

9

MAJOR LANDFORMS AND THEIR ECONOMIC SIGNIFICANCE

9.1 INTRODUCTION

You have learnt in the previous lesson that the landforms found on the earth's surface are the result of interplay between internal and external forces. The soft rocks are easily worn down by these forces. While the relatively harder rocks are not so easily worn down. Therefore, rocks have a great influence on the landforms developed in an area. The internal forces are perpetually elevating the earth's surface and the external forces about which you will study in the next lessons are constantly wearing down such elevations to make the surface level. This is how various landforms are formed by constant action of agents of gradation. These landforms are not only the physical features of the earth's surface but also the basis of human civilization. The major landforms found on the earth's surface are mountains, plateaus and plains. In this lesson, we will study the major landforms of the earth and their economic importance for us.

9.2 OBJECTIVES

After studying this lesson you will be able to :

- differentiate among the three major landforms found on the earth's surface;
 - explain the process of formation of various landforms with the help of illustrations;
 - classify mountains on the basis of their mode of formation;
 - discuss the usefulness of mountains to man;
 - list different types of plateaus and describe economic significance of plateaus;
 - enumerate major types of plains and explain their influence on human life;
 - locate major mountains, plateaus and plains on the outline map of the world.
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9.3 MOUNTAINS

Mountain, plateau and plain are the broad present day land feature of the earth's surface produced by the deformation of its crust. Among them, mountains are the most awe-inspiring land form. About 27% of the earth's surface is covered by the mountains. Generally they are uplifted portions of the earth's surface which are much higher in contrast to the surrounding areas. But all uplifted or elevated areas are not mountains. In fact height and slope together give rise to a particular form of land which we identify as a land form. For example, the elevated portion in Tibet, which is about 4500 metres high above sea level, is called a plateau and not a mountain.

It may also be remembered that the formation of a mountain range takes millions of years. During these years, the internal forces of the earth uplifting the land are fighting against erosion wearing it down. In order to form one Mt. Everest, internal forces must push up the land faster than the external forces constantly eroding it. Therefore, mountains are those uplifted portions of the earth's surface which have steep slopes and small summit area rising more than thousand metres above the sea level. Mountains have the maximum difference of height between their high and low portions i.e. their local relief is high.

* The uplifted portions of the earth's surface with steep slopes and small summit area rising above 1000 metres and formed over a period of million of years are called mountains.

9.4 CLASSIFICATION OF MOUNTAINS

On the basis of their mode of formation, the mountains have been classified as

- (a) Fold Mountains
- (b) Block Mountains
- (c) Volcanic Mountains
- (d) Residual Mountains

(a) Fold Mountains

We have studied in the last lesson how folds are formed in the rock strata by the internal earth movements. Mountain range mainly consisting of uplifted folded sedimentary rock are called fold mountains. When these rocks are subjected to horizontal compressional forces for millions of years, they get bent into up and down folds. This leads to the formation of anticlines and synclines. Such earth movements occur from time to time and lift the folds to a considerable height which result in the formation of fold mountains.

* The mountains which have been formed by the uplift of mainly the folded sedimentary rock strata under compressional forces are called fold mountains.

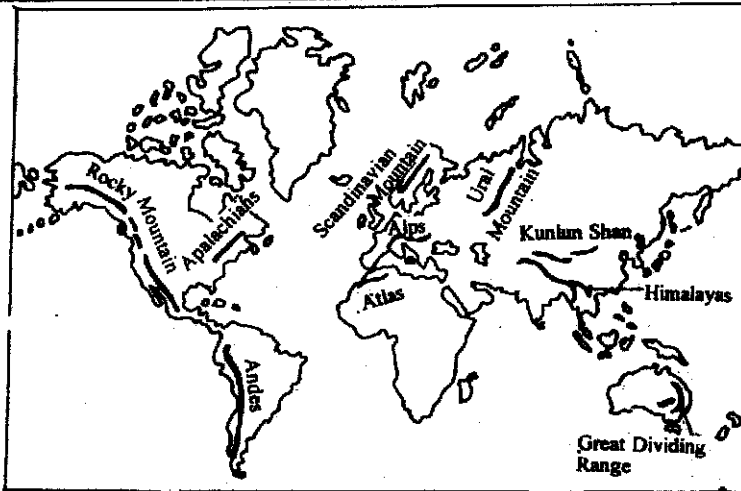


Fig. 9.1 Distribution of Important Fold Mountains of the World

The Himalayas in Asia, the Alps in Europe, the Rockies in North America and the Andes in South America are the most prominent fold mountains of the world, (See fig. 9.1). Since these mountain ranges were formed during the most recent mountain building period, they are known as young fold mountains. Some of these mountain ranges, for example Himalayas are still rising.

(b) Block Mountains

Block mountains are also formed by the internal earth movements. When the forces of tension act on the rocks, they create faults in them. When the land between the two almost parallel faults is raised above the adjoining areas, it forms a block mountain. It may also occur when land on the outer side of the faults slips down leaving a raised block between them. The rocks composing the fault levels may be flatlying or even folded. Block mountain is also called horst (see fig. 9.2). The Vosges in France, Black Forest Mountains in Germany and Sierra Nevada in North America are the typical examples of block mountains.

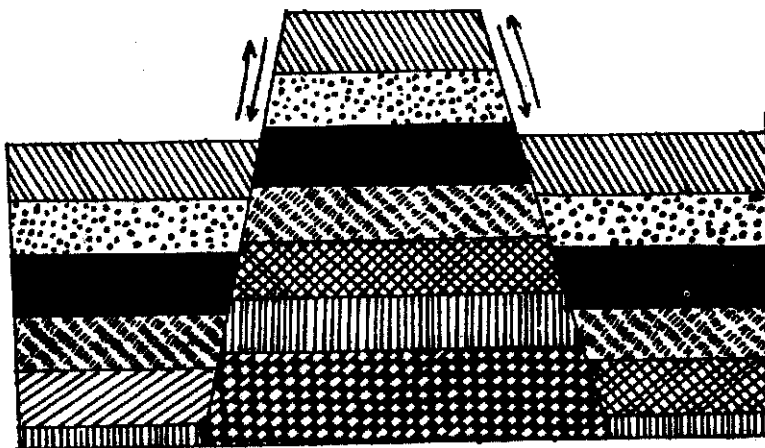


Fig. 9.2 Block Mountain or Horst.

- * The mountain formed by the uplift of land between faults or by the subsidence of land outside the faults is known as block mountain.

(c) Volcanic Mountains

We have learnt in the previous lesson that the interior of the earth is extremely hot. Due to high temperature deep inside the earth rocks turn into a molten magma. When this molten rock material is ejected to the earth's surface during volcanic eruption, it accumulates around the vent and may take the form of a cone. The height of the cone increases with each eruption and it takes the form of a mountain. As these mountains are formed by the accumulation of volcanic material, they are known as volcanic mountains or mountains of accumulation (see fig. 9.3). Mount Mauna Loa in Hawaii Islands, Mount Popa in Myanmar, Vesuvius in Italy, Cotopaxi in Ecuador and Fuji Yama in Japan are examples of volcanic mountains.



Fig. 9.3 Volcanic Mountains

- * The mountains formed by the accumulation of volcanic material are called volcanic mountains or mountain of accumulation

(d) Residual Mountains

The weathering and different agents of erosion - rivers, winds, glaciers etc. are constantly acting on the earth's crust. As soon as an elevated mountain range appears on the earth's surface, the agents of gradation begin their work of leveling it down. To a large extent, the process of wearing down depends on the shape and structure of the rocks. After thousands of years, soft rocks are worn down into sand and the hard rocks are left standing up in the area that has been reduced in height. These are called residual mountains (fig. 9.4). Hills like the Nilgiris, the Parasnath and the Rajmahal in India are examples of residual mountains.

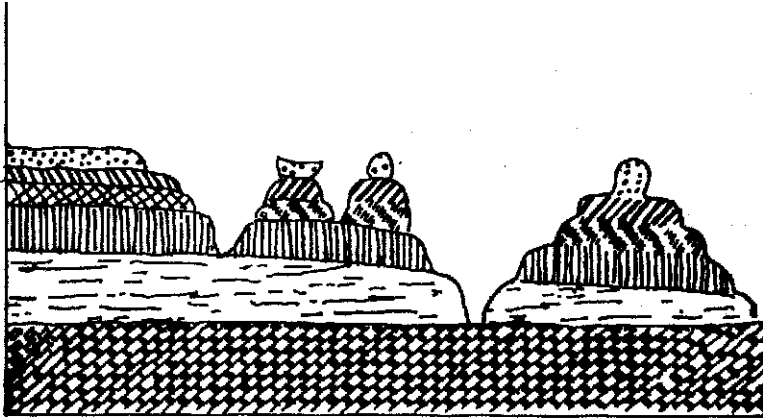


Fig. 9.4 Residual Mountains

- * The elevated regions that have escaped weathering and erosion and appear in the form of mountains are called residual mountains.
- * On the basis of their mode of formation, the mountains can be classified as Fold Mountains, Block Mountains, Volcanic Mountains and Residual Mountains.

9.5 THE ECONOMIC SIGNIFICANCE OF MOUNTAINS

Mountains are useful to us in the following ways

(a) Storehouse of Resources

Mountains are the storehouse of natural resources. Large resources of minerals are found in mountains. The Appalachian range in the United States is well-known for coal and limestone deposits. We get timber, lac, medicinal herbs and wood for making pulp from the forests of the mountains. Tea and coffee plantations and some fruits orchards have been developed on mountain and hill slopes.

(b) Generation of Hydro-electricity

Hydro-electricity is generated from the waters of perennial rivers in the mountain regions. The mountainous countries like Japan, Italy and Switzerland, which suffer from the shortage of coal have developed hydro-electricity.

(c) Abundant Sources of Water

Perennial rivers rising in the snow fed or heavily rain fed mountains are the important source of water. They help in promoting the irrigation.

(d) Formation of Fertile Plains

The rivers that originate in the high mountain region bring silt alongwith water to

the lower valleys. This helps in the formation of fertile plains. The great alluvial plain of northern India has been formed by the rivers Ganga, Sutlej and the Brahmaputra.

(e) Natural Political Frontiers

The mountain ranges do act as natural political frontiers between countries and protect them from invasions to some extent. The Himalaya have formed a political frontier between India and China.

(f) Effect on Climate

Mountainous areas have lower temperatures. They serve as climatic divide between two adjoining regions. The Himalaya for example form a barrier to the movement of cold winds from Central Asia towards the Indian subcontinent. They also force the South West Monsoons to ascend and cause rainfall on their southern slopes.

(g) Tourist Centres

The salubrious climate and the beautiful scenery of the mountains have led to their development as centres of tourist attraction. The tourist and hotel industries get an additional encouragement in such regions. Shimla, Nainital, Mussorie and Srinagar are some of the important hill stations of India which attract tourists all over the world.

9.6 PLATEAUS

The plateaus cover another 18% of the earth's surface. This landform has a large elevated area on its top unlike a mountain and has a nearly even surface out there. Very often rivers or streams cut out deep valley and gorges in a plateau region. In place of its original smooth topography, it then changes into a dissected plateau. A plateau, however remain much higher above the sea level of the nearby areas. Though normally 600 metres above sea level, there are plateau of Tibet and Bolivia, more than 3600 metres above sea level.

* A plateau is an elevated area of more or less level land on its top. It has a large area on its top and steep slope on its side.

INTEXT QUESTIONS 9.1

1. Name the three major landforms found on the earth's surface.
 - (i) _____ ii) _____ iii) _____
 2. Answer in brief
 - (a) From which rock type have the fold mountains been formed?

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(b) By which forces are the fold mountains formed?

(c) Name the four important hill stations of India.

(i) _____ (ii) _____

(iii) _____ (iv) _____

3. Write the type of mountain in the brackets :

(a) The Black forest ()

(b) The Nilgiris ()

(c) The Fuji Yama ()

(d) The Andes ()

9.7 CLASSIFICATION OF PLATEAUS

On the basis of their geographical location and structure of rocks the plateaus can be classified as :

(a) Intermontane Plateaus

(b) Piedmont Plateaus

(c) Continental Plateaus

(a) Intermontane Plateau

The plateau which are bordering the fold mountain range or are partly or fully enclosed within them are the intermontane plateaus (Fig. 9.5). Vertical movements raise this extensive landforms of nearly horizontal rocks to thousands of metres above sea level. The extensive and over 4200 metres high plateau of Tibet is one such example. It is surrounded by folded mountains like Himalaya, Karakoram, Kunlun and T'ien Shan on its two sides. The plateau of Colorado is another well known example, over one km high into which rivers have cut the Grand Canyon and a series of gorges. The plateau of Mexico, Bolivia, Iran and the plain of Hungary are all other example of this type.

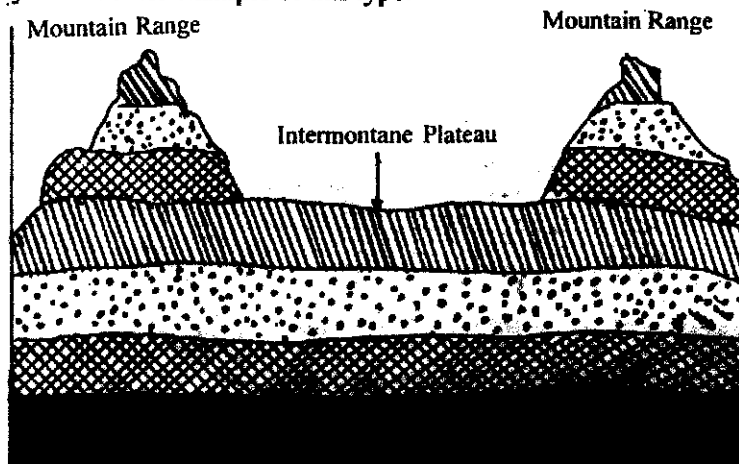


Fig. 9.5 Intermontane Plateau

(b) Piedmont Plateau

The plateaus that are situated at the foot of the mountains and are bounded on other sides by a plain or an ocean are called piedmont plateaus. The plateau of Malwa in India, those of Patagonia facing the Atlantic ocean and the Appalachian situated between the Appalachian Mountain and the Atlantic Coastal Plain in U.S.A are their examples. In their case, the areas once high have now been reduced by various agents of erosion. For this reason, these are also called the plateaus of denudation.

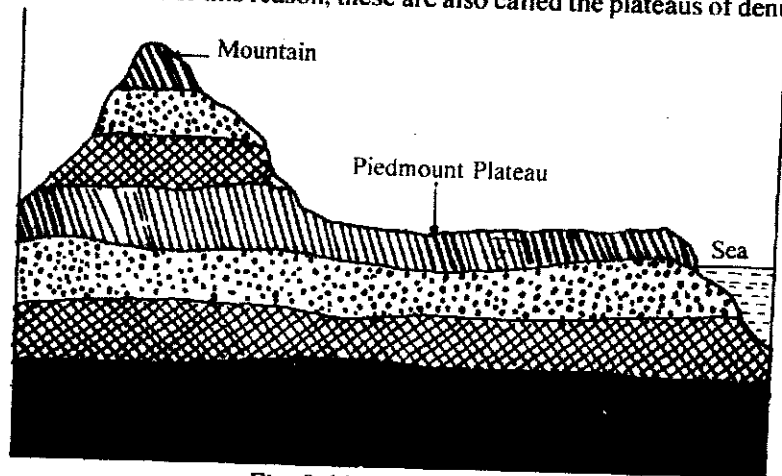


Fig. 9.6 Piedmont Plateau

(c) Continental plateau

These are formed either by an extensive continental uplift or by the spread of horizontal basic lava sheets completely covering the original topography to a great depth. The volcanic lava covered plateau of Maharashtra in India, Snake River Plateau in North West USA are the examples of this type. These are also called the plateau of accumulation.

All continental plateau show an abrupt elevation in contrast to the nearby lowland or the sea. As compared to other, these plateau cover a vast area like the Great Indian Plateau and those of Arabia, Spain, Greenland, Africa and Australia. They may be tilted on one side without any disturbance in the horizontal nature of underlying rock strata as in the case of Great Indian plateau.

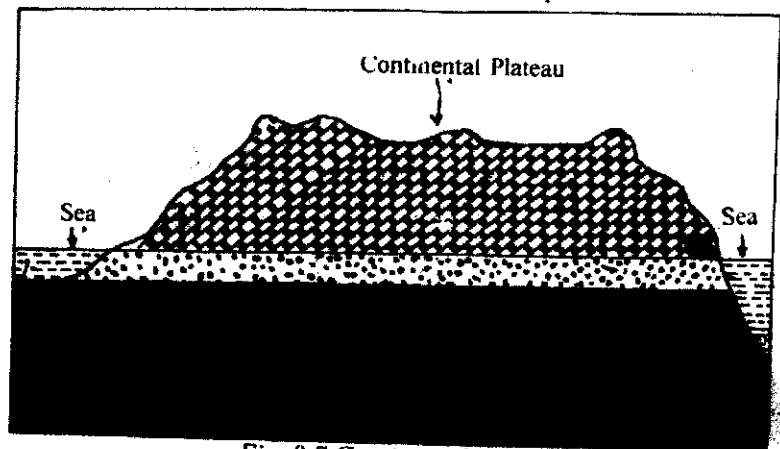


Fig. 9.7 Continental Plateau

- * The plateau which are bordering or are enclosed within high mountain ranges are called intermontane plateau.
- * The plateaus formed by the uplift of large areas or by the gradual spread and accumulation of basic lava sheets are called continental plateau.
- * The plateaus which are situated at the foot of mountains and are bounded by a plain or an ocean on the other side are called piedmont plateaus.

9.8 ECONOMIC SIGNIFICANCE OF PLATEAUS

Due to continuous erosion of their surface, we observe the prevalence of a patchy or the slow development of agriculture and building of roads on the plateaus. This factor also explains why the plateaus are sparsely populated. Nevertheless plateaus are extremely useful to mankind in the following ways :

(1) Storehouse of Minerals

Most of the minerals in the world are found in the plateaus. Besides, the extraction of minerals is relatively easier on plateaus. These minerals are indispensable as raw material for our industries. We get gold from the Plateau of Western Australia; copper, diamonds and gold from the Plateaus of Africa and coal, iron, manganese and mica from the Chota Nagpur Plateau in India.

(2) Generation of Hydel-power

Rivers falling down the edges of plateaus form water-falls. These water-falls provide ideal sites for generating hydel-power.

(3) Cool Climate

The higher parts of the plateaus even in tropical and sub-tropical regions have cool climate. Hence they have attracted Europeans to settle there and develop their economy e.g. South and East Africa.

(4) Useful for Animal-rearing and Agriculture

Plateaus have large grassland areas suitable for animal-rearing specially sheep, goat and cattle. They provide a variety of products such as wool, milk, meat and hides and skin. The lava plateaus as compared to all other plateau are richer in agriculture since their soil is very fertile.

- * Plateaus are useful because of the presence and easier way of extracting minerals and favouring generation of hydro-power. Their suitable climate and sometimes fertile soils are helpful for developing animal-rearing and agriculture.

INTEXT QUESTIONS 9.2

1. Answer briefly

(a) Name the three types of plateaus.

(i) _____ (ii) _____ (iii) _____

(b) Name three natural resources for which plateaus are well known

(i) _____ (ii) _____ (iii) _____

(c) Write against each of the following the type of plateaus to which it belongs:

(i) The plateau of Patagonia _____

(ii) The plateau of Bolivia _____

(iii) The Decean plateau _____

9.9 PLAINS

Plains are the most important landforms found on the earth's surface. A low-lying relatively flat or slightly rolling land surface with very gentle slope and minimum local relief is called a plain. Plains occupy about 55% of the earth's area. Most of the plains have been formed by the deposition of sediments brought down by rivers. Besides rivers, some plain have also been formed by the action of wind, moving ice and tectonic activity. Plains have an average height of less than 200 metres.

* A low-lying relatively flat or slightly rolling land surface with very gentle slope and minimum local relief is called a plain.

9.10 CLASSIFICATION OF PLAINS

On the basis of their mode of formation plains can be classified into the following types :

(a) Structural plains,

(b) Erosional plains and

(c) Depositional plains.

(a) Structural plains

These plains are mainly formed by the uplift of a part of the sea-floor or continental shelf. These are located on the borders of almost all the major continents. The south eastern plain of the United States formed by the uplift of a part of the Gulf of Mexico is an example of this type of plain. The structural plains may also be formed by the subsidence of areas. One such plain is the central low-lands of Australia.

(b) Erosional Plains

These plains are formed by the continuous and a long time erosion of all sorts of upland. The surface of such plains is hardly smooth. These are therefore also called peniplains which means almost a plain. The Canadian shield and the West Siberian plain are examples of erosional plains.

- * The plains formed by uplift or subsidence of an area are called structural plains.
- * The plains formed by the continuous long term erosion of uplands are called erosional plains.

(c) Depositional plains

Depositional plains are formed by the filling up of depression like lakes and seas by the sediments brought down by rivers, glaciers and wind. When plains are formed by river deposits, they are called riverine or alluvial plains. The Indo-Gangetic plain of the Indian sub-continent, the Hwang-Ho Plain of North China, the Lombardy Plain of the Po river in Italy and the Ganga-Brahmaputra Delta Plain in Bangladesh are examples of alluvial plains.

The deposition of sediments in a lake gives rise to a lacustrine plain or a lake plain. The Valley of Kashmir and that of Manipur are examples of two most prominent lacustrine plains in India.

When plains are formed by glacial deposits they are called glacial or drift plains. Plains of Canada and North-Western Europe are examples of glacial plains.

When wind is the major agent of deposition, they are called loess plains. Loess plains of North-Western China are formed by the deposits of loess—air-borne fine dust particles.

- * depositional plains are formed by the deposition of sediments brought down by rivers, glaciers and winds.
- * depositional plains are sub-divided into alluvial, lacustrine, glacial and loess plains.

9.11 ECONOMIC SIGNIFICANCE OF PLAINS

The plains have influenced the human life in the following ways:

(1) Fertile Soil

The plains generally have deep and fertile soil. Since the plains have a flat surface, the means of irrigation are easily developed. Both these factors have made the plains agriculturally so important that they are often called 'food baskets of the world'.

(2) Growth of Industries

The rich agricultural resources especially of alluvial plains have helped in the growth

of agrobased industries. This has given employment to millions of people and has registered a marked increase in the national production and per capita income. Since the plains are thickly populated, plenty of labour is available for the intensive cultivation and for supplying work force for industries.

(3) Expansion of Means of Transport

Since the plains have an even surface it favours the building of roads, airports and laying down of railway lines.

(4) Centres of civilization

The plains have been the centres of many modern and ancient civilizations. The major river valley civilizations of the world have flourished in the plains only. Hence they are aptly referred to as the cradles of civilization. For example there are the civilization of the Indus and the Nile Valley.

(5) Setting-up of Cities and Towns

Easy means of transport on land, the growth of agriculture and industries in plains have resulted in the setting-up and expansion of cities and towns. The most developed trade-centres and ports of the world are found in the plains only. Rome, Tokyo, Calcutta, Yangoon (Rangoon), Kanpur, Paris and other famous cities are situated in the plains. As much as 80% of the world's population lives in the plains.

* Plains are useful to man due to their fertile soils, growth of industries, development of transport, setting up of cities & towns and making them attractive as cradles of human civilisation.

INTEXT QUESTIONS 9.3

1. Answer briefly :

(a) Name the three major types of plains.

(i) _____ (ii) _____ (iii) _____

(b) To which category do the following plains belong?

(i) Lombardy Plain of Italy _____

(ii) The Plain of North-Western China _____

(iii) The Plain of Northern Canada _____

2. Name two civilization that flourished in the river valleys.

(i) _____ (ii) _____

3. Give two examples of lacustrine plains?

(i) _____ (ii) _____

WHAT YOU HAVE LEARNT

The major landforms found on the earth's surface are the mountains, the plateaus and the plains. Besides the structure of rocks, the external and internal forces acting on the earth's surface also play a significant role in the development of these landforms. The landforms on the earth's surface have influenced human life in different ways. Fertile plains have been formed by the rivers originating in the mountains. These rivers are our perennial source of water for irrigation and other purposes. The plateaus are often described as the storehouse of minerals. Many of our major industries are dependent on the constant supply of these minerals. Besides this, the density of population is also influenced by the landforms. The plains including some of the valleys located in the mountain are teeming with people. Compared to the plains, the mountains and the plateaus have an uneven surface and less fertile soil. That is why they are generally sparsely populated.

TERMINAL QUESTIONS

1. Name the four types of mountains found in the world and describe the formation of each type.
2. Describe how plateaus are useful to man.
3. Why are the plains called 'cradles of civilization'?
4. Describe the significance of mountains.
5. distinguish between the following :
 - (i) The intermontane plateau and the continental plateau.
 - (ii) The block mountain and the volcanic mountain.
 - (iii) The structural plain and the depositional plain.
6. Locate and label the following on the outline maps of the world.
 - (a) Rockies and Alps mountain ranges;
 - (b) Patagonia and Tibetan plateaus;
 - (c) Central low land of Australia and Hwang-Ho plains.

CHECK YOUR ANSWER

INTEXT QUESTIONS

9.1

1. (a) Mountain (b) Plateau (c) Plain
2. (a) Sedimentary rocks (b) Horizontal compressional force (c) (i) Shimla (ii) Nainital (iii) Mussorie (iv) Srinagar.
3. (a) Block mountain (b) Residual mountain (c) Volcanic mountain (d) Fold mountain

9.2

- (a) (i) Intermontane plateau (ii) Piedmont plateau (iii) Continental plateau
- (b) (i) Mineral resources, (ii) water & soils, (iii) grassland
- (c) (i) Piedmont plateau (ii) Intermontane plateau (iii) continental plateau.

9.3

1. (a) (i) Structural, (ii) Erosional and (iii) Depositional
(b) (i) Alluvial plain, (ii) Loess plain and (iii) Erosional plain
2. (i) The Indus valley civilization (ii) The Nile valley
3. (i) Valley of Kashmir (ii) Manipur plain

TERMINAL EXERCISE

1. See para 9.4 - classification of Mountains. Give examples of each type of mountain and illustrate your answer with diagram.
 2. See para 9.8
 3. Expand on the following points-availability of fertile soil, development of means of transport, growth of industries, development of trading centre. Give examples of different civilization which flourished on plains.
 4. See para 9.5
 5. (i) See para 9.7 (a) and (c)
(ii) See para 9.4 (b) and (c)
(iii) See para 9.10 (a) and (c)
 6. See Maps.
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