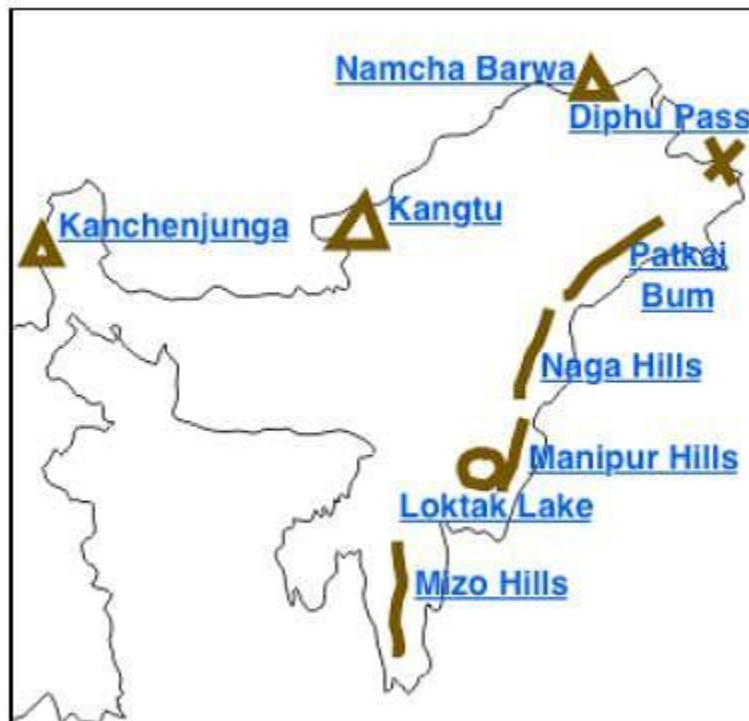


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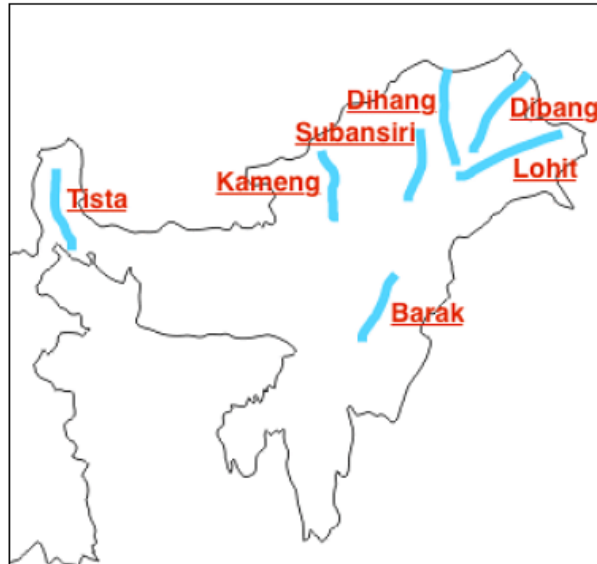
The Arunachal Himalayas

These extend from the east of the **Bhutan Himalayas upto the Diphu pass in the east**. The general direction of the mountain range is from southwest to northeast. Some of the important mountain peaks of the region are **Kangtu** and **Namcha Barwa**.



Mountain ranges in Arunachal Pradesh

- These ranges are dissected by fast-flowing rivers from the north to the south, forming deep gorges. The Brahmaputra flows through a deep gorge after crossing Namcha Barwa. Some of the important rivers are the **Kameng**, the **Subansiri**, the **Dihang**, and the **Lohit**.
- These are perennial with a high rate of fall, thus, having the highest hydro-electric power potential in the country.



Important rivers of Arunachal Pradesh

- An important aspect of the Arunachal Himalayas is the numerous ethnic tribal communities inhabiting these areas. Some of the prominent ones from west to east are the **Monpa, Dafla, Abor, Mishmi, Nishi, and the Nagas**. Most of these communities practice Jhumming. It is also known as shifting cultivation or slash-and-burn agriculture. Due to rugged topography, the inter-valley transportation linkages are nominal. Hence, most of the interactions are carried through the duar region along the Arunachal-Assam border.

The Eastern Hills and Mountains

- These are part of the Himalayan mountain system having their general alignment from the north to the south direction. They are known by different local names. In the north, they are known as **Patkai Bum, Naga hills, the Manipur hills**, and in the south as **Mizo or Lushai hills**. These are low hills, inhabited by numerous tribal groups practicing **Jhum cultivation**.
- Most of these ranges are separated from each other by numerous small rivers. The **Barak** is an important river in Manipur and Mizoram. The physiography of Manipur is unique by the presence of a large lake known as '**Loktak**' lake at the centre, surrounded by mountains from all sides. Mizoram which is also known as the '**Molasse basin**' which is made up of soft unconsolidated deposits. Most of the rivers in Nagaland form the tributary of the Brahmaputra.
- While two rivers of Mizoram and Manipur are the tributaries of Barak river, which in turn is the tributary of Meghna, the rivers in the eastern

part of Manipur are the tributaries of Chindwin, which in turn is a tributary of the Irrawaddy of Myanmar.

The Northern Plains

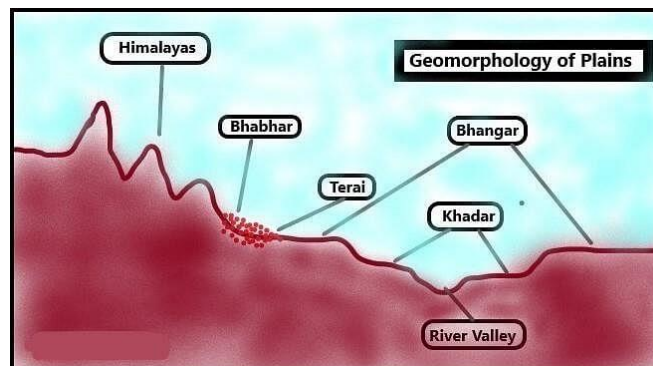


Indo- Gangetic Plains

- The northern plains are formed by the alluvial deposits brought by the rivers- the Indus, the Ganga, and the Brahmaputra. These plains extend approximately 3,200 km from the east to the west. The average width of these plains varies between 150-300 km. The maximum depth of alluvium deposits varies between 1,000-2,000 m.

From the north to the south, these can be divided into three major zones:

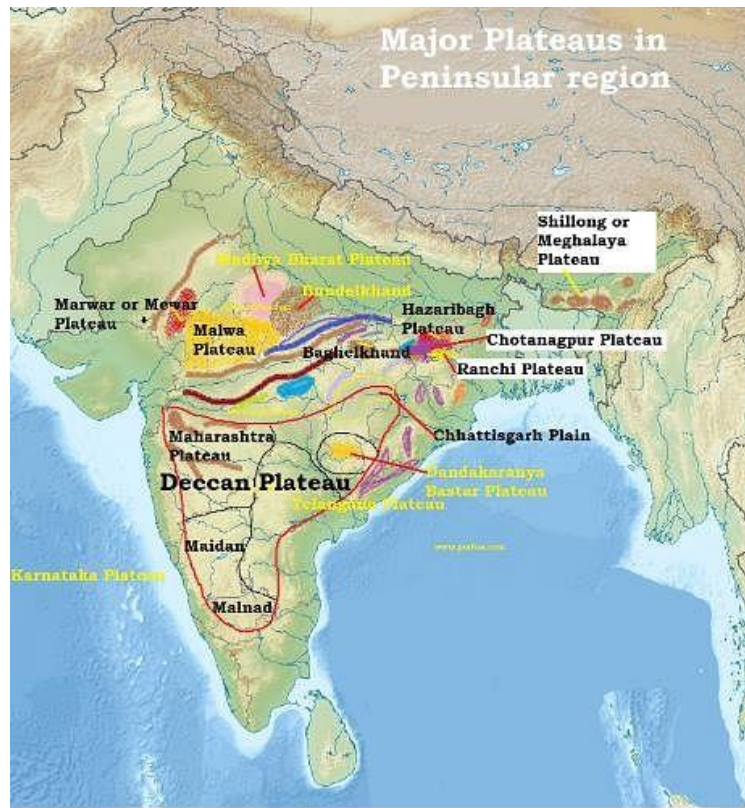
- The **Bhabar**, the **Tarai** and the **alluvial plains**.
- The alluvial plains can be further divided into the **Khadar** and the **Bhangar**



- Bhabar is a narrow belt ranging between 8-10 km parallel to the Shivalik foothills at the break-up of the slope. As a result of this, the streams and rivers coming from the mountain deposit heavy materials of rocks and boulders, and at times, disappear in this zone.
- South of the Bhabar is the **Tarai belt**, with an approximate width of 10-20 km where most of the streams and rivers re-emerge without having any properly demarcated channel, thereby, creating marshy and swampy conditions known as the Tarai. This has a luxurious growth of natural vegetation and houses varied wildlife.
- The south of Tarai is a belt consisting of old and new alluvial deposits known as the Bhangar and Khadar respectively. These plains have characteristic features of the mature stage of fluvial erosional and depositional landforms such as sand bars, meanders, oxbow lakes, and braided channels. The Brahmaputra plains are known for their **riverine islands** and **sand bars**. Most of these areas are subjected to periodic floods and shifting river courses forming braided streams.
- The mouths of these mighty rivers also form some of the largest deltas of the world, for example, the famous **Sunderbans delta**. Otherwise, this is a featureless plain with a general elevation of 50-150 m above the mean sea level. The states of Haryana and Delhi form a water divide between the Indus and the Ganga river systems.
- As opposed to this, the Brahmaputra river flows from the northeast to the southwest direction before it takes an almost 90° southward turn at **Dhubri** before it enters Bangladesh. These river valley plains have a fertile alluvial soil cover which supports a variety of crops like wheat, rice, sugarcane, and jute, and hence, supports a large population.

The Peninsular Plateau

- Rising from the height of 150 m above the river plains up to an elevation of 600-900 m is the irregular triangle known as the peninsular plateau. Delhi ridge in the northwest, (extension of Aravalis), the Rajmahal Hills in the east, Gir range in the west and the Cardamom Hills in the south constitute the outer extent of the peninsular plateau. However, an extension of this is also seen in the northeast, in the form of the Shillong Karbi-Anglong plateau.
- The peninsular India is made up of a series of **peatland plateaus** such as the Hazaribagh plateau, the Palamu plateau, the Ranchi plateau, the Malwa plateau, the Coimbatore plateau and the Karnataka plateau, etc. This is one of the **oldest and the most stable landmass of India**.

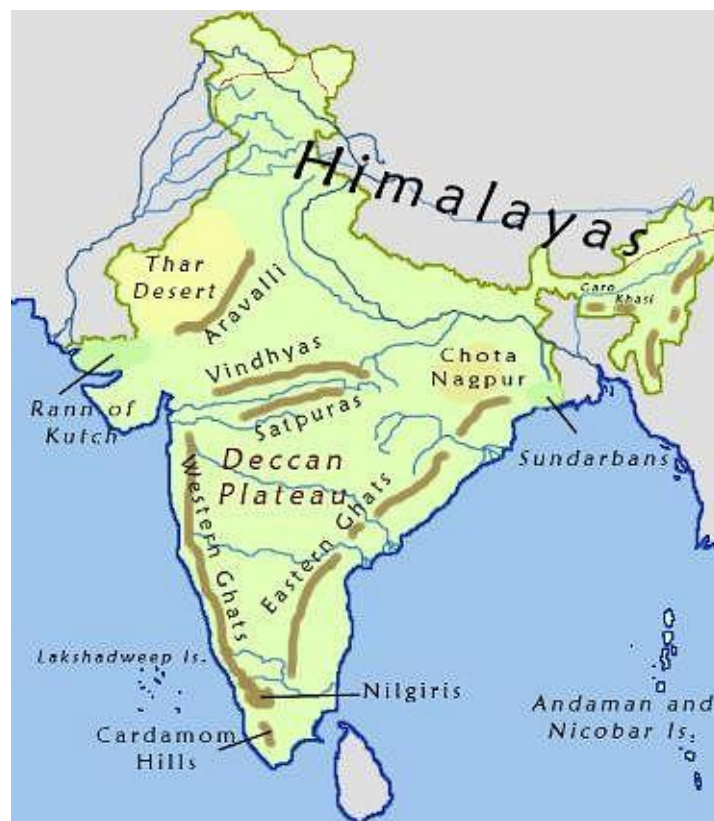


- The general elevation of the plateau is from the west to the east, which is also proved by the pattern of the flow of rivers. Name some rivers of the peninsular plateau which have their confluence in the Bay of Bengal and the Arabian sea and mention some landforms which are typical to the east-flowing rivers but are absent in the west-flowing rivers.
- Some of the important physiographic features of this region are tors, block mountains, rift valleys, spurs, bare rocky structures, series of hummocky hills and wall-like quartzite dykes offering natural sites for water storage.
- The western and northwestern part of the plateau has an emphatic presence of black soil. This peninsular plateau has undergone recurrent phases of upliftment and submergence accompanied by crustal faulting and fractures. (The Bhima fault needs special mention, because of its recurrent seismic activities).
- These spatial variations have brought in elements of diversity in the relief of the peninsular plateau. The northwestern part of the plateau has a complex **relief of ravines and gorges**. The ravines of Chambal, Bhind, and Morena are some of the well-known examples.
- On the basis of the prominent relief features, the peninsular plateau can be divided into three broad groups:
 - (a) The Deccan Plateau

- (b) The Central Highlands
- (c) The Northeastern Plateau

(a) The Deccan Plateau

- This is bordered by the Western Ghats in the west, Eastern Ghats in the east and the Satpura, Maikal range, and Mahadeo hills in the north. Western Ghats are locally known by different names such as **Sahyadri** in Maharashtra, **Nilgiri hills** in Karnataka and Tamil Nadu, and **Anaimalai hills**, and **Cardamom hills** in Kerala.
- The **Western Ghats** are comparatively higher in elevation and more continuous than the Eastern Ghats. Their average elevation is about 1,500 m with the height increasing from north to south. 'Anamudi' (2,695 m), the highest peak of Peninsular plateaus is located on the Anaimalai hills of the Western Ghats followed by Doddabetta (2,670 m) on the Nilgiri hills. Most of the Peninsular rivers have their origin in the Western Ghats.



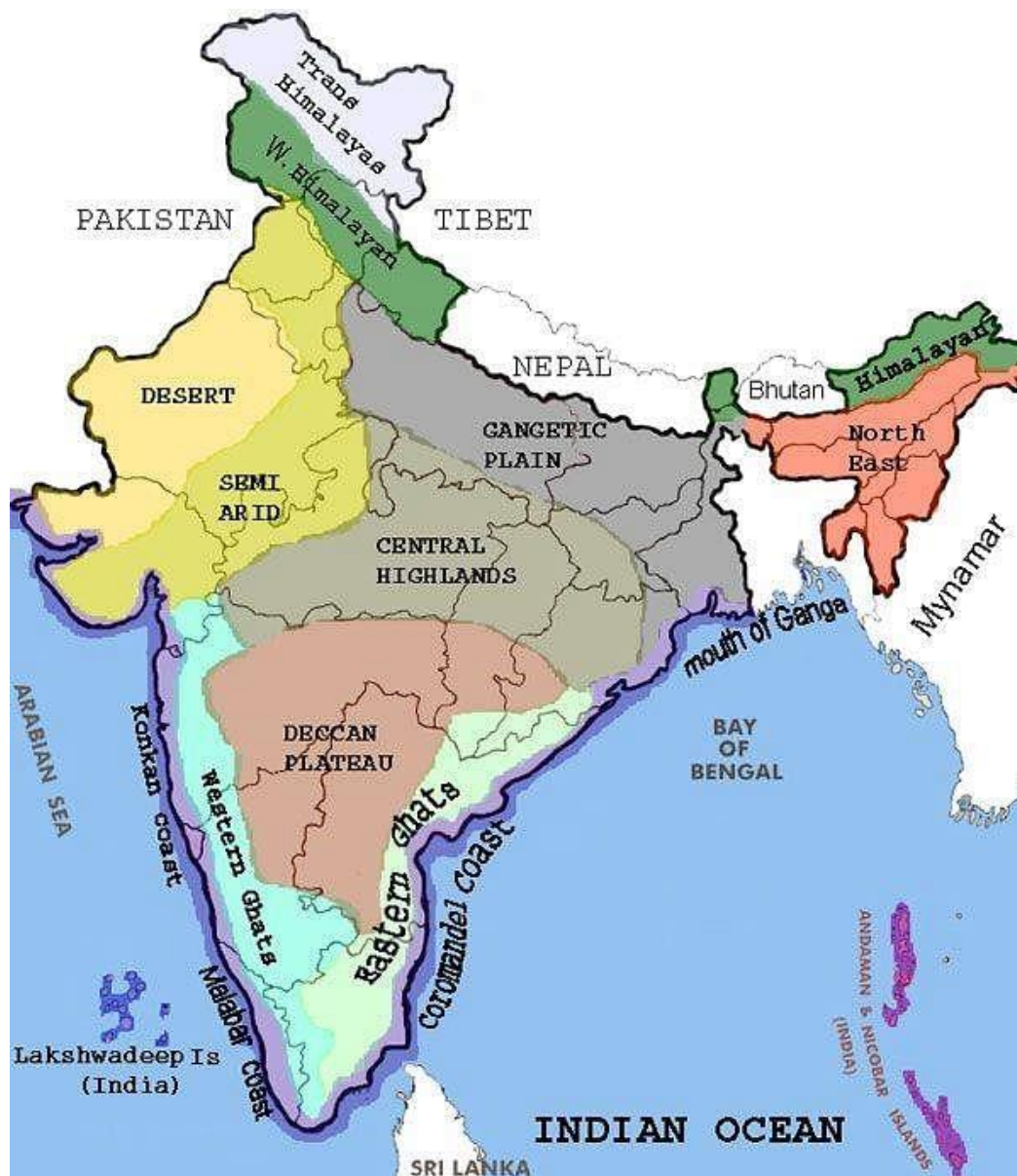
Deccan Plateau

- Eastern Ghats comprising the discontinuous and low hills are highly eroded by the rivers such as the Mahanadi, the Godavari, the Krishna, the Kaveri, etc. Some of the important ranges include the Javadi hills, the

Palconda range, the Nallamala hills, the Mahendragiri hills, etc. The Eastern and the Western Ghats meet each other at the Nilgiri hills.

(b) The Central Highlands

- They are bounded to the west by the Aravali range. The **Satpura range** is formed by a series of scarped plateaus on the south, generally at an elevation varying between 600-900 m above the mean sea level. This forms the northernmost boundary of the Deccan plateau. It is a classic example of the **relict mountains** which are highly denuded and form **discontinuous ranges**.



Central Highlands

- The extension of the Peninsular plateau can be seen as far as Jaisalmer in the West, where it has been covered by the longitudinal sand ridges and crescent-shaped sand dunes called **barchans**. This region has undergone metamorphic processes in its geological history, which can be corroborated by the presence of metamorphic rocks such as marble, slate, gneiss, etc.
- The general elevation of the Central Highlands ranges between 700-1,000 m above the mean sea level and it slopes towards the north and northeastern directions. Most of the tributaries of the river Yamuna have their origin in the **Vindhyan** and **Kaimur** ranges.
- **Banas** is the only significant tributary of the river Chambal that originates from the Aravalli in the west. An eastern extension of the Central Highland is formed by the Rajmahal hills, to the south of which lies a large reserve of mineral resources in the Chotanagpur plateau.



Banas-Tributary of Chambal River

The Northeastern Plateau

- In fact, it is an extension of the main peninsular plateau, it is believed that due to the force exerted by the northeastward movement of the Indian plate at the time of the Himalayan origin, a huge fault was created between the Rajmahal hills and the Meghalaya plateau. Later, this depression got filled up by the deposition activity of the numerous rivers.
- Today, the Meghalaya and Karbi Anglong plateau stand detached from the main peninsular Block.

The Meghalaya plateau is further sub-divided into three Hills:

- (i) The Garo Hills
- (ii) The Khasi Hills
- (iii) The Jaintia Hills

- These hills named after the tribal groups inhabiting this region. An extension of this is also seen in the Karbi Anglong hills of Assam. Similar to the Chotanagpur plateau, the Meghalaya plateau is also rich in mineral resources like coal, iron ore, sillimanite, limestone, and uranium.
- This area receives maximum rainfall from the **southwest monsoon**. As a result, the Meghalaya plateau has a highly eroded surface. Cherrapunji displays a bare rocky surface devoid of any permanent vegetation cover.

The Indian Desert



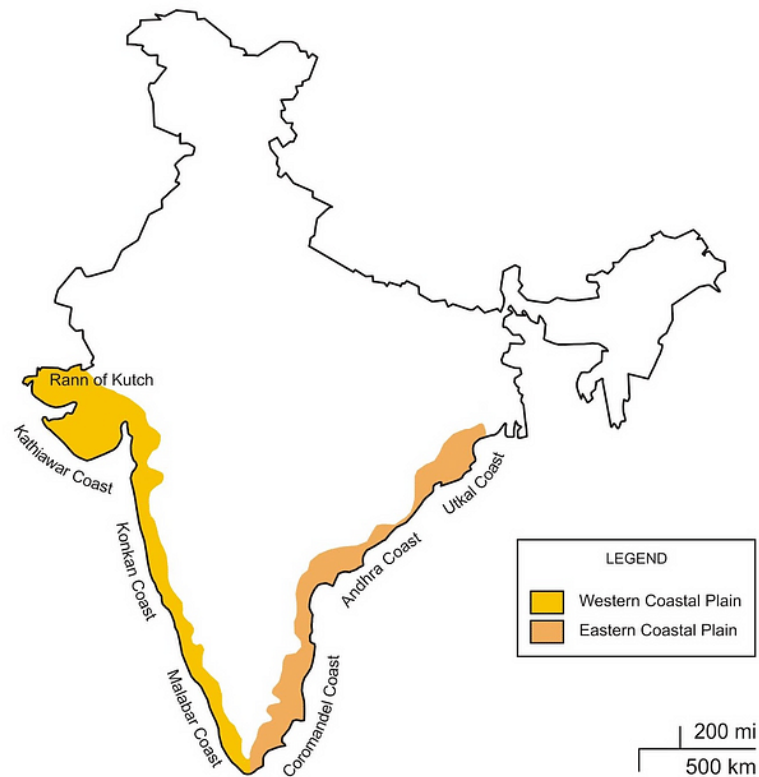
- To the northwest of the Aravali hills lies the Great Indian desert. It is a land of undulating topography dotted with longitudinal dunes and barchans. This region receives low rainfall below 150 mm per year, hence, it has arid climate with low vegetation cover. It is because of these characteristic features that this is also known as **Marusthali**.
- It is believed that during the Mesozoic era, this region was under the sea. This can be corroborated by the evidence available at wood fossils park at Aakal and marine deposits around Brahmsar, near Jaisalmer (The approximate age of the wood fossils is estimated to be 180 million years).

- Though the underlying rock structure of the desert is an extension of the peninsular plateau, yet, due to extreme arid conditions, its surface features have been carved by physical weathering and wind actions. Some of the well pronounced desert lands feature present here are mushroom rocks, shifting dunes, and oasis (mostly in its southern part).
- On the basis of the orientation, the desert can be divided into two parts: **the Northern part is sloping towards Sindh and the South towards the Rann of Kachchh.**
- Most of the rivers in this region are ephemeral. The Luni river flowing in the southern part of the desert is of some significance. Low precipitation and high evaporation makes it a water deficit region. There are some streams which disappear after flowing for some distance and present a typical case of inland drainage by joining a lake or playa. The lakes and the playas have brackish water which is the main source of obtaining salt.

The Coastal Plains

- India has a long coastline.
On the basis of the location and active geomorphological processes, it can be divided into two:
 - (i) Western Coastal Plains
 - (ii) Eastern Coastal Plains

Coastal Plain of India



- The western coastal plains are an example of a submerged coastal plain. It is believed that the **city of Dwaraka** which was once a part of the Indian mainland situated along the west coast is submerged underwater. Because of this submergence, it is a narrow belt and provides natural conditions for the development of ports and harbors.
- Kandla, Mazagaon, JLN port Navha Sheva, Marmagao, Mangalore, Cochin, etc. are some of the important natural ports located along the west coast. Extending from the Gujarat coast in the north to the Kerala coast in the south, the western coast may be divided into following divisions- the Kachchh and Kathiawar coast in Gujarat, Konkan coast in Maharashtra, Goa coast and Malabar coast in Karnataka and Kerala respectively.
- The western coastal plains are narrow in the middle and get broader towards north and south. The rivers flowing through this coastal plain do not form any delta. The Malabar coast has got certain distinguishing features in the form of '**Kayals**' (backwaters), which are used for fishing, inland navigation and also due to its special attraction for tourists.

Every year the famous **Nehru Trophy Vallamkali** (boat race) is held in **Punnamada Kayal** in Kerala.

- Some important mountain peaks in Andaman and Nicobar islands are **Saddle peak** (North Andaman- 738 m), **Mount Diavolo** (Middle Andaman- 515 m), **Mount Koyob** (South Andaman- 460 m), and **Mount Thuiller** (Great Nicobar- 642 m).
- As compared to the western coastal plain, the eastern coastal plain is broader and is an example of an **emergent coast**. There are well-developed deltas here, formed by the rivers flowing eastward into the Bay of Bengal. These include the deltas of the Mahanadi, the Godavari, the Krishna and the Kaveri. Because of its emergent nature, it has less number of ports and harbors.
- The continental shelf extends up to 500 km into the sea, which makes it difficult for the development of good ports and harbors. Name some ports on the eastern coast.

The Islands

- There are two major island groups in India- one in the **Bay of Bengal** and the other in the **Arabian**. The Bay of Bengal Island groups consists of about 572 islands/islets. These are situated roughly between 6°N – 14°N and 92°E-94°E.

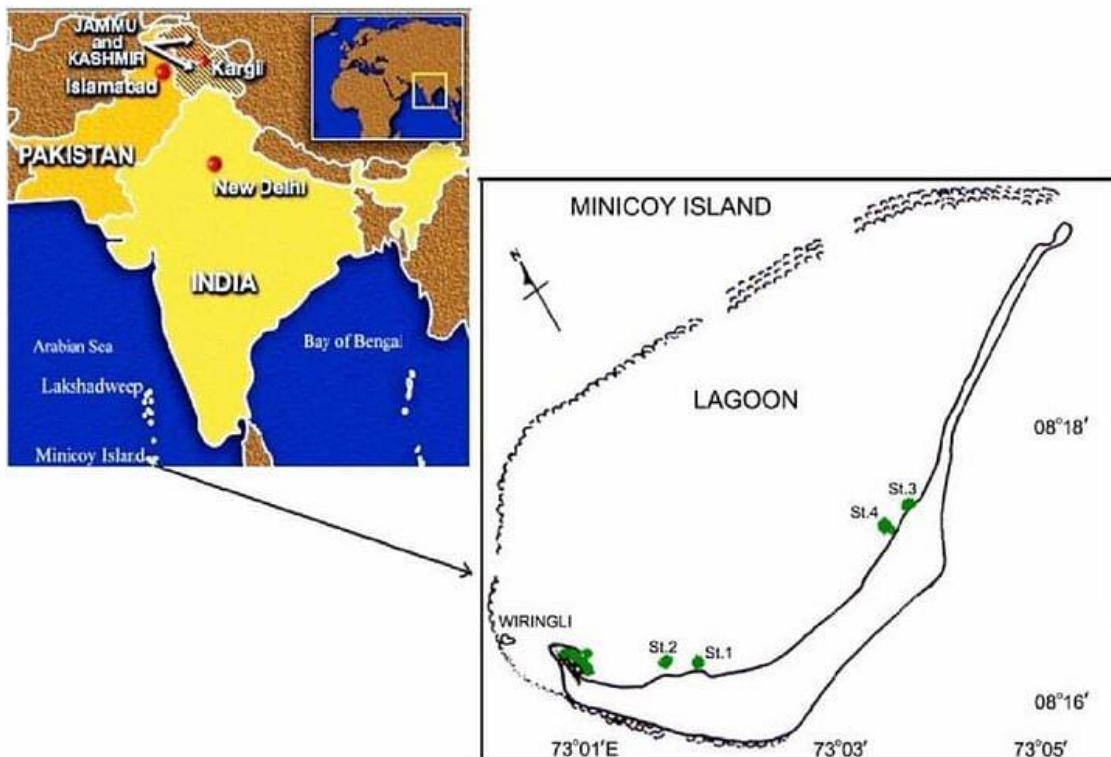


Islands in India

- The two principal groups of islets include **Ritchie's archipelago** and **Labyrinth Island**. The entire group of

islands is divided into two broad categories the Andaman in the north and the Nicobar in the south. They are separated by a water body which is called the **Ten-degree channel**. It is believed that these islands are an elevated portion of submarine mountains. However, some smaller islands are volcanic in origin. A barren island, the only active volcano in India is also situated in the Nicobar Islands.

- The coastal line has some coral deposits and beautiful beaches. These islands receive conventional rainfall and have an equatorial type of vegetation.
- The islands of the Arabian sea include **Lakshadweep** and **Minicoy**. These are scattered between 8°N and 71°E - 74°E longitude. These islands are located at a distance of 280 km - 480 km off the Kerala coast. The entire island group is built of coral deposits. There are approximately 36 islands of which 11 are inhabited.



Lakshadweep and Minicoy islands

- Minicoy is the largest island with an area of 453 sq. km. The entire group of islands is broadly divided by the **Eleventh-degree channel**, north of which is the **Amini Island** and to the south of the **Canannore Island**. The islands of this archipelago have storm beaches consisting of unconsolidated pebbles, shingles, cobbles, and boulders on the eastern seaboard.

