



drishti

Drainage Patterns and Drainage Systems of India

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- **Drainage:**

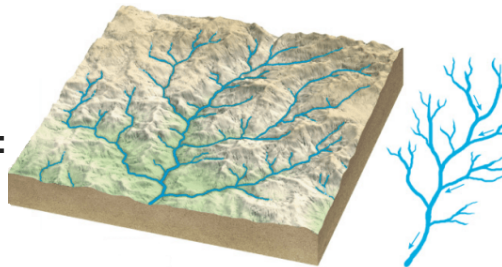
The **flow of water through well-defined channels** is known as 'drainage' and the network of such channels is called a '**drainage system**'.

- **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**.

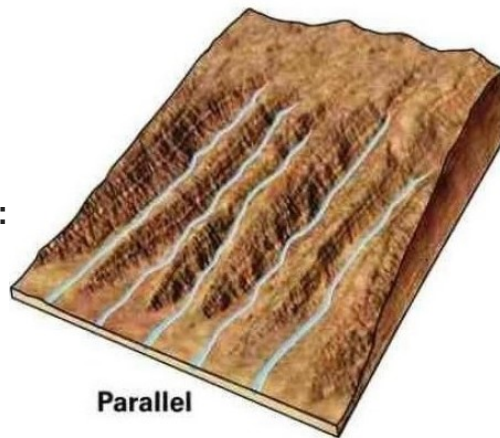
Types of Drainage Patterns

- **Dendritic Drainage Pattern:**



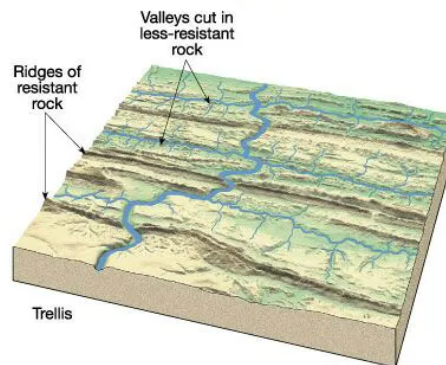
- It is the **most common form** and **resembles the branching pattern of tree roots**.
- The dendritic pattern develops where the river channel follows the slope of the terrain.
- The pattern develops in areas where the **rock beneath the stream has no particular structure** and can be eroded equally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

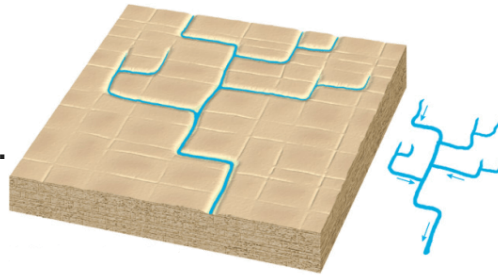
- **Trellis Drainage Pattern:**



- 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.

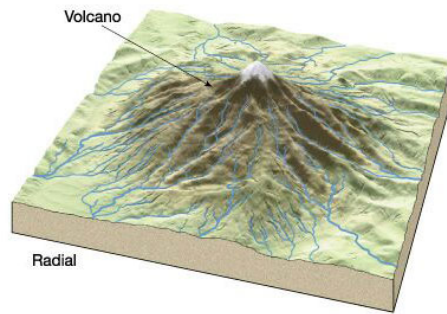
The **tributary streams make sharp bends** and enter the main stream at high angles.

- E.g. Streams found in the Vindhya mountain range; **Chambal, Betwa and Ken.**

Folding and Faulting

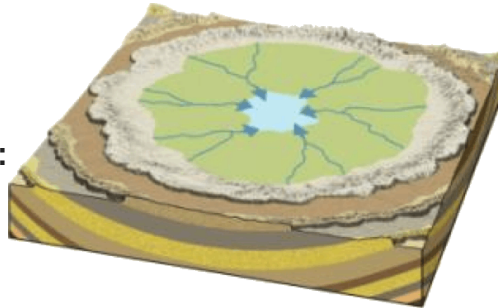
- When the Earth's crust is pushed together via compression forces, it can experience geological processes called folding and faulting.
- **Folding occurs when the Earth's crust bends away from a flat surface.**
A bend upward results in an **anticline** and a bend downward results in a **syncline**.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