

# The Work of Moving Ice, Wind and Sea Waves

Lesson No.	Title	Activity
6	The Work of Moving Ice, Wind and Sea Waves	Identify some places in nearby areas affected by moving ice, wind or sea waves

**Meaning**

Moving ice, wind and sea-waves too are powerful agents of gradation. These three agents too perform the threefold function of erosion, transportation and deposition. In other words, they are removing the weathered material, transporting it from the elevated ground and are depositing the same into low lying areas. This process also tends to ‘grade’ or ‘level off’ all irregularities on the surface of the earth in the areas of their operation.

**Snowfields**

- Snowfields are always found above the snow line. Snow line is an imaginary line above which there is permanent snow.
- Factors affecting snowline are-latitude, amount of snowfall, direction of winds and slope of the land

**Glacier**

- A glacier is a huge mass of many years of snow, ice, rock, sediment, and water. It originates on land and moves down slope under the influence of its own weight and gravity.
- Each glacier is different in its own special way and each glacier has a different surrounding environment.
- On the basis of their location or area of origin, glaciers are divided into two types:
  - (i) continental glaciers and
  - (ii) valley glaciers.

*Erosion work of glacier:*

- As a glacier moves over the land, it drags rock fragments, gravel and sand along with it. These rock fragments act as erosive tools. Thus the glaciers scrape and scour the surface rocks with which it comes in contact. This action of glacier leaves behind scratches and grooves on rocks.

*Types of Glaciers*

- Continental- A thick ice sheet covering vast area of land is called a continental glacier. The thickness of ice in such regions goes upto thousands of metres. Glaciers of this type build

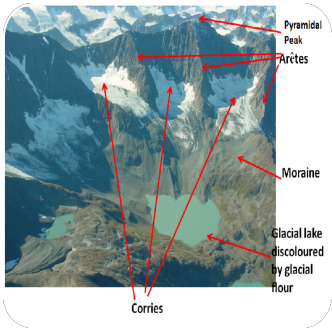
up at the centre and move outward in all directions. Examples of Continental glaciers are found mainly in Antarctica and Greenland. The precipitation in these regions is in the form of snow.

- Valley- When a mass of ice from the high mountainous region starts moving down into the valleys, it is called a valley glacier or a mountain glacier. The shape of the valley glaciers depends on the valley it occupies. Where the valley is broad, the glacier spreads outwards and where the valley is narrow, the glacier contracts.

*Landforms Produced by Glacial Erosion*

A. Erosional Work of Glacier

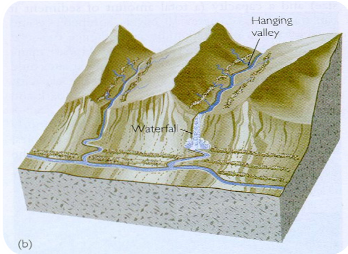
- Cirque (Corrie)- Snow collects at the upper end in a bowl shaped depression, is called cirque. Layers of snow in the process of compaction and recrystallization are called firn. Sometimes the deepest parts of these hollows are occupied by accumulated-water, to form Corrie Lake (or Tarn).
- ‘U’ - shaped Valley- The glacier deepens and widens a preexisting valley by smoothing away the irregularities. In this process the glacier broadens the sides of the valley. The



shape of the valley formed in this manner resembles the letter 'U' and is therefore called a 'U' - shaped valley.

- **Hanging Valley-**

Typically formed when the main valley has been widened and deepened by glacial erosion, leaving the side valley cut off abruptly from the main valley below. The steep drop from the hanging valley to the main valley floor usually creates cascading waterfalls.



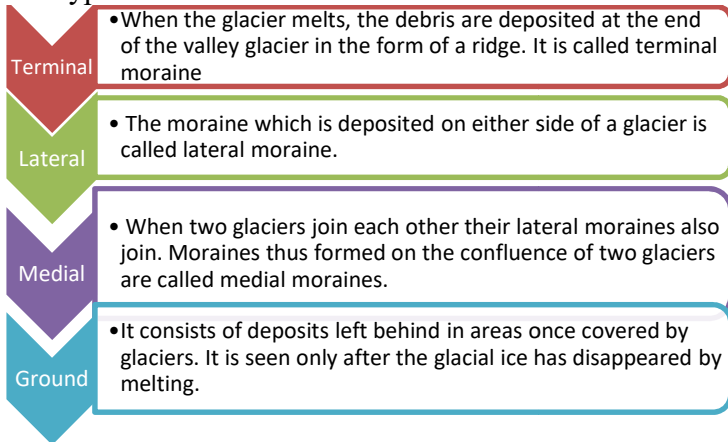
- B. Transformational Work of Glacier

- The glacier moves very slowly, it drags with it large boulders and rock fragments.
- Glacier gets this material from the mountain slopes, valley sides, valley bottom and from air. This material is called the load of glacier

- C. Depositional Work of Glacier

- When the glacier melts or retreats, it deposits its load in different parts. The debris that are deposited are called Moraines.

**Types of Moraines**



**Landforms Produced by the Wind**

- Wind action moves mineral particles when they are in a dry state and unprotected by a vegetation cover.
- These conditions are found in deserts and semiarid regions of the world, as well as on sandy shorelines.

- A. Erosion by the Wind

- Loose particles laying on ground surface may be lifted into the air or rolled along the ground by wind action in the form of wind abrasion, attrition and deflation.

*Landforms Produced by Wind Erosion*

- **Mushroom Rocks (Or Rock Pedestals):** When rocks, consists of alternate hard and soft layers then the soft layers are easily eroded but the hard layer's resist erosion. It narrowed near the base and features like a rock pillar shaped like a mushroom.
- **Wind Eroded Basins:** A land form produced by deflation is a shallow depression called a "blowout".

- B. Transportation by Wind

- Wind is an important agent of transportation in the arid region and sometimes transported material is deposited in areas very far away.

- C. Deposition by Winds

Favourable condition for deposition:

- Carrying capacity
- Speed of the wind
- Obstruction in the path of the wind

**Landforms**

- **Sand dunes-** Special feature of the deserts. They are of different types and have a variety of shapes.
- **Barchans-** The most common type of sand dune is an isolated heap of free sand called a barchan, or crescentic dune.
- **Seif Dunes-** Long, narrow ridges of sand that lie parallel to the direction of the prevailing winds.
- **Loess-** Deposits of wind transported silt that has settled out from dust storms over many thousands of years is known as loess.

**Landforms produced by Sea Waves**

- The tides, waves and ocean currents contribute to the restlessness of ocean.
- The work of sea waves as an agent of gradation includes erosion, transportation and deposition.

**Erosion by Sea Waves**

- Sea waves have a great erosive force and perform four functions i.e. abrasion, attrition, hydraulic action and solution.

- **Landforms**

- Sea Cliff- The upper part of the rock projecting towards sea falls into the sea due to its own weight. As a result a vertical wall is left and called a cliff.
- Sea Caves- A type of **cave** formed primarily by the wave action of the **sea**.



- iii. **Sea Arches-** Sea waves working from opposite directions cut a passage through the soft rocks extended in the sea and create broad door like features are called sea arches or natural bridges.
- iv. **Sea Stacks-** When the roof of an arch is broken a part of the original rock remains standing as a solitary mass called as a sea stack.

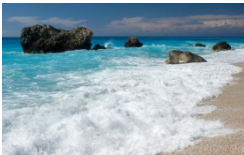


### **Transportation by Sea Waves**

Sea waves, currents and tides are the main agents of transportation of eroded material in the coastal regions.

### **Deposition by Sea waves**

Sea waves are helpful in the deposition of the material eroded from the coastal areas.

#### *Depositional Landforms*

- **Beach-** Waves deposit materials near the coast which is raised above the water level and looks like a flat plain of a platform formed of gravel and sand. It is called a beach.
 
- **Sand Bar-** The deposits of sand and gravel laid down by waves and currents form embankment, separating shoreline from the sea. They thus form barriers between the sea and the mainland. Such deposits are called sand bars.
 
- **Spit-** When one end of a bar is attached to the coast and other extends into the sea, it is called a spit.
- **Lagoon-** Sometimes due to deposition of waves and currents both the ends of the bar join to enclose a part of the sea water between the coast and the bar. This enclosed part of the sea forms a lake of saline water called a lagoon.
 

### **Evaluate yourself**

1. Distinguish between continental glacier and valley glacier.
2. Explain the process of mushroom rock formation with the help of graphics.
3. Describe the major relief features formed by glacial erosional and depositional work.
4. Differentiate between V- shaped valley and U-shaped valley.
5. Define hanging valley. Explain the process of its formation.