



## Key Terms

delta	: a depositional landform created near the mouth of a river	mouth (of river)	: the place from where the river joins another water body
erosion	: the wearing away of landforms by water, wind or ice	natural levees	: raised embankment of the river due to flood
lagoon	: enclosed salt water lake between the coast and the sand bar	rapid	: the steep sloping of the river
meanders	: loops and large bends in the river due to erosion	source (of river)	: the place from where the river originates
		weathering	: breaking up of rocks on the Earth's surface

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The Earth is dynamic in nature. Looking at the landforms you might think that they are present on the surface of the Earth from the beginning, but it is not so. The surface of our planet is continuously changing. Volcanic eruptions and earthquakes are sudden changes. But other changes are so slow that their effects are visible in thousands of years. The formation of a valley or gorge is its best example.

The landforms are being continuously worn away by two processes, weathering and erosion.

Weathering is the breaking up of the rocks on the Earth's surface. A number of factors like heat, cold, frost, chemical reactions and work of plants and animals help in weathering. Erosion is the wearing away of the landforms by different agents like running water (rivers), wind and moving ice (glaciers). Erosion is slowed down due to plants as their roots tighten and bind rock particles and



Weathering



Erosion

prevent them from slipping away. Plants also act as a natural barrier to flowing water and wind. So, cutting of extensive forests is the main reason behind the increase in different types of erosion.)

## WORK OF A RIVER

Running water is perhaps the most powerful agent of erosion. Rain causes some water to flow in small streams so it can be joined together to form a river. Some rainwater evaporates and the rest of it sweeps underground.

Source is a term used for a place from where the river originates. (Sea, lake and ocean are large water bodies in which a river falls.) Mouth is the term used for the place where the river joins another water body. River basin is an area which is drained by the river and its tributaries.

The three ways by which running water carries out its work are:

- Eroded material is transported by running water. *transportation*
  - It erodes the rock over which it flows. *erosion*
  - The transported material is also deposited by it. *deposition*
- The function of a river varies with the volume of water it carries. The slope of a riverbed also plays a vital role.

In hilly regions or in the mountains, due to the steep slope of land, the river carries a small volume of water. Due to narrow stream it flows swiftly, with enormous erosive power, forming number of landforms. The most common landform which is formed by rivers is a **V-shaped valley**.

**Gorge** is a very deep and narrow valley. It is formed, when a river erodes vertically through hard rocks. This valley is shaped like the letter 'V' and therefore, also called an **I-shaped valley**.



**A V-Shaped Valley**

A waterfall is formed, when the water of the river falls almost vertically down a steep valley side. A sudden break in the landform due to faulting is also responsible for the formation of a waterfall. Suddenly, the slope of the river bed drops and a waterfall is formed. In Africa, the Victoria Falls on River Zambezi is the best example of such a waterfall. The other waterfall includes Angel Falls in Venezuela in South America, the Niagara Falls in North America and Jog Falls at Karnataka in India.

**Multiple Choice Questions (Quick Revision)**

Tick (✓) the correct options.

1. Water is the most powerful agent of
- (a) erosion  (b) corrosion
- (c) explosion
2. Victoria Falls is situated on the River
- (a) Cehana  (b) Zambezi
- (c) Victoria

**Rapid** is a term given to the steep sloping segment of the swift flowing river. On entering the plain, the flow of the river is no longer swift. Due to continuous erosion, meanders are formed when the floor of the river valley widens. The river twists and turns to form loops and large bends.

The meandering loops become almost circular due to continuous erosion and deposition and come very close to each other. After some time, the strip of land is cut by the river in two loops, taking a straight course. The circular loop is completely cut off from the main channel and this results in the formation of an **ox-bow lake**.

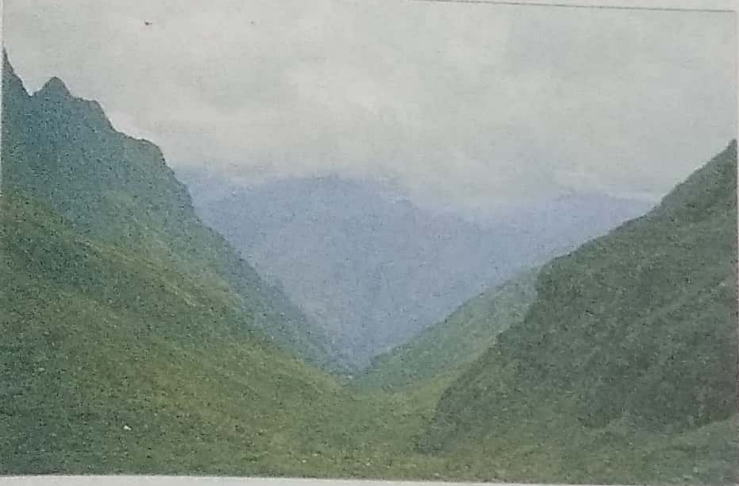


**An Ox-Bow Lake**

Most of the floods are caused in rainy season as the water spills over the banks causing floods. On receding, this water leaves behind alluvial deposits over a large area on both sides of the river. This deposited alluvium forms a relatively flat region known as a **flood plain**. Deposition is in abundant quantity near the river channels. So after many floods, these deposits pile up along the banks of the river and form raised embankments. These embankments are termed as **natural levees**. The river ends at the river mouth. On reaching its mouth, the river carries large volume of alluvium and water. In the wide river channel, the excess load is deposited as **sand bars**. The main channel is divided into several channels. These several channels are known as **distributaries**. The most distinctive feature formed in this stage of the river is the **delta**.

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A delta is a depositional landform, formed by a network of distributaries, generally due to deposition of sediment by the respective river. The shape of the delta is triangular. The Ganga-Brahmaputra delta of India is the largest delta in the world. Major Indian rivers which drain in Bay of Bengal form deltas at their mouths. Rivers which drain into the Arabian Sea do not form deltas because most of the rivers are short and cannot accumulate enough sediments to build deltas.



The Ganga-Brahmaputra Delta

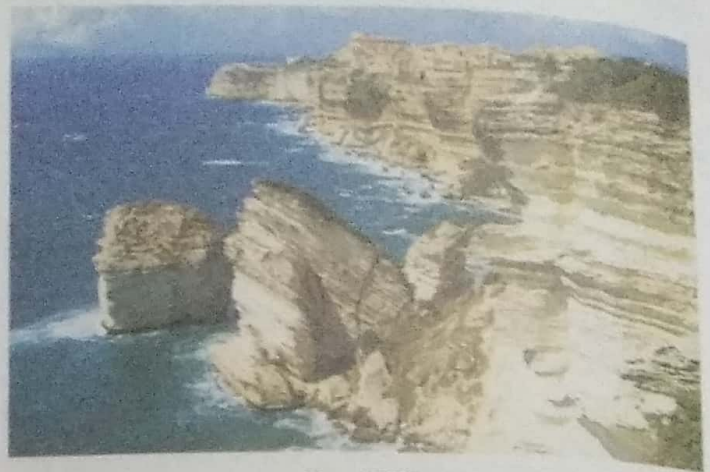
## WORK OF SEA WAVES

In coastal areas, the sea is constantly eroding the old landforms and creating new ones. Erosional and depositional work is performed by seawater, with the help of sea waves. Currents, tides and storms also help in it. Even hard rocks are broken down by the sea wave, colliding in the coast. Rock material is carried away by receding waves. This rock material, present in sea water, causes the erosion of landforms against which it crashes. This is known as **marine deposition** or **marine erosion**.

**Sea cliffs** are formed when waves crash against a high rocky coast near the base. The rocks are eroded near the base. With the passage of time, the rocks above the hollowed out part, collapse. It leaves behind a steep wall of rock facing the sea. These are known as sea cliffs.

Sea waves create a through passage when a headland projecting into a sea is dashed. This passage is called **sea arch**. It leaves behind a pillar of rocks standing in the open water. When the roof

of the sea arch is further eroded, it collapses. These are termed as **stacks**. Sandbars are formed when the broken rock materials are deposited on the sea floor near the coast.



Sea Cliffs

Sediments like pebbles and sand are deposited in sea water along the coast. They include material produced by marine erosion and brought by



Sea Arch

rivers. A beach is formed in due course of time from all these deposits. Sometimes, the seawater is trapped between the sand bars and the coast. As a result, a lagoon is formed which is a partially enclosed lake. **The Chilka (Chilika) Lake in Odisha is the largest lagoon in India.**

## WORK OF MOVING ICE

Snowfields are formed by the snow which falls in high latitudes and heights. They lie above the snowline. A **glacier** is a river of snow and ice that moves out very slowly from the snowfields.

## Multiple Choice Questions (Quick Revision)

Tick (✓) the correct options.

1. Sea cliffs are formed due to crashing of  
(a) waves  (b) wind  (c) gases
2. Weathering is  
(a) formation of rocks   
(b) breaking up of rocks   
(c) rolling away of rocks

It may move at the rate of only a few metres a day. The main work of a glacier is transportation, erosion and deposition. A glacier can alter as well as totally remove the existing landforms, creating completely new and different landforms.



Glacier

When a glacier passes through a valley, the floor and sides of the valley are eroded by the rock pieces present in the glacier. Thus, the floor



A U-Shaped Valley

becomes flat and sides become steep. This type of valley is called **U-shaped valley**.

Along the slope of a mountain, the glacier carves out deep hollows. It develops an armchair like depression which is known as **cirque**. The depression is filled up with water and forms a lake when glacial ice melts. This lake is known as **tarn**.

The capacity of glacier to carry load is reduced when it starts melting. Hence, it deposits the rock material on the floor and side of the valley. These deposits form **glacial moraines**.

## WORK OF WIND

Wind action is the most prominent in deserts. Wind also works like ice and water. It erodes, transports and deposits rock materials. It is the most effective agent of erosion in the desert where it blows freely because of the absence of vegetation. A large amount of sand, dust particles and gravel are carried with strong winds which erode the rocks. **This wind erodes the lower part of the rocks more than the upper part. This gives the rock a shape resembling a mushroom. Hence, such rocks are called mushroom rocks.**



Sand Dunes

Sand dunes are the coarse particles deposited in the form of hillocks. They develop when there is some obstruction in the path of the wind. They vary in height ranging from a few metres to 300 metres. The leeward slope is steep and the windward slope is gentle. Sand dunes are mostly formed in groups.

Sometimes fine dust particles are carried by the wind and deposited in distant regions. These

deposits gradually develop into a thick layer of soil. Such deposits are known as loess.

### Points To Remember

- Weathering is the breaking up of the rocks on the Earth's surface.
- Erosion is the wearing away of the landforms by different agents.
- River basin is an area which is drained by the river and its tributaries.
- In the plains, the river forms meanders, ox bow lakes, flood plains, natural levees, sandbars and deltas.
- Sea arches, sea caves, stacks and sea cliffs are formed due to erosion by sea waves.
- Sandbars, lagoons and beaches are formed due to marine depositions.
- A glacier is a river of snow and ice which moves out very slowly from the snowfields.
- Glacial erosion leads to the formation of a U-shaped valley, cirque and tarn.
- Glacial moraines are deposits of the rock material on the floor and side of the valley.
- Wind erosion is most prominent in deserts.
- Mushroom rocks are formed due to wind erosion.
- Loess and sand dunes are the features of wind depositions.

### Exercise

#### Quick Revision

Use **Cordova Smart Class Software** on **smart board** in class to do these exercises.

#### A. Multiple Choice Questions (MCQs)– Tick (✓) the correct options.

1. The place where the river originates is called its  
(a) source  (b) mouth  (c) rapid
2. A U-shaped valley is created by  
(a) rivers  (b) glaciers  (c) winds

#### B. Fill in the blanks.

1. The landforms are continuously worn away by two processes, ..... and .....
2. A river ..... is the place where river joins another water body.
3. The river of snow and ice, which moves very slowly is called a .....
4. .... are the coarse particles deposited in the form of hillocks.

#### C. Write (T) for true and (F) for false statements.

1. All rocks are equally prone to weathering and erosion.
2. Sea cliffs are formed when waves crash against a high rocky coast.
3. Seawater contains sediments like, sand, pebbles, etc.
4. Chilika Lake in Odisha is the largest lagoon in India.

#### D. Match the following.

1. river basin (a) pillars of rocks standing in open water
2. stacks (b) area drained by a river and its tributaries
3. cirque (c) coarse particles deposited in the form of hillocks
4. sand dunes (d) an armchair – like depression

## Answer The Following

### A. Multiple Choice Questions (MCQs)– Tick (✓) the correct options.

1. It is the largest delta in the world.

(a) Victoria  (b) Chilika Lake  (c) Ganga-Brahmaputra Delta

2. Mushroom rocks are found in

(a) mountains  (b) glaciers  (c) deserts

### B. Short Answer Questions

1. What is a river basin? Write down the two ways in which running water carries out its work.

2. Write a short note on flood plains.

3. Define a U-shaped valley. How is it formed?

4. Discuss in brief about loess.

### C. Long Answer Questions

1. Write a note on the work of a river.

2. What do you understand by a glacier? What shapes does it form?

3. Explain the formation of sand dunes.

4. Discuss how a V-shaped valley is formed.

### D. HOTS (Higher Order Thinking Skills) Questions

1. Do you think glaciers play an important role in maintaining the temperature of our planet?

2. River Kosi is located in Bihar. Why is this river termed as 'Sorrow of Bihar'?

### E. Value Corner

The river mingles with everything that comes in its way and emerges out as a more powerful landform. What do you learn from this quality of river?

## Activity

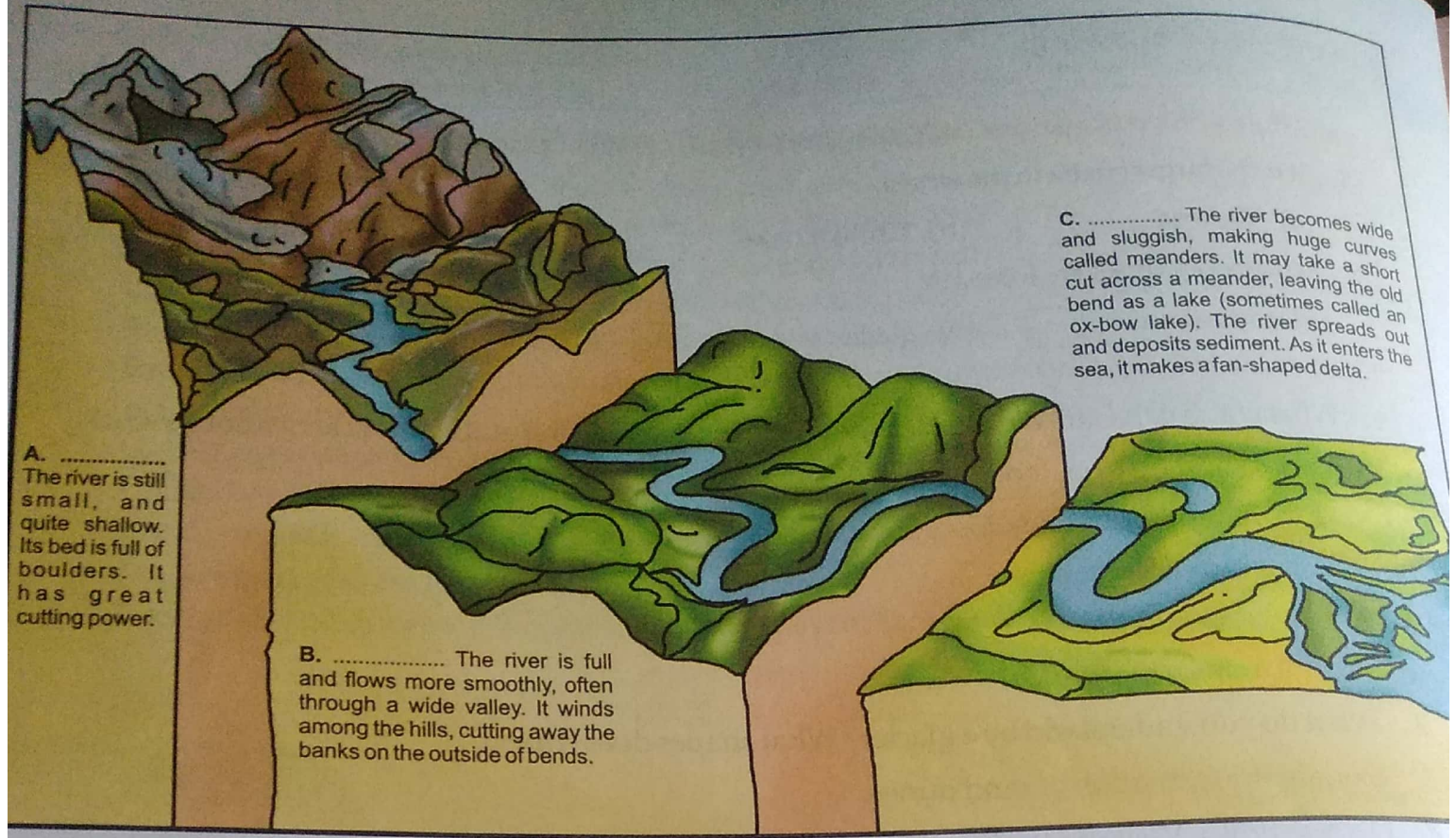
- River rafting is an adventurous sport. List out the places where river rafting is done in India.
- Make a model out of clay or play dough, showing the different stages in the life of a river. Paint the mountain brown, the river blue and the plains green. Also show a valley, a waterfall, a meander, an ox-bow lake, flood plains and a delta.

### Make a collage

Cut out pictures of various landforms from magazines and newspapers. Make a collage with them. You can use this collage as a greeting card.

Collect information about the features of erosion and deposition caused by any two agents of gradation. Prepare a project on it.

The journey of a river is given on the next page. Describe and make a report on the same. Also, fill the blanks.



A. .... The river is still small, and quite shallow. Its bed is full of boulders. It has great cutting power.

B. .... The river is full and flows more smoothly, often through a wide valley. It winds among the hills, cutting away the banks on the outside of bends.

C. .... The river becomes wide and sluggish, making huge curves called meanders. It may take a short cut across a meander, leaving the old bend as a lake (sometimes called an ox-bow lake). The river spreads out and deposits sediment. As it enters the sea, it makes a fan-shaped delta.

**Surfing is Interesting:**

- **To know about the work of a river, visit :**  
<http://www.water.vic.gov.au/environment/rivers/how-rivers-work>  
<http://www.groundwateruk.org/How-Rivers-Work-Role-of-Groundwater.aspx>
- **To know about weathering and erosion, visit :**  
<http://www.mrsciguy.com/weathering.html>  
<http://www.nature.nps.gov/geology/usgsnps/misc/gweaero.html>

**Life Skill**

Visit a nearby hill-station with your parents and capture the beautiful regions of the hill-station. Try to list down the problems that are faced by people living in hilly areas. You can focus on:

- relief features
- transportation
- natural calamities
- farming

