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TOPIC -

Himalayan Rivers



Drainage System

- Drainage pattern refers to the system of flow of surface water mainly through the forms of rivers and basins.
- The drainage system depends upon factors such as slope of land, geological structure, amount of volume of water and velocity of water.

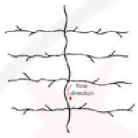
Different Drainage Patterns

- There are four types of drainage patterns formed by a river: Dendritic, Trellis, Radial, and Centripetal pattern.

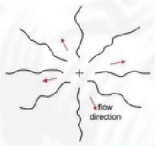
01 **Dendritic**



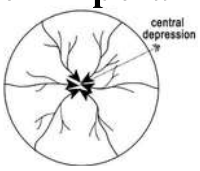
02 **Trellis**

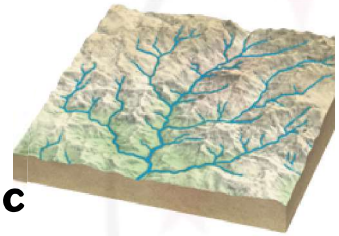


03 **Radial**



04 **Centripetal**





Dendritic

- The most common drainage pattern that resembles a tree's branching roots.
- It occurs when a stream receives water from tributaries, which are fed by smaller tributaries. Tributaries join larger streams at acute angles (less than 90°). E.g. The rivers of the Northern Plains: Indus, Ganga and Brahmaputra.



Trellis

- This type of drainage pattern is formed when primary tributaries of main rivers flow parallel to each other and secondary tributaries join them at right angles.
- E.g. Rivers originating at Chota Nagpur and rivers in the upper Himalayan region: Damodar river, Indus river, etc.



Radial

- This type of drainage pattern is a pattern of streams and rivers that radiate outward from a central high point. It's common around volcanoes and other conically shaped features.
- E.g. The rivers like Narmada, Son and Mahanadi originating from Amarkantak Hills are examples of drainage pattern.

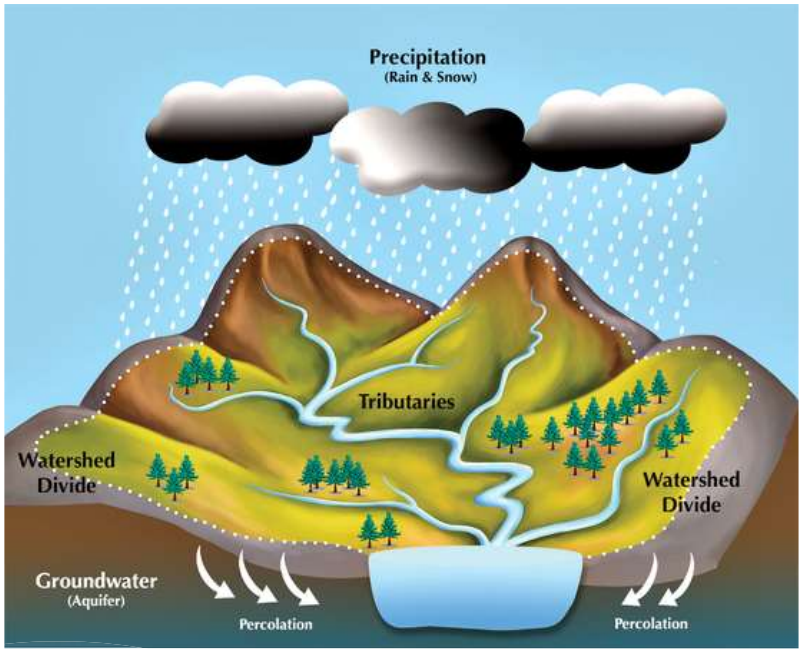


Centripetal

- It is just the opposite of the radial pattern.
- The stream flow toward a central depression / Basin.
- Eg. : Loktak Lake (Manipur)

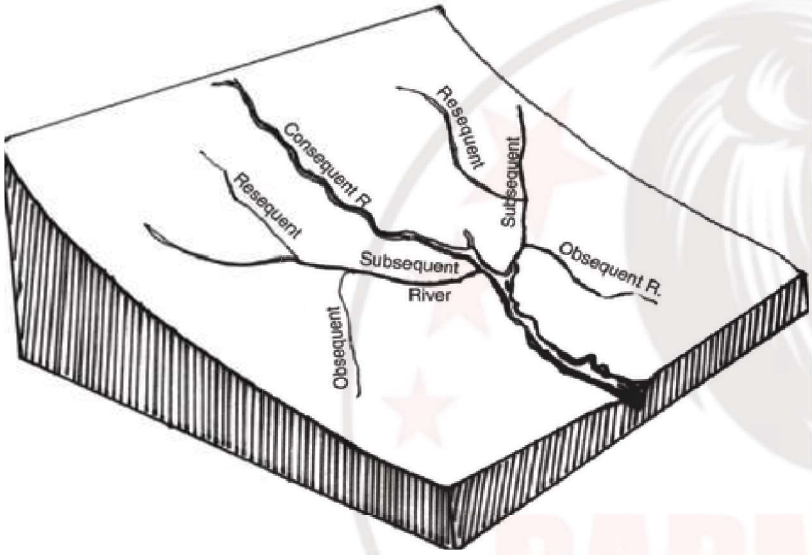
Drainage Basin

- A drainage basin is the total area of land that drains into a river system or other body of water.



Watershed / Catchment Area

- A land area where all the water from precipitation, such as rain and snowmelt, drains into a common outlet like a river, lake, or ocean



- **Consequent River** : A river that flows along the general direction of the land's slope.
- **Subsequent River** : A tributary stream that forms after the main drainage pattern, eroding along a belt of weaker rock
- **Obsequent River** : A tributary that flows in the opposite direction to the main, or consequent river
- **Resequent River** :A stream that flows in the same direction as the original consequent river but originates at a much later stage.

Himalayan River System

- They are perennial rivers, flow throughout the year and they do not depend on monsoon for their water flow.
- They originate from glacier in the Himalayas.
- They have long course from source to the sea. Three major Himalayan rivers are Indus, Ganga and Brahmaputra, originating from northern mountain ranges.
- Some Himalayan rivers are antecedent (They flow their original course despite geological changes)
- Examples are Sutlej, Kosi, Indus and Ganga.
- Yamuna is not Antecedent.



Peninsular River System

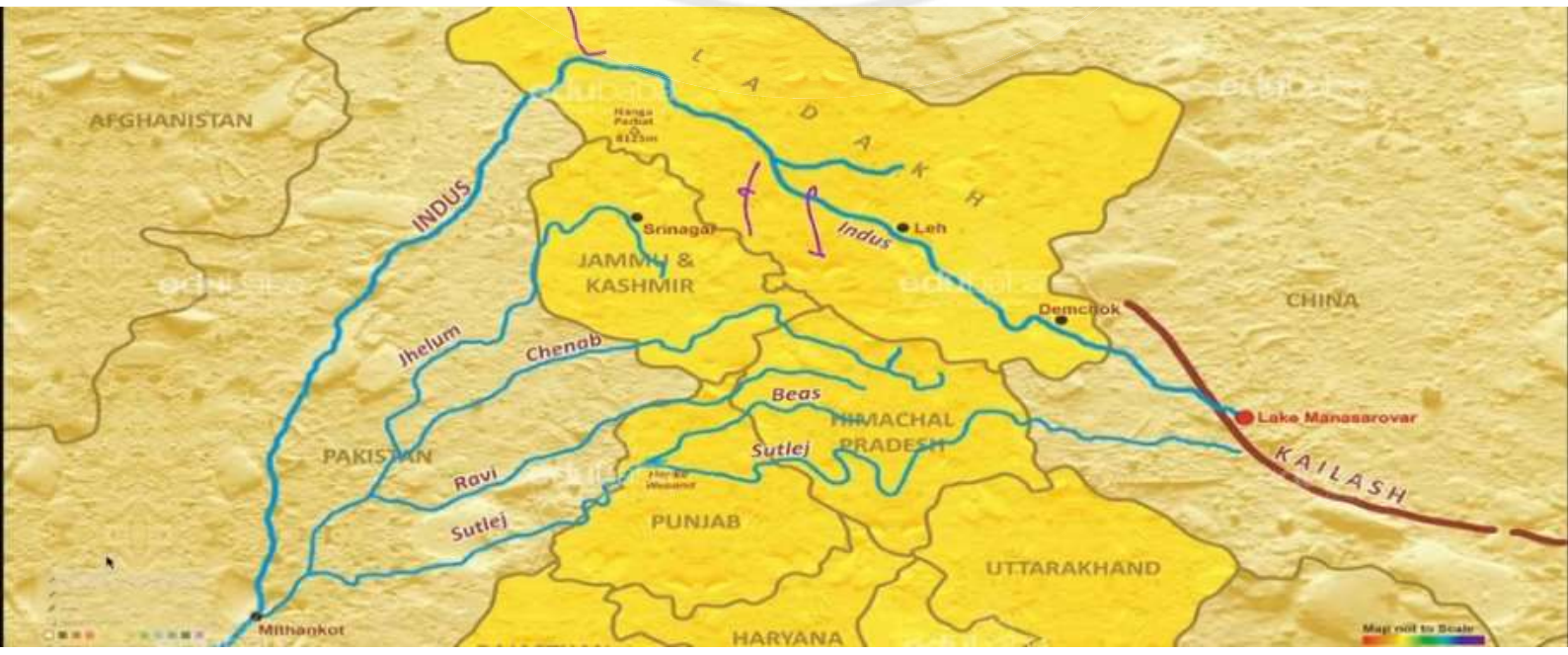


- They are Ephemeral (they are seasonal rivers)
- They have shorter and shallower course
- Some of the major peninsular rivers are : Narmada , Tapi, Krishna, Godavari etc.

Indus River System

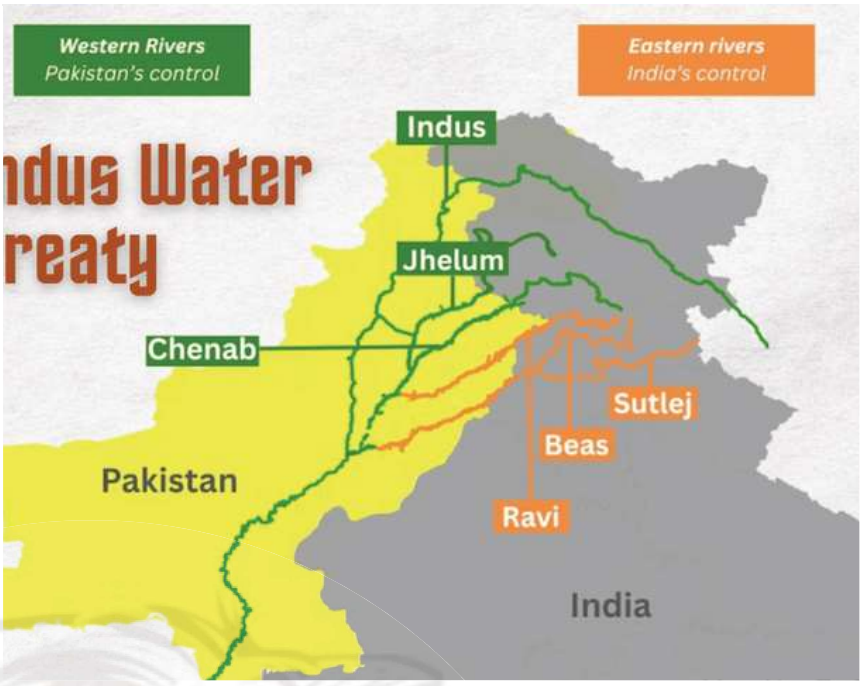


- Length : 2880 Km (1114 Km in India)
- **Origin** : Bokhar Chu Glacier (Tibet) in the Kailash Mountain range near lake Mansarovar and it enters India at Demchok (Ladakh)
- Flow through : China, India and then Pakistan
- Drains Into : Arabian Sea
- Indus flows between Ladakh and Zanskar Range.
- In Tibet, It is known as " Singi Khamban" meaning Lion's Mouth.
- Leh is located on the bank of Indus River
- **Left Bank Tributaries** : Jhelum, Chenab, Ravi, Beas , Sutlej
- **Right Bank Tributaries** : Shyok, Gilgit, Hunza



Indus Water Treaty

- This treaty was signed between India and Pakistan in Karachi (mediated by World Bank) in 1960.
- Then PM of India was Jawaharlal Nehru and Mohammad Ayub Khan (Former President of Pakistan)
- The Treaty Allocates the Rivers to the Countries:
- **Western Rivers:** Indus, Jhelum, and Chenab to Pakistan (80% water used by Pakistan and 20% used by India).
- **Eastern Rivers:** Ravi, Beas, and Sutlej to India (80% water used by India and 20% used by Pakistan)
- Indus Water Treaty has been suspended by India in 2025 after Pahalgam attack.



Doab

- It refers to the area of land situated between two rivers

Doabs Formed :

1. **Indus + Jhelum:** Sindh Sagar Doab.
2. **Jhelum + Chenab:** Jech Doab
3. **Chenab + Ravi**: Rechna Doab
4. **Ravi + Beas:** Bari Doab.
5. **Beas + Sutlej:** Bist Doab



Panchnad

- It refers to the confluence of five rivers in Punjab : Jhelum + Chenab + Ravi + Beas + Sutlej



Jhelum

- Jhelum river meanders in its youthful stage.
- Ancient Name: Vitasta.
- Origin: Verinag (Jammu & Kashmir)
- Srinagar is located on the bank of Jhelum river.
- Wular lake (largest freshwater lake in India) is fed by Jhelum river.

- Jhelum is also known as "Vyath" in kashmir
- Jhelum is also known as "Hydaspes" in Greek
- Battle of Hydaspes : Between Alexander & Porus in 326 BC

Chenab

- Chenab river is formed by the confluence of two rivers → Chandra and Bhaga at Tandi (HP) in Lahaul Valley.
- Ancient Name: Askini.
- Origin: Baralacha La Pass
- It is the largest tributary of Indus.



Fig: Chenab River Bridge in Reasi district of J&K.

- It is part of Udhampur-Srinagar-Baramula Rail link Project.
- Hight: 359 m
- Length : 1315 m

Ravi

- Ancient Name: Purushni.
- Origin: Rohtang Pass.
- It is a transboundary river, it flows through both India and Pakistan.

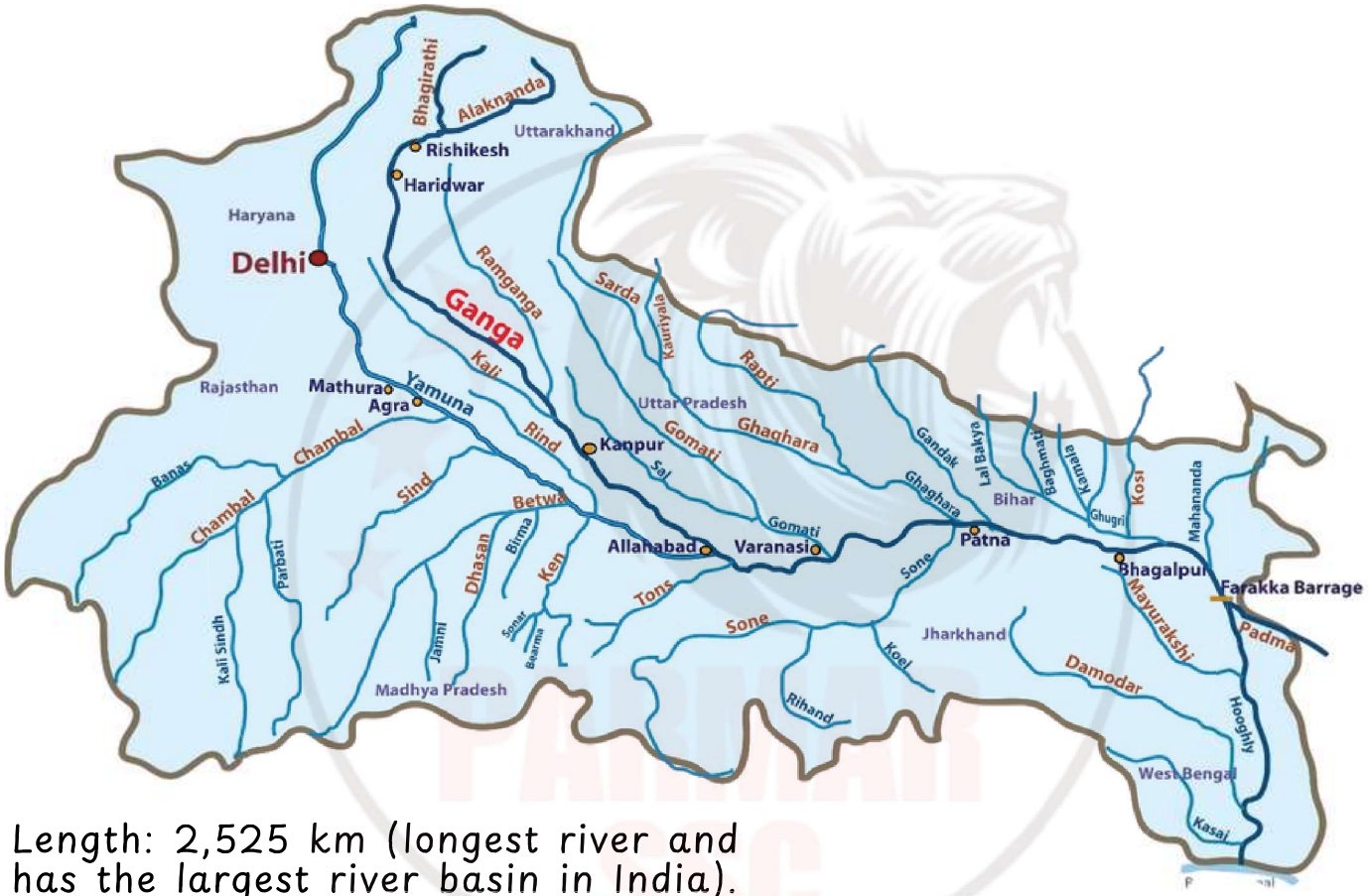
Beas

- Ancient Name: Bipasha.
- Origin: Rohtang Pass.
- It is the only tributary of Indus that does not enter Pakistan. It joins Sutlej near Harike (Punjab).

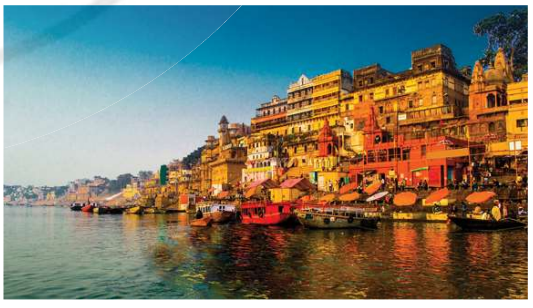
Sutlej

- Ancient Name: Shutudri.
- Origin: Rakshastal Lake (Mansarovar Lake, Tibet).
- It enters India through Shipki La Pass.
- It is the longest tributary of Indus river.
- In Tibet it is known as Langqen Zangbo.

Ganga River System



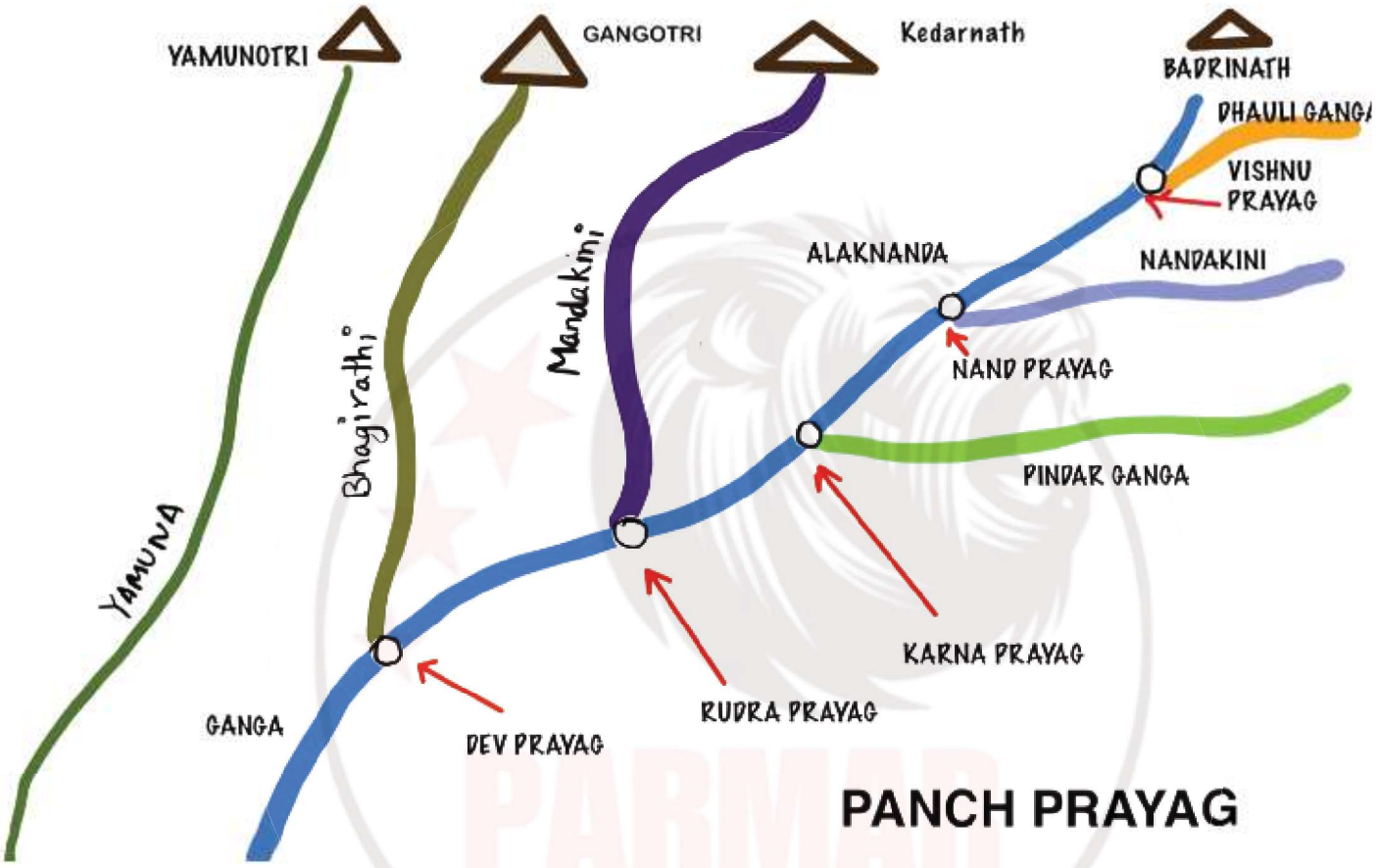
- Length: 2,525 km (longest river and has the largest river basin in India).
- Origin: Gangotri Glacier (Gaumukh, Uttarakhand).
- Drains into: Bay of Bengal.
- Ganga was declared as National river of India in 2008.
- The water from Ganga stored in bottle remains fresh due to the presence of Bacteriophage viruses.
- Endangered species found in Ganga: Susu Dolphins.
- It passes through: Uttarakhand, Uttar Pradesh (longest), Bihar, Jharkhand (shortest), and West Bengal.
- Major cities on the banks of Ganga: Kanpur → Prayagraj →Varanasi → Patna (in west to east order).



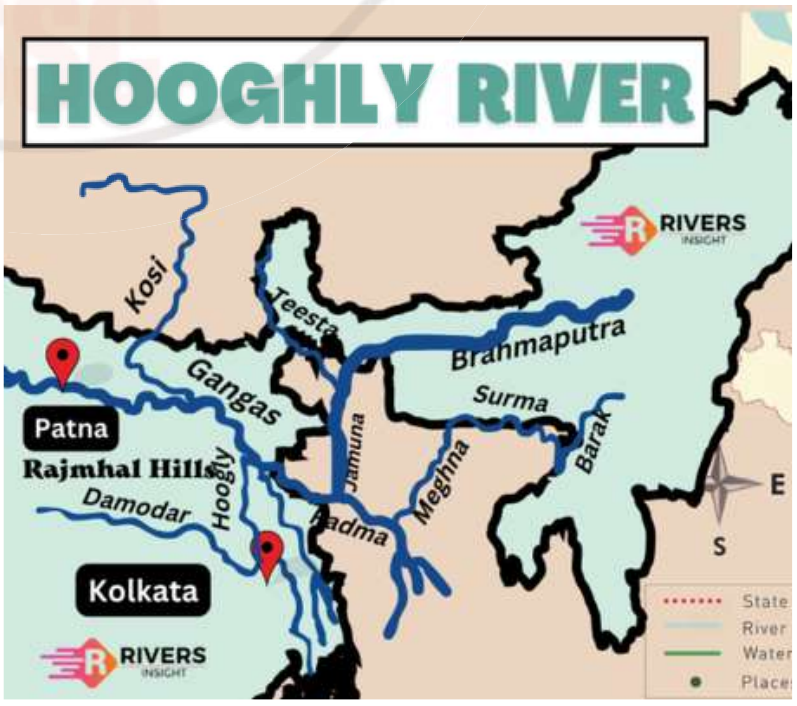


Famous Confluences (Prayags) Formed:

- Devprayag: Alaknanda + Bhagirathi (meets to form Ganga).
- Rudraprayag: Alaknanda + Mandakini.
- Karnaprayag: Alaknanda + Pindar.
- Nandaprayag: Alaknanda + Nandakini.
- Vishnuprayag: Alaknanda + Dhauliganga.



- Ganga splits into two branches near Murshidabad, West Bengal→ Padma river (flows through Bangladesh) and Bhagirathi-Hoogli river (flows through West Bengal).
- The Ganga is known as Padma (in Bangladesh) where it meets Brahmaputra (Jamuna) to form Meghna river and finally drains into Bay of Bengal forming Sunderban Delta.



Farakka Agreement

- It is a treaty between India and Bangladesh in 1996 to share the Ganga river water at the Farakka Barrage where it divides into Hugli river.
- Mayurakshi, Kangsabati, Damodar, and Rupnarayan are tributaries of Hugli.



- Ghaghara River forms a deep gorge at Shishapani
- Brahmaputra river forms a Gorge at Namcha Barwa

- Sarda/Kali/Goriganga originates from Milam Glacier

- Haryana & Delhi act as water divide (watershed) between Indus and Ganga river systems

Tributaries of Ganga

Left Bank Tributaries

Gomti

- Origin: Fulhar lake (Uttar Pradesh).
- It joins Ganga at Kaithi, Ghazipur (Uttar Pradesh).

Ghagra

- Origin: Mapchachungo glacier (Tibet).
- It is also known as Karnali in Nepal.
- It joins Ganga at Chapra (Bihar).
- Tributaries: Sharda, Tila, Seti, Beri.

Gandak

- Origin: Nhubine Himal glacier (Nepal).

Kosi

- Origin: Nepal Himalayas. It is formed by the confluence of Sun Kosi, Arun Kosi, Tamur Kosi.
- It is also known as "Sorrow of Bihar", as it brings frequent floods.
- It joins Ganga at Katihar district (Bihar).

Ramganga

- Origin: Doodhatoli Ranges (Pauri Garhwal)

Right Bank Tributaries

Yamuna

- Length: 1,370 km (longest tributary of Ganga in the Northern Plains).
- Origin: Yamunotri Glacier, Banderpoonch Peak (Uttarakhand).
- Tributaries: Chambal, Sindh, Betwa, Ken, Tons (largest tributary of Yamuna).

Son/Sone River

- Origin: Amarkantak Plateau (it forms a radial drainage pattern).
- Tributaries: North Koel, Rihand.
- It joins at just above Patna.

Punpun

- Origin: Palamu district of Jharkhand.
- It joins Ganga at Fatuha near Patna

Chambal River

- It is tributaru of Yamuna
- Originates from Mhow Plateau (Janapav Hills) of Madhya Pradesh.
- It is well-known for its badland topography (due to ravines formed by gully erosion).
- Tributaries: Banas, Shipra, Kalisindh, Parvati

- Ganga plains lies between Ghaggar and Teesta river.
- River Ganga Divides Bihar into two parts

- Sharda (also known as Goriganga.)
- Its origin is from Milam Glacier
- It is also known as Kali River

Brahmaputra River System

- Length: 2,900 km (length in India: 916 km).\
- Origin: Chemayungdung Glacier/Angsi Glacier, Tibet.
- It makes the easternmost boundary of the Himalaya
- **Left Bank Tributaries:** Lohit, Dhansiri, Dibang.
- **Right Bank Tributaries:** Kameng, Manas, Teesta, Subansiri, Sankosh.



- The Brahmaputra river takes a sharp U-turn at Namcha Barwa (Tibet) and enters Arunachal Pradesh and then it takes a South turn at Dhubri (Assam).
- Majuli (world's largest river island) and Umananda (world's smallest river island) is located on Brahmaputra river.
- It forms Sundarbans Delta (largest delta in the world).
- The Barak river originating in Manipur hills, enters Bangladesh as Surma and Kushiyara rivers and later, the river is known as Meghna where it receives the combined flow of the Padma (Ganga in India) and Jamuna (Brahmaputra in India) rivers.
- The region of Ganga-Brahmaputra Basin lies between 10°N-30°N latitude.
- The Dhola-Sadiya Bridge also known as Bhupen Hazarika Bridge connecting Assam and Arunachal Pradesh, spans over Lohit river.

Names of Brahmaputra in Different Region

- **Tibet** : Yarlung Tsangpo
- **Arunachal Pradesh** : Siang / Dihang
- **Assam** : Brahmaputra
- Bangladesh : Jamuna



Bhupen Hazarika Setu having length of 9.15 Km

Cities on River Bank

Cities	River
Lucknow	Gomati
Kanpur / Allahabad / Varanasi / Patna	Ganga
Delhi / Agra	Yamuna
Jabalpur	Narmada
Ahmedabad	Sabarmati
Surat	Tapi
Ayodhya	Sarayu
Dibrugarh (Assam)	Brahmaputra
Ujjain	Shipra
Nasik	Godavari
Hyderabad	Musi
Kota / Gwalior / Dholpur	Chambal
Srinagar	Jhelum
Ludhiana	Sutlej
Jamshedpur	Subarnarekha
Vijaywada	Krishna

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