

CHAPTER 8 MAJOR LANDFORM FEATURES

Objectives

After studying this chapter, the student should be able to:

1. Identify major mountain types, Plateaux and plains.
2. State the distinguishing characteristics of the different types of mountains, Plateaux and plains.
3. describe the processes involved in the formation of different mountains, plateaux and plains.
4. state the importance of mountains, plateaux and plains.

8.1 LAND FORMS

A land form is a natural physical feature of the earth's surface.

Types of Landform

There are four major types of landforms on the earth's surface. These are:

- (i) Mountains (ii) Plateaux (iii) Plains (iv) depression

(i) Mountains

Mountains are great elevated land surfaces resulting from intense action of internal forces. Mountains are usually above 600m in height.

There are four basic types of mountains depending on their mode of formation. These are (i) Fold mountain (ii) Block mountain (iii) Volcanic mountain and (iv) Residual mountain.

(i) Fold Mountains

Fold mountains are the most common types of mountains. They are formed by compressional forces acting on sedimentary rocks which push them into huge and complex structures. (See Fig. 8.1)

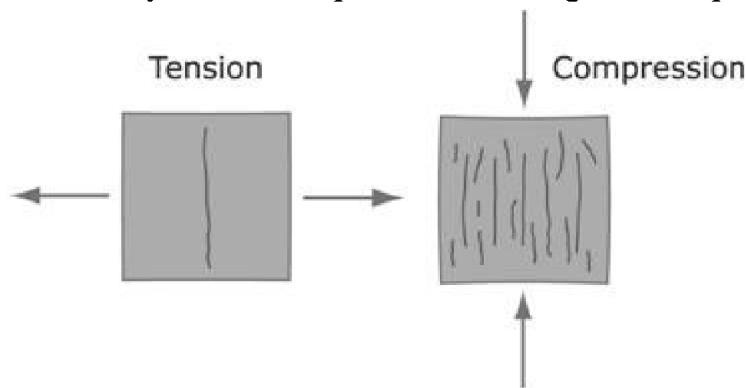


Fig. 8.1: Tensional and Compressional Forces

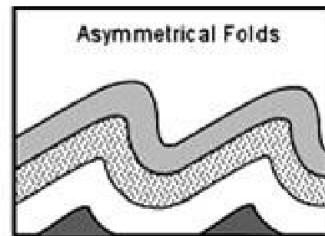
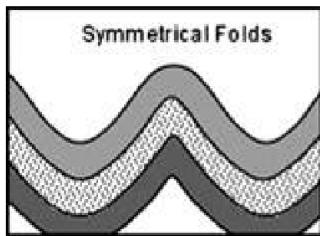
Characteristics of fold mountains: Fold Mountains exist in layers and have anticlines and synclines. They form the highest mountain ranges and contain many active volcanoes. They contain old hard rocks with steep sides, rich mineral resources such as copper, petroleum, gold and tin, and have wrinkling or folding appearance. Examples of Fold Mountains include Himalayas in Asia, Alps in Europe, Andes in South America, Rockies in USA, Atlas in North Africa.

Mode of Formation

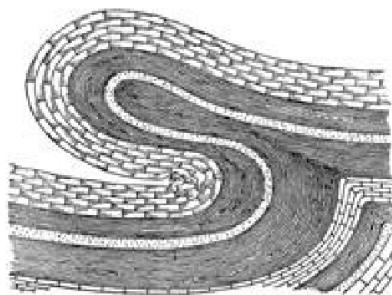
Fold Mountains are usually formed by large scale earth's movement.

Stresses caused by expansion and contraction of some parts of the earth are set up in the earth's crust. Such stresses therefore subject the rocks to compressional forces. The compressional forces produce wrinkling or folding of the earth crust. The up folds of the wrinkles are called anticlines while the down folds are called synclines.

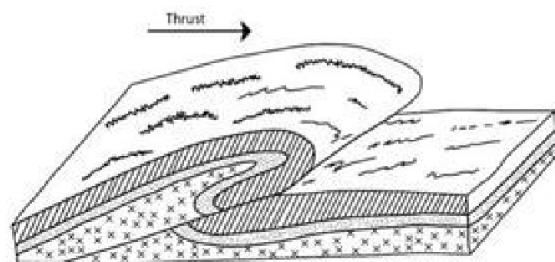
A fold may be simple, but where the compressional forces are complex, it results in over fold. When pushed further, an over fold becomes a recumbent fold. Faults or cracks may result in extreme folding to form an over thrust fold.



Anticline



Syncline



Overfolds

Thrustfolds

Fig. 8.2: Types of Folding

(ii) Block Mountains

Block Mountains are caused by faulting accompanied by tensional and compressional force.

Characteristics: Block Mountains are usually very high. They have steep sides, and are made of old hard rocks with flat or slightly sloping surfaces. They are associated with rift valleys. Examples of Block Mountains include the Voges Mountains, Black Forest of the Rhine land and Hamsruck of Germany.

Mode of formation

Block Mountains are formed when the earth cracks due to faulting. Faulting may result from tensional forces, it may also be due to tensional forces that pull the earth's crust apart that shorten the crust of the earth to produce a

thrust fault. Therefore, if a block of rock between two normal faults rises or the land on either sides of the block subsides, a block mountain or Horst is formed. (See Fig 8.3).

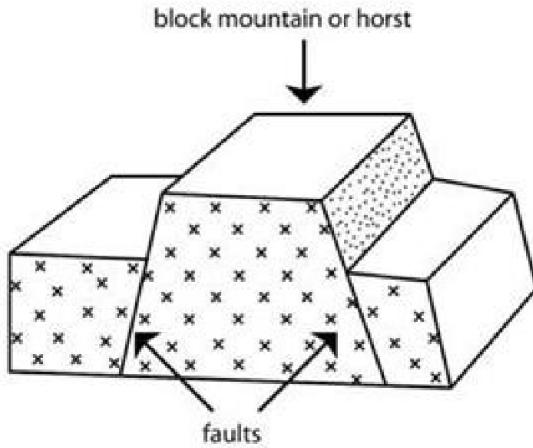


Fig. 8.3: Block Mountains (horst) formed by tension when develop

When a block in between two faults subsides, a Rift valley or Graben is formed. Rift valleys are usually very deep; they have steep-sided walls. There is a trough between two parallel faults.

Example of such Great East African Rift valley which is about 4,800km long, Central Valley of Scotland, Rhine Valley and Jordan Valley. (See Fig. 8.4)

Rift Valley Formed by Extension

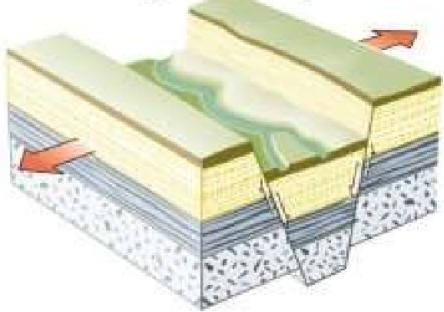


Fig. 8.4: Formation of Rift Valley

(iii) Volcanic Mountains

Volcanic mountains are formed from materials (ash, magma, cinder and volcanic rocks) which have been ejected from within the earth's crust through a vent.

Characteristics: Volcanic Mountains have irregular sides with conical shape. They are made up of lava, ash, cinders, volcanic bombs which are arranged in layers. They are common in the Circum Pacific Belt.

Examples include Mountains Fuji Yama in Japan, Etna in Italy, Cotopaxi in South America, Mts Kenya, Elgon, Kilimanjaro, and Cameroun in Africa and Mayon in Philippines.

Mode of formation

Volcanic Mountains are formed from activities volcanoes. They are formed when fissures or cracks develop in the earth's crust and materials such as molten lava, volcanic bombs, ash, dust, cinders and liquid mud are ejected through the fissures or vents on to the earth's surface. The ejected materials are usually viscous and fall around the vent in successive layers, building up extensive cones called volcanic mountains. (See Fig. 8.5)

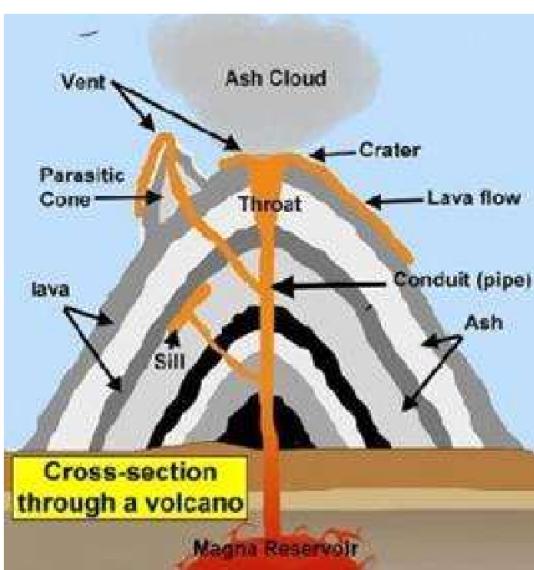


Fig. 8.5: Volcanic Mountain

(iv) Residual Mountains

Residual mountains are formed when agents of denudation (e.g. wind, running water and glacier) wear down a highland, leaving behind hard and resistant rocks. This remaining part is called residual mountains, they are also known as mountains of denudation. Residual mountains may also evolve from plateaux which have been dissected by rivers into hills and valleys. (See Fig. 8.6)

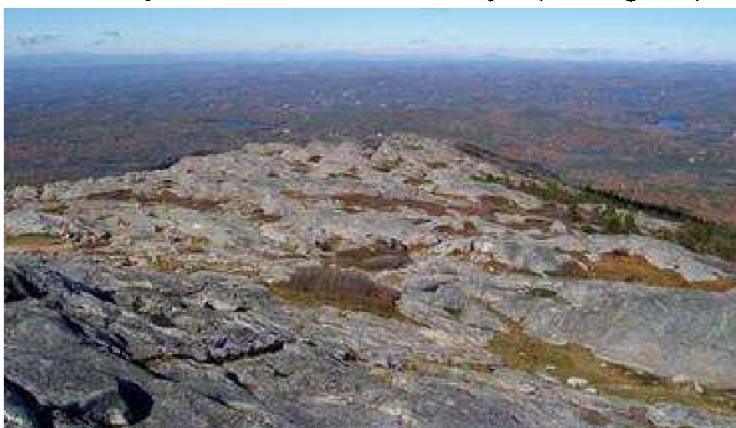


Fig. 8.6: Residual Mountain

Characteristics: Residual Mountains are formed from the remains of already existing mountain. They have irregular surfaces with steep sides. They are caused by agents of denudation, and occur in varying sizes and

heights. Examples include Mountain Monadnock in USA, Deccan Plateau, in India, Highlands of Scotland and Highlands of Scandinavia.

Advantages of Mountains

Mountains are important to man in the following ways:

1. **Tourism:** Mountains serve as tourist attractions or holiday resorts. Examples include the Swiss Alps, Olumo Rocks and Idanre Hills.
2. **Lumbering:** Most mountain regions are usually forested and serve as source of valuable timber, for example Scandinavia, such as known for timber; paper, pulp and matches industries.
3. **Minerals:** some mountains contain valuable minerals. *E.g.* abundant coal and copper on the Rocky mountain and coal on the Appalachian mountain in the USA, Africa.
4. **Modification of Climates:** Mountains modify climate thereby making the environment conducive and comfortable for human habitation. Such mountains include Kenyan, Kilimanjaro and Elgon in East Africa.
5. **Defence:** Mountains of the world serve as shield against invaders especially in the olden days.
6. **Agriculture:** Some mountain regions contain fertile soils for agricultural activities, *e.g.* the fertile volcanic soils of Mt. Kilimanjaro. Mountains also encourage the practice of terrace farming, because of their steep slopes.
7. **Natural Boundaries:** Mountains serve as natural boundaries *e.g.* Cameroon Mountain which separates Cameroon from Nigeria.
8. **Pastoralism:** Transhumance is practised on mountain pasture, *e.g.* Switzerland and Austria.
9. **Source of rivers:** Mountains serve as sources of rivers.
10. **Construction:** Rocks from mountains and highlands are used for construction purposes *e.g.* Roads and building construction.
11. **AID to HEP:** In many parts of the world, important hydroelectric power projects are located on highland slopes where rivers flow swiftly, *e.g.* U.S.A., Switzerland and Japan.

Disadvantages of Mountains

- i) Most mountains in the world are barriers to communication due to their steep slopes as they prevent the construction of roads, railway and airport.
- ii) High mountains are known to be associated with cold weather which prevents good human and animal habitation.
- iii) Most mountain regions are not good for agriculture as the soils are poor in nutrient and difficult to cultivate.
- iv) Mountains encourage soil erosion due to the steepness of the associated slopes.

(ii) Plateaux

Plateau is an area of highland usually consisting of relatively flat terrain. Plateaux are often referred to as table lands because of their flat surface. Like all highlands, plateaux are subjected to erosional processes. As a result, their original characteristics may be greatly altered.

Types of Plateaux

There are three types of plateaux based on their mode of formation. These are tectonic, volcanic and dissected plateaux.

(i) Tectonic Plateaux

These are formed as a result of earth movement. A piece of land is uplifted during tectonic processes to form a plateau.

Characteristics: Tectonic plateaux are formed as a result of earth movement. Tectonic plateaux are of two types namely: table land and intermont, which may be tilted or faulted. Examples include Deccan plateaux in India Haz in Germany; Mesetal in Central Iberia Examples of intermont plateaux are Tibetan Plateau and Bolivia Plateau.

Mode of formation

These plateaux are formed as a result of earth movement which causes the uplift of some areas and the depression of others. Uplifted areas of land form tectonic plateaux and the depressed areas form basins. When tectonic plateaux are enclosed by Fold Mountains, they are known as intermont plateaux.

(ii) Volcanic Plateaux

Volcanic Plateaux result from the accumulation of lava.

Mode of Formation

These plateaux are formed when molten lava comes out of the earth's crust through a vent and spreads out in successive layers. The lava cools and solidifies to form volcanic or lava plateau. Examples include Antrim Plateau of Northern Ireland, North Western part of Deccan Plateau, Biu Plateau in North eastern Nigeria and the Colombia Snake Plateau.

(iii) Dissected Plateaux

Dissected Plateaux are plateaux formed due to weathering.

Characteristics: They are formed due to actions of agents of denudation such as running water, wind, glacier etc. They may be formed as a result of uplift. Such examples include Futa Jalon Highland in Guinea, the edges of the Jos plateaux in Nigeria and kumasi Plateau in Ghana.

Mode of formation

Dissected plateaux are formed through the continual process of weathering and erosion by ice, wind and running water. High and extensive plateaux are gradually worn down, and their surfaces made irregular. Vertical erosion is the dominant action of some rivers that cross a plateau. These rivers carved out deep valleys which break up the plateau surface into many steep-sided pieces.

Advantages of Plateaux

1. Some plateaux are centres of tourist attraction.
2. Plateaux are good for agricultural activities, due to their favourable climate and good soil fertility e.g. Jos, Plateau.
3. Some plateaux are rich in mineral resources and have been actively mined. The African plateau yields diamonds' copper, gold and chromium. The Decann plateau has deposits of manganese, coal and iron, Western Australia Plateau is rich in gold and iron. There is an occurrence of tin and columbite on the Jos Plateau of Nigeria.
4. Plateaux support the growth of pasture and legumes which support the rearing of animals such as sheep, goat and cattle. Example is the Mambila Plateau in Taraba state, Nigeria.
5. Some Plateaux, like Jos plateau, create a pleasantly cool climate which encourages human habitation.

6. Hydro-electric power are sometimes sited on plateau slopes e.g. Shiroro Dam on Shiroro Falls in Niger state, Nigeria.
7. Some plateaux are the sources of many rivers.

Disadvantages of Plateaux

This includes:

1. Some plateaux are associated with erosion which tends to limit farming activities.
2. Some plateaux are inaccessible as they are surrounded by mountains which serve as obstacles to the construction of airports, railways and roads.

(iii) Plains

A plain refers to a land with flat gently rolling and relatively low relief. It seldom rises more than a few hundred metres above sea-level.

Types of Plains

Based on the mode of formation, there are three major types of plains. These are [i] Structural Plains [ii] Depositional Plains and; [iii] Erosional Plains.

(i) Structural Plains: These are plains that have not been disturbed by earth movement.

Characteristics: They are the structurally depressed areas of the world and formed the most extensive most extensive natural lowlands on the earth's surface. Examples of structural plains include the Great Plains of U.S.A, the Russian Platform and the Central lowlands of Australia.

Mode of Formation: They are formed by horizontally bedded sedimentary rocks, relatively undisturbed by the crustal movement of the earth. (See Fig. 8.7)



Fig. 8.7: Structural Plains

(ii) Depositional plains: These are plains formed by the deposition of materials brought by various agents of transportation.

Characteristics: They are comparatively low level land, but rise gently towards adjacent highlands. Their fertility depends on the types of sediments that are deposited. They form the most productive agricultural plains of the world, and are usually densely populated. Examples include the Nile Delta of Egypt and the Plain of North China.

Mode of formation: These are plains formed by the deposition of materials or sediments transported by the various agents of transportation such as wind, waves, rivers and glaciers. When this action is effected the following categories of depositional plains emerged:

- a. **Flood plain:** They are formed as a result of the deposition of sediments eroded from the upper course of a river to its lower course.
- b. **Alluvial Plains:** Alluvial plains are formed from the deposition of alluvial sediments eroded from the upper course of a river and deposited on the lower course.
- c. **Deltaic plains:** These are extensive lowland areas on deltas. They are formed from the deposition of sediments by a river on the areas where it enters the sea or ocean.
- d. **Outwash plains:** These are formed due to glaciations processes. They are formed by the deposition of sediments brought by glaciers.
- e. **Coastal Plains:** These are low lands on the coast formed from the deposition of sediments brought by ocean waves on the continental shelf.
- f. **Loess plains:** Loess plains are usually found in Arid and Semi Arid regions [Desert] where fine particles are deposited within the desert region and the neighboring lands. It is usually very fertile.

(iii) **Erosional plains:** These are plains that are formed through various agents of denudation.

Characteristics: They are carved by the agents of erosion. Erosional plains are of two types namely pediplains and pene plains. Plains resulting from action of agents of denudation are known as peneplains while those that result from wind actions are known as pediplains.

Examples of pediplains include Reg and Hamad of Sahara Desert, and that of peneplains is the Great Lake Plain of the Hudson Bay Area in North America.

Mode of formation: They are associated by agents of denudation such as glacier, wind, rivers, ocean waves and rain which wear out irregular rock surface and smoothen them into plains.

Advantages of Plains

1. Plains favour the development of settlement. Usually plains are densely populated e.g. the Nile alluvial plains.
2. Some valuable mineral resources are found on plains, e.g. petroleum on the coastal plain of Nigeria.
3. Plains, especially depositional plain are rich fertile soils which favour intensive agriculture.
4. Plains provide good pastures for rearing of animals
5. Plains support good transportation route ways such as roads, railways airports, railways etc.
6. Rivers in plains provide water for domestic/industrial uses and transportation,
7. Plains support concentration of manufacturing and economic activities.

Disadvantages of Plains

Problems associated with plains include:

1. They are extensively prone to flooding when they are located close to the sea or to a large river.
2. Security and defence may be difficult to provide in plain areas.
3. Some plains may be barren, e.g. outwash plains in some parts of Netherlands.

Summary

In this chapter, you have learnt that:

- Land forms are physical features of the earth surface.
- Compressional and tensional forces are responsible for the formation of fold and block mountains.

- Residual mountains are formed by agents of denudation.
- Mountains are beneficial to human existence.
- Plateau are products tectonic processes.
- Plains are relatively lowland areas that supported settlement and high economic activities.

Objective Questions

1. Which of the following is a Volcanic plateau?
(A) kukuruku (B) Terra Rosa (C) Deccan (D) Graben (E) Atlas
2. Depositional Plains refer to all the following except
(A) alluvial plains (B) structural plains (C) deltaic plains (D) flood plains (E) coastal plain. [SSCE, 1988].
3. When a plateau is enclosed by Fold Mountains it is called
(A) a volcanic plateau (B) a tectonic plateau (C) an intermont plateau (D) a dissected plateau (E) an extensive plateau [WAEC, 1991].
4. Mountains formed as a result of compressional forces in the earth crust are
(A) block Mountains (B) fold mountains (C) volcanic Mountains (D) dissected mountains (E) residual mountains. (WAEC, 1994)
5. Which of the following is responsible for the formation of block mountains?
(A) Faulting (B) Sedimentation (C) Folding (D) Deposition (WAEC, 1999)
6. Residual mountains occur when
(A) there are faults on the earth's crust.
(B) the earths crust bends due to compression.
(C) the general level of land is lowered by agents of denudation.
(D) materials are ejected from the interior of the earth and deposited on the earth's surface. (WAEC.2000)
7. A large expanse of low, level land, formed due to an uplift of part of the sea floor bordering a continent is called
(A) a flood plain (B) an outwash plain (C) a deltaic plain (D) a high plain (E) a coastal plain. (WAEC, 1994)
8. Which of the following is not an example of a fold mountain?
(A) Andes (B) Kilimanjaro (C) Rockies (D) Himalayas
9. The plains formed when the slopes of mountains are worn back in arid and semi-arid regions by mechanical weathering
(A) Pedi plains (B) alluvial plains (C) deflation plains (D) Outwash plains (WAEC, 2004.)
10. Which of the following is not a type of mountain?
(A) Conical mountain (B) Block mountain (C) Fold mountain (D) Mountain of accumulation. (WAEC, 2009)

Answers

1. C 2. B 3. C 4. B 5. A 6. C 7. E 8. B 9. A 10. A

Essay Questions

- 1a. Name three types of mountains and give a good example of each.
- b. Describe the process of formation of any one type of mountain
- c. In what four ways are mountains of great importance to man? (WAEC, 1990)
2. With the aid of diagrams and examples, write explanatory notes any two of the following:

a. Rift valley; b. Horst; c. Volcanic mountain. (WAEC, 2003)

3. Describe the formation of (i) Erosional plains (ii) Dissected plateau.

b. Highlight two advantages and two disadvantages of plains.(WAEC,2006)

4a. What is a plateau?

b. Describe the mode of formation of

(i) Tectonic plateaux (ii) Dissected plateaux

c. Outline three ways in which plateaux are important to man. (WAEC, 2007)

5a.What is a plateau?

b. List two types of plateau.

c. Describe the formation of any one type of plateau listed in (b) above

d. Highlight three ways in which plateaux are of importance to man. (WAEC, 2010)