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Evolution of Landforms Due to Internal Force: Objectives, Internal Forces, Earth Movements

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- We live on an unstable earth, the surface of which is uneven. While travelling, we come across a variety of landforms, such as mountains, hills, plateaus, plains, cliffs, and ravines. We also come across tilted, broken, and twisted layers of rocks which are originally deposited in horizontal forms. We have already studied about different types of rocks, their formation, and characteristics.
- There is a close relationship between the types of rock and the shape of landforms. But all deformation on the face of the earth is due to the continuous influence of internal and external forces. The internal forces are deriving their strength from earth's interior and playing their role in shaping what we see on the earth's crust.

Objectives

The major objectives of this chapter are:

- To explain the endogenetic forces and the landforms produced by them
- To distinguish between sudden and slow movements
- To differentiate between vertical and horizontal movement
- To differentiate between folding and faulting
- To explain the causes of volcanic activity
- To describe the different types of volcanoes
- To locate on the outline map of the world, important volcanoes and areas affected by earthquakes
- To explain the causes of earthquakes and their effects

Internal Forces

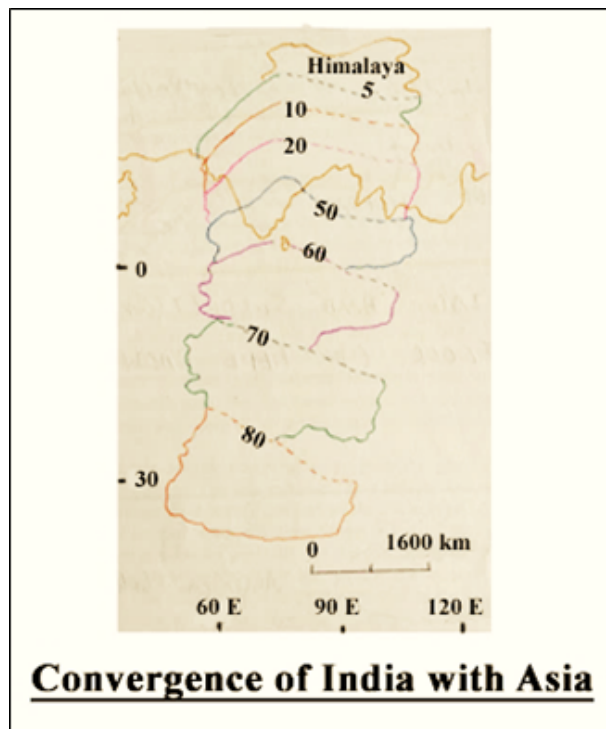
The variety in the types of landforms on the earth is the end result of two types of forces working simultaneously and continuously both inside and outside on the earth's surface. The forces which originate from within the earth's crust or inside the earth are known as internal or endogenetic forces. The sources providing them energy are internal heat, chemical reactions taking place within the earth, and the transfer of rock materials on the earth's surface by external forces.

Earth Movements

- The earth is neither stable nor the rocks of which its crust is made of, are so hard. Since the origin of the earth, there have been major changes in the distribution of continents and oceans. The earth has experienced innumerable earth movements which have brought about vast changes in

its surface. Some of the examples of these movements are submergence of forest in the Bombay harbour, the Mahabalipuram temple now standing on the sea, and changes in the ground level in the Rann of Kutch of India.

- The forces working from within the earth in turn cause movements in its crust. These movements are called earth movements. These movements pertain to or rise from, the movements of the actual structure of the earth's crust. Thus, they are also termed as tectonic movements. The word tectonic is derived from the Greek word, tekton which means builders. These are the earth movements which are constructional and have been responsible for buildings of different types of landforms.
- The physiography of India was entirely different about 60 million years ago. The vast Tethys Sea existed in that area where the Himalayan ranges and Indo-Gangetic plain exist today. The Tethys Sea was gradually filled up by sediments brought by rivers from the surrounding regions. Later, the sedimentary rocks formed in the beds of Tethys Sea gradually emerged in the form of the Himalayas in the north, and Indo-Gangetic plain to its south.



The Malwa plateau and the Deccan traps of India, Columbia and Snake Rivers Plateau of North America, Kimberley Plateau of Australia, and Parana and Patagonian Plateaus of South America were formed by the solidification of molten lava which had escaped from the earth's interior to its surface at different geological times. The evidences clearly show that the surface of the earth never remained the same as it is today, and it will not be the same in the future.

Classification of Earth Movements

On the basis of the time taken by earth movements, they are divided into:

- **Slow Movements:** The movements which bring about changes on the earth's crust very gradually or slowly taking hundreds or thousands of years and which cover a period much longer than a human life span are known as slow movements. These slow movements act on the earth's crust either vertically or horizontally. Acting vertically, they cause uplift or subsidence of a part of the

crust. The raised sea beaches along the Kathiawar coast of India which contain the shells of marine life clearly point out that this coast was once below the sea level. Similar raised beaches are found in Odisha, Andhra Pradesh, and Tamil Nadu along the eastern coast of India. These beaches have been uplifted to a height ranging between 15 - 30 metres above the mean sea level.

- On the other hand, there are numerous examples of submergence. Such as the presence of peat and lignite beds found below the sea level in the Sundarbans Delta, the submerged forest in Tirunelveli in Tamil Nadu, and the submerged forest on the east coast of Bombay Island.
- **Sudden Movements:** Contrary to the slow movements, there are certain movements which bring about abrupt changes in the earth's crust. The examples of such movements are volcanic eruptions and earthquakes. The changes brought about by these two events are so sudden that the courses of rivers undergo changes and the lava flow results in the formation of mountains, uplands and plateaus in a number of days. Landslides occur in mountainous regions due to these movements.