

Unit 2 : Sub Part : Drainage of India

Introduction

- The flow of water through well-defined channels is known as **drainage** and the network of such channels is known as **drainage system**.
- The drainage pattern of an area is the result of the geological time period, nature, and structure of rocks, topography, slope, etc.



- About 77% of the drainage area consisting of the *Ganga*, the *Brahmaputra*, the *Mahanadi*, the *Krishna*, etc. is oriented towards the Bay of Bengal.
- On the other hand, 23% comprising the *Indus*, the *Narmada*, the *Tapi*, the *Mahi*, and the *Periyar* systems discharge their waters in the Arabian Sea.
- A river drain is a specific area, which is known as the **catchment area** of that river.
- An area drained by a river and its tributaries is known as a **drainage basin**.
- The boundary line separating one drainage basin from the other is called as the **watershed area**.

Drainage Pattern

- Following are the major drainage patterns –

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

Classification of Drainage

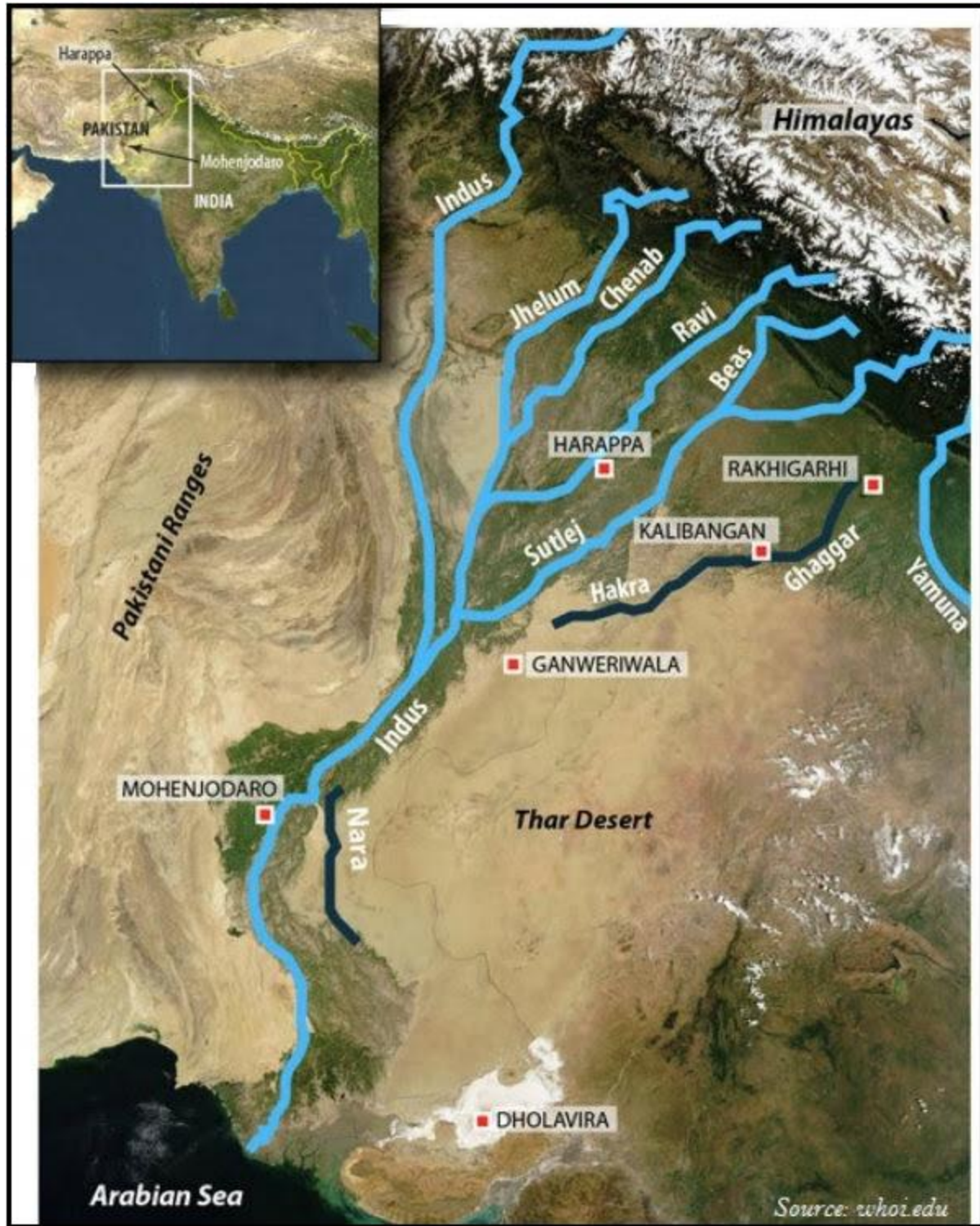
- On the basis of the mode of origin, nature, and characteristics, the Indian drainage is classified as –
 - The **Himalayan drainage** and
 - The **Peninsular drainage**.

Himalayan Drainage

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

The Indus

- The total length of the Indus River system is 2,880 km (in India 1,114 km).
- The Indus, which is also known as the **Sindhu**, is the westernmost of the Himalayan Rivers in India.



- The Indus originates from a glacier near **Bokhar Chu** in the Tibetan region at an altitude of 4,164 m in the *Kailash* Mountain range.
- In Tibet, the Indus is known as **Singi Khamban** or the Lion's mouth.
- The Indus enters into Pakistan near *Chillar* in the Dardistan region.

- Major tributaries of Indus are the *Shyok*, the *Gilgit*, the *Zaskar*, the *Hunza*, the *Nubra*, the *Shigar*, the *Gasting*, and the *Dras* in the upper part.
- In the lower part, the *Satluj*, the *Beas*, the *Ravi*, the *Chenab*, and the *Jhelum* are the major tributaries of the *Indus*.
- Finally, the *Indus* discharges into the *Arabian Sea* near Karachi in Pakistan.
- The *Jhelum*, an important tributary of the *Indus*, rises from a spring at *Verinag* situated at the foot of the *Pir Panjal*.
- The *Jhelum* flows through Srinagar and the *Wular Lake* before entering into Pakistan.
- *Jhelum* joins the *Chenab* near Jhang in Pakistan.
- Formed by two streams i.e. the *Chandra* and the *Bhaga*, the *Chenab* is the largest tributary of the Indus.
- *Chenab* is also known as *Chandrabhaga*.
- The *Chenab* flows about 1,180 km before entering into Pakistan.
- Originating from the *Rohtang* pass in the *Kullu* hills of Himachal Pradesh and flowing through the *Chamba* valley of the state, *Ravi* is one of the important tributaries of the Indus.
- Originating from the *Beas Kund* near the *Rohtang* Pass at an elevation of 4,000 m above the mean sea level, *Beas* is also an important tributaries of the Indus.

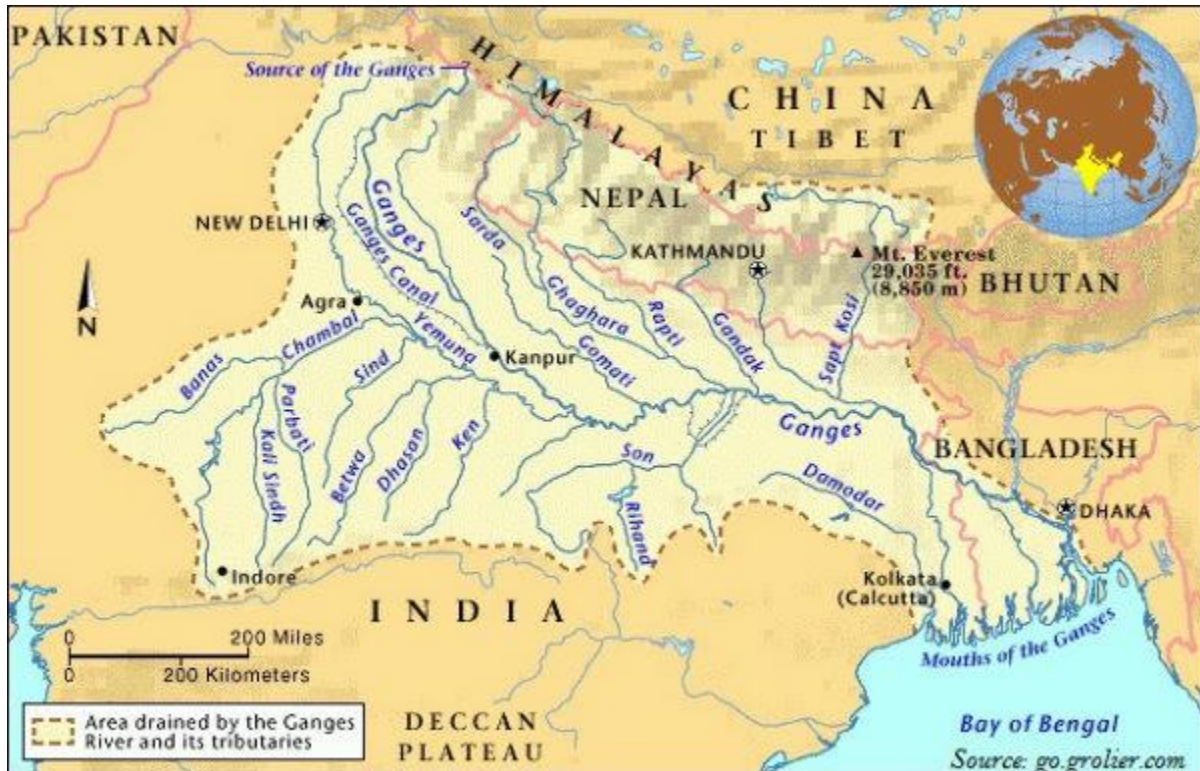


- Beas enters into the Punjab plains and meets with the *Satluj* near Harike.
- Also popular as **Langchen Khambab** (in Tibet), the *Satluj* originates from the *Rakas* lake near *Mansarovar* at an altitude of 4,555 m in Tibet.
- The *Satluj* passes through the *Shipki La* on the Himalayan ranges and enters into the Punjab plains.

- The *Satluj* is the river that feeds the canal system of the Bhakra Nangal project.

The Ganga

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



- However, the river, when it originates from the Gangotri glacier is known as the **Bhagirathi**.
- At **Devprayag**, the *Bhagirathi* merges with another river, i.e., the *Alaknanda*; and from here, it is known as the *Ganga*.
- The *Alaknanda* originates from the *Satopanth* glacier above Badrinath.
- The major tributaries of the *Alaknanda* are the *Dhaulti* and the *Vishnu Ganga*; these two rivers meet at *Joshimath/Vishnu Prayag*.
- Some other tributaries of the *Alaknanda* are the *Pindar* (joins at *Karna Prayag*), the *Mandakini* or *Kali Ganga* (joins at *Rudra Prayag*).
- The total length of the Ganga in India is 2,525 km, which is shared by Uttarakhand (110 km); Uttar Pradesh (1,450 km); Bihar (445 km); and West Bengal (520 km).
- The Ganga river system is the largest river system in India.

- The *Son* is a major right bank tributary of the Ganga; however, major left bank tributaries are the *Ramganga*, the *Gomati*, the *Ghaghara*, the *Gandak*, the *Kosi*, and the *Mahananda*.
- Originating from the *Yamunotri* glacier on the western slopes of *Banderpunch* range (6,316 km), the *Yamuna* is the longest tributary of the Ganga.
- The Yamuna joins the Ganga at Allahabad (Prayag), Uttar Pradesh.
- The *Chambal*, the *Sind*, the *Betwa*, and the *Kenon* are the right bank tributaries of the Yamuna and the *Hindan*, the *Rind*, the *Sengar*, the *Varuna*, etc. are the left bank tributaries.
- The *Chambal* rises near **Mhow** in the Malwa plateau of Madhya Pradesh.
- The *Chambal* is famous for its badland topography, known as the **Chambal ravines** (as shown in the image given below).



- Originating from the Nepal Himalayas between the Dhaulagiri and Mount Everest, the *Gandak* consists of two streams, namely *Kaligandak* and *Trishulganga*.
- The *Gandak* joins the Ganga at *Sonpur* near Patna, Bihar.
- The *Ghaghara* originates from the *Mapchachungo* glaciers and joins the Ganga at Chhapra, Bihar.
- The *Kosi* originates from the north of Mount Everest in Tibet where it is known as the **Arun**.

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

The Brahmaputra

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



- Finally, the Brahmaputra merges with the river *Padma* and falls in the Bay of Bengal.

Peninsular River System

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

- Of the total catchment area of the *Krishna*, 27% lies in Maharashtra, 44% in Karnataka, and 29% in Andhra Pradesh.
- The *Kaveri* originates from the *Brahmagiri* hills (1,341m) located in Kogadu district of Karnataka.



- The river *Kaveri*'s total course of 770 km commands a basin area of 8.8 million hectare mha, of which, 3% lies in Kerala, 41% lies in Karnataka, and 56% lies in Tamil Nadu.
- Major tributaries of the *Kaveri* are the *Kabini*, the *Bhavani*, and the *Amravati*.
- The *Narmada* originates from the western flank of the *Amarkantak* plateau (1,057 m).
- Flowing through a rift valley located between the *Satpura* in the south and the *Vindhya* range in the north, the *Narmada* forms *Dhuandhar* waterfall and a picturesque gorge of marble rocks nearby Jabalpur.



- The total length of *Narmada* is 1,312 km.
- Flowing in the westward direction, *Narmada* finally empties into the Arabian Sea in the Bharuch district of Gujarat.
- Originating from *Mul tai* in the Betul district of Madhya Pradesh, *Tapi* is the other important westward flowing river emptying into the Arabian Sea.
- About 79% of the *Tapi* basin lies in Maharashtra, 15% in Madhya Pradesh, and the remaining 6% in Gujarat.
- *Luni* is the longest river system of Rajasthan.
- Primarily, *Luni* originates in the Pushkar valley of the Aravalli range, Rajasthan in two branches, i.e. the ***Saraswati*** and the ***Sabarmati***; which join each other at Govindgarh. From here, the river is known as *Luni*.
- *Luni* finally debouches into the Arabian Sea nearby the Rann of Kachchh.
- Some small rivers flowing towards the West are the *Shetruniji*, the *Bhadra*, *Dhadhar*, *Sabarmati*, *Mahi*, *Vaitarna*, *Kalinadi*, *Dedti*, *Sharavati*, *Mandovi*, *Juari*, *Bharathapuzha*, *Periyar*, etc.
- Some small rivers flowing towards the East are *Subarnarekha*, *Baitarni*, *Brahmani*, *Penner*, and *Palar*.

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

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

	deepening in the valleys	reached their base levels.
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