

Drainage Basin:-

It is also known as river basin. It is the land area on which a river, tributaries and streams flows.

Catchment Area:-

The area from which water flows in the river.

Watershed:-

It is the area in which all tributaries get merge into one river. We divide area into many watershed to study entire flow of water.

The flow characteristics of a river

DRAINAGE SYSTEM OF INDIA (09:15 AM)

- The flow of water through a well-defined channel is called as drainage.
- The area from where all the water drains into a single channel is the watershed.
- Water divide - A high elevated land which separates two watersheds or river basins.
- Tributary- A smaller river that joins a bigger river.
- **Distributary:-**
Smaller river which get separated from main river.
- **Evolution of the Himalayan drainage system**
- The widely accepted theory regarding the evolution of the Himalayan drainage system proposes the existence of a single river all along the Himalayas flowing from east to west called as **Indo-Brahm or Shivalik River**. It occupied the remnant of the Tethys basin and it drained into the Gulf of Sindh.
- This earlier drainage system was disturbed by **three main events**:
 - a. More rising of Western Himalayas
 - b. Upliftment of Potwar plateau and Delhi Ridge
 - c. Downthrusting of Malda gap or Garo Rajmahal gap
- This divided the entire river into **three river systems**:
 - a. Indus and its tributaries
 - b. Ganga and its tributaries
 - c. Brahmaputra and its tributaries
- **Evolution of Peninsular Drainage System**
- The peninsular drainage system is influenced by **three major events**:
 - a. Submergence of the western side of the western Ghats which disturbed the symmetrical pattern of peninsular drainage.
 - b. Upliftment of the Himalayas which caused the northern part of Vindhyas to tilt more towards the north and also the **deepening of rift valleys of Narmada and Tapi**
 - c. Gradual tilting of Peninsular block from Northwest to southeast direction causing slope towards the Bay of Bengal

that is why Narmada and Tapi flows from east to west despite the slope of land is from N-W to S-E.

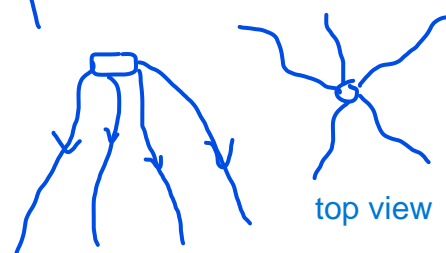
DIFFERENCE BETWEEN HIMALAYAN AND PENINSULAR DRAINAGE (10:08 PM)

- | Himalayan rivers | Peninsular rivers | |
|---|---|--|
| They are perennial in nature, fed by glaciers, and flow throughout the year. The river basin is bigger and the catchment area is bigger. | They are rainfed and are seasonal in nature as they are fed by monsoon rainfall. | ← originating from peninsular block
→ The term perennial generally means something that is lasting or enduring for a long time. |
| Higher meandering | Lower meandering | |
| Huge deltas formation | Smaller deltas and estuaries | |
| Large flood plains | Smaller flood plains | |
| These rivers are dominated by the youth stage. | They are dominated by the mature stage. | |
| They are both antecedent and consequent but you will find antecedent rivers | They are consequent | → they do not change if slope of land changes, they maintain their flow by cutting mountains that is why we see gorge here. EX: Indus, Sutlej, Ghagra etc. |
| A dendritic pattern of drainage | Rectangular pattern | → these are the rivers which flow along the slope of the land and if slope changes due to upliftment or subsidence their direction of flow will also change. |
| | or trellis | |
- **Consequent and antecedent river**
 - The consequent river follows the slope. Examples: Ganga, Yamuna
 - The antecedent river will be able to maintain its course in spite of changes in topography. Examples: Indus, Brahmaputra, etc

where river and its tributary seems like leaf. This pattern is found in plain area where river dominates over land.
EX: Ganga

DRAINAGE PATTERN (10:30 AM)

- The flow characteristics of a river are called drainage patterns.
- There are **5 major patterns**:
- **a. Dendritic pattern**
 - A drainage pattern where a river and its tributary form a dense network and appear like branches of a leaf or tree. It is prevalent in those regions of plain sedimentary soil with a **lack of structural control**. EX: Ganga, Indus
- **b. Rectangular pattern** → it means control of structure like land pattern, slope etc. is lacking.
 - The river takes sharp right turns.
 - It is prevalent in plateau regions with high structural control.
 - Example, Mahanadi, Krishna, etc
- **c. Trellis pattern**
 - The main river flows in a rift valley and the tributaries join at 90 degrees. EX: Narmada and Tapi
- **d. Radial pattern**
 - A drainage pattern in which different rivers originate and flow in different directions from a highland or mountain. moves to west to north
 - Example: Amarkantak with Narmada and Son.
- **e. Parallel drainage**
 - The rivers are running parallel to each other and enter the ocean.
 - Example: West flowing rivers of western ghats.



INDIAN RIVERS & THEIR TRIBUTARIES (11:07 AM)

- Things to remember:
- Origin of important rivers.
- The states of origin and states through which they flow.
- The location of the mouth of important rivers.
- Tributaries.
- Important features like National parks, sanctuaries, hydropower projects, etc. related to these rivers.

- **1. Indus:**

- **(Explained with Maps)**

- Origin: In the Kailash range, ~~Minsarowar~~ ^{near Mansarovar}
- ~~Goes to~~ ^{starts from} China.

- Flows through Laddakh (PoK) in India.
- Flows through, mouth is at Karachi port.

- Right Bank Tributaries: (Right from direction of river)

- **Shyok**, Nubra, Gilgit River, and Kabul river.

Shyok joins Nubra river.
Gilgit river comes from Gilgit Baltistan.
Kabul is named after Kabul river.

- Left bank Tributaries:

- Jhelum, Chenab, Ravi, Bias, and Satluj from North to South.

- **Jhelum** JCRBS

:

- Originates from Verinag in Jammu & Kashmir.

- **Chenab**

:

- Two small streams on opposite sides of the pass, namely Chandra (originates in Barachergri) and Bhaga (Originates in Surajtal), the united stream Chandrabhaga flows in the northwest direction.

- Chandrabhaga is Chenab.

Sutlej and Beas meets in Harike.

Galwan river
is the
tributary of
Shyok.

- *Ravi:*

- The Ravi has its source in Kullu hills near the Rohtang Pass in Himachal Pradesh.
- It drains the area between the Pir Panjal and the Dhaola Dhar ranges.
- It meets Chenab a little above Rangpur in Pakistani Punjab.

- *Beas River:*

- The Beas originates near the Rohtang Pass, on the southern end of the Pir Panjal Range, close to the source of the Ravi.
- It crosses the Dhaola Dhar range, takes a south-westerly direction and meets the Satluj River at Harike in Punjab.
- It is a comparatively small river that lies entirely within the Indian territory.

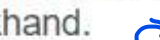
- *Sutlej:*

- The Satluj rises from the Manasarovar-Rakas Lakes in western Tibet.
- Like the Indus, it takes a north-westerly course up to the Shipki La on the Tibet-Himachal Pradesh boundary.
- It cuts deep gorges where it pierces the Great Himalayas and the other Himalayan ranges.
- Before entering the Punjab plain, it cuts a gorge in Naina Devi Dhar, where the famous Bhakra dam has been constructed.
- After entering the plain at Rupnagar (Ropar), it turns westwards and is joined by the Beas at Harike.

GANGA RIVER SYSTEM (11:44 AM) (flows from UK, UP, Bihar, Jharkhand, WB and joins Brahmaputra in Bangladesh.)

- *(Explained with Maps)*

Gaumukh of

- The Ganga originates as Bhagirathi from the Gangotri glacier in Uttar Kashi District of Uttarakhand.  originates from Satopant glacier to the north of Badrinath

- **Alaknanda** River joins Bhagirathi at Devaprayag.

- From Devapryag the river is called Ganga.

- Ganga debouches [emerge from a confined space into a wide, open area] from the hills into the plain area at

- It is joined by the Yamuna at Allahabad.

- Near Rajmahal Hills it turns to the southeast.

- It touches Jharkhand also.

- At Farraka, it bifurcates into Ganga-Hugli(it is a major distributary of Ganga, it is also known as Bhagirathi) in West Bengal and Padma-Meghna in Bangladesh.

- Brahmaputra (or the Jamuna as it is known here) joins Padma-Meghna.

- **Major Left Bank Tributaries:**

- a. Ramganga: Form Uttarakhand. (Ramganga flows through India's first national park that is Jim Corbett National Park and joins with Ganga in UP.)

- b. Gomti: From Uttar Pradesh. (Joins in UP itself and also flows from Lucknow.)

- c. Ghaghra River: Comes from China, enters Nepal, then UP, then Bihar where it joins the Ganga River.

- Ghaghra has two tributaries:

Ganga river bifurcates in Bhagirathi-Hooghly near to Murshidabad in WB (at Murshidabad it is known as Bhagirathi and later in downstream it is known as Hooghly) and Padma(when it joins Jamuna in Bangladesh). Bhagirathi-Hooghly joins Bay of Bengal from WB and rest part of Ganga joins with Jamuna (which is known as Brahmaputra in India) it will be known as Padma and Padma is known as Meghna in lower parts which joins Bay of Bengal eventually.

The Gomti River emerges from Gomat Taal (also known as Fulhaar Jheel), a small lake near Madhotanda village in Pilibhit district, in the state of Uttar Pradesh, India. The river originates in the Terai region, close to the India-Nepal border, and flows entirely within Uttar Pradesh before eventually joining the Ganga near Kaithi in Varanasi district.

- Ghaghra has two tributaries:
- Left banks: Sarda or Kali River (comes from Uttarakhand, Forms boundary between India & Nepal)
- Rapti River (comes from Nepal)
- Ghaghra in Ayodhya is called Saryu.
- d. Gandak River: (Comes from Nepal and merges with Ganga in Bihar.)
- Originates near the Tibet-Nepal border.
- It flows into the Ganga at Bihar.
- e. Kosi River: (Comes from Tibet and joins Ganga in Bihar.)
- The Kosi River consists of seven streams known as Sapta Kosi.
- These streams flow through eastern Nepal which is known as the Sapt Kaushik region.
- The river channel is braided and it shifts its course frequently. This has resulted in frequent devastating floods and has converted large tracts of cultivable land into wastelands in Bihar.
- Thus the river is often termed the 'Sorrow of Bihar'.

☞ Mahananda comes from Darjiling and joins Ganga in Bangladesh.

Ram jaane Gomti ka Ghagra Ganda kaise



trick to remember

Yamuna comes from Yamnotri glacier. (comes from HP and enters UK then Haryana then UP and merges with Ganga at Allahbad.)

bz of major river Ganga, Yamuna has no major left bank tributary but it has major right bank tributary among which few ones are-

Chambal, Sindh, Betwa and Kenn SBKC

Banas joins Chambal.

These are monsoon dependent rivers so joining project of Betwa and Kenn is going on.

Son originates from Amarkantak and meets with Ganga near Patna.

The Son River (also spelled Sone) emerges from the Amarkantak Plateau in the Anuppur district of Madhya Pradesh, India. It originates near the Narmada River's source but flows in a different direction.

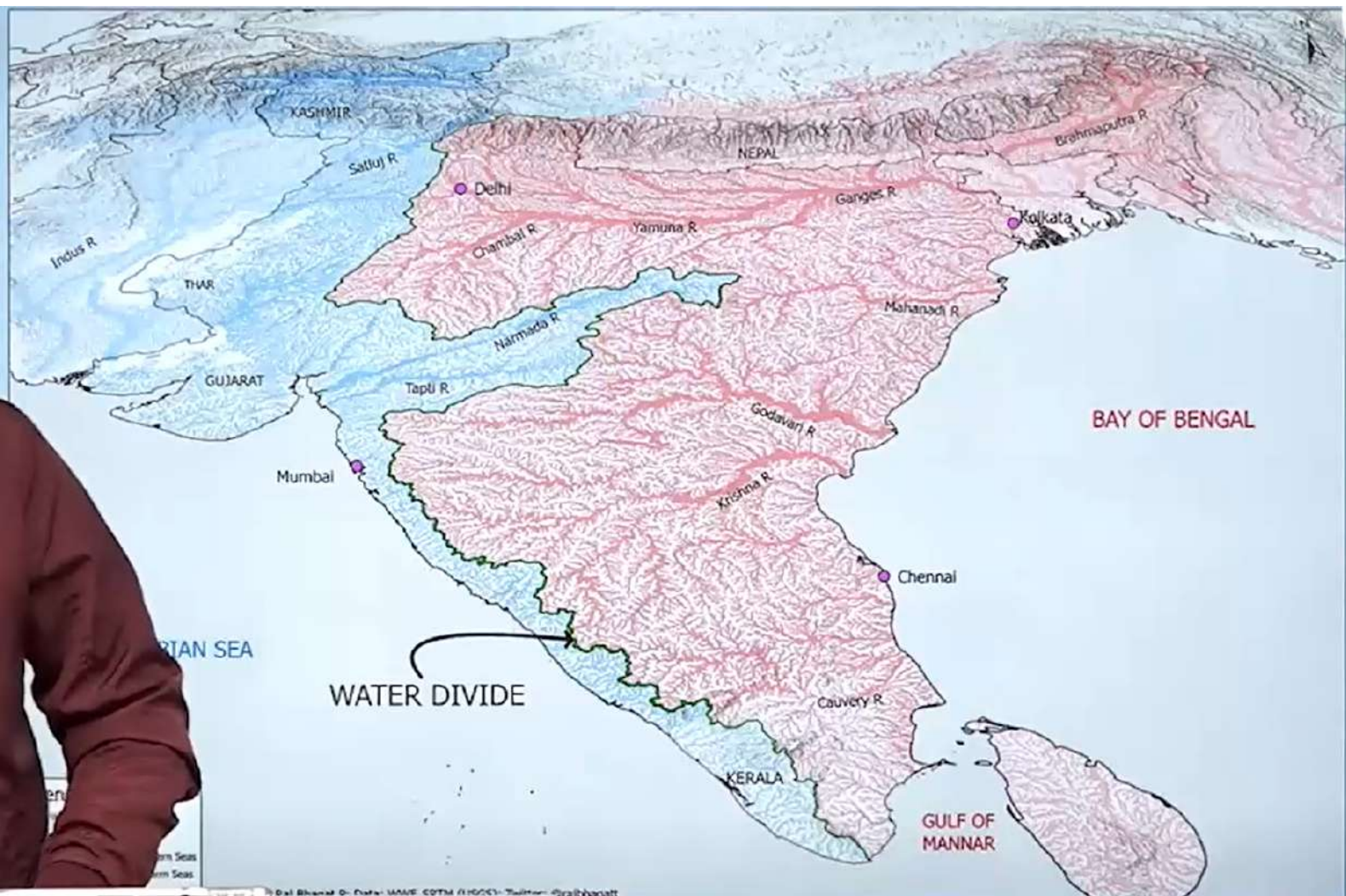
Ajay and Damodar originates from chota Nagpur plateau joins Hoogly in WB which is distributary of Ganga. Hoogly flows through Kolkata. Hoogly is also known as Bhagirathi.

Brahmaputra has total 7 names- Yarlung Tsangpo in Tibet, Siang in hilly part of Arunachal, Dihang in lower part of Arunachal or in Assam, Dihang meets with Lohit river in Assam from where it is known as Brahmaputra, Jamuna in Bangladesh after meeting with Teesta, in Bangladesh it divide into two parts among them one meet with Padma and one with Meghna.

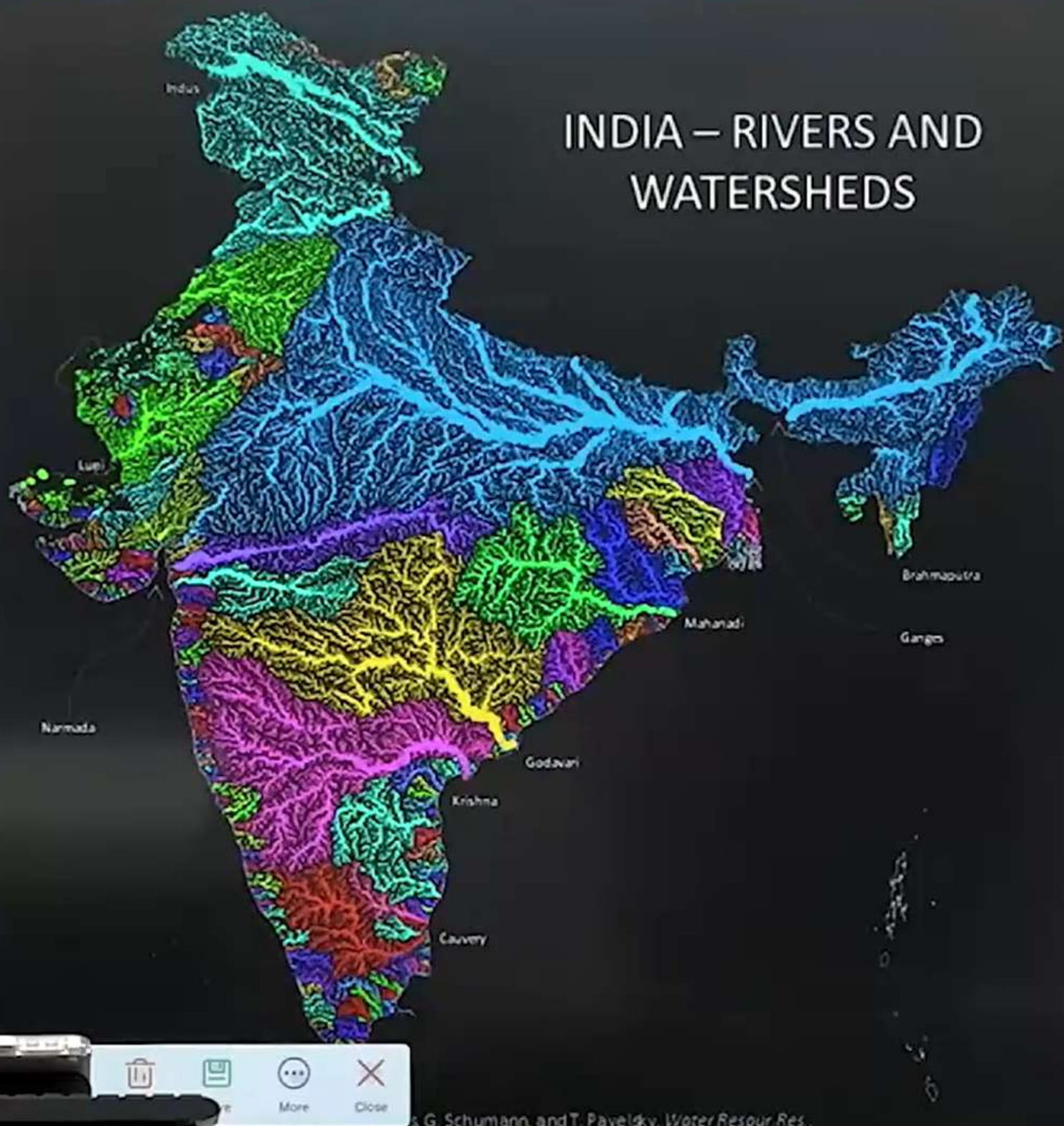
THE BRAHMAPUTRA RIVER (12:03 PM) (one among the longest river of the world.)

- (Explained with Maps)
- The Brahmaputra's source is the Angsi and Chemayungdung glaciers in southwestern Tibet.
- Major Tributaries:
 - a. Subansiri River, (Ranga is the tributary of Subansiri and all the three river altogether forms India's largest riverine island called Majuli.)
 - b. Kameng River(called Jia Bhareli in Assam), Pakke Tiger Reserve is located on this river.
 - c. Manas River: from Bhutan
 - Manas River is a transboundary river in the Himalayan foothills between southern Bhutan and India.
 - It has two major reserve forest areas, namely the Royal Manas National Park in Bhutan and the contiguous Manas Wildlife Sanctuary.
 - d. Sankosh:
 - It rises in northern Bhutan and empties into the Brahmaputra in the state of Assam
 - e. Teesta: (Rangeet is the tributary of Teesta)
 - The river originates from North Sikkim in the Himalayas.
 - The river then flows past the town of Rangpo where it forms the border between Sikkim and West Bengal up to Teesta Bazaar.
 - The river flows through Jalpaiguri and then to the Rangpur District of Bangladesh, before finally merging with the mighty Brahmaputra.
 - f. Dibang River: (rich in biodiversity)
 - g. Lohit
 - h. Dhansiri.
 - i. Kopili River, Barak(Surma in Bangladesh), etc.
 - Barak which is known as Surma in Bangladesh

TOPIC OF NEXT CLASS- DRAINAGE SYSTEM OF INDIA (TO CONTINUE)



INDIA – RIVERS AND WATERSHEDS



More

Close

G. Schumann, and T. Pavelsky, *Water Resour. Res.*

