

GEOLOGICAL DIVISIONS AND GEOLOGICAL STRUCTURE OF INDIA

GEOLOGICAL DIVISIONS OF INDIA

The Three geological regions broadly follow the physical features:

- (i) The Peninsular Block** - has been part of the Earth's crust since its formation.- oldest and most stable geological division, consisting of ancient rocks that have been exposed to weathering and erosion for millions of years
- (ii) The Himalayas and other Peninsular Mountains** - younger mountain system formed primarily during the Tertiary period due to tectonic activities associated with the collision between the Indian Plate and the Eurasian Plate
- (iii) Indo-Ganga-Brahmaputra Plain.** -youngest geological divisions began forming aggradational during the Pleistocene period from deposition of sediments by Indus, Ganga and Brahmaputra and their tributaries

GEOLOGICAL TIME SCALE

- Refers to chronology framework (chart) which helps to trace the evolutionary mechanism of Earth geological history and biological (life) events based on rock record.
- The GTS is based on empirical observations from various scientific fields including geology, paleontology, geophysics, geochemistry, and paleoclimatology.
- By analyzing lithologies (rock types), paleomagnetic properties (magnetic orientation preserved in rocks), fossils (biological remnants), and other features within strata, scientists have been able to construct a comprehensive timeline that reflects significant geological events such as mass extinctions, continental drift, and climatic changes

DIVISIONS OF GTS

- The GTS is divided into eons, eras, periods, epochs, and ages. (oldest (eon) to youngest (ages))

The major divisions include:

- Precambrian: Comprising three eons—Hadean, Archean, and Proterozoic.
- Phanerozoic Eon: Divided into three eras—Paleozoic, Mesozoic, and Cenozoic.

Word :

- **Cambrian** - Name of Mountains located in UK
- **Cambrian Period** - All life forms originated in this Period
- **Cambrian Rocks** - abundant fossils records
- **Pre Cambrian** - No life, No Fossils record present in Pre Cambrian rocks
- **Zoic**- Life
- **Azoic** - No Life
- **Paleo** - Ancient, **Meso**- Middle , **Ceno**- Recent
- **Orogeny/ Orogenesis** - mountain building process

Relative Time Span		Eon	Era	Period	Epoch	Development of Plants and Animals										
Phanerozoic	Cenozoic	Phanerozoic	Cenozoic	Quaternary	Holocene	0.01	Humans develop									
	Mesozoic				Pleistocene	2.6										
					Pliocene	2.6										
Paleozoic	Tertiary			Neogene	Miocene	5.3	"Age of Mammals"									
					Oligocene	23.0										
	Paleogene			Eocene	33.9											
				Eocene	56.0											
				Paleocene	66.0	Extinction of dinosaurs and many other species										
	Mesozoic			Cretaceous	Mesozoic	Cretaceous		145.0	"Age of Reptiles"	First flowering plants						
										Jurassic	201.3	First birds				
Triassic			252.2				Dinosaurs dominant									
Paleozoic			Permian				Paleozoic			Permian	298.9	"Age of Amphibians"	Extinction of trilobites and many other marine animals			
													Carboniferous	Pennsylvanian	323.2	First reptiles
														Mississippian	358.9	Large coal swamps Amphibians abundant
Paleozoic	Devonian		Paleozoic	Devonian	419.2	"Age of Fishes"	First insect fossils									
							Silurian	Silurian	443.8	Fishes dominant						
										First land plants						
							Ordovician	Ordovician	485.4	"Age of Invertebrates"	First fishes					
											Cephalopods dominant					
Cambrian	Cambrian		541	Trilobites dominant												
Precambrian	Proterozoic		Precambrian	Proterozoic	2500	Proterozoic	First multicelled organisms									
							Archean	Archean	~4000	Archean	First one-celled organisms					
											Hadean*	Hadean*	~4600	Hadean*	Origin of Earth	

The Precambrian comprises about 88% of the geologic time scale

* Hadean is the informal name for the span that begins at Earth's formation and ends with Earth's earliest-known rocks.

ROCK SYSTEM BASED ON THE GEOLOGICAL HISTORY OF INDIA

- Geology is the study of the Earth's composition, structure, and history.

Define Geological structure:

- the arrangements and deposition of the rocks in the earth's crust

Significance of Geological Structure :

- it study helps to understand the type and character of rocks,
- physical and chemical properties of soils
- availability of minerals and
- the surface and underground water resources

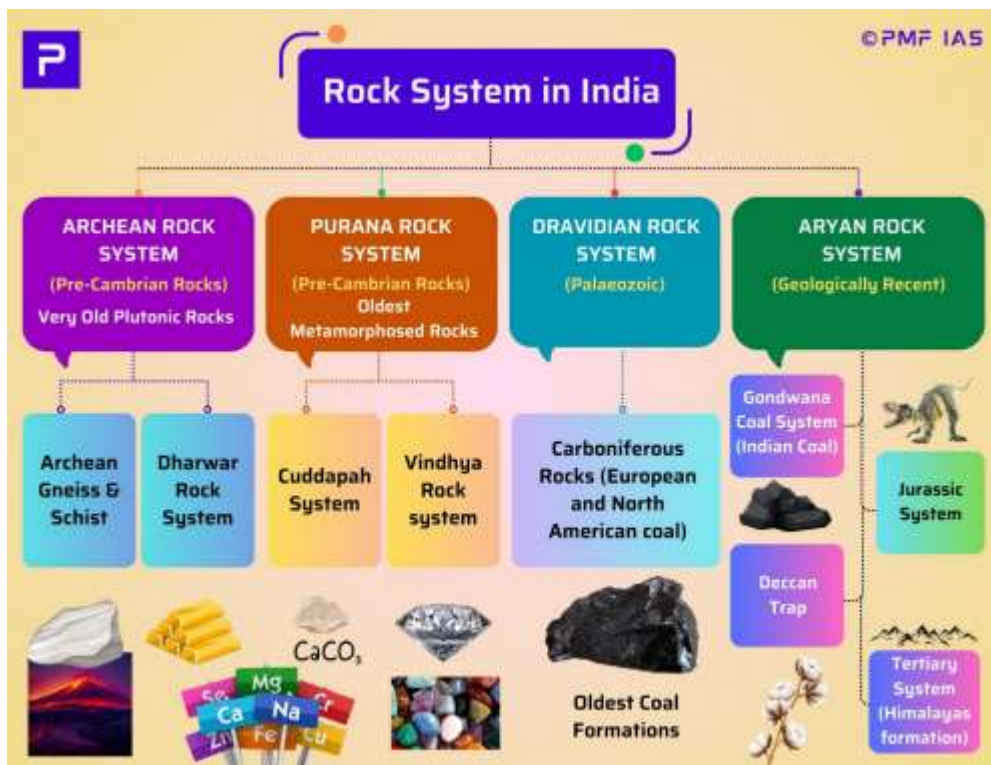
GEOLOGICAL HISTORY OF INDIA:

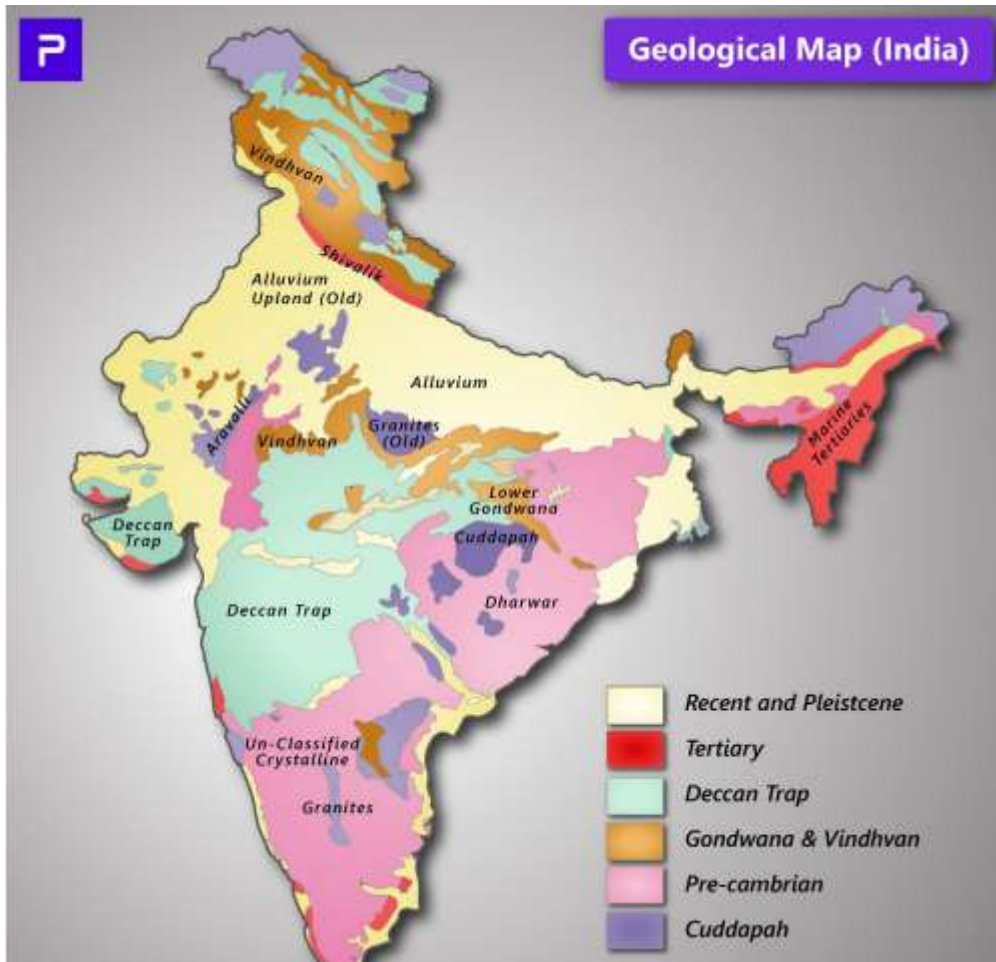
According to Geological Survey of India (Ministry of Mines, Kolkatta Based)

- Geological Survey of India: Plays a pivotal role in comprehensive geological research and studies
- The geological history of India is both complex and varied and gone through various stages of geological formations
- India also has its own Geological Time Scale, advocated by T.S. Holland.

Based on the Geological History of India, the rock systems can be classified into four types:

- **1) The Archaean Rock System : (4 billion years old)**
- 2) The Purana Rock System : (1400 to 600 million years old)
- 3) The Dravidian Rock System: 600-300 million years ago
- 4) The Aryan Rock System 400 million years old to present





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Archean (Purana System)



Dharwar System



Cudappah & Vindhyan System

ARCHEAN ROCKS

- formed prior to the Cambrian system
- These are the oldest rocks in India
- They were formed due to the cooling and solidification of molten magma in the upper crust
- They are mainly found in the Peninsular Shield and are composed of igneous and metamorphic rocks
- Known as 'Basement Complex'; They are azoic or unfossiliferous
- They are foliated (layered) and are thoroughly crystalline (as they are volcanic in origin)
- Distribution in India: Central and southern regions of the Indian Peninsula, as well as in portions of Odisha, Meghalaya, Madhya Pradesh, Chhattisgarh, Bundelkhand region and the Chotanagpur Plateau in Jharkhand.

DHARWAR SYSTEM (4 TO 1 BILLION YEARS OLD)

- They are oldest metamorphosed rocks
- formed due to the metamorphosis of sediments of Archaean gneisses and schists.
- They are found in abundance in the Dharwar district of Karnataka
- economically the most important rocks because they possess valuable minerals like high-grade iron-ore, manganese, copper, lead, gold, etc
- Distribution in India: Dharwar-Bellary-Mysore belt of Karnataka, the central and eastern parts of India in the states of Odisha, Jharkhand, Madhya Pradesh, and Chhattisgarh and parts of Aravallis

PURANA ROCK SYSTEM (1400 TO 600 MILLION YEARS OLD)

- These rocks include a mix of sedimentary, volcanic, and metamorphic rocks
- Location: Peninsular Shield and parts of the Himalayas.
- Rock Types: Diverse, including sedimentary rocks (quartzites, sandstones, limestones), volcanic rocks (basalts), and metamorphic rocks (marble, slates).
- Divisions: the Cuddapah System and the Vindhyan System

Cuddapah System	Vindhyan System
Outcrops of these rocks are best observed in the Cuddapah district of Andhra Pradesh	This system derives its name from the Vindhyan mountains
Also Found Chhattisgarh, Jharkhand, and Odisha	comprises of ancient sedimentary rocks
ores of iron, manganese, copper, cobalt, nickel	Karnataka (Bhima Valley), Chhattisgarh and Andhra Pradesh also found.
	It is devoid of metalliferous minerals but provides large quantities of durable stones, ornamental stones, limestone, pure glassmaking sand,
They contain large deposits of cement-grade limestones.	diamond-bearing regions from which Panna and Golconda diamonds have been mined

DRAVIDIAN ROCK SYSTEM (Palaeozoic) formed about 600-300 million years ago

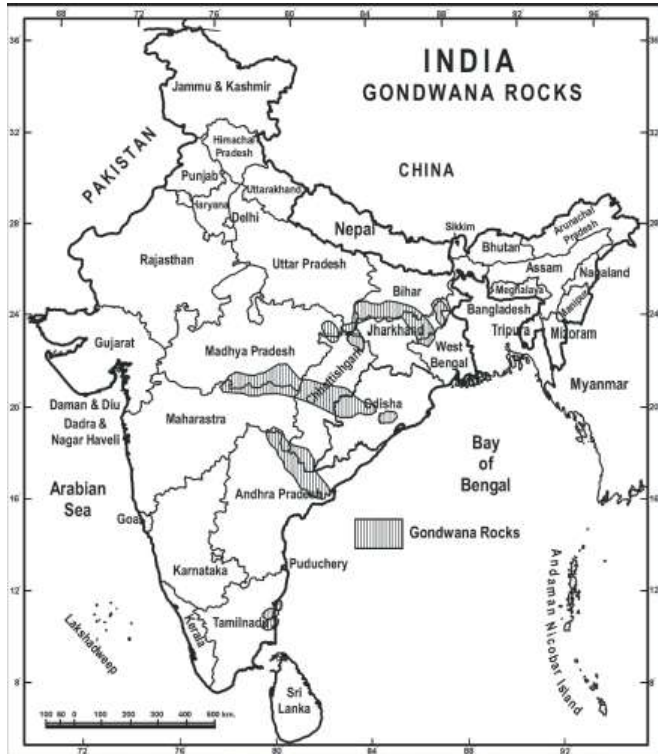
- It is found in the extra-Peninsular region (the Himalayas and Ganga Plain) and is very rare in Peninsular India.
- (The name 'Dravidian' doesn't mean they are found in South India!)
- The rocks of Cambrian, Ordovician, Silurian, Devonian and Carboniferous periods fall under the Dravidian system.
- They are sedimentary rocks with abundant fossils

CARBONIFEROUS ROCKS (350 MILLION YEARS)

- comprise mainly of limestone, shale, and quartzite
- Mount Everest is composed of Upper Carboniferous limestones
- Coal formation started in the Carboniferous (coal-bearing) age.
- High-quality coal from the Great Lakes Region of the USA, UK and Ruhr region of Germany is Carboniferous coal (oldest coal).
- Most of the coal found in India (Gondwana Coal) is of poor quality as it is not from the Carboniferous period.

ARYAN ROCK SYSTEM

- Age: 400 million years old to present (Upper Carboniferous to the Recent)
- Location: Diverse, including the Himalayas, Gondwana basins, Deccan Traps, and alluvial plains.
- Rock Types: These rocks include sedimentary deposits, such as sandstone, shale, and limestone, as well as volcanic rocks in some regions



GONDWANA SYSTEM:

- derives its name from the New Gond tribes from Telangana and Andhra Pradesh
- Distribution in India: Damodar valley, Mahanadi valley, series of troughs along the Godavari River valley, Kashmir, Sikkim, etc.
- Gondwana rocks have rich deposits of iron ore, copper, uranium and antimony. Sandstones, slates and conglomerates, which are used as building materials, are also found.
- Most of the coal found in India (Gondwana Coal) is of poor quality as it is not from the Carboniferous period.
- Gondwana rocks contain nearly 98 per cent of India's coal reserves. Gondwana coal is much younger than the Carboniferous coal, and hence, its carbon content is low
-

[UPSC 2010] Which one of the following is the appropriate reason to considering the Gondwana rocks as most important of rock systems of India?

- More than 90% of limestone reserves of India are found in them
- More than 90% of India's coal reserves are found in them
- More than 90% of fertile black cotton soils are spread over them
- None of the reasons given above is appropriate in this

TRIASSIC SYSTEM

- mainly concentrated in the Himalayan belt- Kashmir to Kumaon , Zanskar, Spiti, Chamba
- The Peninsular Shield lacks any significant exposure to Triassic rocks. This is because it remained stable while the Tethys Sea (predecessor to the Himalayas) formed to the north
- The tertiary is the most significant period in India's geological history because the Himalayas were born, and India's present form came into being in this period.

JURASSIC SYSTEM

- The marine transgression in the latter part of the Jurassic gave rise to a thick series of shallow water deposits in Rajasthan and Kutch.
- Another transgression on the east coast is found between Guntur and Rajahmundry.
- Coral limestone, sandstone, conglomerates, and shales occur in Kutch

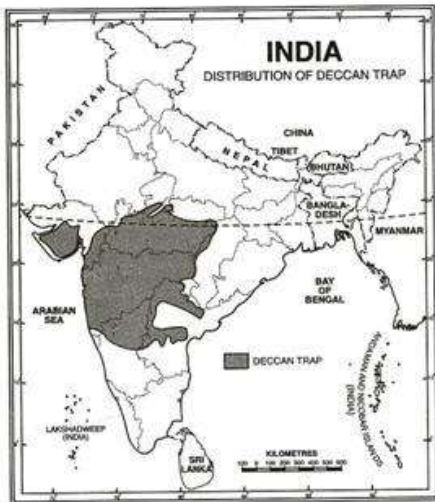


FIG. 2.7. India : Deccan Trap

DECCAN TRAPS :

- The outburst of basaltic lava from fissures due to hotspot volcanism over a vast area of 10 lakh square kilometres of Peninsular India from the end of the Cretaceous till the beginning of the Eocene gave rise to the Deccan Traps
- These volcanic deposits have flat tops and steep sides and are therefore called traps, meaning a 'stair' or 'step' in Swedish.
- The process of weathering and erosion (denudation) for millions of years has reduced the Deccan Traps to almost half of their original size.
- At present, Deccan Traps cover about 5 lakh square kilometres, mainly in parts of Kutch, Saurashtra, Maharashtra, the Malwa plateau and northern Karnataka.
- The thickness of the Deccan Traps is 3,000 metres along the west, which is reduced to 600-800 metres towards the south, 800 metres in Kutch and only 150 metres at the eastern limit.
- The weathering of these rocks for a long time has given birth to black cotton soil known as regur

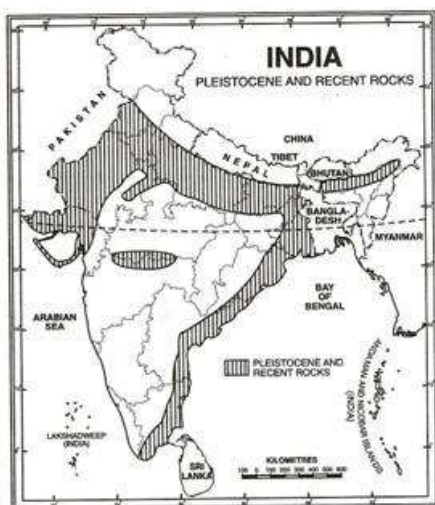


FIG. 2.9. India : Pleistocene and Recent Rocks

PLEISTOCENE SYSTEM:

- Age: 2.6 million to 11,700 years ago (within the Quaternary period)

- The Pleistocene Epoch is part of the Quaternary Period and represents a significant geological era characterised by multiple glacial and interglacial cycles
- The Pleistocene rock system in India is primarily composed of sedimentary deposits, glacial formations, and volcanic activity, reflecting the diverse climatic and geological processes
- Glacial features dominate the Himalayan region, while alluvial plains stretch across the Indo-Gangetic plain. Loess deposits enrich soils in Punjab and Haryana, while lacustrine deposits are found in basins like Dal Lake in Jammu and Chilika Lake in Odisha
- Narmada-Tapi alluvial deposits

[UPSC 1997] Match List-I with List-II and select the correct answer:

List-I	List-II
A. Deccan Traps	1. Late Cenozoic
B. Western Ghats	2. Precambrian
C. Aravalli	3. Cretaceous Eocene
D. Narmada-Tapi alluvial deposits	4. Cambrian
	5. Pleistocene

Codes:

- a) A – 3; B – 5; C – 1; D – 4
- b) A – 3; B – 1; C – 2; D – 5
- c) A – 2; B – 1; C – 3; D – 4
- d) A – 1; B – 4; C – 2; D – 5


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CHAPTER 3 INDIAN PHYSIOGRAPHY

PHYSIOGRAPHY:

- it deals with the study of surface features and the landforms of the earth .
- Physiography of an area is the outcome of geological structure, process and the stage of development.

India Physiographic region have great deal of diversity and its relief characteristics are:

- Mountains and Hills : 30 %
- Plains: 43 %
- Plateaus: 27 %

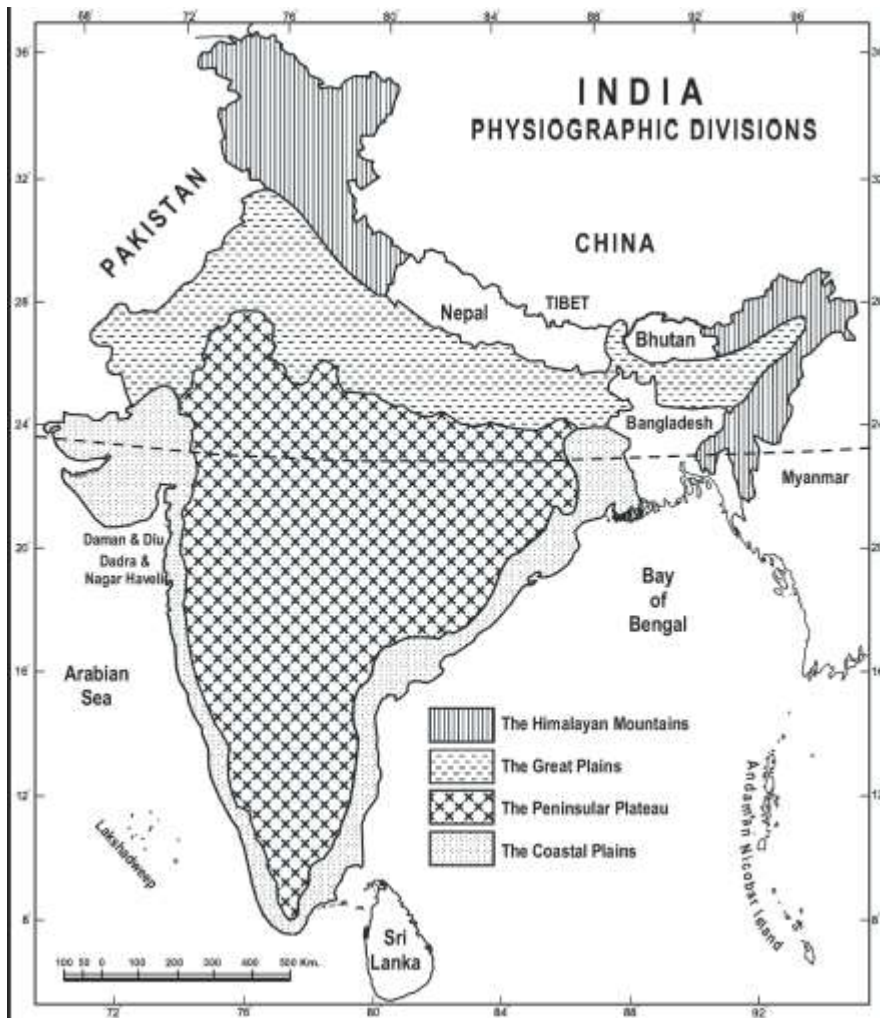
DIVISION OF INDIAN PHYSIOGRAPHY

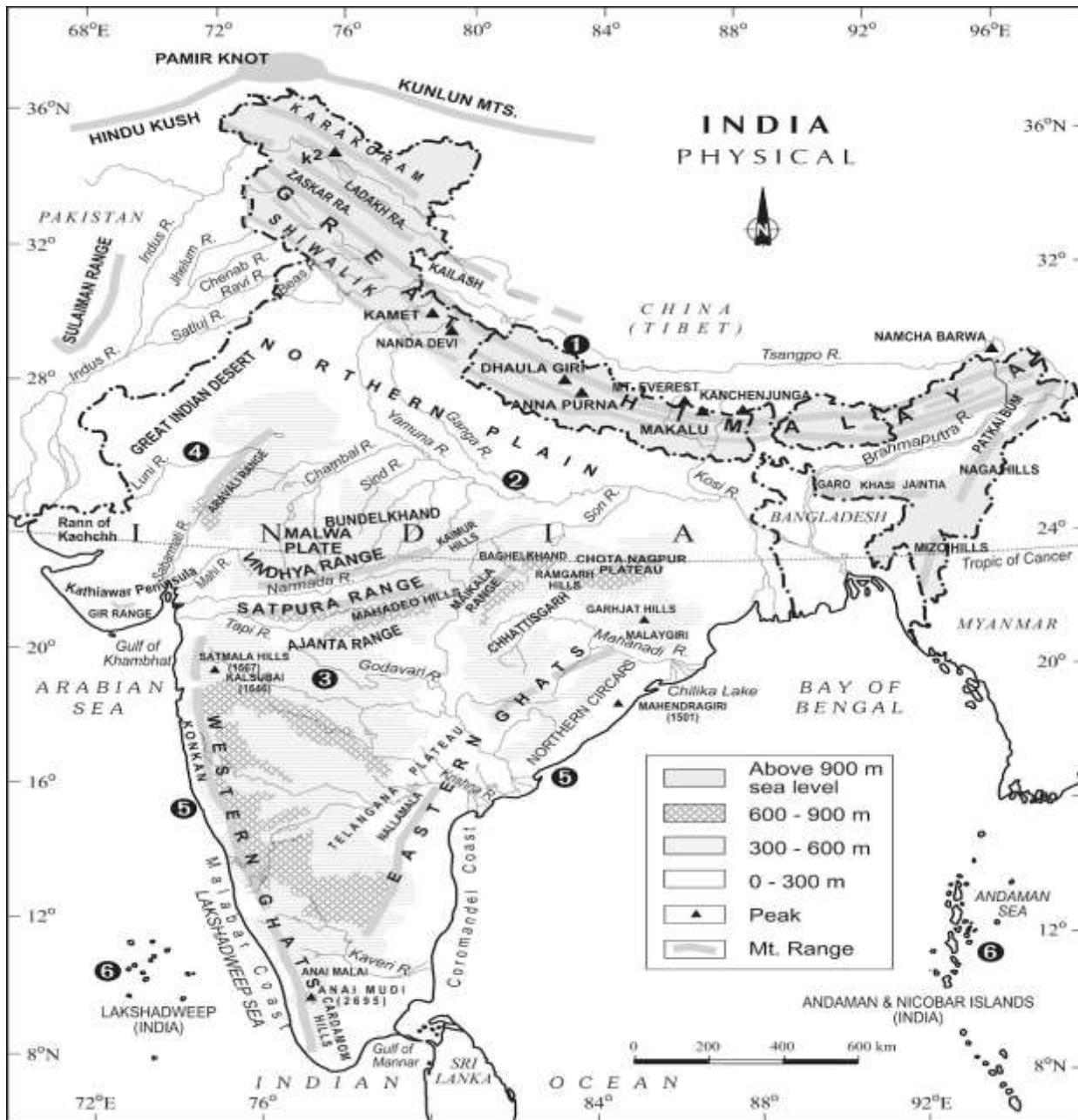
India can be divided into six physiographic regions.

They are:

- Northern Mountains
- Peninsular Plateau

- Indo-Gangetic Plain
- Thar Desert
- Coastal Plains
- Islands and Offshore Islands



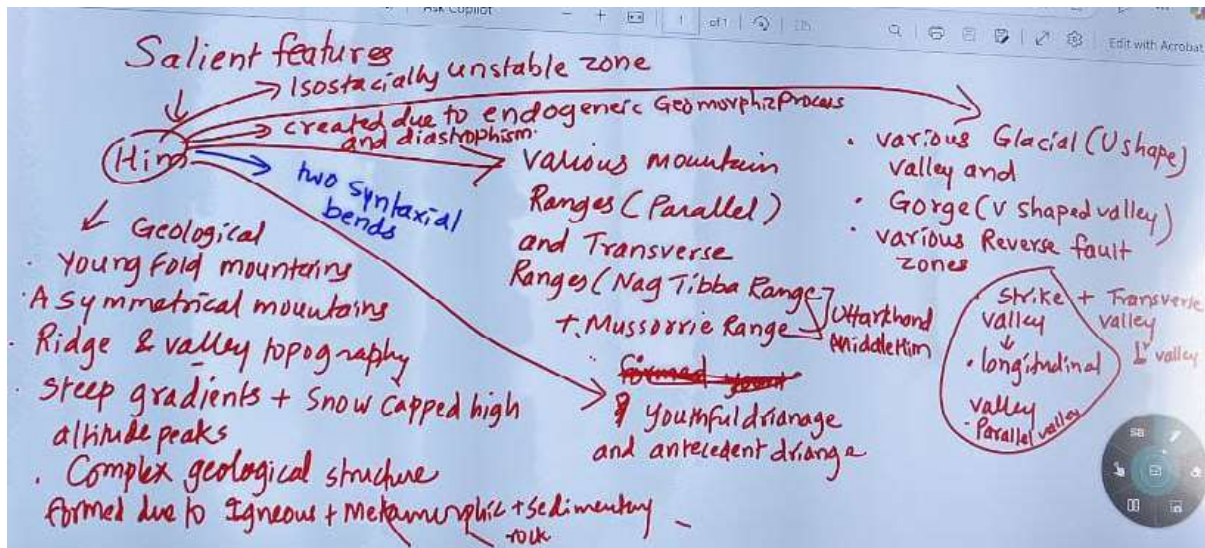


Ch:3 Himalayas

formed

- due to Collision-Compression and Convergent of two tectonic plate
- These Indian plate + Eurasian plate are tectonic - continental - continental plate

- due to this crust thickness is increased and no volcanic eruptions happens in Him.R
- But it is highly seismic Earthquake prone Region (zone I)



NORTHERN AND NORTHEASTERN MOUNTAIN REGION



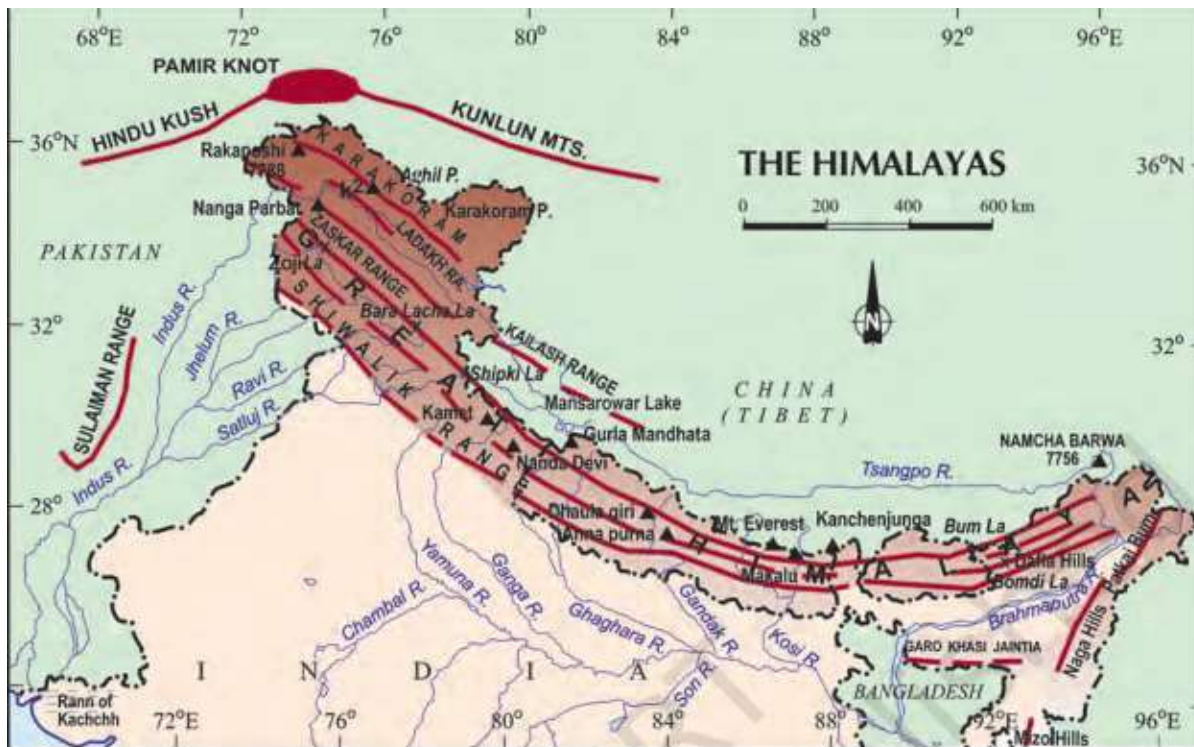
This region is divided in three parts

1. The Himalaya Mountain Region
2. The Trans Himalayas Mountain Region
3. The Eastern or Purvanchal Hills

HIMALAYAS FORMATION :

- Convergent of Two Continental Tectonic Plates
- Subduction of Indian Plate inside the Eurasian Plate.
- Result of Collision, the sedimentary rocks which were accumulated in the geosynclines (known as Tethys) got folded and thus the mountain systems of West Asia and the Himalayas were formed.
- So Himalayas consisting mostly of uplifted sedimentary and metamorphic rock and its height is rising by few mm in year .

ABOUT HIMALAYAS :



- **The Himalayan region is an arc-shaped area**
- Approx 2400 to 2500km Long, Approx 400 Km width in West Side and 150km east side
- Their extension is between 22 longitudes
- stretching from the Karakoram, Nanga parbat in the West to the NamchA Barwa in the East,
- crosses five countries - India, Bhutan, Nepal, China and Pakistan.
- The Indian Himalayan arc starts at Kashmir and passes through Himachal Pradesh, Kumaon, Garhwal, Sikkim, and Arunachal Pradesh.
- All three ranges curve convexly to the south.

GENERAL ORIENTATION :

Parts of Himalayas	Orientation
North-western part of India	Northwest to Southeast direction
Darjeeling and Sikkim regions	East-West direction
Arunachal Pradesh	Southwest to the Northeast
Nagaland, Manipur and Mizoram	North-South direction

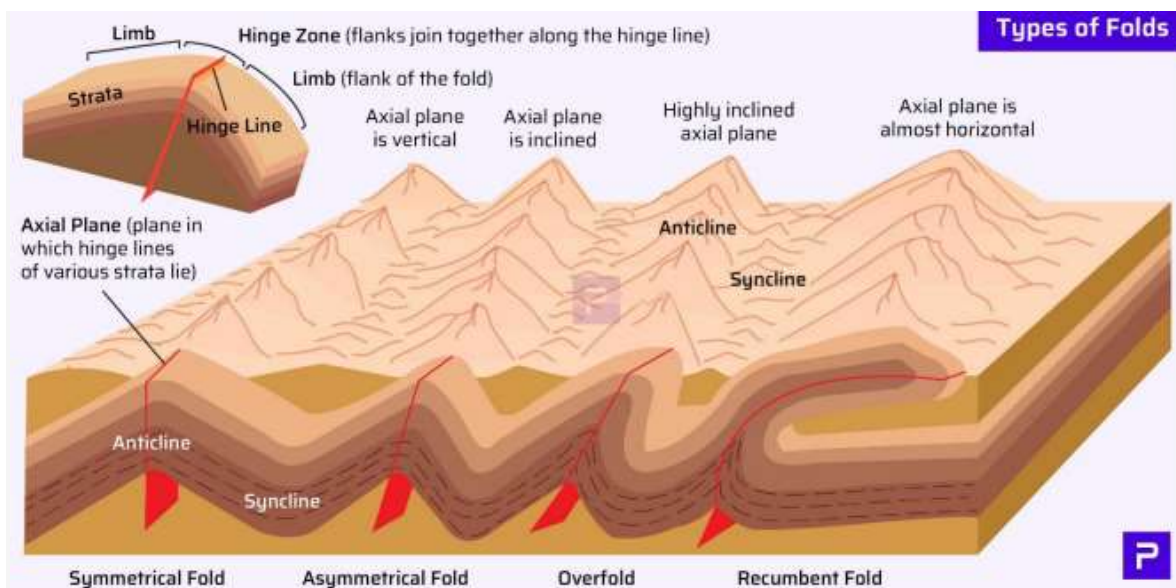
- The amount of yearly rainfall increases from west to east along the southern front of the range
- Its Himalaya Ecology varies with climate, rainfall, altitude, and soils
- The climate ranges from tropical at the base of the mountains to permanent ice and snow at the highest elevations
- Himalaya soil is Forest and mountain soil, except Arunachal Pradesh Red and Yellow Soil
- The **high temperature at lower altitude and undecomposed organic matter associated with low temperature at higher elevations** are responsible for the formation of acidic soils of this humid region.
- They are loamy and silty in valley sides and coarse grained in the upper slopes

[UPSC 2012] When you travel in Himalayas, you will see the following:

1. Deep gorges
2. U-turn river courses
3. Parallel mountain ranges
4. Steep gradients causing land-sliding.

Which of the above can be said to be the evidence for Himalayas being young fold mountains?

- a) 1 and 2 only
- b) 1, 2 and 4 only
- c) 3 and 4 only
- d) 1, 2, 3 and 4



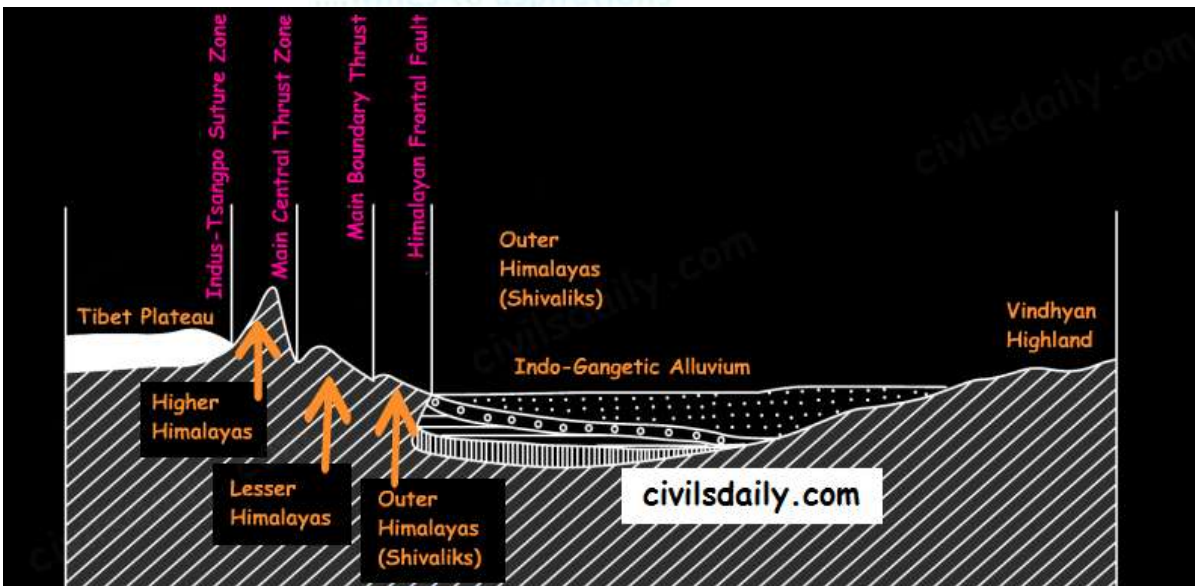
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HIMALAYANS MOUNTAINS CHARACTERISTICS

- Geologically young and Asymmetrical mountains
- with valleys being a part of synclines, and the hills are part of anticlines or anti-synclines.
- This creates a topography with steep south slopes and gentle north slopes, giving hogback (a long, steep hill or mountain ridge) topography.
- Deeply dissected topography (Ridge and Valley Topography)
- High Altitude and steep gradient
- Their slope towards south is convex; steep gradient towards the south, much gentle slope towards the north
- Complex geological structure
- Youthful drainage and Youthful topography
- Isostatically Unstable zone
- Formed of Sedimentary rocks and metamorphic rocks
- **Known for two Syntaxial Bends**



- The Himalayas stretch in an east-west direction from the Indus Gorge in the west to the Brahmaputra Gorge in the east. At these gorges, the Himalayan ranges sharply bend southward. These bends are referred to as the syntaxial bends of the Himalayas.
- The western syntaxial bend is situated near Nanga Parbat, the western tip of the Zaskar Range (where the Indus River has carved a deep gorge). The eastern syntaxial bend is located near Namcha Barwa
- **Region of Reverse Fault Zones due to Compression of Two Plates**



Reverse / Thrust Fault of Himalayas	Located Between
Indus Tsangpo Suture Zone (ITSZ)	Tibet and Great Himalayas

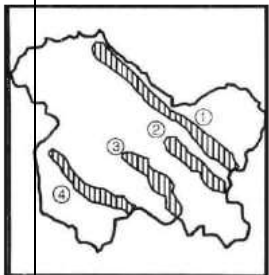
Main Central Thrust (MCT)	Great Himalayas and Middle / Lesser Himalayas
Main Boundary Thrust (MBT)	Middle Himalayas and Shiwalik
Main Frontal Thrust (HFT)	Shivalik and Indo Ganga Plains

DIVISIONS OF HIMLAYAS

North to South

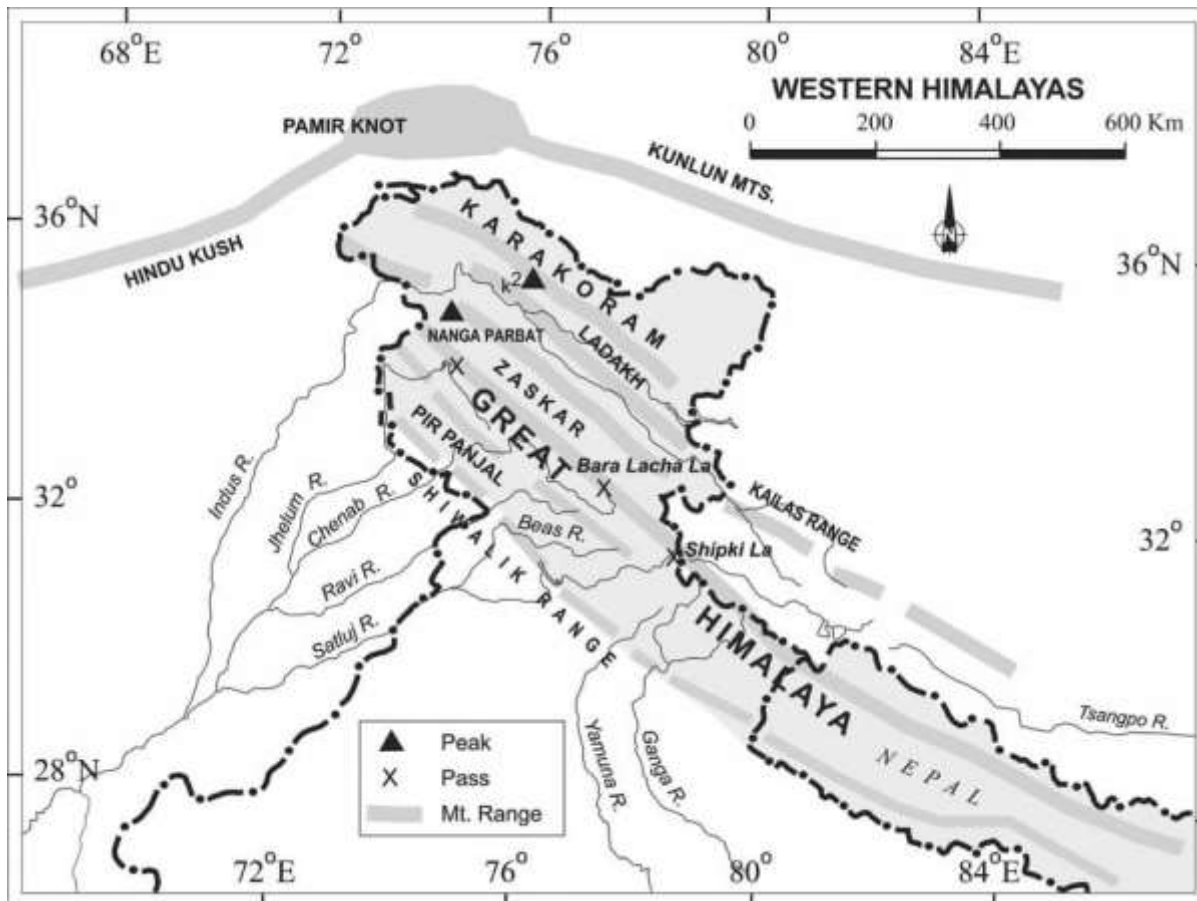
East to West Divisions

LATITUDINAL DIVISION/ PARALLEL ZONES	LONGITUDINAL DIVISION/ REGIONAL
Trans- Himalaya/ Tethys Himalaya	The Kashmir Himalayas
Great Himalaya/ Inner Himalaya/ Himadri	The Himachal Himalayas
Lesser Himalaya/ Middle Himalaya/ Himachal	The Garhwal andd Kumaon Himalayas
Outer Himalaya/ Shiwalik/ Sub Himalayas	The Central Himalayas/ Nepal Himalayas
	The Eastern Himalayas / Assam Arunachal H



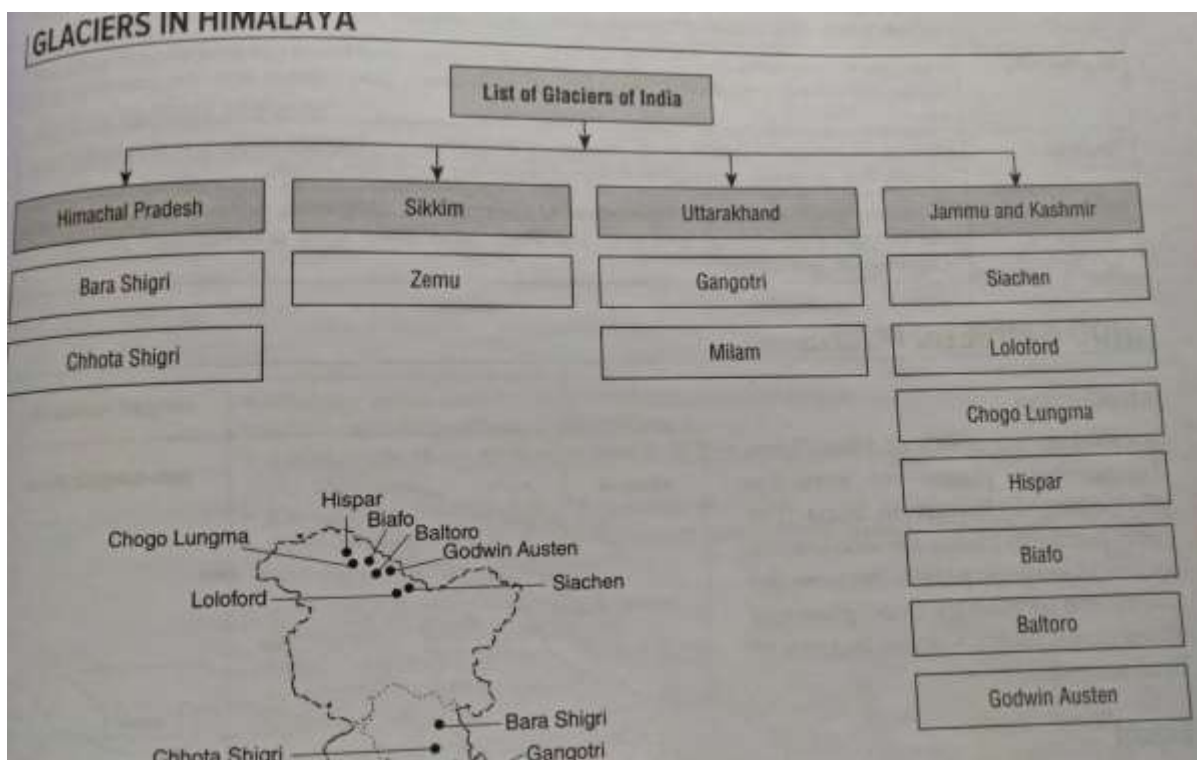
Examine the map of Jammu and Kashmir given below: The mountains ranges marked 1, 2, 3 and 4 are respectively:

- (a) Ladakh, Zaskar, Karakoram and Pir Panjal
- (b) Karakoram, Ladakh, Zaskar and Pir Panjal
- (c) Karakoram, Zaskar, Pir Panjal and Ladakh
- (d) Ladakh, Pir Panjal, Karakoram and Zaskar



TRANS-HIMALAYAS

- Located North of Great Himalayas
- The Trans-Himalayas have several main ranges — Karakoram, Ladakh, Zaskar, and Kailas.
- The average elevation is around 3000 meters above mean sea level
- it spans approximately 1,000 km in the east-west direction, occurring only in the western part of the Himalayas
- Karakoram Range or Krishnagiri, is the northernmost Trans-Himalayan range in India. It extends 800 km eastwards from the Pamirs of Pakistan.
- K2 (8611 m), or Godwin Austen- the second highest globally and the highest in the Indian Union.
- The Ladakh Plateau lies northeast of the Karakoram Range, divided into various plains and mountains, such as Soda Plains, Aksai Chin, Lingzi Tang, Depsang Plains, and Chang Chenmo.
- Ladakh range - situated south of the Karakoram Range and north of the Zaskar Range
- The Zaskar Range is situated south of the Ladakh Range.
- The average height of the Zaskar Range is about 6,000 m. It houses Nanga Parbat, standing at 8126 m
- The Kailas Range- offshoot of the Ladakh Range
- Mount Kailas, with an elevation of 6714 meters, is the highest peak in this range.



- The Indus River originates from the southern slopes of the Kailas Range near Lake Manasarovar

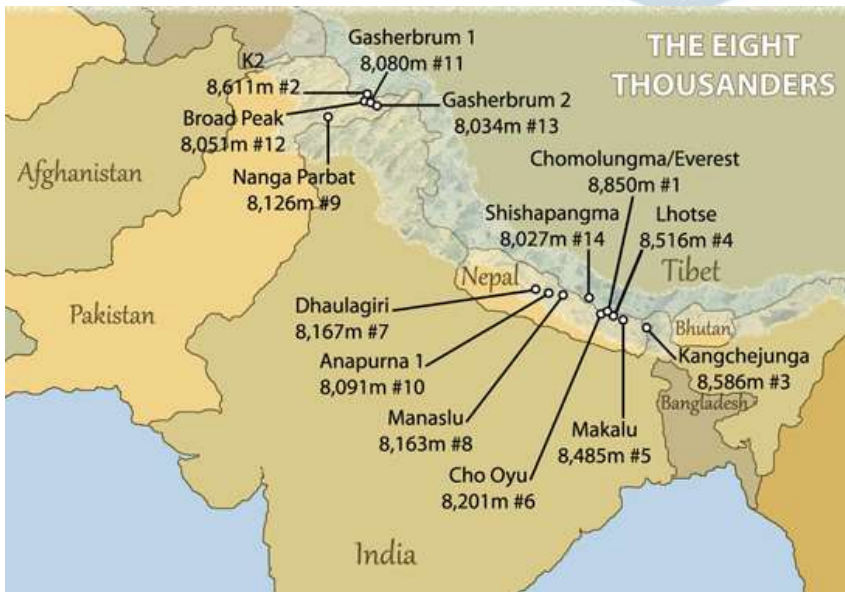


About Pangong Tso Lake :

- means **“high grassland lake”**.
- is an [endorheic lake](#) spanning eastern [Ladakh](#) and [West Tibet](#)
- endorheic lake means : [drainage basin](#) that normally retains water and allows no outflow to other.
- Having ribbon shaped lake and India holds one-third of the 135 km-long boomerang-shaped Pangong lake.
- 50 % China, 40 % India and 10 % disputed and de facto buffer zone between India and China.
- situated at an elevation of 4,225 m
- It is the world's **highest saltwater lake**.
- Type of Soda lake (Saline Lake) Reason : Located in Rain-shadow of Great Himalayas)
- The [Line of Actual Control](#) (LAC) passes through the lake
- Pangong lake is its ability to change colour. The shades range from light green to crystal blue and sometimes even golden, red and pink. Experts believe that change in sky colour and refraction at high altitudes causes this phenomenon.
- It is also **known to change colors**, appearing blue, green, and red at different times of a day .
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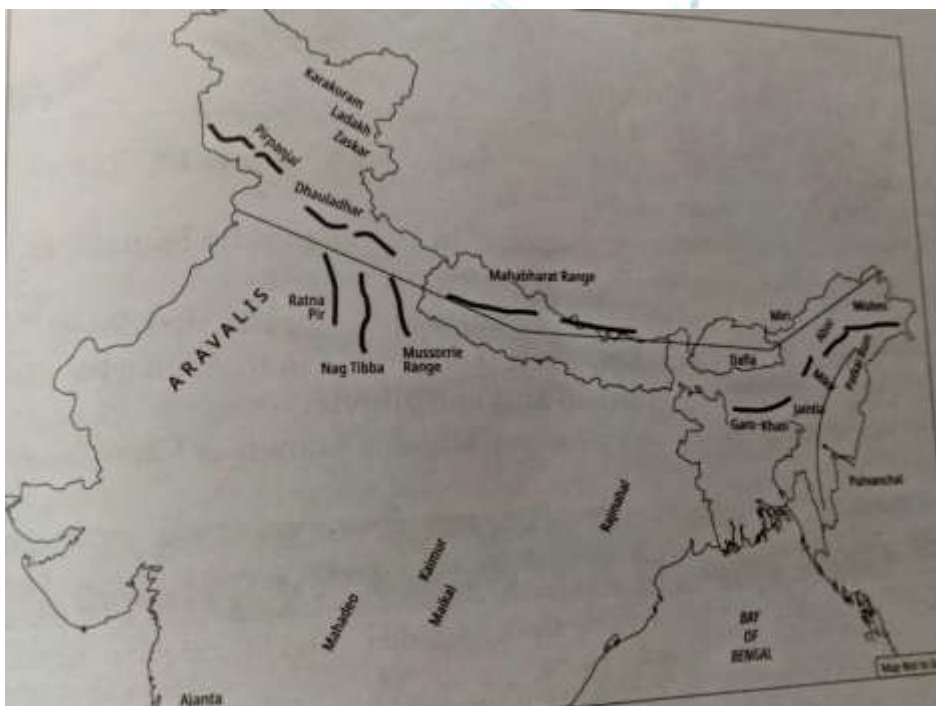


Tso Moriri or Lake Moriri or "Mountain Lake", is a lake in the Changthang Plateau of Ladakh in India. The lake and surrounding area are protected as the Tso Moriri Wetland Conservation Reserve. It is a Ramsar site. The lake is at an altitude of 4,522 m. world's highest salt water lake at 14836 ft.



GREATER HIMALAYAS

- Other Name : Inner Himalayas or Himadri
- Asymmetrical Young Fold Mountains and Core composed of granite
- Continuous Range 2400 to 2500km From Mt Namcha Barwa to Nanga Parbat
- width varies between 160-400 km
- Average Height - 6000 M
- Peaks : From West to East : Dhaulagiri, Annapurna, Manaslu, Mt Everest, , Makalu
- receive less rainfall as compared to the Lesser Himalayas and the Shiwaliks so Erosion is less effective over the Greater Himalayas



LESSER HIMALAYAS

- Other Name: Middle Himalayas or Himachal
- their length is over 2400km
- These ranges are 50 km wide
- Average Height 3800 M but they are divided into many ranges .
- the ranges are mainly composed of highly compressed and altered rocks .
- it consist of unfossiliferous sediments or meta morphosed crystalline , main rocks : slate ,limestone quartzites .
- it is composed of loose rocks like shale , limestone and conglomerates . (so more prone to seismicity and landslides)
- This region is subjected to extensive erosion due to heavy rainfall, deforestation and Urbanisation

Part of Lesser Himalayas :

1 Pir Pinjal Range- longest range of Middle Himalayas and extends from the Jhelum river to the upper Beas river. It rises to 5,000 meters and contains mostly volcanic rocks. Banihas pass is located in Pir Pinjal and connects Kashmir to Jammu

2 Dhaula Dhar Range in Himachal Pradesh and

3 .Mussorie Range, and Nagtiba range in Uttarakhand

4 . the Mahabharat Range in Nepal

5. Dafla Hills, Miri Hills, Abor Hills, Mishmi Hills in eastern side .

- **Parallel Ranges** – Pir Panjal, Dhaula Dhar
- **Transverse Ranges** – Ratan Pir, Nagtiba, Mussorie Range
- The central part in Nepal is called the Mahabharata range and the eastern part is called the Dafla hills, Mishmi hills, Miri hills, Abor which are closely compressed with the Shiwaliks and difficult to isolate from Shiwalik Ranges

Middle Himalayas region consists of the famous valleys of Kashmir, the Kangra, the Kullu, the Katmandu and Pokhara

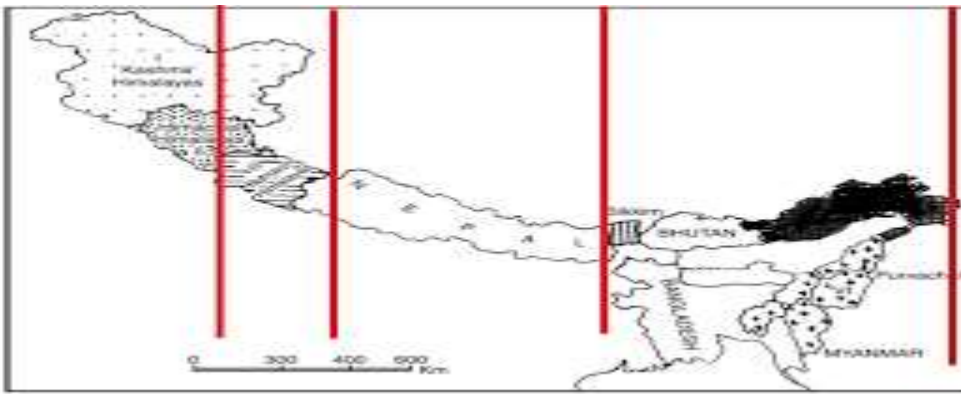
Kashmir Valley -Intermontane valley between Pir Pinjal Range and Great Himalaya

SHIWALIK RANGE (SHIWALIKS) OR OUTER HIMALAYAS

- The Shiwalik Range, also known as the Outer Himalayas, is situated between the Great Plains and Lesser Himalayas.
- The width varies from 50 km in HP to less than 15 km in Arunachal Pradesh.
- With altitudes ranging from 900 to 1100 meters, it spans 2,400 km from the Potwar Plateau (Pakistan) in the west to the Brahmaputra Valley in the east.
- It runs mostly as a continuous chain of low hills for over 1200 km from northwestern India to the Gandak River. Between the Gandak and the Teesta Rivers, it becomes discontinuous, with many streams and rivers highly dissecting the hills
- Located in between the **Great Plains** and **Lesser Himalayas**
- They represent Hogback topography . The southern slopes are steep while the northern slopes are gentle.
- The southern slope Shiwaliks are marked by the absence of forest cover in Punjab and Himachal Pradesh and are highly dissected by several seasonal streams locally called Chos.
- it is border in the west and narrow down in the east
- Between Shiwalik and Middle Himalayas are longitudinal valleys called " Duns
- Ex Patil Dun, DehraDun, Chumbi, Katmandu, Udampur and Kotli
- Garhwal Himalayas part of Shiwalik Hills , Major Peak of Garhwal Himalayas Nanda Devi, Kamet Peak

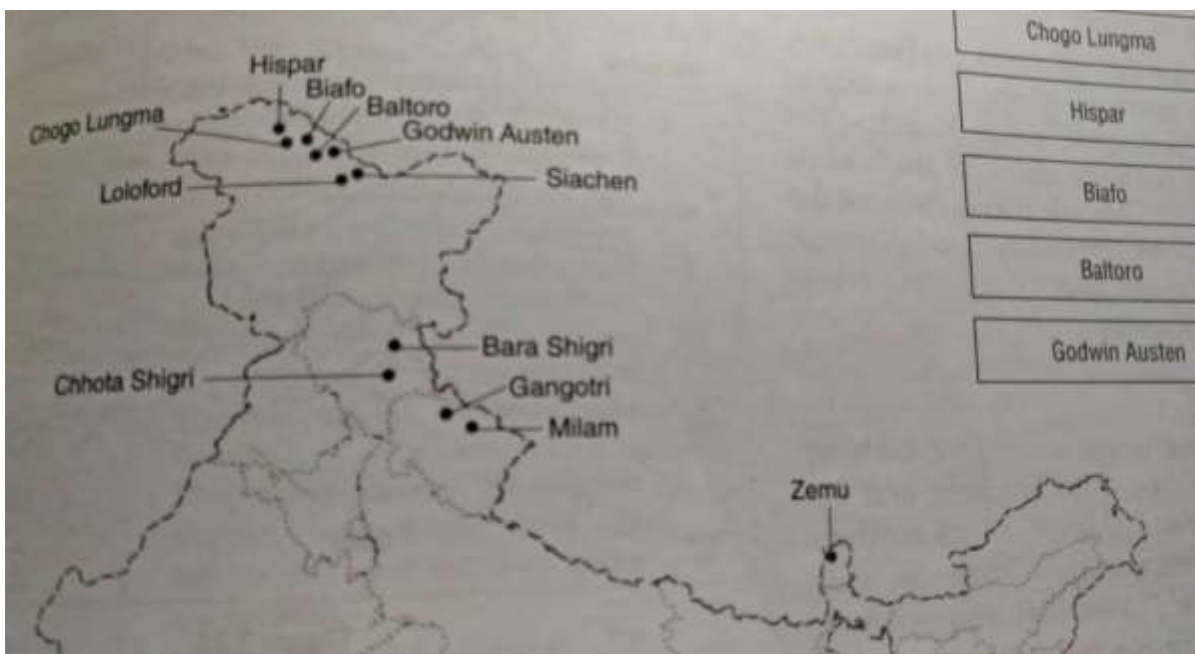
EAST -WEST DIVISION OF HIMALAYAS:





LONGITUDINAL DIVISIONS OF THE HIMALAYAS DUE TO RIVERS

- The Kashmir / Punjab Himalayas: Between the Indus and Sutlej
- The Kumaun Himalayas: Between Sutlej and Kali rivers
- The Central/ Nepal Himalayas: Between Kali and Tista rivers
- The Eastern Himalayas: Between Tista and Dihang rivers



THE KASHMIR HIMALAYAS :

- Largest number of glaciers in India (locate it)
- Comprises ranges: Karakoram, Ladakh, Zaskar and Pir Panjal
- Important Peaks -Trans Himalayas (North to South): Karakoram Range (Peaks- K2, Gasherbrum); Ladakh Range (Peaks- Rakaposhi); Zaskar Range (Peaks-Nanga Parbat)
- Northeastern part of the Kashmir Himalayas is a Ladakh cold desert lying between the Greater Himalayas and the Karakoram ranges
- Longitudinal Doon Valley of Kashmir and Dal Lake lie between the Great Himalayas and the Pir Panjal range (Jhelum River flows in Kashmir valley)
- Srinagar is located on the banks of Jhelum river
- Karewa formations found in Kashmir Himalayas - lacustrine deposits consisting of silt sand and clay ie loamy .
- Karewa Soil : useful for the cultivation of Zafran (saffron), Apple, peach, almond , walnut and apricot .
- Important passes: Zoji La (Great Himalayas), Banihal (Pir Panjal), Photu La (Zaskar), Khardung La (Ladakh range)
- Lakes: Freshwater - Dal and Wular; Saltwater - Pangong Tso and Tso Moriri.
- Rupshu Valley- Eastern Ladakh - Changpa Buddhist community nomadic pastoralist tribe- rear yaks, sheep and horses; and the famous "pashmina" goats
- Southernmost part of it has longitudinal valleys called 'duns'. Eg. Jammu dun and Pathankot dun

- Places of pilgrimage: Vaishno Devi, Amarnath Cave, Charar-e-Sharif etc

HIMACHAL HIMALAYAS

- All three ranges of Himalayas are prominent in this section - Great Himalayas, the Lesser Himalayas (Dhauladhar in Himachal Pradesh and Nag Tibba in Uttarakhand) and the Shiwalik.
- Rohtang pass, Bara lacha pass, Shipki la
- Productive valley : Kangra, Kullu, Manali, Lahual and Spiti in HP all goods for orchards and scenic beauty ie tourism potential
- Shimla, Dalhousie, Chamba, Kullu Manali : imp Hill Stations
- Lahaul and Spiti Cold Desert extension of ladakh cold desert located here
- Tribes: Bhotia inhabit the valleys in the Great Himalayan range. 'Bugyals' are used by these nomadic groups (the summer glasslands in the higher reaches) during summer and they return to the valleys during winter (Transhumance).

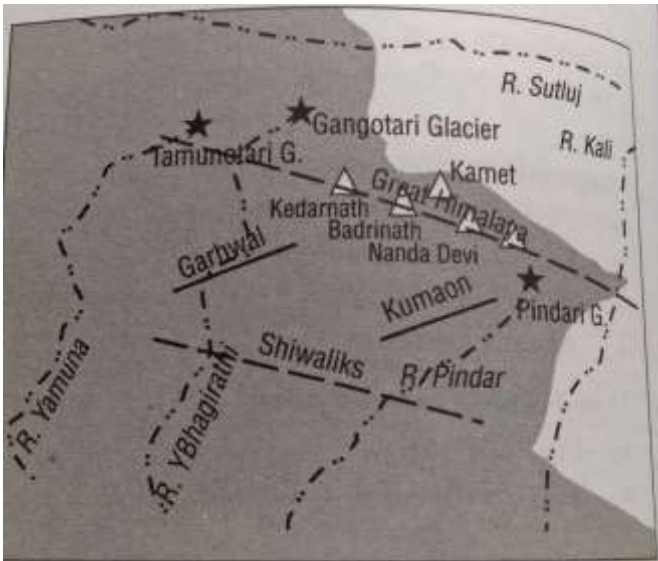


Figure 7.19 Kumaon Himalayas

THE KUMAON HIMALAYAS

- lie between the Satluj and the Kali rivers,
- They include Garhwal and Kumaon Range
- Nandadevi, Kamet , Trishul , Badrinath Kedarnath Gangotri : Imp Peak
- Mussorrie Naintal, Raniket, Almora : Hill Stations
- Mana pass, Niti pass, Lipu Lekh pass : Imp pass
- Kullu, Manali, Kangra are tectonic valley in this region

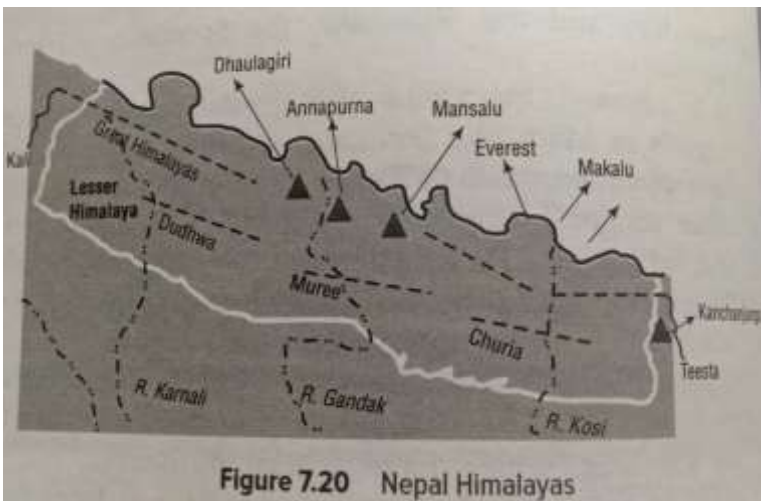
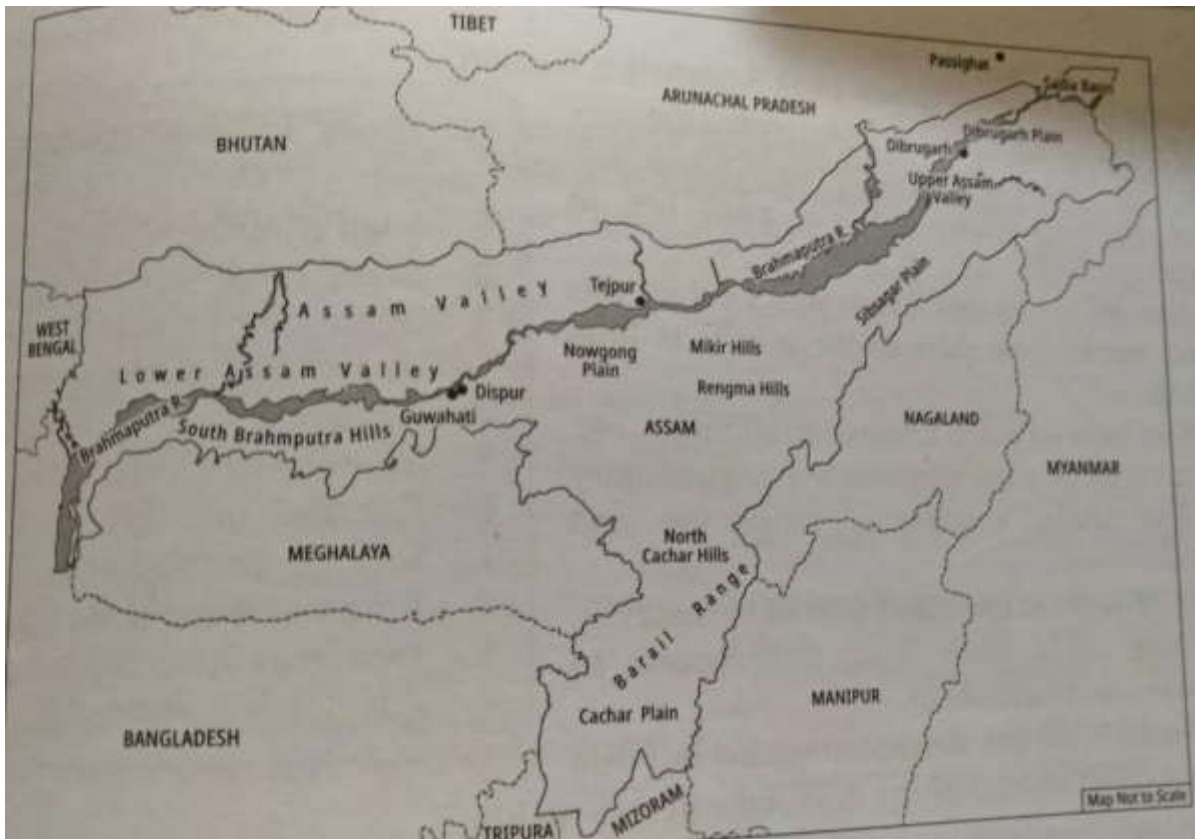


Figure 7.20 Nepal Himalayas

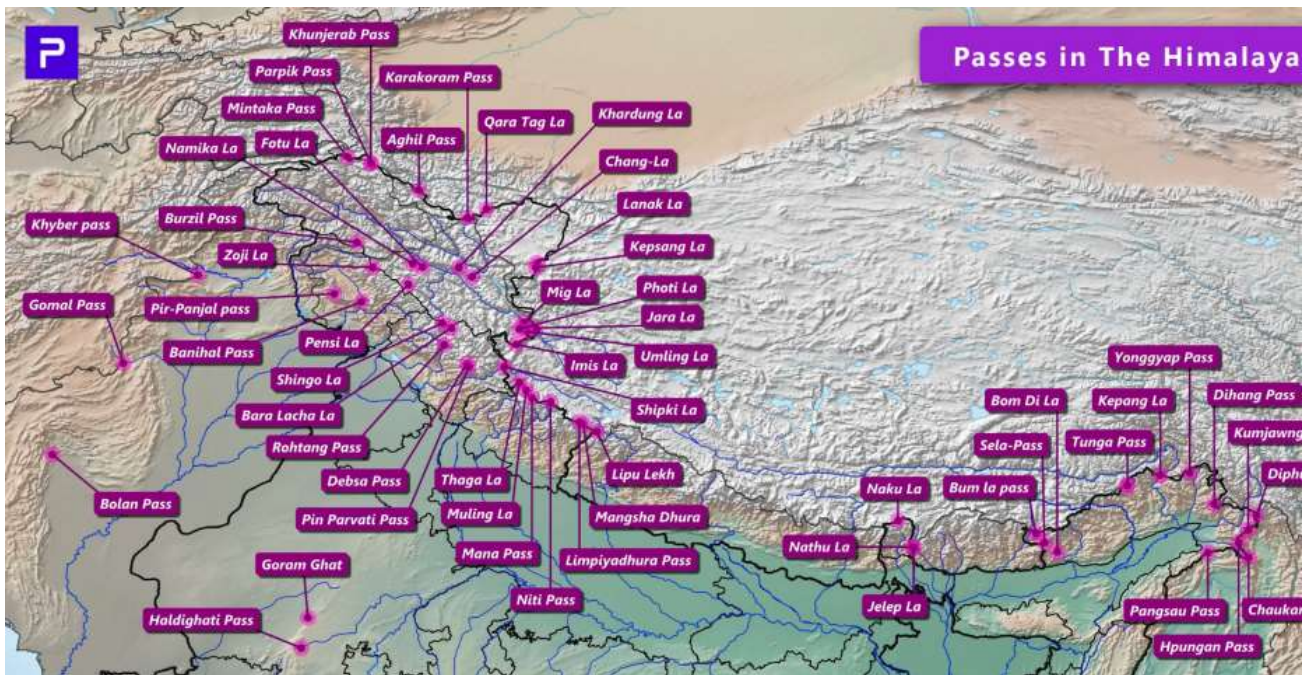
THE CENTRAL HIMALAYAS :

- From Kali river to Teesta river
- Lesser Himalayas: Mahabharat Range (Peaks- West to East): Dudhwa, Murree, Churia; Tallest section of Himalayas.
- Important peaks- Great Himalayas-(West to East):Dhaulagiri, Annapurna, Mansalu, Gauri Shankar, Everest, Makalu;
- Major part located in Nepal region and some part in Sikkim and Darjeeling of West bengal
- All the three ranges of Himalayas represented here
- **Mount Everest is made of marine limestone from the Tethys sea ancient ocean**
- Nathu la pass Jelep la
- Kosi and teesta river have their origin in Kanchenjunga mountain .



THE EASTERN HIMALAYAS :

- Lie between Teesta River and Brahmaputra River
- It Extends from the east of Bhutan Himalayas up to Diphu pass (near tripoint borders of India, China, and Myanmar) in the east and dissected by fast-flowing rivers with deep gorges.
- Tea plantations due to favourable conditions - moderate slope, thick soil cover with high organic content, well distributed rainfall throughout the year, and mild winters
- Include Aka Hills, Dafla Hills, Miri Hills , Abor Hills , Mishmi Hills and namcha barwa peak .
- Due to heavy rainfall fluvial erosion is more and soil pattern is Red and Yellow Soil
- Mountain peaks: Kangtu and Namcha Barwa.
- Tribal communities: Monpa, Daffla, Abor, Mishmi, Nishi and Nagas (West to East). Most of them practice shifting or slash and burn cultivation (Jhumming).



LADAKH AND JAMMU AND KASHMIR KEY PASSES :

- Aghil Pass- Karakoram Range -North of K2 Peak
- Umling La-The world's highest motorable road pass
- Banihal Pass -Jammu-Srinagar across the Pir-Panjal Range
- Khardung La-Gateway to the Nubra and Shyok Valleys. One of the world's highest motorable road passes
- Zoji La-Srinagar-Kargil-Leh

HIMACHAL PRADESH KEY PASSES :

- Bara Lacha La- Manali to Leh
- Rohtang Pass - Leh via Manali-Atal Tunnel is a 9 km highway tunnel built under the Rohtang Pass
- Shipki La-River Sutlej enters India near Shipki La. The pass is one of India's border trading points with Tibet, along with Nathu La in Sikkim and Lipulekh in Uttarakhand.

UTTARKHAND KEY PASSES :

- Lipulekh Pass-Near the tri-junction of India-China-Nepal. Kailash-Mansarovar pilgrims use this pass.
- Mana Pass-Located within the Nanda Devi Biosphere Reserve, a little north of Badrinath

Sikkim Passes :

- Nathu La
- Jelep La

ARUNACHAL PRADESH PASSES :

Pass	Elevation	Connects	Comments
Bom Di La	2,217 m	Itanagar-Tawang-Lhasa (Tibet)	
Bum La	4,600 m	Tawang-Tibet	Near India-Tibet-Bhutan tri-junction
Sela Pass	4,170 m	Itanagar-Tawang	Between Bum La and Bom Di La
Dihang (Siang)	4,590 m	Connects Arunachal and Tibet.	
Yonggyap Pass	3,962 m		
Dipher (Diphu) Pass	4,587 m	India-Myanmar	Tri-junction of India-China-Myanmar
Kumjawng Pass (2,929 m), Hpungan Pass (3,072 m), Chaukan Pass (2,400 m) and Pangsau Pass (1,136 m) connect Arunachal Pradesh with Myanmar.			

SIGNIFICANCE OF HIMALAYAS FOR INDIA

Strategic significance Acts as a natural frontier of India with other countries (China, Pakistan, Afghanistan)

Climatic significance Prevent further northward movement of summer monsoon and also prevent cold northern winds from Siberia to enter into India

Agricultural significance Rivers from Himalayas deposits a lot of sediment on its foothold, from which are formed India's most fertile agricultural grounds known as Northern plains

Economic significance Huge hydro-electric power potential of Himalayan rivers + Himalayan timber + Himalayan Herbs & Medicinal plants and various minerals

Cultural Significance **Tourism** Comprises of Large ecological biodiversity, natural views & hill stations, Pilgrimage

Minerals. Coal is found in Tertiary rocks of Kashmir. Copper, lead, zinc, nickel, cobalt, antimony, tungsten, gold, silver, limestone, semi-precious and precious stones.

the Geological Survey of India (GSI) established lithium-inferred resources of 5.9 million tonnes in the Salal-Haimana area of the Reasi district in Jammu and Kashmir (J&K).

Tourism: Srinagar, Dalhousie, Dharamshala, Chamba, Shimla, Kulu, Manali, Mussoorie, Nainital, Ranikhet, Almora, Darjeeling, Gangtok, etc. are important tourist centres in the Himalayas.

Pilgrimage: Amarnath, Badrinath, Kedamath, Vaishnu Devi, Uttarkashi, Gangotri, Yamunotri, etc. are important places of pilgrimage.

CONCERNS OF HIMALAYA REGION

- Increasing Population in this region, Clearing Forest and grasslands for cultivation
- Widespread Logging on slope region, resulting in severe erosion.
- Habitat Fragmentation due to new Infrastructure development ex [Chardham Mahamarg Vikas Pariyojna](#),
- Poaching is serious issue
- climate change leading to glacial melt and altered weather patterns, to rampant urbanisation and unsustainable development practices
- Earthquakes and landslide prone regions
- The loss of vegetative cover destabilises Himalayan slopes, making them susceptible to erosion during heavy rainfall or seismic events
- Soil Erosion and Landslides: Deforestation, construction activities, and improper land use practices increase soil erosion and the risk of landslides.
- Growth of Invasive Species: As temperatures rise, new habitats become available for invasive species that can outcompete native the flora and fauna of the Himalayan region.
- many communities of Himalaya region faces poverty and inequality, leading to social unrest and resource conflicts .

Note : Gorge and Canyon Difference

- Both are Valley types - Erosional Landforms by Running Water:



Les GORGES du FIER / Photo G. LANSARD

○ **Gorge:**

- A **gorge is a deep valley with very steep to straight sides.**
- A deep valley having cliffs or steep rock formations on each side
- A gorge is almost equal in width at its top as well as its bottom.
- Gorges form in **hard rocks.**
-

Canyon:

- A canyon is characterised by steep step-like side slopes and may be as deep as a gorge.
- A canyon is wider at its top than at its bottom. In fact, a canyon is a variant of a gorge.
- Canyons commonly form in horizontal bedded sediment.



Gandikota canyon of South India was created by which river :

Ans Pennar in Andhra pradesh, Grand canyon of India



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