UNIT
04

Section 2

Geography of Pakistan

Natural Vegetation and Forests of Pakistan

In this unit the students will be able to:

- Investigate geographical, climatic, political, cultural, economic, and industrial aspects influencing natural vegetation and forests using geographical representations and geospatial technologies for deeper understanding.
- Utilize geographic tools and techniques to annotate and map the spatial distribution of the different types of forests in Pakistan, including productive and protective forests, and also elaborate their benefits and uses for the country.
- Investigate different factors affecting the different types of forests and evaluate the advantages and disadvantages of irrigated plantations and mangroves with regard to sustainability, climatic impacts and protecting against natural disasters.
- Differentiate between deforestation and afforestation while critically analysing the causes and effects of deforestation on climate and social life in Pakistan, and propose sustainable solutions to address deforestation.

Natural Vegetation of Pakistan

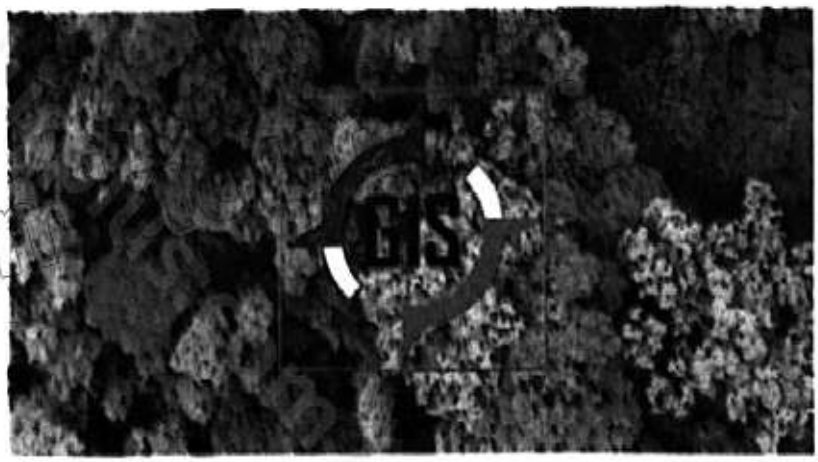
Natural vegetation encompasses the flora and fauna found in different regions of a country. Flora refers to a plant community that grows over an area and is left undisturbed by humans. It includes trees, thorny bushes and shrubs of all kinds. Fauna is all of the animal life present in a particular region at a time.

Forests

A Forest can be defined as a region with a high density of trees. Forests are a habitat for a variety of living beings including plants, animals and microorganisms. Trees help in producing oxygen which is the requirement of all living things. A forest is nature's most efficient ecosystem system with a high rate of photosynthesis affecting both animal and plant life.

Geographic Tools and Techniques to Annotate and Map different Types of Forests.

Geographical representations and Geospatial technology are terms to describe the range of modern tools contributing to the geographical mapping and analysis of the earth and human societies. These are linked to high level- resolution satellite imagery for monitoring forest cover, land-use changes and environmental features of any area.



Geospatial technology is an emerging field of study that consists of three major disciplines:

(i) Geographic Information System (GIS),

(ii) Remote Sensing (RS),

(iii) Global Positioning System (GPS).

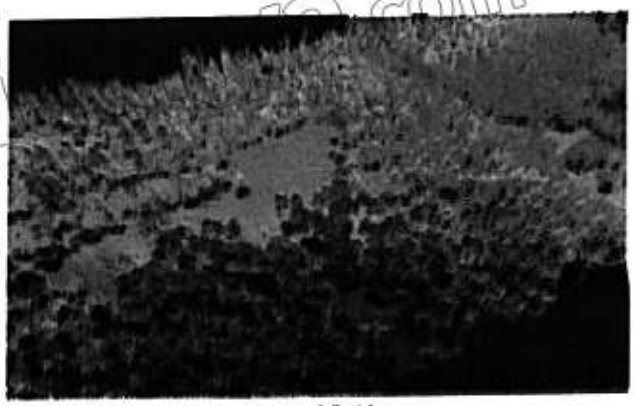
Geo-Spatial technologies include, Satellite images, Drones, Camera traps and Audio records. When data is collected with machine learning technology, it can detect forest destruction, distribution and can even detect a single felling in the forest. GIS integrates Hardware, Software data to capture, manage, analyse, and display all forms of spatial data and imagery. This system is also helping in preparing 3D maps.

This technology, manages tracking of water for irrigation, also aids in mapping of a aquifers to monitor their water level and evaluate the impact of climate change on water resources.

Through this technology, Drones and Robots can be used to stop deforestation. Planning for afforestation and re-afforestation is easy and more efficient. GIS application for forest management has detected 4.2 million hectares of planted forests including 4.8% of coniferous and scrub forests in Pakistan.

GIS helps to model and map forests, predict future conditions under different scenarios, plan harvests, predict Forest fires, can provide the assessment of the extent of the forest density and types of plantations and grasslands.

LiDAR is another method of determining ranges by targeting an object of a surface with a laser and measuring the time for the reflected light to return to the receiver.

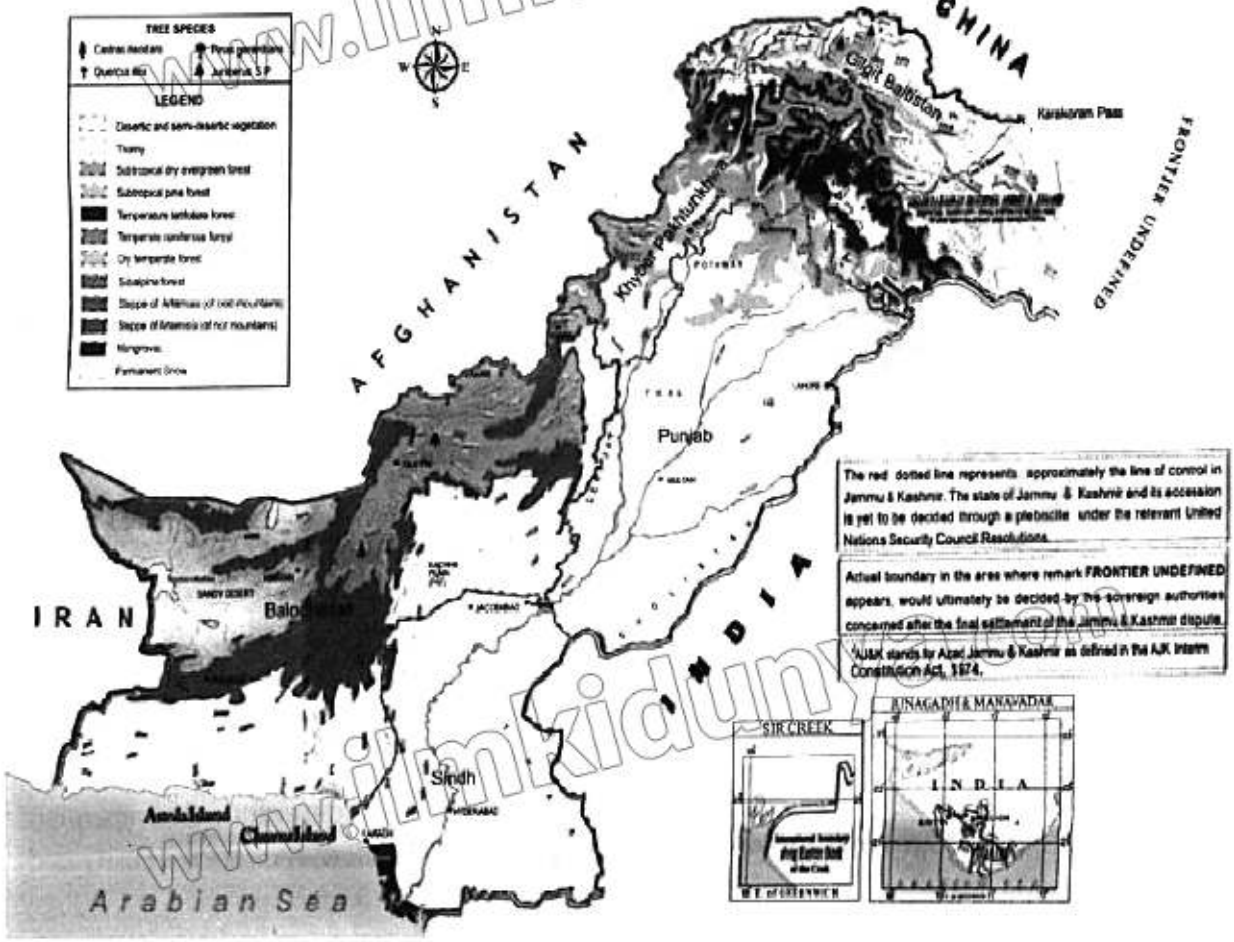


Forests of Pakistan

LiDAR, stands for Light detection and ranging. It is an advanced technology that estimates three-dimensional structure of forest vegetation. It also measures the height and density of vegetation cover of large areas. It has been successfully used in number of ways to detect forest fires, capture forest structure and map individual trees. Visualising forest and vegetation LiDAR system can rapidly collect vast amounts of data, creating 3D models with centimeter-level accuracy. This level of detail allows utility companies to pinpoint potential vegetation hazards, prioritize maintenance work and optimise trimming schedules.

Types of forests

Pakistan serves as an excellent example of the range of forests that grow according to altitude. The Arabian Sea in the south is bounded by coastal forests such as mangroves. As you move northward, the altitude increases. Tropical thorn forests and shrubs grow up to an elevation of 1,000 meters. Further north, coniferous forests thrive at an elevation reaching 3,000 meters. Alpine forests are found at even higher altitude of around 4, 000 meters.



Factors Affecting Different Types of Forests

Altitude

Altitude in the context of forest refers to the vertical height of the forest above the sea-level. This elevation directly influences the type of trees and vegetation that can thrive with different forest classification. The table below shows how areas of similar altitude have the same vegetation across different provinces and areas

Altitude	Types of Forests
Above 5000 Metres	Snow-line is on the mountains above which there is perpetual snow. Snow-capped peaks of The Himalayas, Hindu Kush and Karakoram mountains-are the examples of permanent snow
4000-4500 Metres	**Alpine forests are found** in northern areas, Chitral, Dir, Kohistan
3000 meters:	**Coniferous evergreen forestsare found** in northern areas, Rawalpindi- Islamabad, Murree, Quetta and Kalat in Baluchistan, Abbottabad, Mansehra, Kohistan, Shangla and Swat in Khyber Pakhtunkhwa.
1000 meters:	**Tropical thorn forests** (natural vegetation) are found in Punjab plains, southern and western Baluchistan, Sindh plains
	Sub-tropical Scrubfrosts are on the foothills of lower Himalayas, Sulaiman and Kirther ranges, Western Mountains (Peshawar, Waziristan, Kohat, Mardan), and north of Makaran coastal ranges. **Riverian Bela forests** (irrigated forest) Indus river and its tributaries.
Sea level:	**Mangroveforests** are found in coastal Areas (Sindh and Baluchistan)

Climate and Soil

Altitude or height of land above sea-level is a major factor for the difference in vegetation but rainfall is also important for the density and growth of forests. Trees absorb large amounts of water and store it in their roots to remain healthy and strong and mostly evergreen. **Temperature** differences also influence the growth of vegetation. The trees in hot areas are less dense, have hard wood and broad leaves. They are mostly deciduous and shed their leaves in dry season. Most of the areas of high temperature and low rainfall have dry bushes. Type of soil of the area also determines the density of the trees.

Types of Forests

It is estimated that for a stable economy of a country, its forest cover should be at least 20-25 % of the land area. Pakistan is a rain deficient country. The natural forest cover is only about 5% as of 2024. There are two types of forests:

'Productive forests' are forests which grow according to natural factors without any human activity. They mostly have dense canopy and their timber is used for commercial use.

'Protective forests' have trees which are grown by people or by the government schemes to increase area under tree cover for their own benefits. These are mostly grown for the protection of soil to increase the benefits of tree cover in the country. They are planted in large blocks or in a linear shape. The trees are planted using irrigation due to low rainfall. They improve the problems of barren land.

Irrigated Plantations

Pakistan mostly has semi-arid climate with low rainfall and high temperature. Land area under forests is very little. Irrigated plantations help in increasing area under tree cover. The advantages and disadvantages are elaborated below:

Advantages

- They provide shade and protect the land from soil erosion, mostly planted along the road sides.
- Absorb carbon dioxide and release oxygen to provide a healthy environment.
- Leaves of the trees provide food for livestock.
- Fallen leaves provide fertility to the soil.
- Fruit trees are grown for commercial purposes.
- Protect the crops from strong winds and heavy rains.
- Water logging and salinity is controlled particularly by planting eucalyptus trees, which absorb maximum amounts of sub-soil water and improve the land for healthy cultivation.
- They are planted in parks for better environment and beautification of the places to promote recreation and tourism.
- They promote employment to the people for the maintenance and protection of these plantations.
- Source of firewood, crafts and basketry.

Disadvantages

- They require a large area for a long time in order to get the trees mature enough to provide income.
- The trees are under constant threat of damage due to storms, diseases and illegal cutting.
- The land can no longer be used for other commercial purposes and quick returns.
- Money is required for the maintenance and regular care of the forests.
- Extra burden on the limited water supplies.
- Government is providing the facilities of parks and recreational areas where a variety of plants and trees are grown. So, people feel less need for investment in this field.

Productive Forests

1. Alpine forests

These forests are found at the highest altitudes of the country below the snow line. They grow mostly in the mountains of the Himalayas, Hindukush, and Karakoram between altitudes of 4000m and 4500m. These trees are conical in shape and have stunted growth. They are evergreen, contain soft wood, Deodar, Kail are few species. The trees are mostly used as firewood.

2. Coniferous forests

These trees grow over a large area in the northern mountains at an altitude between 1000m and 4000m.

These forests are mostly evergreen and contain soft wood. The trees are tall and conical in shape, with thick, leathery, needle-shaped leaves and sloping branches to prevent the accumulation of snow.

These trees provide timber for a variety of industries and crafts. They help in conserving soil, check floods, and prevent landslides. The forests offer a healthy environment for the breeding of animal and plant life. Oak, walnut, deodar, chestnut, fir, spruce, and blue pine are the main species. They provide scenic beauty and are attractive for tourism.

3. Tropical Thorn forests (Rakh)

These trees grow over vast areas from sea level to 1000m. They mostly have broad leaves and contain hardwood due to high temperatures and low rainfall. They are deciduous and shed their leaves during the dry season. Common trees include kikar, acacia, pulahi, and wild olives, which are generally of low height. The forests are dominated by xerophytic shrubs. They are primarily used for fuel wood, grazing, and watershed protection.

4. Sub-tropical Scrub forests

These forests also have the same features of small thorny bushes and trees but mostly grow on the

dry hillslopes of the western mountains, Quetta, and Kalat divisions. Due to high temperatures and low rainfall, the trees are short and broad-leafed. Pine nuts, blackberry, and poplar trees grow alongside tropical thorny bushes.

Sub-tropical Scrub forests

5. Mangroves

Mangroves grow on the tidal flats of Indus and Hub delta, where the fresh water from the rivers along with its silt mixes with the salty sea water in the coastal estuaries. The mangrove trees also need a mixture of a substantial amount of silt brought by the river to mix it with coastal marshes to survive. Mangroves grow along the coast of the Arabian Sea on the tidal mud flats, their roots spread in the salty water of the sea. They are also known as floating forests. .

The height of the trees varies from 3 to 8 meters. They have broad leaves with drip tips. Avicenna, Alba and Rhizophora are the main species. The trees have knobbly "knee roots" that project above the salty mud surface to absorb oxygen for respiration. They have a leathery texture to minimize transpiration and have a unique adaptation to live in salt water.

Mangroves

Importance of Mangrove Forests

These forests provide coastal protection against sea storms, tsunamis, and earthquakes. They are the breeding ground for small fish and shrimp, which have great local and international demand. These forests provide a unique and healthy array of plant and animal species. Coastal communities use the wood for boat making, fishing rods, baskets, and a variety of small products for fishing. The wood is also used for fuel.

Threats to Mangroves

The building of dams on the Indus River and the expansion of the irrigation system have reduced the amount of fresh water and silt to the lower course of the river. The size of the Indus delta is decreasing, affecting the healthy growth of mangroves. Due to increasing urbanisation there is expansion of seaports, oil spills from ships, development of tourist attractions on the beaches,

and the dumping of domestic and industrial waste in the sea. They are all a threat to the survival of these forests.

Sustainable Development of Mangrove for Marine life

Sustainable development of natural resources has become the dire need of the time. This is a process in which it has to be planned to use the natural resources not only for the present generation but to preserve them for the use of future generations.

The Fisheries Department of Sindh has taken various efforts to establish nurseries for the afforestation of Mangrove forests, with the help of NGOs, for the sustainability of these forests to maintain the requirement of the ecosystem and their economic importance.

Mangrove Action Project (MAP) works with the forest communities, grassroots NGOs, researchers, and local governments to conserve and restore these forests. WWF also has made a great contribution to establish nurseries for their afforestation and conservation. It has also brought awareness to the communities and increased about 8000 hectares for their sustainable use. A balance must be kept between the need for economic activities and the conservation of these forests.

Importance of Mangroves for Climate Change

Mangroves are very important for far-reaching implications for climate change mitigation and adaptation. Their ability to sequester carbon, provide coastal protection, support biodiversity, and sustain livelihoods makes them a powerful ally in the fight against climate change. Mangroves capture atmospheric carbon and store it in their roots and sediments. The intricate root system of mangrove trees traps and holds a significant amount of carbon, preventing it from being released back into the atmosphere. One of the most critical roles in fixing climate change lies in this "sequester carbon dioxide". It is estimated that mangroves sequester up to five times more carbon per hectare than terrestrial forests.

Pakistan's coastline is very vulnerable to the impact of rising sea levels and extreme weather events. Rich biodiversity supported by the mangrove ecosystem contributes to the overall resilience of the environment for the country. Preserving biodiversity is essential for safeguarding the overall stability of the ecosystem. The people of the coastal area are heavily dependent on marine resources for sustenance and livelihood. However, giving importance to carbon benefits through the implementation of mangrove conservation as part of climate change mitigation may be conflicting with socio-economic issues. Thus, legal frameworks and the participation of stakeholders, especially for local communities, are needed to bring awareness about the reduction in mangroves and restrict their activities according to the law. To harness the full potential of mangroves in fixing climate change, concrete efforts are needed to conserve and restore this precious ecosystem. Effective policies, community awareness, and international cooperation are essential for the continued existence of healthy mangroves.

Deforestation in Pakistan

Deforestation is the process of frequent cutting of trees on a large scale for commercial use or fuel wood. Other reasons for deforestation include a variety of wood-based industries, sports goods, furniture making, wood crafts, handicrafts, chipboard, veneer, and plywood. These industries are an important reason for lumbering and cutting of wood. Forests have been removed

for agriculture, the development of tourism, industrial expansion, urban development, and the building of roads and infrastructure. The livestock farming is mostly nomadic and unplanned. The farmers move with their cattle from place to place in search of water and food. The land becomes barren and susceptible to intense soil erosion. Due to the lack of availability of natural gas and other energy resources, the local people cut down wood for fuel.

Effects of Deforestation

Natural vegetation provides a green cover to the land, which protects it from degradation from many natural and human dangers. Decrease in evapotranspiration due to lack of vegetation cover disturbs the ecosystem, causing untimely rains and drought leading to climate change. This may lead to low crop yields. Deforested land is susceptible to land erosion. Rainwater moves down the slope with great speed, carrying loose soil with it as a deposition of silt in reservoirs, riverbeds, and canals, causing heavy floods. These floods are a great threat to rural and urban life, damaging infrastructure and causing loss of life. The silt is also deposited in dams and reservoirs, decreasing water storage capacity and leading to a decrease in hydroelectricity, causing load shedding. Lack of forest cover increases pollution, and the quality of air, water, and soil is degraded. Deforestation can directly lead to biodiversity loss when animal species lose their habitat; some tree species may disappear permanently. Land degradation can reduce crop production, leading to famine and a great threat to climate change.

Afforestation in Pakistan

Afforestation means the planting of trees on barren land by human resources. Re-afforestation is the planting of trees in areas that have been affected by deforestation. Pakistan is facing serious problems not only due to its small area under natural vegetation but also due to further reduction of forests of unplanned cutting. A strong awareness program is required to stop the people from unnecessary cutting.

The forest department of the government is responsible for the restriction on lumbering and planning of various afforestation programs to increase the vegetation cover of the country. The government is taking suitable measures with the help of NGOs to overcome the problems. Twice a year tree plantation campaigns are launched by providing free sapling, to be planted on the affected areas during spring and monsoon seasons. This is a regular program of the government to increase forests in the country twice a year. Due to lack of care of these saplings, the required benefits are not obtained. Trees vary in their growth rate so the replanting of trees should be immediately followed after the cutting of trees to protect the area from any future damage.

Pakistan has a semiarid climate, and after the development of an irrigation system in northern Punjab, Changa-Manga irrigated forest was planted near Lahore in 1866. It was to provide wood for railways and recreation to the nearby people. Following the success of the first irrigated forest, other irrigated forests were planted in many locations near the canals and barrages to protect the land from waterlogging and soil erosion problems. Sukkur Barrage, Kotri Barrage, Wanbachran in Thal, and Chicha watni in Sahiwal are important examples. The Rachna Doab project is a reclamation project from waterlogging and salinity, where thousands of trees are planted to reclaim the land between the Ravi and Chenab rivers.

Linear plantation is common along the roads, railways, canal, and river banks. Under the Agha Khan Rural Support Project, a successful afforestation program was launched in Baluchistan in

1995. The government also started additional tree planting on over 620 hectares.

The government has also planned urban forests, using the Miyawaki system to plant fast-growing groves of native plants and trees in clusters for the restoration of the ecosystem, planting trees through the most adaptable plant communities. This is called the potential natural vegetation. Following the method of Japanese corporations to check industrial pollution and soil erosion, the Billion Tree Tsunami project on the deforested areas of Khyber Pakhtunkhwa, has been planned to reforest the areas that have been affected by the tremendous cutting of trees for intensive logging, overgrazing, and fuel purposes.

The **Ministry of Climate Change** helps create policies and programs to protect the environment in coordination with government and non-government organisations. They have worked with territorial forest and Wildlife departments to encourage eco-tourism and community engagement for job opportunities for the positive achievements of the afforestation programs. The Ministry plans strategies and programs with regard to disaster management including environmental protection, preservation, pollution ecology, wild life, bio diversity, climate change and desertification. Pakistan is a regular member of all the international organisations of climate change. It also works as focal point for the United Nations Framework Convention on Climate Change (UNFCCC).

Impact of Natural Vegetation and Forests on Lifestyle

Natural vegetation, flora and fauna have a great influence on the lifestyle of the people of an area. This difference is very evident in Pakistan due to the difference of vegetation cover in different areas of the country. These differences also coincide with the physical features of the country.

Lifestyle of the people of Northern mountains

Northern areas of Pakistan consist of lofty mountains, big glaciers, and dense forests. This unique combination of natural resources has great influence on the life style of the people. They live in small houses with sloping roofs to keep them warm and remain safe from accumulation of snow. They have different activities in winter and summers. Due to very cold winters, people remain indoor, store sufficient amount of wood for fuel and prepare Handi crafts, wood crafts, weave woollen cloth for shawls and dresses and woollen caps, they weave carpets, make leather crafts and do embroidery on dresses for the tourists and visitors for summer season. they also practice Transhumance, migrate with their cattle to warmer areas in winter and come back to their summer pastures. During summers, they practice subsistence agriculture, grow food crops, fresh and dry fruits. During summers, due to pleasant weather and the scenic beauty, large number of national and international tourists visit these areas.

After the opening of Karakoram highway, the area has developed better infrastructure for tourism, Pakistan Tourism Development corporation of the government is continuously working for better facilities of the boarding and lodging of the tourists. Social services have increased employment ratio of the people. Most of the people are employed as hotel staff, tourist guides and tourist helpers. People are provided with better facilities of education, health care and recreation. The economic standard of the area is improving due to increasing tourism.

Lifestyle of the people of western mountains

Western Mountains have lower heights, lower rainfall (about250mm) and thin vegetation cover

with thorny bushes and broad leave deciduous trees. Sulaiman and Kirthar mountains have north-south direction. The area is rich in mineral wealth of coal, marble limestone etc. people are engaged in mining industry. Due to rugged terrain and lack of infrastructure facilities people practice nomadic livestock farming. Cement, sugar and chemical industries provide job opportunities to the people at various levels. Leather craft, marble products, carpet weaving, woollen shawls and blankets are popular small scale industries. Kuram, Tochi and Gomal are small rivers of the area which get dry during dry season. Small dams have been built to store rain water for domestic use. People are also employed in transport system. The area is famous for it truck Art. Many people migrate to other provinces for employment. People are employed in low paid jobs due to low literacy.

Life Style of the People of Baluchistan

Baluchistan Plateau has rugged terrain and scanty rainfall, mostly about 125 mm. Only a small area around Quetta is a highland area with snowfall in winter. Most of the plateau receives rainfall in winter. It has a unique irrigation system known as Karez irrigation. Due to availability of electricity, these Karez have been converted int tube wells. People mostly grow vegetables and fruits on small cultivable areas. Nomadic livestock farming is a common occupation. Juniper forests grow on the mountains around Quetta, due to climate change, the trees are in decline. Baluchistan is also blessed with variety of mineral wealth. People are engaged in mining, (important minerals are gold, copper, lead, sulphur, coal, natural gas mineral oil and manganese). Gwadar is an important upcoming international sea port on the Baluchistan coast followed by, Pasni and Ormara as fishing ports. People of the coastal area are engaged in subsistence and commercial fishing. Most of their fish is exported to Middle East countries. People of Baluchistan have variety of job opportunities according to the available natural resources of the area.

Lifestyle of the People of Indus Plain.

The Indus River and its tributaries, hold a significant importance in terms of biodiversity due to its rich and diverse ecosystem, including riverine habitats, flood plains, wetlands, marshes and estuarine areas. These diverse habitats support a rich variety of flora, and fauna adapted to different niches.

Indus plain is a vast and extensive fertile land, covering 200,000 square miles with a gentle slope from the Himalayas piedmont in the north to the Arabian sea in the south. To the northwest it is bounded by potohar plateau and salt range. The land has a long history of Indus valley civilisation. It is drained by River Indus and its eastern and western tributaries. Due to availability of reliable source of water and fertile and flat land, agriculture has remained the main occupation of the people. The region is known as the "bread basket of Pakistan". The land has a very thin natural vegetation cover consisting of mostly Acacia trees and grasses due to low rainfall. This is the land of irrigated forests and plantations for various uses. The fertile land, abundant water resources and favourable terrain have allowed for the development of agriculture, urbanisation, industrialisation, transportation, and energy generation, making Indus plain the most developed physical region of Pakistan. Indus plain mostly experiences extreme climate. People make brick houses according to their economic standards to protect them from different extreme weather calamities, for example, floods, dust storms, intense heat and cold weather according to season. The plain is marked by deserts in the east, (Cholistan, Nara and thar) The vast and properly

planned irrigation system has met the increasing needs of water for domestic, agriculture, industrial and commercial needs of the people. Some of the desert areas have also been reclaimed to grow crops. In desert areas, people make mud houses to keep them cool during intense heat.

Life style of the People of Coastal area.

Mangroves forests along the coast of Indus and Hub delta mostly provide fishing as an important occupation of the people. Making of boats, fishing nets, and fish processing is their important activities. they are involved in Fish sale, Packing and processing of fish for domestic and commercial markets. Fish meal is prepared for poultry feed. Ice factories have been setup to freeze fish packs for to maintain the freshness and quality of the product. Sindh Coast has a broad continental shelf which attracts variety of marine fish. Ibrahim Hyderi is a Whole sale fish market of Sindh. It has its own fish harbour for both commercial and subsistence fishing. Beaches along the coastal areas also provide recreational facilities to the people.

Significance of Natural Vegetation and Forests on the Environment.

Natural vegetation contributes to the environment by providing healthy and fresh air, beauty to the landscape, and habitat for plant and animal life. Forests contribute to the ecosystem, provide biodiversity, and control weather changes. They provide wood, timber, raw materials, vegetables, and fruits. They are a source of a variety of medicines and provide recreational, aesthetic, and spiritual benefits.

Pakistan has a small area under natural vegetation, and even that is under a great threat of deforestation. Forest department of the government needs to take strict measures to protect the forests. The fast-growing population of Pakistan has increasing needs for housing , food and other needs. Sustainability and conservation of natural resources are becoming inevitable to protect them for a prolonged use. Forests are one of the most precious natural resources for the environment and economy of the country. According to international standards, for the conservation of the forests, important focus should be on recycling or alternative uses of raw materials. 3Rs are introduced for focusing on "reduce, "followed by "reuse" and then recycle, in order to keep as much material out of land fill as possible, helping to combat climate change.

To avoid the use of fuelwood, gas pipelines should be extended, and more gas cylinders to be provided as an alternate use of fuel. The government is focusing on renewable sources of energy, such as solar, wind, and hydroelectricity, and raising awareness to save electricity instead of fuel wood. The use of synthetic wood, chipboard, cardboard, plastics and synthetic rubber are introduced as an alternate of wood. the treatment of solid waste should be managed more seriously by the municipal authorities of the cities to check soil degradation. More awareness programs may be introduced to involve the public to minimise waste. New technologies of research should be introduced according to international standards. Literacy ratio of the country should be increased by providing more ratio of GNP for education. This change in learning will improve the economic and social life of the people with new dimensions. This effort of the government will not only increase the employment ratio of the country but public will also be aware of better tomorrow. Intense care of mangroves for the fishing industry along the coast will bring better returns. These are a few examples to save the forests not only for better economy but also for better environment.

EXERCISE

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

1. **Coniferous trees are:**
   (a) Dry bushes (B) Deciduous,
   (c) Evergreen, (d) tall grasses
2. **Mangrove forests grow:**
   (a) On hill slopes (b) on irrigated lands,
   (b) Along the coast (d) along the river banks.
3. **Changa-Manga Forests:**
   (a) Tropical thorn forests b) Evergreen forests,
   (c) Irrigated forests (d) coastal forests.
4. **Acacia tree grows in:**
   (a) Cold climate (b) Arid climate
   (c) Humid climate, (d) semi-arid climate.
5. **Kharan desert is in:**
   (a) Punjab (b) Sindh
   (c) Khyber Pakhtunkhwa (d) Baluchistan
6. **Subtropical dry Forests grow:**
   (a) At sea level (b) below 1000 meters
   (c) above 2000 metres (d) above 3000 metres
7. **Avicennia Alba trees grow in:**
   (a) Irrigated areas (b) Northern mountains
   (c) Baluchistan (d) Coastal areas
8. **Rachna doab reclamation project is to:**
   (a) To check soil erosion (b) To check flooding,
   (c) to check water logging (d) to check drought.
9. **Mangroves are known as:**
   (a) Dry forests, (b) Irrigated forests,
   (c) floating forests (d) urban forests.
10. **Fir and spruce trees grow on:**
    (a) Northern highlands (b) irrigated lands,
    (c) Waziristan hills (d) Potwar plateau

Answer the following questions briefly:

1. Identify different types of forests of Pakistan.
2. Why are irrigated forests important for Pakistan?
3. Compare Productive and Protective forests.
4. Identify the government efforts to protect the environment.

5. Assess the importance of Mangroves for Pakistan.
6. What are the effects of deforestation?
7. Why are mangroves important for fishing?

Answer the following questions in detail:

1. Explain with reference to examples, how deforestation has affected the land and economy of the country?
2. Analyse the importance of afforestation for the economic and social needs of the people.
3. Evaluate the role of Mangrove forests in mitigating climate change.
4. Identify the need of different geographic tools and techniques to map different types of forests
5. Evaluate the impact of natural vegetation and forests on the lifestyles of the people.

Learning Activities:

(i) Use Google Earth to identify the forests and natural vegetation.
(ii) On the outline map provided, mark and label the irrigated forests.
(iii) Class presentation to discuss the importance of forests.

Divide the class in groups and assign the task:

(i) Importance of irrigated forests,
(ii) Importance of Natural forests,
(iii) A debate for both the groups for more suggestions for further development of these forests with reference to case studies.

Glossary

- **Afforestation:** Planting or adding tress in an area where there was no a tree or plantation. This is a method to create a new forest.
- **Deforestation:** The removal and destruction of a forest from an area for agriculture, animal grazing or manufacturing.
- **Irrigation Plantation:** Manmade forests mostly in the shape of blocks of tree plantation in canal irrigated tract.
- **Mangroves:** Mangroves are a group of trees and shrubs that live in the costal and intertidal zones
- **Mitigation:** The action of reducing the severity, seriousness, or painfulness of something. Reducing risk of loss from the occurrence of any undesirable event.
- **Sustainability** is our society's ability to exist and develop without depleting all the natural resources needed to live in future.

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