Lesson - 8

Major Landforms

There is sufficient difference between various landforms visible on the earth's surface like continents, oceans, mountains, plateaus and lakes. Major landforms are divided into three different categories:-

1. Relief of First order - continents and oceans
2. Relief of Second order - mountains plateaus and plains
3. Relief of Third Order - Valleys and deltas etc. (Fig.8.1)

The formation of different landforms on the earth's surface is because of the interaction of endogenetic and exogenetic forces. These forces are classified into different categories as follows :-

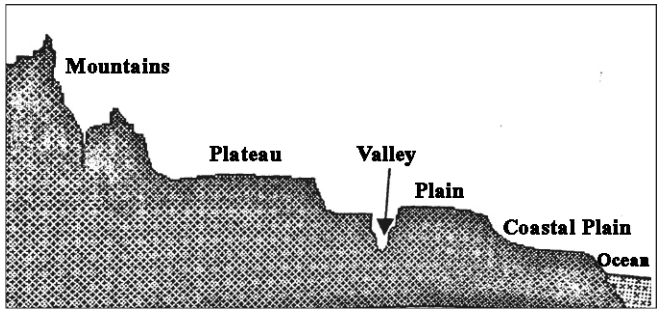


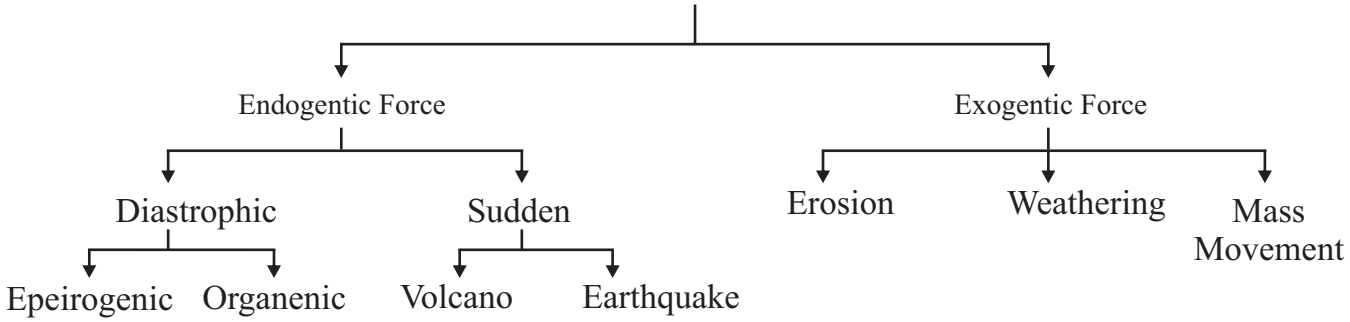
Fig. 8.1 : Major Landforms

Mountain

The landform which is elevated from its surrounding area , and has a pointed peak with steep slopes is called mountain.

According to Finch Mountains are 600m or

Table 8.1
Forces responsible for formatin of different landforms



600 metres above mean sea level and its slope varies from 260 to 350 degrees.

Types of mountains and their classification

1. Fold mountains

Due to the contractional forces of the earth's interior, folds appear on the earth's crust, these are called fold mountains. The uplifted area in form of fold, formed due to the contractional forces is called anticyline and the down folded portion is called syncline. Intense geological activities uplift these anticlines and synclines and gradually the fold mountains are uplifted. Himalayas, Andes and Ural Mountains are the examples of fold mountains. These Mountains are the youngest mountains of the world, fossils are not found in these type of mountains . (Fig.8.2)

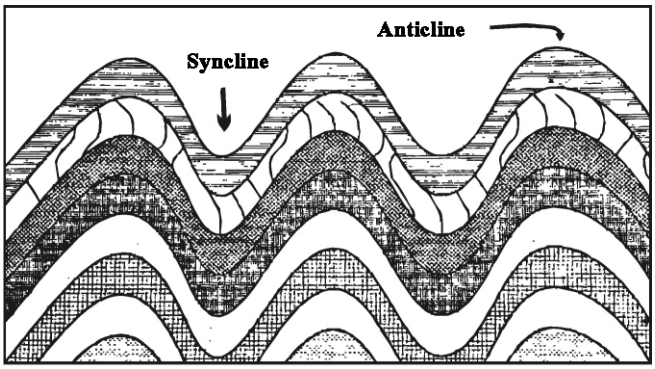


Fig. 8.2 : Folded Mountain

2. Dome shaped mountain

The hot molten magma attempts to move out to the surface of the earth, when this magma is not able to erupt, it uplifts the crustal rocks in form of a dome. Henry and Yunta ,of Utah Province of North America are examples of this types of mountain. (Fig. 8.3)

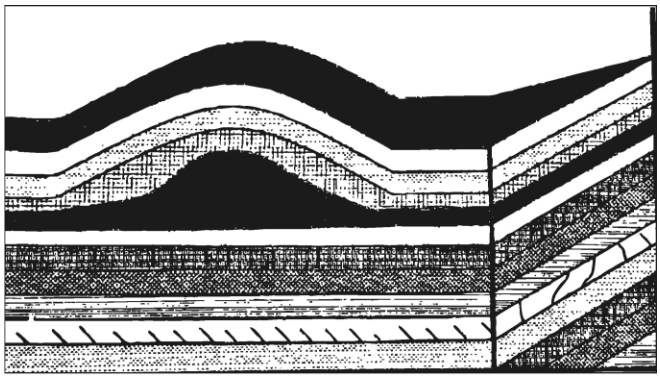


Fig. 8.3 : Dome Shaped Mountain

3. Accumulated mountain

These Mountains are formed of the huge heap of accumulated material and its deposition by wind, river, glaciers, waves and volcanoes. Fujiyama of Japan, Mt. Vesuvius of Italy, Kilimanjaro volcano of Africa are the examples of accumulated mountain. (Fig. 8.4)

Fig. 8.4 : Accumulated Mountain

Table 8.2
Classification of Mountain

On the basis of origin	On the basis of altitude	On the basis of age
1. Fold Mountain	1. Higher altitude Mountain	1. Archanean
2. Dome Shaped Mountain	2. Normal altitude Mountain	2. Caledonian
3. Accumulated Mountain	3. Lesser altitude Mountain	3. Heriynian
4. Block Mountain	4. Very Less altitude Mountain	4. Alpine
5. Residual Mountain		

4. Faulted or block mountain

When the central portion between the two parallel faults or fracture gets uplifted or the sides of the central region gets subsided down , it results into the formation of Block mountains. As it is formed of fault it is also called fault mountains.

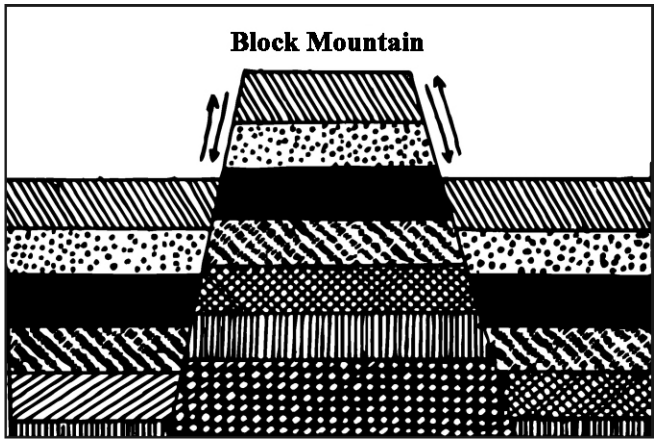


Fig. 8.5 : Block Mountain

5. Residual mountains

These are hard portions of the rocks which remains uplifted from its surrounding areas and is not affected by the agents of denudation like river, wind, sea waves, glaciers. When the river erodes the terrain and plateau is converted into flat plain but harder rocks are not eroded by the river , these left over raised portions take the form of residual mountains. (Fig.8.6)

Classification on the basis of age of mountains

So far four major mountain building movements have taken place. There has been period

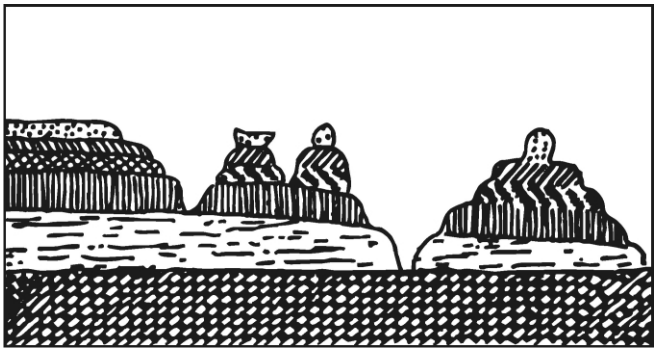


Fig. 8.6 : Residual mountains

of absolute no activity in between these activities . During this period, contractional force kept accumulating. due to which the following mountain building activities happened.

1. Archaean Mountain

Archaean mountain building activities occurred around 40 million years ago , during the pre-cambrian period. During this period Feno-Scandia of Europe and Aravalli mountains of India were formed.

2. Caledonian Mountains

Around 32 million years ago, during the previous mountain building activities, the appalachian mountains of America, Scandinavian uplands of Europe and mountains of Ireland were formed.

3. Hercynian mountains

Mountain building activities that occurred almost 22 million years ago are also referred as Altai, Variscan and Armenian activities.

Table 8.3
Classification of Plateaus

Basis

Origin	Location	Development	Climate
1. Formed by Lava	1. Intermountane	1. Young	1. Humid
2. Formed by Glacier	2. Pedimont	2. Mature	2. Arid
3. Formed by Wind	3. Continental	3. Old	3. Snow covered
4. Formed by Water		4. Rejuvenated	

Tein Shan , Khingan and Altai mountains of Asia, Eastern cordillera of Australia, the Pennines of Europe are the mountains formed during this period.

4. Alpine mountains

Around 3 million years ago, the formation of fold mountains began. mountains included in this category are Himalayas Karakoram, Kunlun, Elburg, Hindukush, Rockies, Andes, Balkans , Pyrenees etc.

Classification of mountains on the basis of height

French has proposed these divisions-

1. High mountains

The height of these mountains varies from 6000 to 2000 m

2. Rugged mountain

These Mountains are mostly between 4500 to 6000 feet or 1500 to 2000m high.

3. Rough mountain

These are the with lesser height. Their height varies between 3000 to 4500 feet or from 1000 to 1500m.

4. Low mountain

Mostly these mountains are 2000 to 3000 feet on 700 to 1000 m high.

Effect of mountains on human beings

Mountains have been an important tourist destination. Mountains play an important role in entertainment, health benefits and adventurous mountaineering. Mountains have strategic and political importance. Mountains are the source of origin of many rivers which provides drinking water, irrigation, fishing and generation of hydroelectricity. mountains also affect the climate of the area and controls the rainfall. Mountain dwellers are mostly brave, healthy and simple.

Mountains have their own importance in reference to religion and mythology. Peaceful and isolated caves are centres of meditation and dwelling places of saints. Many pilgrimage sites are the gift of mountains. Badrinath, Vaishno Devi which are important pilgrimage sites are being visited by thousands of devotees every year.

Plateau

Areas which are uplifted from their surroundings, having a flat and a broad top, having more than one, steep slopes are called plateau.

Classification of Plateau on the basis of origin.

1. Lava plateau

Lava from the interior of the earth when overflows over an area, forms Lava plateau. Columbia and Deccan Plateau of India are its example.

2. Glaciated plateau

These plateaus are located in higher latitudes like Labrador, Alaska and Scandinavia etc.

3. Aeolian plateau

These plateaus are formed because of the excess deposition of soil accumulated erosional work of the Wind. Potwar in Pakistan and Loess plateau in China are its best examples.

4. Acqueous plateau

The sediments which have been constantly being deposited in the oceanic regions or geosynclines, causing upliftment in sea beds due to endogenetic forces, resulting into formation of acqueous plateau.

Classification of plateaus on the basis of their location -

1. Intermontane plateau

As these plateaus are located between mountains they are called intermontane plateau. Tibet plateau is located between Himalaya and Kunlun mountains. (Fig.8.7)

2. Pedimont plateau

These plateaus are formed on the foothills of the mountains, having mountain on one side and sea or plain on the other. Petagonian plateau of Argentina is situated at the foothills of Andes mountain. (Fig.8.8)

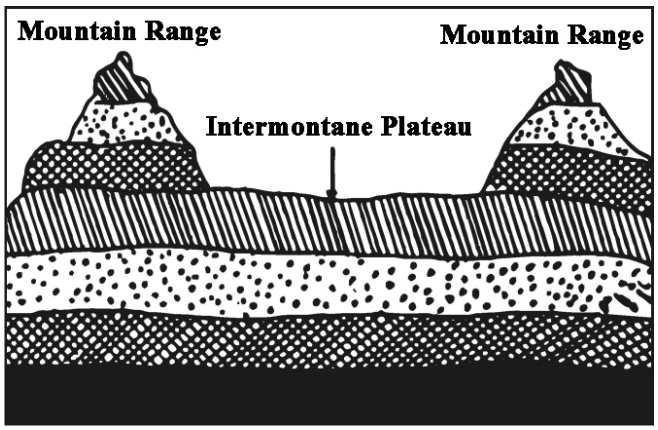


Fig. 8.7 : Intermoantane Plateau

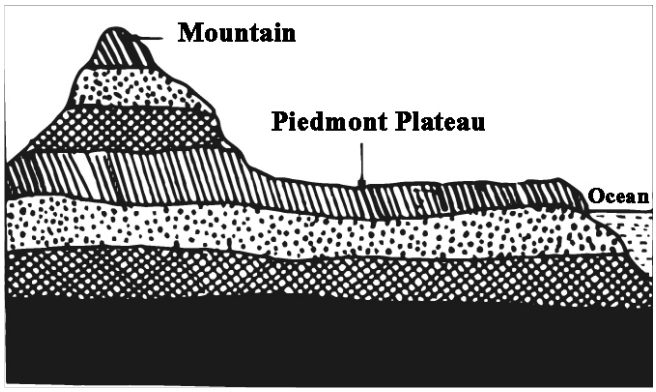


Fig. 8.8 : Piedmont Plateau

3. Continental plateau

These types of Plateaus are extended in the entire area of a country or a continent. for example Deccan Plateau , plateau of Greenland and plateau of Antarctica.

Classification of Plateau on the basis of climate-

1. Humid plateau

These plateaus mostly have 50% of humidity and good rainfall. For example plateaus of Meghalaya and Malagasy are included under this category.

2. Dry or Arid plateau

The amount of evaporation exceeds the amount of rainfall received thus dryness prevails on these plateaus example Tarim, Gobi and Potwar Plateau.

3. Iced plateau

Higher regions and higher latitudes are mostly covered with perpetual snow because of lower temperatures example Greenland and Antarctic plateaus.

Classification of plateaus on the basis of its stages of development -

1. Young plateau

These types of plateaus are separated from its nearby region with a steep edge. The rivers flowing on these plateaus creates deep valleys. Kolu plateau, which is on a river creates deep canyon.

2. Mature plateau

These plateaus have caves and ridges with highly uneven surface. the margins of these plateaus appear to be terrace form like Appalacian plateau.

3. Old plateau

The relief features of these plateaus are converted into flat Plains example plateau of Ranchi.

4. Rejuvenated plateau

Due to the endogenetic forces the old plateaus sometimes get uplifted and erosion begins again.

Importance of Plateau -

In reference to economy, plateaus are more crowded than mountains . intensive agriculture can be practiced on its fertile soil the store houses of minerals. Rivers creates waterfalls on its steep slopes. Reservoir can also be created on its hard surface. Means of transport are more developed in comparison to mountains. Plateaus are comparatively less developed than plains.

Plain

The part of earth's surface which is comparatively more flat, successive and gentler slope and have lower elevation is called plain. Plains have dissimilarities in refrence height above sea level. Like Polder plain of Holland is lower than sea level whereas the plains of the lakes in Kashmir are situated at the height of 1700 m. On the other

hand the northern plain of India extends from 8 metre high delta region to 200m high plain in Punjab.

Classification of Plain

Erosional	Depositional
1. Riverine	1. Alluvial
2. Glaciated	2. Glacio Fluvial
3. Wind Eroded	3. Loess
4. Karst	4. Lava
	5. Lacustrine

Erosional plains

At the end of the cycle of erosion all the topographic features are turned into a plain.

1. Riverine plains

The rivers transform the undulating surface with their erosional work into flat plains. In these plains , hard rocks which are resistant to erosion as visible as small ridges and are called Monadnocks. the basins of Paris and London are the examples of these type of plains.

2. Glaciated plain

Higher mountain ranges and latitudes are mostly covered with snow. The surface beneath the snow undergoes attrition and abrasion, which turns the surfaces into flat plains. Glaciated plains are found in Canada, Sweden and Finland.

3. Wind eroded plain

Wind blows away the loose and broken rock pieces with mechanical erosion. The rocks lying in the direction of the winds get eroded through the process of abrasion by the wind. This abrasion results in the formation of Pediplain.

4. Karst plain

In the areas of limestone rocks, by the end of the erosional cycle of the underground water, the topographical features are transformed into a Karst plain. The Karst plains of Nainital and Almora in India ,Yugoslavia and France are its examples.

(B) Depositional plains

1. Alluvial plains

These plains are formed by the deposition of debris brought down by the rivers from higher elevations to the lower regions. These plains are called Peidmont plain or Deltaic plain on the basis of their locations. The Deltaic plains of Ganga Brahmaputra and Nile rivers are very fertile and thickly populated.

2. Glacial fluvial plain

These plains are formed by the deposition of glaciers. Till plains are formed by the deposition of boulders, rock pieces and sand brought down by the glaciers whereas Outwash plains are formed during the ablation of the glaciers when fine sand is deposited in form of plains.

3. Loess plain

These plains are formed in desert areas, due to the deposition of sand particles by the wind. Loess plains found in China, Argentina and near Caspian Sea are its remarkable examples.

4. Lava plains

These plains are formed with during volcanic eruptions when Lava, ashes and fine particles of rocks are deposited extensively. Lava plains are found in Southern parts of India.

5. Lacustrine plains

When the lakes get completely filled with sediments brought by the rivers , the deposited sediments, take the form of fertile lacustrine plains. Sometimes due to endogenetic forces when the bottom of the lakes are uplifted and the water spreads in the nearby surroundings, the bottom of the lake is transformed into a plain.

Importance of plains

80% of the world population, resides in plains. Major civilizations of the world like Indus Valley Civilization, Nile civilization, Babylon Civilization of Mesopotamia flourished in plains. This is the reason why plains are called cradle of civilizations. Plains are most suitable for transport communication, pastures and human habitat. As plains are flat the construction of railway lines, roadways and airports are much easier. Plains are best for all the different types of human activities. The densiest places of the world are situated in plains.

Valleys

Valleys are mostly referred as 'Negative Topography' of rivers, but all the valleys are not necessarily formed by rivers. Diastrophism is also responsible for formation of valleys. Glaciers and underground water also form valleys. Valleys are actually underdeveloped or eroded trenches between the two slopes, formed by the tectonic movement or exogenetic forces.

Classification of valleys -

Valley is formed of tectonic movements The valleys which are formed because of the movement due to endogenetic forces are included under this category. its following types are as follows-

1. Synclinal Valley

Due to tectonic activities, contractional forces causes folding of the rocks. This results in the formation of synclinal valley in the syncline of the folds.

2. Rift Valley

When the land between two parallel faults subsides down, Rift valley is formed. Valley formed by river Narmada is an example of Rift valley.

Valleys formed of exogenetic forces are as follows-

1. River valley

Rainwater erodes the surface of the earth horizontally and vertically, which leads to the formation of River valley. The depth, width and the length of the valley develops it.

2. Glacial valley

The sliding snow from higher peaks of the mountain forms 'U' shape valley which is broad and has steep sides. Another Glacier joining the main Glacial valley, forms the hanging valley.

3. Blind valley

Due to the solution of the limestone rocks with river water, sinkholes are formed . The rivers often disappears in these sinkholes. The dry valley left after disappearance of the river into the sinkholes is called Blind valley.

Genetic classification -

1. Consequent valley

The valleys that corresponds to the slope of the surface are called consequent valley.

2. Subsequent valley

After the formation of consequent valley, this valley is formed along the strike dip of the slope. It is also called longitudinal valley.

3. Obsequent valley

This valley is formed by the tributaries of the rivers of the subsequent valleys. In these valleys the water in the streams flow opposite to the rivers of consequent valleys.

4. Resequent valley

These valleys are formed by the streams that flows in the direction as that of the consequent valleys.

5. Insequent valley

The valleys which remain unaffected by the structure and slope are called insequent valley.

Stages of valleys

1. Youth valley

During the youth stage Valley has a steep slope. The rivers erodes vertically due to which the depth of the valley increases.

2. Mature valley

In the Mature stage, the slope of the valley is reduced and it becomes more gentler, lateral erosion increases and the valleys start broadening.

3. Old valley

This may be called the last stage of the valley. In this stage the slope of the valley is negligible and the valley starts becoming flat.

Classification of valleys on the basis of structural trends-

1. Antecedent valley

Antecedent valleys are formed when part of the earth's surface on which river was flowing undergoes upliftment , the river does not changes its course and continue flowing in the previous valley.

2. Superimposed valley

The valley built on the upper layers of the ground when progresses in the same direction on rigid rocks it is called superimposed valley.

Classification on the basis of change in base level

1. Drowned valley

With the rise in the sea levels, the opening of the valleys get submerged, which is called as Drowned valley.

2. Rejuvenated valley

When the rivers flow below sea level, they erodes the valley downward, due to which these valleys are rejuvenated.

Concept of development of landforms

Continents and oceans are the largest landforms on the earth' surface. Mountains, Plateaus and Plains are the landforms of the second order. The third order landforms are formed when the endogenetic forces work on these first order and second order landforms and none of these landforms formed on earth's surface is permanent. Whenever a new landforms is formed because of the work of endogenetic forces, its degradation starts along with its development. Tethys sea existed at the place of the present day Himalayas. Mountains are eroded and takes the form of plateau, Plateaus are eroded and takes the form of plains, Plains gets submerged and get transformed into sea. The cycle of erosion continues. Many complexities are found in development of landforms. All the continents and the oceans are formed by 20 major and minor tectonic plates. As the tectonic plates shift due to tectonic activities, many different types of landforms are formed on the plate margins. The concept of plate tectonics resolves it answers many questions related to formation of mountains, earthquakes, volcanoes and continental drift. In the same way Geomorphic cycle and cycle of erosion resolves many problems related to the development of the third order landforms.

Important points

1. Many landforms on the earth surface are formed due to the work of endogenetic and exogenetic forces.
2. Range of fold mountain are the youngest mountains in the world. These mountains are formed of geosynclines
3. Himalayas , Urals and Andes are the examples of young fold mountains.
4. A landform which is extensively high from its surrounding areas, have steep slope and conical top is termed as a mountain.
5. A landform which is of higher elevation from its surrounding areas, with broader flat top and steep slopes, is called a Plateau.
6. A comparatively flatter area with gentler slope, with neglible relief features is called a plain.

Exercise
Multi Choice Questions

1. Identify the first order landforms-
   A. Deltas and valleys
   B. Continents and Oceans
   C. Mountains and Plateaus
   D. Plains and Coasts

2. Which of the following forces is not an endogenetic force-
   A. Volcano
   B. Earthquake
   C. Mountain building
   D. Erosion

3. Which of the following is an example intermontane plateau-
   A. Plateau of Patagonia
   B. Plateau of Tibet
   C. Plateau of Loess
   D. Plateau of Malagasy

4. Which of the following is the example of accumulated mountain-
   A. Himalaya
   B. Fuji Yama of Japan
   C. Ural
   D. Andes

5. Which of the following is an example of humid plateau-
   A. Plateau of Potwar
   B. Plateau of Gobi
   C. Plateau of Cherrapunji
   D. Plateau of Tarim

Very short type questions-

6. Which are the youngest fold mountains of the world?
7. Which Mountains are called accumulated mountains?
8. Which type of valley is formed by river Narmada?
9. What are residual mountains?
10. What are pediment plateau?

Short type questions -

11. Write the names of Hersynian mountains.
12. Describe briefly about glaciated plateau.
13. What is intermontane plateau?
14. What is antecedent valley?
15. What is Mature plateau? Give examples.

Essay type questions-

16. Classify mountains
17. Classify plateaus on the basis of its origin.
18. Classify plains and highlight its importance.

Answer key -

1. B. 2. D. 3 B. 4. B. 5. C