



Drainage Patterns and Drainage Systems of India

▪ Drainage:

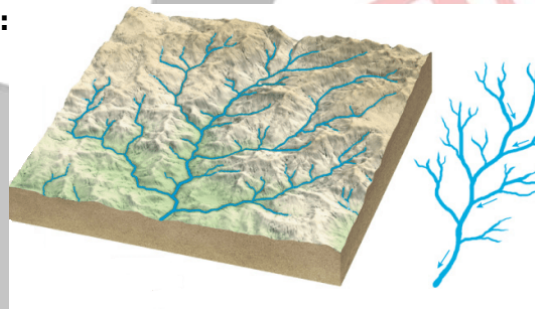
- The **flow of water through well-defined channels** is known as 'drainage' and the network of such channels is called a '**drainage system**'.

▪ Drainage Pattern:

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

Types of Drainage Patterns

▪ Dendritic Drainage Pattern:

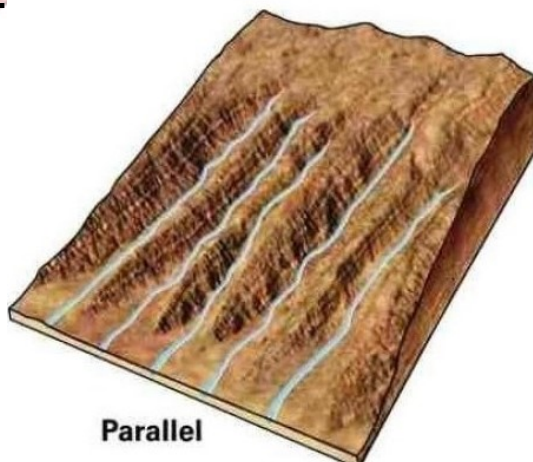


- It is the **most common form** and **resembles the branching pattern of tree roots**.
- The dendritic pattern develops where the river channel follows the slope of the terrain.
- The pattern develops in areas where the **rock beneath the stream has no particular structure** and can be eroded equally easily in all directions.

- **Tributaries join larger streams at acute angles (less than 90°).**

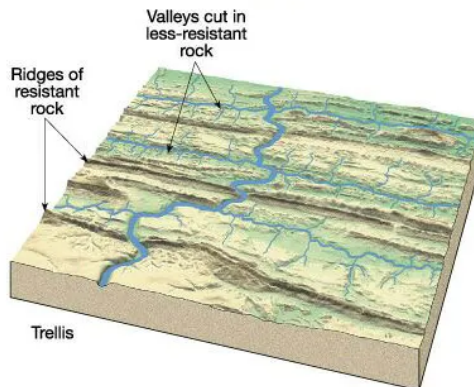
- E.g. The rivers of the **northern plains**; [Indus](#), [Ganga](#) and [Brahmaputra](#).

▪ Parallel drainage pattern:



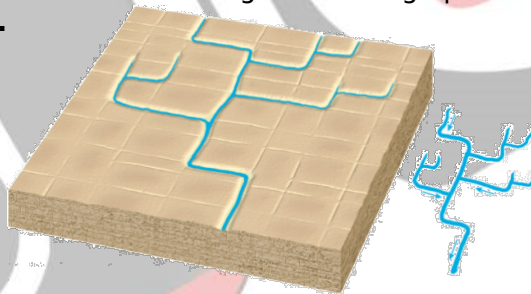
- It develops in regions of **parallel, elongated landforms** where there is a **pronounced slope to the surface**.
- Tributary streams tend to stretch out in a parallel-like fashion following the slope of the surface.
- E.g. The rivers originating in the [Western Ghats](#); **Godavari, Kaveri, Krishna,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

▪ **Trellis Drainage Pattern:**



- Trellis drainage **develops in folded topography** where **hard and soft rocks exist parallel to each other**.
- Down-turned folds called **synclines** form valleys in which reside the main channel of the stream.
- Such a pattern is formed when the **primary tributaries of main rivers flow parallel** to each other and **secondary tributaries join them at right angles**.
- E.g. The rivers in the **upper part of the Himalayan region**; **Indus, Ganga and Brahmaputra**.

▪ **Rectangular Drainage Pattern:** The rectangular drainage pattern is **found in regions that have undergone faulting**.



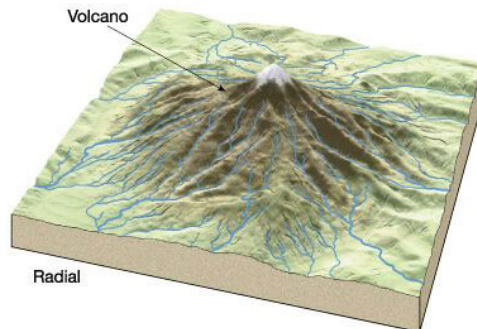
- It develops on a strongly jointed rocky terrain.
- Streams follow the path of least resistance and thus are concentrated in places where exposed rock is the weakest.
 - The **tributary streams make sharp bends** and enter the main stream at high angles.
- E.g. Streams found in the Vindhya mountain range; **Chambal, Betwa and Ken**.

Folding and Faulting

- When the Earth's crust is pushed together via compression forces, it can experience geological processes called folding and faulting.
- **Folding occurs when the Earth's crust bends away from a flat surface.**
 - A bend upward results in an **anticline** and a bend downward results in a **syncline**.
- **Faulting happens when the Earth's crust completely breaks and slides past each other.**

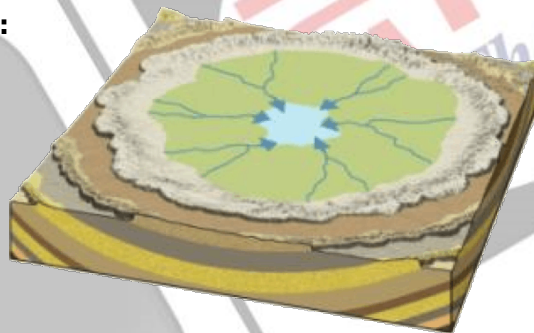
- Whether the Earth's crust experiences a fold or fault will depend on the material it is made out of in that area.
 - A **fold is more likely to happen with flexible material** and it is what **causes mountains** to form, whereas a **fault will happen with more brittle material** and is what **causes [earthquakes](#)** to occur.

- **Radial Drainage Pattern:**



- The radial drainage pattern **develops around a central elevated point** and is **common to conically shaped features** such as volcanoes.
- When the rivers originate from a hill and flow in all directions, the drainage pattern is known as 'radial'.
- E.g. The **rivers originating from the Amarkantak range; Narmada and [Son](#)** (tributary of Ganga).

- **Centripetal Drainage Pattern:**



- It is just the **opposite of the radial** as **streams flow toward a central depression**.
- During wetter portions of the year, these **streams feed ephemeral lakes**, which evaporate away during dry periods.
 - **Sometimes, salt flats are also created in these dry lake beds** as salt dissolved in the lake water precipitates out of solution and is left behind when the water evaporates away.
- E.g. [Loktak lake](#) in Manipur.

Drainage System of India

Himalayan Drainage System:

- **About:**

- Rivers of this system are **fed both by melting of snow and precipitation** and hence, **are perennial**.
- These rivers **form V-shaped valleys**, rapids and waterfalls in their mountainous course.

- While entering the plains, they form depositional features like **flat valleys**, ox-bow lakes, [flood plains](#), braided channels and [deltas](#) near the river mouth.

▪ Indus River System:

- It is one of the largest river basins of the world.
- It is also known as the **Sindhu** and is the **westernmost of the Himalayan rivers in India**.
- It originates from a glacier **near Bokhar Chu** in the Tibetan region in the **Kailash Mountain range**.
 - In Tibet, it is known as '**Singi Khamban**'; or Lion's mouth.
- The Indus **flows in India only through the [Leh district](#)** in the **[Union Territory of Ladakh](#)**.
- Important tributaries of the Indus are [Sutlej](#), [Ravi](#), [Jhelum](#), [Chenab](#) (largest tributary of Indus) and **Beas**.

▪ Ganga River System:

- It **rises in the [Gangotri glacier](#) near Gaumukh** (3,900 m) in Uttarakhand where it is known as **Bhagirathi**.
- At Devprayag, the Bhagirathi meets the [Alaknanda](#); hereafter, it is known as the Ganga.
 - The Ganga **enters the Northern plains at Haridwar**.
- Ganga flows through the states of **Uttarakhand, Uttar Pradesh, Bihar and West Bengal**.
- Son is the major right bank tributary and the important left bank tributaries are **Ramganga, Gomati, Ghaghara, Gandak, Kosi and Mahananda**.
- [Yamuna](#) is the western most and the longest tributary of the Ganga and has its source in the **Yamunotri glacier**.
- Ganga flows into the [Bay of Bengal](#) near the Sagar Island.

▪ Brahmaputra River System:

- It is one of the largest rivers of the world and has its **origin in the Chemayungdung glacier (Kailash range)** near the [Mansarovar lake](#).
- In southern Tibet, it is known as the **Tsangpo**, which means 'the purifier.'
- The river **emerges from the foothills of Himalayas** under the name of **Siang** or **Dihang**.
 - It **enters India west of Sadiya town in Arunachal Pradesh**.
- Its main left bank tributaries are **Dibang** or Sikang, Lohit, **Burhi Dihing** and **Dhansari**.
 - Important right bank tributaries are the **Subansiri**, Kameng, **Manas** and Sankosh.
- In Bangladesh, it **merges with the river Padma**, which falls in the Bay of Bengal.



Peninsular Drainage System

▪ About:

- The peninsular rivers are characterised by **fixed course, absence of meanders and nonperennial flow of water.**
- The drainage system is **older than the Himalayan one.**
- The **Western Ghats** running close to the western coast act as the water divide between the major Peninsular rivers.
- Most of the major Peninsular rivers except **Narmada** and **Tapi** flow from west to east.

- The other major river systems of the Peninsular drainage are **Mahanadi**, **Godavari**, **Krishna** and **Kaveri.**

▪ Narmada:

- It is the **largest west flowing river** of the peninsular region flowing through a rift valley **between the Vindhya (north) and the Satpura Range (south).**

- It rises from Maikala range near **Amarkantak** in Madhya Pradesh.
- Major Tributaries of the river are Hiran, Orsang, Barna and Kolar.
- The Narmada basin covers parts of **Madhya Pradesh, Maharashtra and Gujarat.**

- The **Sardar Sarovar Project** has been constructed on this river.

▪ Tapi:

- Another important westward flowing river, originates from the Betul district of Madhya Pradesh in the Satpura ranges.
- It flows in a **rift valley parallel** to the **Narmada** but is much shorter in length.
- Its basin covers parts of Madhya Pradesh, Gujarat and Maharashtra.

▪ Mahanadi:

- It **rises in Raipur district of Chhattisgarh** and runs through Odisha to discharge its water into the Bay of Bengal.
- 53% of the drainage basin of this river lies in Madhya Pradesh and Chhattisgarh, while 47% lies in Odisha.
- Major tributaries: **Seonath, Hasdeo, Mand, Ib, Jonking and Tel rivers.**
- Its basin is bounded by the Central India hills on the north, by the **Eastern Ghats** on the south and east and by the Maikala range on the west.

▪ Godavari:

- It is the **largest Peninsular river system** and is also called the **“Dakshin Ganga”**.
- It **rises in the Nasik district of Maharashtra** and discharges its water into the Bay of Bengal.
- Its tributaries run through the states of Maharashtra, Madhya Pradesh, Chhattisgarh, Odisha and Andhra Pradesh.
- **Penganga, Indravati, Pranhita, and Manjra** are its principal tributaries.

▪ Krishna:

- Krishna is the **second largest east flowing Peninsular river** which **rises near Mahabaleshwar in Sahyadri.**
- **Koyna, Tungbhadra and Bhima** are its major tributaries.
- It flows through the states Maharashtra, Karnataka, Telangana and Andhra Pradesh before flowing into the Bay of Bengal.

▪ Kaveri:

- Kaveri **rises in Brahmagiri hills** of Kodagu district in **Karnataka.**
- It is a **sacred river** of southern India.
- Its important tributaries are **Arkavathi, Hemavathi, Bhavani, Kabini and Amravati.**
- It flows in a southeasterly direction through the states of Karnataka, Kerala and Tamil Nadu and **drains into Bay of Bengal through Pondicherry.**