

Erosion • Mass Movement • Landforms

■ Key Words & Quick Meanings

Erosion — The carrying away of broken (weathered) rock pieces from one place to another by rivers, wind, ice or waves.

Denudation — The overall wearing down and 'baring' of the land surface caused by weathering + erosion together.

Mass Movement — The downhill sliding of loose rock, soil or mud purely due to gravity — landslides are a common example.

Landslide — A sudden downhill slide of dry soil and rock pieces on a steep slope.

Earth Flow — A slow downhill movement of water-soaked clay and silt on a gentle slope.

Mud-flow — A fast downhill movement of water-soaked rock debris through hill channels.

Meander — A large, snake-like loop formed by a river flowing across flat land.

Glacier — A huge, slow-moving mass of ice found on mountains or in polar regions.

Remember: *Weathering happens IN PLACE, but Erosion happens WHEN material is CARRIED AWAY. That one difference unlocks the whole chapter!*

1. Erosion — Nature's Moving Crew

Once rocks break down through weathering, the loose bits don't just stay there forever. Erosion is the process that picks them up and carries them somewhere else. Think of weathering as 'breaking the biscuit' and erosion as 'carrying the crumbs away'.

Who carries the material?

- Rivers — carry mud, sand and pebbles downstream
- Rainwater — washes loose soil down slopes
- Glaciers — drag rock debris along as they creep forward
- Waves — pick up sand and shingle along the coast
- Winds — lift dust and sand in dry regions

What controls how fast erosion happens?

Erosion is not the same everywhere — some places lose land quickly, others very slowly. The speed depends on:

1. Amount of rainfall in the area
2. Temperature conditions
3. Steepness (slope) of the land

4. Type of soil present
5. How much vegetation/plant cover protects the ground
6. Changes in how the land is being used by people

Did You Know?: The mighty Himalayas now stand where a deep ocean called the 'Tethys Sea' once existed! Weathering and erosion over millions of years reshaped that ocean floor into the world's highest mountains.

2. Mass Movements — When Gravity Takes Over

Sometimes material doesn't need wind, water or ice to move it — gravity alone pulls loose rock and soil downhill. These sudden or slow slides are called mass movements, and they are especially common in hilly states like Uttarakhand, Himachal Pradesh, and Jammu & Kashmir, where they can cause serious damage to lives and property.

Types of Mass Movement

Type	What Moves	Speed & Condition
Landslide	Dry soil and broken rock pieces	Sudden slide down a steep slope
Earth Flow	Water-soaked clay and silt	Slow movement down a gentle slope
Mud-flow	Water-saturated rock debris	Fast movement through steep hill channels

Here's a simple way to picture how these three relate to one another:



3. Agents of Denudation

'Denudation' literally means making the land bare or 'nude'. The five great natural agents that wear down the land are listed below.

The Five Agents at a Glance

#	Agent	How It Changes the Land
1	Rivers	• Carry broken rocks from mountains to lowlands • Erode the land into gorges and valleys
2	Rain Water	• Seeps underground through cracks and pores • Forms springs in hilly areas

#	Agent	How It Changes the Land
		• Creates caves in soluble rocks like limestone
3	Ice / Glaciers	• Slow-moving ice masses on mountains • Melting edges give birth to rivers • Turn V-shaped valleys into U-shaped valleys
4	Sea Waves	• Erode the coastline • Deposit material along the shore when they recede
5	Winds	• Remove dry dust and sand particles • Most powerful in deserts (e.g. Thar, Sahara)

How Frost (Freeze–Thaw) Action Breaks Rocks

Water is one of the strongest natural 'tools' for breaking rock apart. Here is the step-by-step process:



Key Point: This freeze-thaw cycle repeats season after season — a tiny crack today can become a broken boulder after many years!

4. Role of Humans in Changing the Land

Nature isn't the only force reshaping the land — human activity speeds up land degradation in several ways:

- Cutting down trees carelessly → less rainfall → land turns into wasteland
- Uncontrolled construction → land gets covered and surrounding areas degrade
- Factory waste (effluents) → poisons land and renders it useless
- Dumping city garbage → completely spoils the land



5. The River's Journey — Erosion to Deposition

A river behaves very differently depending on where it is along its course. Geographers divide this journey into three stages:



Stage 1: The Upper Course — Mountain Stage

Here the land is very steep, so water rushes down with great force. The river is busy mainly with erosion and transportation, cutting deep into the land.

Main Landforms Created Here

Landform	How It Forms
Gorge	A narrow valley with steep walls, cut through hard rock
V-shaped Valley	Soft rock + heavy rain → sides erode easily, widening the valley into a V
Waterfall	A sudden vertical drop of water over a hard rock step
Rapids	A sloping, rocky riverbed with up-and-down curves causing water to tumble continuously

Fun Fact: The Angel Falls in Venezuela is the world's highest waterfall at about 980 metres — more than 25 times taller than Niagara Falls!

Waterfall vs Rapids — What's the Difference?

Feature	Waterfall	Rapids
Rock layers	Top layer hard, layers below soft	Both top and valley bottom are rocky
Type of drop	One single, deep vertical fall	A series of small jumps, one after another
Result	Cannot easily deepen further	Cannot gain extra height or depth either

Stage 2: The Middle Course — Plain Stage

As the slope becomes gentle, the river slows down. It now becomes useful for navigation and irrigation, and instead of just eroding, it starts depositing the sediment it has carried.

- Overflowing banks deposit alluvial soil → forms fertile flood plains
- On flat land, the river swings side to side, forming large loops called meanders
- Towns and cities often grow along these banks during this stage

River Slows Down



Deposits Alluvium



Fertile Flood Plains +
Meanders

Stage 3: The Lower Course — Delta Stage

This is the river's final stage before joining the sea. Speed drops sharply, so the river can no longer carry all its sediment load — deposition speeds up here.

River Slows
Further



Riverbed Rises



Splits into
Distributaries



Forms a Fertile
Delta

Quick Recall: Delta = many small channels (distributaries) + lots of fertile alluvium (soil) deposited near the sea.

6. Glaciers — Mountain vs Continental

Glaciers are huge, slow-moving masses of ice. Based on size and location, they are classified into two main types:

Feature	Mountain Glaciers	Continental Glaciers
Location	Move down along mountain valleys	Cover huge areas, mainly in Polar Regions
Size	Comparatively smaller	Cover thousands of square kilometres
Speed	Move slowly, slowed by valley floor	Move even more slowly
Effect on rivers	Melting edges give birth to rivers (e.g. Ganga, Yamuna)	Mostly remain as thick ice sheets
Valley shape change	Erode V-shaped valleys into U-shaped valleys	Cover entire land surface uniformly

From V to U — How a Glacier Reshapes a Valley

River-cut V-
shaped Valley



Glacier Moves
Through It



Sides & Floor
Eroded Wider



U-shaped Valley

7. Major Landforms of the Earth

The Earth's surface is not flat or even — it rises and falls into three broad categories of landforms: mountains, plateaus, and plains.

Mountains

A mountain is a high landmass with steep sides, considerably higher than the land around it. Mountains usually occur in long chains or ranges — for example the Himalayas, Alps, Rockies, Andes and Pamir.

Young vs Old Mountains

Type	Height	Peak Shape	Examples
Young Mountains	Very high	Sharp, pointed peaks	Himalayas, Alps, Andes, Rockies
Old Mountains	Lower in height	Rounded tops (due to long erosion)	Aravalli, Appalachian

Three Types of Mountains — Classification Table

Type	How It Forms	Examples
Fold Mountains	Cooling & contracting of molten magma causes the crust to fold; elevated folds become mountains, depressions become valleys	Himalayas, Alps, Appalachians, Ural Mountains
Block Mountains	Large blocks of land break and shift vertically	Rhine Valley region, Vosges Mountains
Volcanic Mountains	Built up by repeated volcanic activity (lava & ash)	Mt. Kilimanjaro, Mount Fujiyama

Life in the Mountains: *Hard, rocky terrain makes roads and railways difficult to build, and the climate is harsh — so very few people live in mountain regions.*

Plateaus

A plateau (also called a tableland) is a broad, raised, fairly flat area that rises sharply above the land around it. Its surface is often rugged and rocky, and it is usually rich in minerals.

- The Deccan Plateau (India) — extends over thousands of kilometres
- The Tibet Plateau — the highest in the world, nicknamed 'the Roof of the World'
- Large plateaus are also found in Africa, Australia, Asia, North America and South America

Life on Plateaus: *Just like mountains, plateau regions are not heavily populated — uneven, rocky land makes roads, railways and canals difficult to build.*

Plains

A plain is a relatively flat, low-lying stretch of land. Some plains are completely level, while others gently roll or undulate. Most plains form from silt, sand and stones deposited by rivers over a very long time.

Plain	Formed By	Location
Great Northern Plain	River Ganga and its tributaries	India
Hwang-Ho Plain	River deposits	China
Nile Valley Plain	River Nile	Egypt

Why Plains Matter: *Plains formed by river deposits are extremely fertile, which is why they are among the most densely populated regions on Earth — perfect for farming and settlement.*

Summary Map — Mountains, Plateaus & Plains

Landform	Surface	Fertility	Population Density
Mountains	Steep, rugged, high	Generally low	Very low
Plateaus	Flat-topped but rugged, rich in minerals	Low to moderate	Low
Plains	Flat, low-lying, formed by deposition	Very high	Very high