

Tectonic Processes in Pakistan & How the Himalayas Formed (Fold Mountains)

Meaning of Tectonic Processes

Tectonic processes mean the **movements of Earth's crustal plates**. These plates slowly move, push, or pull against each other.

When plates move, they can cause **mountain building, earthquakes, and volcanoes**.

In Pakistan, these processes are very active and shape the land and mountains.

Tectonic Setting of Pakistan

Pakistan lies where the **Indian Plate meets the Eurasian Plate**.

The Indian Plate is moving **northward**, pressing hard against the Eurasian Plate.

This constant pressure causes the land to **fold, rise, and break**, creating mountains.

That is why Pakistan often experiences **earthquakes** and has many **mountain ranges** in the north.

Collision of Plates and the Formation of the Himalayas

About **50 million years ago**, the Indian Plate hit the Eurasian Plate.

Neither plate went under the other because both were made of **thick continental crust**.

Instead, the rocks between them **bent and folded upward**, forming the **Himalayan Mountains**.

This process is still continuing — the Himalayas are still **rising slowly every year**.

Main Faults and Thrusts in Pakistan

There are several **major fault lines** in Pakistan that show how the crust has broken and moved:

- **Main Mantle Thrust (MMT):** marks the joining line of two old plates.
 - **Main Boundary Thrust (MBT):** divides the high Himalayas from lower ranges.
 - **Salt Range Thrust (SRT):** forms the edge of the northern plains.
 - **Chaman Fault:** runs through western Pakistan and causes many earthquakes.
- These faults show where **rocks have pushed over one another**, forming fold mountains.

Fold Mountains and Their Structure

Fold mountains are made when **rock layers are squeezed and bent upward**.

Upward folds are called **anticlines**, and downward folds are called **synclines**.

In the Himalayas, these folds are very large and stretch for hundreds of kilometres.

Over time, **erosion by rivers and rain** has cut valleys between these folds, shaping the landscape.

That's how the **Himalayan fold mountains** got their tall peaks and deep valleys.

Phases of Himalayan Formation

The formation of the Himalayas happened in **different stages**:

- First, the **Tethys Ocean** between the plates started closing.
- Then, the **collision began** and rocks folded upward.
- Later, new **thrust faults** formed and pushed more rocks southward.
Even today, the mountains are rising as the Indian Plate keeps moving north.
This slow rise is why the region is **geologically young and active**.

Tectonic Activity in Pakistan Today

Pakistan's northern and western parts are still very **tectonically active**.

Earthquakes happen when **pressure along faults is suddenly released**.

For example, the **2005 Kashmir earthquake** was caused by such movement.

The same process is what keeps **raising the Himalayas and Karakoram ranges**.

So, Pakistan's landscape is always changing due to these **underground forces**.

How Tectonics Shape the Landscape

Tectonic forces build **mountains, valleys, and plateaus**.

As mountains rise, rivers like the **Indus** carry eroded material to plains.

This process helps form **fertile soil** and shapes Pakistan's **northern and central plains**.

At the same time, steep slopes and active faults make some regions **dangerous for people**.

Thus, tectonics create both **beautiful scenery and natural hazards**.

Hazards of Tectonic Movements

The same forces that build mountains also cause **earthquakes and landslides**.

Areas near faults, like northern Pakistan and Baluchistan, are **earthquake-prone zones**.

These quakes can damage cities and cause **loss of lives and property**.

Studying tectonics helps scientists **predict earthquake risks** and plan safer buildings.

Importance of Tectonics for Pakistan

Tectonic activity gives Pakistan its **amazing mountains**, which attract **tourists and climbers**.

These mountains store **glaciers and rivers** that provide water to the whole country.

The erosion from the mountains helps form **fertile plains for farming**.

Understanding tectonics also helps protect people from **natural disasters**.

So, tectonics are both **a blessing and a challenge** for Pakistan.