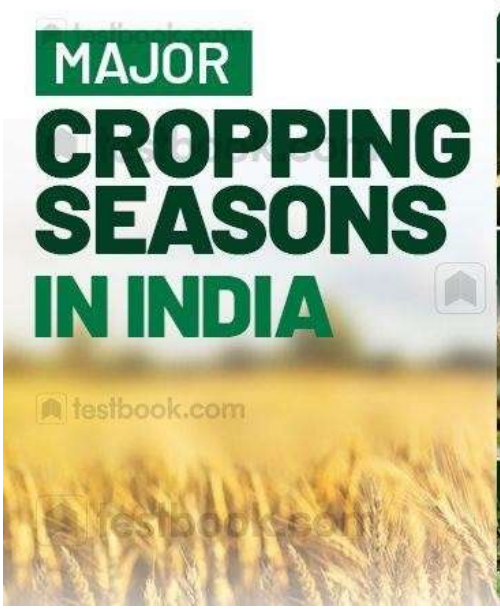
PARAMOUNT DEFENCE ACADEMY

Indian Agriculture

- India is an agricultural economy where approx. 50% of the people depend on agriculture.
- Share in GDP → 17 %

Salient Features of Indian Agriculture

- Dependent on unreliable monsoon (60 %)
- Less Mechanization; Inadequate Agricultural research
- **1st rank in Milk** (17% of world production), Mango, banana, coconut, cashew, papaya, peas, cassava and pomegranate
- **Largest producer and exporter of spices, Millets, Pulses, Dry Bean, Ginger**
- Overall, second largest producer of vegetable, fruits and fishes



SEASON	TIME PERIOD	CROPS	STATES
RABI	Sown October - December Harvested April - June	Wheat, Barley, Peas, Gram, Mustard.	Punjab, Haryana, Himachal Pradesh, Jammu & Kashmir, Uttarakhand, Uttar Pradesh
KHARIF	Sown June - July Harvested September - October	Rice, Maize, Jower, Urad, Cotton, Groundnut, Soybean	Assam, West Bengal, Coastal regions of Odisha, Andhra Pradesh, Telangana, Tamil Nadu, Kerala & Maharashtra
ZAID	Sown & Harvested March - July (Between Rabi and Kharif)	Seasonal fruits, Vegetables, Fodder crops	Most of the Northern and North-Western states

Kharif Crops

- Also known as **Monsoon / Summer Crops**
- Require long hot weather for growth
- **Sown** → May – July, **Harvest** → Sep – Oct
- **Major Crops → Paddy, Sugarcane, Maize, Jowar, Bajra, Cotton, Pulses, Groundnut, Soybean, Sunflower, Tea, Coffee, Rubber, Sesame, Guar etc.**

Rabi Crops

- Also known as **Winter Season Crops**
- **Requires less water**
- **Require cold weather for growth**
- **Sown** → Oct – Nov, **Harvest** → Feb – April'

- **Major Crops → Wheat, Gram, Potato, Peas, Oil seeds (Rapeseed, linseed), Mustard etc.**

Zaid Crops

- **Sown between Rabi & Kharif crops i.e. from March to June**
- Requires warm dry weather for growth & longer day length for flowering
- Major Crops → Seasonal fruits & vegetables (Musk melon, Water melon, Cucumber, China Paddy, Gourds, Fodder crops)

Current Irrigation Resources

- Wells & Tube wells = 60 %
- Canal Irrigation = 30 %
- Tanks = 6 %
- Multipurpose Projects = 2 %

Drip Irrigation

- Also Known as **low- flow, Micro, and Trickle Irrigation**
- **Frequent, slow application of water, drop by drop, at the plant base through a network of pipelines**

Mixed Cropping

- Also known as **Multiple cropping**
- **When two or more than two crops are grown simultaneously on the same field**
- Increases crop yield & Fertility of soil

Terrace Farming

- **Farming on steps cut on mountainous region**
- Mainly for prevention of soil erosion

Extensive Agriculture

- Farmers tries to get the greater output by bringing more and more new land areas under cultivation
- **Agriculture at large farm with extensive use of machinery**
- Yield / Area is low but Yield / Labor is high
- **Crops are grown solely for the purpose of commercial activities**

Intensive Agriculture

- **Land holding is small which is intensively used by means of labor provided by family members**
- Hence, Yield / Area is high but Yield / Labor is low

Subsistence Agriculture

- **Farming in which the main production is consumed by the farmer's household**
- For Livelihood, Small land area & Great no. of labors

Shifting Agriculture

- **Farmers clear the forestland and use it for growing crops.**
- The crops are grown for 2 to 3 years.
- When the fertility of the soil decreases, the farmer shifts to a new land
- **Also known as Slash & Burn agriculture**

Cooperative Farming

- **Farmers voluntarily pool their resources together like land, machinery etc. to form a co-operative society.**

Collective Farming

- **State owned agriculture esp. in socialist countries like Russia**
- Farmers pool their resources together to achieve yearly targets set by gov. to sell their produce at fixed rates.

Organic Farming

- **Excludes the use of manufactured fertilizers, pesticides, insecticides, fungicides & herbicides**
- Strictly prohibits the use of plant growth regulators, livestock antibiotics, food additives, and genetically modified organisms
- Relies on techniques such as crop rotation, green manure, biofertilizers, compost and biological pest control to maintain soil productivity

Bio Fertilizers

- **Contains living microorganisms which, when applied promotes growth by increasing supply or availability of primary nutrients to the host plant**
- Examples → Rhizobium, Azotobacter, Azospirilium and Blue Green Algae (BGA)
- Gross cropped area -195 million hectare

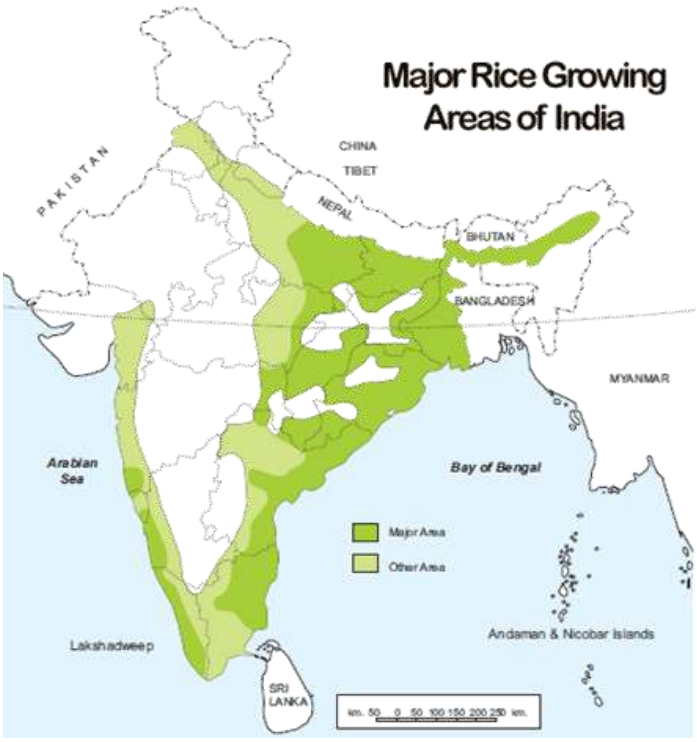
- Net sown area -141 million hectare
- **Agricultural growth- 4.1% in the current year from 1.2% in 2015-16 (Economic survey)**
- **Government to Double the Income of Farmers by 2022**

Cereals

- **The cereals occupy about 54 per cent of total cropped area in India.**
- The country produces about 11 per cent cereals of the world and ranks third in production after China and U.S.A.
- India produces a variety of cereals, which are classified as fine grains (rice, wheat) and coarse grains (jowar, bajra, maize, ragi), etc.

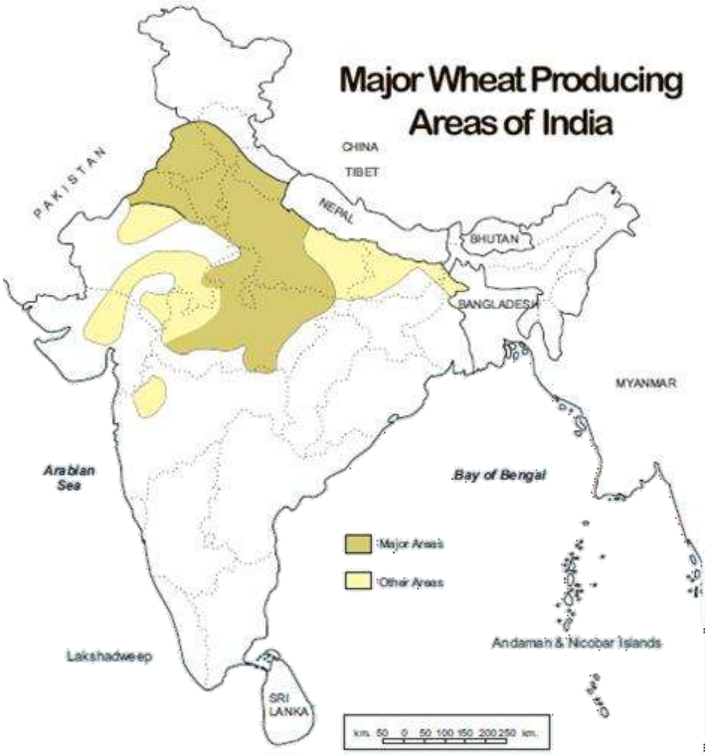
Rice

- Rice is a staple food for the overwhelming majority of population in India.
- it has about 3,000 varieties which are grown in different agro-climatic regions.
- These are successfully grown from sea level to about 2,000 m altitude and from humid areas in eastern India to dry but irrigated areas of ***Punjab, Haryana, western U.P. and northern Rajasthan.***
- **In southern states and West Bengal, the climatic conditions allow 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'. But in Himalayas and northwestern parts of the country, it is grown as a kharif crop during southwest Monsoon season

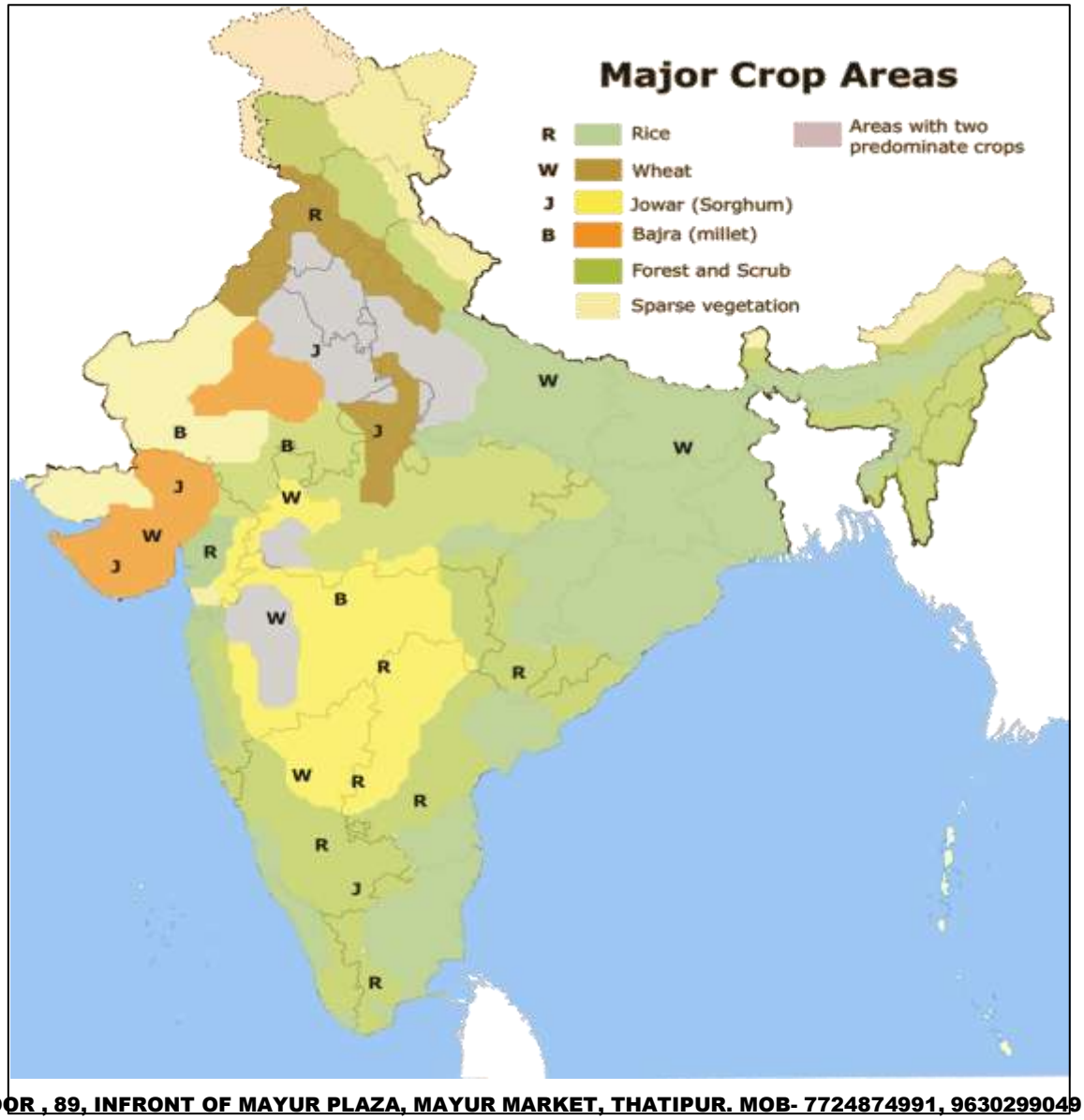


- **India contributes 21.6 per cent of rice production in the world and ranked second after China in 2008-09**
- The yield level of rice is high in Punjab, Tamil Nadu, Haryana, Andhra Pradesh, Telangana, West Bengal and Kerala. In the first four of these states almost the entire land under rice cultivation is irrigated.
- Rice cultivation in the irrigated areas of Punjab and Haryana was introduced in 1970s following the Green Revolution.

Wheat



- **Wheat is the second most important cereal crop in India after rice**.
- India produces about 12 per cent of total wheat production of world.
- **It is primarily a crop of temperate zone. Hence, its cultivation in India is done during winter i.e. rabi season.**
- About 85 per cent of total area under this crop is concentrated in north and central regions of the country i.e. Indo-Gangetic Plain, Malwa Plateau and Himalayas up to 2,700 m altitude. Being a rabi crop, it is mostly grown under irrigated conditions
- About 14 per cent of the total cropped area in the country is under wheat cultivation. Uttar Pradesh, Punjab, Haryana, Rajasthan and Madhya Pradesh are five leading wheat producing states



Jowar

- The coarse cereals together occupy about 16.50 per cent of total cropped area in the country.
- Among these, jowar or sorghum alone accounts for about 5.3 per cent of total cropped area.
- **It is main food crop in semi-arid areas of central and southern India.**
- **Maharashtra alone produces more than half of the total jowar production of the country.**
- Other leading producer states of jowar are Karnataka, Madhya Pradesh, Andhra Pradesh and Telangana.
- It is sown in both kharif and rabi seasons in southern states. But it is a kharif crop in northern India where it is mostly grown as a fodder crop

Bajra

- **Bajra is sown in hot and dry climatic conditions in northwestern and western parts of the country.**
- It is a hardy crop which resists frequent dry spells and drought in this region.
- **It is cultivated alone as well as part of mixed cropping.**
- This coarse cereal occupies about 5.2 per cent of total cropped area in the country.
- Leading producers of bajra are the states of Maharashtra, Gujarat, Uttar Pradesh, Rajasthan and Haryana

Maize

- **Maize is a food as well as fodder crop grown under semi-arid climatic conditions and over inferior soils.**
- This crop occupies only about 3.6 per cent of total cropped area.
- Maize cultivation is not concentrated in any specific region. It is sown all over India except eastern and north-eastern regions

Pulses

- **Pulses are a very important ingredient of vegetarian food as these are rich sources of proteins.**
- These are legume crops which increase the natural fertility of soils through nitrogen fixation.
- India is a leading producer of pulses and accounts for about one-fifth of the total production of pulses in the world.
- **The cultivation of pulses in the country is largely concentrated in the drylands of Deccan and central plateaus and northwestern parts of the country.**
- Pulses occupy about 11 per cent of the total cropped area in the country.

Fibre Crops

- **These crops provide us fiber for preparing cloth, bags, sacks and a number of other items.**
- Cotton and jute are two main fiber crops grown in India.

Cotton

- **Cotton is a tropical crop grown in kharif season in semi-arid areas of the country.**
- India lost a large proportion of cotton growing area to Pakistan during partition.
- However, its acreage has increased considerably during the last 50 years.
- **India grows both short staple (Indian) cotton as well as long staple (American) cotton called 'narma' in north-western parts of the country. Cotton requires clear sky during flowering stage.**
- **India ranks fourth in the world in the production of cotton after China, U.S.A. and Pakistan and accounts for about 8.3 per cent of production of cotton in the world.**
- Cotton occupies about 4.7 per cent of total cropped area in the country.
- **There are three cotton growing areas, i.e. parts of Punjab, Haryana and northern Rajasthan in north-west, Gujarat and Maharashtra in the west and plateaus of Andhra Pradesh, Karnataka and Tamil Nadu**
- Leading producers of this crop are Maharashtra, Gujarat, Andhra Pradesh, Punjab and Haryana. Per hectare output of cotton is high under irrigated conditions in north-western region of the country. Its yield is very low in Maharashtra where it is grown under rainfed conditions.

Jute

- **Jute is used for making coarse cloth, bags, sacks and decorative items.**
- It is a cash crop in West Bengal and adjoining eastern parts of the country.
- **India lost large jute growing areas to East Pakistan (Bangladesh) during partition.**
- At present, India produces about three-fifth of jute production of the world.
- West Bengal accounts for about three-fourth of the production in the country. Bihar and Assam are other jute growing areas

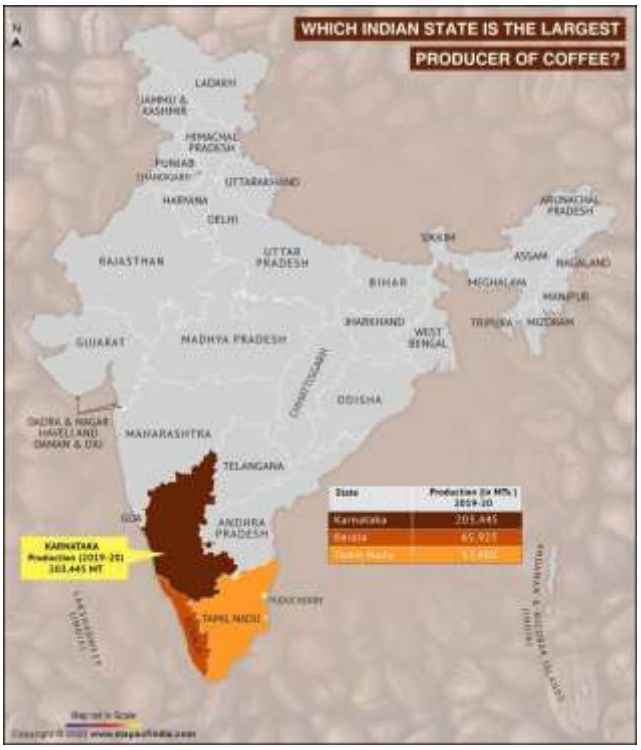
Sugarcane

- **Sugarcane is a crop of tropical areas. Under rainfed conditions, it is cultivated in sub-humid and humid climates.**
- But it is largely an irrigated crop in India. In Indo-Gangetic plain, its cultivation is largely concentrated in Maharashtra & Uttar Pradesh.
- India was the second largest producer of sugarcane after Brazil in 2008-09. It accounts for about 23 per cent of the world production of sugarcane. But it occupies only 2.4 per cent of total cropped area in the country. Uttar Pradesh produces about two-fifth of sugarcane of the country. Maharashtra, Karnataka, Tamil Nadu, Telangana and Andhra Pradesh are other leading producers of this crop

Tea

- **Tea is a plantation crop used as beverage. Black tea leaves are fermented whereas green tea leaves are unfermented.**
- Tea leaves have rich content of caffeine and tannin. It is an indigenous crop of hills in northern China.
- **It is grown over 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 Brahmaputra valley of Assam which still is a major tea growing area in the country.
- Later on, its plantation was introduced in the sub-Himalayan region of West Bengal (Darjeeling, Jalpaiguri and Cooch Bihar districts). Tea is also cultivated on the lower slopes of Nilgiris and Cardamom hills in Western Ghats
- India is a leading producer of tea and accounts for about 28 per cent of total production in the world.
- India's share in the international market of tea has declined substantially. At present, it ranks third among tea exporting countries in the world after Sri Lanka and China.
- **Assam accounts for about 53.2 per cent 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 producers of tea.**

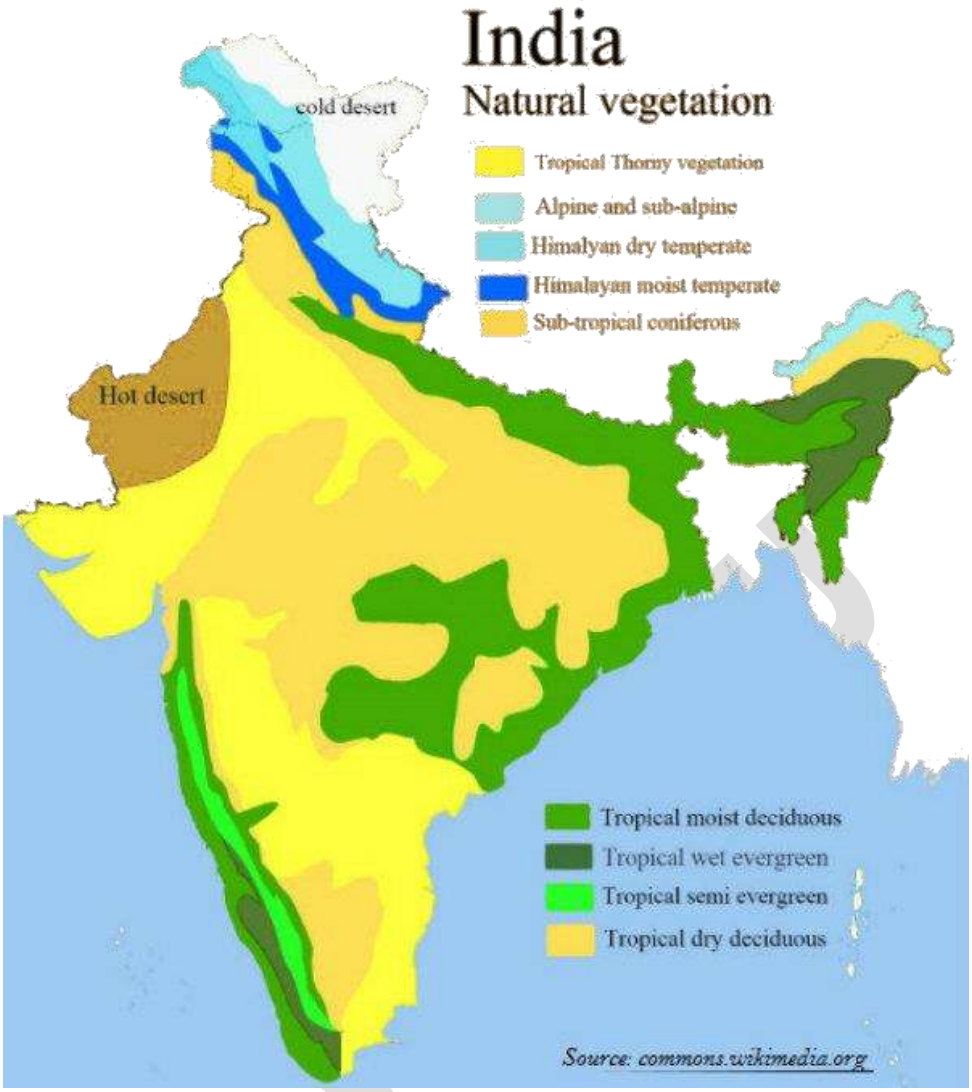
Coffee



- **Coffee is a tropical plantation crop. There are three varieties of coffee i.e. arabica, Robusta and liberica.**
- India mostly grows superior quality coffee, arabica, which is in great demand in International market.
- **But India produces only about 3.2 per cent coffee of the world and ranks seventh after Brazil, Vietnam, Colombia, Indonesia, Ethiopia and Mexico in 2008-09.**
- Coffee is cultivated in the highlands of Western Ghats in Karnataka, Kerala and Tamil Nadu. Karnataka alone accounts for more than two-third of total production of coffee in the country.

PARAMOUNT DEFENCE ACADEMY

Natural Vegetation of India



Annual Rainfall	Type of Vegetation
200 cm or more	Evergreen Rain Forests
100 to 200 cm	Monsoon Deciduous Forests
50 to 100 cm	Drier Deciduous or Tropical Savanna
25 to 50 cm	Dry Thorny Scrub (Semi-arid)
Below 25 cm	Desert (Arid)

Forest Cover in India

- According to the 2019 report, the **total forest cover of the country is 712,249 square kilometers** (21.67 percent of India's total geographical area) slightly up from 708,273 sq. km (21.54 percent) in 2017.
- The tree cover of the country is 95,027 sq. km (2.89 percent of the total area) again slightly up from 93,815 sq.
- MP – Largest Area
- Mizo- Largest % area

Classification of Natural Vegetation of India

- Tropical Evergreen Rain Forests
- Deciduous or Monsoon Type of Forests
- Tropical dry Deciduous Forests
- Arid Forests and Desert Vegetation
- Tidal or Mangrove Forests
- Mountain Forests

Tropical Evergreen Forests

- **Av. Rainfall → Above 200 cm**
- **Av. Temp. → 24* C**
- Found at Hot & Humid areas of India
- Found at WGs, A & N islands & Eastern India
- **Sunrays unable to reach earth surface**
- Trees compete & rise high to get sunlight
- Ex. Rubber, Coconut, Ebony, Mahogany, Palms

Deciduous Forests

- **Av. Rainfall → 100 -200 cm**
- **Av. Height → 25 – 45 m**
- Shed their leaves in summers due to shortage of water
- **Found at Shivalik's, Ganga valley, WGs, NE India**
- Ex. Sal, Teak, Shisham, Sandalwood, Deodar, Mahua

Tropical dry Forests

- **Av. Rainfall → 50 – 100 cm**
- **Less dense & Small in size → 6 – 9 m**
- Roots are thick & long to use underground water
- Thick Bark to prevent undue evaporation
- **Found at Punjab, Haryana, MP, Eastern Rajasthan, Central Deccan Plateau**
- Most of the areas are used for agriculture
- Dwarf Deciduous trees and long- grasses grow in these regions
- Ex. Neem, Shisham, Babul, Pipal, Mango

Arid or Desert Forests

- **Av. Rainfall < 50 cm**
- **Prominent features → Small leaves, Thick Bark, Long Roots**
- Indian wild date is common in these deserts
- **Found at Western Rajasthan, SW Haryana & Punjab, In some parts of Gujrat**
- Ex. Small sized kikar, Babul, Acacia, Bushes & Shrubs

Tidal Forests

- **These forests grow along the coast and on the edges of the deltas**
- **Famous for Mangrove & Sundari Trees**
- Consists of thick Bushes & Ferns
- Known as Halophytes → Tolerant of Salinity
- **Found at Sundarbans, A & N Islands, Deltas of Mahanadi, Godavari, Krishna & Kaveri**

Mountain forests

- **Mountain forests vary considerably along the slopes of mountain**
- **On the foothills of Himalayas, up to a height of 1500 meters, evergreen trees, (Sal, teak, bamboo and cane) grow abundantly.**
- On higher slope between 1,500 meters to 3,500 meters, temperate conifer trees (pine, fir, oak, maple, deodar, laurel spruce, cedar) grow.
- **At the higher altitude of the Himalayas, rhododendrons and junipers are found.**
- Beyond these vegetation belts, alpine grasslands appear up to snowfield.

Classification of Natural Vegetation of India

- Classification of Natural Vegetation of India is primarily based on spatial and annual variations in rainfall. Temperature, soil and topography are also considered.
- **India's vegetation can be divided into 5 main types and 16 sub-types**

A. Moist Tropical Forests

- Tropical Wet Evergreen
- Tropical Semi-Evergreen
- Tropical Moist Deciduous
- Littoral and Swamp

B. Dry Tropical Forests

- Tropical Dry Evergreen
- Tropical Dry Deciduous
- Tropical Thorn

C. Montane Sub-Tropical Forests

- Sub-tropical broad-leaved hill
- Sub-tropical moist hill (pine)
- Sub-tropical dry evergreen

D. Montane Temperate Forests

- Montane Wet Temperate
- Himalayan Moist Temperate
- Himalayan Dry Temperate

E. Alpine Forests

- Sub-Alpine
- Moist Alpine scrub
- Dry Alpine scrub

Forest Type in India	% of Total Area
Tropical Moist Deciduous	37
Tropical Dry Deciduous	28
Tropical Wet Evergreen	8
Sub-Tropical Moist Hill	6
Tropical Semi-Evergreen	4
Rest below 4 %	

Tropical Wet Evergreen Forests or Rain Forests

Climatic Conditions

- **Annual rainfall exceeds 250 cm**
- The annual temperature is about 25°-27°C
- The average annual humidity exceeds 77 per cent
- The dry season is distinctly short.

Characteristics

- Evergreen: Due to high heat and high humidity, the trees of these forests do not shed their leaves together.
- **All plants struggle upwards (most epiphytes) for sunlight resulting in a peculiar layer arrangement.**

Distribution

- **Western side of the Western Ghats (500 to 1370 meters above sea level).**
- Some regions in the Purvanchal hills.
- In the Andaman and Nicobar Islands

Tropical Semi-Evergreen Forests

- **They are transitional forests between tropical wet evergreen forests and tropical deciduous forests.**
- They are comparatively drier areas compared to tropical wet evergreen forests.

Climatic Conditions

- **Annual rainfall is 200-250 cm**
- Mean annual temperature varies from 24°C to 27°C
- The relative humidity is about 75 per cent
- The dry season is not short like in tropical evergreen forests.

Distribution

- Western coast
- Assam
- Lower slopes of the Eastern Himalayas
- Odisha and
- Andamans.
- The important species are laurel, rosewood, mesua, thorny bamboo – Western Ghats, white cedar, Indian chestnut, champa, mango, etc. – Himalayan region.

Tropical Moist Deciduous Forests

Climatic Conditions

- **Annual rainfall 100 to 200 cm.**
- Mean annual temperature of about 27°C
- The average annual relative humidity of 60 to 75 per cent.
- Spring (between winter and summer) and summer are dry.

Characteristics

- **The trees drop their leaves during the spring and early summer when sufficient moisture is not available.**
- The general appearance is bare in extreme summers (April-May).
- Tropical moist deciduous forests present irregular top storey [25 to 60 m].
- These provide valuable timer like Teak.
- These forests occupy a much larger area than the evergreen forests but large tracts under these forests have been cleared for cultivation.

Distribution

- Belt running along the Western Ghats surrounding the belt of evergreen forests.
- **A strip along the Shivalik range including terai and bhabar from 77° E to 88° E.**
- Manipur and Mizoram.
- Hills of eastern Madhya Pradesh and Chhattisgarh.
- Chota Nagpur Plateau.
- Most of Odisha.
- Parts of West Bengal and
- Andaman and Nicobar Islands.

Tropical Dry Evergreen Forests

Distribution

- Along the coasts of Tamil Nadu.

Climatic Conditions

- **Annual rainfall of 100 cm [mostly from the north-east monsoon winds in October – December].**

- Mean annual temperature is about 28°C.
- The mean humidity is about 75 per cent.
- The growth of evergreen forests in areas of such low rainfall is a bit strange.

Tropical Dry Deciduous Forests

Climatic Conditions

- **Annual rainfall is 100-150 cm.**

Characteristics

- These are similar to moist deciduous forests and shed their leaves in dry season.
- **The major difference is that they can grow in areas of comparatively less rainfall.**
- They represent a transitional type – moist deciduous on the wetter side and thorn forests on the drier side.

Distribution

- **They occur in an irregular wide strip running from the foot of the Himalayas to Kanyakumari except in Rajasthan, Western Ghats and West Bengal.**
- The important species are teak, axle wood, rosewood, common bamboo, red sanders, laurel, satinwood, etc.

Tropical Thorn Forests

Climatic Conditions

- **Annual rainfall less than 75 cm.**
- Humidity is less than 50 per cent.
- Mean temperature is 25°-30°C.

Characteristics

- The trees are low (6 to 10 meters maximum) and widely scattered.'
- Acacias and Euphorbias are very prominent.
- The Indian wild date is common. Some grasses also grow in the rainy season.

Distribution

- **Rajasthan, south-western Punjab, western Haryana, Kachchh and neighboring** parts of Saurashtra.

- Here they degenerate into desert type in the Thar desert.
- Such forests also grow on the leeside of the Western Ghats covering large areas of Maharashtra, Karnataka, Telangana, Andhra Pradesh and Tamil Nadu.
- The important species are neem, babul, cactii, etc.

Montane Sub-Tropical Forests

- Sub-tropical Broad-leaved Hill Forests

Climatic conditions

- **Mean annual rainfall is 75 cm to 125 cm.**
- Average annual temperature is 18°-21°C.
- Humidity is 80 per cent.

Distribution

- **Eastern Himalayas to the east of 88°E longitude at altitudes varying from 1000 to 2000 m.**

Characteristics

- Forests of evergreen species.
- Commonly found species are evergreen oaks, chestnuts, ash, beech, sals and pines.
- **These forests are not so distinct in the southern parts of the country. They occur only in the Nilgiris and Palni hills at 1070-1525 meters above sea level.**

Sub-tropical Dry Evergreen Forests

Distribution

- Found in the Bhabar, the Shivalik's and the western Himalayas up to about 1000 meters above sea level.

Climatic Conditions

- **Annual rainfall is 50-100 cm (15 to 25 cm in December-March).**
- The summers are sufficiently hot and winters are very cold.

Montane Wet Temperate Forests

Climatic Conditions

- Grows at a height of 1800 to 3000 m above sea level
- **Mean annual rainfall is 150 cm to 300 cm**
- Mean annual temperature is about 11°C to 14°C and the
- Average relative humidity is over 80 per cent.

Distribution

- Higher hills of Tamil Nadu and Kerala, in the Eastern Himalayan region.

Alpine Forests

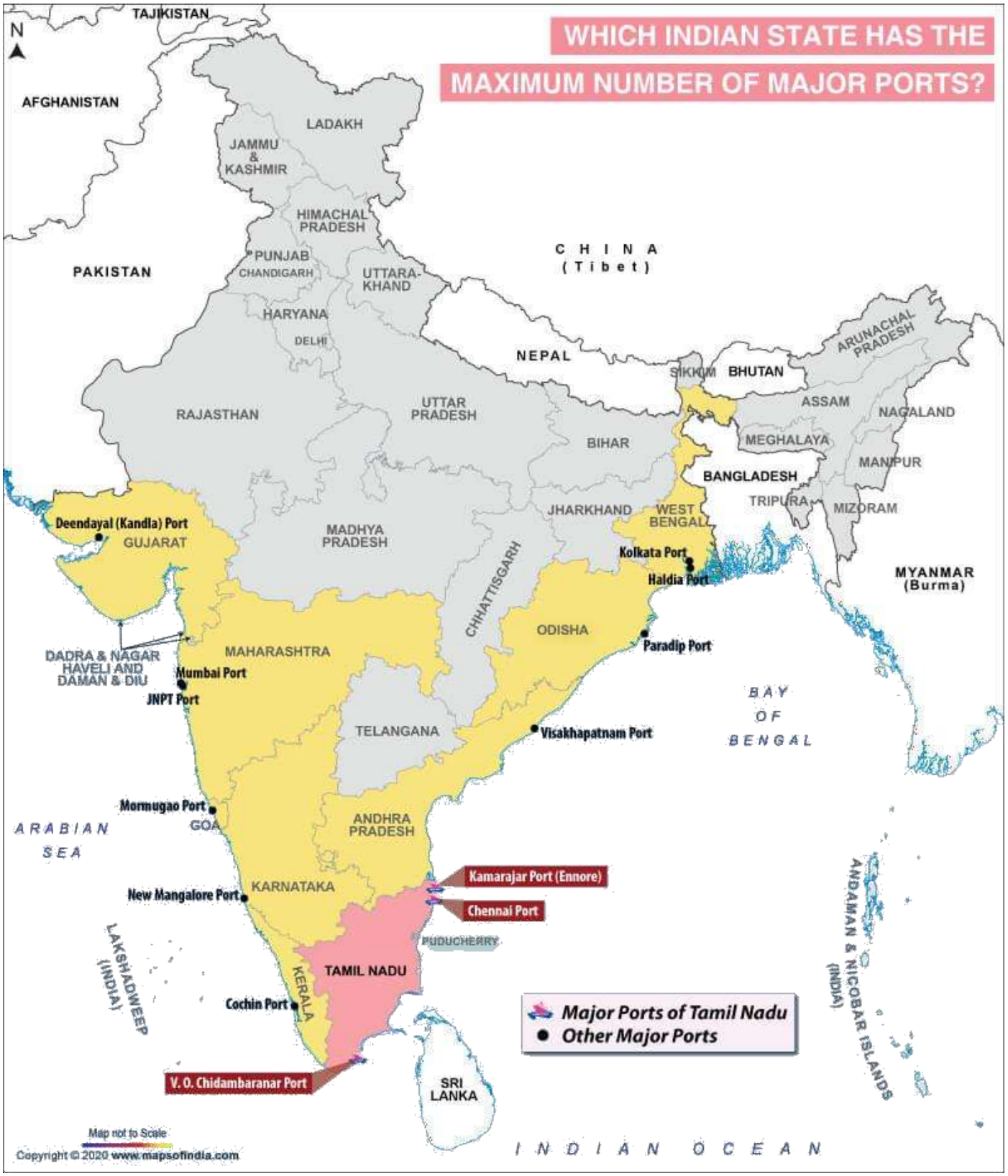
- Altitudes ranging between 2,900 to 3,500.
- **It is a mixture of coniferous and broad-leaved trees in which the coniferous trees attain a height of about 30 m while the broad-leaved trees reach only 10 m.**
- Fir, spruce, rhododendron, etc. are important species.

PARAMOUNT DEFENCE ACADEMY

Ports of India

Zone	State	Port	Features
Eastern Coast	Tamil Nadu	Chennai	Artificial Port Second busiest port
Western Coast	Kerala	Kochi	Sited in the Vembanad lake Exports of spices and salts
Eastern Coast	Tamil Nadu	Ennore	India's First corporatized port
Eastern Coast	West Bengal	Kolkata	India's only major Riverine port Situated on Hugli river Known as Diamond Harbour
Western Coast	Gujarat	Kandla	Known as Tidal Port Acknowledged as Trade Free Zone Largest port by volume of cargo handled.
Western Coast	Karnataka	Mangalore	Deals with the iron ore exports
Western Coast	Goa	Mormugao	Situated on the estuary of the river Zuari
Western Coast	Maharashtra	Mumbai Port Trust	Largest Natural Port and harbour In India The busiest port in India
Western Coast	Maharashtra	Jawaharlal Nehru Port Trust (JNPT) also known as Nhava Sheva, Navi Mumbai	Largest Artificial Port It is the Largest Container Port in India.
Eastern Coast	Odisha	Paradip	Natural Harbour deals with the export of iron and aluminium
Eastern Coast	Tamil Nadu	Tuticorin	A major port in south India deals with the fertilizers and petrochemical products
Eastern Coast	Andhra Pradesh	Visakhapatnam	Deepest port of India deals with the export of iron ore to Japan. Amenities for building and fixing of ships are available
Bay of Bengal	Andaman & Nicobar Islands	Port Blair	The port connected to the mainland of India through ship and flight. This port is situated in between two international shipping lines namely Saudi Arabia & US Singapore.

PARAMOUNT DEFENCE ACADEMY



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PARAMOUNT DEFENCE ACADEMY

National Waterways of India

Sl. No.	NW Number	River System	Route	Length (in km)	Locations	Established
1	NW – 1	Ganga-Bhagirathi-Hooghly	Prayagraj – Haldia	1620	Uttar Pradesh, Bihar, Jharkhand, West Bengal	1986
2	NW – 2	Brahmaputra	Sadiya-Dhubri	891	Assam	1982
3	NW – 3	West Coast Canal, Champakara Canal, and Udyogamandal Canal	Kottapuram – Kollam	205	Kerala	1993
4	NW – 4	Krishna and Godavari	Kakinada–Puducherry stretch of canals, Kaluvelly Tank, Bhadrachalam – Rajahmundry, Waziraba–Vijayawada	1095	Andhra Pradesh, Tamil Nadu, and Puducherry	2008
5	NW – 10	Amba River		45	Maharashtra	
6	NW – 83	Rajpuri Creek		31	Maharashtra	
7	NW – 85	Revadanda Creek – Kundalika River System		31	Maharashtra	
8	NW – 91	Shastri river–Jaigad creek system		52	Maharashtra	
9	NW – 68	Mandovi – Usgaon Bridge to the Arabian Sea		41	Goa	
10	NW – 111	Zuari– Sanvordem Bridge to Marmugao Port		50	Goa	
11	NW – 73	Narmada River		226	Gujarat and Maharashtra	
12	NW – 100	Tapi River		436	Gujarat and Maharashtra	
13	NW – 97	Namkhana to AtharaBankiKhal	Indo-Bangladesh Protocol Route	172	West Bengal	

National Waterways

Transportation plays an important role in the development of a country and it is of great significance for a developing country like India. The country is bestowed with a plethora of diverse topography which enables different kinds of transportation. India has about 14500 km of navigable waterways. This includes rivers, backwaters, canals, creeks, and so on.

- **National Waterways Act** came into effect in 2016. It proposed 106 additional National Waterways and merges 5 existing Acts which were declared the 5 National Waterways. As a result, 106 new waterways were identified by IWAI and intimated to MoS. In this regard, the National Waterways Act, 2016 was published in the Gazette of India, Extraordinary, Part II, Section I dated 26th March, 2016 as an Act No. 17 of 2016
- In 1986, the Government of India created the **Inland Waterways Authority of India** (IWAI) for regulation and development of Inland Waterways for navigation and shipping.
- Out of the **111, National Waterways** declared under the National Waterways Act, 2016, **13 are operational** for shipping and navigation and cargo/passenger vessels are moving on them.

About the IWAI

Inland Waterways Authority of India

- This body was created by the government of India in 1986 for regulating and developing inland waterways for shipping and navigation. The body chiefly undertakes development and maintenance projects of IWT infrastructure on national waterways. It undertakes these projects through grants from the Shipping Ministry. Its headquarters is in Noida. It also has regional offices in various other cities and towns across the country.