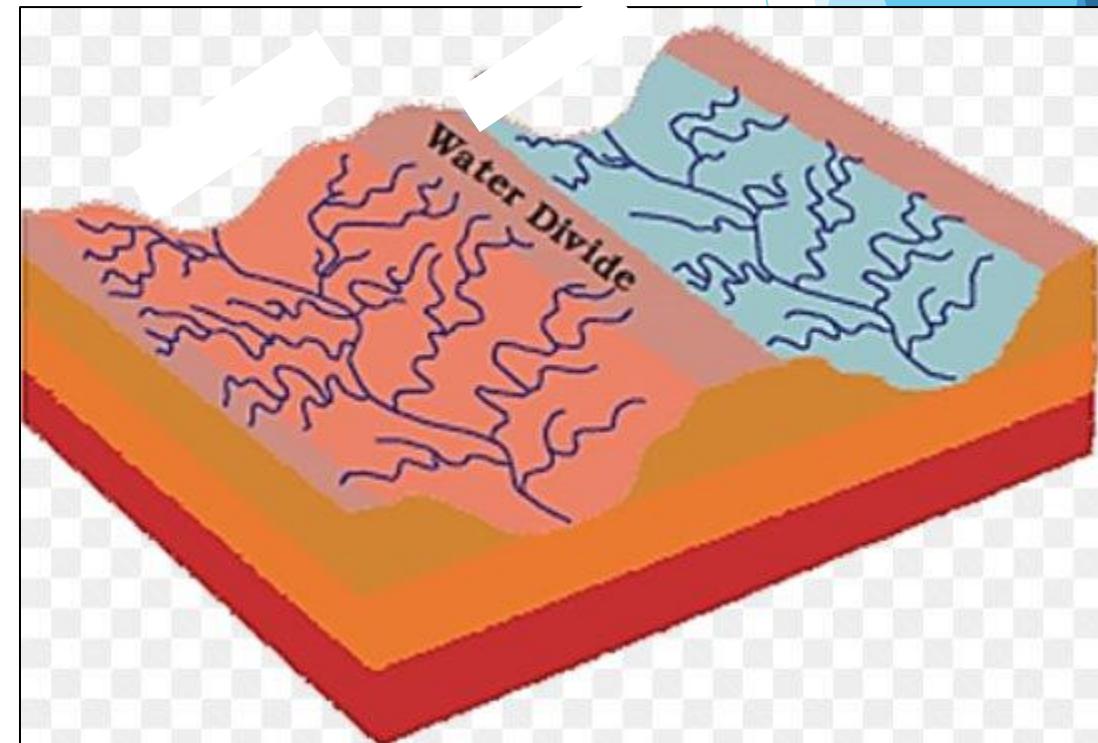
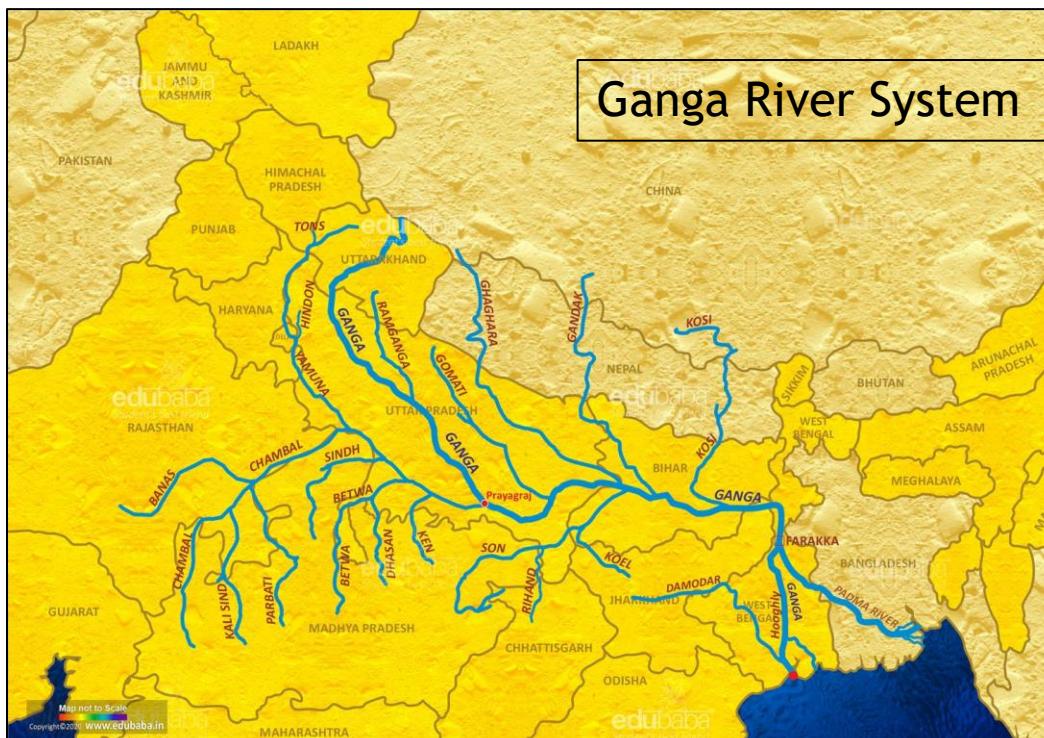


RIVERS OF INDIA



DRAINAGE SYSTEM AND ITS COMPONENTS

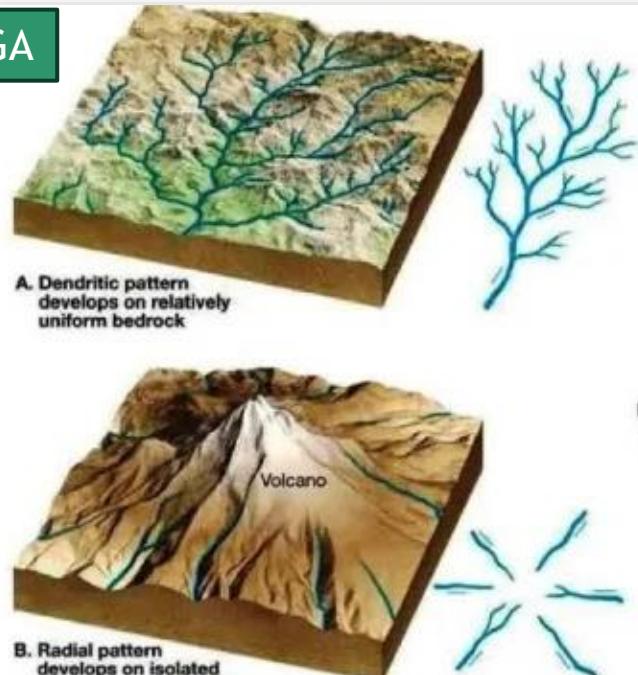
- ▶ **DRAINAGE:** The removal of surface or sub-surface water.
- ▶ **RIVER:** Large natural stream flowing through a defined channel towards another waterbody at a lower elevation.
- ▶ **RIVER SYSTEM/ DRAINAGE SYSTEM:** A river along with its network of tributaries and distributaries.
- ▶ **DRAINAGE BASIN:** The areas drained by a single river system is called a drainage basin.
- ▶ **WATER DIVIDE:** Any elevated area, such as a mountain or an upland which divides two drainage basins is known as a Water Divide.



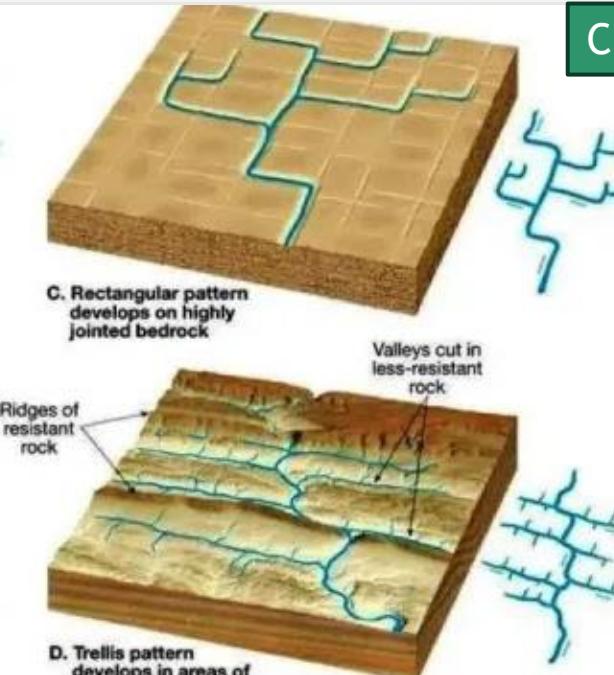
Drainage Patterns

- ▶ The streams within a drainage basin form certain patterns, depending on the slope of land, underlying rock structure as well as the climatic conditions of the area . These are dendritic, trellis, rectangular, and radial patterns.
- ▶ Antecedent and consequent drainage pattern.

INDUS, GANGA



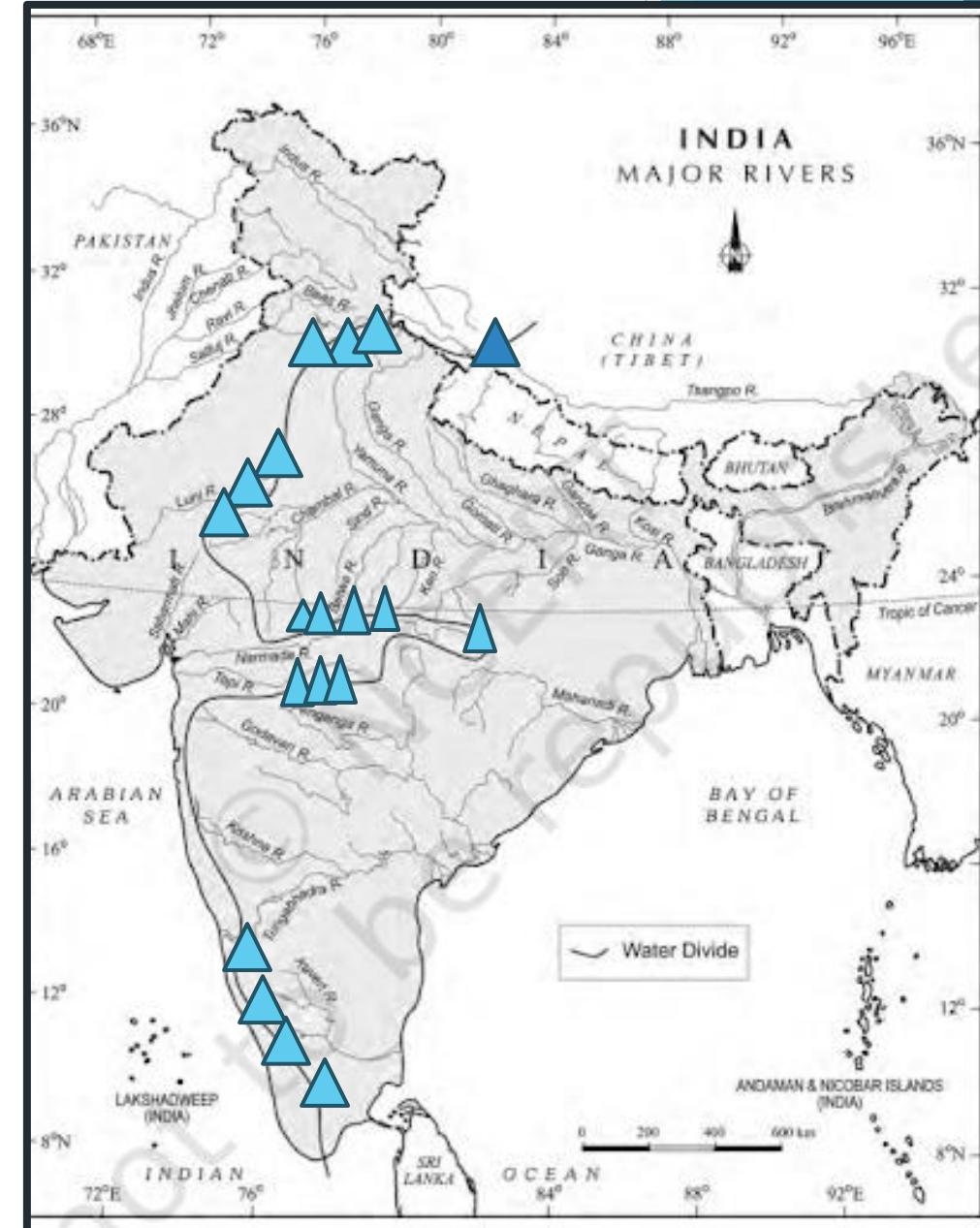
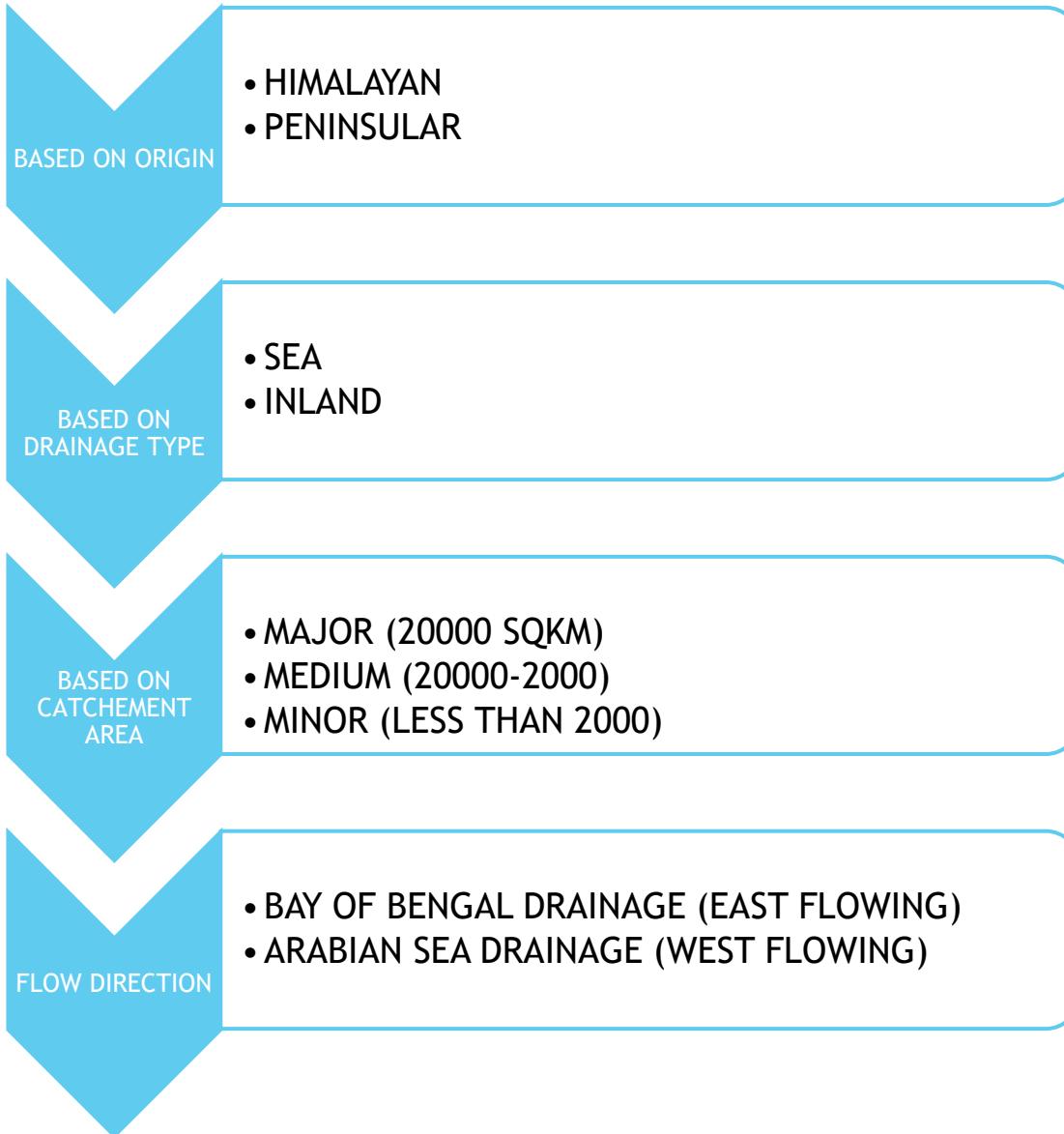
CHAMBAL, BETWA



NARMADA, SON

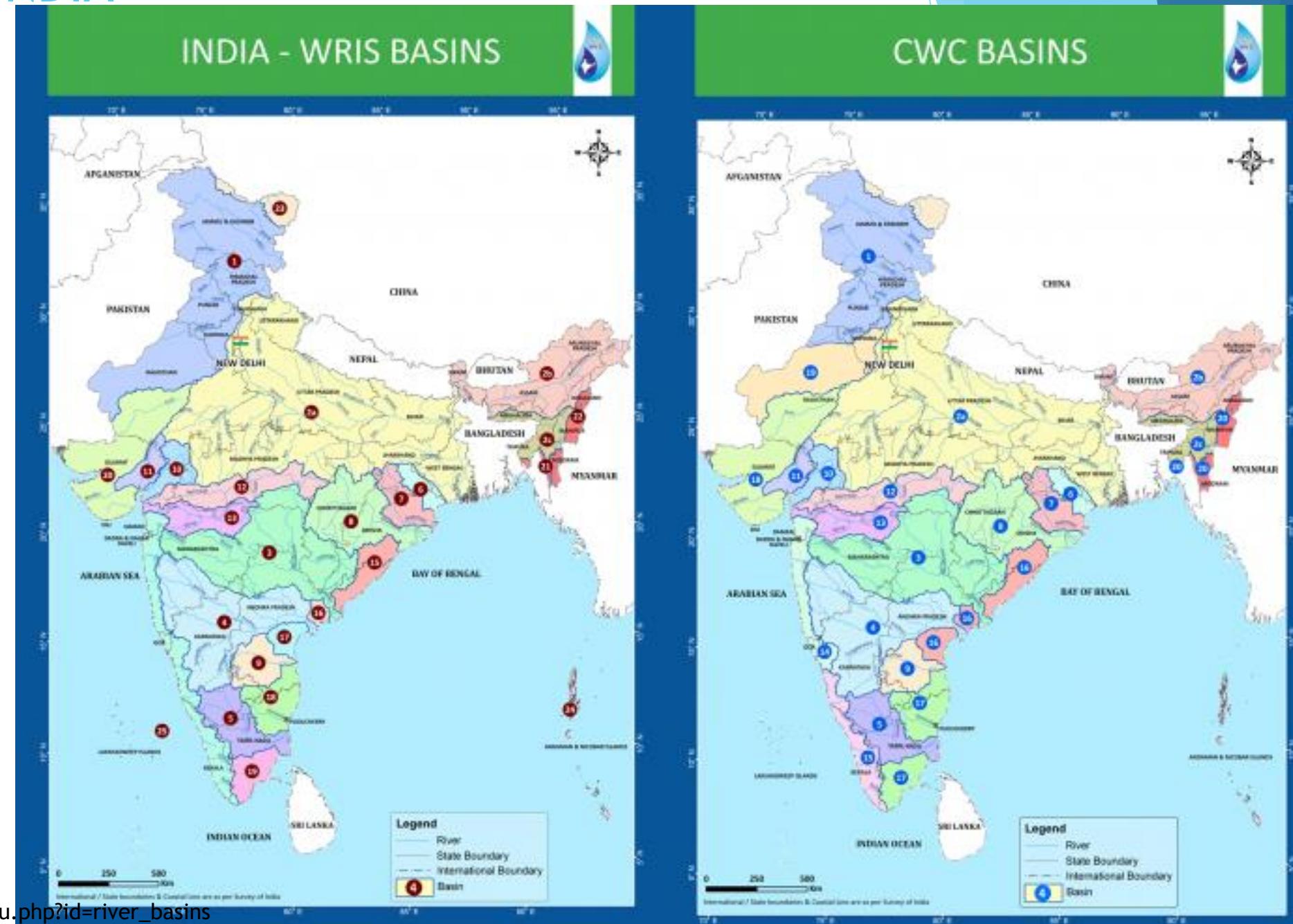
INDUS, GANGA (UPPER)

DRAINAGE SYSTEM OF INDIA



RIVER BASINS OF INDIA

- **INDIA-WRIS** (Water Resource Information System) based on SRTM DEM data of NASA **25 major basins**
- 22 basins as per **Central Water Commission**



See also: https://indiawris.gov.in/wiki/doku.php?id=river_basins

Himalayan River

- These rivets originate from the lofty Himalayan ranges and are named as the Himalayan rivers.
- These rivers have **large** basins and catchment areas. The total basin area of the Indus, the Ganga and the Brahmaputra is 11.78, 8.61 and 5.8 lakh square kilometers
- The Himalayan rivers flow through deep **V - shaped valleys** called gorges. These gorges have been carved out by down cutting carried on side by side with the uplift of the Himalayas.
- These are examples of **antecedent drainage**.
- Himalayan rivers are **perennial** in nature, i.e., water flows throughout the year in these rivers. These rivers receive water both from the monsoons and snow-melt. The perennial nature of these rivers makes them useful for irrigation.
- These rivers flow across the young fold mountains and are still in a **youthful** stage.
- The upper reaches of the Himalayan rivers are highly tortuous. When they enter the plains, there is a sudden reduction in the speed of flow of water. Under these circumstances these rivers **form meanders** and often shift their beds.
- The Himalayan rivers form **big deltas** at their mouths. The Ganga-Brahmaputra delta is the largest in the world.

Peninsular River

- These rivers originate in the Peninsular Plateau and are named as Peninsular rivers.
- These rivers have **small** basins and catchment areas. The Godavari has the largest basin area of 3.12 lakh square kilometres only which is less than one-third the basin area of the Indus. **Valleys**.
- The Peninsular rivers flow in comparatively **shallow valleys**. These are more or less completely graded valleys. The rivers have little erosional activity to perform.
- These are examples of **consequent drainage**. **Water Flow**.
- The Peninsular rivers receive water only from rainfall and water flows in these rivers in rainy season only. Therefore, these rivers are seasonal or **non-perennial**. As such these rivers are much less useful for irrigation. Stage.
- These rivers have been flowing in one of the oldest plateaus of the world and have reached **maturity**.
- The hard rock surface and non-alluvial character of the plateau permits **little scope for the formation of meanders**. As such, the rivers of the Peninsular Plateau follow more or less **straight courses**.
- Some of the Peninsular rivers, such as the **Narmada** and the **Tapi** form **estuaries**.
- Other rivers such as the Mahanadi, the Godavari, the Krishna and the Cauvery form **deltas**.
- Several small streams originating from the Western Ghats and flowing towards the west enter the Arabian Sea without forming any delta.

Himalayan Rivers

The Indus

The Ganga

The Brahmaputra

THE INDUS RIVER

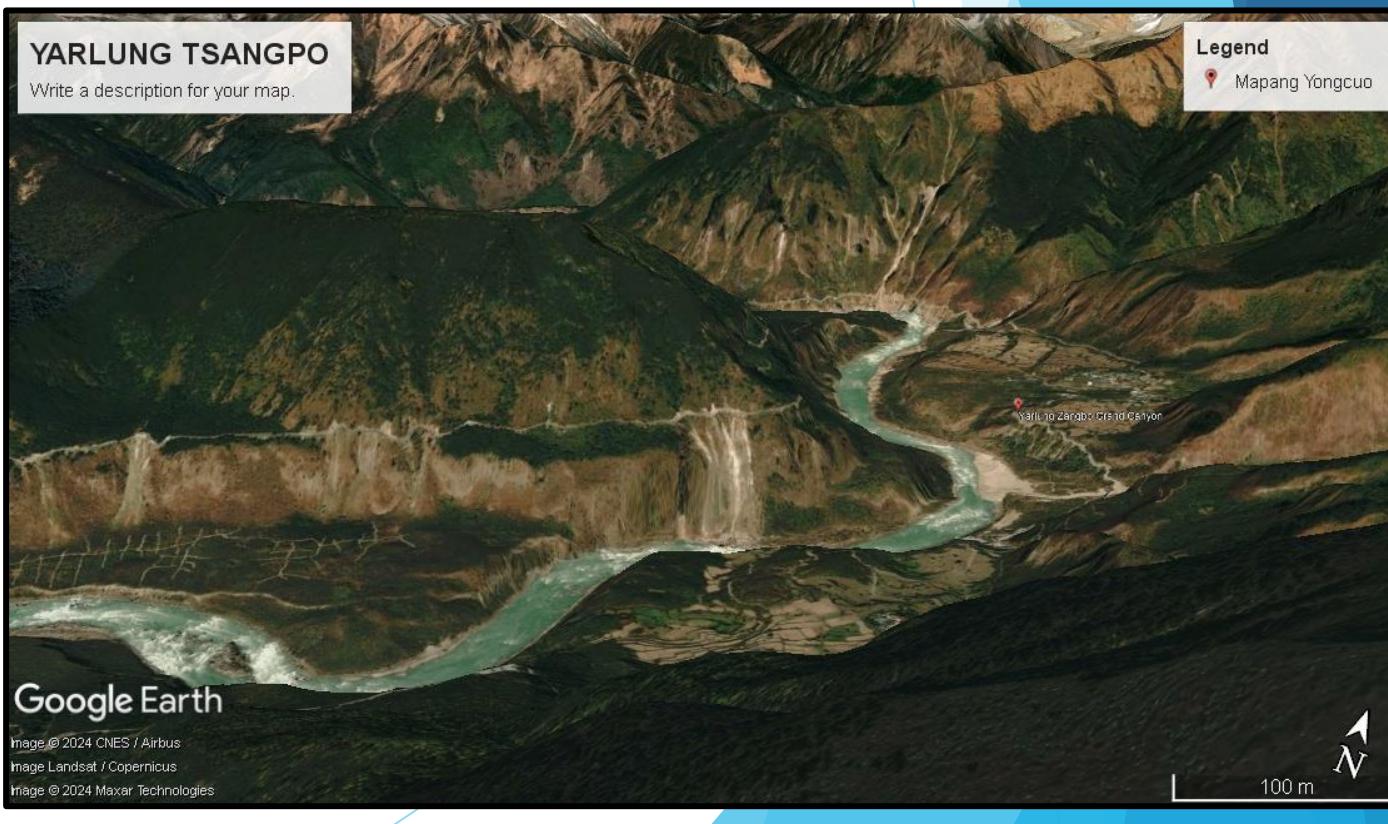
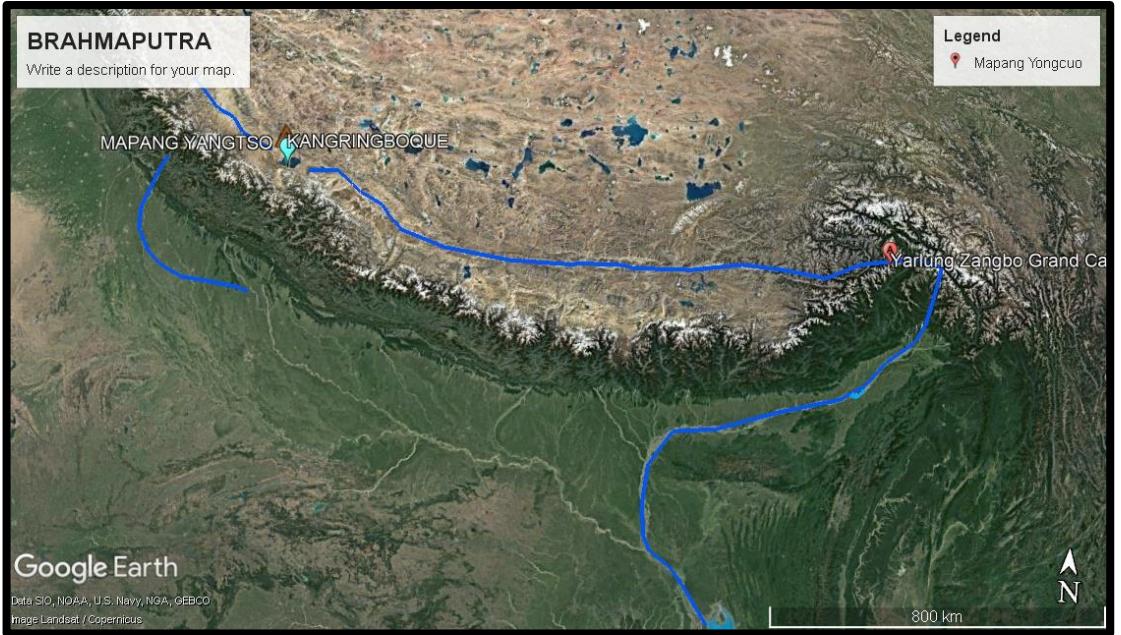


THE INDUS RIVER

- Indus River, Trans-Himalayan, trans-boundary river of southern Asia.
- It is one of the world's longest rivers, with a length of 1,800 mi (2,897 km). Nearly 33.3% the Indus basin is located in India (700 km). Ladakh, Himachal Pradesh and the Punjab is drained by Indus.
- Bokhar Chhu Glacier near Mansarovar (southwestern Tibet). Singh Khammam, Sindhu.
- Several tributaries like the Zaskar, the Shyok, and the Huzana joined it. It flows between the Ladakh Range and the Zaskar Range at Leh. It crosses the Himalayas through a 5181 m deep gorge near Attock, which is lying north of Nanga Parbat.
- It continues northwestward through the Indian- and Pakistani-administered areas and then turns south (hairpin bend) into Pakistan.
- Swelled by tributaries from the Punjab region, including the Jhelum, Chenab, Ravi, Beas, and Sutlej rivers, it widens and flows more slowly. It has supplied water for irrigation on the plains of the Indus valley since early times. Five rivers meet at Mithankot, Pakistan. Discharges in Arabian Sea.
- India uses 20% of its water by Indo-Pak Treaty 1960 for irrigation in the Punjab, Haryana and the western parts of Rajasthan

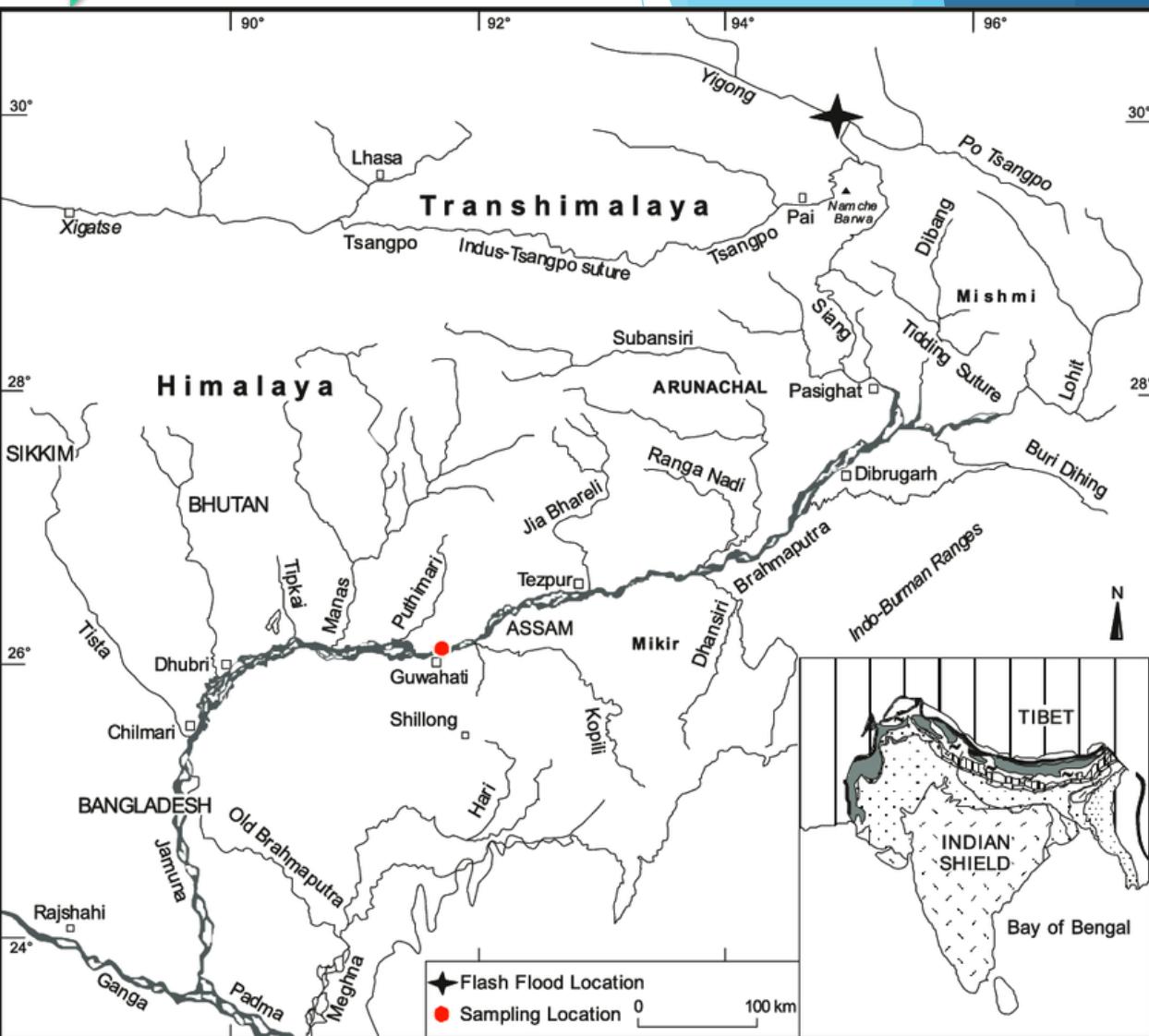


THE BRAHMAPUTRA RIVER



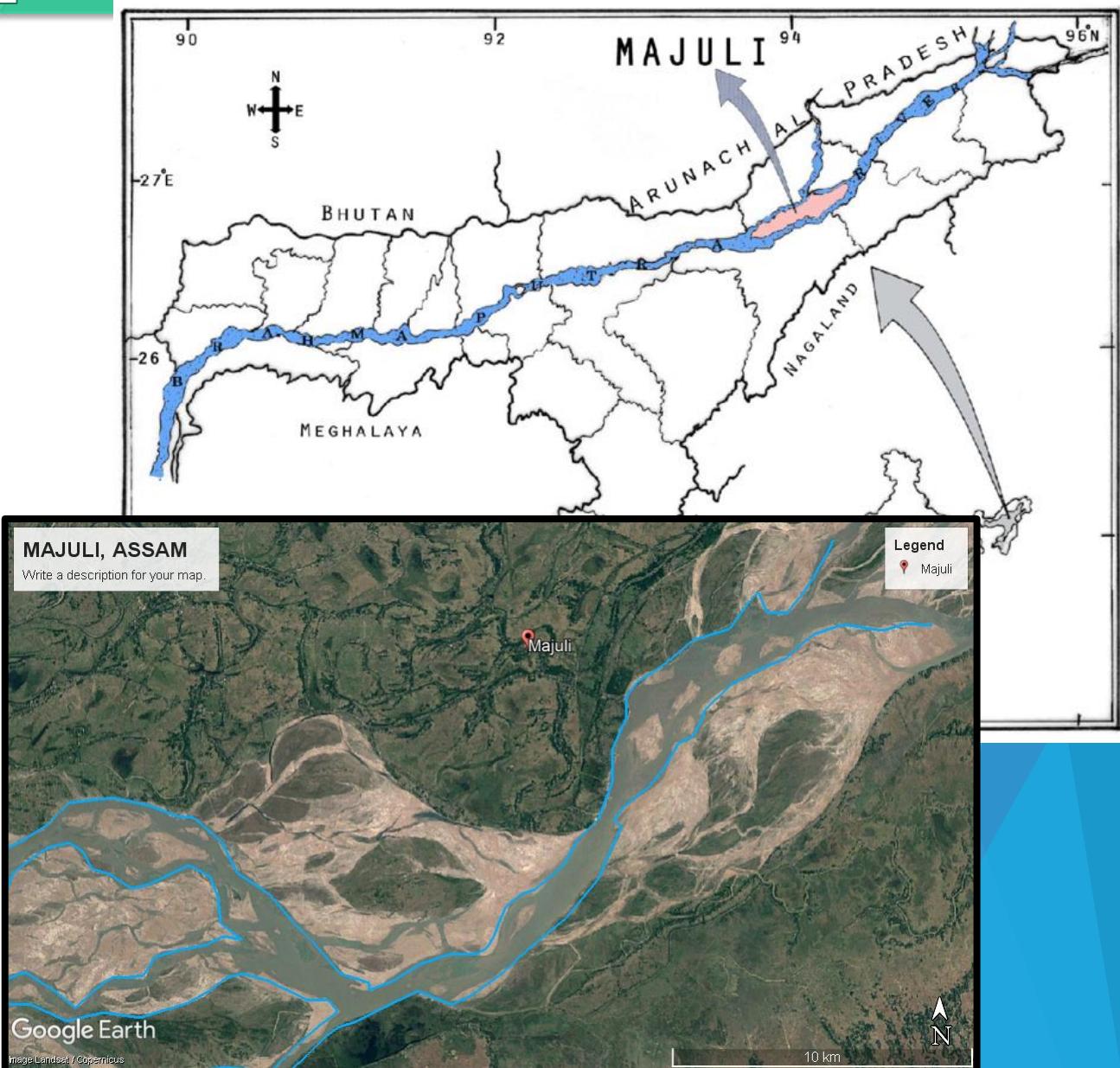
THE BRAHMAPUTRA RIVER

- ▶ The Brahmaputra originates from Mansarovar Lake, which is also a source of the Indus and Sutlej.
- ▶ It is 3848kms long, a little longer than the Indus River.
- ▶ Most of its course lies outside India.
- ▶ It flows parallel to the Himalayas in the eastward direction. When it reaches Namcha Barwa, it takes a U-turn around it and enters India in the state of Arunachal Pradesh.
- ▶ Here it is known as the **Dihang River**. In India, it flows through the states of Arunachal Pradesh and Assam and is connected by several tributaries.
- ▶ The Brahmaputra has a braided channel throughout most of its length in Assam.
- The river is known as the **Tsangpo in Tibet**. It receives less volume of water and has less silt in the Tibet region. But in India, the river passes through a region of heavy precipitation, and as such, the river carries large amounts of water during rainfall and a significant amount of silt. It is considered one of the largest rivers in India in terms of Volume. It is known for creating the calamity in Assam and Bangladesh.

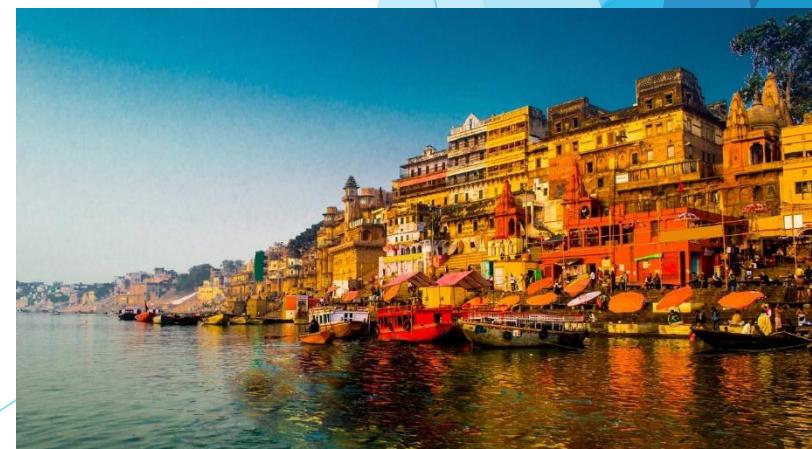
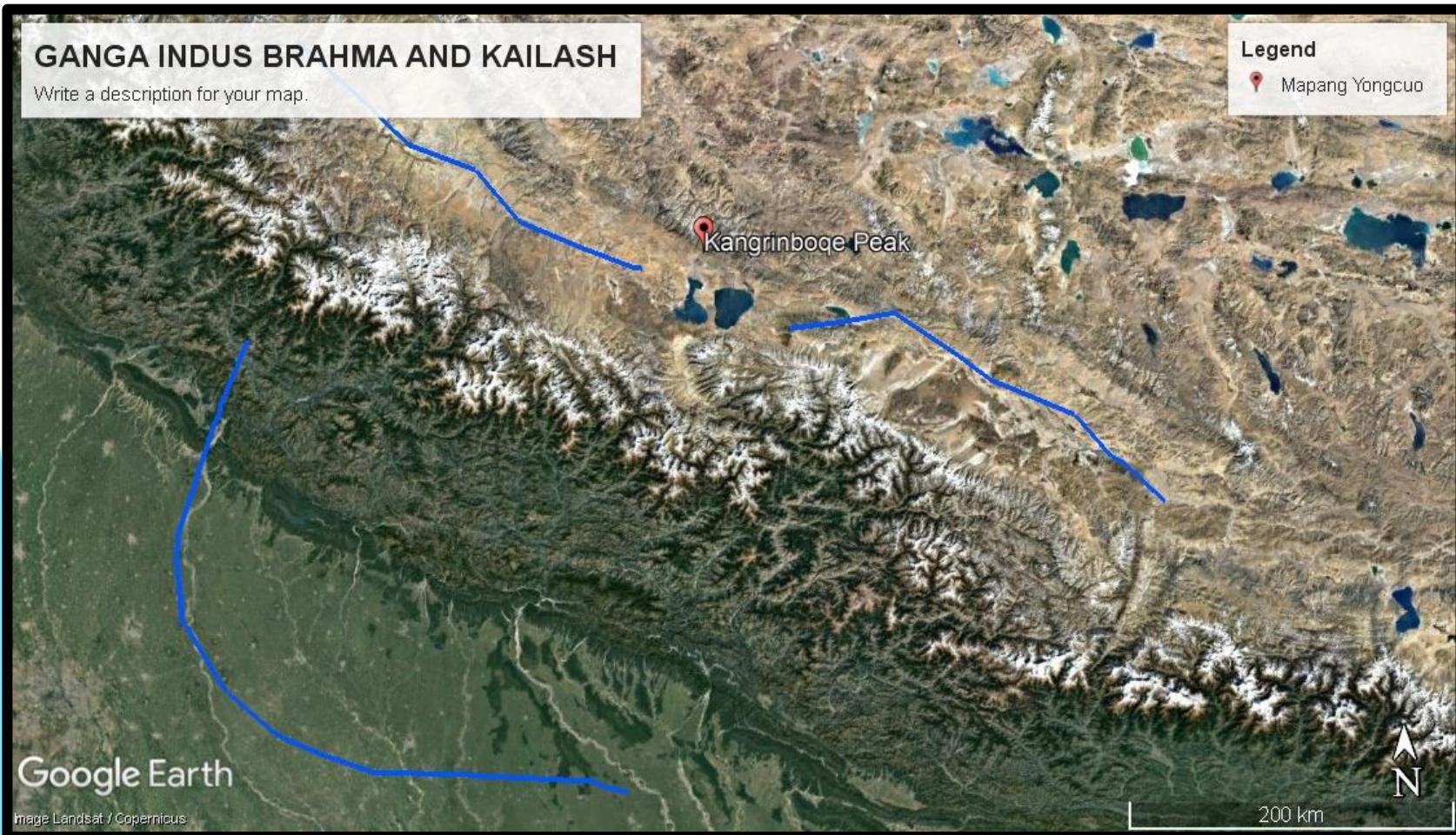


THE BRAHMAPUTRA RIVER

- Majuli means ‘the land between two parallel rivers’.
- Majuli is the world’s largest river island according to Guinness World Record & situated on the Brahmaputra River in Assam. It sprawls over an extensive area of 352 sq km., first island to be identified as district.
- It is formed by the Brahmaputra River in the south and the Kherkutia Xuti joined by the Subansiri River in the north.

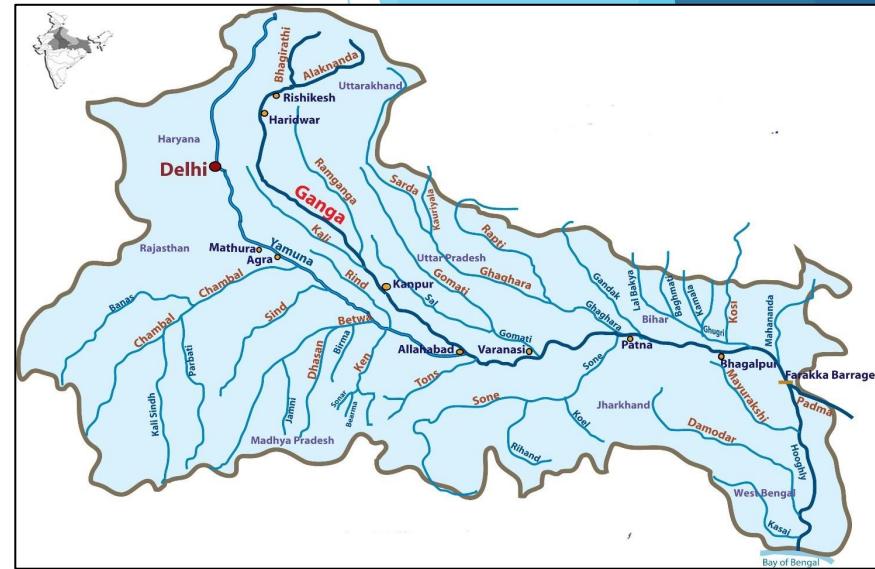


THE GANGA RIVER



THE GANGA RIVER

- The Ganges has many names associated with its many roles in Sanskrit mythology. The Ganga originates as the Bhagirathi from the Gangotri glacier. The Ganga river system is the largest river basin in India in terms of a catchment area, covering about 26% of the country's land mass, which is approximately 8,61,404 square kilometers. The Ganga basin is home to 650 million people.
- The Ganga basin is a transboundary river basin.
- The Ganga river system serves as a vital source of water for irrigation, drinking, and industrial purposes, as well as a home for a wide variety of flora and fauna.
- Before it reaches Devprayag in the Garhwal Division, the Mandakini, Pindar, the Dhauliganga and the Bishenganga rivers merge into the Alaknanda, and the Bheling drain into the Bhagirathi.
- The Pindar River rises from East Trishul and Nanda Devi unite with the Alaknanda at Karan Prayag. The Mandakini meets at Rudraprayag.
- The water from both Bhagirathi and the Alaknanda flows in the name of the Ganga at Devprayag.
- The concept of Panch Prayag**
- Vishnuprayag: where the river Alaknanda meets river Dhaul Ganga
- Nandprayag: where river Alaknanda meets river Nandakini
- Karnaprayag: where river Alaknanda meets river Pinder
- Rudraprayag: where river Alaknanda meets river Mandakini
- Devprayag: where river Alaknanda meets river Bhagirathi -GANGA
- The principal tributaries of the Ganga are Yamuna, Damodar, Sapta Kosi, Ram Ganga, Gomati, Ghaghara, and Son. The river after traveling a distance of 2525 km from its source meets the Bay of Bengal.



Numerous Tributaries OF Ganga:

i. From the north, the Ganga is joined by numerous tributaries like-the Yamuna, the Gomti, the Ghaghara, the Gandak and the Kosi.

ii. The river Yamuna rises from the Yamunotri Glacier in the Himalayas.

a. It flows parallel to the Ganga. b. It is the right bank tributaries of the Ganga and meets the Ganga at Allahabad.

iii. The Ghaghara, the Gandak and the Kosi rise in the Nepal Himalayas.

These rivers flood parts of the northern plain every year, causing widespread havoc but enriching the soil for the extensive agricultural lands of the north plains.

iv. The main tributaries coming from the peninsular uplands, are the Chambal, the Betwa, the Son and the Damodar.

a. They rise from semiarid areas. b. They have shorter courses and do not carry much water in them.

v. Ganga is enriched with the waters from its right and left bank tributaries.

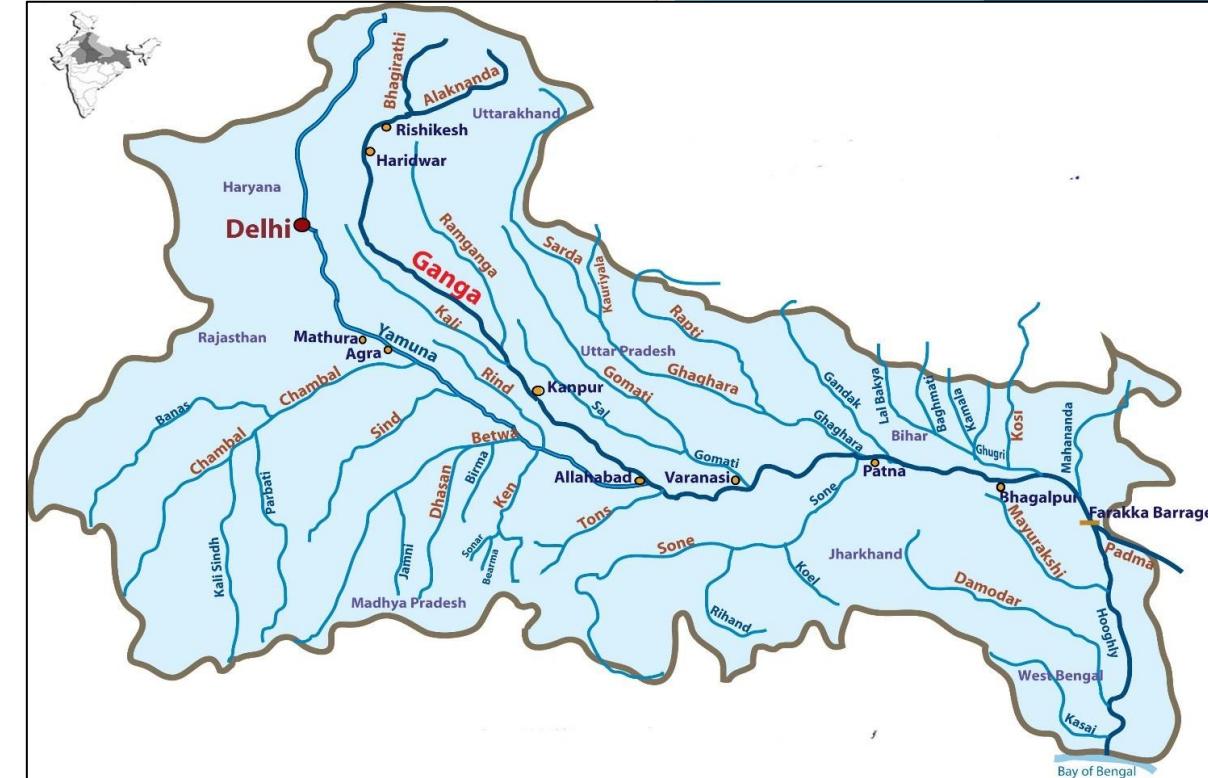
vi. It flows eastwards till Farakka in West Bengal. This is the northernmost point of the Ganga delta.

The river bifurcates here.

vii. The Bhagirathi-Hooghly (distributary) flows southward through the deltaic plains to the Bay of Bangal.

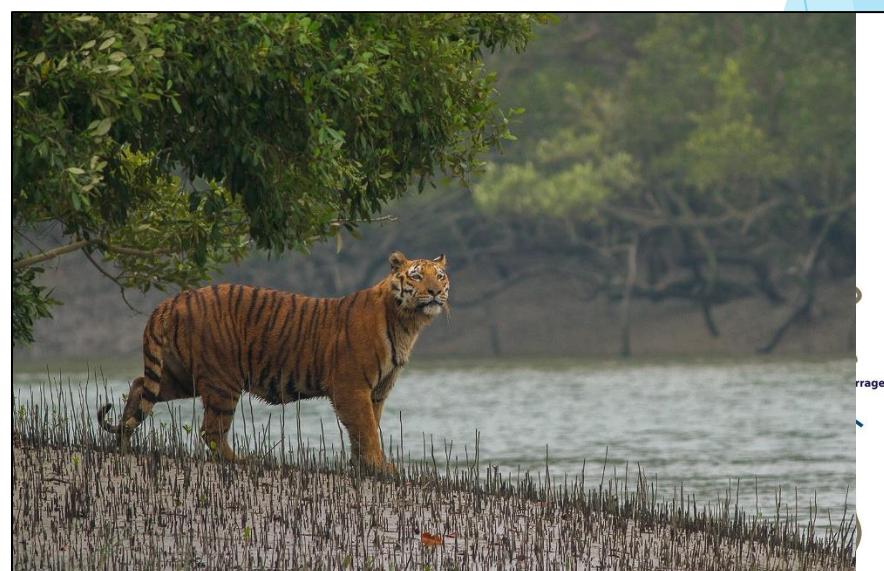
viii. The mainstreams flow southward into the Bangladesh and is joined by the Brahmaputra. It is known as the Jamuna here, further downstream. It is known as the Meghna.

ix. This mighty river, with waters from Ganga, and the Brahmaputra flows into the Bay of Bangal and forms the Sunderban delta. It is the most classic and the largest delta of the world.



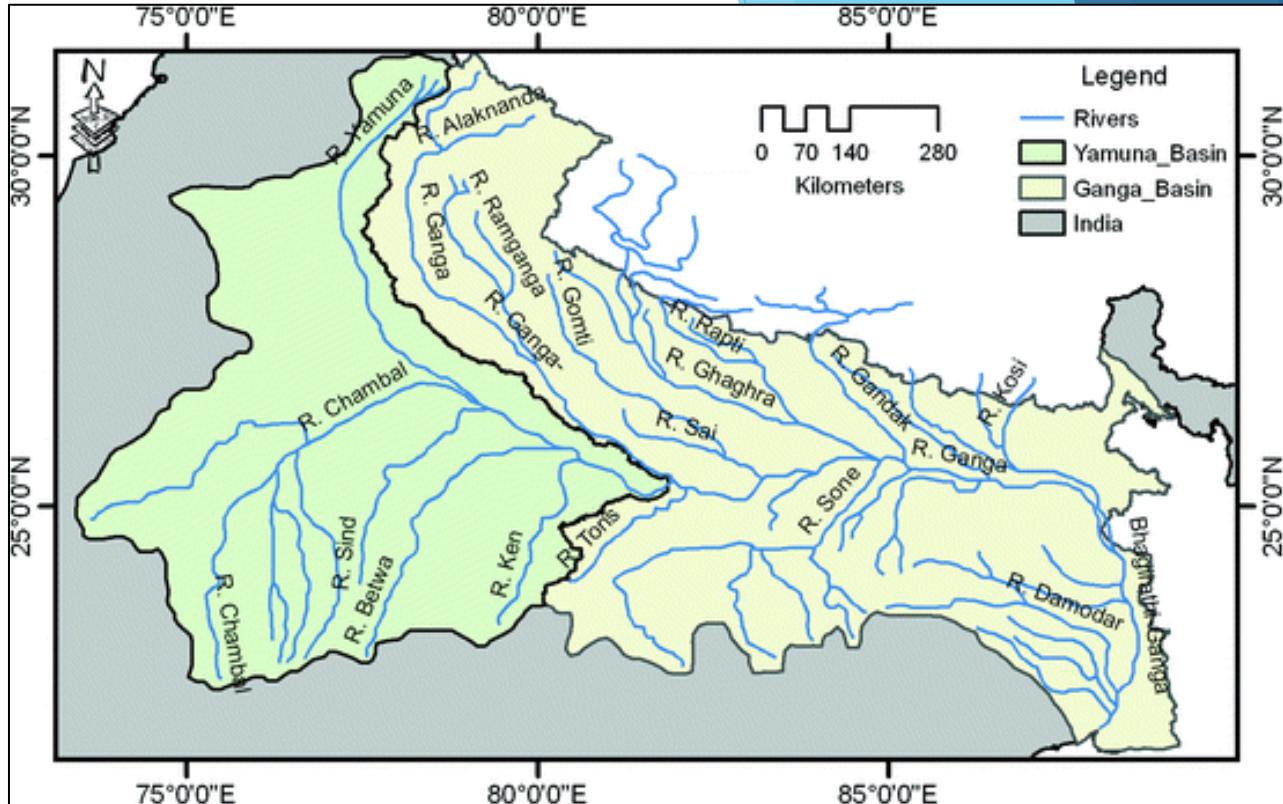
THE GANGA RIVER

- Bhagirathi is the source stream of Ganga. It emanates from Gangotri Glacier at Gaumukh at an elevation of 3, 892 m (12,770 feet). Many small streams comprise the headwaters of Ganga. The important among these are Alaknanda, Dhauliganga, Pindar, Mandakini and Bhilangana. At Devprayag, where Alaknanda joins Bhagirathi, the river acquires the name Ganga. It traverses a course of 2525 km before flowing into the Bay of Bengal. It has a large number of tributaries joining it during this journey. Its right bank tributaries are the Yamuna and Son. While Gomti, Ghaghara, Gandak, Kosi are some left bank tributaries.
- The Ganga river basin covers 11 states in India, which are Uttarakhand, Himachal Pradesh, Haryana, Uttar Pradesh, Madhya Pradesh, Rajasthan, Chhattisgarh, Jharkhand, Bihar, West Bengal, and Delhi.
- The Ganges, Brahmaputra, and Meghna (GBM) or Sundarbans delta is a region in India and Bangladesh formed by the confluence of these three significant river systems.



Yamuna River System

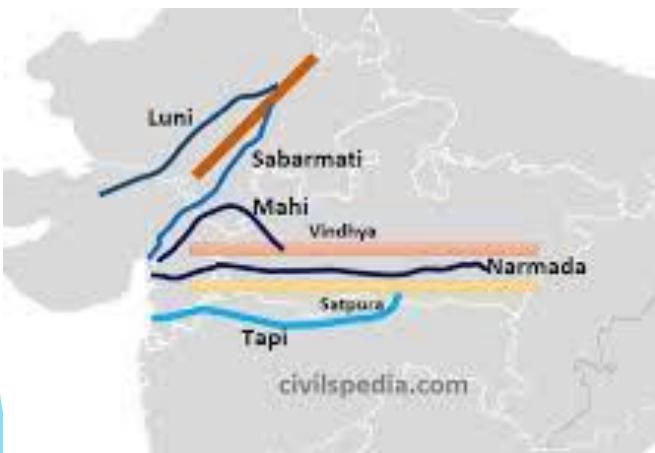
- The Yamuna River is the largest tributary of the Ganga River.
- It originates from the Yamunotri glacier, at the Bandarpooch peak in Uttarakhand.
- The main tributaries joining the river include the Sin, Hindon, Betwa Ken, and Chambal.
- The Tons is the largest tributary of the Yamuna.
- The catchment of the river extends to the states of Delhi, Himachal Pradesh, Uttar Pradesh, Haryana, Rajasthan, and Madhya Pradesh.



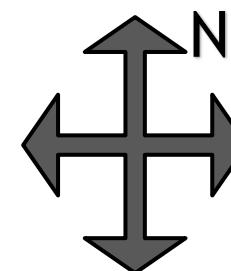
PENINSULAR RIVER

- The main water divide in Peninsular India is formed by the Western Ghats, which runs from north to south close to the western coast. Most of the major rivers of the Peninsula such as the Mahanadi, the Godavari, the Krishna and the Kaveri flow eastwards and drain into the Bay of Bengal. These rivers make deltas at their mouths. There are numerous small streams flowing west of the Western Ghats .The Narmada and the Tapi are the only long rivers, which flow west and make estuaries .The drainage basins of the peninsular rivers are comparatively small in size.

THE NARMADA
THE TAPI



THE GODAVARI
THE MAHANADI
THE KRISHNA
THE KAVERI

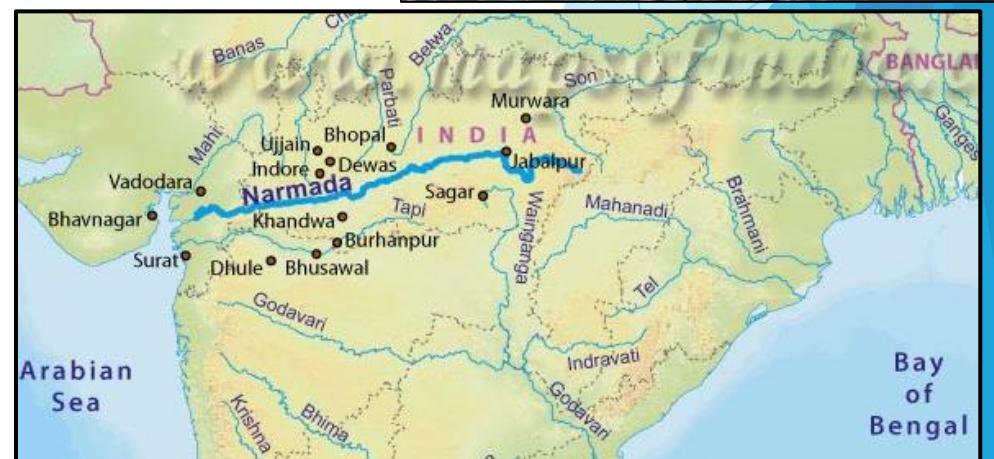


THE NARMADA RIVER



THE RIVER NARMADA

- ▶ The Narmada rises in the Amarkantak hills in Madhya Pradesh. (at 1057 m in Maikala range)
- ▶ It flows towards the west in a rift valley formed due to faulting. On its way to the sea, the Narmada creates many picturesque locations. The ‘Marble rocks’, near Jabalpur where the Narmada flows through a deep gorge, and the ‘Dhuadhar falls’ where the river plunges over steep rocks ,are some of the notable ones. All the tributaries of the Narmada are very short and most of these join the main stream at right angles. The Narmada basin covers parts of Madhya Pradesh and Gujarat.
- ▶ It outlines the traditional frontier between North India and South India.
- ▶ Along with Tapti, and the Mahi this river runs from east to west.
- ▶ The river flows through the states of Madhya Pradesh, Gujarat, and Maharashtra.
- ▶ It drains into the Arabian Sea in the Bharuch district of Gujarat. (1,312 km)

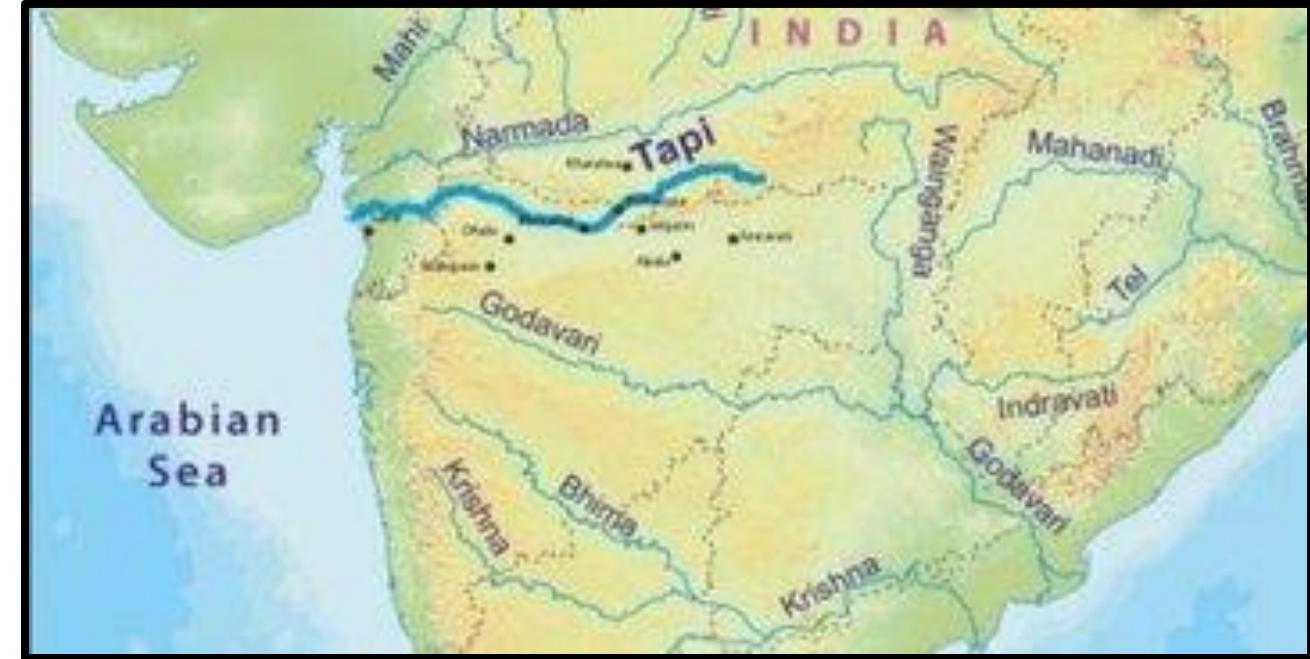


THE RIVER TAPI



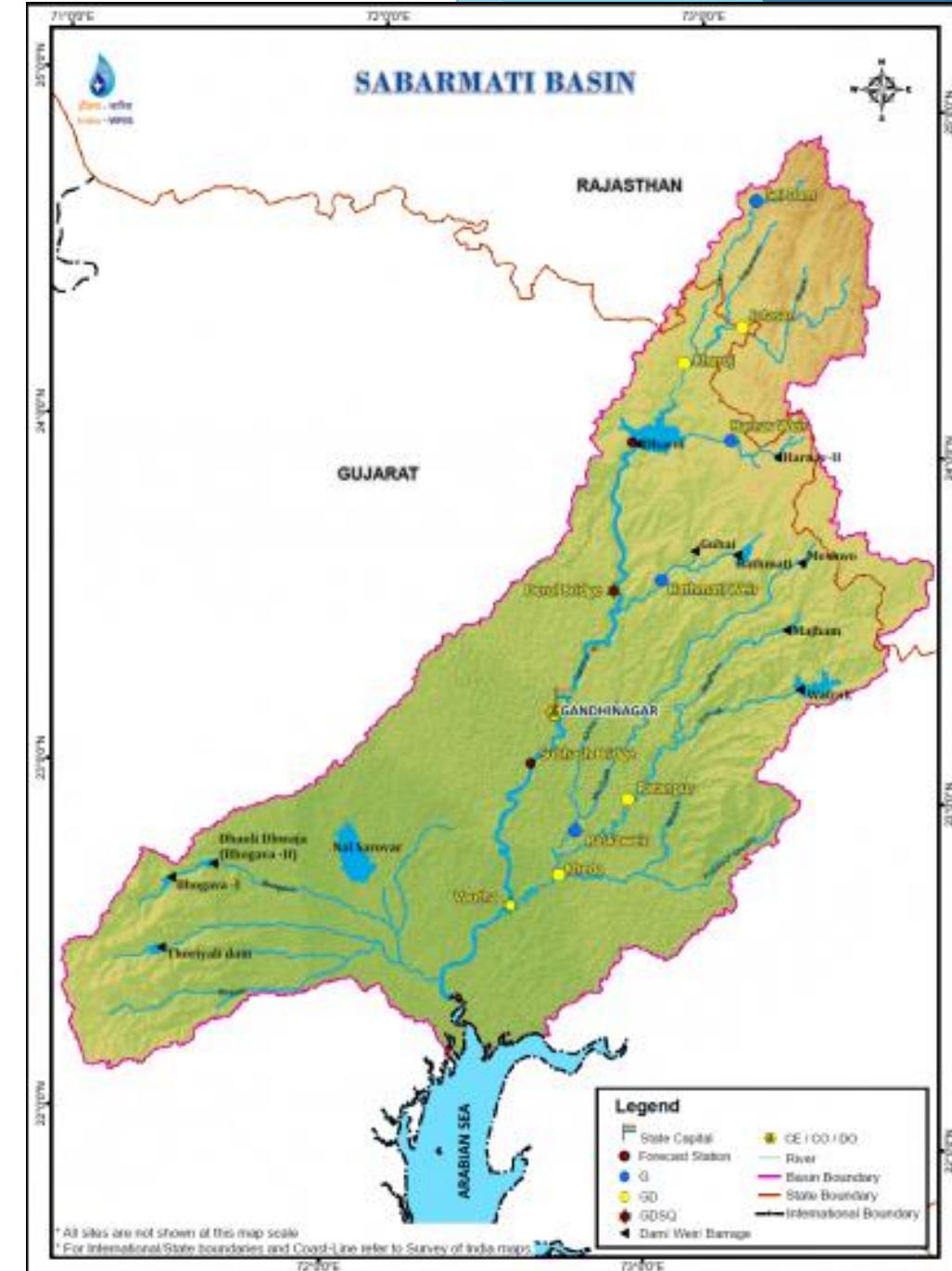
THE RIVER TAPI

- ▶ The Tapi or Tapti is the second largest west-flowing river.
- ▶ It rises in the Satpura ranges, in the Betul district of Madhya Pradesh, near Multai reserve forest at an elevation of 752 m.
- ▶ It also flows in a rift valley parallel to the Narmada but it is much shorter in length. Its basin covers parts of Madhya Pradesh, Gujarat and Maharashtra.
- ▶ It has a length of around 724 kilometers.
- ▶ It meets Arabian sea at the Gulf of Khambat.



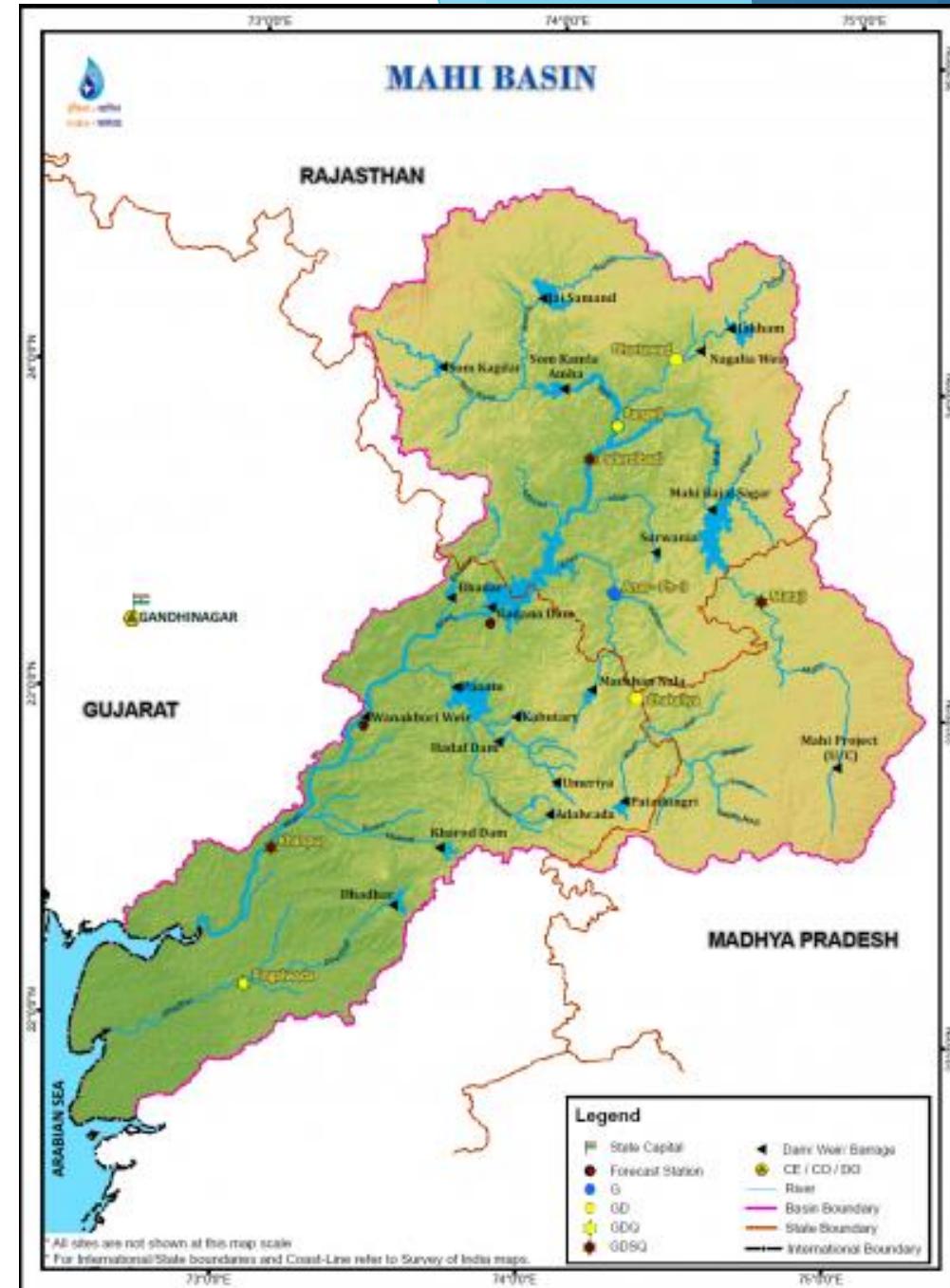
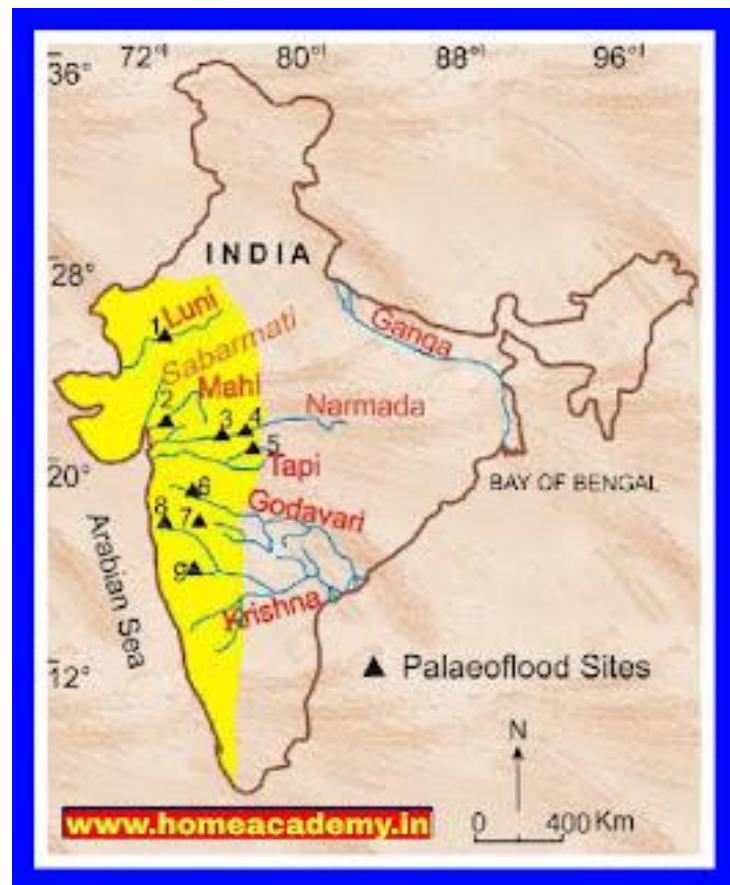
RIVER SABARMATI

- ▶ Starts from the southern slope of Araballi
- ▶ Narrow long basin (21,700 sqkm)
- ▶ Eastern flank tributaries
- ▶ North south course
- ▶ Gulf of Khambat



RIVER MAHI

- ▶ Vindhyan Hills of M.P. is the source of Mahi R.
- ▶ It flows south-west through the Banswara (Rajasthan) and Anand (Gujarat) district and drains into Arabian Sea at Gulf of Khambat creating an estuary.

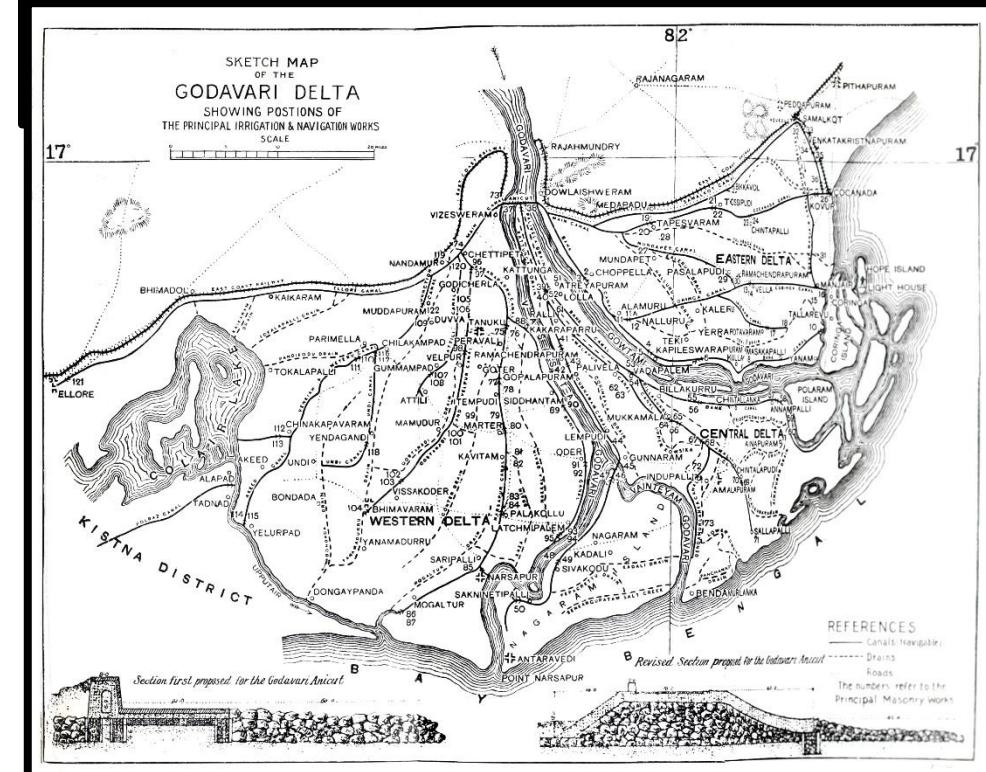
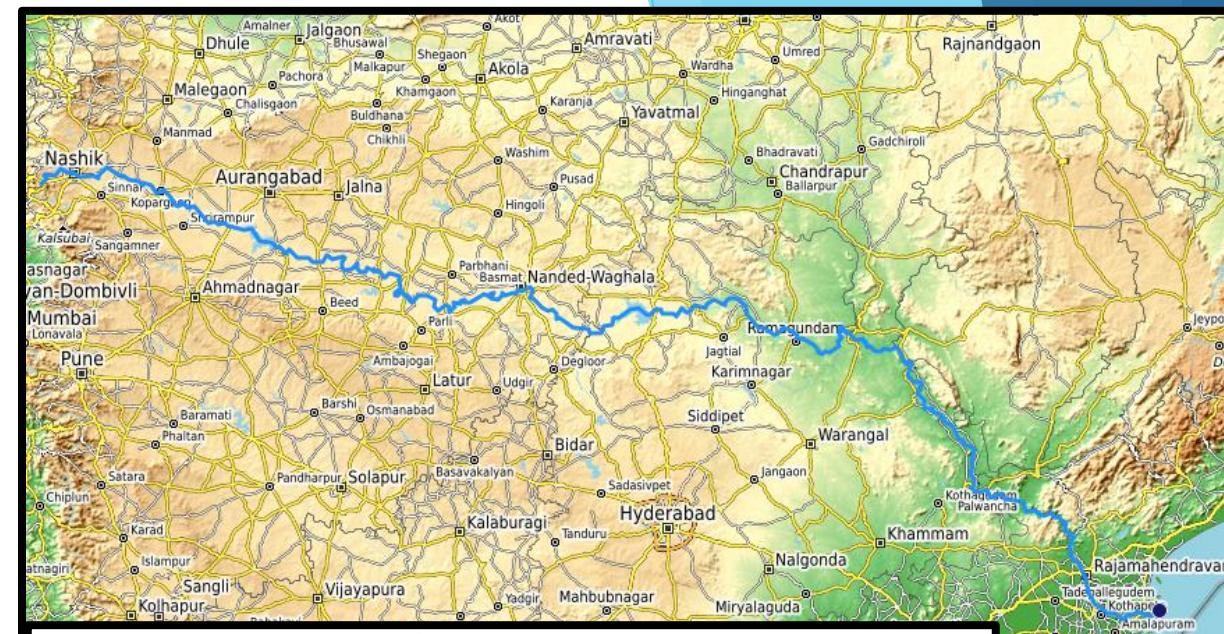


THE RIVER GODAVARI



THE RIVER GODAVARI

- The Godavari is the largest Peninsular river and second largest Indian River. Its length is about 1464 km. Because of its length and the area, it drains about 10% of India's total geographical area), it is also known as the 'Dakshin Ganga'.
- The river Godavari rises at an elevation of 1,067 m in the Western Ghats near Thriambak Hills in the Nasik district of Maharashtra (80 km (50 mi) from the Arabian Sea). It flows for 1,465 km (910 mi), first eastwards across the Deccan Plateau then turns southeast, into Andhra Pradesh, until it splits into two distributaries forms a large river delta and then flows into the Bay of Bengal.
- The basin covers parts of Maharashtra (about 50 per cent of the basin area lies in Maharashtra), Madhya Pradesh, Orissa and Andhra Pradesh.
- The major left bank tributaries include the Purna, Pranhita, Indravati, and Sabari River. The right bank tributaries are Pravara, Manjira, and Manair.

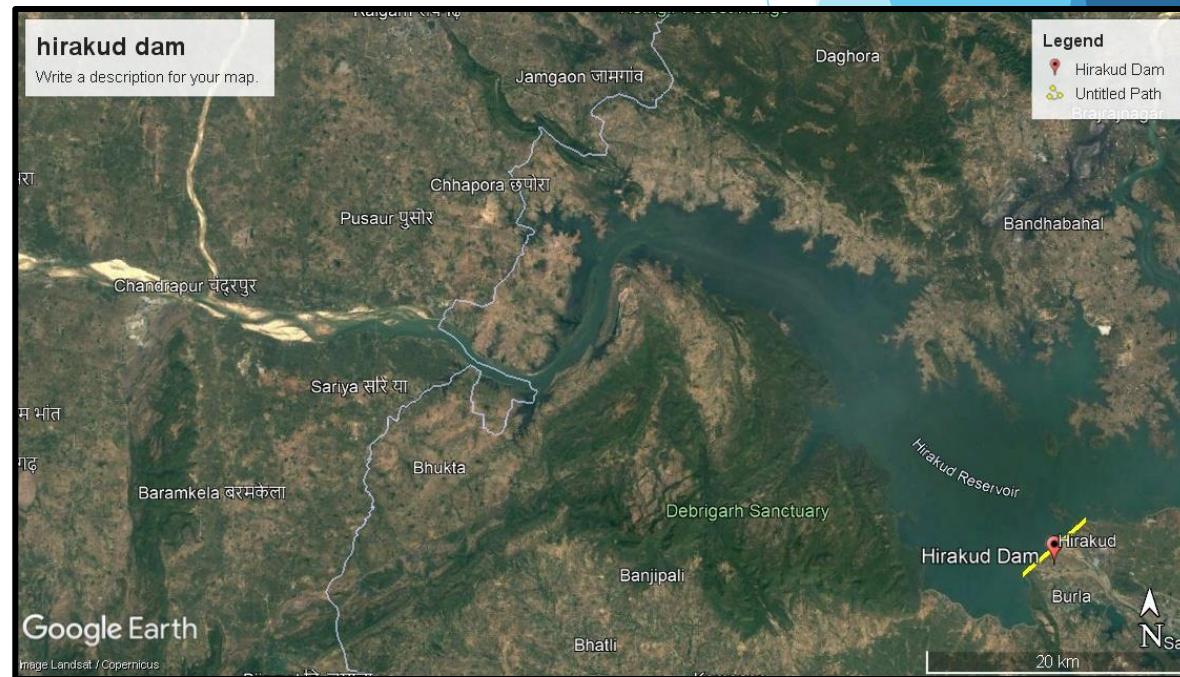


THE MAHANADI RIVER



THE MAHANADI RIVER

- ▶ The Mahanadi rises in the highlands of Chhattisgarh. It flows through Orissa to reach the Bay of Bengal. The length of the river is about 860 km. Its drainage basin is shared by Maharashtra, Chhattisgarh, Jharkhand, and Orissa.
- ▶ The Mahanadi River is a major river in East Central India. It drains an area of around 132,100 square kilometres (51,000 sq mi) and has a total length of 900 kilometres (560 mi).
- ▶ Mahanadi is also known for the Hirakud Dam (longest earthen dam) which was the first major multipurpose river valley project after India's independence in 1947.



THE KRISHNA RIVER



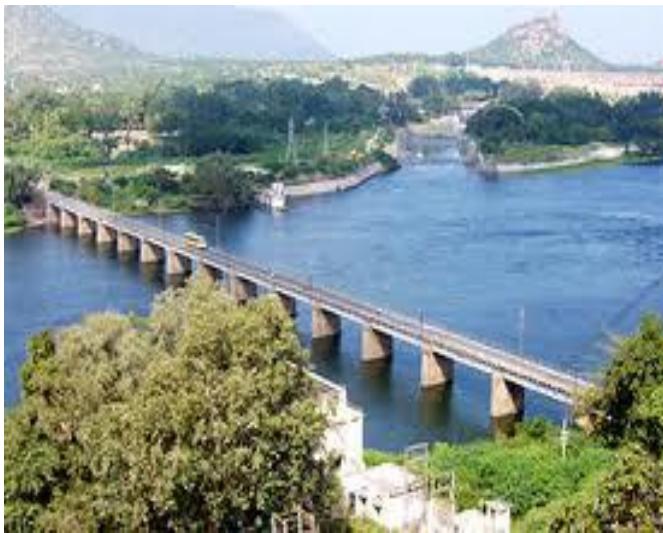
MB

THE KRISHNA RIVER

- ▶ Krishna river rises in the Western Ghats at an elevation of about 1337 m. (from a spring near Mahabaleshwar,)
- ▶ It starts just north of Mahabaleswar, about 64 km from the Arabian Sea and flows for about 1400 km and outfalls into the Bay of Bengal. Rising the Krishna flows for about 1400 km and reaches the Bay of Bengal. Its drainage basin is shared by Maharashtra, Karnataka and Andhra Pradesh.
- ▶ The Krishna Basin extends over Andhra Pradesh, Maharashtra and Karnataka having a total area of 2,58,948 Sq.km which is nearly 8% of the total geographical area of the country.
- ▶ The Tungabhadra, the Koyana, the Ghatprabha, the Musi and the Bhima are some of its tributaries.
- ▶ The Nagarjuna Sagar Dam is one of the largest masonry dams in the world, built on the River Krishna in the state of Telangana.



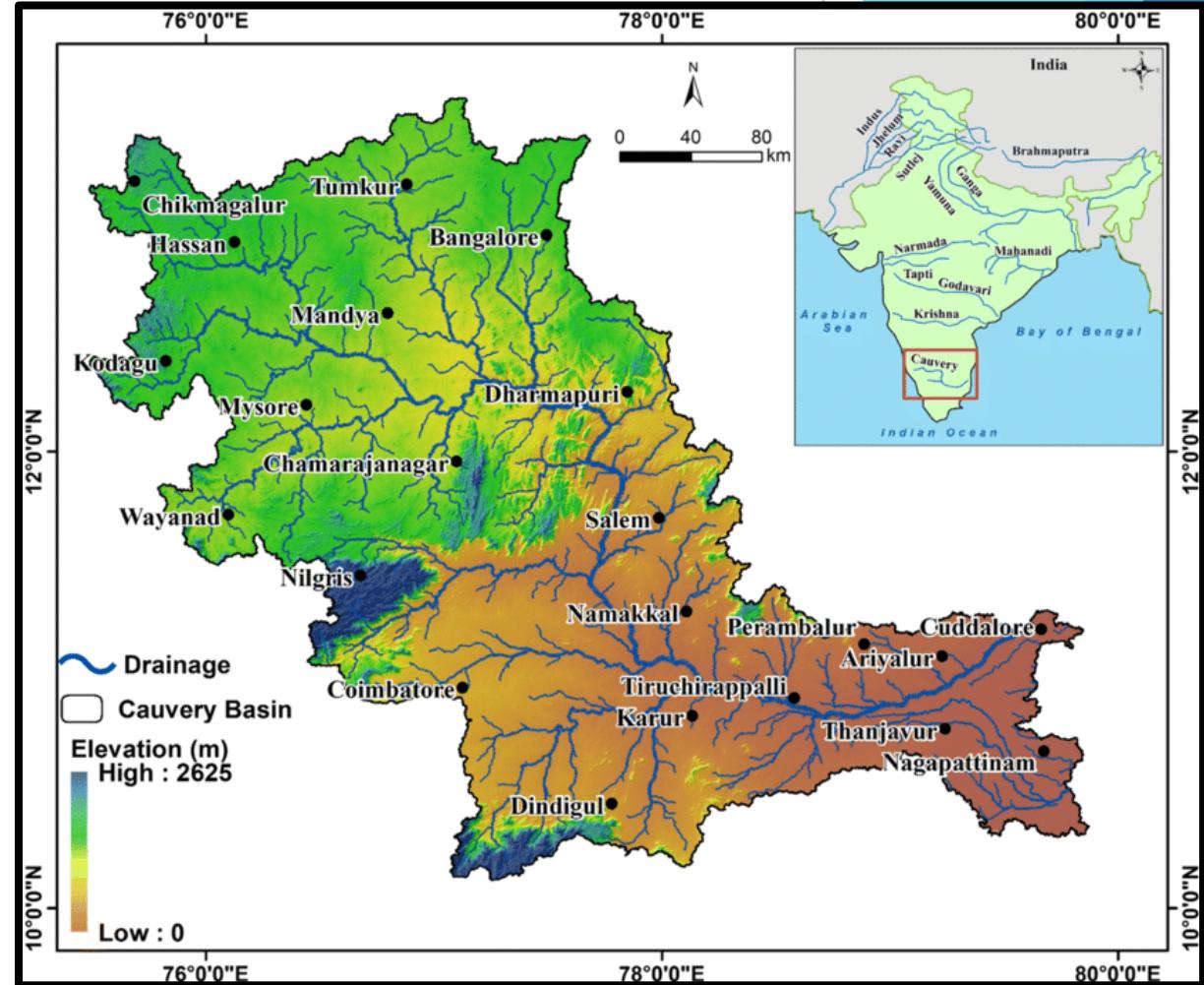
THE KAVERI RIVER



MB

THE KAVERI RIVER

- ▶ It rises at an elevation of 1,341 m at Talakaveri on the Brahmagiri range near Cherangala village of Kodagu district of Karnataka.
- ▶ It reaches the Bay of Bengal in south of Cuddalore, in Tamil Nadu. Total length of the river is about 760 km.
- ▶ Its main tributaries are Amravati, Bhavani, Hemavati and Kabini. Its basin drains parts of Karnataka, Kerala and Tamil Nadu.
- ▶ Infamous for its river water dispute between Tamilnadu and Karnataka.



INLAND DRAINAGE

- ▶ An inland drainage system is developed when rivers do not meet an open sea or ocean instead they empty themselves into an inland lake or disappears into sandy areas.

▶ Luni

- ▶ The Luni is the largest river in the Thar Desert of northwest India. It originates in the Pushkar valley of the Aravalli Range, near Ajmer, passes through the southeastern portion of the Thar Desert, and ends in the marshy lands of Rann of Kutch in Gujarat, after travelling a distance of 495 km (308 mi). It is first known as Sagarmati, then after passing Govindgarh, it meets its tributary Sarasvati, which originates from Pushkar Lake and from then on it is called Luni.
- ▶ The Luni is also known as the Lavanavari or Lavanavati, which means "salt river" in Sanskrit, due to the high salinity of its water.

