

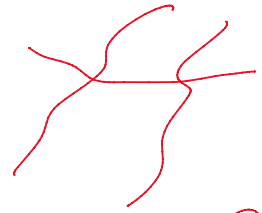


Landforms made by...

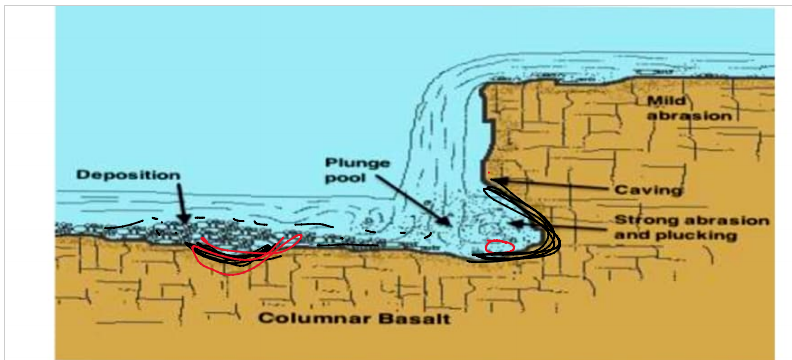
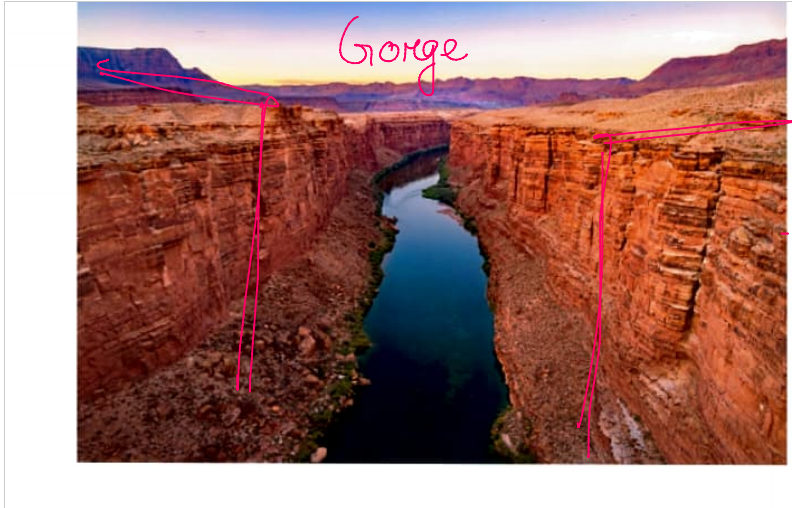
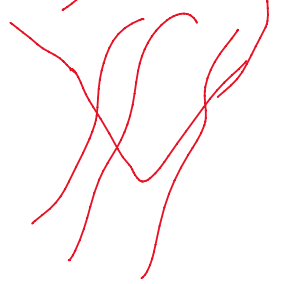


Valleys

rills.



gullies.



Paired Terraces

Types of Valleys 178 cm.

→ Gorge

→ deep valley 178 cm

→ very steep side

→ straight side

→ hard rocks.

Steep slopes + step wise

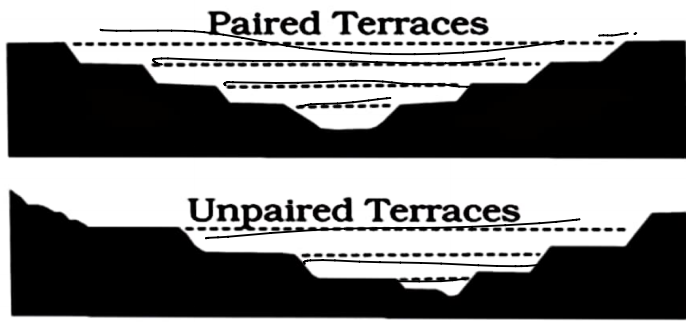
→ (Potholes + Plunge pools.)

Inised meanders
Entrenched meanders

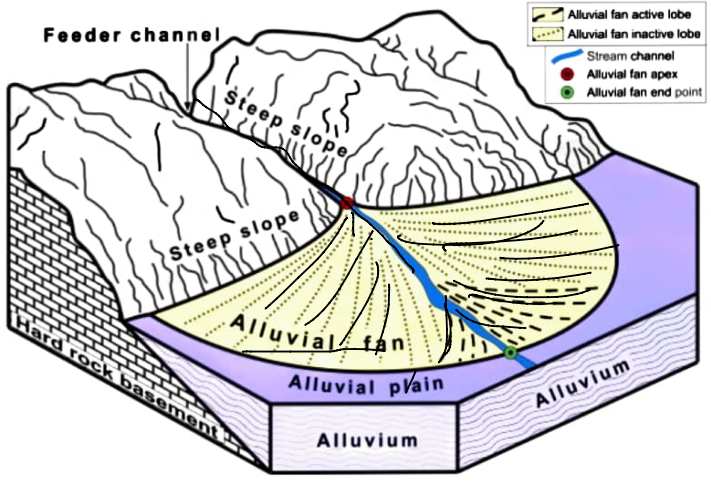
very deep and wide
hard rocks

Meanders

hard rocks



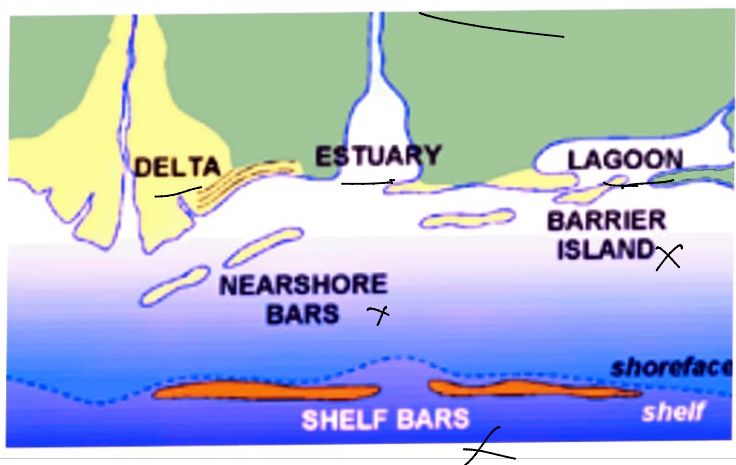
River terraces.
vertical erosion



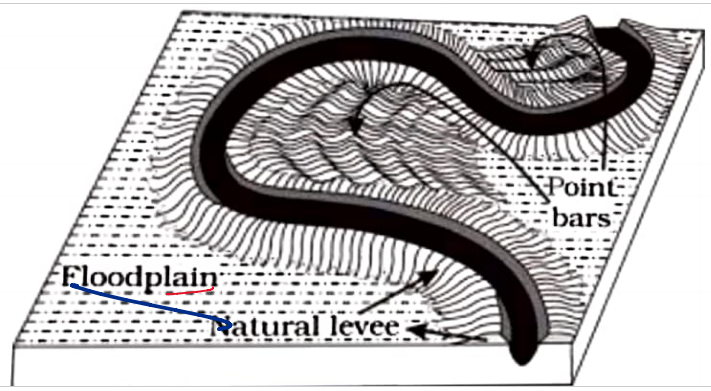
Alluvial fan



Stratification:

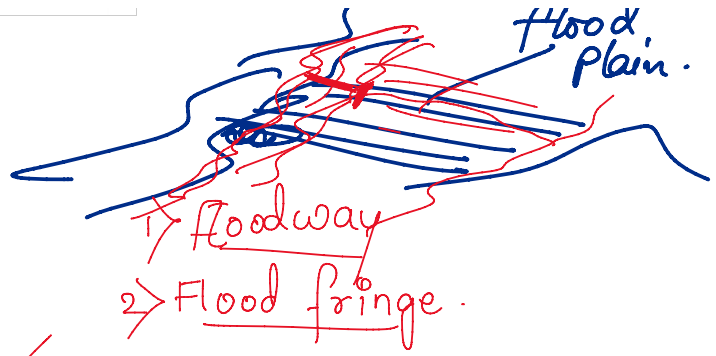
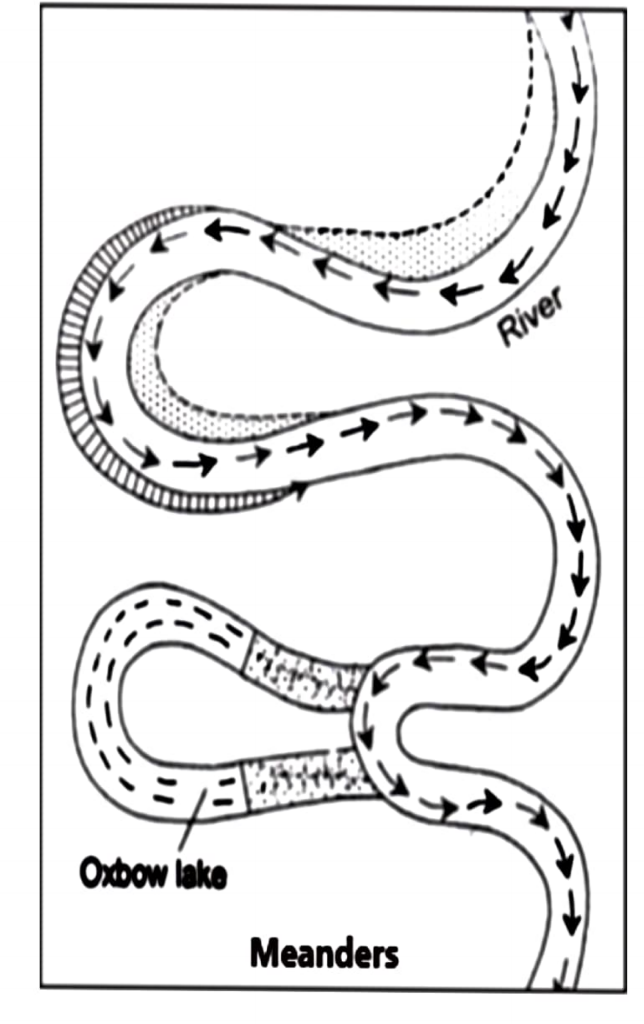


Floodplains existing in deltaic regions are delta plains.



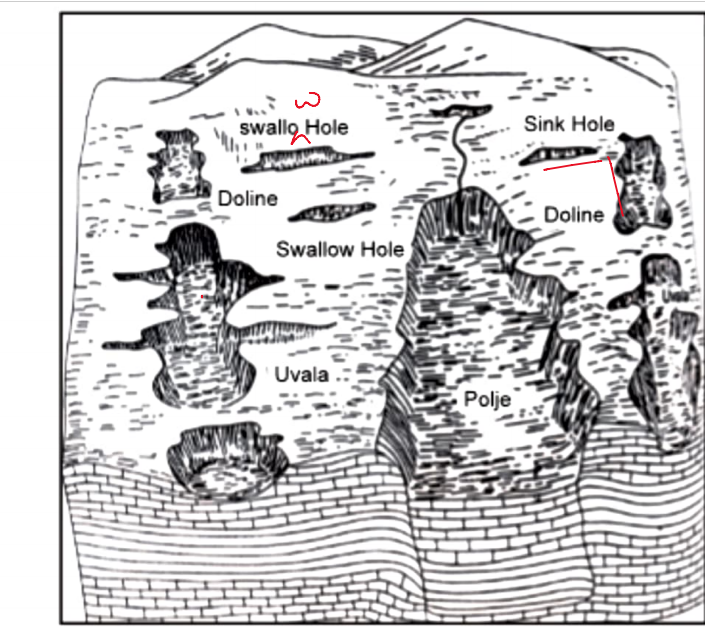
→ plain land / flat area of land next to a river or a stream

Flood Plain.



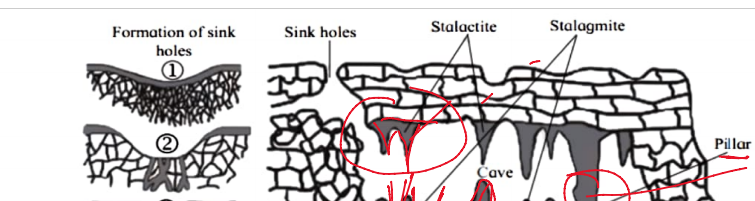
→ oxbow lake (meander)

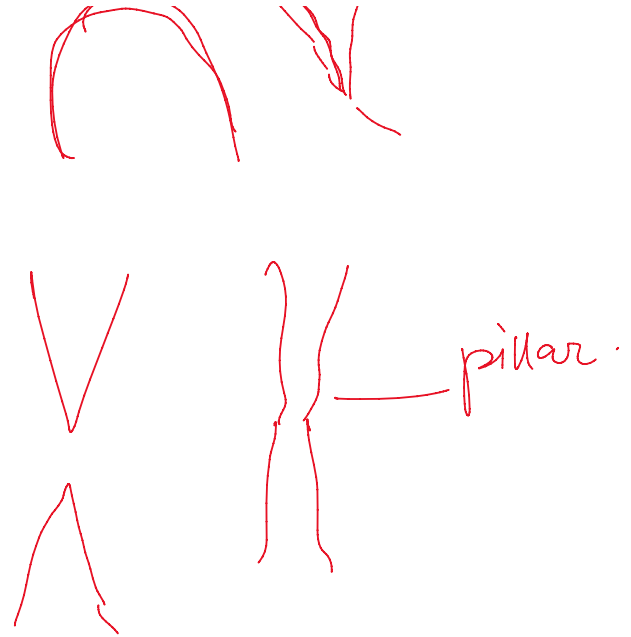
Landforms made by
↓
Groundwater



Carbonic acid
↓
rock limestone
gets dissolved.
↓
Karst topography
artificial pavement

Swallow Holes
Sinkholes
Lapies
Limestone pavements
Caves
Stalactites
Stalagmites





NOTES

- Canyons and gorges are geographical landforms belonging to the broad categories of valleys. Morphologically, they are either V-shaped or U-shaped with a downward fold extending below the earth surface.
- They are classically low areas and could be separating mountains or hills. More often than not, canyons and gorges have rivers streaming through them and are usually very long and narrow. They are often considered deep valleys with very steep escarpments.
- In terms of the proportions of the two, a **canyon is considered larger than a gorge**. They are both deep valleys, but a **canyon is often wider compared to a gorge**.
- The term **gorge is at times used to describe ravines which are narrower than canyons**. Canyons are mainly localized to the arid areas while gorges can be found in temperate areas like between mountain ranges.
- While water or lava flow is implicated in the formation of gorges, erosion from a plateau level coupled with resistance of hard rocks to weathering is the manner in which canyons are formed.
- Often, **gorges are associated with rivers** while canyons are not.

Gorge

- It is a deep valley with very steep to straight sides.
- It is almost equal in width at its top as well as its bottom.
- It is usually formed in hard rocks.
- Example is **gorge of Narmada river in Jabalpur district, Madhya Pradesh**

Formation Of Gorges

- Gorges form via three forms of natural forces: **erosion, geological uplift and glaciers melting**. **Erosion and washing away of the sediments caused by rivers and streams in valleys** is responsible for formation of most gorges in the world.
- Upward movement of the Earth's surface termed the **geologic uplift** has been implicated in formation of these land forms. In most cases, geologic uplift works hand in hand with erosion.

Canyon

- It is a variant of gorge only.
- It is characterised by steep step-like side slopes. It may be as deep as a gorge.
- It is wider at its top than at its bottom.
- It usually forms in horizontal bedded sedimentary rocks.
- Example is **Gandikota Canyon, Andhra Pradesh**

Formation Of Canyons

- **Erosion, is the weathering process that leads to the formation of canyons**.
- This begins at the **table land level and continues downwards**.
- Hard rock is resistant to this weathering process, thus remains on the

escarpments in form of granite and sandstones.

Canyons, Gorges and Valleys of India

| Canyons/Gorges /Valleys | Location/Place | Details/Remarks |
|-----------------------------|--------------------------------|--|
| Gandikota Canyon | Andhra Pradesh | Penner river , Kadapa district of Andhra Pradesh formed by the river Pennar that cuts through the Erramala hills . |
| Gangani Danga Canyon | West Bengal | located on the bank of river Silabati at Garbeta of West Bengal. |
| Chambal River Canyon | Rajasthan | On the banks of Chambal River |
| Sandhan Valley | Maharashtra | Sandhan Valley is a combination of a canyon and valley in the Sahyadri mountain ranges of Maharashtra. |
| Zaskar Valley | Ladakh | Zaskar Valley is a semi-arid region that is nestled in the lap of the northern flank of Great Himalayas. |
| Spiti Valley | Himachal Pradesh | "Spiti" means "The middle land ", i.e. the land between Tibet and India. |
| Papi Hills | Andhra Pradesh | Godavari river , located near Rajahmundry in West Godavari district. |
| Ravines of Chambal | Madhya Pradesh | — |
| Marble Rocks Gorge | Madhya Pradesh | River Narmada near the city of Jabalpur |
| Raneh Falls Canyon | Madhya Pradesh | Ken River , located in Khajuraho |
| Laitlum Canyon | Meghalaya | East Khasi Hills, Laitlum Canyones, which literally means 'The End of Hills or the End of the Earth'. |
| Mekedatu Gorge | Karnataka | Kaveri river |
| Satkosia Gorge | Odisha | eastern Odisha, carved by the Mahanadi River . |
| Kangra Valley | Himachal Pradesh | — |
| Araku Valley | Vishakhapatnam | — |
| Flower Valley | Uttarakhand's Chamoli district | — |
| Ziro Valley | Arunachal Pradesh | — |
| Nubra Valley | Ladakh | — |
| Silent Valley | Kerala | — |

Potholes: Potholes are circular depressions formed because of stream erosion aided by the abrasion of rock fragments. Once a small and shallow depression forms, pebbles and boulders get collected in those depressions and get rotated by flowing water and consequently the depressions grow in dimensions.

Plunge pools: Plunge pools are large, deep potholes commonly found at the foot of a waterfall. They are formed because of the sheer impact of water and the rotation of boulders. These pools also help in the deepening of valleys.

River Terraces:

- River terraces are **surfaces marking old valley floor or floodplain levels**.
- They are **basically products of erosion as they result due to vertical erosion** by the stream into its own depositional floodplain.
- The river terraces **may occur at the same elevation on either side** of the rivers in which case they are called **paired terraces**.
- When the **terraces are seen only on one side** with none on the other or one at quite a different elevation on the other side, they are called **unpaired terraces**.

Depositional Landforms by Running Water

• Alluvial Fans:

- Alluvial fans are **formed when streams flowing from higher levels break into foot slope plains** of low gradient.
- Normally a **very coarse load is carried by streams** flowing over mountain slopes.
- This **load becomes too heavy for the streams to be carried** over gentler gradients and gets dumped and spread as a broad low to high cone shaped deposit called alluvial fan.

Deltas:

- Deltas are **like alluvial fans** but develop at a different location.
- The **load carried by the rivers is dumped and spread** into the sea.
- If this **load is not carried away far into the sea or distributed along the coast**, it spreads and accumulates as a low cone.
- Unlike in alluvial fans, the deposits making up deltas are very well sorted with clear **stratification**.

Floodplains:

- A floodplain (or floodplain) is a **generally flat area of land next to a river or stream**.
- It stretches from the **banks of the river to the outer edges of the valley**.
- A floodplain **consists of two parts**.
- **Floodway:**
 - The first is the main channel of the river itself, called the **floodway**.
 - Floodways can sometimes be seasonal, meaning the channel is dry for part of the year.
- **Flood Fringe:**
 - Beyond the floodway is the **flood fringe**. The flood fringe extends from the outer banks of the floodway to the bluff lines of a river valley.

Meanders:

- Meander is not a landform but is **only a type of channel pattern**. This is because of:
 - **Propensity of water flowing** over very gentle gradients to work laterally on the banks.
 - **Unconsolidated nature of alluvial deposits** making up the banks with many irregularities which can be used by water exerting pressure laterally.
 - **Coriolis force** acting on the fluid water deflecting it like it deflects the wind.
 - The **tendency to meander is reduced**, if there is no deposition and no erosion or undercutting.
- **An oxbow lake is a meander** that is no longer attached to the river.

- **Any limestone or dolomitic region showing typical landforms** produced by the action of groundwater through the processes of solution and deposition is called **Karst topography**.
- **The karst topography** is also characterised by erosional and depositional landforms.

Erosional Landforms by Groundwater:**Swallow Holes, Sinkholes, Lapies and Limestone Pavements:****Swallow Holes:**

- Small to medium sized round to sub-rounded shallow depressions called swallow holes form on the surface of limestones through solution.

Sinkholes:

- They are **very common in limestone/karst areas**.
- A sinkhole is an **opening more or less circular at the top** and funnel-shaped towards the bottom with sizes varying in area from a few sq. m to a hectare and with depth from a less than half a meter to thirty meters or more.

Lapies:

- Lapies are **uneven grooves and ridges** that form when the majority of the limestone's surface is removed by the solution process.

- **Deep grooves separate the etched**, fluted, and pitted rock pinnacles that make up the weathered limestone surface seen in the karst region.

Limestone Pavements:

- A limestone pavement is a **natural karst landform consisting of a flat, incised surface** of exposed limestone that resembles an artificial pavement.
- **Caves:**
- In areas where there are **alternating beds of rocks** (shales, sandstones, quartzites) with limestones or dolomites in between or in areas where limestones are dense, massive and occurring as thick beds, cave formation is prominent.
- There **can be a maze of caves** at different elevations depending upon the limestone beds and intervening rocks.

Depositional Landforms by Groundwater

- **Stalactites:**
- Stalactites hang as **icicles of different diameters**.
- Normally they are **broad at their bases and taper towards** the free ends showing up in a variety of forms.
- **Stalagmites:**
- Stalagmites **rise up from the floor of the caves**.
- They form **due to dripping water from the surface** or through the thin pipe of the stalactite, immediately below it.
- Stalagmites **may take the shape of a column**, a disc, with either a smooth, rounded bulging end or a miniature crater like depression.
- **Pillars:**
- The stalagmite and stalactites eventually fuse to give rise to columns and pillars of different diameters.