



- **FACULTY NAME:**
  - **KANHAIYA JHA**
- **SUBJECT:**
  - **GEOGRAPHY**
- **TOPIC NAME:**
  - **DRAINAGE SYSTEM**

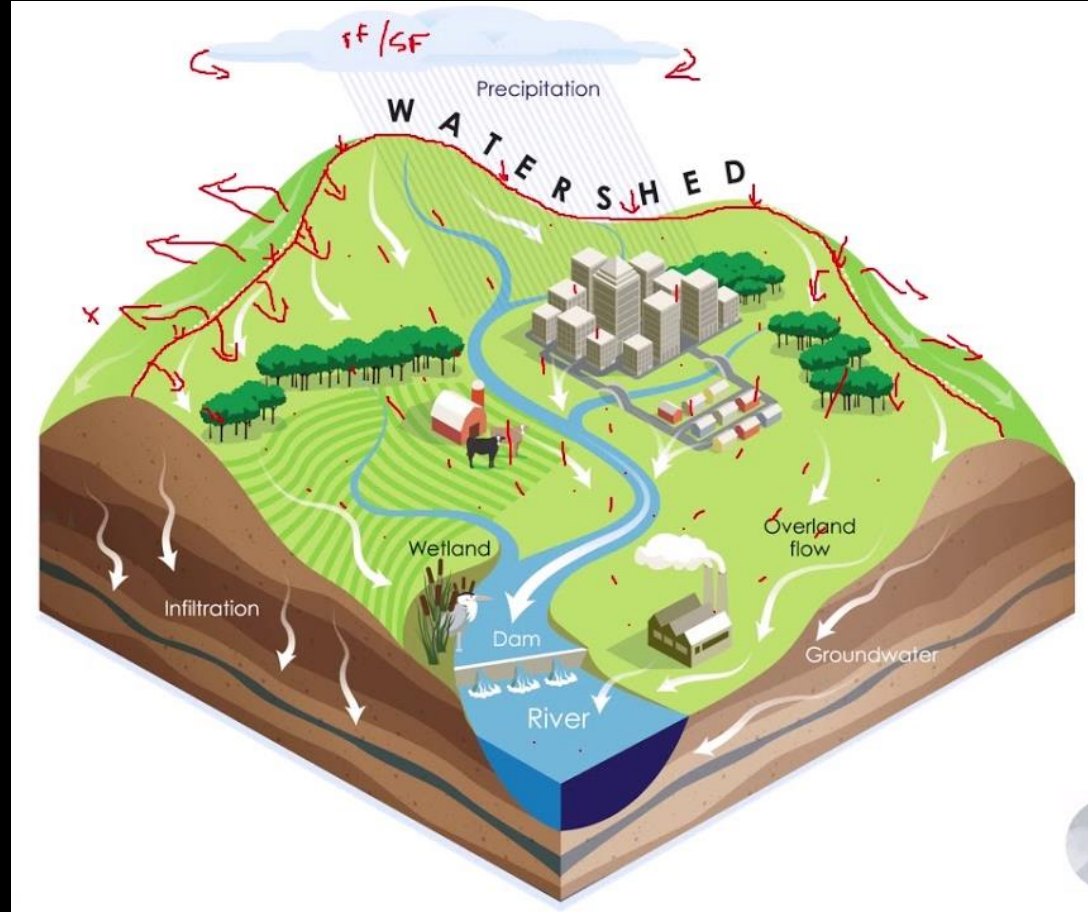


# DRAINAGE SYSTEM



## DRAINAGE SYSTEM

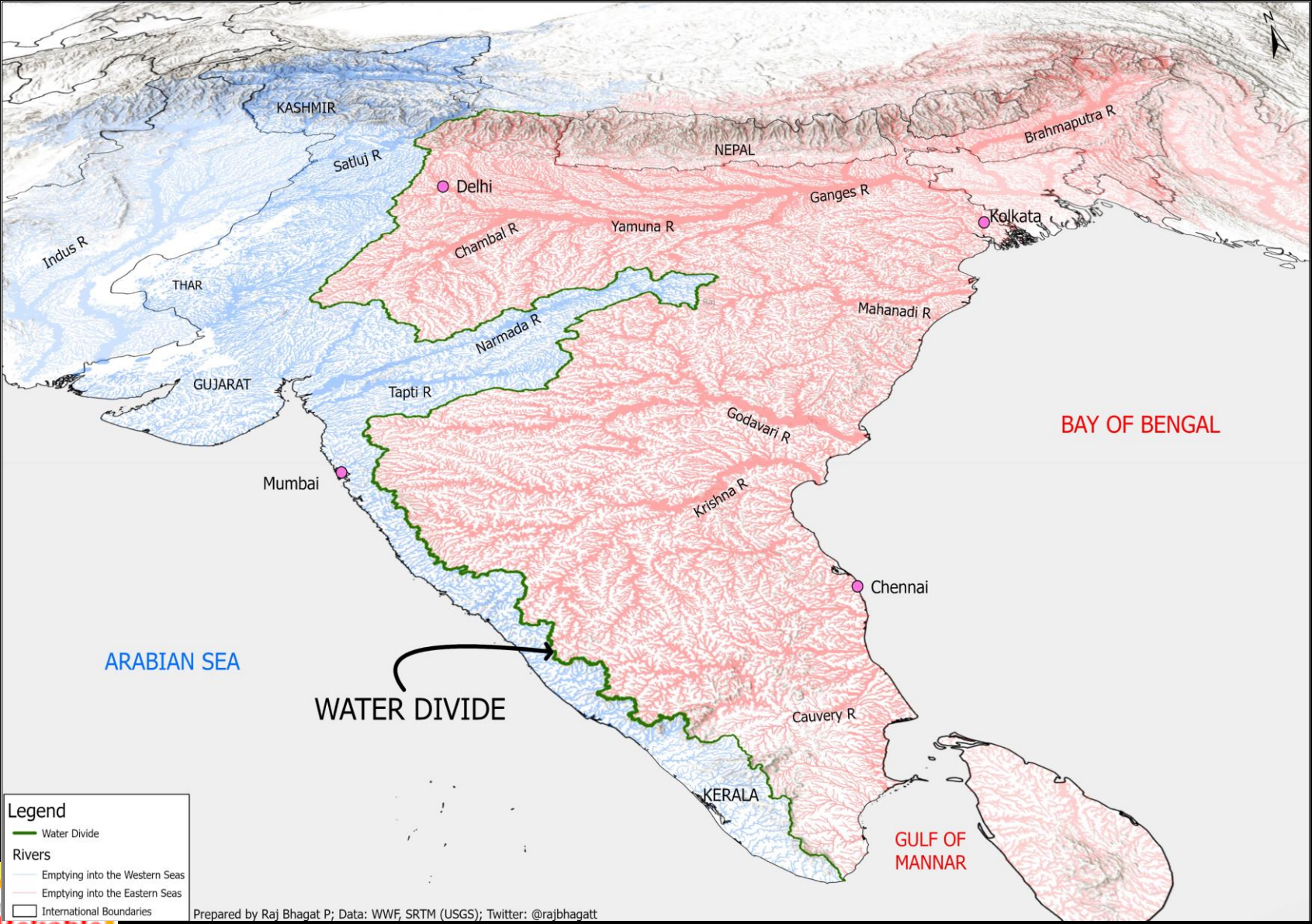
- The **flow of water** through **well-defined channels** is known as ‘drainage’ and the **network of such channels** is called a ‘**drainage system**’.
- The drainage pattern of **an area** is the outcome of the geological time period, nature and structure of rocks, topography, slope, amount of water flowing and the periodicity of the flow.
- A river drains the water **collected from a specific area**, which is called its ‘*catchment area*’. Sometimes, **The catchments of large rivers are called river basins** while those of small rivulets and rills are often referred to as **watersheds**.
- An area drained by a river and its tributaries is called a ***drainage basin***.
- The **boundary line** separating one drainage basin from the other is known as **the watershed**.
- **The catchments of large rivers are called river basins** while those of small rivulets and rills are often referred to as **watersheds**.
- Watersheds are small in area while the basins cover larger areas.



# Division of Indian drainage system



- **On the basis of discharge of water (orientations to the sea)**
  - (i) the Arabian Sea drainage; and
  - (ii) the Bay of Bengal drainage.
- They are separated from each other through the **Delhi ridge, the Aravalis and the Sahyadris.**
- **Nearly 77 per cent** of the drainage area consisting of the Ganga, the Brahmaputra, the Mahanadi, the Krishna, etc. is oriented towards the Bay of Bengal while **23 per cent comprising** the Indus, the Narmada, the Tapi, the Mahi and the Periyar systems discharge their waters in the Arabian Sea.



**Legend**

- Water Divide
- Rivers**
- Emptying into the Western Seas
- Emptying into the Eastern Seas
- International Boundaries

Prepared by Raj Bhagat P; Data: WWF, SRTM (USGS); Twitter: @rajbhagatt



# On the basis of origin of river

## THE HIMALAYAN DRAINAGE

- Antecedent drainage i.e. Himalayan rivers are older than lesser Himalayas and Shivalik's (older than the structures they cut across).
- Nature of flow is perennial- fed by rain and melting glaciers.
- Geologically young
- Long courses
- Flow through loose alluvial soils of northern plains
- Form deep valley and gorges due to intensive erosion.
- Generate large quantities of sediment.
- Cause annual flooding.
- Nature of river course is quiet changing, meandering , forming ox-bow lakes, high waterfalls, deeper basins and large catchment areas and form deltas.

## PENINSULAR DRAINAGE

- Super-imposed drainage i.e. regional structures are older than the river valleys that cut through them.
- Nature of flow is seasonal- during sw monsoons.
- Geologically older.
- Shorter courses.
- Flow through hard granitic soils of peninsular India.
- Shallow graded valleys with little erosion.
- Shallow valleys, small waterfalls, deltas and estuaries

- On the **basis of the size of the watershed**, the drainage basins of India are grouped into three categories:
  - **(i) Major river basins** with more than **20,000 sq. km** of catchment area. It includes **14 drainage basins** such as the Ganga, the Brahmaputra, the Krishna, the Tapi, the Narmada, the Mahi, the Pennar, the Sabarmati, the Barak, etc.
  - **(ii) Medium river basins** with catchment area between 2,000-20,000 sq. km incorporating **44 river basins** such as the Kalindi, the Periyar, the Meghna, etc.
  - **(iii) Minor river basins** with catchment area of less than 2,000 sq. km include fairly good number of rivers flowing in the area of low rainfall



# INDUS RIVER VALLEY SYSTEM

- It is one of the largest river basins of the world,
- covering an area of 11,65,000 sq. km
- In India it is 321, 289 sq. km
- Total length of 2,880 km (in India 1,114 km).



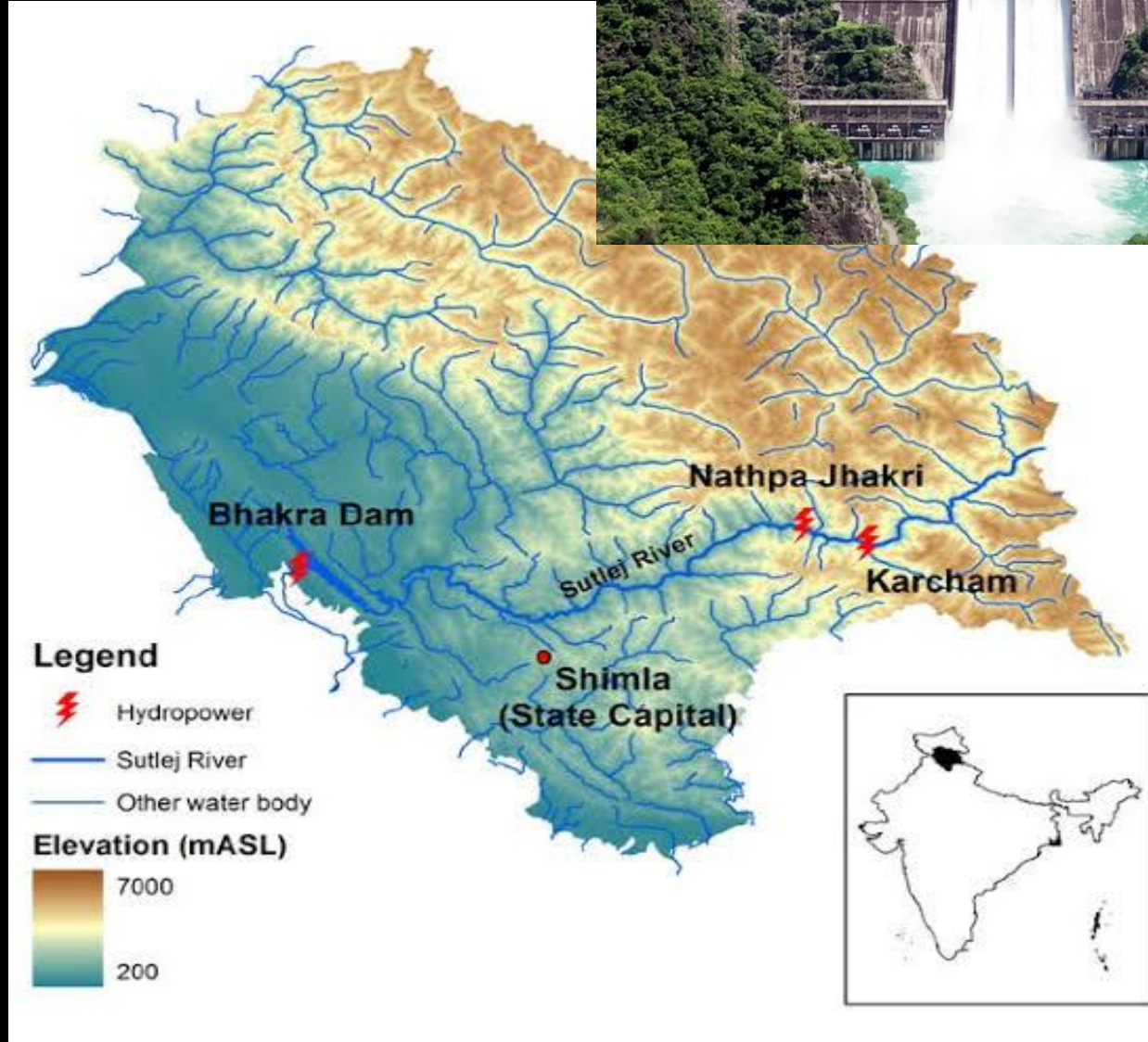
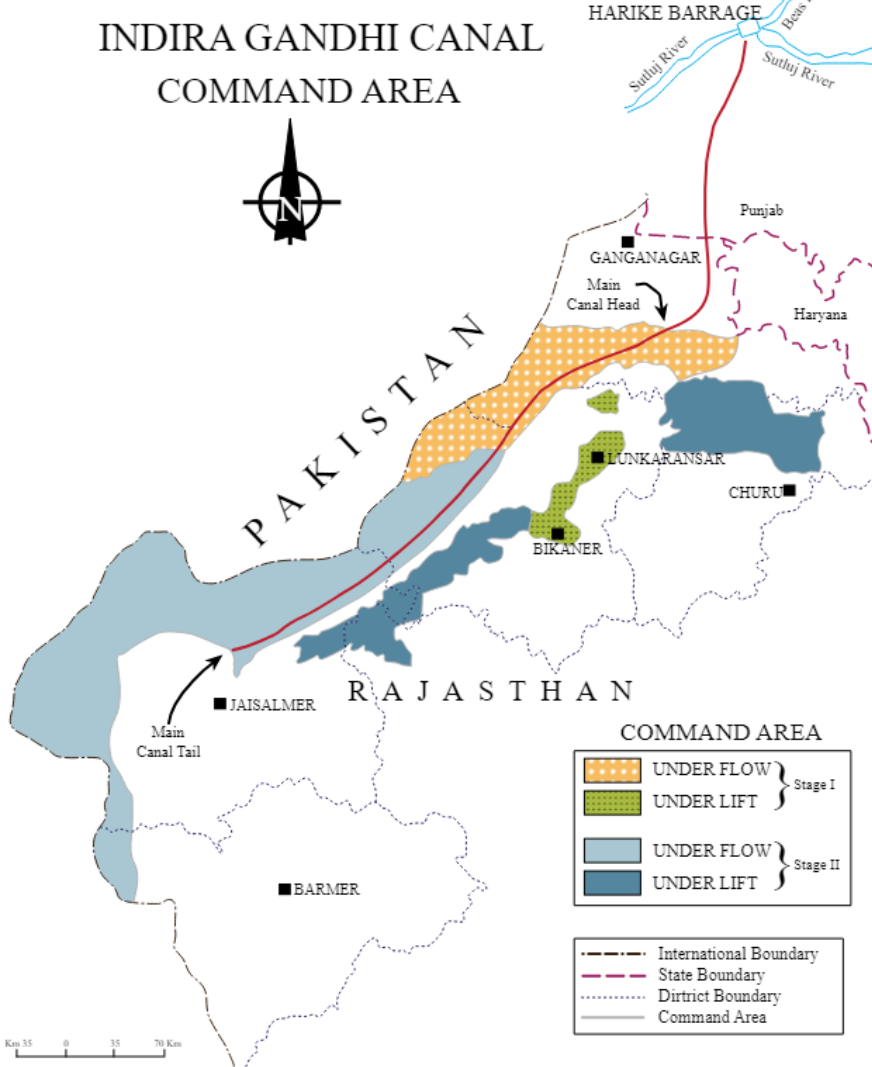
River	Source	Mouth	Length (in km)	Tributaries	Other information
<b>Indus (Sindhu)</b>  <b>westernmost of the Himalayan rivers in India</b>	<b>Near Bukhar chu Glacier</b> In Tibet, it is known as ' <b>Singi Khamban; or Lion's mouth.</b> '	Arabian sea	2880 (1114 km in India)  Enters Ladakh (India) through <b>changla pass* (depending)</b> flows through the <b>Potwar plateau</b> and crosses the <b>Salt Range</b> (South Eastern edge of Potwar Plateau)	Joined by the <b>zaskar river at leh</b>  Near <b>Skardu</b> , joined by the <b>Shyok</b>  <b>Kabul river</b> from Afghanistan joins Indus near <b>Attock</b>  Other:- <b>Gilgit, Gartang, Dras, Shiger, Hunza</b>	<b>DIAMER BHASHA DAM</b> ➤ Located in Gilgit Baltistan of Pakistan ➤ will be the tallest RCC Dam of world  <b>INDUS WATER TREATY 1960</b> ➤ India - use 80% water of Ravi, Beas and Sutlej river ➤ Pakistan - use 80% water of Indus, Jhelum and Chenab

River	Source	Mouth	Length (in km)	Tributaries	Other information
<b>Jhelum (Vistasta)</b>	verinag Spring (J & K )	Chenab	724	Lidar, Sindh kishanganga / Neelam (Muzaffarabad)	<b>Mangla Dam</b> ➤ located in Mirpur Pakistan <b>Tulbul project</b> ➤ Constructed by India
<b>Chenab (Akshani)</b>  <b>(Confluence of Chandra and Bhaga river)</b>	Near bara lacha pass (lahaul Spiti district of HP)	Sutlej	1180	➤ Jhelum ➤ Ravi	<b>Hydel power project</b> ➤ Dulhasti ➤ Baglihar ➤ Salal ➤ Ratle Hydroelectric Project
<b>Ravi (Purushni)</b>	Kullu hills near Rohtang Pass (HP)	Chenab (near Ranpur)	725		<b>Ranjit Sagar Dam / Thin dam</b> ➤ joint project of Punjab and Jammu-Kashmir ➤ located in Pathankot Punjab

River	Source	Mouth	Length (in km)	Tributaries	Other information
Beas ( Bipasha )	Beas Kund near Rohtang Pass, HP	Sutlej at harike Barrage	460	NA	<ul style="list-style-type: none"> <li>➤ lies entirely within the territory of India</li> <li><b>Pong Dam</b></li> <li>➤ also known as Maharana Pratap Sagar Dam</li> <li>➤ located in Kangra, HP</li> <li>➤ Highest Earth fill Dam In India</li> </ul>

River	Source	Mouth	Length (in km)	Tributaries	Other information
<b>Sutlej Satadru</b>	<b>Lake Rakshasta</b>	<b>Indus near mithankot (Pak)</b>	<b>1450 (1050 in India )</b>	<ul style="list-style-type: none"> <li>➤ <b>Spiti river joins near shipki La Pass</b></li> <li>➤ <b>Parchu River, which originated from Tibet, a tributary of Spiti River.</b></li> <li>➤ <b>Beas river at harike</b></li> </ul>	<ul style="list-style-type: none"> <li>➤ <b>From Firozpur to Fazilka forms Indo Pak boundary</b></li> <li>➤ <b>Enters HP at shipki La Pass</b></li> <li>➤ <b>naphtha jhakri Hydrel power project</b></li> <li>➤ <b>Bhakra Nangal Dam( Govind Sagar reservoir)</b></li> </ul>

# INDIRA GANDHI CANAL COMMAND AREA



River	Source	Mouth	Length (in km)	Tributaries	Other information
Kishanganga Neelum	Krishna Sagar lake, sonmarg, J & K	Jhelum river at Muzaffarab ad pok	245		➤ kishanganga Hydel power project constructed by India
Shyok	Remo Glacier ( Siachen Glacier)	Indus	550		➤ known as river of death





# GANGA RIVER VALLEY SYSTEM

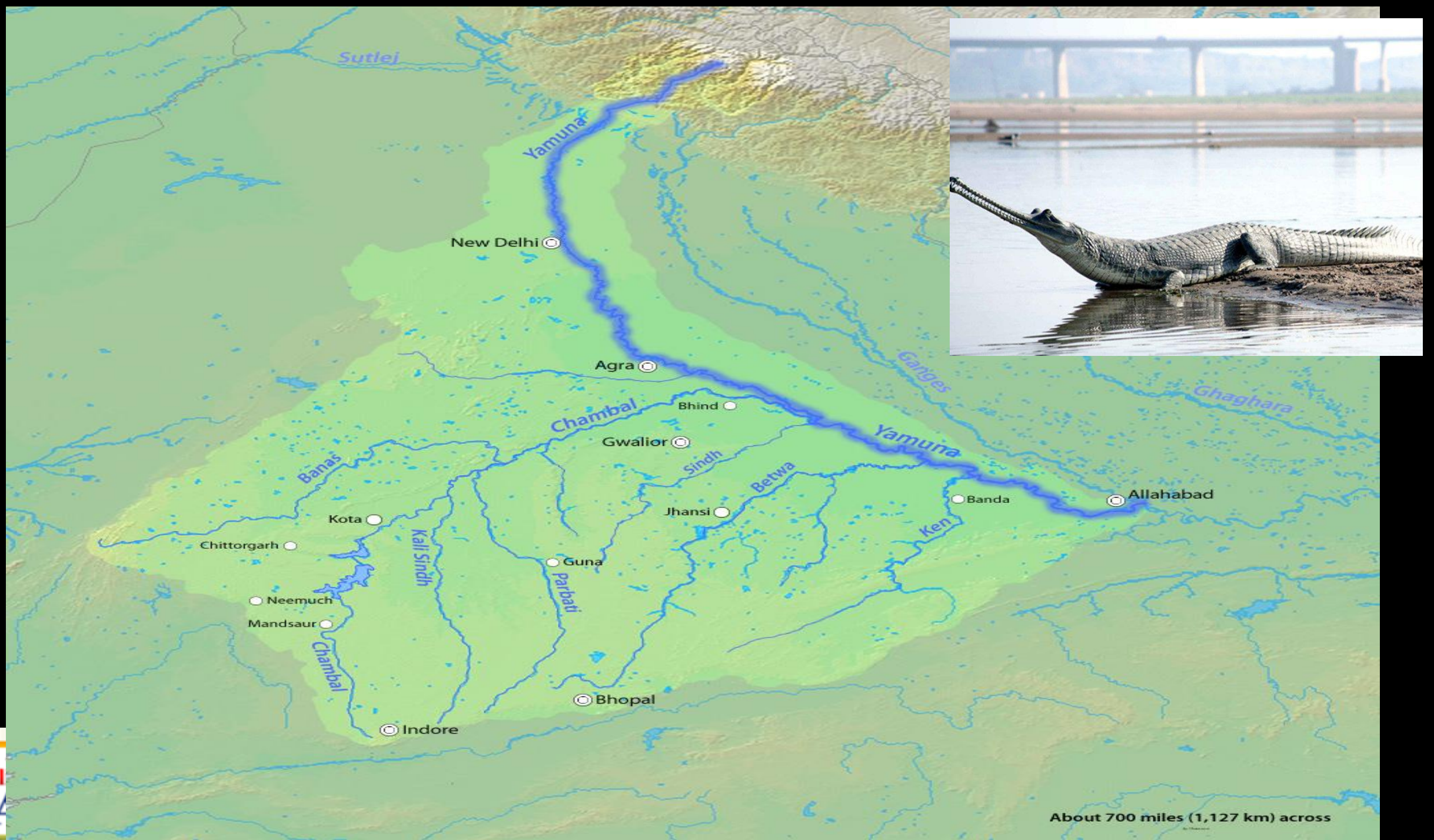


River	Source	Mouth	Length (in km)	Tributaries	Other information
Ganga	<ul style="list-style-type: none"> <li>• Gangotri Glacier</li> <li>• as Bhagirathi</li> <li>• from Devprayag : ganga</li> </ul>	Bay of Bengal	2525 km <ul style="list-style-type: none"> <li>• Up-1450 km</li> <li>• WB- 520 km</li> <li>• Bihar-445 km</li> <li>• UK -110 km</li> </ul>	Left <ul style="list-style-type: none"> <li>• Ramganga</li> <li>• Gomti</li> <li>• Ghagra</li> <li>• Gandak</li> <li>• Budhi gandak</li> <li>• Kosi</li> <li>• Mahananda</li> </ul> Right <ul style="list-style-type: none"> <li>• Yamuna</li> <li>• Tamsa</li> <li>• Karamnasa</li> <li>• Sone</li> <li>• Pun-Pun</li> </ul>	<ul style="list-style-type: none"> <li>• Debouche on at Haridwar</li> <li>• Known as Padma in Bangladesh</li> </ul>

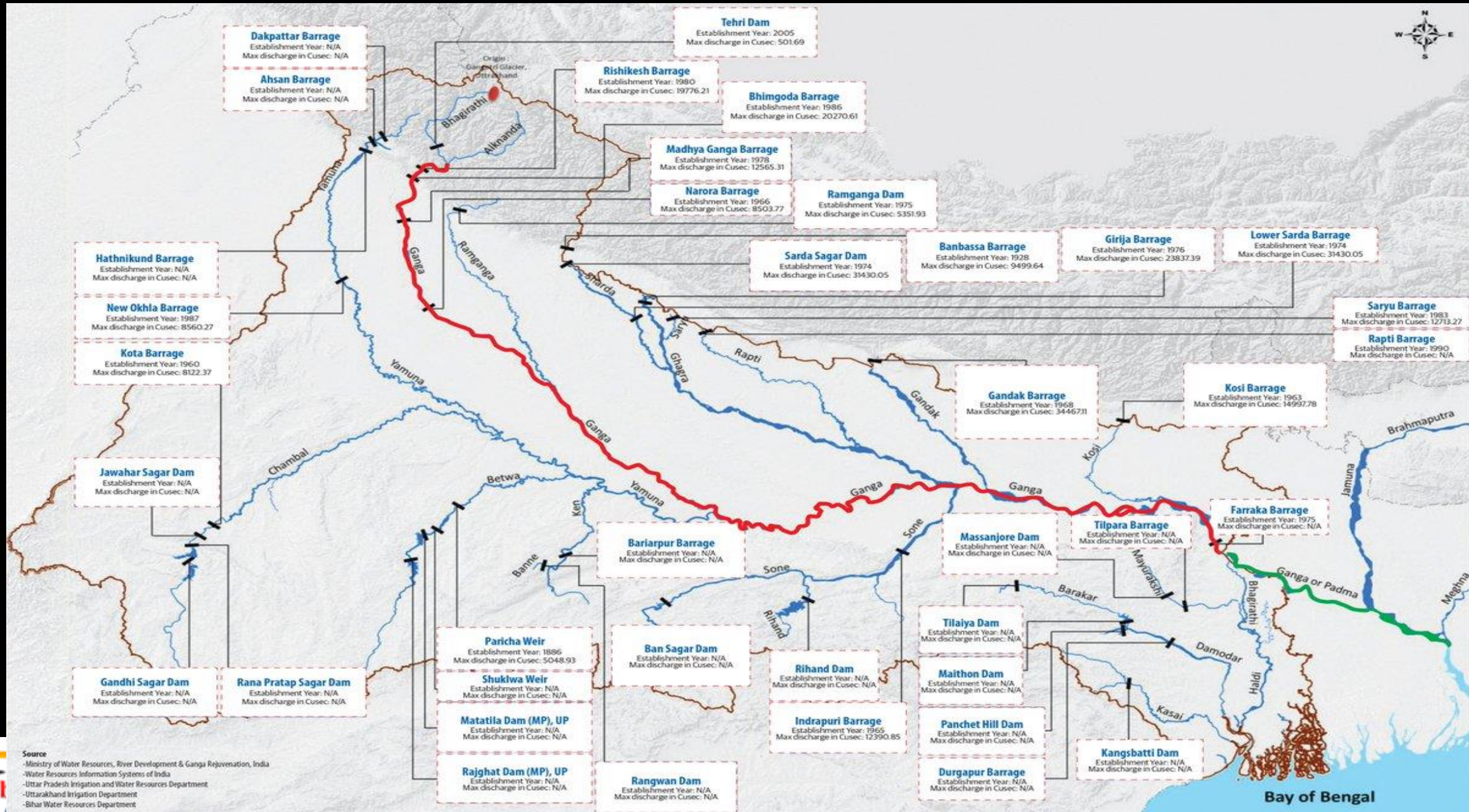




River	Source	Mouth	Length (in km)	Tributaries	Other information
<b>Yamuna</b>	Yamunotri Glacier Bandar pooch UK	Ganga; Prayagraj	1376 km	Tones Giri Hindaun Gambhiri Chambal Betwa and Ken	Enters to the plain near tajewala longest tributary of Ganga
<b>Chambal charmanvati</b>	janapav Hills Mau district MP	Yamuna Etawah UP	1050	Banas Parvati Kali Sindh shipra	<ul style="list-style-type: none"> <li>• Gandhi Sagar MP</li> <li>• Rana Pratap Sagar RJ</li> <li>• Jawahar Sagar Kota RJ</li> <li>• Kota Barrage RJ</li> </ul>
<b>Son</b>	spring near Amarkantak	Ganga; Danapur Patna	784 km	Johila Rihand North Koel	<b>Bansagar Dam project</b> <ul style="list-style-type: none"> <li>• joint project of MP UP Bihar</li> <li>• located in the Deolond village Shahdol MP</li> <li>• named on Bana Bhatt <b>Dehri on son</b></li> </ul>



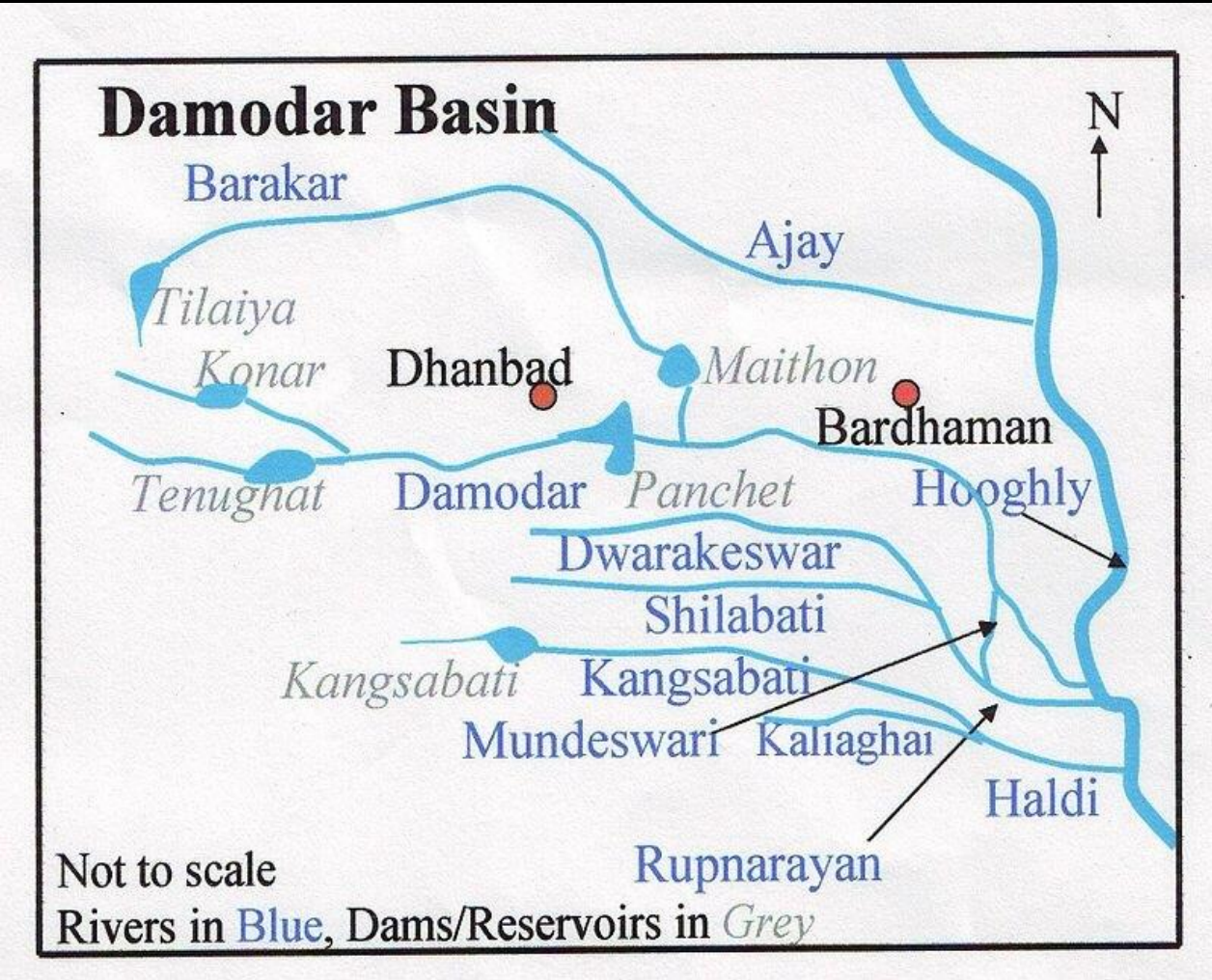
About 700 miles (1,127 km) across



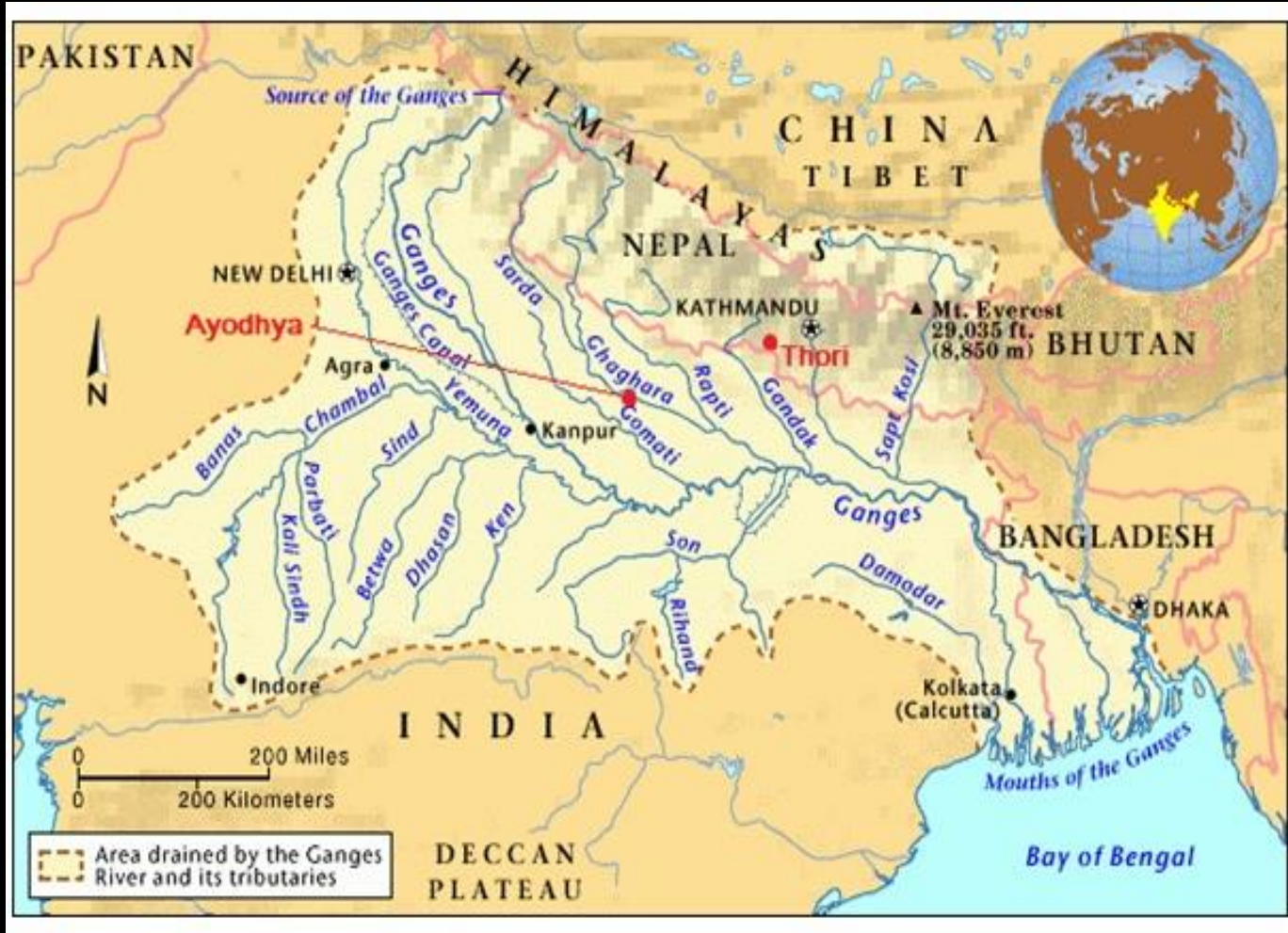
Source  
 -Ministry of Water Resources, River Development & Ganga Rejuvenation, India  
 -Water Resources Information Systems of India  
 -Uttar Pradesh Irrigation and Water Resources Department  
 -Uttarakhand Irrigation Department  
 -Bihar Water Resources Department

River	Source	Mouth	Length (in km)	Tributaries	Other information
<b>Damodar</b>	chulhapani latehar( <b>Palamu hills</b> ) Jharkhand	Hooghly river	592 km (passes through two states - <b>Jharkhand and West Bengal</b> )  flows <b>through a rift valley</b>	Barakar, noniya, konar	<ul style="list-style-type: none"> <li>• Due to the devastating floods it is also known as the '<b>sorrow of Bengal</b>.'</li> <li>➤ <b>DVC 1948 (1<sup>st</sup> MPP of independent India)</b></li> <li>• designed on the lines of the <b>Tennessee Valley Authority (T.V.A.)</b> in U.S.A.</li> <li>• <b>four dams</b> were constructed <ol style="list-style-type: none"> <li><b>1. Tilaiya Dam:</b> across the <b>Barakar river</b> at Tilaiya in Koderma district of <b>Jharkhand</b>.</li> <li><b>2. Konar Dam:</b> across the Konar river in the Hazaribagh District of <b>Jharkhand</b>.</li> <li><b>3. Maithon Dam</b> across the Barakar river near the confluence of Barakar with Damodar river.</li> <li><b>4. Panchet Dam:</b> constructed across the Damodar river,</li> </ol> </li> </ul>
<b>Karamnasa</b>	Kaimur district of Bihar	Ganga near chausa			Destroyer of religious merit
<b>Mayurakshi</b>	<b>Trikut Hills</b> , about 16 kilometres (10 mi) from Deoghar in Jharkhand state	Hooghly River	250 km (160 mi)	<b>Mayurakshi Project</b>	<ul style="list-style-type: none"> <li>• joint project of Jharkhand and West Bengal</li> <li>• <b>The Massanjore dam (also called Canada Dam), located at in Dumka district of Jharkhand, was commissioned in 1955.</b></li> </ul>



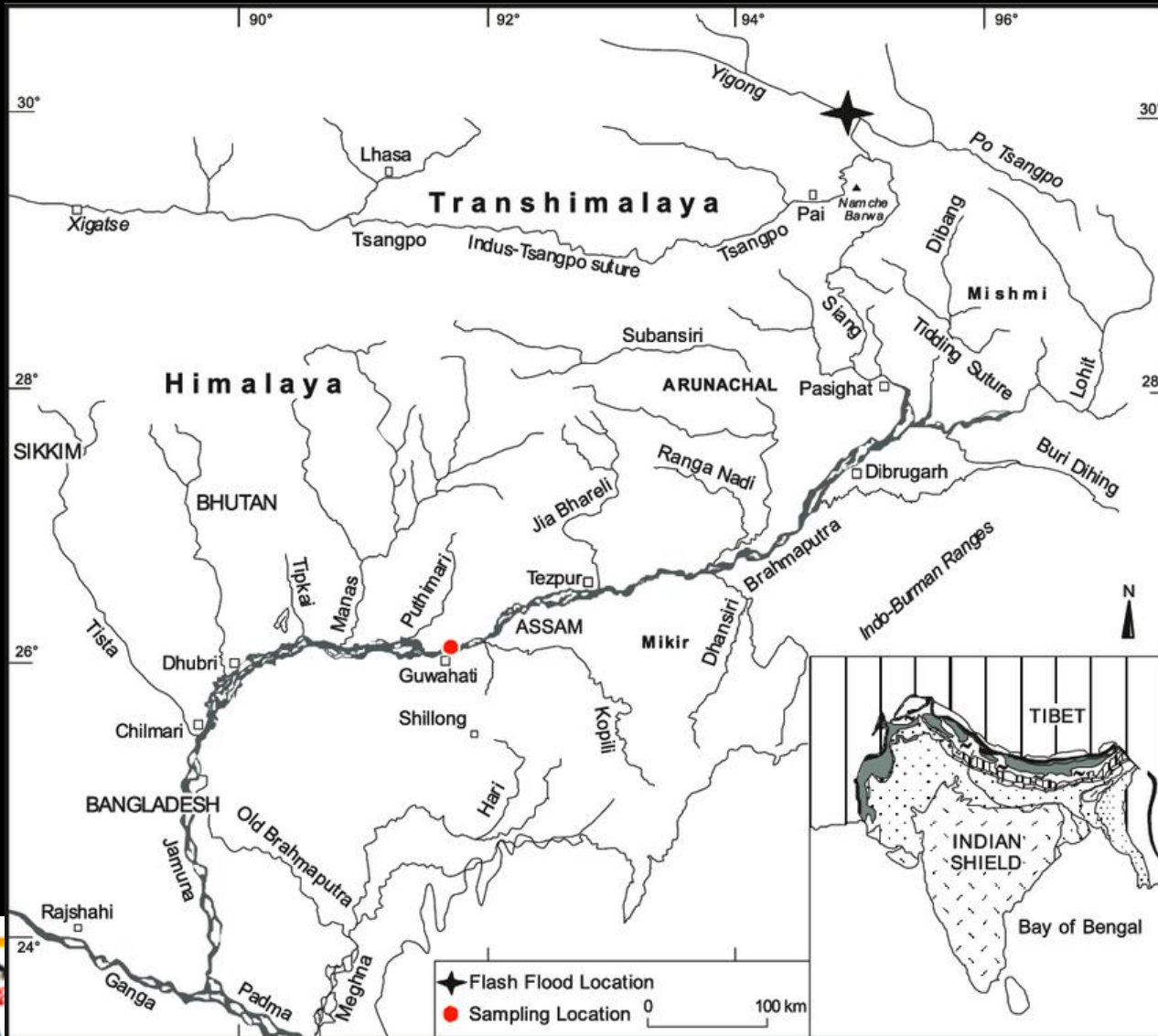


River	Source	Mouth	Length (in km)	Tributaries	Other information
<b>Ramganga</b>	namik Glacier Garhwal district of UK	Ganga Kannauj	596 km		passes through Jim Corbett National Park
<b>Ghagra riv.</b>	Guru Mandhata peak South Mansarovar	1080 km	Ganga near Chhapra	Sarju Rapti Sharda Chhoti gandak Budhi Ganga	<ul style="list-style-type: none"> <li>• known as Karnali in Nepal</li> <li>• it is the longest river in Nepal</li> <li>• It is the largest tributary of the Ganges by volume and the second longest tributary of the Ganges by length after Yamuna.</li> </ul>



River	Source	Mouth	Length (in km)	Tributaries	Other information
<b>Kali / Sharda ( after Tanakpur)</b>	Kala Pani /Milam glacier UK (known as the Goriganga)	Ghagra river	350 km	Gori Chamliya (Nepal)	Forms boundary between Nepal and Kumaon
<b>Gandak (Narayani)</b>	Mustang ,nepal	Ganga	630 km	Kali gandak Trisuli Bari	<b>National Park</b> <ul style="list-style-type: none"> <li>• Chitwan NP Nepal</li> <li>• Valmiki NP Bihar</li> </ul>
<b>Burhi gandak</b>	Sumer Hills near Indo Nepal border	Ganga	320 km		Form largest ox-bow lake- Kanwar taal, begusarai, bihar
<b>Kosi Sapt koshki</b>	Triveni Ghat Nepal	Ganga near kursela Ghat, Katihar	729 kilometre	Kamla Bagmati	sorrow of Bihar
<b>Sarju</b>	Nanda Kot mountain in Bageshwar district in Uttarakhand	Ghagra	350 km		Ayodhya located on the bank

# Brahmaputra River system



River	Source	Mouth	Length (in km)	Tributaries	Other information
<p>Brahmaputra</p> <p>known as</p> <ul style="list-style-type: none"> <li>• Tsangpo in Tibet</li> <li>• yarlung zangbo in China</li> <li>• Siang/Dihang River in Arunachal Pradesh,</li> <li>• Luit, Dilao in Assam</li> </ul>	<p>Manasarovar Lake Kailash range</p>	<p>Padma Ganga</p>	<p>2900 km</p> <ul style="list-style-type: none"> <li>• 9th largest river in the world by discharge</li> <li>• the 15th longest</li> </ul>	<p>left</p> <ul style="list-style-type: none"> <li>• Lhasa River,</li> <li>• Nyang</li> <li>• Parlung</li> <li>• Zangbo,</li> <li>• Lohit River,</li> <li>• Dhansiri</li> <li>• Kolong</li> </ul> <p>Right</p> <ul style="list-style-type: none"> <li>• Kameng</li> <li>• Manas</li> <li>• Raidak River,</li> <li>• Jaldhaka River,</li> <li>• Teesta</li> <li>• Subansiri</li> </ul>	<p><b>Majuli Island</b></p> <ul style="list-style-type: none"> <li>• largest river made island of world</li> <li>• in 2016 it became the first island to be made a district in India.</li> <li>➤ takes sharp turn near <b>namcha Barwa</b> peak</li> <li>➤ trans-boundary river which flows through Tibet, India, and Bangladesh</li> <li>➤ Jamuna River : lower stream of the Brahmaputra River; joins the Padma River</li> </ul>

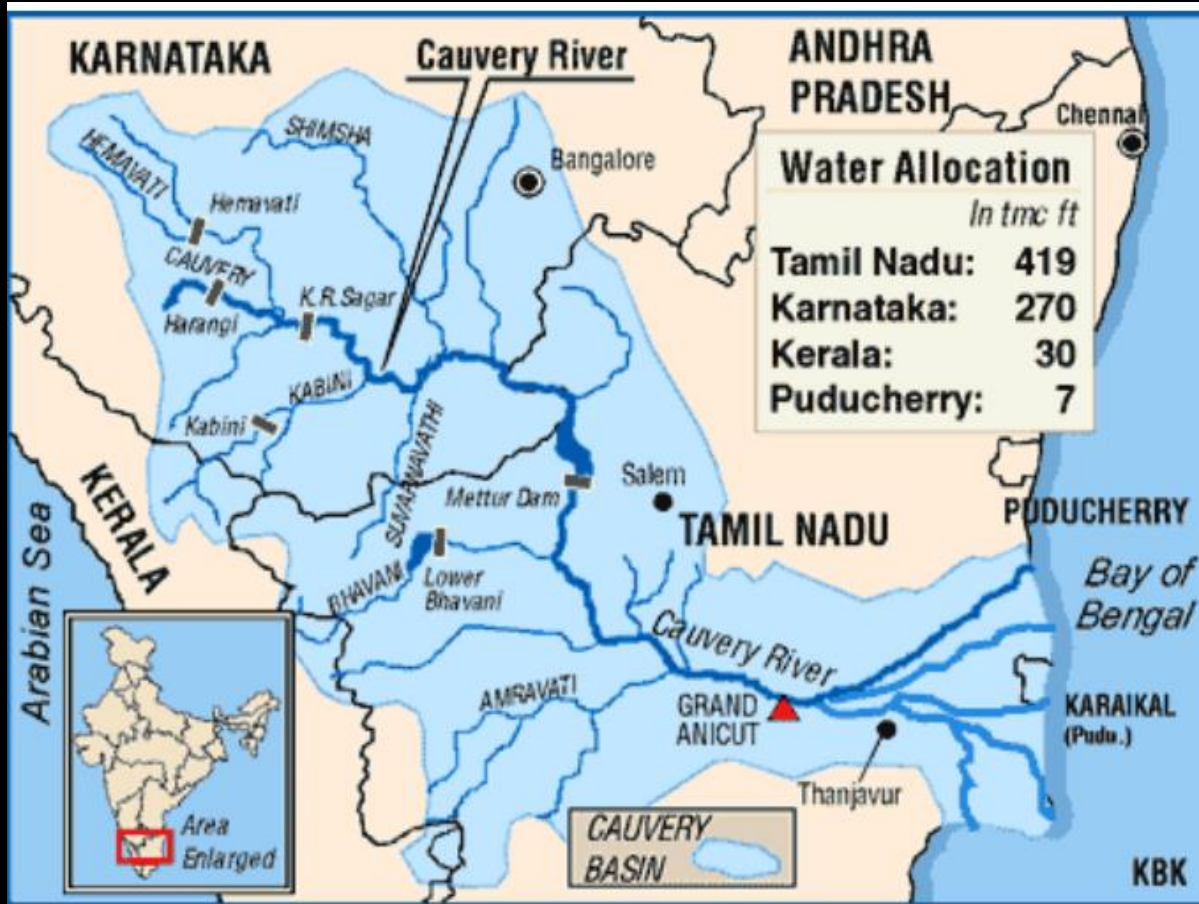


## Peninsular river system

River	Source	Mouth	Length (in km)	Tributaries	Other information
<b>Godavari</b>  <b>Dakshina Ganga</b>	Trimbakeshwar Nashik Maharashtra Brahmagiri	Bay of Bengal	1465	<b>left</b> <b>Banganga</b> , Kadva, Shivana, <b>Purna</b> , Kadam, <b>Pranahita</b> , <b>Indravati</b> , Taliperu, Sabari <b>Right</b> Nasardi, <b>Pravara</b> , Sindphana, <b>Manjira</b> , Manair, <b>Kinnerasani</b>	<ul style="list-style-type: none"> <li>• longest river of Peninsular India</li> <li>• second longest river of India after Ganga</li> <li><b>Kaleshwaram dam project</b></li> <li>• pranahita river</li> <li>• joint venture of Maharashtra and Telangana</li> <li><b>polavaram project</b></li> <li>• river interlinking project between Godavari and Krishna</li> <li>• has been accorded National project status by the Union Government of India</li> <li>• Papikonda National Park</li> </ul>



River	Source	Mouth	Length (in km)	Tributaries	Other information
<b>Krishna</b>	near Mahabaleshwar Maharashtra	bay of Bengal	1400 km	<p><b>left</b> Bhima, Dindi, Peddavagu, Musi, Paleru, Munneru</p> <p><b>right</b> Kudali (Niranjna) Venna, Koyna, Panchganga, Dudhaganga, Ghataprabha, Malaprabha, Tungabhadra</p>	<p>second largest east flowing river of Peninsular India</p> <p><b>Koyna Hydroelectric Project -Shivaji Sagar reservoir</b></p> <p><b>Nagarjuna Sagar Dam</b></p>
<b>Kaveri</b>	<b>Talakaveri, Brahmagiri range, near Cherangala</b> village of Kodagu (Coorg) district of Karnataka	Bay of Bengal	800 KM	<p><b>Left bank</b> Harangi, Hemavati, Shimsha, Arkavathy</p> <p><b>Right Bank</b> Lakshmana Tirtha, Kabini, Bhavani, Noyyal, Amaravati, Moyari</p>	<p>Mekedatu project arkavathi river</p> <p><b>Cauvery basin extends over states of Tamil Nadu, Karnataka, Kerala and Union Territory of Puducherry</b> draining an area of 81 thousand Sq.km.</p> <p><b>Shivanasamudra Falls</b></p>



# MEKEDATU PROJECT

**KARNATAKA**

- Mekedatu is **Rs 9,000-cr** project proposed at Ontigondlu in Karnataka.
- Project site is at confluence of Cauvery & its tributary Arkavathi.
- Reservoir aimed at ensuring **drinking water** to Bengaluru & adjacent areas.
- Project also envisioned to generate **400 MW** of power.



Cauvery river near Mekedatu

MAP NOT TO SCALE

ThePrint



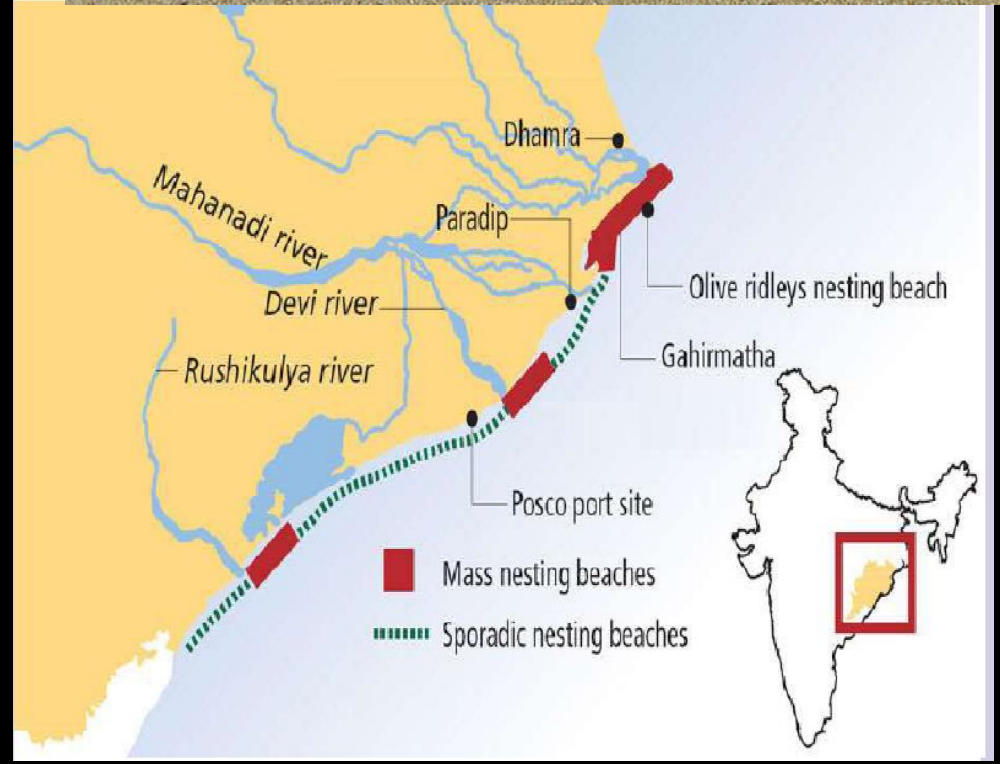
River	Source	Mouth	Length (in km)	Tributaries	Other information
Brahmani river Confluence of South Koel and sankh at Rourkela	Santhal Pargana Jharkhand	Bay of Bengal	800 km	tikra Kura	rengali Dam bhitarkanika wildlife sanctuary
Swarna Rekha	Nagari Hills near Ranchi	Bay of Bengal	395 km		forms boundary between West Bengal and Orissa hundru waterfall

River	Source	Mouth	Length (in km)	Tributaries	Other information
Mahanadi	Sihawa, Dhamtari, Dandakaranya, Chhattisgarh, India	Bay of Bengal <b>False Point, Jagatsinghpur, Delta, Odisha, India</b>	857	<b>left</b> Seonath, Mand, Ib, Hasdeo <b>right</b> Ong, parry, Jonk, Telen	Hirakud Dam js. Khanwilkar tribunal
Devi river	<ul style="list-style-type: none"> <li>• Is one of the <b>principal distributaries of Mahanadi.</b></li> <li>• It flows through Jagatsingh-pur district and Puri district across Odisha and joins Bay of Bengal.</li> <li>• The mouth of the Devi river serves as a nesting ground <b>for olive ridley sea</b> turtles during their breeding season.</li> </ul>				
Rushikulya River	<ul style="list-style-type: none"> <li>• Source - Daringbadi, Kandhamal, Odisha, India</li> <li>• Mouth- Puruna Bandha, bay of Bengal</li> <li>• olive ridley sea turtles nesting place near the mouth of the Rushikulya River</li> </ul>				
Vamsadhara River	<ul style="list-style-type: none"> <li>• originates in the border of Thuamul Rampur in the Kalahandi district and Kalyansinghpur in Rayagada district of Odisha and runs for a distance of about 254 kilometers, where it joins the Bay of Bengal at Kalingapatnam, Andhra Pradesh.</li> <li>• Vamsadhara river basin occupies 8015 square kilometers in Odisha and the remaining 2815 km<sup>2</sup> flows in Andhra Pradesh</li> </ul>				

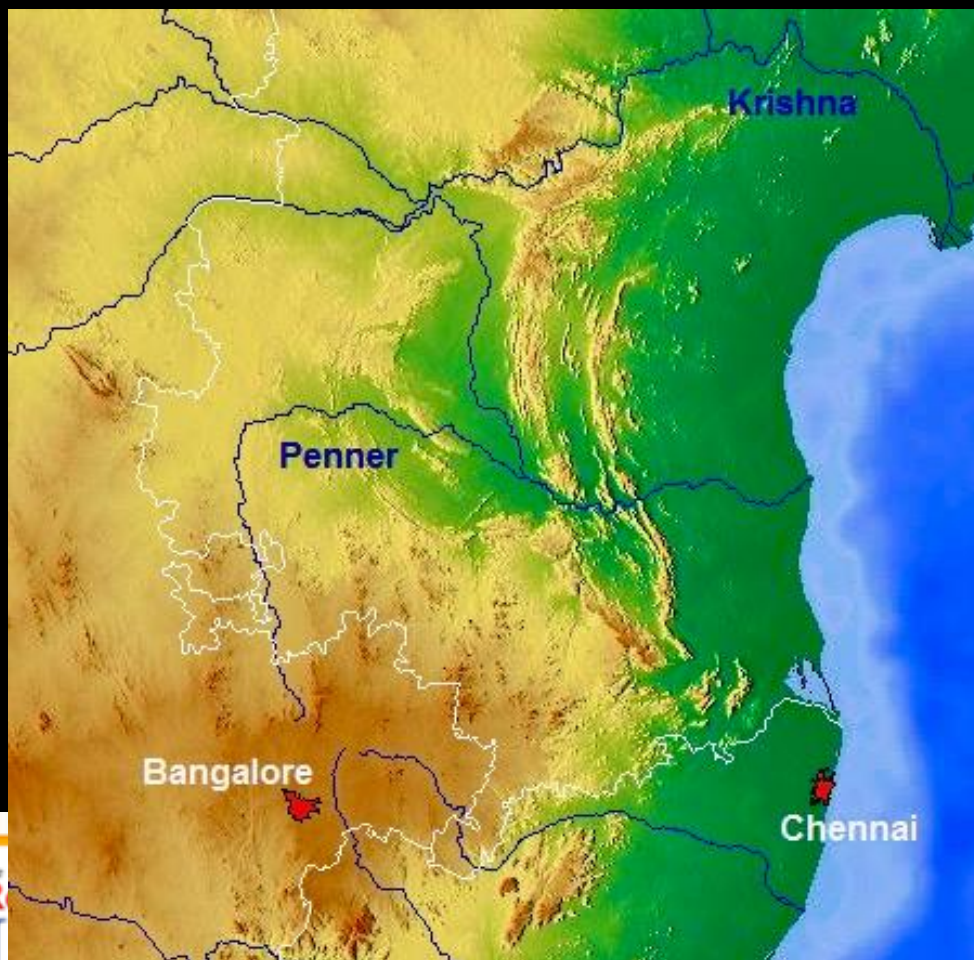
**SRIKAKULAM RIVER MAP**



Map not to Scale  
 Copyright © 2012 [www.mapsofindia.com](http://www.mapsofindia.com)  
 (Updated on 1st May 2012)



River	Source	Mouth	Length (in km)	Other information
<b>Penna (also known as Pinakini, Pennar,</b>	Nandi Hills, Karnataka	the Bay of Bengal	597 km Karnataka - Andhra Pradesh	The river basin lies in the rain shadow region of Eastern Ghats and receives 500 mm average rainfall annually Forms <b>Gandikota canyon</b> also known as gran canyon of india



River	Source	Mouth	Length (in km)	Other information
<b>Palar riv</b>	Nandi Hills in Chikkaballapura district of Karnataka state	Bay of Bengal at Vayalur	216 km Karnataka , Andhra Pradesh and Tamil Nadu	<ul style="list-style-type: none"> <li>It flows as an underground river for a long distance</li> <li><b>Palar river water</b> from Palaranicut is diverted to <b>the Poondi reservoir</b> and to <b>Chembarambakkam Lake</b> located in the Adayar River basin.</li> <li>These two reservoirs are major water supply points to Chennai city.</li> </ul>
<b>Vaigai riv.</b>	Varusanadu Hills, the Periyar Plateau of the Western Ghats range	Palk Bay close to Pamban Bridge in Ramanathapuram District.		<ul style="list-style-type: none"> <li>Flows through the Kambam Valley, which lies between the Palani Hills and the Varushanadu Hills</li> <li>The <b>Vattaparai Falls</b> are located on this river</li> <li><b>Madurai,,</b> lies on the Vaigai.</li> <li>Sangam literature (circa 300 B.C. has paid many tributes to Vaigai</li> </ul>





## West flowing river of Peninsular India

River	Source	Mouth	Length (in km)	Tributaries	Other information
Narmada also known as Rewa	Amarkantak MP	Gulf of cambay ( Khambhat ) near Bharuch  Estuary aliabet Island near mouth	1310	<b>left</b> Kharmer, Burhner, Banjar, Temur, Sanair (Saner), Sher, Shakkar, Dudhi, Sukhri, Tawa, Hather, Ganjal, Anjal, Machak, Chhota Tawa, Kaveri (MP), Khurkia, Kundi, Borad, Deb, Goi, Karjan <b>right</b> Silgi, Balai, Gaur, Hiran, Biranjo, Tendon, Barna, Kolar (MP), Sip, Jamner, Chandrakeshar, Khari, Kenar, Choral, Karam, Man, Uri, Hathni, Orsang	largest West flowing river of Peninsular India third longest river entirely flow in India after Godavari and Krishna river dhuandhar waterfall in Jabalpur
Tapi river also known as twin of Narmada river	Multai hill Betul district MP	Gulf of Cambay near Surat	730 km	<b>the Purna, Girna, and Panjhra</b>	second longest West flowing river of India Ukai project in Gujarat

River	Source	Mouth	Length (in km)	Tributaries	Other information
Sabarmati	dhebar Lake Udaipur Rajasthan	Gulf of cambay	320 km		Ahmedabad located on the Shore
Mahi river	MP	Gulf of Khambhat	533 km		<ul style="list-style-type: none"> <li>• Mahi Bajaj Sagar Dam, Rajasthan</li> <li>• <b>Canara Dam Gujarat</b></li> <li>• passes through Tropic of Cancer twice</li> </ul>

River	Source	Mouth	Length (in km)	Tributaries & Other information
<b>Mandovi River</b>  <b>also known as Mahadayi or Mhadei river</b>	Bhimgad Karnataka	Arabian Sea,	81 kilometres	<ul style="list-style-type: none"> <li>• is described as the lifeline of the Indian state of Goa</li> <li>• Panaji ,capital of Goa, situated on the bank.</li> <li>• <b>Mandovi joins with the Zuari</b> at a common creek at Cabo Aguada, forming the <b>Mormugao harbour</b>.</li> <li>• Three large freshwater isles — Divar, Chorão and Vanxim are present in the Mandovi near the town of Old Goa.</li> <li>• The island of Chorão is home to <b>the Salim Ali Bird Sanctuary</b>, named after the renowned ornithologist Salim Ali.</li> <li>• The Mahadayi Water Disputes Tribunal (MWDT) <ul style="list-style-type: none"> <li>➤ between the of Karnataka and Goa</li> </ul> </li> </ul>

# MAHADAYI (MANDOVI) RIVER PATH



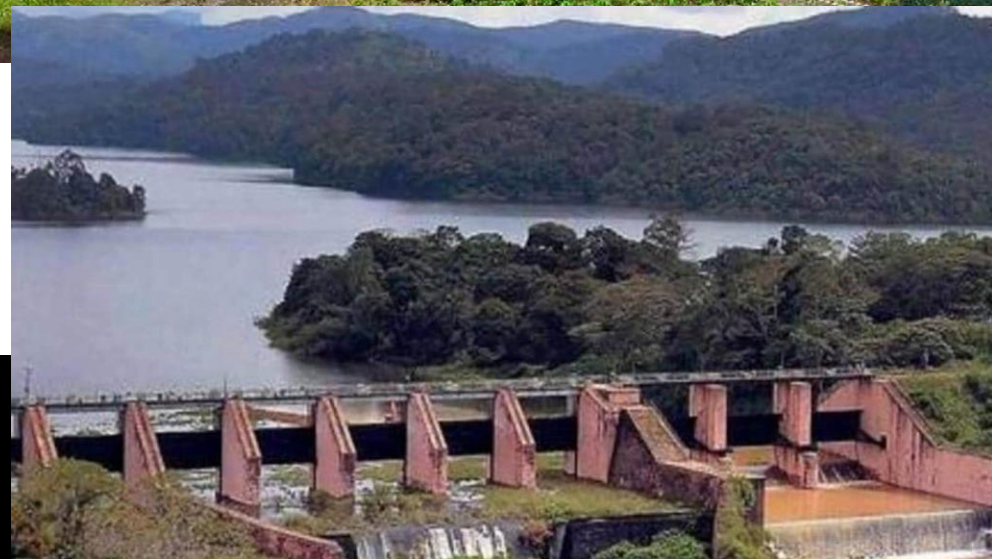
River	Source	Mouth	Length (in km)	Tributaries	Other information
<b>Periyar, (meaning: big river)</b>	Chokkampatti Mala, Periyar Tiger Reserve, Kerala, India	Arabian Sea, Vembanad Lake	244 KM		<ul style="list-style-type: none"> <li>• is the longest river and the river with the largest discharge potential of Kerala.</li> <li>• perennial rivers</li> <li>• <b>Idukki Dam</b> <ul style="list-style-type: none"> <li>➤ is a <b>double curvature Arch dam</b> constructed across the Periyar River</li> <li>➤ in Mariyapuram village in Idukki District in Kerala, India.</li> <li>➤ At 168.91 metres, it is one of the highest arch dams in Asia.</li> </ul> </li> <li>• <b>Mullaperiyar Dam</b> <ul style="list-style-type: none"> <li>➤ Is a masonry gravity dam</li> <li>➤ located in Thekkady, Idukki District of Kerala</li> <li>➤ At 881 m (2,890 ft) above mean sea level, on the Cardamom Hills of the Western Ghats in Kerala,</li> <li>➤ Constructed between 1887 and 1895 by John Pennycuick</li> <li>➤ In a UN report published in 2021, the dam was identified as one among the world's big dams which needs to be decommissioned for being 'situated in a seismically.</li> </ul> </li> </ul>

ARABIAN SEA

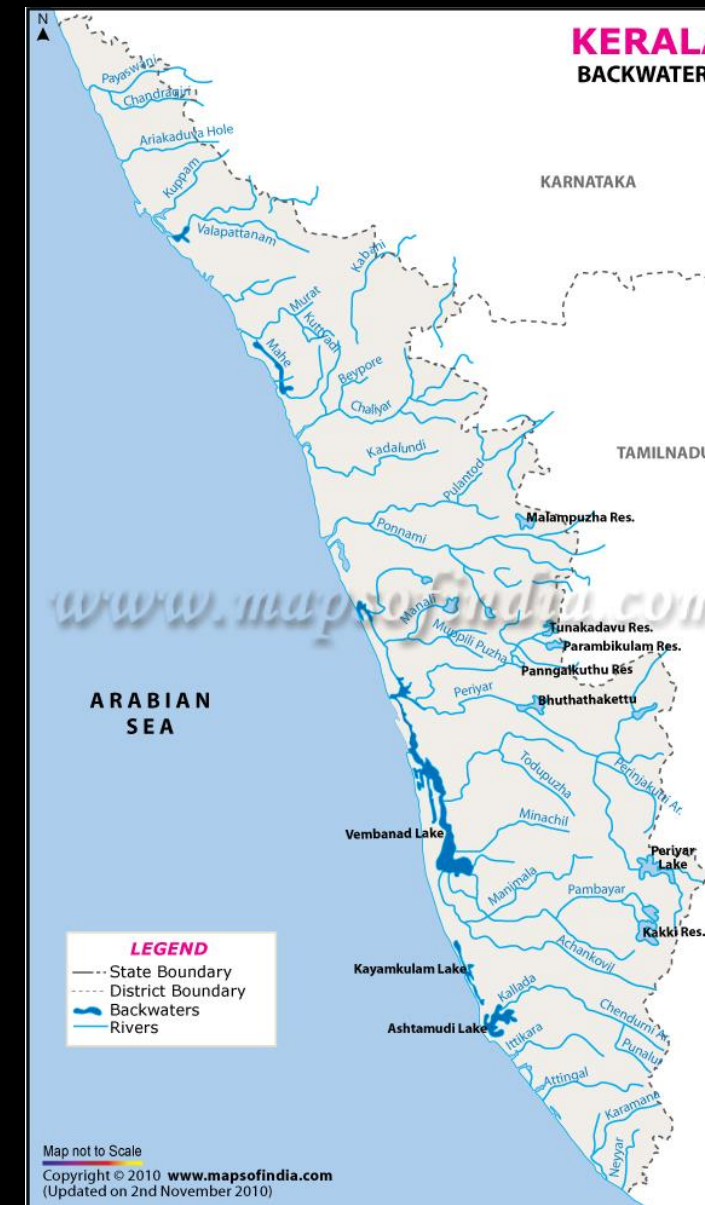


**LEGEND**

- State Boundary
- District Boundary
- Backwaters
- Rivers

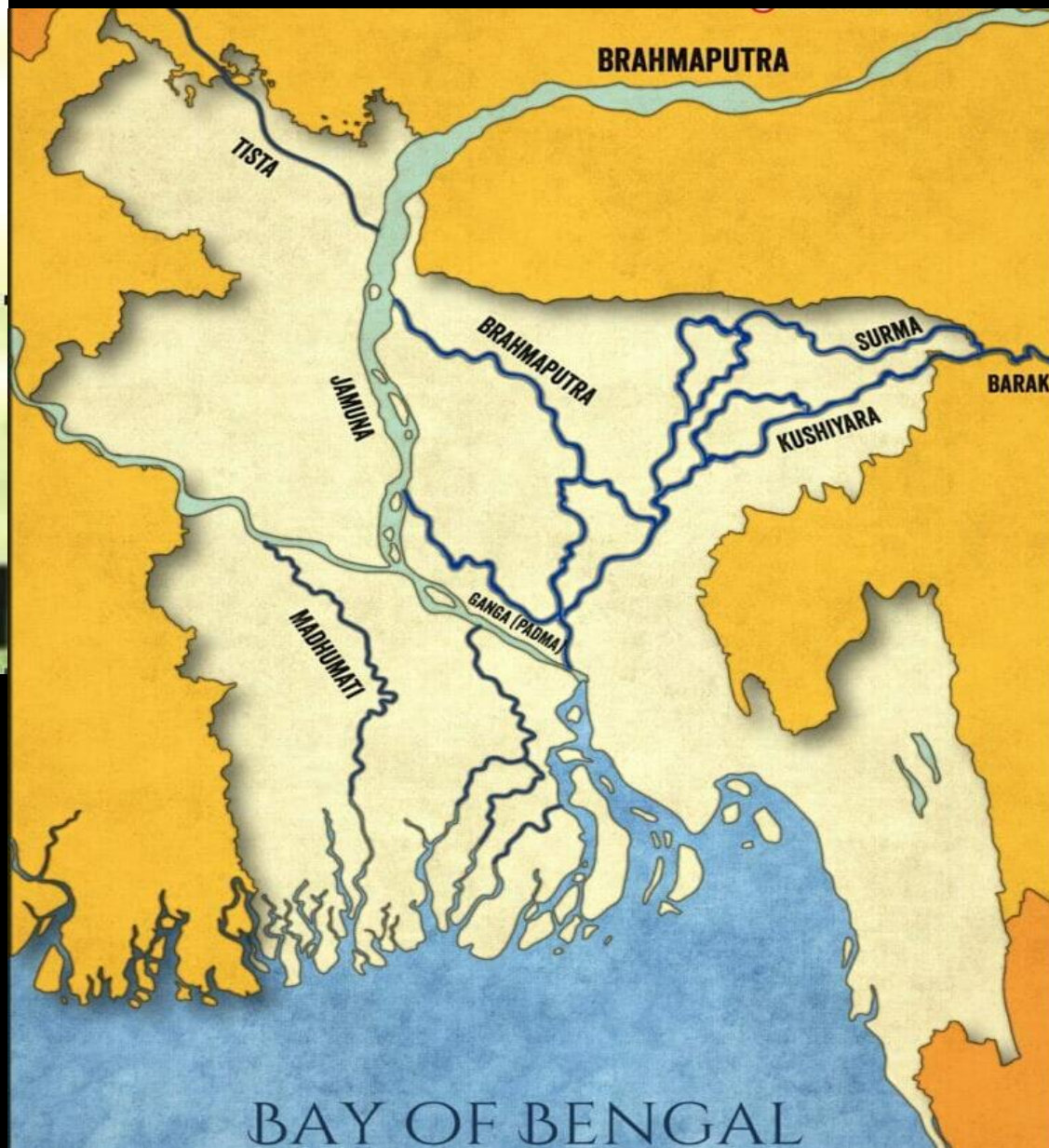


River	Source	Mouth	Length (in km)	Tributaries	Other information
chandragir i (also known by the name Payaswini )	Kodagu district in Karnataka	Arabian sea	105 km (Karnatka –Kerala)		<ul style="list-style-type: none"> <li>The river got its name Chandragiri from the place of its origin, <b>Chandragupta Vasti</b>, where the Maurya emperor Chandragupta is believed to have spent his last days as a sage.</li> <li>This river is considered as the traditional boundary between Tulu Nadu and Malayalam regions of Kerala.</li> </ul>
Umngot River also known as the Dawki River					<ul style="list-style-type: none"> <li>Flows mainly in Meghalaya</li> <li>one of India's cleanest rivers</li> </ul>

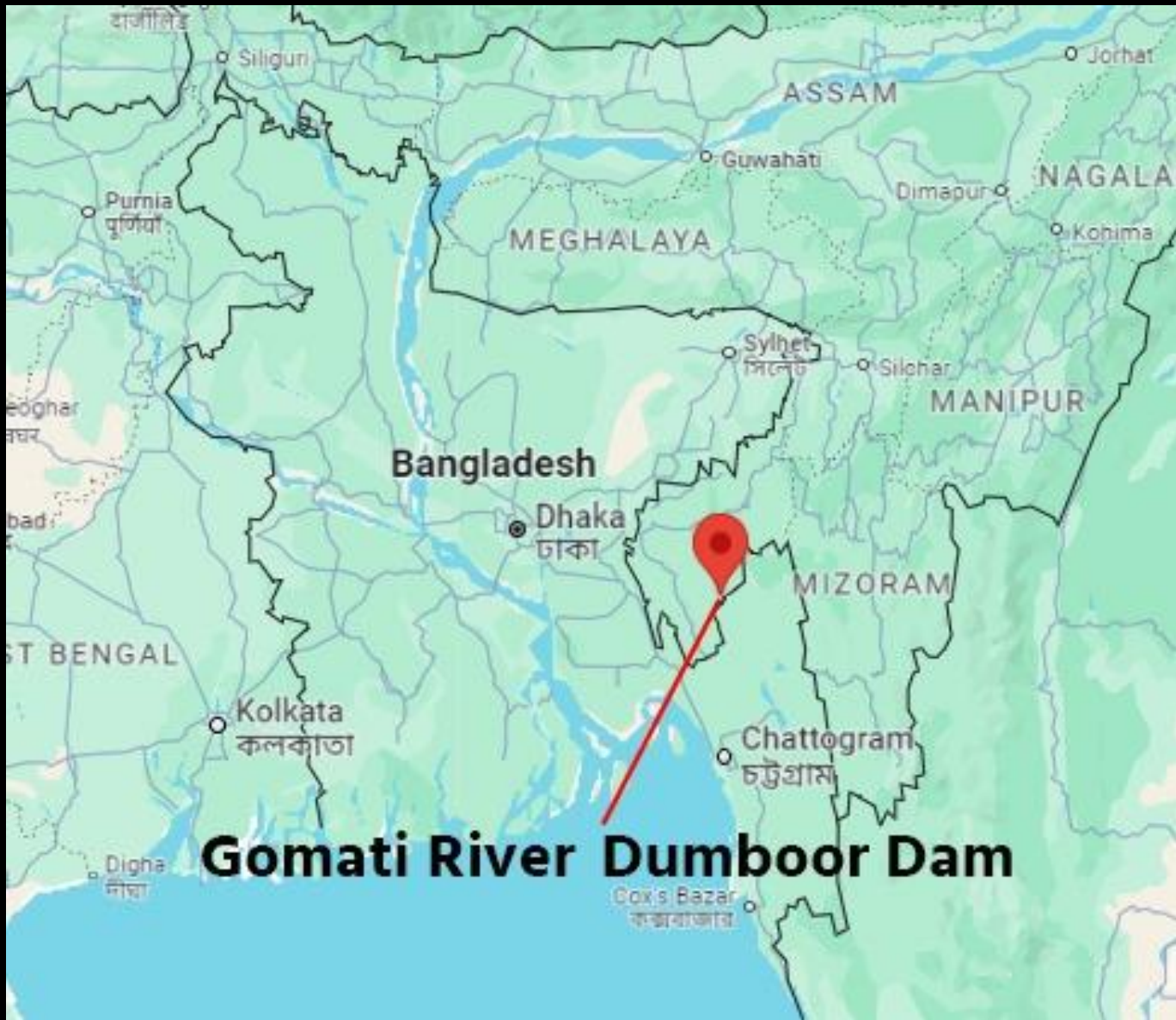


River	Source	Mouth	Length (in km)	Tributaries	Other information
<b>Barak River</b>	Manipur hills	Bay of Bengal	900 KM ( Manipur, Nagaland, Mizoram, Assam and Bangladesh)	<ul style="list-style-type: none"> <li>• In Bangladesh, it is known by the name of the Surma and the Kushiyara and later called the Meghna.</li> <li>• National Waterway 6, <ul style="list-style-type: none"> <li>➤ between Lakhipur and Bhanga (121 km )</li> <li>➤ Declared in the year 2016</li> </ul> </li> <li>• Tributaries :- the Sonai (or Tuirial), Jiri, Tlawng (or Dhaleswari, or Katakal), tJatinga, the Longai and the Madhura</li> <li>• <b>Tipaimukh Dam</b> is a proposed embankment dam on the river Barak in <b>Manipur</b> , first commissioned in 1983. The purpose of the dam is flood control and hydroelectric power generation</li> </ul>	

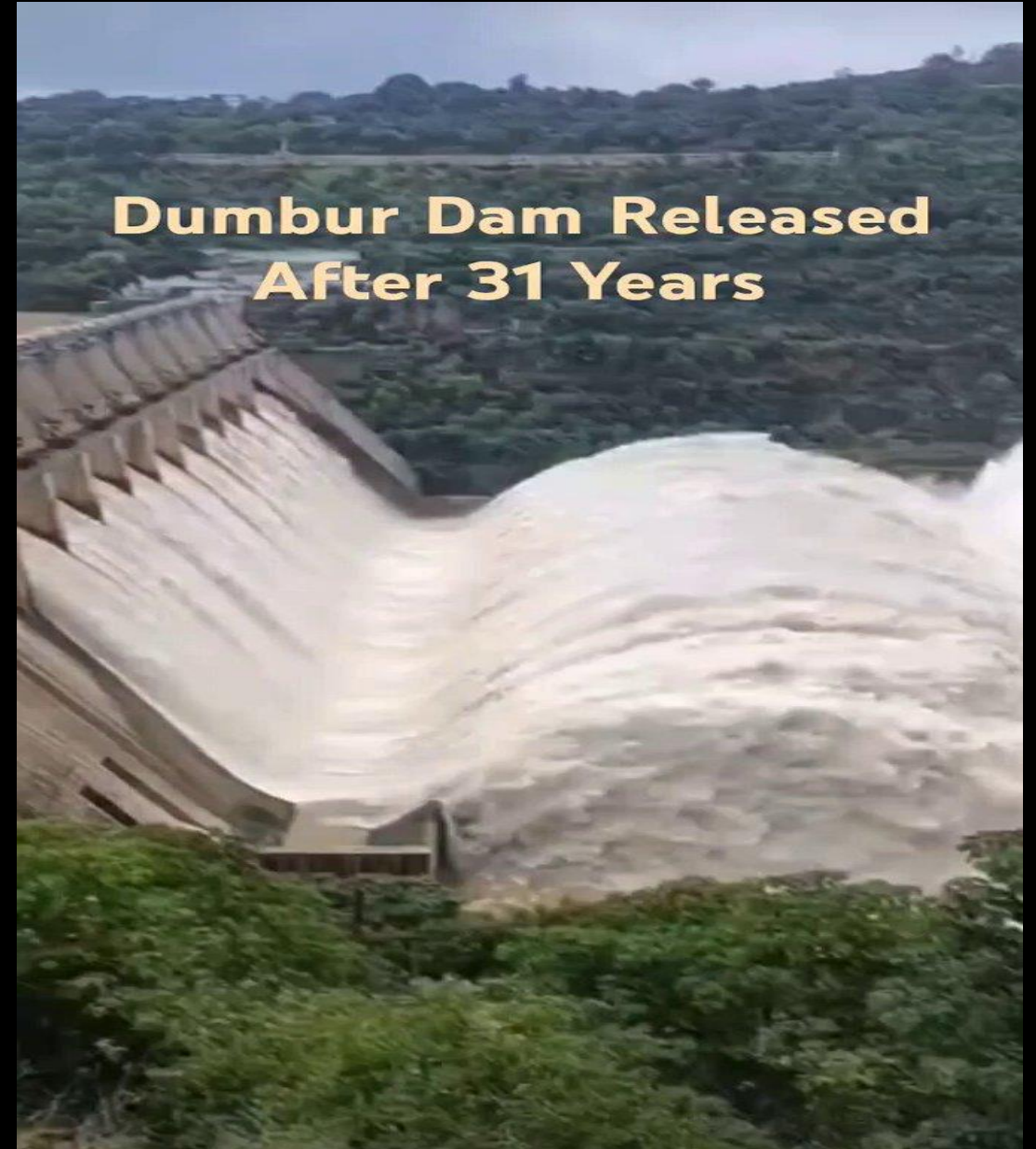




## Gumti river



- The Gumti river is a **transboundary river between India and Bangladesh.**
- It flows through the Tripura and **Comilla district** in Bangladesh.
- The river is a tributary of the **Meghna River.**
- A dam near **Dumboor** has created a 40-square-kilometer (15-square-mile) lake on the river

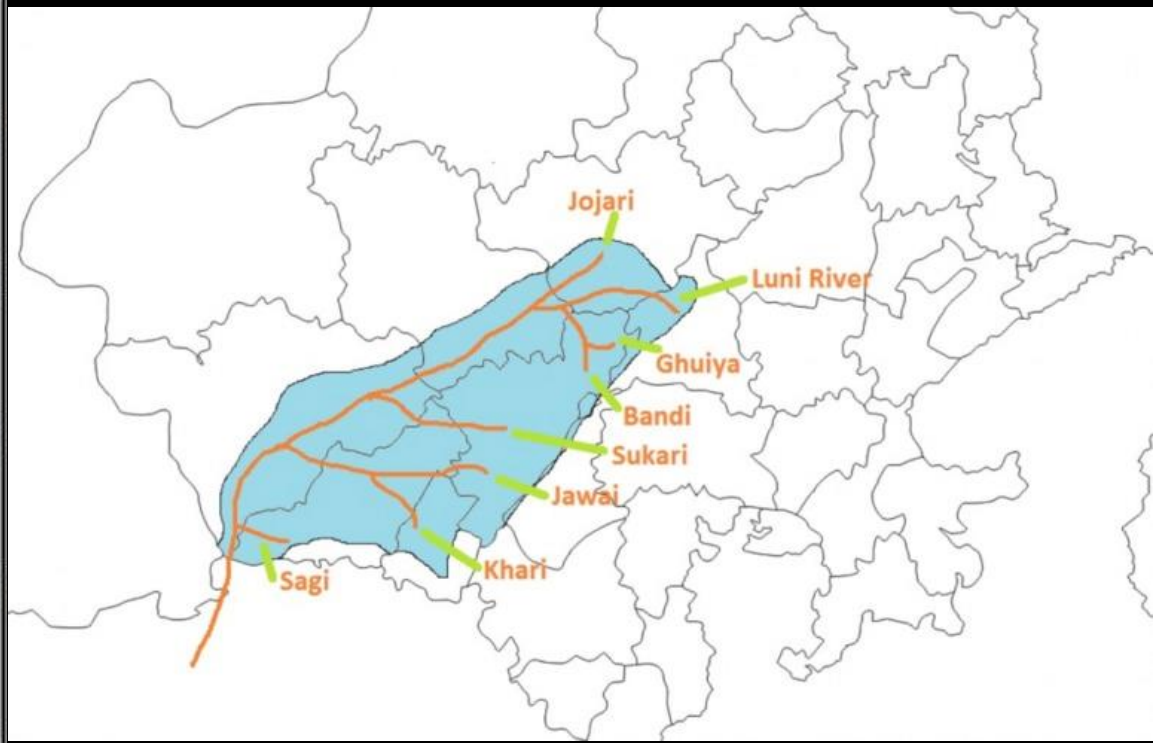
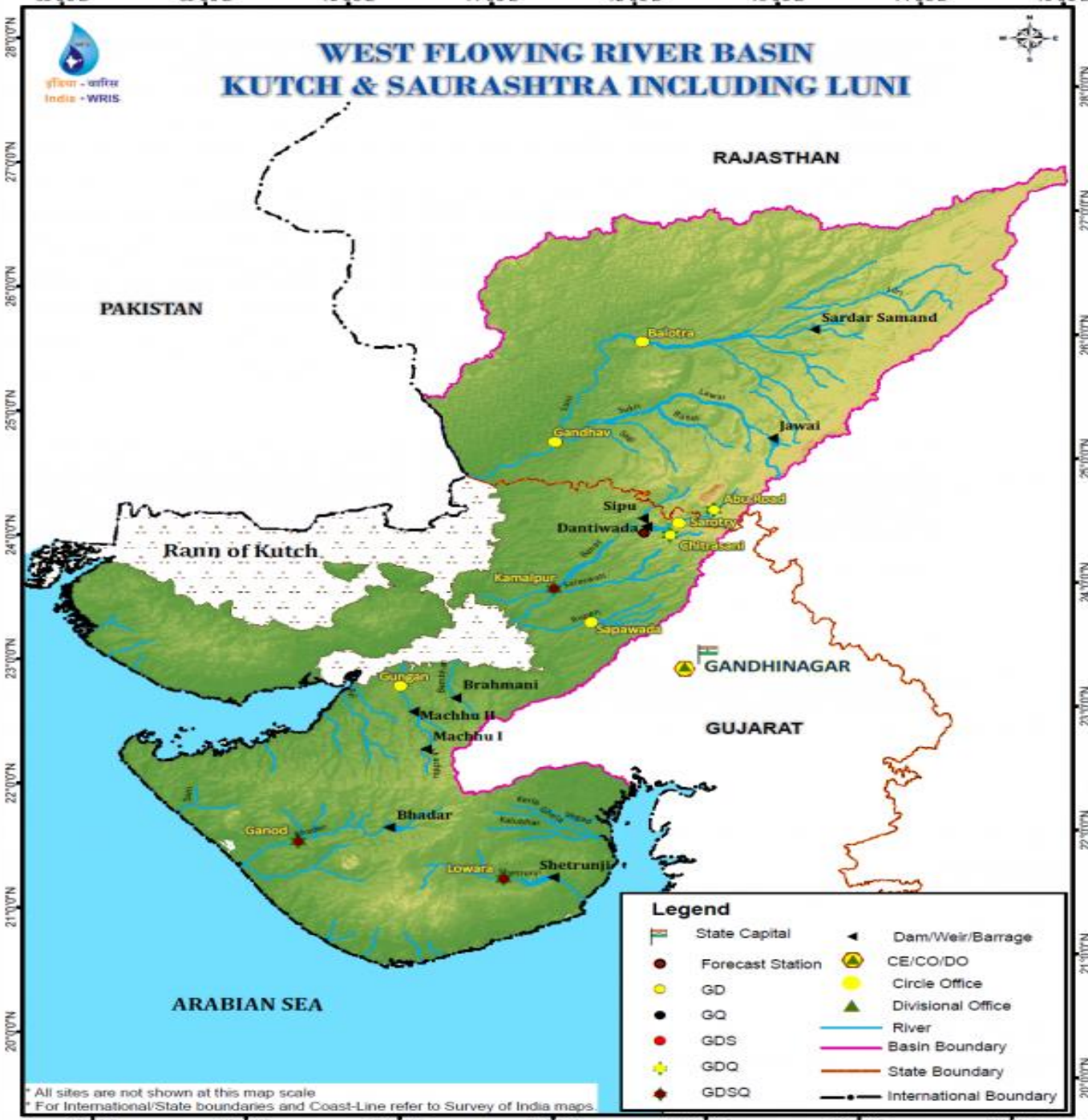


River	Source	Mouth	Length (in km)	Tributaries	Other information
<b>Kaladan River</b>	Mount <b>Zinghmuh</b> (2565m / 8 415ft) Naga Hills, Myanmar	Sittwe, Bay of Bengal			<ul style="list-style-type: none"> <li>• is Mizoram's largest river</li> <li>• Forms the international border between India and Burma</li> <li>• Kaladan was an entry point to Mizoram from the seaport of Sittwe in 1904</li> <li>• <b>Kaladan Multi-Modal Transit Transport Project</b> <ul style="list-style-type: none"> <li>➤ A joint venture of India and Myanmar</li> <li>➤ Estimated cost US\$500 million</li> <li>➤ The project includes <ul style="list-style-type: none"> <li>➤ Construction of Sittwe Port at the mouth of the river</li> <li>➤ Dredging of the Kaladan River to enable cargo vessels to navigate the river from Sittwe to Mizoram,</li> <li>➤ The construction of a river port at Paletwa (Myanmar)</li> <li>➤ Widening and upgradation of highways between Paletwa and Myeikwa on the Indo-Myanmar border</li> </ul> </li> </ul> </li> </ul>

## Endorheic river of India

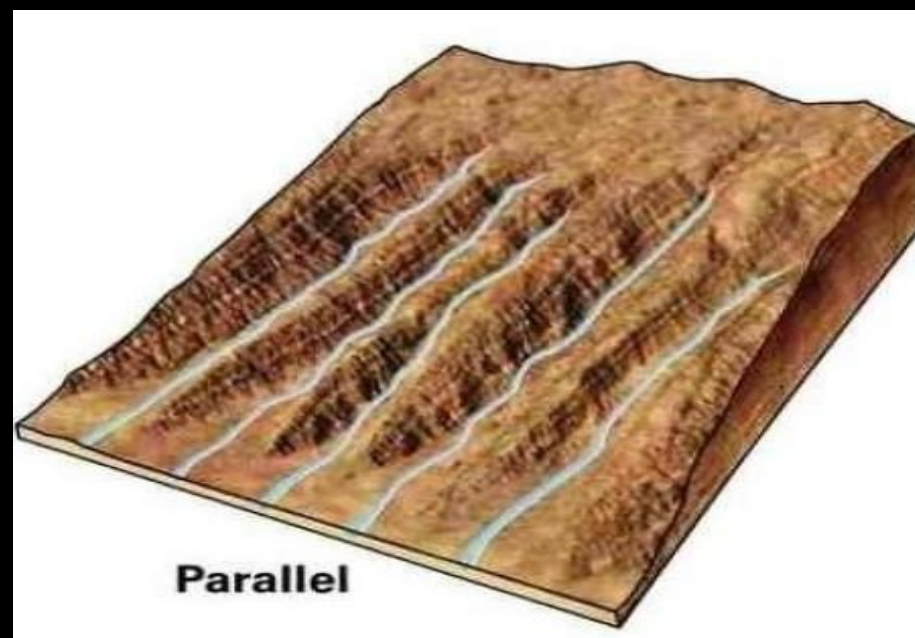
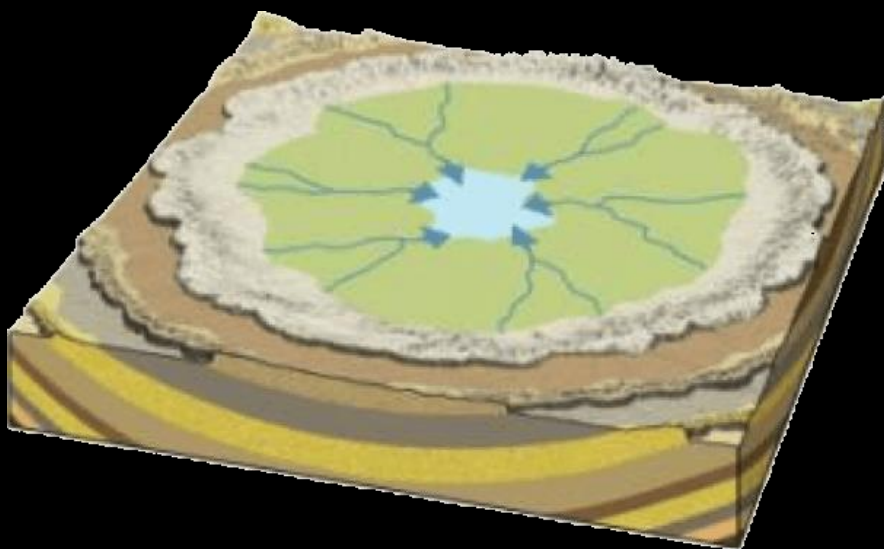
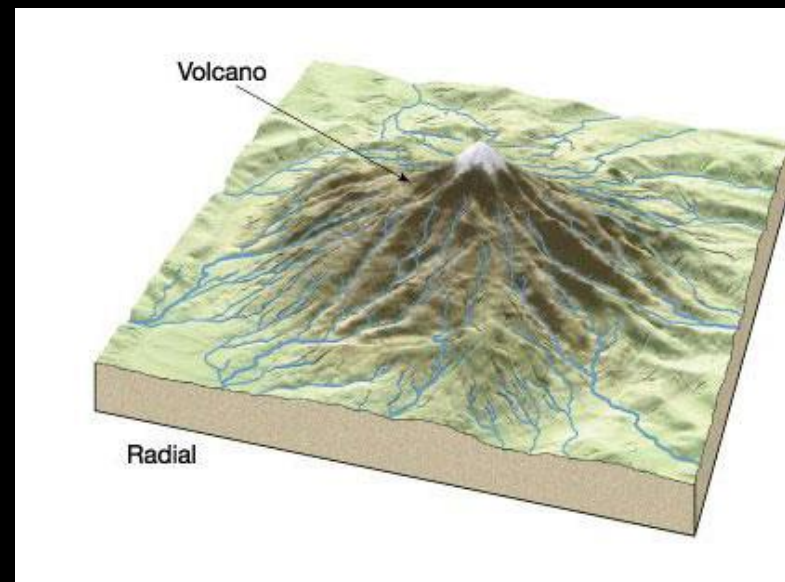
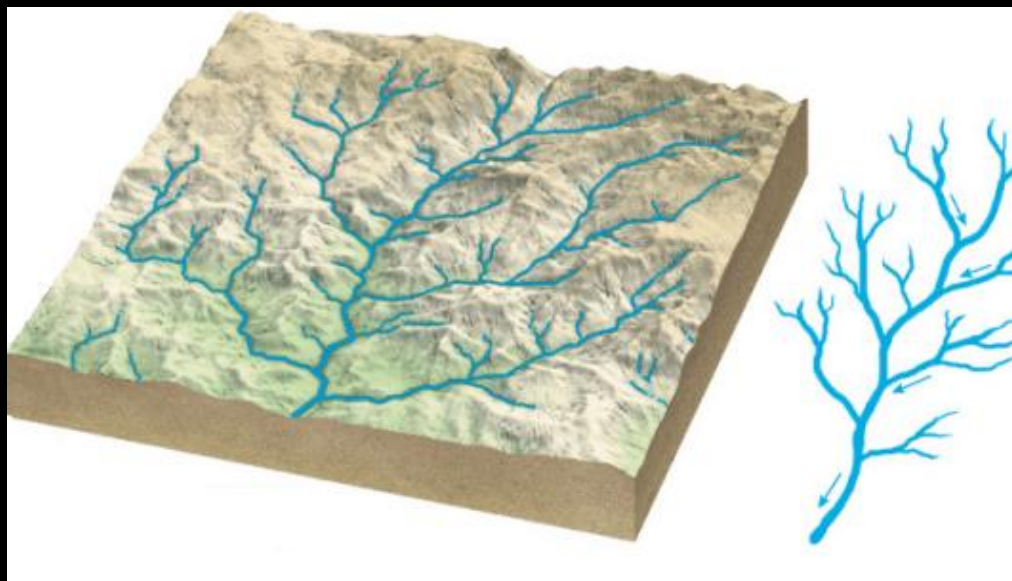
River	Source	Mouth	Length (in km)	Tributaries	Other information
<b>Luni river</b>  <b>Sagarmati and Saraswati river joins at Govindgarh and from luni</b>	Pushkar lake Ajmer	Rann of Kutch Gujarat	495 km		After Baltora water becomes saline
<b>Ghaggar river</b>	Himachal Pradesh	ottu Haryana	320 km		Flowing during monsoon

# WEST FLOWING RIVER BASIN KUTCH & SAURASHTRA INCLUDING LUNI



\* All sites are not shown at this map scale  
 \* For International/State boundaries and Coast-Line refer to Survey of India maps.

# Drainage Patterns



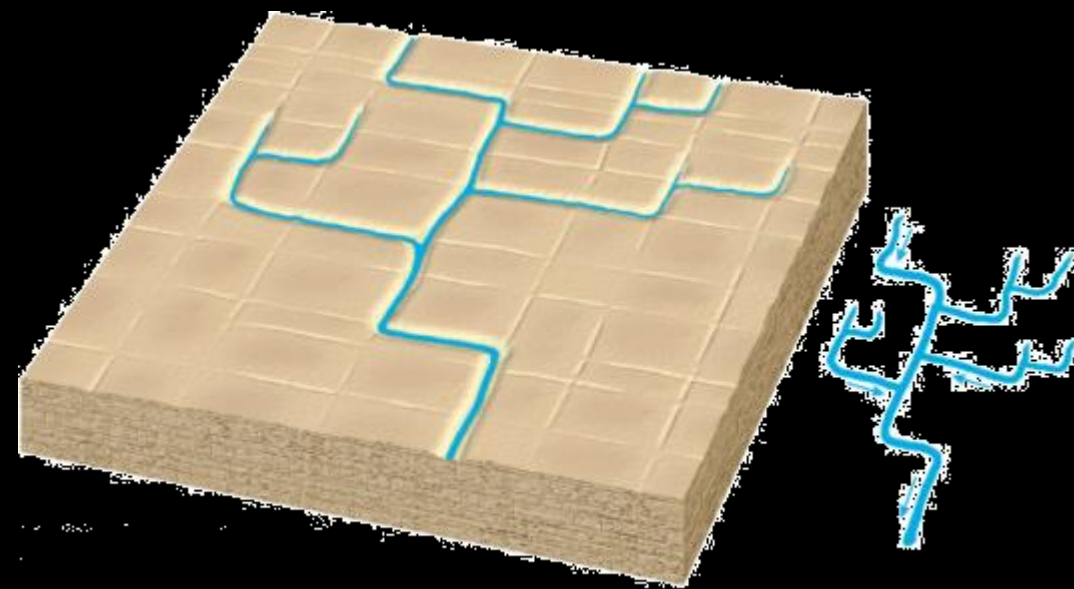
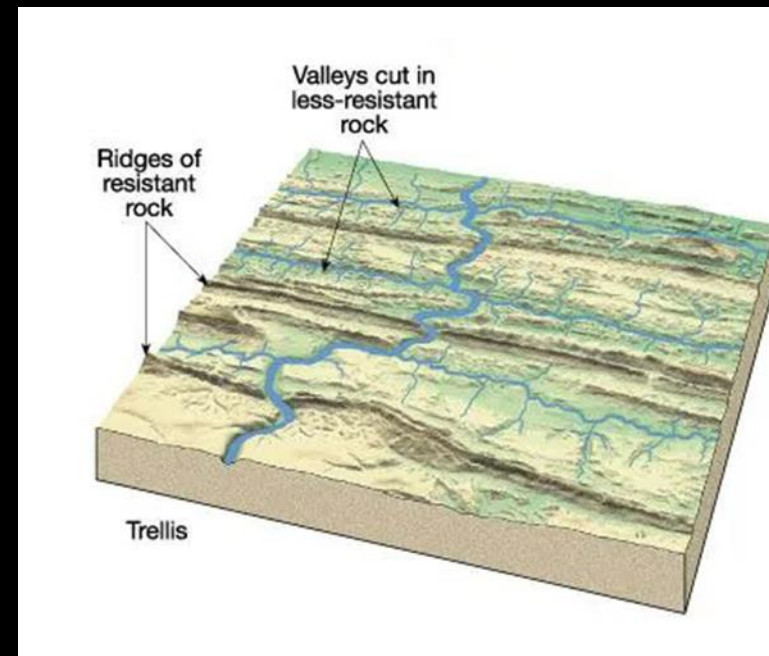
- The streams within a **drainage basin form certain patterns**, depending on the slope of land, underlying rock structure as well as the climatic conditions of the area.
- (i) The drainage pattern resembling the **branches of a tree is known as “dendritic”**.  
Examples :- **rivers of northern plain** (Indus, Ganga and Brahmaputra.)
- (ii) When the rivers originate **from a hill and flow in all directions**, the drainage pattern **is known as ‘radial’**. The rivers originating from the *Amarkantak* range present a good example of it (Narmada, Son and Mahanadi ).
- (iii) When the rivers discharge their waters from all directions in a lake or depression, the **pattern is known as ‘centripetal’**. It is just the opposite of the radial as streams flow toward a central depression. E.g. **Loktak lake in Manipur.**



(iv) When the primary tributaries of rivers *flow parallel to each other* and secondary tributaries join them at right angles, the **pattern is known as 'trellis'**. It develops in folded topography where hard and soft rocks exist parallel to each other

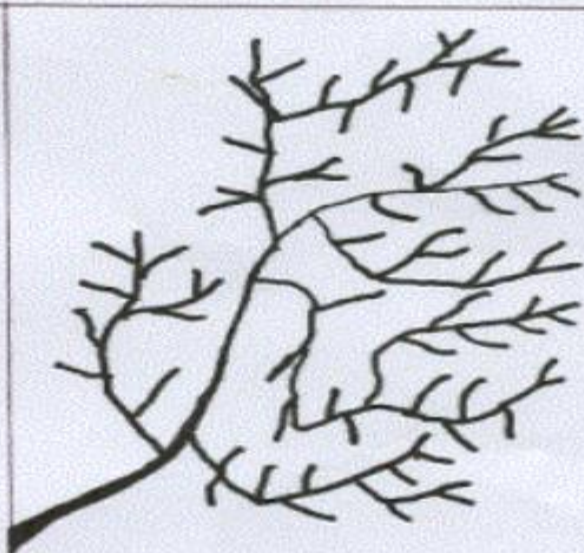
(v) **The rectangular drainage** pattern is found in regions that have undergone faulting. It develops on a strongly jointed rocky terrain. E.g. Streams found in the Vindhya mountain range; Chambal, Betwa and Ken.

(vi) **Parallel drainage** pattern develops in regions of parallel, elongated landforms where there is a pronounced slope to the surface. Tributary streams tend to stretch out in a parallel-like fashion following the slope of the surface. E.g. The rivers originating in the Western Ghats; Godavari, Kaveri, Krishna, and Tungabhadra.

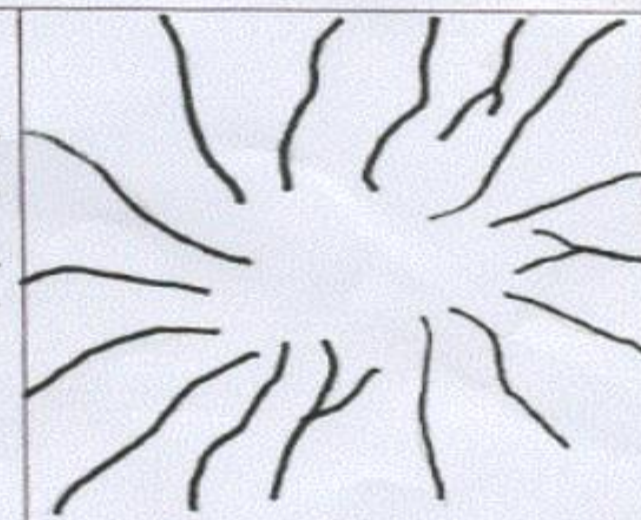




**Dendritic**



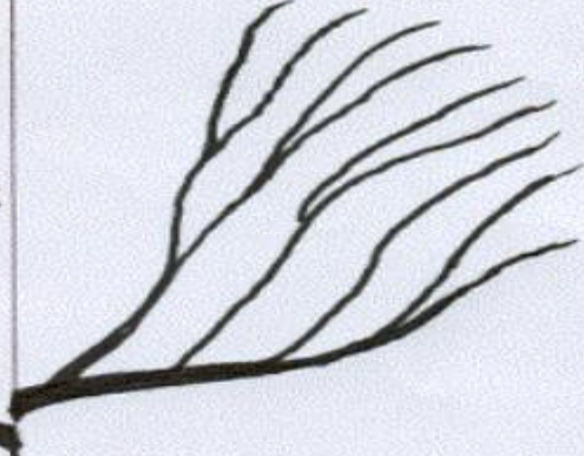
**Trellis**



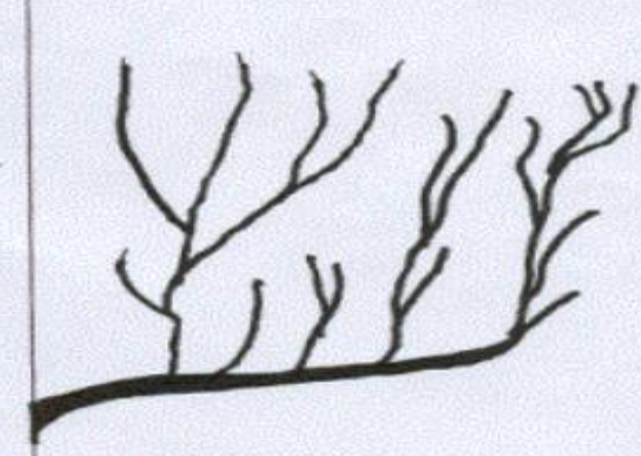
**Radial**



**Sub-dendritic**



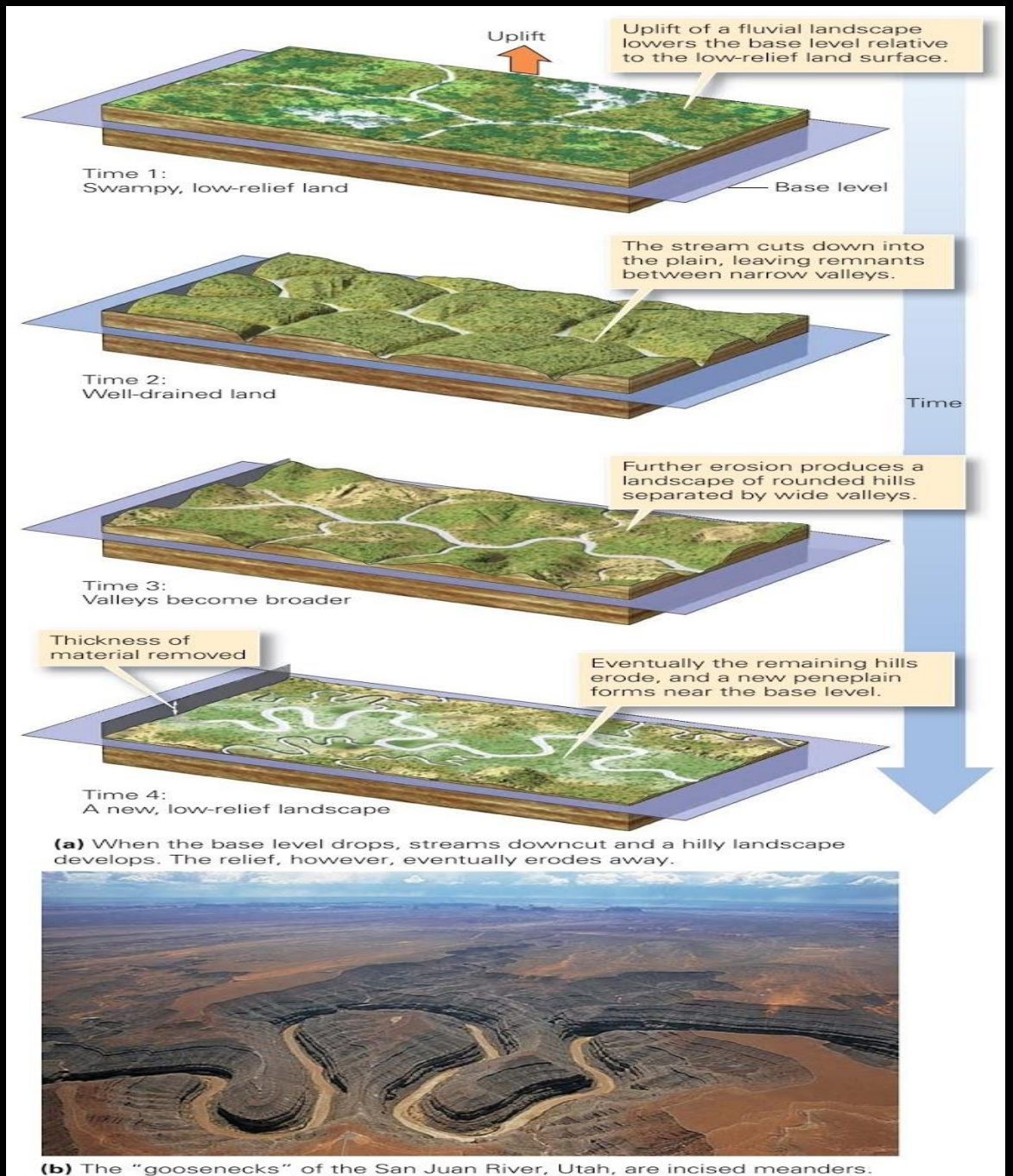
**Parallel**



**Sub-parallel**

# Discordant (slope independent) drainage

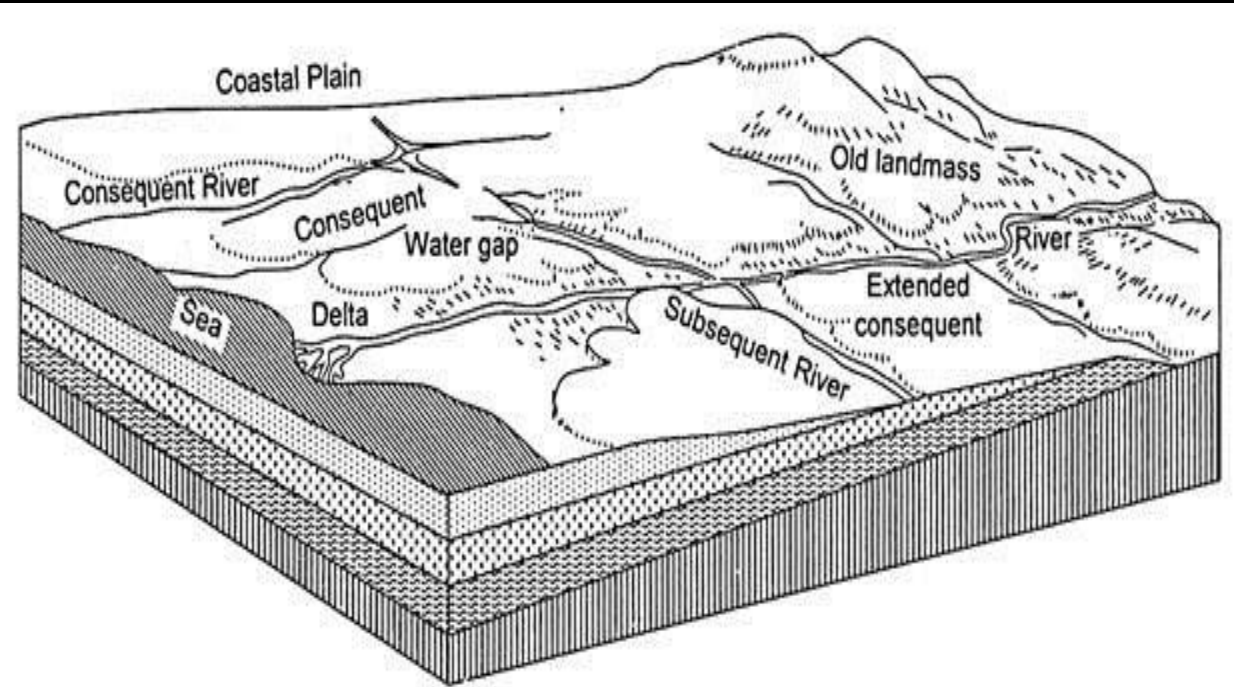
- Discordant (slope independent) drainage occurs when a river's course does not follow the slope or structure of the underlying terrain. Instead, the river cuts across different landforms, ignoring the natural slopes. This pattern typically forms due to geological processes like **superimposition** or **antecedence**.



- An **antecedent drainage** pattern forms when a river existed before the land was uplifted. As the land rose, the river kept cutting through, maintaining its original course. Examples include the Indus, Satluj, Ganga\*, Sarju (Kali), Arun (Kosi tributary), Tista, and Brahmaputra rivers.
- A **superimposed drainage pattern** forms when a river cuts through older rock layers that have been worn away by erosion. This happens through a process called superimposition. Examples include the Damodar, Subarnarekha, Chambal, and Banas rivers.

## Concordant Drainage (accordant drainage)

- **Concordant (or accordant) drainage occurs when a river's course follows the natural slope or structure of the underlying terrain. This means the river aligns with the geological features, such as valleys, folds, or faults, and flows in harmony with the landscape's slope.**



*Fig. 17.1 : Development of master consequent and subsequent streams over a coastal plain.*

- **Consequent Streams:** Those streams whose courses are the direct consequence of the initial topography are called consequent streams. **Consequent streams are the first streams to be originated in a particular region.** The longest stream of the whole system of consequent streams is called master consequent
- **Subsequent Streams:** These are developed after the master consequent. join the master **consequent at almost right angle.** Asan River, a tributary of the Yamuna River and the Song River, a tributary of the Ganga River in the Dehra Dun valley (in filled alluvial plain) are the examples of subsequent streams.
- **Obsequent streams:** These flow in **opposite direction to the master consequent.**
- **Resequent Streams:** A resequent stream flows **in the same direction as that of the initial consequent stream,** but which develops in response to a new base level formed due to inversion of relief.

# WATERFALL IN INDIA



## WATERFALL IN INDIA

Sr. No	Name	River / height	Important fact
1	• Kunchikal fall	<ul style="list-style-type: none"> <li>• Varahi riv.</li> <li>• With 1493 fit height it is the highest waterfall in India</li> </ul>	• Located in Karnataka
2	• Barhipani fall	<ul style="list-style-type: none"> <li>• on Balanga riv</li> <li>• 1309 fit</li> </ul>	• In Mayurbhanj dist. Odisha
3	• Nohkalikai fall	<ul style="list-style-type: none"> <li>• 1115 fit</li> </ul>	• Located in east khasi dist. Of Meghalaya
4	• Dudh sagar fall	• mandavi riv.	• Goa
5	• Jog / Gersoppa fall	<ul style="list-style-type: none"> <li>• Saravati river</li> <li>• Height - 829 fit</li> </ul>	<ul style="list-style-type: none"> <li>• located in Karnataka</li> <li>• renamed as Mahatma Gandhi Waterfall.</li> <li>• Is the second-highest plunge waterfall (253 meters)</li> <li>• waterfalls that drop vertically without touching the underlying cliff face.</li> </ul>
6	• Hundru fall	• Subarnarekha riv.	• Ranchi , Jharkhand
7	• Duduma fall	• Machhkund riv.	• Odisha



## WATERFALL IN INDIA

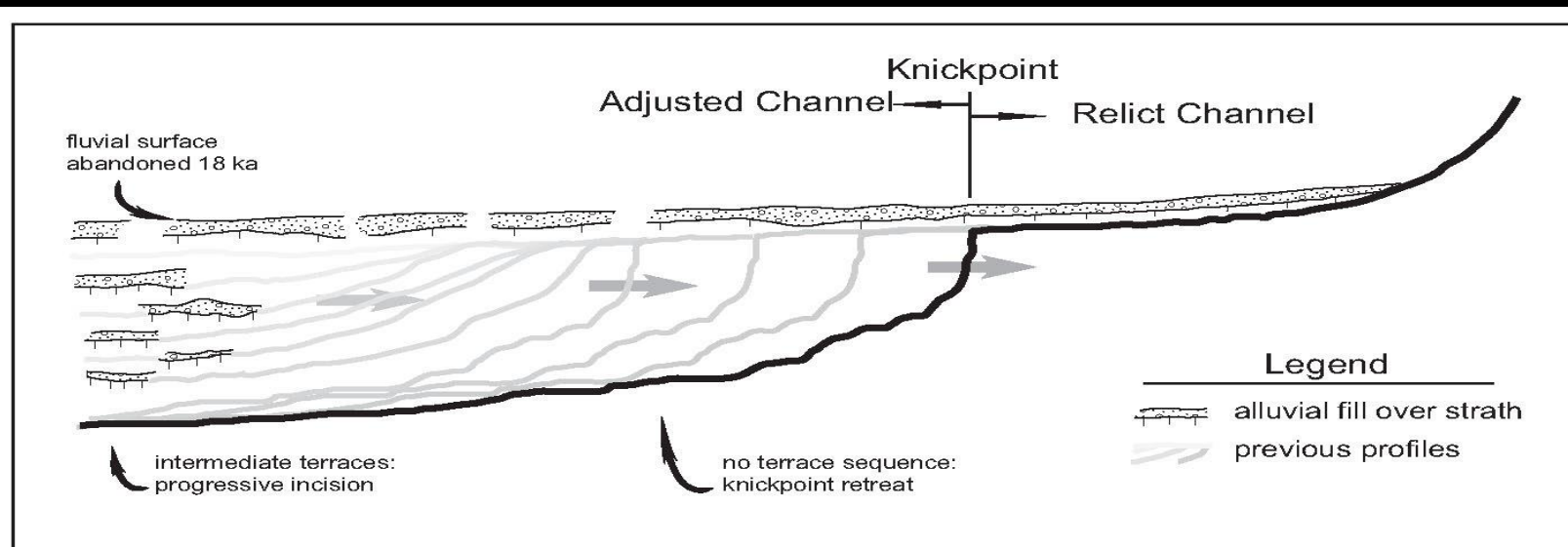
Sr. No	Name	River / height	Important fact
8	• Chachai / kavati	• Beehad River, a tributary of Tamsa or Tons River (Ganga)	• Rewa, MP
9	• Shivasamundramb fall	• Kaveri riv.	• Karnataka
10	• Kakolat fall		• Navada , Bihar
11	• Chitrakot fall		• Chhattisgarh • Called Niagara fall of India
12	• Rajrappa fall	• Located at the confluence of the Damodar and Bhairavi (locally called Bhera) rivers	• Ranchi in Jharkhand
13	• Barkana Falls	• Seetha River	• located in Shimoga district Karnataka • Falls is among the ten highest waterfalls in India.

## WATERFALL IN INDIA

Sr. No	Name	River / height	Important fact
14	• Gokak Falls	• Ghataprabha River	• Belagavi district of Karnataka
15	• Shivaganga falls	• River Shalmala	• Uttara Kannada, Karnataka
16	• Thalaiyar Falls	• Manjalar River, (tributaries of Vaigai river)	• Located in the Theni District , TN • Sixth highest waterfall in India • also known as Rat Tail Falls
17	• Badaghagara Waterfall		• Kendujhar district Odisha
18	• Lodh Falls	• Burha / Burhaghagh River , a tributari of North Koel River	• Highest waterfall in Jharkhand • waterfall in a mid forest of Palamau Tiger Reserve,
19	• Dhuandhar Falls	• Narmada River	• In Jabalpur district Madhya Pradesh

## WATERFALL IN INDIA

Sr. No	Name	River / height	Important fact
20	<ul style="list-style-type: none"> <li>Bahuti WaterFall</li> </ul>	<ul style="list-style-type: none"> <li>River Sellar</li> </ul>	<ul style="list-style-type: none"> <li>Highest waterfall in Madhya Pradesh</li> <li>Is an example of a knick point caused by rejuvenation</li> </ul>



# list of notable lakes in India

Lake Name	State/UT	Key Feature
Dal Lake	Jammu & Kashmir	Known for houseboats, Shikaras, floating gardens, and scenic beauty.
Pangong Lake	Ladakh	Endorheic lake, famous for changing colors; partially lies in China; is <b>the world's highest saltwater lake</b>
Wular Lake	Jammu & Kashmir	<b>Largest freshwater lake in India</b> ; important for fisheries and biodiversity.
Renuka Lake	Himachal Pradesh	Shaped like a woman's profile; considered sacred, linked to Renuka Devi.
Sambhar Lake	Rajasthan	<b>Largest inland saltwater lake in India</b> ; known for salt production.
Pushkar Lake	Rajasthan	Sacred Hindu pilgrimage site; hosts the annual Pushkar Camel Fair.
Vembanad Lake	Kerala	<b>Longest lake in India</b> ; popular for houseboats and the Nehru Trophy Boat Race.
Lonar Lake	Maharashtra	Created by a meteor impact; known for alkaline and saline water.
Bhojtal (Upper Lake)	Madhya Pradesh	Artificial lake in Bhopal; important source of drinking water.

Lake Name	State/UT	Key Feature
Chilika Lake	Odisha	<b>Asia's largest brackish water lagoon;</b> renowned for migratory birds and dolphins.
Rudrasagar Lake	Tripura	UNESCO-recognized Ramsar site; known for the Neermahal Palace.
Pulicat Lake	Andhra Pradesh & Tamil Nadu	Second largest brackish water lake in India; famous for flamingos.
Kolleru Lake	Andhra Pradesh	The <b>largest shallow freshwater lake in Asia;</b> significant bird sanctuary.
Ooty Lake	Tamil Nadu	Artificial lake, popular for boating; surrounded by Nilgiri Hills.
Loktak Lake	Manipur	Largest freshwater lake in Northeast India; floating phumdis and wildlife.
Umiam Lake	Meghalaya	Artificial lake formed by a dam; popular for water sports.