

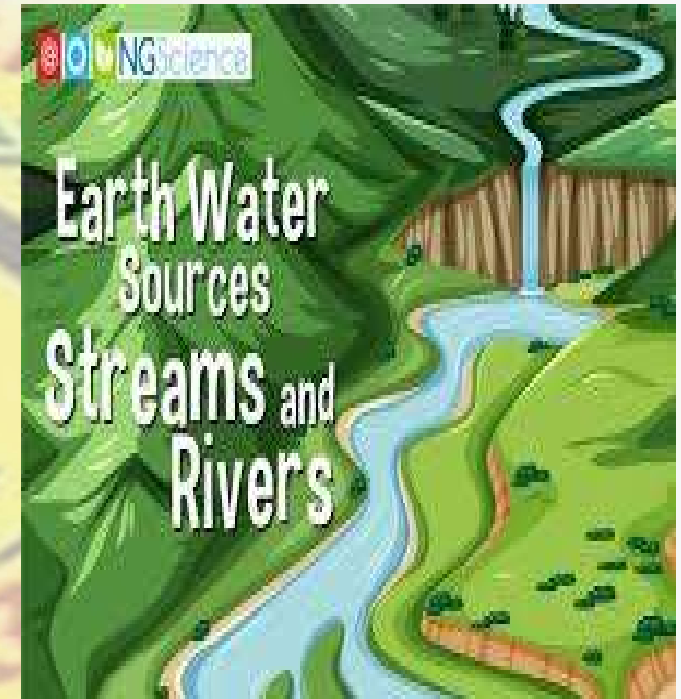
RIVER AND DRAINAGE SYSTEM



Drainage System

The drainage basin includes **both the streams and rivers and the land surface.**

The drainage basin acts as a **funnel**. By collecting all the water within the area covered by the basin and channeling it to a **single point**.



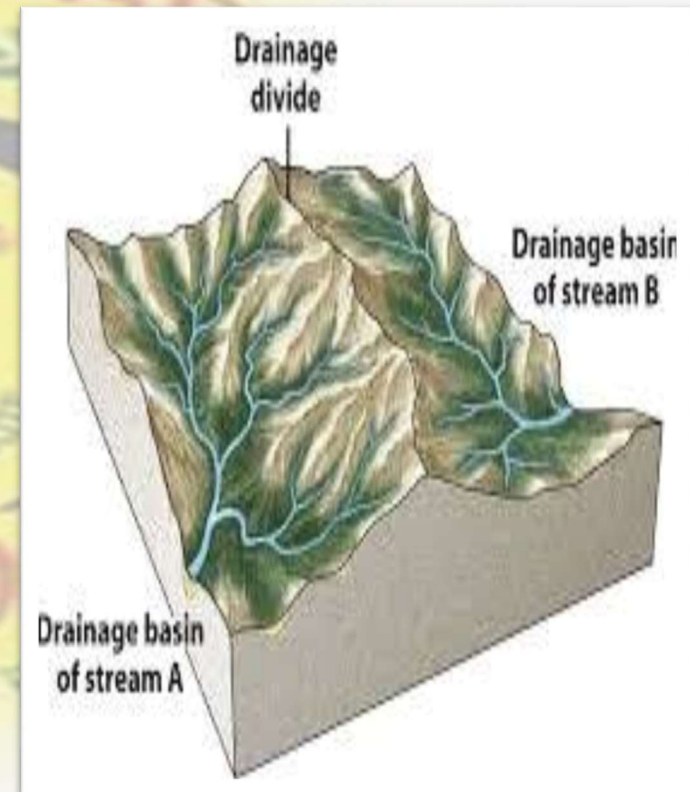
Drainage divide

Drainage divide is usually a ridge or a high platform

Adjacent drainage basins are separated from one another by a drainage divide.

River basins and watersheds are areas of land that drain to a particular water body, such as a lake, stream, river or estuary.

The term watershed is used to describe a smaller area of land that drains to a smaller stream, lake or wetland.

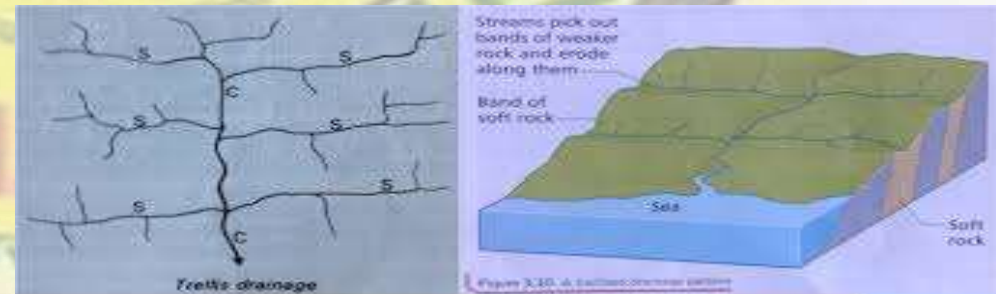
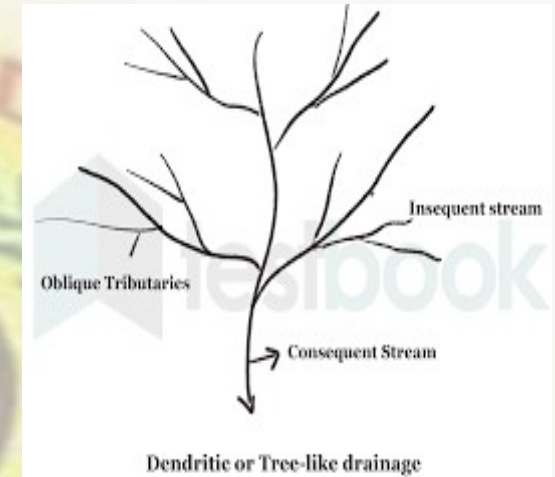
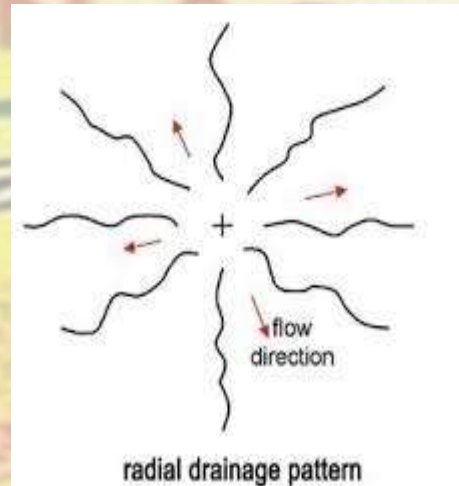


Types of Drainage Patterns

Dendritic: Branch-like pattern; examples in the northern plains.

Radial: Flow from a central point; e.g., rivers from the Amarkantak range.

Trellis: Parallel main rivers with right-angle tributaries.





A watershed is an entire river system—an area drained by a river and its tributaries. It is sometimes called a drainage basin in larger scale.

The term "**watershed**" is often used to refer to smaller-scale drainage areas, such as the area of land draining into a small stream or local body of water.

The term "**drainage basin**" usually refers to larger, more extensive areas that drain into major rivers, lakes, or oceans. It encompasses multiple watersheds.

Watersheds are typically discussed in the context of local water management, conservation efforts, and community-based environmental studies.

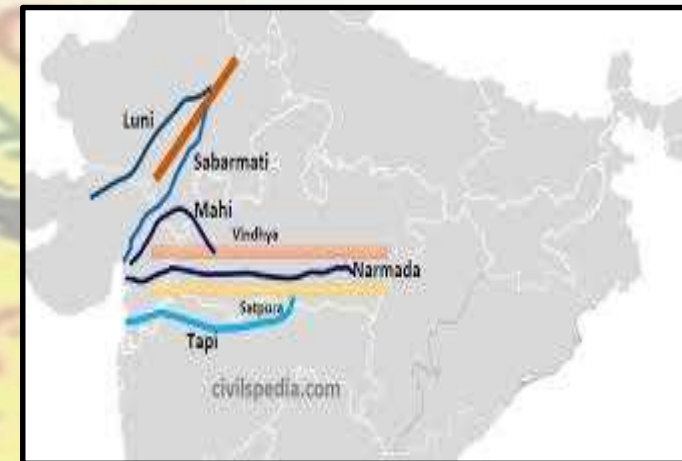
Drainage basins are often discussed in broader geographic contexts, such as regional planning, national water resource management, and large-scale environmental studies.

A watershed is defined by the **topographic high** points (such as ridges or hills) that direct water flow towards a common outlet. It focuses on how the landscape influences water flow.

A drainage basin is a **hydrological unit** that includes all the land area draining towards a significant water body, including its tributaries and sub-basins. It emphasizes the hydrological connectivity within the basin.

Major Drainage Systems

- **Arabian Sea Drainage:** Indus, Narmada, Tapi.
- **Bay of Bengal Drainage:** Ganga, Brahmaputra, Mahanadi, Krishna.

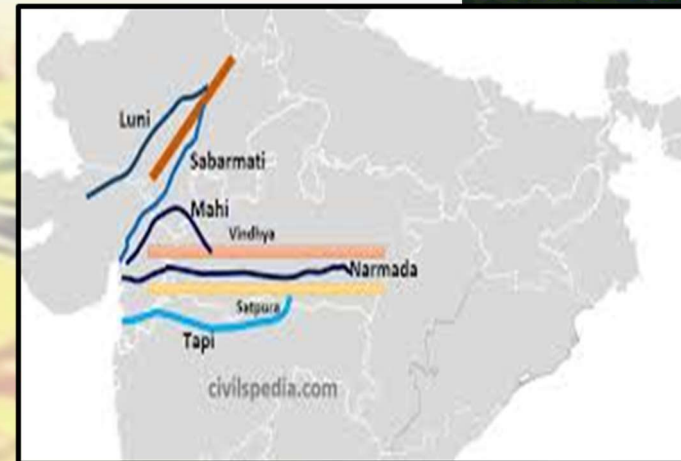


- **Rivers that drain into Bay of Bengal:**

The Mahanadi, the Godavari, the Krishna, the Cauvery and several smaller rivers drains south-east into the Bay of Bengal.

- **Rivers that drain into Arabian Sea:**

The Narmada, the Tapi, the Mahi flowing west as well as several small streams flow westwards into the Arabian Sea.



HIMALAYAN RIVERS

- The Indus, the Ganga and the Brahmaputra comprise the Himalayan river systems.
- The **Himalayan Rivers existed** even before the formation of Himalayas i.e. before the collision of Indian Plate with the Eurasian plate. **Antecedent Drainage**
- They were flowing into the **Tethys Sea**.



These rivers pass through the giant **gorges carved** out by the erosional activity carried on simultaneously with the uplift of the Himalayas.

These rivers also form **V-shaped valleys**, rapids and waterfalls in their mountainous



While entering the plains, HIMALAYA RIVERS form

depositional features like

flat valleys

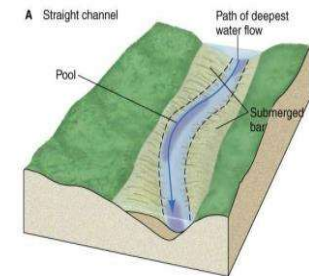
ox-bow lakes

flood plains,

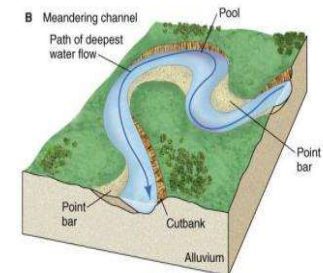
braided channels, and

deltas near the river mouth.

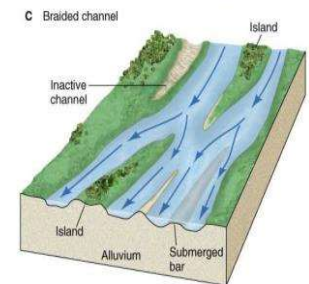
Straight Channel



Meandering Channel



Braided Channel



The Indus River System

Origin: Near **Bokhar Chu** in Tibet, Glaciers of Kailas Range (Close to ManaSarovar Lake)

India got her name from Indus.

The Indus Valley Civilization' was born around this river.

Tributaries: Shyok, Gilgit, Zaskar

Course: Flows through Ladakh, enters Pakistan, and finally Drains into the Arabian Sea.



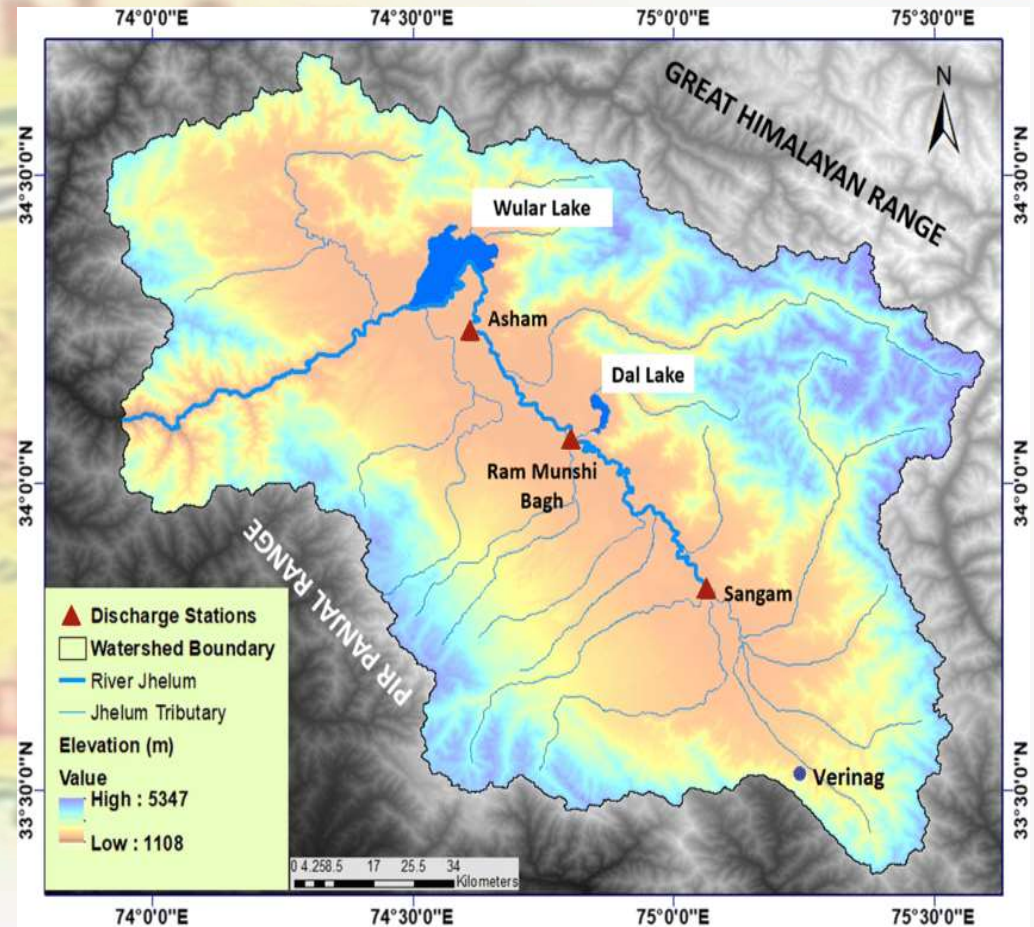
The Jhelum River

Origin: The Jhelum River has its source in a spring at **Verinag** in the south-eastern part of the Kashmir Valley.

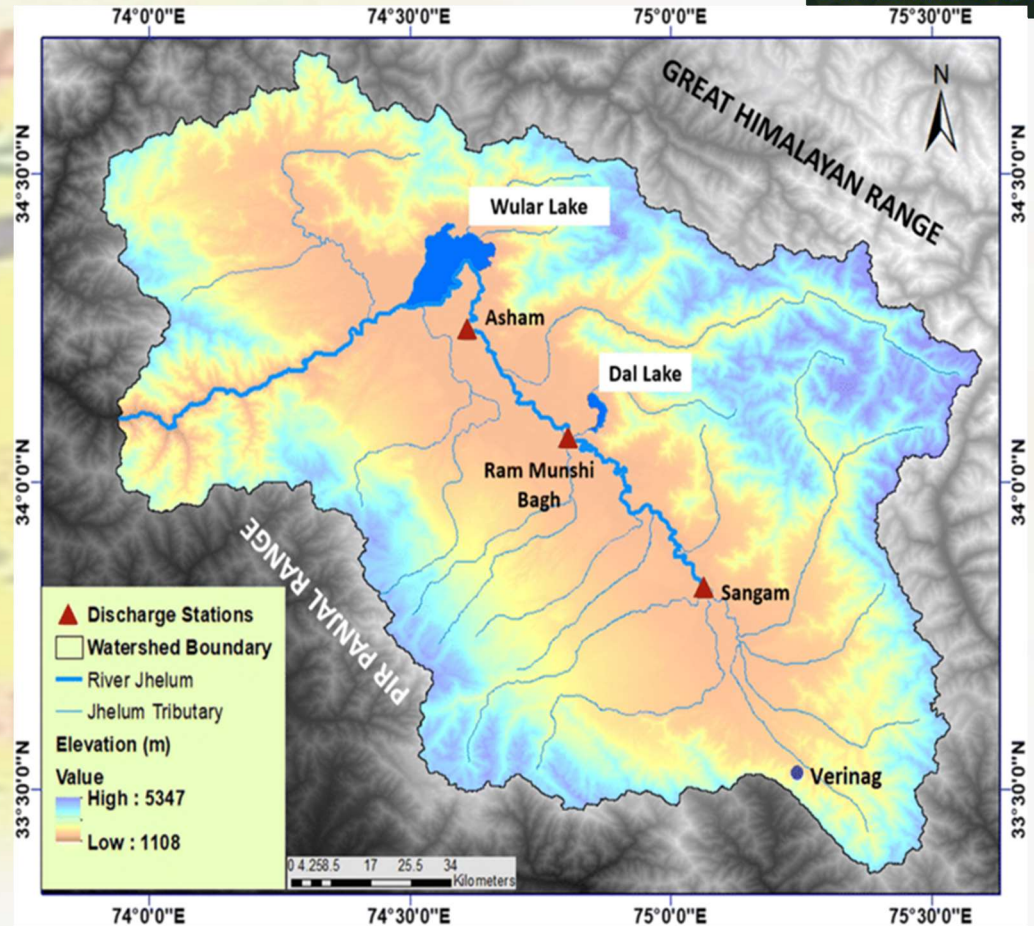
Flow Direction

Northwards: The river flows **northwards into Wular Lake**, situated in the north-western part of the Kashmir Valley.

Course Change: From Wular Lake, the Jhelum changes its course southwards.



- **Pir Panjal Range**: It forms a steep-sided narrow gorge through the Pir Panjal Range below Baramulla.
- **Chenab River**: It **joins the Chenab** at Trimmu.

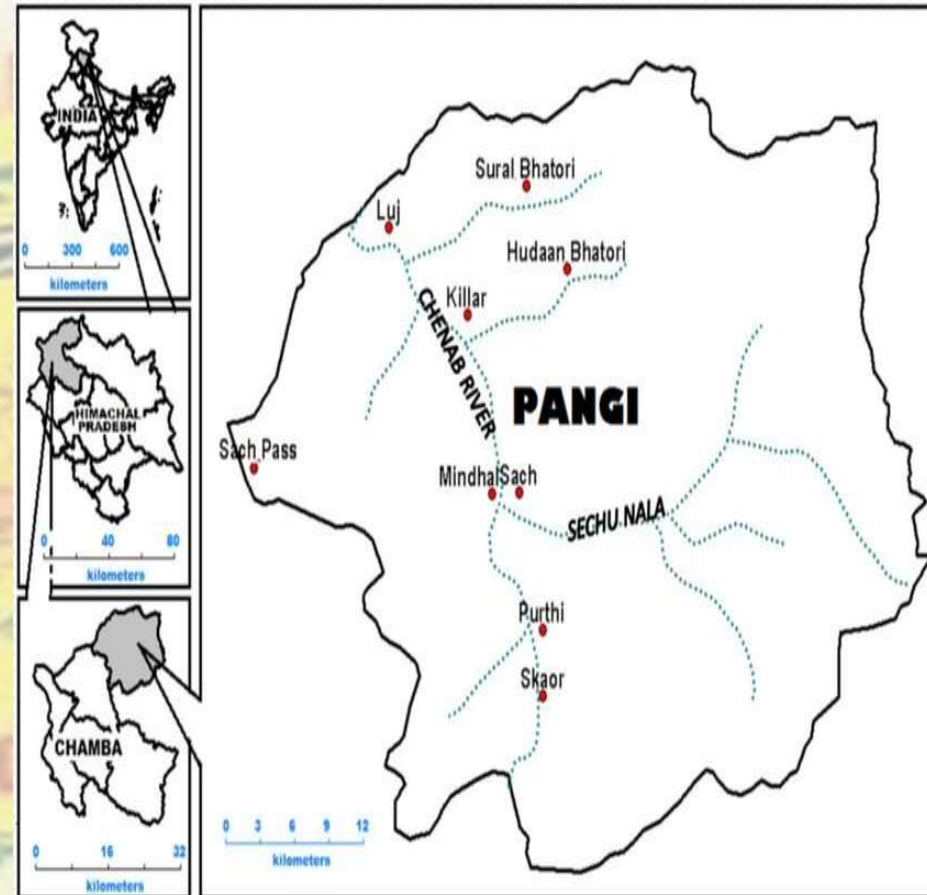


The Chenab River

- **Introduction**
- **Origin:** The Chenab River originates near the **Bara Lacha Pass** in the Lahul -Spiti part of the Zaskar Range.
- **Formation:**
- **Streams:** Two small streams, Chandra and Bhaga, form its source at an altitude of 4,900 m



- The united stream, known as **Chandrabhaga**, flows in a north-west direction through the **Pangi Valley**
- The Chenab is the **largest tributary** of the Indus
Because Avg discharge : 1700 m³/s



The Ravi River

- The Ravi River rises west of the **Rohtang Pass** in the Kullu Hills of Himachal Pradesh.

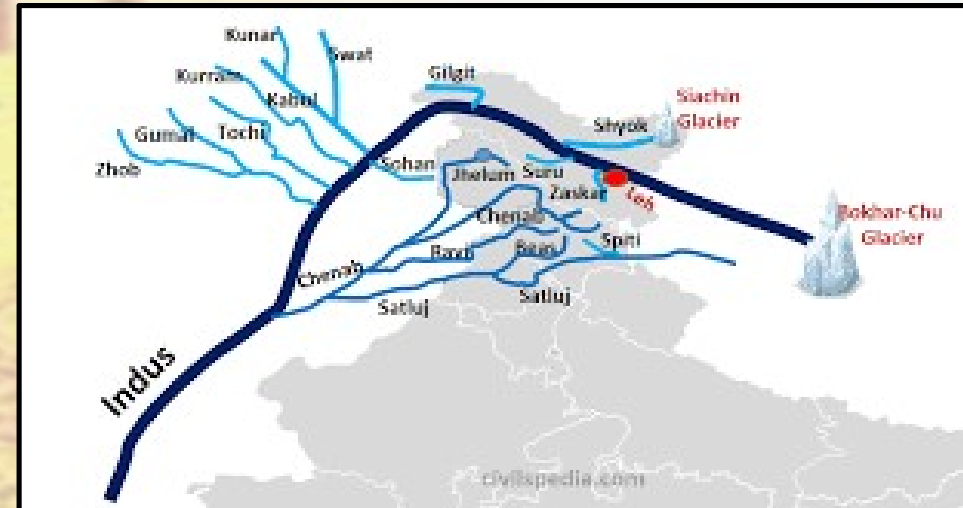
Chamba Valley:

- The river flows joins CHENAB near Sarai Sidhu.
- Flows through Chamba Valleys

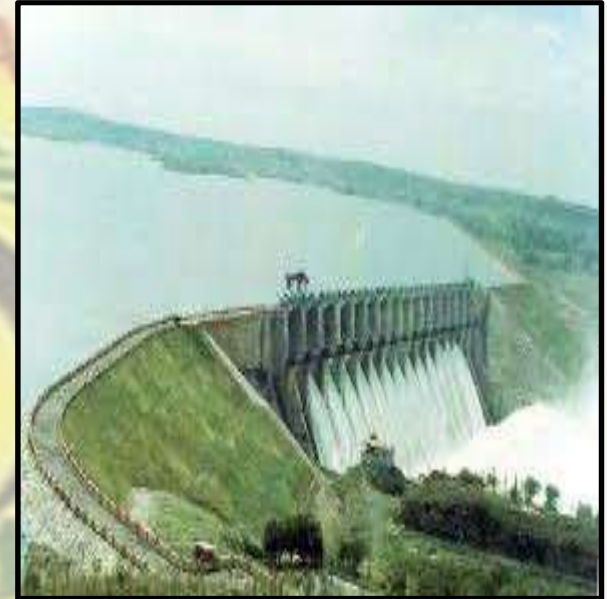


The Beas River is one of the **major rivers** in Northern India, flowing through **Himachal Pradesh and Punjab**.

The Beas River **originates** from **Beas Kund**, a glacial lake located near Rohtang Pass in the Himalayas.



- The Beas River is crucial for irrigation, supporting the agriculture of Punjab, known as the "Granary of India."
- It is a popular destination for tourists, especially in Manali, which offers activities like rafting and fishing.
- The river is also harnessed for hydroelectric power, with projects such as the Pong Dam.



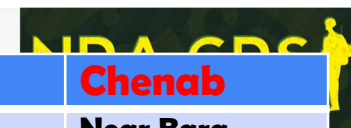
The Sutlej River is the longest of the five rivers that flow through the historic region of Punjab in northern India and Pakistan.

It is a major tributary of the Indus River.

The river is approximately **1,450 kilometers (900 miles)** long.

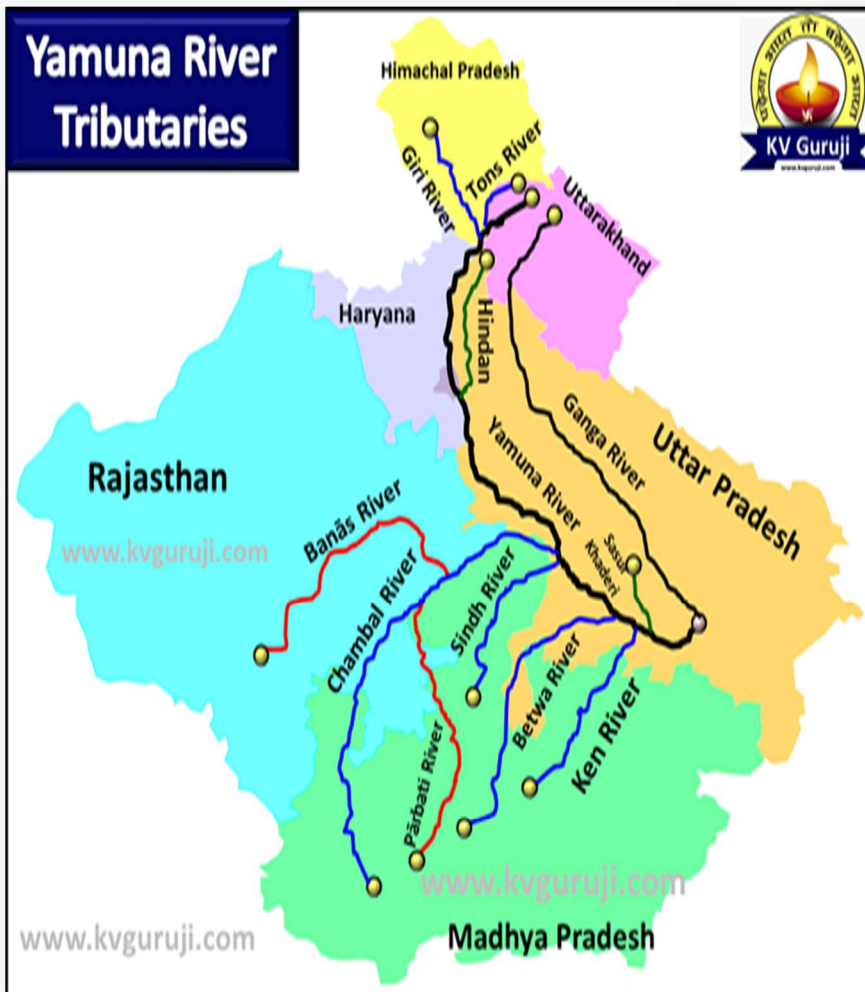
The Sutlej River originates from Lake Rakshastal in Tibet, near Mount Kailash.





Feature	Indus	Jhelum	Ravi	Beas	Sutlej	Chenab
Source	Near Bokhar Chu, Tibet	Spring at Verinag, Kashmir Valley	West of Rohtang Pass, Kullu Hills	Beas Kund, Rohtang Pass	Rakshastal Lake, Tibet	Near Bara Lacha Pass, Zaskar Range
Length	Approx. 3,180 km	Approx. 724 km	Approx. 720 km	Approx. 470 km	Approx. 1,450 km (Longest)	Approx. 960 km
Average Discharge	6,600 - 7,100 m ³ /s	1,700 m ³ /s	500 - 600 m ³ /s	475 - 500 m ³ /s	500 - 600 m ³ /s	2,800 - 3,100 m ³ /s (largest tributary)
Major Tributaries	Jhelum, Chenab, Ravi, Sutlej, Beas	Chandra and Bhaga	None (significant on its own)	None (significant on its own)	Beas	Jhelum, Ravi, Sutlej
Regions Drained	Tibet, India (Ladakh), Pakistan	Kashmir Valley, Pakistan	Himachal Pradesh, Jammu and Kashmir, Pakistan	Himachal Pradesh, Punjab	Tibet, Himachal Pradesh, Punjab, Pakistan	Himachal Pradesh, Jammu and Kashmir, Pakistan
Confluence Point	Arabian Sea near Karachi	Joins Chenab at Trimmu	Joins Chenab near Sarai Sidhu	Joins Sutlej near Harike , Punjab	Joins Chenab at Panchnad.	MEETS Sutlej at Panchnad after receiving Ravi. Panchnad meets Indus at Mithankot.

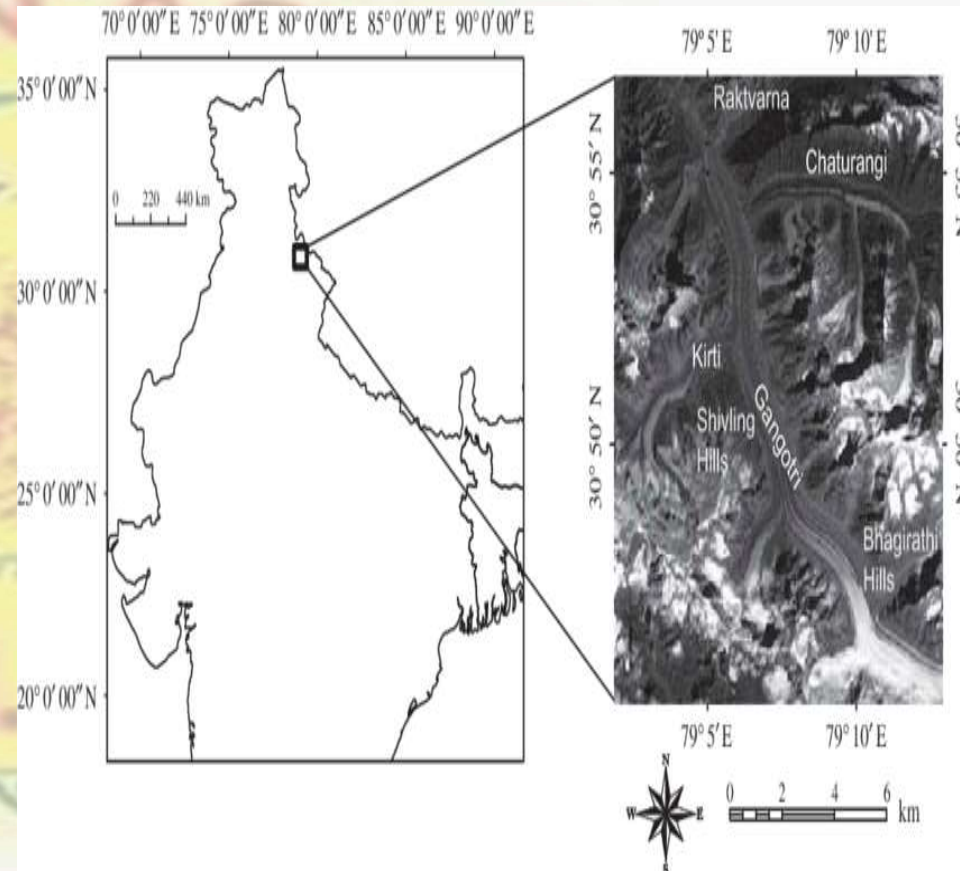
Yamuna River Tributaries



Tributary	Source	Side	Significance
Chambal	Malwa Plateau, Madhya Pradesh	The Banas River is an important tributary of the Chambal River,	Known for Chambal ravines
Sind	Malwa Plateau, Madhya Pradesh	Right Bank	Joins the Yamuna in Uttar Pradesh
Betwa	Vindhya Range, Madhya Pradesh	Right Bank	Flows through Madhya Pradesh and Uttar Pradesh
KEN	Kaimur Range, Madhya Pradesh	RIGHT BANK	Joins the Yamuna near Banda, Uttar Pradesh

The Ganga River basin

- The Ganga is the most important river in India.
- Rises in the Gangotri Glacier near Gaumukh (3,900 m) in Uttarkashi district, **Uttarakhand.**
- Length: 2,525 km.
- Basin covers 8.6 lakh sq. km in India.
- Cultural and historical significance.



- These headstreams are typically found in the **upper reaches of a river basin**, often originating in mountainous or highland areas.
- They contribute their water to the main river, which becomes larger and more powerful as it moves downstream.

Course of the Ganga

- Starts as **Bhagirathi** at Gangotri
- **Meets Alaknanda** at Devprayag to form the Ganga.

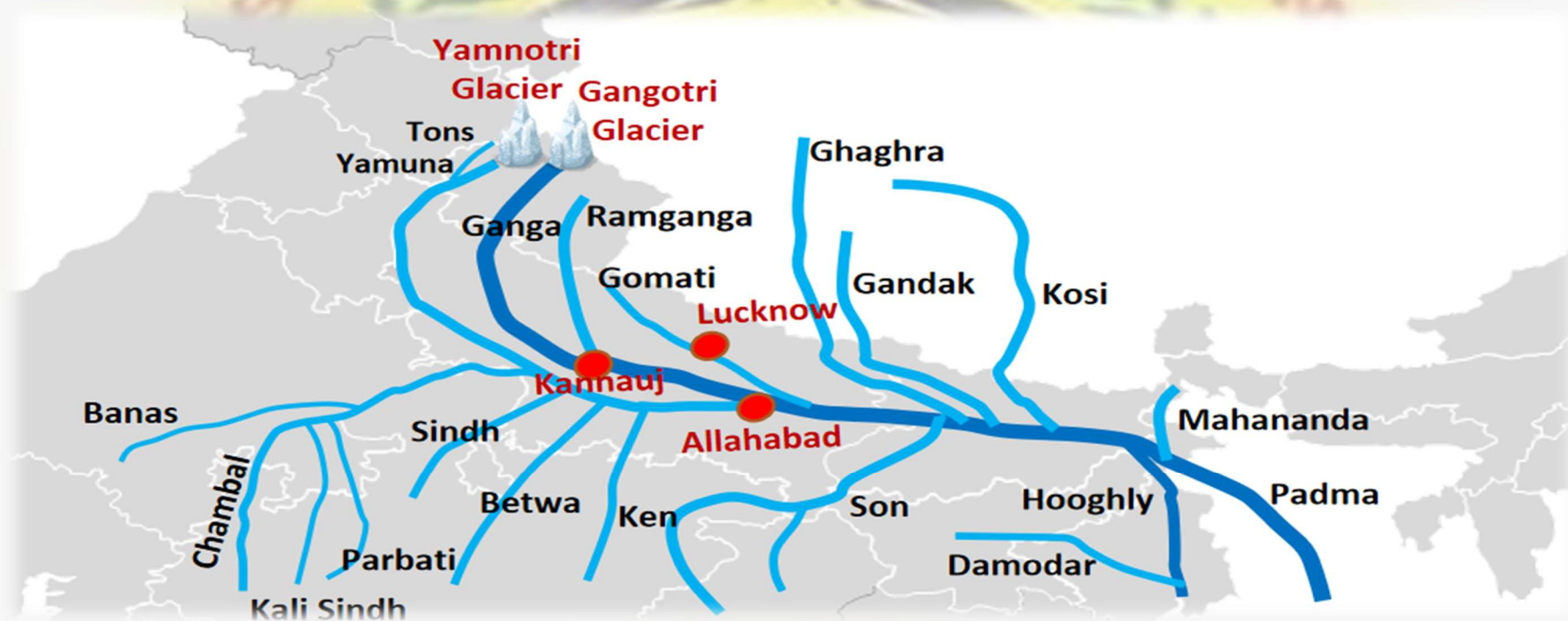


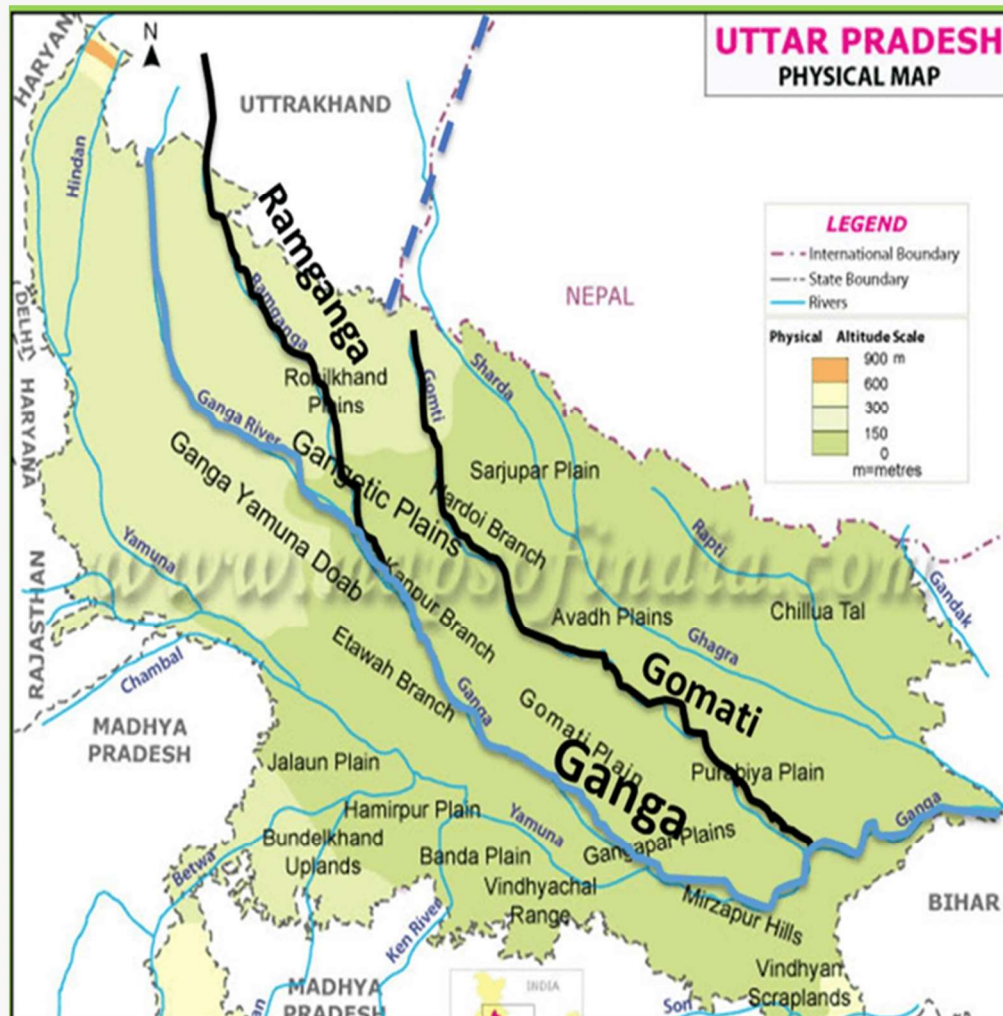
Tributary	Source	Confluence with Alaknanda
Dhauliganga	Near Niti Pass, Chamoli district, UK	Vishnuprayag
Nandakini	Nanda Devi Glacier, Chamoli district	Nandprayag
Pindar	Pindari Glacier, Kumaon region	Karnaprayag
Mandakini	Chorabari Glacier, Kedarnath	Rudraprayag
Bhagirathi	Gangotri Glacier, Uttarkashi district	Dev-prayag



Tributaries of Ganga

- **Left Bank:** Ramganga, Gomati, Ghaghara, Gandak, Kosi, Mahananda.
- **Right Bank:** Yamuna, Son.





**Source of
Ramganga**

**Garhwal
Hills,
Uttarakhand**

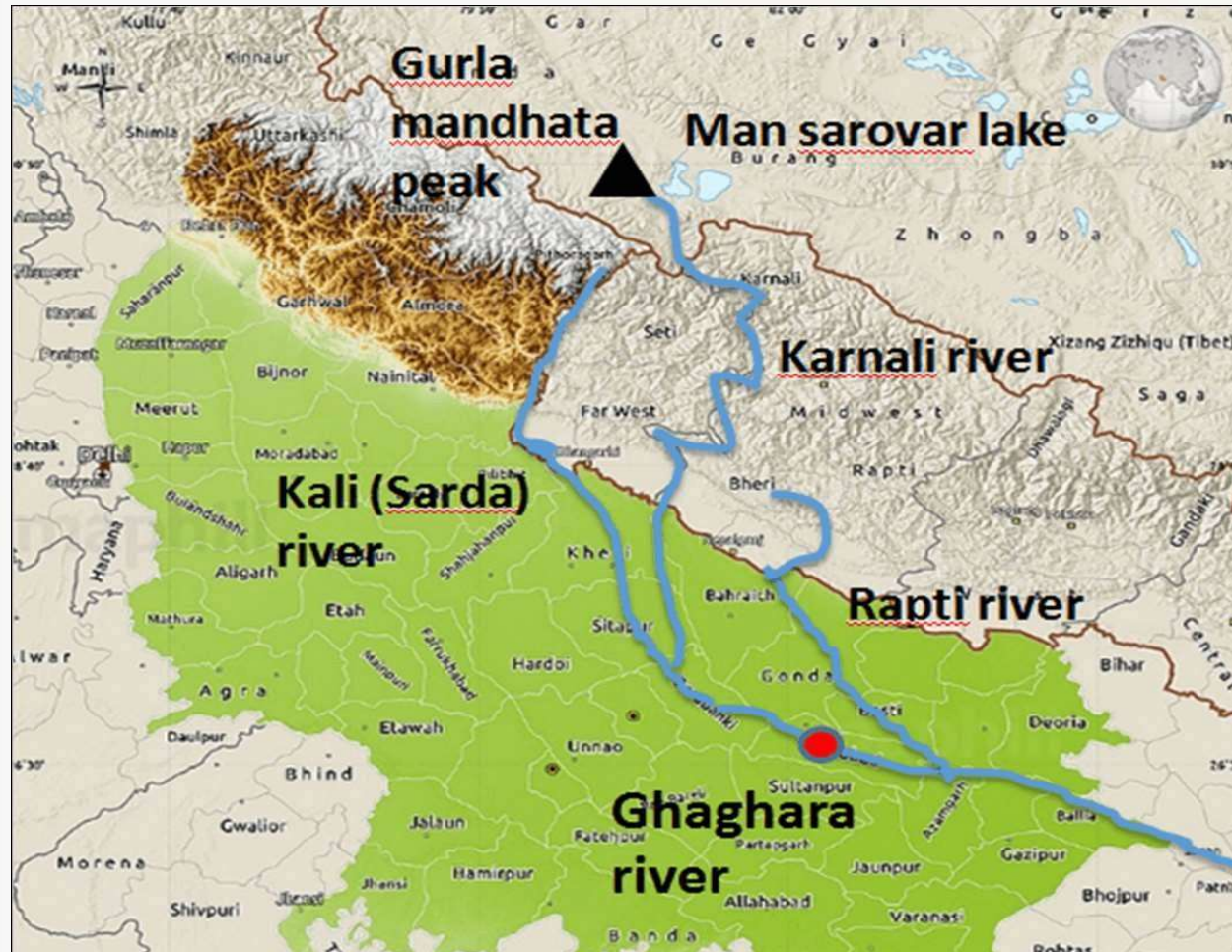
**Conjunction
point**

**Joins Ganga
near
Kannauj,
Kanpur, U.P**

**Source of
Gomati**

**Gomat
Taal, UP**

**Joins Ganga
near
Saidpur, UP**



Ghaghara

Mapchachung,
Glaciers, near
Mansarovar
Lake Tibet

joining the
Ganga near
Chapra,
Bihar

Kali

Sourc:
Kalapani
springs,
Pithoragarh
district of
Uttarakhand



Kosi	North of Mount Everest, Tibet
	<p>forms Sapta Kosi</p> <p>Sun Kosi, the Indravati River, the Dudh Kosi, the Bhoté Koshi, Tamur River, Barun River, and the Arun River.</p>

Left bank tributary	source	Length	Conjection point	Feature
Ramganga	Garhwal Hills, Uttarakhand	596 km	Joins Ganga near Kannauj	Changes course at Siwalik.
Gomati	Gomat Taal, UP	900 km	Joins Ganga near Saidpur	Major river in UP
Ghaghara	Mapchachung, Glaciers, Tibet	1,080 km	Joins Ganga at Chhapra	Forms deep gorge at Shishapani
Gandak	Nepal Himalayas	630 km	Joins Ganga at Sonpur near Patna	Drains central Nepal
Kali	Kalapani springs, Pithoragarh district of Uttarakhand	252 kilometers (157 miles)	joins the Ghaghra River, Uttar Pradesh	conflicts over water resources between India and Nepal
Kosi	North of Mount Everest, Tibet	729 km	Joins Ganga near Kursela, Bihar	Antecedent river, forms Sapta Kosi
Mahananda	Darjeeling Hills, WB	360 km	Joins Ganga in West Bengal	Last left bank tributary of Ganga

Feature	Details
Origin	Chemayungdung glacier, Kailash range near Mansarovar lake, Tibet
Initial Name	Tsangpo (Tibet) - meaning 'the purifier'
Major Right Bank Tributary in Tibet	Rango Tsangpo
Emergence	Emerges from the Himalayas as the Siang or Dihang
Entry into India	West of Sadiya town in Arunachal Pradesh
Major Left Bank Tributaries	Dibang (Sikang), Lohit
Major Right Bank Tributaries	Subansiri, Kameng, Manas, Sankosh
Journey through Assam Valley	Receives numerous tributaries; major ones are Burhi Dihing, Dhansari (South)
Entry into Bangladesh	Near Dhubri; known as Jamuna
Final Confluence	Merges with the Padma River, then flows into the Bay of Bengal
Notable Characteristics	Known for floods, channel shifting, and bank erosion due to heavy sediment load and rainfall in its catchment area



Brahmaputra River Basin

The peninsular river system



The peninsular river system

Mahanadi	Godavari	Krishna	Kaveri	Narmada	Tapi	Luni
Near Sihawa, Raipur district, Chhattisgarh	Nasik district, Maharashtra	Mahabaleshwar, Sahyadri, Maharashtra	Brahmagiri hills, Karnataka	Amarkantak plateau, Madhya Pradesh	Multai, Betul district, Madhya Pradesh	Near Pushkar, Rajasthan
1.42 lakh sq. km	3.13 lakh sq. km	2.58 lakh sq. km	81,155 sq. km	98,796 sq. km	65,145 sq. km	37,000 sq
Seonath, Jonk, Hasdeo	Penganga, Indravati	Koyna, Tungbhadra, Bhima	Kabini, Bhavani, Amravati	Hiran, Son	Purna	Ghaggar, Saraswati
53 % in M.P Chhattisgarh 47 % in Odisha	Maharashtra 49% M.P 20 % Chhattisgarh 20 % Odisha and Andhra 6%	Karnataka 44 % Andhra Telangana 29 % Maharashtra 27 %	Tamil Nadu 56 % Karnataka 41%	M.P 90 % Maharashtra 8% Gujrat 2 %	Maharashtra 79 % M.P 15 % Gujrat 6 %	Rajasthan 96% Gujrat 4%