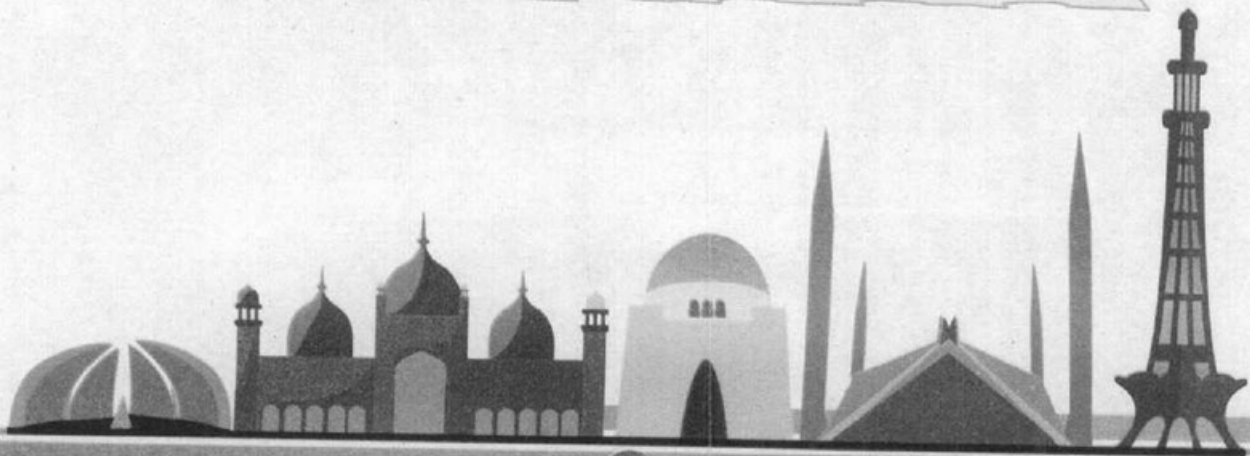


THE NATURAL TOPOGRAPHY AND VEGETATION OF PAKISTAN

In this unit the students will be able to:

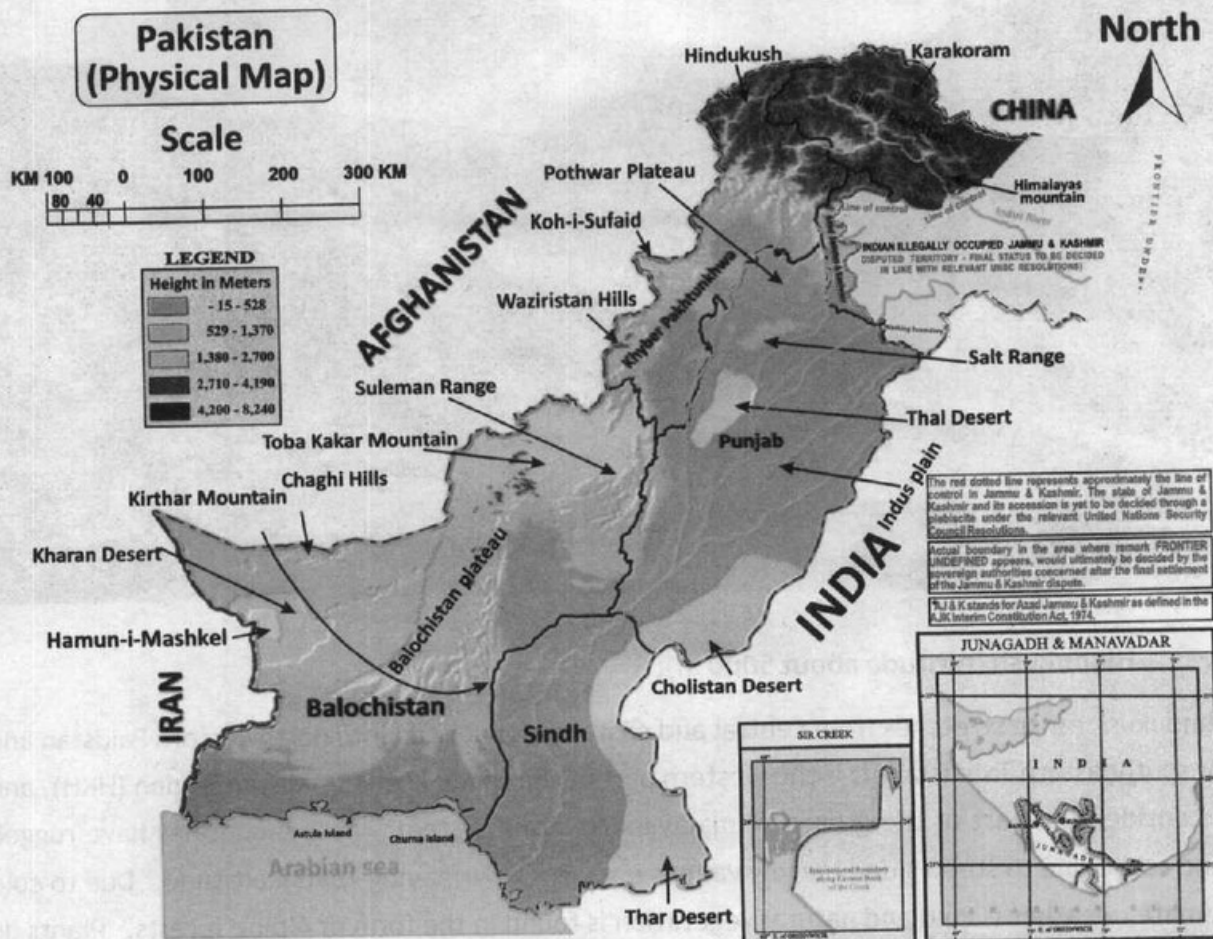
- Label the significant mountain ranges, plateaus, rivers, and plains of Pakistan on a physical map, and explain their importance to the country's physical and human geography.
- Analyze the natural topography of Pakistan, including the spatial distribution of physical features such as mountains, plateaus, rivers, and plains, using appropriate geographical vocabulary and terminology.
- Investigate the weather patterns, economy, natural vegetation, drainage systems, lifestyles, and cultures of people living in various landforms of Pakistan, using geographic representations and geospatial technologies to analyze the similarities and differences.
- Construct well-supported arguments with relevant evidence to assess the potential of Pakistan's natural topography for future growth and sustainability, considering opportunities for leisure, commercial, and economic development.



Regions of Pakistan

Topography is the study of the earth surface and the representation of both natural and artificial features of land on a map. The study of topography is fundamental to understanding the Earth's surface features and how they have changed over time. In this chapter, we will explore the natural topographical features of Pakistan. The natural topography of Pakistan can be classified into six main regions.

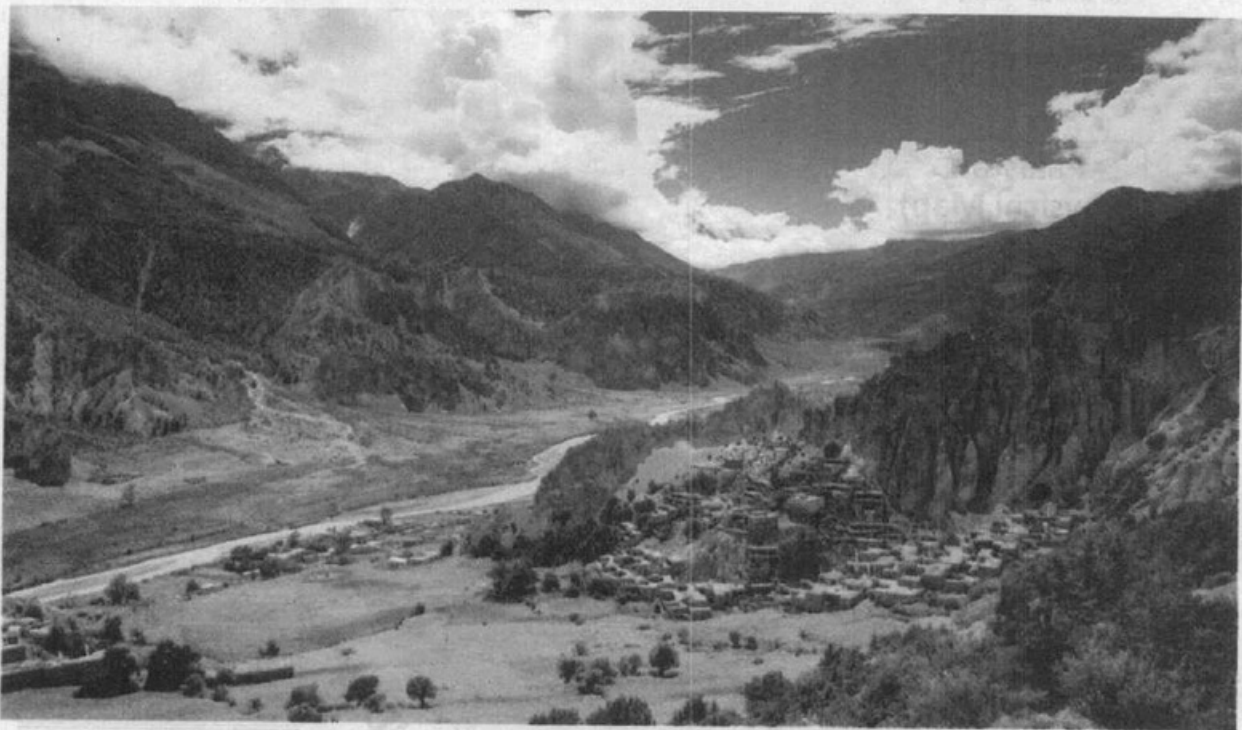
1. The Northern Mountains and North Western Mountains
2. The Western Mountains
3. The Balochistan Plateau
4. Pothwar Plateau and Salt Range
5. The Indus Plain
6. Desert Areas



1-Northern mountains and North western mountains. This region includes following three mountain ranges

i. **Himalayas (Altitude about 4000 m):**

The Himalayas cover 2500 km from east to West. They include Siwaliks, lesser Himalayas and the central Himalayas. The Siwaliks hills have altitude between 600-1200 meter. While Lesser Himalayas have altitude between 1800-4500 meter. Himalayas have tremendous tourist potential such as Murree, Galiats such as Ghora Gali, Nathia Gali situated there. The central Himalayas lies between the ranges of Pir Punjal and Karakoram. Most parts of central Himalayas generally located in Kashmir with the highest peak Nanga Parbat having height of about 8126 meters. The natural topography is characterized with snow peaked mountains, massive glaciers with very rich natural vegetation including tropical evergreen Coniferous forests, deciduous forests and Alpine meadows. Above the tree line, vegetation is in the form of grasses, shrubs and wild flowers.



Sparsely Populated Himalayas

ii. **Hindukush (Altitude about 5000 m):**

Hindukush range stretches from central and eastern Afghanistan into northwestern Pakistan and far southeastern Tajikistan. It is the western part of the Hindu Kush Himalayan Region (HKH), and is considered a part of the greater Himalayan Mountain system. These mountains have rugged land scape due to steep sided narrow valleys e.g., Tirch Mir having 7690m altitude. Due to cold climate, weather is cold and natural vegetation is found in the form of Alpine forests. Plants do

not grow above the snow line which starts above 4000 m. At this altitude mountains remain covered with the snow round the year. The glaciers including Batura and Chiantar of the Hindu Kush are a vital source of water for the region, and they also support a number of important economic activities, such as agriculture and



Hindukush

hydropower generation. The Hindu Kush Mountains consist of a number of strategically important passes, including the Shandur Pass, the Shangla Pass, and the Lawarai Pass. These passes connect important population centers and valleys, such as Gilgit, Chitral, Swat, and Peshawar.

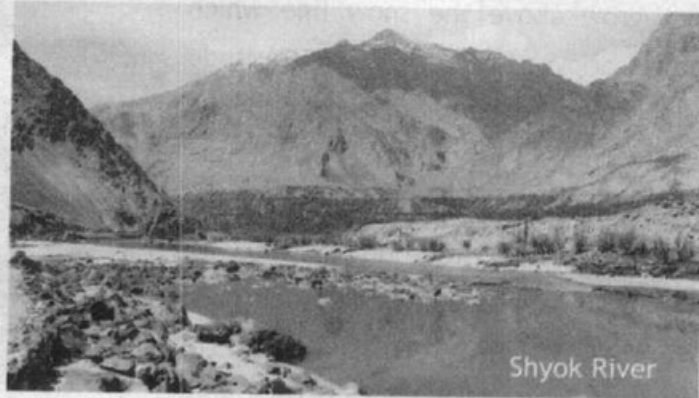
iii. Karakoram mountains: (Average Altitude 6000 m)

The Karakoram range consist of a long chain of Rocky Mountains which are generally snowcapped running east to west. The range stretches for 400 kilometers from the Hunza Valley to the Shyok River, with the westernmost part of the range in Pakistan. The Karakoram Mountain range is characterized by narrow and deep valleys, such as the Hunza, Shyok, and Baltoro; towering gorges, such as the Nanga Parbat and Indus Gorges; and vast glaciers, such as the Baltoro, Siachen, and Biafo Glaciers. K2, the second-highest mountain peak in the world, is also located in the Karakoram. The precipitation at lower elevations is typically in the form of rain. At higher



Karakoram Mountains

elevations, precipitation is typically in the form of snow. Natural vegetation at lower elevations is mostly dry and steppe-like, with grasses, shrubs, and scattered trees such as poplar, Juniper and willow. At higher elevations, the vegetation becomes more alpine, with meadows, mosses, and lichens.



The population density in the Karakoram Mountain range is low due to the challenging climate and landscape. Most of the population is concentrated in three towns in the disputed Kashmir region of the northern Indian subcontinent Gilgit and Skardu in Gilgit-Baltistan. Most of the people who live in these high-altitude areas are subsistence farmers and pastoralists as they grow crops and raise livestock for their own needs and they trade surplus goods with other communities.

Importance of Northern Mountains

- i. The Northern Mountains are a major source of water for the region, providing drinking water, irrigation water, and hydropower. For example, the Indus River, which provides water for millions of people in Pakistan, originates in the Northern Mountains.
- ii. The Northern Mountains play a role in regulating the climate of the region and the world. For example, the glaciers of the Northern Mountains help to cool the planet.
- iii. The Northern Mountains are home to a variety of unique and endangered wildlife species, such as the snow leopard and the Tibetan antelope.
- iv. Mountain peaks provide protection to Pakistan from cold winds of Siberia and Central Asia
- v. The Northern Mountains offer a variety of economic opportunities for local communities, such as tourism, agriculture, and forestry. For example, the Northern Mountains of Pakistan are a popular tourist destination for mountaineers and trekkers.
- vi. Northern Mountains provide raw materials to several important industries e.g., chemical industry, pharmaceutical industry, pulp and paper and furniture making industries.

Earthquake in Northern Areas

Northern Pakistan, including Kashmir, lies at the collision point of the Eurasian and Indian tectonic plates, making it prone to earthquakes. On October 8, 2005, a magnitude 7.6 earthquake struck the region, causing widespread devastation, especially in Balakot, Kashmir, which was almost completely destroyed. The earthquake resulted in a massive loss of life, damage to settlements and infrastructure, and large-scale migration to plain areas. Secondary effects included water shortages and the spread of diseases. The Pakistani government provided emergency relief, evacuation measures, and rehabilitation centers.

2-Western Mountains

The Western Mountains are a chain of mountains with low altitude running parallel to each other. The description of Western Mountains is given in the table:

Name of Mountain Range	location	Altitude above sea level	Important Features & Passes	significance
Safed Koh	South of the Kabul River	Between 4712 m to 4755 m	-Snow-capped peaks -Limestone ridges -Mount Sikaram has maximum elevation -Pine vegetation Kohat & Peshawar as urban centers	-Forms a natural border between Afghanistan and KPK through Kurram Pass
Waziristan Hills	Between Kurram and Gomal Rivers	3513 m	-Abundant mineral deposits such as clay. - little vegetation due to scanty rainfall - Kurram dam provides water for irrigation	-Tochi pass connects Bannu and Gazhni
Suleman Range	West of the River Indus in southern Punjab	3383 m	-Lime stone -Shale and sandstone deposits -Takht-i-Suleman as highest peak	-boundary between Baluchistan plateau and the Indus River in Punjab - Bolan Pass connects Kachhi Sibbi plain to Quetta
Kirthar Range	West of the River Indus in Sind	2174 m	- Kirthar Hills aquifer -Shrub species -drained by river Hab and Lyari	-Border between Sindh plain and Baluchistan plateau



Note For Teachers: Ask students to develop a fact file related to the Northern Mountains. Students may research this information online, in books, or by interviewing experts to contribute to the fact file.

Economic Activities and lifestyle in the Western Mountains

The landscape of western mountain ranges is rugged and are largely devoid of natural vegetation. Most of the population lives in small towns and rural areas in a subsistence and Nomadic lifestyle. Population density is lower than 100 people per kilometer square. Canal irrigation is not viable in the majority of the western mountains due to the challenging terrain. There is a lack of infrastructure facilities, including commuter trains, asphalted roadways, and air links, for instance, the large urban centers like Peshawar and Kohat are accessible through roads and railways and connected with the country. Although there are abundant of mineral resources but they have not been extracted due to tough terrain.

Expand Your Horizon

Read the newspaper clipping and answer the questions given below

Food security in mountains published in DAWN December 9, 2009

The problem of hunger in mountains is getting worse. Harsh climates and the difficult, often inaccessible, terrain combined with political and social marginality make mountain people vulnerable to food shortages. Indigenous knowledge about local foods and traditional agricultural practices in mountain areas is eroding and agricultural diversity as well as productivity is declining, further increasing the vulnerability of mountain people. Now food prices are soaring worldwide and increased transportation costs to remote mountain areas mean mountain communities are paying that much more for their food, Food and Agriculture Organization (FAO) says.

Food security in mountains published in DAWN December 9, 2009

1. How does the harsh climate and difficult terrain in mountains affect the lives of people living there?
2. How is the lack of indigenous knowledge about local foods and traditional agricultural practices affecting the lives of mountain people?
3. Suggest some solutions to help mountain communities address the problem of hunger?

3-The Balochistan Plateau

Balochistan Plateau forms the southwestern half of Pakistan. It is bordered to the north by the Hindu Kush mountains, to the south by the Arabian Sea, and to the west by the Iranian border. The plateau is characterized by its high-altitude ranges (600-300 meters) with total area stretching over 347,190 sq km. Balochistan has a dry climate, with less than 250 millimeters (10 inches) of annual rainfall on average.

The distinct topography of Balochistan Plateau is identified as follows:

i. Basins of North Balochistan

Between the Toba Kakar and the Suleman ranges, a number of depressions are found which are marked as the Zhob and Loralai basins. Quetta valley is located to the south west of the basin of Loralai.

ii. Basins of Western Balochistan

The western basins are found between a number of mountain ranges such as Chagai hills, Siahan and central Makran. Balochistan has inland drainage. The rainwater of the basins drains into the rivers and streams which either absorbed into the ground or forms temporary lakes called Hamuns which contains high salt concentration. The largest Hamun is found in Kharan desert.

iii. Mountain Ranges

The mountain ranges found in Balochistan Plateau are infertile and devoid of vegetation. However, these ranges contain vast deposits of coal, gold and copper and sulphur. These ranges include:

- Central Brahui range
- Hala range
- Siahan Range
- Toba Kakar Range
- Makran coastal range
- Ras Koh Range

iv. Coastal Areas

Coastal areas of Balochistan Plateau are divided into eastern including Lasbela plain and western extents consisting of Makran coast and its coastal plain is formed by the projection of land into the sea. There are some significant coastal rivers i.e., Hab, Hingol, Porali and Dasht which empty their waters into Arabian sea.

Natural and Economic Resources

Balochistan plateau is rich in natural resources which are as follows:

• Water Resources

Water resources in Balochistan are limited and unevenly distributed. People face water scarcity all round the year as there is no major source of water. The main sources of water are surface



Note For Teachers: Inform students that a basin is a large, generally level region of land that is enclosed by higher land. Basins of Baluchistan are formed by the erosion of the surrounding mountains and hills over time. They have no outlet to sea.

water, ground water in the form of aquifers and springs. The system of Karez helps in irrigation. However, ground water is declining due to over extraction.

- **Minerals**

Balochistan is rich in mineral wealth which is possibly important but remains an under-developed sector in Balochistan's economy. According to provincial Census report Balochistan 2017, the extraction of thirty-nine out of fifty recorded mineral resources present in the province generates an annual revenue close to Rs. 3.4 billion. The most important minerals are gas, coal, copper, antimony and gold.

Do You Know?

Balochistan; A Trading Gateway

Gwadar port can be a hub for inter-regional transport and trade as it provides access to the Arabian Sea for landlocked Afghanistan and Central Asia. Gwadar has been marketed as a futuristic trade gateway with Central Asian regions. Goods from Gwadar port can be transported via land routes to Afghanistan, Tajikistan, Uzbekistan, Turkmenistan, and deeper into Central Asia. To make this possible, road and railway networks are being laid linking Gwadar to Afghanistan and Iran. Plans to open gateways on the Afghanistan and Iran borders are also under execution. With these and similar developments, Balochistan can serve as a transit route into the neighboring countries of Afghanistan and Iran, and a trading gateway into Central Asia.

- **Agriculture**

- a) **Fruit and vegetable production**

Balochistan has two crop seasons: Kharif (summer) and Rabi (winter). Kharif crops include rice, jowar, maize, onion, potato, melons, chilies, tobacco, and sugarcane. Kharif vegetables include lady fingers, tinda, brinjals, bitter gourd, bottle gourd, pumpkin, kharif tomatoes, and cucumber. Rabi crops include wheat, barley, rapeseed & mustard, cumin, gram, and sunflower. Rabi vegetables include cabbage, carrot, cauliflower, peas, radish, turnip, spinach, beet root, and Rabi tomatoes. Important fruits include almonds, apples, apricots, grapes, peaches, plums, pomegranates, cherries, dates, bananas, mangos, chikoos, papayas, and coconuts.

- b) **Fishing**

Balochistan's fishing sector has the potential to grow significantly, but it needs more support infrastructure and services. The important fish are Tuna, Sardinals, Mekerals etc. Its coastline is 70% of Pakistan's total coast line, but it only contributes 30% of the country's landed catch. This is due to a lack of supporting infrastructure and services at the ports of Gwadar, Ormara and Pasni, as well as a lack of modern processing facilities. Integrating the development of the coastal

highway and the Gwadar port is expected to boost the development of the fishing sector and the local economy.

c) **Livestock**

Balochistan is rich in livestock resources, almost 70 percent population is directly or indirectly involved in livestock rearing activities. Animals such as cattles, camels and poultry are traditionally kept for household milk and meat needs. The main consumers of Balochistan's livestock products include the leather, carpet, and pharmaceutical industries. A poverty alleviation strategy with a focus on livestock development may well target the higher poverty in the province. By investing in infrastructure, services, and training, the government can help livestock farmers to increase their productivity and incomes.



Gwader Port, A part of CPEC Project

4. The Pothwar Plateau & Salt Range

Pothwar plateau and Salt range are located to the south of Islamabad and lying between the river Indus and river Jhelum. It has changing landscape due to constant erosion. Pothwar Plateau and Salt range have rich deposits of minerals like gypsum, limestone, marble, dolomite coal and oil. A number of oil and gas field are set up in this area such as Attock Oil Refinery. Farming depends on the natural rainfall which is why this area is called Barani (rainfed). Natural vegetation is consisted of dry temperate forest, with a mix of deciduous and evergreen trees and shrubs.

Natural Topographical and Drainage Features of Pothwar

The Pothwar Plateau presents a badland topography owing to its dissected, eroded and faulted land. The Soan river forms alluvial plains which are agriculturally productive.

i. Ridges and residual hills

These features are formed by the erosion of soft rock through the action of running water and fast blowing winds. Kala Chitta and Khairi are important residual hills of Pothwar plateau.

ii. Faulted land

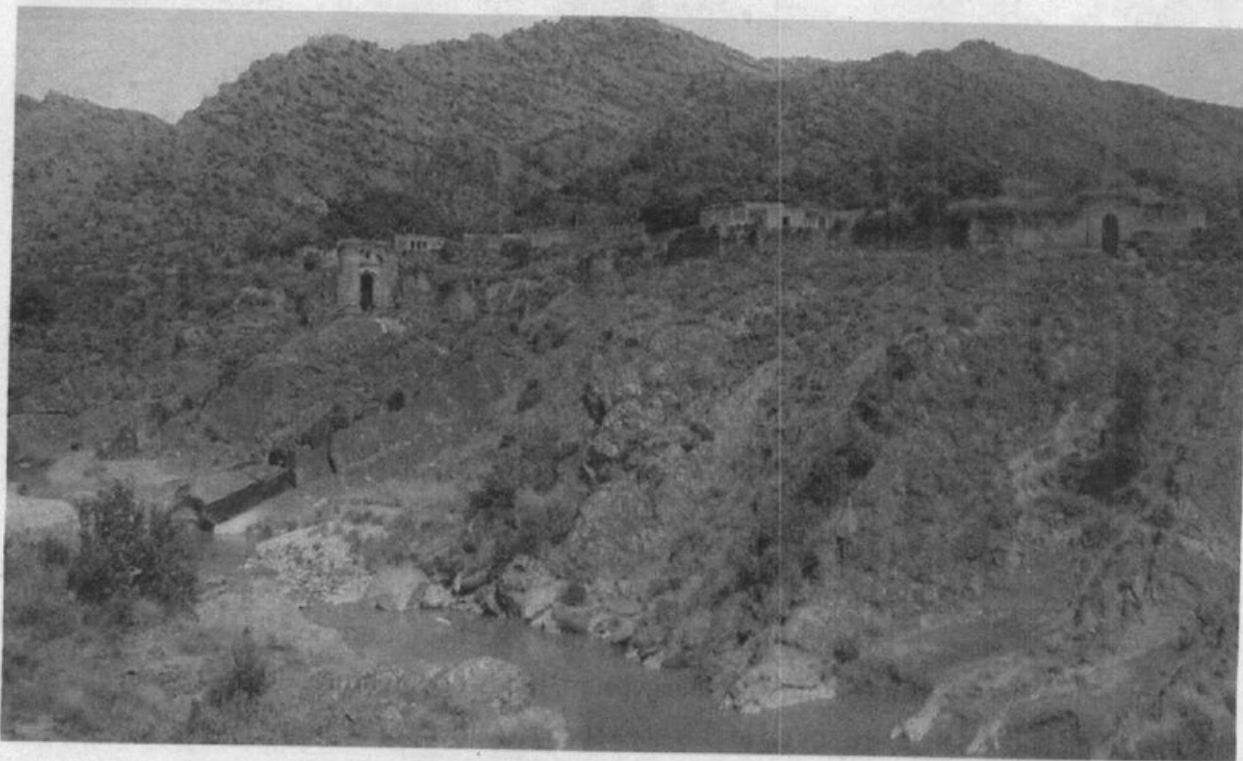
During the mountain building process, the land is weak and shows off cracks.

iii. Troughs and depressions

These features are formed when soft rocks are eroded by water and wind blow away the loose soil which creates depression and trough.

iv. Ravines

Ravines are deep channels created by the erosion of soft water and carry running water particularly during rainy season.



Badland Topography of Pothwar Plateau (Pharwala Fort along the Soan River)

The Salt Range

The Salt range is located 160 km from Islamabad. Salt range are parallel ranges with average altitude between 750 to 900 meters and located in Khewra. The area is rich in the mineral deposits such as gypsum, rock salt and limestone. Salt ranges are consisted of broken and faulted land eroded by rivers. It has famous Kallar Kahar lake and Sakesar peak (1,527 m) which is the highest point of the Salt ranges. The main districts of Salt ranges are Jhelum, Mianwali and Chakwal.

5.The Indus Plain

The Indus plain is drained by the river Indus and its eastern and western tributaries as shown in the table.

Eastern Tributaries	Western Tributaries
1. Jhelum River	1. Shyok River
2. Chenab River	2. Gilgit River
3. Ravi River	3. Kabul River
4. Sutlej River	4. Kurram River
5. Beas River (tributary of Sutlej)	5. Gomal River

Natural Topographical features of the Indus Plain

Indus plain is formed by the river Indus. It is divided into two plains:

- (i) Upper Indus Plain (ii) Lower Indus Plain

Some important topographical features of Indus plain and their importance is discussed below:

Active Flood plain: It is a narrow strip of land with rich alluvial deposits on either side of almost all the river except for the southern half of the river Ravi. Active flood plain is almost regularly flooded every year. The active flood plain of river Ravi is 40 km wide which makes it important for agricultural activities such as crop cultivation, fish farming etc. Other features like meanders and ox-bow lakes are also present in the active flood plain formed by the acts of erosion and deposition.

Old Flood Plain: An old floodplain is a high, flat area that was once flooded by a river. It is the area that lies between active flood plain and the alluvial terraces. Old floodplains are valuable for agricultural activities, provide food, flood control, habitat, and recreation.

Alluvial Terraces: Alluvial terraces or bars, are flat and higher grounds that are found at different elevations between the rivers or doabs. They are formed when the river changes its course over time and leaves behind its old floodplain. Alluvial terraces are typically made up of sand, silt, and clay, and they are often very fertile and favour extensive farming. The prominent alluvial

terraces are Nili Bar in Bari Doab, Sandal in Rachna doab and Kirana Bar in Chaj Doab. Doabs attract population because of the availability of flat land for the construction, settlements and other industrial and business activities.

Piedmont Plains or Alluvial Fans: These plains are formed by the river as soon as it comes out of mountains. These plains are agriculturally productive. Piedmont plains are located at the foothills of Kirthar, Suleman and Siwaliks of Himalayan Mountain ranges.

Tidal Delta: It is also called Indus delta located to the south of Thatta.

It is a triangular or fan shape area with distributaries coming out from the main river. It plays a significant role in the ecology, economy and culture of Pakistan.

Cuestas: Cuestas or escarpments are important features of lower Indus Plain. These are limestone ridges gently sloping on one side and steep on the other side. Examples include Rohri Cuesta and Gango Takkar in Hyderabad. These cuestas provide firm foundation for the construction of barrages which are used for storage of water for irrigation and fishing purposes.

Economic Activities in the Indus Plain

The Indus plain is very productive region of Pakistan for a number of reasons. The fertile soil and plenty of water supply through a well-developed irrigation system makes it ideal for agricultural activities. Availability of flat land and drainage makes it ideal for settlement growth. Industrialization is encouraged due to the presence of vast mineral deposits, well developed transport network of air, railways and roads. Main urban centers are Lahore, Sialkot, Faisalabad and Gujranwala.

Do You Know?

Doab: Doab refers to a tract of land lying between two rivers.

Do You Know?

A piedmont plain is a low-lying area of land that lies at the base of a mountain range.



Irrigated Plains of the Punjab

6. Desert Areas

Pakistan has vast and hot deserts. They are located at three places.

- a) The **Thal desert** is located between the river Indus and River Jhelum. It is also called Sindh Sagar Doab
- b) To the south east of Pakistan, the **Thar desert** is located in Sind. It has further three main desert areas:
 - Cholistan
 - Nara
 - Tharparker
- c) The **Kharan desert** is a sandy and mountainous desert situated in Balochistan province in south-western Pakistan.

Deserts have a very changing landscape due to strong winds. Most important relief features of desert areas are rolling sand dunes, undulating land, sand plains or strip of land, bare rock, dry soil due to lack of water, cracks in rocks caused by intense heat and weathering action. Hot climate, lack of rainfall and strong winds make desert areas a hard place to live because all the basic life sustaining activities are hindered such as farming. Natural vegetation in desert areas is a mixture of shrubs, succulents, herbs, and a few grasses. Availability of water to a major part of Thar was made possible through canals from Sukkar Barrage which has changed the area into a farmland.



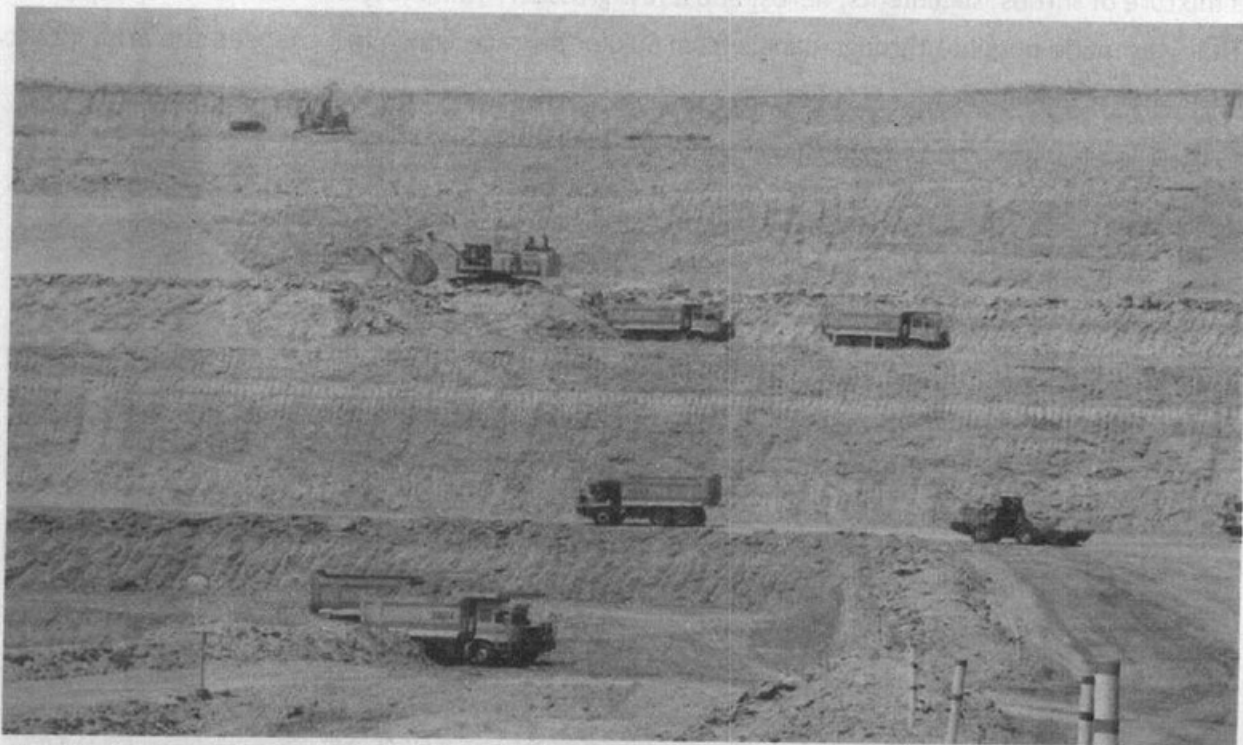
Thar Desert

Economic Potential of Desert Areas of Pakistan

Desert areas are rich in mineral deposits and fossil fuels such as coal, oil and gas. These mineral deposits have the potential to play an important role in the development of Pakistan's economy. For example, Cholistan desert is rich in lignite, gypsum, and silica sand. Moreover, the coal deposits in the Thar desert could be used to generate electricity, and the iron ore deposits could be used to produce steel.



Coal in Thar Desert



Dumpers working at a mining site in the Thar Desert

What I have Learned

- Pakistan's natural topography is diverse, with mountains, deserts, plains, and coastlines.
- The northern highlands are home to some of the world's highest mountains including the Karakoram Range, the Himalayas, and the Hindu Kush.
- The Indus plain is a vast agricultural region.
- The Indus River has been a source of water for irrigation and drinking for centuries, and it has also been a major transportation route.
- Pakistan has potential for renewable energy and tourism development
- Desert areas are rich in mineral deposits such as fossil fuels.

Exercise

Answer the following questions by choosing the best answer A, B, C or D.

1. Which of the following is the highest mountain peak in Pakistan?
a. K2 b. Nanga Parbat c. Tirch Mir d. Kalar Kahar
2. Which of the following mountain ranges is located in northwestern Pakistan?
a. Himalayas b. Hindu Kush c. Karakoram d. Kirthar
3. What is the average altitude of the Karakoram Mountains?
a. 4000 m b. 5000m c. 6000 m d. 7000m
4. What percentage of Pakistan's land area is covered by mountains?
a. 25% b. 33% c. 50% d. 66%
5. Which of the following is a temporary lake that forms in the Balochistan Plateau during the rainy season?
(a) Zhob Basin (b) Loralai Basin (c) Hamun (d) Quetta Valley
6. Which of the following is NOT a characteristic of the Potwar Plateau?
(a) Badland topography (b) Ridged and residual hills
(c) Faulted land (d) Dense forests

7. Which of the following is a mineral deposit found in the Salt Range?
 (a) Gypsum (b) Rock salt (c) Limestone (d) coal
8. Which of the following is NOT a characteristic of the Indus Plain?
 (a) Active flood plains (b) Old flood plains
 (c) Alluvial terraces (d) Dense forests
9. Which of the following is a type of cuesta found in the lower Indus Plain?
 (a) Rohri Cuesta (b) Gango Takkar (c) Both (d) and (b)
10. Which of the following is a mineral deposit found in the Cholistan desert?
 (a) Lignite (b) Gypsum (c) Silica sand (d) marble

Answer the following questions briefly.

1. Explain the topographical features of Pothwar Plateau?
2. Identify the important passes situated in northern and western mountains.
3. Describe the location and topography of salt range.
4. Why is the Indus plain a productive region of Pakistan?
5. What are the eastern and western tributaries of Indus River?
6. What is meant by Inland drainage? Give examples
7. Write short notes on the following
 - a. Fishing in Balochistan
 - b. Livestock in Balochistan

Answer the following questions in detail.

1. Discuss the various natural resources available in these deserts and the ways in which they can be sustainably exploited to improve the lives of the local people.
2. Describe the natural vegetation of Northern mountains?
3. Explain how the relief features of Balochistan plateau are different from Potwar Plateau? Give examples
4. Describe the differences between the Northern mountains and Western Mountains.
5. With name examples, describe the deserts of Pakistan. Also explain the economic potential of the desert areas for Pakistan.

Forming Informed opinions

Teacher may ask the following questions for an interactive class discussion on the future prospects of development of the Balochistan Plateau:

1. Identify the main opportunities for development in the Balochistan Plateau?
2. What are some specific projects or initiatives that could be undertaken to promote development in the Balochistan Plateau?

Project

“Pakistan's Natural Topography: A Catalyst for Future Growth and Sustainability”

Ask students to develop their proposal and present their proposal to a panel of judges, such as teachers, environmental experts, or business leaders. The judges should evaluate the proposal based on its feasibility, potential benefits, and implementation plan.

Glossary

Desert: A dry, barren area of land.

Plain: A large, flat area of land.

Plateau: A large, flat area of land that is higher than the surrounding land.

Coast: The edge of a sea or ocean where it meets the land.

Pass: A narrow path through mountains.

List more words and write their meaning that you find difficult in this chapter.
