**Chapter 1- Topography**

Pakistan enjoys the key position in South Asia, bordering China in the North/North-East, India in the West, Afghanistan in the North-West and Iran in the South-West regions.

The word topography refers to the study and description of land features.

Pakistan is home to ***6 major topographical regions*** which include the huge mountain ranges.

Pakistan has 3 major mountain ranges: **Western Mountains** (*Waziristan Hills, Safed Koh*), **North Western Mountains** (*Hindu Kush*) and **Northern Mountains** (*Himalayas and Karakoram*).

1. **Karakoram Range**

Karakoram meand black gravel. Is a mass of ice and rock, averaging a height of 6000m. It borders Pakistan with China through the Khunjerab Pass, home to the second-highest peak in the world K-2. It has a rugged landscape, with steep peaks and deep valleys. Precipitation is mainly in snow, with upper regions covered in glaciers. Extreme cold makes the Karakoram sterile, which is why people adopt a nomadic or semi-nomadic lifestyle. Apples and barley are grown here during the summer.

1. **Himalayas**

They are south of the Karakoram range, bordering India with a maximum height of 4000m. They are divided into 3 categories:

* Siwaliks (In Attock and Taxila region)
* Lesser Himalayas (In Murree, Abottabad, Balakot)
* Central Himalayas (Kashmir and KPK)

It has snow-capped peaks, with an abundance of vegetation and smooth sloppy peaks. It has the world's 9th highest peak, Nanga Parbat.

1. **Hindu Kush**

It lies where the borders of China and Afghanistan meet, with a height of 5000m at max. It runs in a North to South direction with glaciers resembling Karakoram's. Its topography consists of high steep valleys. They are located in the Skardu and Chitral districts. They are also bare of vegetation.

***Economy in the Northern Mountains***

* Traditional handwork
* Agriculture during summers
* Tourism

***Glaciers:*** Tongue-shaped mass of ice moving slowly down a valley. The most famous glacier in Pakistan is the Siachen Glacier. They change the landscape of a mountain through erosion (abrasion-scraping of surface and plucking-freezing of ice over rocks).

**Snowfield:** Plain area covered with perpetual snow adobe the snowline in high altitudes.

**Serrated landscape**: Elevated mountain zone used for agriculture.

**Scree**: a slope consisting of an accumulation of loose rock debris.

**Corrie**: Steep walled basin resulting from first and glacial action.

**Gorges:** when the river erodes the land and flows downhill, it erodes the less resistant rocks leaving behind hard rocks.

* **Western Mountains**

Located in the western side of Pakistan (KPK and Balochistan). They are less fertile, more dry and rugged, lesser in height and bare of vegetation.

They include:

1. ***Safed Koh-*** Located in the east-west direction south of the Kabul River. They mean white mountains that have snow-capped peaks and limestone ridges. They provide a route to Afghanistan through the *Kurram pass*.
2. ***Waziristan Hills***- Located between the Kabul and Swat rivers. They are highly mineralized and devoid of vegetation. Between *Kurram pass and Tochi pass*.
3. ***Sulaiman Range-*** Located west of the River Indus, bordering Balochistan, KPK and Punjab. It is composed of limestone, sandstone and shaly rocks. Takht I Sulaiman is its highest peak. This range separates the Balochistan plateau from the Indus Plain and blocks western depressions from reaching Pakistan.
4. ***Kirthar Range-*** Located west of the River Indus in Sindh, drained by Hub and Lyazri River. It is bare of vegetation due to little rainfall. It is important as it forms a border between the Balochistan plateau and Sindh Plains.

* **Balochistan Plateau**

Northern: The plateau has a lot of depressions that form basins like the Loralai Basin. The climate is generally dry and hot, with moderate to little rainfall. The mountains are not snowcapped except for the ones in Quetta.

Western: Chagai hills, Ras Koh, Siahan and central Makran ranges lie in this area ranging from 1000-100m. They are devoid of vegetation and only a little rainfall during the monsoon season. The basins here have no outlet to the sea thus, are called ***Inland Drainage Basins***. Rainwater forms temporary lakes which are called Hamuns in the local language. When water evaporates, it leaves behind a salt pan.

Mountains are rich in minerals like copper, gold and sulphur.

Coastal Areas: The eastern part comprises the Lasbela Plain and the west comprises of Makran coast.

The only water source for people in Balochistan is rainwater, which is relatively scarce. They use the Karez system or flood diversion channels/tube wells to store water and use it.

Crop farming and livestock farming are the main sources of income for the people there who live a nomadic life.

They contribute to the province’s economy by extracting mineral resources found on the plateau. Anatomy, gold, crude oil and gas reservoirs are found here. They also grow crops like dates, grapes, apples, almonds and apricots which are exported to the Gulf states. The upper lands of the plateau have cooler temperatures which makes it ideal for growing vegetable oil seeds. Livestock farming is also common, where the skin and wool of cattle is exported. Fishing is another common practice in the Makran coastal region, where caught fish is either locally sold or exported to Sri Lanka.

* **Potowar Plateau**

This plateau consists of the Salt Range, located in the south of Islamabad and above Lahore. It is located between the river Jhelum and the Indus. Its height varies from 300m to 1000m at most. A large part of this plateau has been dissected due to wind and water erosion, leaving a badland topography with ridges, ravines and troughs. The Soan River is the most dominating part of this region, with a long salt range called the Khewra mines. This plateau is rich in rock salt, gypsum, limestone, crude oil and coal. It covers the cities of Jhelum. Mianwali, Chakwal and Kalabagh.

* **Indus Plain**

Upper Indus Plain- Punjab

Lower Indus Plain- Sindh

The upper Indus Plain consists of the 5 rivers that drain into the river Indus (Ravi, Beas, Chenab, Sutlej and Jhelum).

Lower Indus Plain consists of just the river Indus draining into the Arabian Sea at the delta.

Important topographical features include:

1. Active flood plains: Narrow strips of land or river bank where the river water overflows during the rainy season. It has braided channels with alluvium. Meanders and oxbow lakes are formed due to the erosion of river beds.
2. Old flood plain: Lies ahead of the active flood plain, where old alluvium is deposited and river water doesn’t reach it.
3. Alluvial terraces: Flat, higher grounds formed at the upper Indus plain where agriculture takes place with the help of irrigation.
4. Doab: Area between two rivers.
5. Tidal delta: Where the river Indus drains into the Arabian Sea near Thatta and Badin. Upper delta regions are suitable for agriculture in comparison to the south because of tides and sediments.

* **Deserts**

The two major deserts of Pakistan are Cholistan in southern Punjab and Thar in southern Sindh. People here live lives as nomads due to extreme heat, dry weather and shortage of water.

**Chapter 2- Forests**

***1- Productive forests:*** Natural forests, which are deeply dense with great commercial value.

***2- Protection forests:*** Planted by people in a linear manner. They include amenity planting, parks etc. They have little commercial value and their purpose is to protect the soil.

**Importance of forests:**

* Ecological, maintaining a diverse balance of animals and plant species.
* Humus formation, maintaining the fertility of the soil.
* Commercial and industrial, provide raw materials.

**Types of forests**

*Alpine*

*Coniferous*

*Tropical thorn*

*Sub-tropical scrub*

*Riverain*

*Mangroves*

*Irrigated*

**Determinants:**

* Altitude
* Aridity
* Precipitation
* Edaphic factors (type of soil)

***Mangroves-*** located in the coastal regions. They thrive in salty water, roots functioning as filters which strain most of the salt from the water absorbed. They have knobbly knee-like roots, spread sideways which protrude from the soil to absorb oxygen.

They prevent damage to the coastal regions by maintaining their ecology from tides and tsunamis.

**Deforestation:**

*Causes-*

1. Mining activities
2. Increase in urbanization
3. Industrialization
4. Transport facilities
5. Increase demand for wood
6. Firewood for heat and cooking
7. Overgrazing by cattle

*Effects-*

1. Soil erosion
2. Siltation and waterlogging
3. Disruption in hydroelectricity
4. Global warming
5. Effects on food production
6. Ecology

*Solutions-*

1. Supply of irrigation facilities to areas with less greenery
2. Allotting specific areas of land to be used for firewood or other commercial purposes
3. Creating awareness
4. Supplying natural gas to rural areas so they don't use wood
5. Educating and improving plans for plantation
6. Strict regulation by forest authorities
7. Using terracing and counter ploughing

**Afforestation**

Re-plantation of trees in deforestation areas.

Projects must include; selecting and managing areas to be afforested.

The Tarbela/Mangala watershed management project is one of the government initiatives.

For **sustainability**, plant trees that can grow quickly, and replace every cut tree with another.