

## 10 Earth's Internal Composition and Landforms

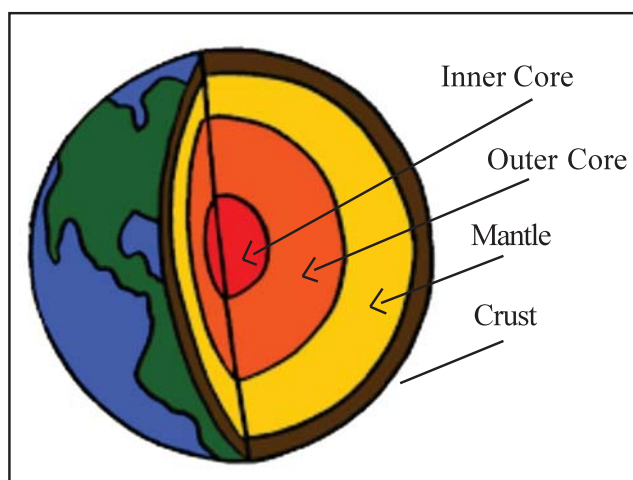
Our Earth is such a planet, on which developed life is seen. Like the other celestial bodies, the shape of the Earth is round. It is constantly changing inside and outside. Have you ever thought that, what is there in the interior of the Earth ? What is Earth made up of ?



### Interior of the Earth

The interior of the earth is made up of several layers arranged one on top of the other like an onion. The uppermost layer of the earth is called 'Crust'. It is the thinnest of all the layers. It is about 35 kms on the continental masses. The main mineral constituents of the continental mass are Silica and Alumina. It is thus called SiAl (Si-Silica and Al-Alumina).

The oceanic crust mainly consists of **Silica** and **Magnesium**; it is therefore called SiMa (Si-silica and Ma-magnesium).



Layers of Earth

### Know This

Only 0.5 % of the size of the Earth is a solid crust 16 % mantle and 83 % is core. The radius of the Earth is 6371 kms.

Just beneath the crust is the mantle which extends upto a depth of 2900 kms. The innermost layer is the core with a radius of about 3500 kms. It is mainly made up of nickel and iron and is called NiFe (Ni-nickel and Fe-ferrous i.e iron). The central core has very high temperature, pressure and density of matter.

### Rocks and Minerals

The types of rocks vary, depending on their properties, particle size and formation process. In terms of formation process, rocks are of three types :

#### (i) Igneous Rock :

Hot magma cools and solidifies. A rock formed in this way is called igneous rock. There are two types of Igneous rocks : **Inner Rock** and **Outer Rock**.

### Know This

- **Igneous** : Latin word ignis, means fire.
- **Sedimentary** : The Latin word Sedimentum, means stable.
- **Metamorphic** : The Greek word metamorphose, which means change in form.

Can you imagine the lava coming out of the volcano ? Actually, the reddish molten magma coming out from the interior of the earth on its surface is lava. When this molten lava comes on the surface of



the earth, it rapidly cools down and becomes solid. Rocks formed in such a way on the crust are called **extrusive igneous rocks**. They have a very fine grained structure. For example, Basalt. Sometimes the molten magma cools down deep inside the earth's crust. Solid rocks are formed which are called **intrusive igneous rocks**. Since they cool down slowly, they form large grains. Granite is an example of such a rock. Grinding stones used to prepare paste/powder of spices and grains are made up of granite.

### (ii) Sedimentary Rocks :

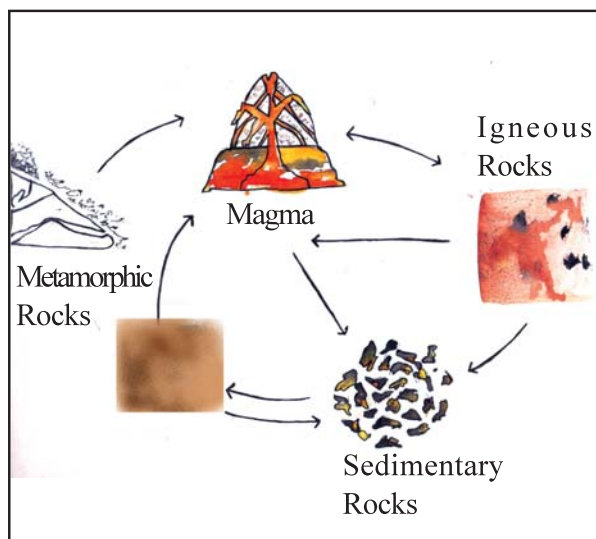
Rocks roll down, crack and hit each other and are broken down into small particles. These sediments are transported and deposited by wind, water etc. These loose sediments are compressed and hardened to form layers of rocks. These types of rocks are called sedimentary rocks. For example sandstone is made from grains of sand. These rocks may also contain fossils of plants, animals and other micro-organisms that once lived on them.

### (iii) Metamorphic Rocks :

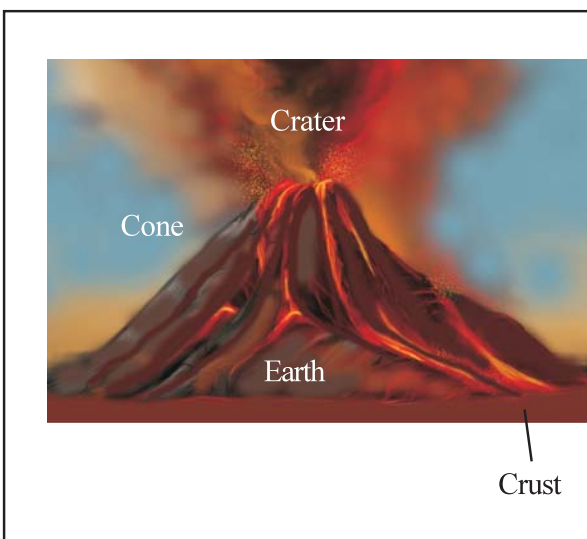
Igneous and sedimentary rocks can change into metamorphic rocks under great heat and pressure. For example clay changes into slate and limestone into marble.

#### Know This

What are fossils ? The remains of dead plants and animals trapped in the layers of rocks are called fossils.



Rock-Cycle



Volcano

You will be surprised to know that one type of rock changes to another type under certain conditions in a cyclic manner. This process of transformation of rocks is called rock-cycle. You have already learnt that when the molten magma cools; it solidifies to become igneous rock. These igneous rocks are broken down into small particles those are transported and deposited to form sedimentary rocks. When the igneous and sedimentary rocks are subjected to heat and pressure, they change into metamorphic rocks. The metamorphic rocks which are still under extreme heat and pressure melt down to form molten magma. This molten magma cools down and solidify into igneous rocks.



Rocks are very useful to us. The solid rocks are used for making roads, houses, and buildings.

Rocks are made up of different minerals. Minerals are naturally occurring substances which have certain physical property and definite chemical composition. Minerals are very important to mankind. Some are used as fuels. For example coal, natural gas, mineral oil and petroleum. They are used in various industries and even for making medicines. Like iron, aluminium, gold, uranium etc.

### Formation of Landforms

The lithosphere is broken into a number of plates known as lithospheric plates. You will be surprised to know that these plates move in different direction i.e few millimeters in a year. This is because of the molten magma inside the earth. The molten magma inside the earth moves in a circular manner.

The movement of these plates causes changes on the surface of the earth. The movements of the earth are divided on the basis of forces which cause them. The movements which are generated in the interior of the earth are called as Endogenic forces and the forces that work on the surface of the earth are called as Exogenic forces.

Endogenic forces sometimes produce sudden movements and sometimes produce slow movement. Sudden movements like earthquakes and volcanoes cause changes on the surface of the earth. A volcano is a vent (opening) in the earth's crust through which molten material erupts suddenly.

Similarly, when the lithospheric plates move, the surface of the earth vibrates. The vibration can travel all round its centre. These vibrations are called 'earthquake'. The place in the crust from where the vibration starts is called the 'focus'. The vibration travels in the form of wave outside the centre of origin. The centre of the surface closest to the centre of origin is called 'epicentre'. Greatest damage is usually caused, closest to the epicentre and as the distance from the epicentre increases, the magnitude of the earthquake gradually decreases.

Although, earthquake cannot be predicted, the impact can be minimized if we are prepared beforehand.

Local people use some common methods to predict possibility of earthquake, like study of behaviour of animals, rapid movements of fish in pond, coming out of reptiles on the surface of the earth etc.

**Major LandForms :** The landscape is continuously worn away by two processes - weathering and erosion. Weathering – is the breaking up of the rocks on the earth's surface. Weathering occurs on the surface due to the agents like water, wind and ice. The weathered material is carried away or transported by water, wind etc. and eventually deposited. This process of weathering and deposition create different landforms on the surface of the earth.

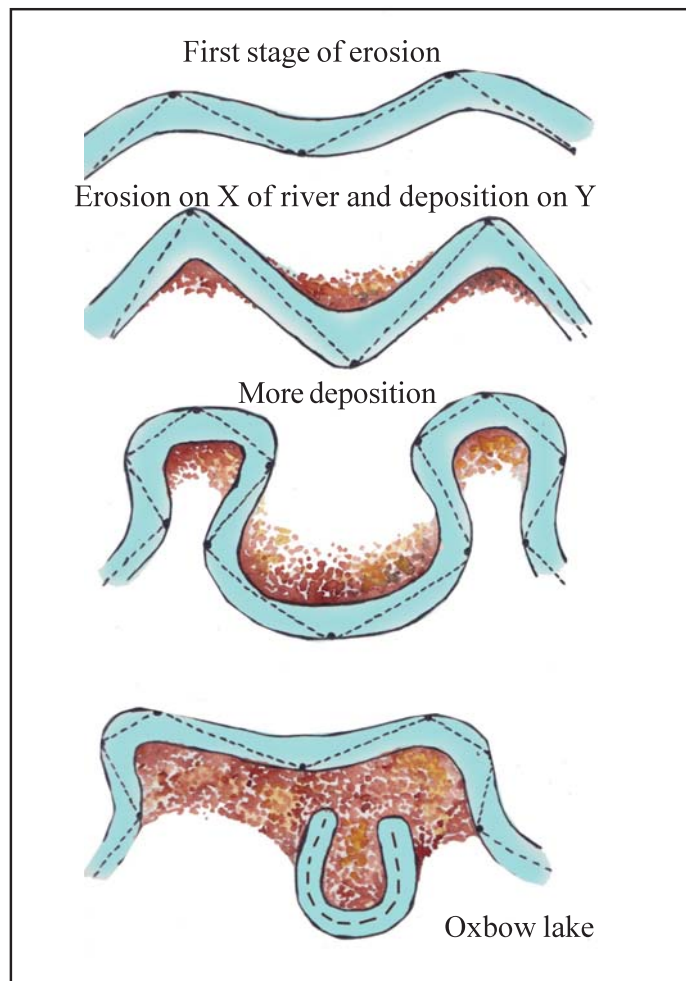
**Work of a River :** The running water in the river erodes the landscape. When the river straightly tumbles at steep angle over very hard rocks or down a valley it forms a waterfall.



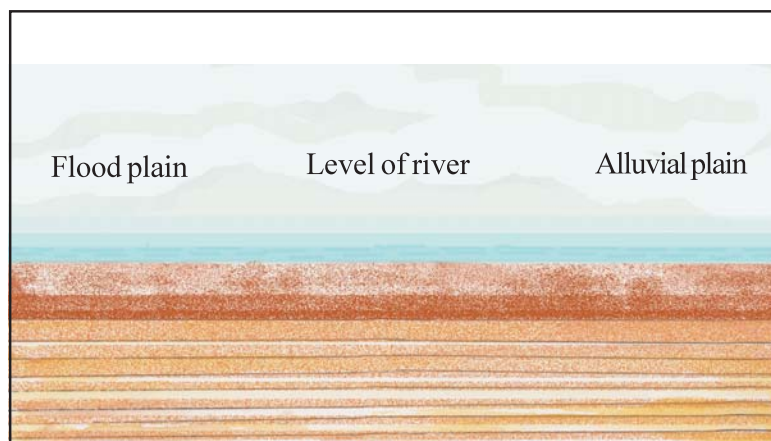
Waterfall



As the river enters the plains, it flows there are twist and turn forming large bend known as meanders. Due to continuous erosion and deposition along the sides of the meander, the ends of the meander loop come closer and almost assume the shape of a horseshoe or a circle. In this condition when the river gets flooded due to deposition, land between the meander loops gets cut off by the river flow and river leaves its long path and takes a straight path. The water remains in the abandoned cylindrical part of the river, called the oxbow-lake. Sometimes the river seems to flow out of its bank. This leads to the flooding of the neighbouring areas. As it floods, it deposits layers of the alluvium and other materials. Landform formed due to this deposition is called floodplain. When a large amount of silt-soil deposits on both sides of the river, the raised banks are called levees. As the river approaches the sea, the speed of



**Formation of Oxbow lake**



**Floodplain and Levees**

the flowing water decreases and the river begins to break up into a number of streams called distributeries. The river becomes so slow that it begins to deposit silt, sand soil and other material. Each distributery forms its own mouth. The collection of sediment from all the mouths from a delta.

**Work of Sea Waves :** The erosion and deposition of the sea waves give rise to coastal landforms. Sea waves continuously strike against the rocks. As a result, cracks develop. Over the time they become larger and wider, which is called sea cave. As these cavities become larger only the roof of the caves remains thus forming sea arches. Continuous erosion breaks the roof and only walls are left. These walls

like features are called stacks. The steep rocky coast rising almost vertically above sea water is called sea cliff. The sea waves deposit sediments along the shores forming beaches.

**Work of Glaciers :** Glaciers are 'rivers of ice' formed in snow-clad mountainous areas. Glaciers erode the landscape by bulldozing rocks and stones to expose the solid rock below. Glaciers form 'U' shaped valley by erosion. As the ice melts hollows formed in mountains get filled up with water and form lakes (tarn). The material carried by the glacier such as small and big rocks, sand and silt get deposited as a result hill like landform is formed which is called **Drumlin**.

**Work of Wind :** Wind is an active agent of erosion and deposition in the deserts. In comparison to lower, the upper part of the rocks is easily eroded. Therefore, such rocks have narrower base and wider top. In the desert you can see rocks in the shape of a mushroom, commonly called 'mushroom rocks.' When the wind blows it lifts and transports sand from one place to another. When it stops, blowing, sand falls and gets deposited in low hill like structure called barchan (Sanddunes). Such type of barchans are seen in Rajasthan. When such sand is deposited in large areas, it is called loess. Large deposits of loess are found in China.



**Sanddune**

### Exercise

#### 1. (A) Match the following correctly :

- | A                                    | B              |
|--------------------------------------|----------------|
| (1) The uppermost layer of the earth | (A) Moraine    |
| (2) Metamorphic Rocks                | (B) Sanddune   |
| (3) Work of river                    | (C) Marble     |
| (4) Work of wind                     | (D) Floodplain |
| (5) Eroded form of the glacier       | (E) Sial       |

#### (B) Fill in the blanks :

- (1) Inner most layer of the earth is known as .....
- (2) ..... stone is used to grind grains.
- (3) The place where the vibration starts below the surface is called ..... centre.



(4) The wall like topography formed due to erosion of the ocean waves is known as ..... .

(5) As the speed of the wind decreases and soil particles spread on the ground, it is known as ..... .

**2. Answer the following questions in one sentence :**

- (1) Which minerals are mainly composed in SiAl layer.
- (2) Name the three main types of rocks.
- (3) What are the intrusive igneous rocks ?
- (4) What is Endogenic force ?
- (5) What is waterfall ?

**3. Write a short note on :**

- (1) Sial and Sima.
- (2) Explain the function of wind with example.
- (3) Explain the function of metamorphic rocks with example.

**4. Answer the following questions :**

- (1) Explain the internal structure of the earth with diagram.
- (2) Explain, types of rocks with example.
- (3) Explain the topography (features) of a river or glacier.

**Activity**

- Collect the pieces of rocks found in your area and identify them.
- Collect and identify rock samples when visiting another area during school trip.
- Visit the following website with the help of your teacher :

[www.nationalgeographic.org](http://www.nationalgeographic.org)

<https://simple.in.wikipedia.org>

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