

GEOGRAPHY IN SHORT ...by USMAN HAMEED



Location of Pakistan:

- Pakistan is located between latitude **24** degree north to **37** degree north.
- Extends from longitude **61** degree east to **78** degree east.
- At the **north east**, Pakistan has a common border with **china**,
- In the **west** it has a long border with Afghanistan, known as **Durand line**.
- To the **North West**, Wakhan is the narrow strip of Afghan territory which separates Pakistan from Tajikistan.
- To the **south west**, Pakistan has a common border with the Islamic republic of **Iran**.
- The **Arabian Sea** marks its **southern** border.
- In the **east** it has a border with **India**.
- There are five provinces of Pakistan, namely Punjab, Sindh, KPK, Gilgit Baltistan & Baluchistan.

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- One federal capital territory, two autonomous and disputed territories, and a group of federally administered tribal areas. Pakistan has three lower tiers of government, including 34 divisions, 149 districts (zillahs), 588 sub-districts (tehsils), and several thousand union councils.

Unit 1

PAKISTAN: THE NATURAL TOPOGRAPHY

What the topography means:

Topography is the study and description of the surface features of land. Pakistan can be divided into six major natural topography areas.

- (i) The **northern mountains** and north western mountains. (Himalayas, Hindukush, the Karakorum)
- (ii) The **western mountains** (Safedkoh ranges, Waziristan hills, Suleiman range, Kirthar range)
- (iii) The **Baluchistan plateau**
- (iv) **Potwar plateau** and Salt ranges
- (v) The **Indus plain**
- (vi) **Desert** areas. (Kharan desert, Thar desert, Thal desert).

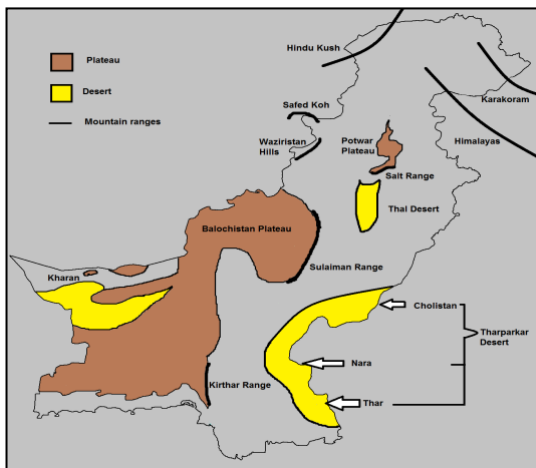


Plate Tectonic Theory:

The word 'Tectonics' comes from the Greek word 'Tekton' meaning builder. The theory suggests that the surface of the earth is made up of rigid plates of lithosphere which floats on the more mobile asthenosphere (35 km below lithosphere). The plates are in constant motion due to the movement in the asthenosphere. This Theory explains many of the major processes such as drifting of continents, mountain building, earthquakes and volcanic activities. Much of this activity occurs at the edges, or margins, of the plates.

KARAKORAM RANGE / HIMALAYA / HINDUKUSH

Relief:

- Average altitude is between 3000 to 6000 m
- Mass of **rock & ice** located
- **Rugged landscape.**
- **Snow covered peaks, valleys, gorges** (a narrow valley between hills or mountains, typically with steep rocky walls and a stream running through it), **cliff**, Ravines and **gully** (a water-worn ravine) are important features are found there.
- **Steep sided peaks** and **deep narrow valleys** are located there.
- Cold winds blow during winters and temperature falls below freezing point in winters.
- Precipitation is mainly in the form of snow fall at higher altitude and rainfall at lower altitude during winter.
- Winters are long and cold while summers are mild and short.
- **Alpine forests** are located.
- **Glaciers** here.
- **Khunjerab** & Karakoram **pass** are located in the Karakoram Range.
- Many **passes** including Khyber Pass, Lawari Pass, Shandur Pass etc. are located in Himalaya

Drainage of Karakoram Range: (how water is carried from one place to another)

- Drainage is called total run off of water.
- **River Shyok** and **river Gilgit** are the main source of drainage.
- As main **glaciers** are located in the region so the melting of **snow** gives rise to the water table.

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- As the rivers are in the upper course so the flow of rivers is very fast.
- Whatever comes in the flow of the rivers like pebbles stones etc. are carried forward and is deposited in the reservoirs in the form of **silt**
- Due to the deposition of silt the storage capacity of reservoirs is decreasing.
- **River Indus & River Chenab** is the main sources of drainage in Himalaya.
- **River Swat & river Kabul** are the main sources of drainage at Hindu Kush
- **Warsak Dam** on river Kabul is the main source of irrigation, drainage and power of generation.

Lifestyle & Economic Activities (northern mountains):

- **Nomadic** to semi nomadic lifestyle is common at higher altitude areas.
- **Animal rearing** is the main profession of the nomadic & semi nomadic people.
- **Transhumance** is practiced at higher altitude areas.
- **Agriculture** is also practiced on smaller scale.
- Warsak dam on river Kabul provides irrigation, drainage & power generation.
- **Mining** is also one of the professions (on Hindu Kush).
- Primary, secondary & tertiary industries are found here.
- Tobacco, wheat, rice & sugarcane are grown here.
- Apple, apricot, grapes, and peaches are common here.

IMPORTANCE OF THE NORTHERN MOUNTAINS:

- Historical passes connect Pakistan to China and Afghanistan. A land route through Karakoram Highway has been opened to carry out **trade**.
- Snowcapped peaks melt during summer to drain **water** into river Indus and its tributaries which irrigate vast Indus plain.
- A source of valuable **minerals, timber** and **fruits**. Provides raw material to several industries e.g. Furniture, paper, chipboard industry, chemical industries.
- Mountain peaks provide **protection** to Pakistan against the cold winds from central Asia. The temperature does not go below freezing point over the upper Indus plain & climate remains tolerable throughout the year.
- Scenic beauty promotes **tourist** resorts which are source of income to local people during summer.

Important Passes of Northern Mountains:

Karakorum 5575 Connects Kashmir with China **Khunjab** 4733 Connects N.Areas with China **Lawari** 3188 Connects Dir and Chitral **Babusar** (Himalayas) 4173 Connects N.Areas and Mansehra

1: Khyber Pass: leads to the fertile vale of Peshawar.

2: Kurram pass: a route to Afghanistan

3: Tochi pass: connects Ghazni to Bannu.

4: Gomal Pass: connects Afghanistan to Derajats

5: Bolan: connects the Kachhi Sbi Plain to Quetta.

WESTERN MOUNTAINS:

(i)SAFED KOH:

RELIEF:

- Located at the south of Kabul river
- They are called safed koh (White Mountains) because their peaks are often covered with **snow**.
- **Steep sided mountains & deep narrow valley** are located here.
- Height reaches up to 4712 meters.
- **Snowfall** at higher altitude & rainfall at lower altitude is experienced during winters.
- Winters are cold and long while summers are mild, hot & short.
- **Passes** like Kurram pass is found there which provides a route to Afghanistan.
- Cities like Peshawar, Kohat are located there.
- Alpine & coniferous **forests** are located here.

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- **Waziristan** hills are located *between River Kurram & River Gomal*.
- They reach up to a height of 3513 meters.
- These hill ranges forms a rampart between Afghanistan & Pakistan.
- **Passes** like Tochi & Gomal pass located there.
- Sulaiman Range is *located to the west of river Indus*.
- Takht-e-sulaiman at 3500 meters is the highest peak.
- Moving southward of Sulaiman Range is joined by Kirthar Range, which is later backed by the Pab range.

Drainage:

- **River Kabul & river kurram** drain these areas.
 - Warsak dam on river Kabul & **kurram dam** on river kurram are the main source of drainage, irrigation and power generation.
 - **Melting of snow** gives rises to the water table.
 - As these rivers are in the upper course so flow of the rivers is very fast.
 - **River Kurram & River Gomal** drain safed koh.
 - **Kurram Dam** on river Kurram provides irrigation, drainage & power generation at safed koh.
-
- Sulaiman Range is *located to the west of river Indus*.
 - Takht-e-sulaiman at 3500 meters is the highest peak.
 - Moving southward of Sulaiman Range is joined by Kirthar Range, which is later backed by the Pab range.
 - Lime stone and sandstone are the main minerals in this area.
-
- **Rivers Hub, Porali & Hingoli** drains sulaiman range.
 - Braided river channels drain the Suleiman range.
 - **Hub dam** on river Hub provide irrigation, drainage & power generation.

Life style & Economic Activities (western mountains):

- The WM are mostly bare of vegetation and climate & relief do not support farming.
- Canal irrigation is not impossible.
- Transportation is very limited. Except Peshawar and kohat rest of the area is not connected with air or rail.
- The cost of infrastructure is very high.
- **Nomadic to semi nomadic lifestyle** is common at higher altitude areas.
- **Animal rearing** is the main profession of the nomadic & semi nomadic people.
- Western mountains are rich in **mineral resources** like Natural Gas, Coal, Iron ore, Copper etc.
- In the winters in house **cottage industry of carpet making** & hand knotted articles become very common.

THE BALOCHSTAN PLATEAU:

- BP is located in the southwest of Pakistan with altitude from 600-3010.
- Total area is 347190 sq. KM.
- It has the following natural **topographical features**.

a) Basins of Baluchistan:

b) Mountain ranges:

Toba Kakar Range
Central Barahvi Range
Chaghai range
Ras koh range
Makran range
Siahen range

c) The Coastal areas:

Lifestyle & Economic activity:

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- **Nomadic to semi nomadic** lifestyle is common at higher altitude.
- Animal rearing is the main profession of nomadic & semi nomadic people.
- **Agriculture** is performed.
- Irrigation is obtained through the canals linked with dams & Barrages.
- Fruit orchards grow apple, apricot, peach etc. in large quantities.
- Baluchistan plateau is a **mineralized** zone & natural gas, coal, limestone, copper etc. are extracted.
- People living on coastal areas perform **fishing** & marine fishing is the main profession.
- Mangrove **forest** is the main vegetation of the coastal areas of Baluchistan Plateau.

POTWAR PLATEAU & SALT RANGE:

Location, Relief & Drainage:

- PP and the salt range are located to the south of Islamabad between the river Indus and river Jhelum
- Height of PP varies from 300 to 600 meters.
- It is generally referred to as **bad land topography**.
- It is dominated by **limestone ridges, salt, coal & oil mines & ravines**.
- Kalar- Kahar Lake & Khabaki Lake is two **salt lakes**.
- Kala- Chitta & Khairi – Murat Range are the two prominent hill ranges (1000 meters).
- **River Jhelum & River Soan** is the two main source s of drainage.
- **Mangla Dam** on River Jhelum is the main source of irrigation, drainage, & power generation.

Lifestyle & Economic Activity:

- Potwar Plateau is a **mineralized** zone & minerals like coal, rock salt &
- Limestones are found in abundance.
- **Agriculture** is practiced on very small scale.
- Attock **Oil refinery** is also located here.
- It has a high population density & contains all three types of industries.
- Rawalpindi, Jhelum & Chakwal are the important towns of Plateau.
- It is a very developed place.
- It is linked throughout the country via roads, rail & airways.

THE INDUS PLAIN:

- **The plains that are formed by River Indus & its tributaries.**
- Indus plain located **throughout most of Punjab & the central part of Sindh**.
- Northern part is known as the **upper Indus plain**.
- Five main tributaries of the Indus joined at **Panjnad**.
- River Panjnad flows 72 km before joining the Indus near **Mithankot**.
- Below Mithankot in Sindh, the Indus flow as a gigantic river till it falls into the Arabian Sea.
- This part is known as **lower Indus plain**

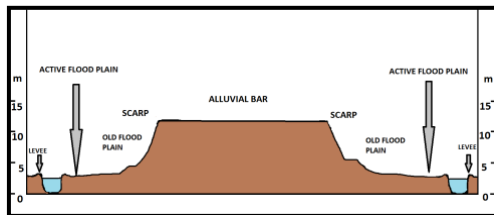
1: Active Flood Plain areas:

- **Narrow strip of land on both sides of the River** Indus & its tributaries. These plains are actively inundated.
- It is locally called as Bet or Khaddar land.
- These plains have fertile top soil formed by the annual deposition of fresh alluvium.
- These plains are annually inundated.
- Flood plain is around 40 km wide which makes it an important farming area.
- The top fertile soil is carried to infertile areas to make them fertile.
- **Meanders, oxbow lakes & levees** are the important feature of Active flood plain.

2: The old flood plain areas:

- These plains are formed by the deposition of old alluvium.
- These plains are higher in height than the active flood plains & are inundated once a decade or in heavy monsoon.
- These are among the most fertile plains in the world.

- Meanders scars, oxbow lakes, old levees are also found there. Large quantities of crops are grown there.



3: Alluvial Terraces:

- They are locally **called Bars**.
- Bars are **found in the Doab**.
- **Doab is the land between two rivers**.
- *Sindh-Sagar Doab between River Indus & River Jhelum.*
- *Chaj Doab between River Jhelum & River Chenab.*
- *Rachna Doab between River Ravi & River Chenab.*
- *Bari Doab between River Ravi & River Beas.*

4: Piedmont plains:

- PP is located at the **foot hills** of the Suleiman, Kirthar and Himalayan mountains.
- The most dominant features of the PP are the **alluvial fans**.
- They become active only during the rainy season.
- The gravel, sand and alluvium deposited by rivers form alluvial fans.
- The Suleiman PP is also known as **Derajat**.
- The PP is mainly agricultural.

5: Tidal delta:

- The Indus delta is located to the **south of Thatta**.
- A delta is often triangular or fan shaped.
- When river flows into sea, its speed is soon checked and its load of alluvium is dropped on the sea floor.
- The Indus delta has mangrove swamps.
- The coastal area is generally low and flat.

6: Cuestas: (a ridge with a gentle slope (dip) on one side and a steep slope (scarp) on the other)

- Cuestas are **the limestone ridges** (mound).
- These ridges are the small variable height features.
- Rohri Cuesta attains the height of about 80 meters & is about 40 km long.
- These limestone ridges provide a firm foundation for the construction of barrages for irrigation.
- Cuestas also provide scenic beauty and flat landscape.

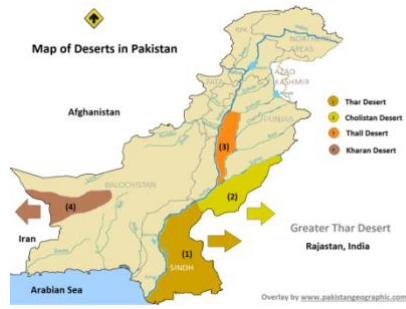
The desert areas:

- Desert areas in Pakistan are located at three places.

- (i) the Sindh Sagar Doab or **Thal desert**, located between the river Indus and river Jhelum
- (ii) The **Thar Desert** is located towards south eastern Pakistan. It can further be divided into three main regions:
 - (a) Cholistan
 - (b) Nara
 - (c) Tharparkar (thar)

- (iii) The **Kharan desert**.

- *Rolling sand dunes, weathering of rocks, lack of vegetation and bare rocks are the main features in the desert areas of Pakistan.*
- *Rainfall is scanty and the water table is extremely low.*



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IMPORTANT TERMS – **Avalanche**. A huge mass of snow that moves down the slope. **Bar**. Alluvial terrace an old flood plain fairly high to active flood plain. **Bet**. Active flood plain. **Doab / Interfluves**. Land between two rivers. **Dhand** : Small salt lake. **Khaddar**. Fresh Alluvium. **Karez**. Irrigation Method used in Baluchistan which consists of a water- tunnel or a narrow underground canal. **Landslide**. landslide is the movement of rocks and soil down the mountain slopes. **Mountain**. A raised part of the earth with a peak, steep slope attaining over 1000 meters height than a hill. **Range**. A group of mountains is called a range. **Plateau**. An area of fairly level high ground. **Plain**. A flat land with fertile soils used to grow crops. **Topography**. The arrangement of the natural and artificial features of an area. The synonyms of topography are land forms/ physical features/ physiography and configuration of earth surface. **Relief**. The specific forms of a physical feature. **Economic activities**. All activities which are carried out to produce something.

UNIT 2

CLIMATE OF PAKISTAN

Weather:

- The day to day changes in the atmosphere.

Climate:

- The change in the atmosphere that persists for long period of time, usually 30 years.

Climatic Elements:

- (a) Temperature
- (b) Atmospheric pressure
- (c) Precipitation(rainfall)
- (d) Humidity
- (e) Winds

Temperature:

- Diversity in temperature in various regions is due to the following factors
 - (i) Large spread of altitude from 24 degree north to 37 degree north.
 - (ii) Diversity of relief ranging from the every high mountain in the north to low lying coastal areas in the south.
 - (iii) High temperature in upper and lower Indus plain up to 45 degree in summer (Jacobabad is known as thermal pole).
 - (iv) Coastal areas have moderate temperature due to sea breezes.

Main sources of Rainfall in Pakistan:

- Rainfall through **Monsoon winds** (July –September)
- Rainfall through the **western depression** also called winter monsoon.(November –March)
- Rainfall through the thunderstorm also called **convectioanal** rainfall.(October –November, April –June)
- **Relief** Rainfall.
- Tropical **cyclones**

Rainfall through Monsoon Winds (July – September)

- Word monsoon means season.
- The monsoon winds causing rainfall from July to September originate from **the Bay of Bengal in the Indian Ocean**.
- After originating from the Bay of Bengal, monsoon winds start moving from east to west.
- On their way to Pakistan monsoon winds cause rainfall over Bangladesh and India and then these winds reach Pakistan.
- By the time these winds reach Pakistan most of their moisture is utilized by these two countries.

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- Only tail end of the monsoon is received by Pakistan.
- Hence the amount of rainfalls is not only little but is variable as well.
- Mean rainfall in both July and August is 125 mm; September is the end of the monsoon season.
- Northern North Western & Eastern sides of Pakistan received their summer rainfall through the monsoon winds.
- Murree, Abbottabad, Peshawar, Swat, Islamabad, Gujrat, Gujranwala, Sialkot, Lahore, Faisalabad are some of the places where monsoon rainfall is experienced.

Rainfall through the western depression (November – March)

- The winds causing rainfall during winters originate from the **Mediterranean Sea**.
- After originating from the Mediterranean Sea they move to the east.
- On their way to Pakistan the western depressions cause rainfall over Turkey, Middle East countries, Iraq, Iran Afghanistan and then Pakistan.
- Most of their moistures are utilized by these countries and Pakistan receives very little rainfall during winters.
- The amount of rainfall during winters is lower than the amount of rainfall during summer.
- The western depression causes rainfall at lower altitude and snow fall at higher altitude areas.
- Northern, North western and western side of Pakistan receive their winter rainfall through the western depression.
- Murree, Swat, Gilgit, Hunza, Mardan, Peshawar, Quetta, Ziarat etc are some of the areas those receive winter rainfall through the western depression.

Convictional Rainfall or Rainfall through Thunderstorm : (April – June, Oct-Nov)

- Unlike monsoon and western depression, convectional rainfall is experienced by the locally evaporated winds.
- Through local **evaporation & transpiration** the water molecules go up to the atmosphere and after condensation, these molecules get the form of clouds and these clouds cause rainfall at the nearby places.
- Convectional Currents are associated with the windstorm or thunderstorm and cause uprooting of trees and destruction as well.
- Convectional rainfall can be experienced at any place in Pakistan, particularly North and North western areas of Pakistan.
- Rawalpindi and Peshawar receive some rainfall in early summer caused convectional currents.
- It is not as plenty source of rainfall as monsoon or depression but it is an important source of rainfall that fills the gap.

Relief rainfall:

- RR is mainly confined to the northern mountainous areas, where there is the largest forest domination.
- Due to excessive rate of evapo transpiration more and more water molecules go up into the atmosphere and more and more water gets back to the ground in the form of rainfall.
- The windward side of the mountains receives more relief rainfall than the leeward side of the mountain.

Tropical cyclones:

- TC brings a few hours of very heavy rainfall with destructive winds to the coastal areas.
- They originate over the Arabian Sea quite often.
- This source of rainfall is totally unreliable.

Climatic Zones

- (a) **High land Zone**
- (b) **Low land Zone**
- (c) **Arid Climate**
- (d) **Coastal Climate (Maritime Climate):**

Causes of floods:

- Melting of snow during winter.
- Heavy monsoon rainfall.
- Cutting of trees on the foothills increase surface run-off.
- Failure to strengthen or heighten embankments alongside rivers.

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Benefits of floods:

- Floods return nutrients to the land.
- Floods distribute rich sediment and refresh streams.
- Floods spread a layer of alluvium which increases the fertility of the land.
- The reproduction, breeding and multiplication of inland fresh water fish and prawn species is finely tuned and adjusted to the monsoon flooding.
- Floods also recharge ground water supplies.

Drought in Pakistan:

- A prolonged shortage of water creates drought.
- Lack of rainfall results in severe water shortage which can destroy crops.
- Drought brings famine, disease and death on massive scale.

Types of drought:

- Permanent droughts
- Seasonal drought
- Invisible drought
- Unpredictable drought.

Causes of droughts in Pakistan:

- Unreliability of monsoon winds.
- Global climate.
- Deforestation
- Mismanagement of water resources.
- Disputed and unfair distribution of water.
- Overgrazing

UNIT 3

WATER RESOURCES

resources:

- Land, water, air.
- Natural resources can be described as renewable or nonrenewable resources.

(a) Renewable resources:

- RR can be recycled or reused.
- They can be used over and over again e.g. water, sunlight, wind power, tidal power, and geothermal power.
- Sustainable e.g. vegetation, soil, landscape.

(b) Nonrenewable resources:

- NRS occur in limited quantity.

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- If their use continues they will run out like fossil fuels and minerals.

Hydrological cycle:

- The water that reaches the ground from the atmosphere falls in various ways such as rain, snow or hail. This is called **precipitation**.
- Some of the water runs directly off the earth's **surface** as rivers and streams draining into lakes and the sea.
- The rest of the water is either utilized by plants or soaks into the **ground**.
- Water is returned to the atmosphere as water vapor through evaporation from surface water and by transpiration from plants.
- Rising into the atmosphere the water vapor cools to form water droplets and this system is called **condensation**.
- This cycle is called the hydrological cycle.

The Indus system:

- Indus is the largest river of Pakistan
- It is watered by the **glaciers** of the **Karakorum** and **Hindu Kush**. The source of river Indus is at the lake **Mansorowar** at Tibet China.
- After crossing the Himalayas it turns into south west and enters Pakistan.
- After leaving the mountainous region of kalabagh the river enters the plains of Punjab and Sindh.
- Finally the Indus flows into Arabian Sea.
- The total journey of the Indus from source to mouth is about 2900 km.
- On its way from source to mouth Indus is joined by some Eastern and Western tributaries.
- **Eastern** tributaries are **Jhelum, Chenab, Ravi, Beas and Sutlej**.
- Rising in the Himalayas and passing through Kashmir, the rivers enter the plains.
- The river Beas joins river Sutlej before entering into Pakistan.
- All the Eastern tributaries join at **Panjnad** and then flow for about a unified stream and join the Indus at **Mithankot** after a distance of 72 km.
- The river Indus has the highest mean monthly discharge in June and July.
- **Western** rivers are Swat, Kabul, Kurram, Tochi, Gomal, Zhob. These are smaller in length and width and have less water than the eastern tributaries.
- The Indus basin covers an area of about one million square kilometers.
- The system irrigates about **60 %** of Pakistan's cultivatable land.

Baluchistan River System:

- **Quetta** being a high altitude region has the central position in the drainage pattern of Baluchistan.
- Rivers like **Zhob, Khandar and the kalachi drain into river Indus** because they flow eastwards.
- The rivers **Loralai, Chakar, Bolan and Mula are absorbed into Kalachi Sibi Plain**.
- The rivers **Hab, Porali, Hingol and Mashkel drain into the Arabian Sea**.
- There are many small rivers that flow westward and drain into shallow depressions called Humuns.
- There are so many rivers in Baluchistan those are absorbed in the land and do not join any other water body.
- This unique pattern of drainage is called Inland Drainage. Braided river channels are the depressions those are flooded only when there is heavy rainfall and otherwise they remain dry.

Indus Waters Treaty:

- The **Indus Waters Treaty** is a water-distribution treaty between India and Pakistan, brokered by the World Bank (then the International Bank for Reconstruction and Development). The treaty was signed in Karachi on September 19, 1960 by Prime Minister of India Jawaharlal Nehru and President of Pakistan Ayub Khan.
- According to this agreement, control over the three "eastern" rivers — the Beas, the Ravi and the Sutlej — was given to India, while control over the three "western" rivers — the Indus, the Chenab and the Jhelum — to Pakistan.
- Tarbela Dam is an earth fill dam located on the Indus River in Pakistan. It is the largest earth-filled dam in the world and fifth-largest by structural volume.

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- The Mangla Dam is a multipurpose dam located on the Jhelum River in the Mirpur District of Azad Kashmir, Pakistan. It is the 7th largest dam in the world.
- Warsak Dam is a mass concrete gravity dam located on the Kabul River approximately 20 km northwest of the city of Peshawar in Khyber Pakhtunkhwa province of Pakistan.
- The Kalabagh Dam is a proposed hydroelectric dam on the Indus River at Kalabagh in the Mianwali District of Punjab Province in Pakistan. Intensely debated, if constructed the dam would have 3,600 megawatts of electricity generation capacity.
- Diemer-Bhasha Dam is a gravity dam, in the preliminary stages of construction, on the River Indus in Gilgit-Baltistan, Pakistan.
- Khanpur Dam is a dam located on the Haro River near Potowar Plateau and the village of Khanpur, Khyber Pakhtunkhwa, Pakistan, about 25 miles from Islamabad, Pakistan. And 15 km from Haripur.
- Baglihar Dam, also known as Baglihar Hydroelectric Power Project, is a run-of-the-river power project on the Chenab River in the southern Doda district of the Indian state of Kashmir.

Ground Water:

- The water available under the ground is called ground water.
- This water is brought to the ground by the method of lift irrigation by shallow **wells, tube wells** and the **Karez** system
- GW can be sweet or saline. But it cannot be saline near the sources or recharge.

Methods of irrigation:

Traditional Methods:

(i) **Shaduf:**

A large pole balanced on a crossbeam, a rope and bucket on one end and a heavy counter weight at the other. By pulling the rope it lowered the bucket into a canal or river. The operator would then raise the full bucket of water by pushing down on the counter weight.

(ii) **Well:** A well is a hole dug in the ground to obtain the subsoil water. An ordinary well is about 3-5 meters deep but deeper wells up-to 15 meters is also dug.

(iii) **Inundation canals:**
Inundated canals are long canals taken off from large rivers and it receives water when the river is high enough and especially when it is in flood.

(iv) **Charsa:**
In charsa irrigation, animal power is used to pull out water from the well. In this the small area irrigates and lots of time is waste in this system of irrigation.

(v) **Persian Wheel:**

Persian water wheel is a device used to raise water out of well or river. It is a system of a chain of buckets slung round a vertical wheel, which is turned by a system of another interlocking vertical and horizontal wheels powered by an ox or bull driven in a circle. With the passage of time the wooden wheel is replaced by metal.

(vi) **Karez:**
(An underground irrigation channel), it is an underground structure for collecting groundwater and conveying it to the surface. Such structures are in use in the mountainous and foothill areas. Water from a *karez* is used for water supply and irrigation. *Karez* tunnels can be as much as several kilometres long.

Modern methods:

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(i) Perennial canals:

- They are linked to dams and barrages to provide water throughout the year and they irrigate a vast area.

(ii) Tubewells:

- Tubewells have diesel or electrically operated pumps that can raise water from the depth of 92 meters (300 feet) to irrigate farms of more than 1000 hectares.
- Tubewells also help to lower the water table thereby protecting the land from water logging and salinity.

(iii) Sprinkler:

- Sprinklers are connected to public water supply pipes.
- They are centrally placed in fields to water the plants.
- They are used mainly in orchards and market gardening.
- It works efficiently with much less water wastage.

Uses of water:

- Major uses of water are agriculture, domestic and industrial.
- 95 % of water is used for the irrigation purposes.

(a) Domestic uses:

- Drinking
- Cooking
- Washing
- Sanitation

(b) Industrial uses:

- Pharmaceutical industry
- Tanning industry(washing, dyeing)
- Food processing (juices, syrups)
- Chemical industry (acids, liquid bleach)
- Textile industry(washing, printing)
- Mineral water industry.
- Iron and steel industry.
- Thermal power stations(to produce steam that make the turbine move)
- Hydro – electric power stations.

(c) Irrigation

- Irrigation is an artificial supply of water.
- In Pakistan 75 % of the cultivated area is under irrigation.
- By canal irrigation millions of gallons of water are utilized that would flow into the Arabian Sea.
- Canal system irrigates a vast area. Even the deserts have been made productive.
- Irregular supply of water in the rivers is then regulated by construction of dams and barrages.
- Huge quantities of water from monsoon rainfall and melting of snow can be stored in reservoirs during summer season.

Siltation in Reservoirs:

- The deposition of materials brought by the rivers in the reservoirs is called silt.
- This leads to the decrease in storage capacity of the reservoirs.

(i) Causes:

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- Abundance of silt eroded from the Karakoram, Hindukush and Himalayan mountains.
- Deforestation
- Rivers from the narrow and deep valleys in the mountainous areas. Most of the eroded material is washed down into the plains and piles in reservoirs of the dams.

(ii) Effects:

- Blockage of canals because silt accumulates.
- Weakens the foundation of dams.
- Choking of irrigation canals.
- Reduced capacity of reservoir and less flow of water affects the generation of Hydro electric power. it also results in availability of less water for irrigation purposes.
- Flow of flood water is hampered which may cause heavy damage to the dam because of mounds of silt which block the flow of water.

(iii) Control:

- Large scale afforestation especially on the foothills of the Himalayas.
- Cemented embankment of canals to make cleaning easier.
- Installation of silt trap before the water flows to the dams.
- Raising height of the dam to increase the capacity of the reservoir.

Types of Canals:

(i) Inundation Canals /seasonal canal

These canals provide water for irrigation only when there is high water table in the rivers.

(ii) Perennial Canals

These canals provide water for irrigation all year round.

(iii) unlined canals

The canals which do not have concrete or cemented embankments

(iv) lined canals

The canals having concrete embankment

Water logging and salinity:

- The condition when the water table of the ground rises is called water logging.
- When water level comes close to the ground.
- Salinity occurs when ground water rises and evaporates leaving the salt behind.
- Unlined perennial canals and the slow movements of water causes water logging and then salinity.
- This occurs when water from the unlined perennial canals penetrate into the ground causing water logging and salinity.

Solution to water logging and salinity:

(i) Installation of tube wells.

- Tubewells are installed to solve the problem of water logging and salinity.
- Boring is done 100 meters below the ground using machines.
- Tubewells use electric pumps to lift the ground water.

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- After the water is lifted, the water table of the ground goes down.
- Tubewells were used for the first time in 1953 and since then it has become the second largest source of irrigation after canal irrigation.

(ii) planting of Eucalyptus tree

- It is the tendency of eucalyptus tree to be grown in waterlogged areas.
- It absorbs and utilizes the extra water present in the soil.

(iii) Lining of canals.

- Canals are lined from the banks to avoid absorption of water through the banks.

(iv) SCARP programme.

- Water logging can be controlled by the launching of the scarp (salinity control and reclamation project)
- It was framed in 1959 in which the Indus basin was divided into 28 zones.
- WAPDA was given the responsibility to carry out the project.
- Tube wells and surface drains were used to lower the water table and flush out salt from the soil

UNIT 4

FOREST

- A large stretch of area dominated by trees is called forest.
- About 25 % of the total area should be covered with forest.
- In Pakistan forest dominate only 4-5 % of the area.

Types of Forest:

(i) Productive Forests:

- The forest which produce wood for furniture, herbs for medicines etc.
- They are thick forest; the canopy is so thick that sapling hardly receives sunlight.
- They can be natural or irrigated forests.
- They are also planted to maintain ecological balance.

(ii) Protective forest:

- These forests are planted to protect the environment.
- They are normally planted along both sides of roads, railways, rivers etc.
- The canopy is not as thick as that of production forests.
- They are mostly man made (irrigated) forests but they can be natural as well.
- Their main function is to protect the soil and to prevent it from eroding or blowing away.
- They keep the environment pleasant by lowering the temperature and providing shade.

Types of forests found in Pakistan:

(i) Alpine forests

- They are located in north and north western mountains.
- These forests are located above 4000 meters.
- They are located in snow – covered areas.
- Trees have stunted growth due to low temperature and less sunlight.

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- Roots spread sideways on the thin soil to absorb nutrition and to have better grip on the ground.
- Used as fuel wood normally.
- Leaves are directed downwards to avoid snow accumulation.
- Gilgit, Skardu, Chitral, Dir etc are some of the areas where alpine forests are found.

(ii) Coniferous Forests:

- These forests are found at the height between 1000 meters and 4000 meters.
- Due to the availability of optimum environmental conditions, they are ever green forests and rise to the height of 20- 25 meters.
- The top is cone like so these are called coniferous forests.
- Less leaves fall during autumn.
- Evergreen forests survive in low temperature.
- Sloping branches prevent snow accumulation.
- Murree, Abbotabad, Muzafarabad, Swat, Mardan, Rawalpindi, Islamabad, Quetta etc are some of the areas of coniferous forests.
- Cheerch, Deodar etc are some of the species of coniferous. Wood is used for furniture making domestic fuel, Herbs are used for medicine.
- Good breeding and conserving centers for birds and wildlife.
- Add to the scenic beauty of the area.

(iii) Subtropical Scrub Forests:

- These forests are located at the foothills of mountains and in plain areas.
- Due to the availability of optimum environmental conditions the trees grow to reasonable good height and remain green for long period of time.
- Sub tropical broad leafed and tropical thorny species.
- Shisham, Babool, Diar, Willow etc are some of the species.
- Wood is used for furniture making, sports goods, and fuel wood by the local people.
- These forests are also used for grazing purpose.
- Gujrat, Sheikhpura, Sialkot, Gujranwala, Peshawar, Kohat, Mardan are some of the places.

(iv) Tropical Thorn Forests (Rakh) :

- These are found in Punjab plains, southern and western Baluchistan and in Sindh plains.
- Due to lack of optimum conditions trees do not attain good height (6 to 10 meters) .
- Trees are mainly thorny bushes.
- Deep roots to search for water
- Wood is used as fuel wood by the locals.

(v) Riverain or Bela Forests:

- These forests are found in the Active Flood Plains of river Indus and its tributaries.
- Linear plantation along the banks of rivers.
- As the optimum environmental conditions are met so the trees grow to good height.
- Species like Eucalyptus, Poplar, Shisham, Babul etc are grown there.
- Wood from these forests is used in furniture making, sports goods making, papermaking etc.
- Areas of the upper Indus plain are located in this region.

(vi) Mangrove Forests:

- These forests are found in coastal areas of Sindh and of Baluchistan.
- The conditions required by the mangrove forest are in the coastal areas.
- They grow in salty water of the sea and require marshy soil.
- These forests do not grow to good height as their roots remain in water all the time. In better water areas, the trees rise to 6-8 meters but their general height is 3 meters.

(vii) Irrigated Forests:

- These forests were planted mainly by human.

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- These can be both productive and protective forests.
- Changa Manga Is such a forests, other locations are Chicha Watni Guddu barrages.
- The British planted these to provide fuel wood to run locomotives.
- These are planted in the linear style on both sides of roads, railways, canals etc.
- They are planted to protect environment, to protect wood for furniture, for sports goods manufacturing, solution to water logging and also use for paper making.

Deforestation:

- The removal of trees on large scale is called Deforestation.

Sustainable forestry:

- SF means that we should manage the forest resources in such a way as to ensure that we will be able to obtain the things that we want from the forests on regular basis while conserving the natural environment.

UNIT 5 **FISHING INDUSTRY**

Introduction:

- Fishing is one of the oldest occupations for people who live near lakes, rivers and the sea.
- With the progress of civilization fishing communities started breeding fish.
- This is called fish farming or aquaculture.
- In Pakistan there are many fish farms inland using man made rectangular ponds as well as using protected areas in rivers and lakes.
- Marine fishing now includes some modern developments in the processing and exporting of the catch.
- Fishing industry has a share of 0.9 % in Pakistan's GDP.
- Pakistan earns 6 % of its total foreign exchange earnings by exporting fish, shrimps and fish products.
- Fishing is the main occupation in the coastal settlements of Sindh and Baluchistan.
- The total number employed in fishing is 395000. Out of which 125000 (31.6%) are engaged in marine fishing and 270000 persons (68.4%) in inland fishing. But the marine catch is nearly three times that of the inland catch.

Fishing Areas and methods:

Marine Fishing:

- Pakistan has a coastline divided into Sindh (30%) and the Makran(70%) coasts.
- In Sindh Karachi is the main fishing centre.
- On the Makran coast fishing ports are small, often no more than villages like Sonmiani and Jiwani. Gwader is the most important fishing port on this coast.
- Gwader besides Ormara and Pasni is being developed as a fishing centre by providing improved facilities such as Ice factory, refrigeration plants and modern fish curing yards.

Types of Marine Fishing:

1: Subsistence fishing:

- In subsistence fishing fisherman and his family consume the fish they catch.
- Fish is the main component of their diet that lives on coastal areas.

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- Subsistence fishermen uses conventional techniques like the traditional net, a small wooden sail boat which does not travel far out to sea.

2: Commercial fishing;

- In commercial fishing fish is sold in the market.
- Fishing communities depend on fishing as the sole source of their income.
- 68 % of the total marine catch is at Sindh coast.
- Sindh coast is more developed because it has numerous creeks, sheltered harbors and a wide shallow sea beyond.
- It has a wider continental shelf than the Makran coast.
- The Indus delta is rich in fish food much of which is brought down to the delta by the river Indus.
- It has better export and processing facilities.
- In commercial fishing the gill netters and mechanized boats have made it possible to fish 50-60km from the coast in deep sea water.
- In Karachi the government has developed the Korangi fish harbor where storage and packing facilities are available to fisherman.

Types of Marine Catch:

- Sharks
- Drums
- Croakers
- Cat Fish
- Skates
- Rays

Inland Fishing:

- Inland fishing is practiced in almost all the rivers and lakes in the country.
- The large reservoirs behind Dams, the lakes of Sindh and irrigation channels are all utilized for fish farming.
- Dug ponds have also been made for this purpose.

Fish Farm:

- Fish farms are rectangular man made ponds for breeding of fish.
- They have a concrete or cemented impervious base to prevent water losses through leakage.
- The side of the farm is edged with solidified mud.
- Trees are planted around the fish farms to keep the water body cool.

Main Fishing Center:

- Manchar Lake in Dadu district.
- Kairi (Keenjhar) Lake north of Thatta.
- Haleji Lake west of Thatta.
- Reservoirs of Mangla and Terbela Dams.
- River Indus at Sukkar, Kotri and Thatta.

Types of inland fish:

- Manaseer
- Palla
- Thalla
- Rahu
- Trout

Fish Marketing:

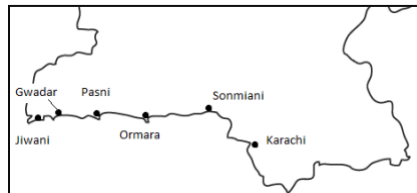
- Pakistan has a domestic and an international market for fish, shrimps and fish products.
- At the domestic level the catch from marine fisheries is supplied to the local fish markets through wholesale dealers.
- Karachi is the main fishing centre where street hawkers also buy some of the fish catch and provide a door to door service.

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- Frozen or processed fish is supplied to only a few large departmental stores in urban areas because people prefer to buy fresh fish and prawns rather than the processed ones.
- However the local demand for fish is less than its catch.
- The per capita consumption is 1.6 kg p.a, which is quite low as compared to the European countries where it is 20 kg p.a.
- About 30% of the total fish catch is exported to 30 countries of the world.
- Japan is the main market for fish and shrimps.
- USA, UK and France are other markets.
- About 80 % of the total fish catch of the Makran coast is dried for export to the Middle East.

Sustainable Fishing

- Fishing of endangered species of fish must be banned to allow stocks to recover
- Nets with certain size of holes be used to avoid by catch of smaller fish
- Illegal fishing must be stopped as they do not conform to rules and regulations. Like they catch smaller and immature fish to maximize profits, unfortunately they can't breed so stocks are destroyed
- Quotas must be set for countries in international water



UNIT 6

MINERAL RESOURCES

Formation of minerals:

- Over 3000 minerals are currently known and about 50 new discovered each year.
- Some minerals are originally formed from hot magma, which contains the minerals.
- When the magma cools crystals of minerals appear.
- Most of the minerals are formed underground when heat and pressure transform one form of rock into another.
- Decomposition of leaves, plants and bones, flesh ultimately transform into minerals but it takes million of years.
- Mostly this process of decomposition happens in oceans where thousands of species dies every day.

Mining processes:

- Mining is a process of digging rocks and minerals from the earth.
- Minerals are found at different depths.
- There are three main methods of mining.

(a) Open cast mining:

- Some minerals like coal and iron often lie near the surface.
- Open caste mining scoops up these minerals from near the surface with the help of giant excavators and power shovels.
- Which then load the material into Lorries or railway wagons to be carried away.

(b) Underground Mining:

- There are two methods by which minerals are accessed underground.

(i) Adit mining:

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- An adit is an opening or passage.
- Adit mining is done in hilly districts where a mineral seam is exposed on a hill side.
- Horizontal tunnels are dug into the side of a valley or hill to reach the mineral deposit.

(ii) **Shaft mining:**

- Vertical shafts are dug down to the minerals, especially for coal.
- This method is expensive and can be dangerous.

Metallic and Nonmetallic minerals:

- Metallic and nonmetallic are one of the mankind's most highly prized possessions.
- Many of our articles are made from metallic minerals.
- Few elements such as gold and copper occur in pure form as "metallic minerals", but most are found as "ores".
- **Ores** are compounds containing a high proportion of the metal.
- These metallic ores are cut or blasted from surrounding rock. The ore is crushed and the worthless rock removed.
- Mineral resources are non-renewable although many can be recycled and used again.

Metallic minerals are:

- Iron ore
- Copper antimony
- Chromite
- Celestine
- Manganese
- Gold
- Silver
- Tin
- Bauxite

Non Metallic minerals are:

- Coal
- Sulphur
- Rock salt
- Gypsum
- Soapstone
- Limestone
- Marble
- Clays

Organizations for mining in Pakistan:

- **Geological Survey of Pakistan**, started working in 1947.its main function was to investigate the minerals deposits.
- **Pakistan Mineral Corporation** started working in 1974.its main function was to explore and market all the minerals. The **Pakistan Mineral Development Corporation** (PMDC) is an autonomous corporation attached to the Ministry of Petroleum and Natural Resources, of the Government of Pakistan.
- **Resource Development Corporation** started working in 1974.it used to investigate and develop copper mines at Saindak, Balochistan.
- **Gemstone Corporation of Pakistan** established in 1979.its main aim was to develop gemstone resources.

Description and uses of metallic and non metallic minerals:

(i) **Rock salt:**

- Seams of rock salt vary in thickness from between 20 to 100 meters.
- The rocks are white and pink in color.
- The salt is overlain by gypsum and clay.

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- Rock salt is used for cooking and preservation purposes and for the manufacture of soda ash, caustic soda and other sodas for laundries, textiles and tanning.

(ii) Brine:

- Used in chemical and fertilizer industry.

(iii) Limestone

- Limestone is a major sedimentary deposit and is widespread in Pakistan.
- It is the main raw material for cement.
- It is also used in the manufacture of bleaching powder, glass, soap, paper, paints and lime.
- It is used to treat sugarcane waste to produce alcohol fuel.
- It is painted on barks of trees to counter pests and termite attacks.

(iv) Coal

- Pakistan has low quality coal is mainly used in brick kilns.
- Some is use to make coal.
- A small percentage is used for power generation.
- Thermal power stations are also being run by coal.

(v) Natural gas;

- Gas is being used in Domestic and industrial uses.

(vi) Gypsum:

- Found is grey, white and pink color.
- It is used in the manufacture of paints, fertilizers and pre – fabricated construction boards.
- White gypsum is used for making cement and plaster of Paris.
- Spread on saline soil to help land reclamation for farming.

(vii) Marble:

- Found in bands of white, grey, yellow and brown.
- It is used in buildings and for making chips for flooring and decorative pieces.

(viii) Clays

- China clay is used in the ceramic industry, for a special type of cement and has other industrial uses.
- Fire clays fine clay capable of enduring high temperature to make fire bricks; it is also used to make pottery and chemicals.

(ix) Magnetite

- It is used in the manufacture of cement, fertilizer, rayon, paper pulp, chemicals and pharmaceuticals.

(x) Sulphur

- Sulphur is used in chemical industries to manufacture sulphuric acid, paints, explosive materials, rayon and fertilizers.

(i) Chromite

- Chromite gives hardness and electrical resistance to steel.
- It is used for bridges and railways carriages.
- It is also used in metallurgical furnaces and for making engineering tools and stainless steel etc.

(ii) Iron ore

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- Steel making, construction and the transport industry.

(iii) **Copper**

- Making electrical wires and other electrical appliances especially switches that carry current.
- It is also used in making alloys, water pipes and tanks.

(iv) **Manganese**

- Used in making dry batteries and paints.
- It is vital alloy in steel making.

(v) **Bauxite:**

- It is used in utensils, tins, cans etc.

UNIT 7 AGRICULTURE:

What is agriculture?

- Agriculture is a **primary** industry concerned with obtaining raw material from the ground for immediate consumption or for further processing.
- All types of agriculture can be viewed as a system with **inputs, processes** and **outputs**.
- The inputs determine the type of processes on the farms. The result of what the farmer does is the output.
- The **inputs** fall into two groups.

(i) **NATURAL (Physical)**

- The factors of nature that affect the possibilities for different crops and animals .e.g. Land, Soil, climate, water.

(ii) **HUMAN (economic)**

- The involvement of the human beings through capital, machines, fertilizers, labor, knowledge, land ownership, traditions, irrigation, pesticides.

Types of farming:

(a) **Small scale subsistence farming:**

(b) **Cash Crop Farming:**

Cropping seasons in Pakistan:

- There are two cropping seasons.
- The crops that are sown at beginning of the winter season, from *October to November* and harvested in early summer from *April to May* are known as **Rabi** crops.
- The crops that are sown in summer *April to June* and harvested in early winter from *October to November* are known as **Kharif** crops. They are rice, sugar cane, millets, maize and cotton.

MAIN CROPS:

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1: wheat:

- It is a staple food used in manufacture of bread and a variety of baked products.
- Low grades of wheat and by products of the flour are used as feed for livestock.
- The canal irrigated areas of Punjab and Sindh meet most of the requirements for wheat.
- Waterlogged areas of the Indus plain are not suitable for the cultivation of wheat.
- Wheat is grown in few areas of KPK and Baluchistan.

Cultivation of wheat:

- In **Oct. – December**, after plowing the field, wheat seeds are sown directly into the ground.
- Wheat does not need a lot of water.
- Farmers irrigate the land twice, the first irrigation is done one month after sowing and the second is done one irrigation takes place one month before harvesting.
- Wheat is harvested after three months.
- **Chaff** is separated from the grain; the grain is then stored by the farmer for the use of his family or transported to the market.

Growing wheat production:

- The yield of wheat has gradually increased in Pakistan with the introduction of *new wheat varieties* and improved farming methods.
- There is improvement in the water management system to cut down water losses from the *canals* to the fields.
- Chemical *fertilizers* are becoming more widely used.
- Government is providing *loans* on easy installments to purchase tractors etc.
- But Pakistan is rarely self –sufficient in wheat because of ever increasing population and gradual decrease in cultivable area due to water logging and salinity.
- **Maxi pak** is one of the most widely used varieties sin Pakistan.

2: RICE:

- Rice is grown on a large scale for commercial purposes in Punjab and Sindh.
- In the northern hilly regions small scale subsistence rice farming is practiced.
- Rice seeds are *initially sown into beds or nurseries*.
- When the plant is about **9** inches high, it is transplanted into the prepared fields which have flooded to a depth of 30 -37 cm.
- The rice fields are kept full of water until the rice is ripe.
- Threshing of rice is either done by draft animals or by a mechanical thresher.
- After threshing, rice is taken to the rice mills for polishing and packing.
- Rice *husks* are used for making cardboard or covering roofs of houses after mixing it with mud and water.
- Use of **Irri Pak** variety has doubled the production of rice.
- Export of *basmati Rice* has increased over the years.

3: COTTON:

- Cotton the king of fiber is the most widely used textile fiber.
- Used in making cloths, furnishing fabrics, bed linen.
- It is a kharif crop.
- Cotton seeds are sown at a distance apart of 30 cm to 45 cm in April – May.
- One month later the fields are irrigated.
- A second irrigation takes place after a further two months.
- Cotton bolls ripen in the dry months of October and November.
- The plant reaches a height of up to 135cm to 150 cm.
- After picking cotton bolls are loaded onto trucks immediately and transported to ginning mill where the seeds are separated from the *lint* (fluffy mass of fibers inside the cotton boll).
- Cotton seeds are used as animal feed and for the extraction of oil.

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- Cotton lint is tied up in bales.

Varieties of cotton:

- Old varieties like Pak. Upland and Desi.
- High yielding varieties like Nayyab 78, B-557, 149 – F

4: SUGAR CANE:

- Sugar, brown sugar and Gur are made.
- Sugar cane stalks 30 cm high are planted in April to May.
- A distance of 30 cm is kept between each stalk.
- The quality and height of sugar cane depends upon proper irrigation and fertilizers (potash).
- The height reaches to 6 to 7.3 feet and the crop can be **rattooned** and so harvested for 2-3 years.
- After the sugar cane is harvested it sends up new shoots called rations and these left to grow so that they can be harvested in the following years.
- Cutting sugar cane requires manual labor.
- At the sugar mill the cane is scrubbed to remove the smell and dirt.
- After extracting the juice by crushing the cane through heavy rollers, the juice is further processed to produce white sugar.
- **Bagasse and molasses** are two major by products.

5: MAIZE:

- It's a kharif crop.
- It's a food grain as well as a raw material for edible oil production.
- It is used in the manufacture of corn flour, custard powder and other processed foods.
- It's also used as fodder for animals and poultry.

6: PULSES:

- Pulses are rich in proteins and are popular in the local diet.
- Pulses fix nitrogen in the soil therefore helping to fertilize the crop that follows.
- Pulses are considered as low value crops because the cash returns are low and consequently inputs are minimal.
- Important pulses are Mung, Mash, Grams, Masoor.

7: MILLETS:

- Jowar and bajra are two millets produced.
- They are fodder for animals, poultry.

8: OIL SEEDS:

- Oil seeds like sunflower, soya bean, rape seed, mustard, sarson, rai, linseed are used to extract edible oil.
- The production of oilseeds is not sufficient to cater for the needs of the growing population.
- 68 % edible oil is being imported.

9: TOBACCO:

LIVESTOCK FARMING IN PAKISTAN:

- Rearing animals is one of the oldest and most common occupations of Pakistan.
- **Shamilat** are the grazing fields of the villages.
- Farmers who own bullocks, cattle, buffaloes, or sheep are considered as respectable people.
- There are two types of farming, subsistence farming and commercial farming.
- There are three types of subsistence livestock farming.

(i) **Nomadic:**

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- Nomadic people in Baluchistan and the desert areas of Punjab and Sindh practice subsistence farming
- They move from place to place along with their animals in search of food and water.
- They rear sheep, goats, and camels.
- Sheep and goats provide them with food in the form of milk and meat and camels carry their loads for long distances.

(ii) Transhumance:

- Transhumance is the system of livestock farming in which the animals are kept on pastures high up in the mountains in summer and brought down to lower pastures in winter.
- This system is common in the northern and the western mountains.
- Meat, dairy products and wool are the main outputs.

(iii) Settled:

- Subsistence livestock farming is also practiced in the villages of Punjab and Sindh.
- Cows and hens are kept for milk and eggs to be continued by the family.
- Excess milk is processed to make butter or ghee.

Subsistence livestock farming as a system:

INPUTS:

- Natural grazing fields for fodder
- Water from ponds and lakes
- Open land
- Labor women and children of the family.

PROCESS:

- Natural breeding
- Feeding
- Milking manually
- Slaughtering
- Shearing wool from sheep.

OUTPUTS:

- Milk
- Meat
- Wool
- eggs

LIVESTOCK FARMING ON A COMMERCIAL FARM:

- Commercial Livestock Farming is practiced either on a small scale by private owners or on a large scale by government owned or military farms.
- Scientific methods are not necessarily to be used.
- Such dairy farms often lacking appropriate drainage or water supplies and a land use incompatible with modern hygienic city life.
- Fodder has to be brought on from the nearest crop growing area, often by heavily overloaded Lorries.
- Cattle dung is collected and dried in circular cakes plastered on any convenient wall and sold to the market to be used as manure or domestic fuel.
- There are some notable exceptions such as Australian designed dairy farms for Islamabad and Karachi, the Govt. dairy farm for Quetta etc.
- To boost livestock production scientific breeding methods and better nutritional diets are in use on many of the government farms.
- Veterinary facilities are also being provided.

Main Livestock Resources:

(i) Cattle

- Bullock
- Cow

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- Camels
- Mules

(ii) Buffaloes

- Nili bar
- Kundi
- Ravi

(iii) Sheep and goats:

(iv) Poultry

- Chicken (egg)

Factors affecting farming:

(i) Natural (physical)

- Topography
- Soil
- Water including rainfall
- Temperature
- Pests and diseases.

(ii) Human (economic)

- Irrigation
- Marketing
- Size of farm
- High yielding varieties
- Mechanization
- Fertilizers
- Plant protection programmes

How the use of chemicals affect the environment:

- Farmer adds a nitrate fertilizer to increase crop yields. it is expensive to buy.
- Pesticides also drain into river water and cause pollution.
- Nitrates in rivers encourage growth of algae and large plants. They use up oxygen.
- Fish die out due to lack of oxygen.
- Water used for domestic supply affects human health.

UNIT 8

POWER RESOURCES:

Nonrenewable energy resources:

(1) Coal:

- Coal is a very old fossil fuels
- The better types of coal have been taken several hundred million years to form
- Coal is formed by the decomposition of natural vegetation.
- There are different types of coal.
- In Pakistan bituminous to lignite types are found in limited quantity.

Types of coal:

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(a) Anthracite:

- Best quality coal
- Hardest with the highest hydrocarbon content
- Burns quietly with great heat
- It is the blackest coal of all.
- It is formed in thin layers very deep underground.

(b) Bituminous

- Steam coal
- Coking coal
- A superior black, hard coal found in highly compressed seams.
- Burns with great heat.
- Its hydrocarbon content is less than that of anthracite.
- Coking coal is burnt to produce coke
- It is also used in blast furnaces for the extraction of iron from the iron ore.
- It is often formed between lignite and anthracite

(c) Lignite

- It is found near the surface and it is easier to mine.
- It is lower quality coal with a high moisture and ash content.
- It has low heating value.

(d) Peat

- Exclusively vegetative matter and represents the initial stage of coal formation.
- Its carbon content is slow

Transportation of coal from the coal mine to the end user:

- After the extraction of coal from the coal face, it is loaded onto trolleys, which run on a track, which leads from the coalmine to the outside surface.
- In some small coalmines donkeys are used as an underground transport.
- Once the coal comes out of the mine , the qualities of coal are separated and sold to the middleman who further loads it into trucks and supplies it to the brick kilns and cement factories where it used as a fuel.
- When the coal is supplied to thermal power stations, rail transport is also used if it is economically feasible.
- **Brick kilns** use 65 % of Pakistan's coal production.

Coal as a preferred source of power in near future:

- Till the late 1990s coal was considered as the least popular energy fuel due to its poor quality and dangerous mining conditions.
 - Recently government has been considering the use of coal in the industrial sector and for power generation due to the following factors.
- (i) New reserves of coal have been discovered in recent years. It is estimated that Pakistan has 7508 million tones of proven coal reserves in 8 major fields in lower Sindh and the salt range.
- (ii) In view of the uncertainty surrounding the price of oil and the tremendous amount of foreign exchange involved in the import of oil, the authorities have considered the option of the use of indigenous coal as an alternate source of f

(2) MINERAL OIL (petroleum)

- Most important fossil fuel today
- Also known as "*black gold*".
- It occurs in porous spaces of sedimentary rocks and is derived mainly from the decomposition of marine animal and vegetation matter over several million years.

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- It can found many hundreds of meters underground or under the sea bed.
- It mainly occurs in dome shaped anticlines between two layers of non porous rocks.
- The oil is trapped in the anticline with gas above and water below.

Oil prospecting and Drilling:

- Wells are drilled to pump this liquid fuel out of the ground.
- Once the drilling site has been selected, a derrick or drilling rig is set up.
- The derrick is a large steel structure that holds the drilling pies and other equipment.

Oil refining:

- Crude oil cannot be used in its raw state.
- It has to be processed and refined into useful products such as petrol; for cars, aero planes, heating oil, kerosene, diesel oil for truck and buses.
- It is cheaper to import crude oil and refine it locally for domestic and industrial use than to import refined products.
- Crude oil production accounted for 36.15 % and import oil accounted for 63.85 %.
- Refined oil production is 33.58 % whereas import of refined oil accounted 64.42%.
- A substantial proportion of Pakistan's import bill is spent on petroleum products which is a great burden on Pakistan's foreign exchange reserves.

Oil refineries:

Pak-Arab Refinery Ltd.
National Refinery Ltd.
Byco Petroleum Pakistan Ltd. (Byco)
Pakistan Refinery Ltd. (PRL)
Enar Petroleum Refining Facility (Enar),
Indus Oil Refinery Ltd
Attock oil refinery

Uses of oil:

- Uses of by – products (wax, plastics, synthetic rubber, detergents, pharmaceutical products, furnace oil)
- Source of power (thermal electricity, for heating)
- As a lubricant for machine
- As an indispensable motor fuel (petrol, diesel, air crafts, cars, buses, rail engines)

Transportation of imported and local petroleum;

(i) transport at sea:

- Pakistan's imported petroleum is transported by sea from oil producing countries (Saudi Arabia, UAE) through oil tankers.
- At keamari port or post Qasim, the oil tanker is berthed at the designated oil pier.
- The pier is a platform with an oil handling system.
- Through the pier the ship is connected to the oil handling system.
- The oil products are pumped from the oil tanker, ship to the oil marketing companies/refineries' storage tanks at keamari and korangi.

(ii) Transport on land:

On land oil is transported in 3 ways.

- (a) by pipeline
- (b) by road tanker
- (c) by rail tanker

- Transportation by road and rail tankers is relatively costly, time consuming and inefficient as compared to transmission by pipelines.

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- Movement of these products by roads is not only dangerous for traffic but because of their weight, it can also cause extreme degradation to the existing road surface and be a danger to human lives.
- Pipeline transportation is the most efficient, convenient and cheapest mode of transportation besides being far more environmentally friendly.

PARCO's project for the transportation of oil:

- In 2002 PARCO launched a white oil pipeline project (WOPP) which is carrying refined oil from Karachi to the north.
- After conversions of PARCO's existing pipeline network for crude oil transportation, the white oil pipeline is used for the transportation of refined petroleum products to the central and northern regions of Pakistan.
- These areas account for almost 60 % of the total petroleum consumption in the country.
- Bin Qasim Port is the initial point of the white Oil Pipeline project.
- The new underground pipeline costed \$480 million and also carrying refined oil from the Pakistan oil refinery at port Qasim to Mahmood Kot in district Muzaffargarh covering a distance of 817 KM.

(3) NATURAL GAS:

- NG found in oil bearing rocks above the oil.
- These rocks have millions of tiny holes
- Above these rocks there is a layer of non- porous rocks that trap the gas underground and stop it from leaking out to the surface.
- Natural gas is made up of many gases especially methane, ethane, propane and butanes.
- Natural gas was discovered in 1952 at Sui, Baluchistan by Pakistan petroleum limited (PPL).
- This gas field is considered to be one of the largest in the world.
- When natural gas is cooled to a very low temperature it turns into a liquid.
- This liquid is called liquefied petroleum gas of LPG.
- It can be moved from place to place in special cylinders.
- In mountainous areas where there is no gas pipelines many people use LPG for heating and cooking.

Main gas fields:

- Sui, Baluchistan
- Pirkoh, Baluchistan
- Mari, Lower Sindh
- Meyal ,potwar
- Dhurnal, Potwar.

Organization to develop oil and gas resources:

- (i) Geological Survey of Pakistan (GSP) 1947
- (ii) Oil and gas development company limited (OGDCL) 1961
- (iii) Sui Northern Gas Pipeline Limited (SNGPL)

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- (iv) Sui Southern Gas Company Limited (SSGCL) 1963
- (v) Pak Arab Refinery Co. Ltd.(PARCO) 1974
- (vi) Pakistan state oil company limited (PSO) 1976
- (viii) Hydrocarbon development institute of Pakistan 1970

(4) NUCLEAR ENERGY:

- NE is power that is released from atoms.
- It is the most powerful source of energy.
- In atomic fission , energy is released when the atoms split into their constitute parts (each has a neutron, a proton, and electron)
- In atomic fusion, energy is released when atoms are fused together.
- At present nuclear power stations are based on atomic fusion.
- Pakistan is trying to utilize nuclear energy for electricity generation like other advance countries.
- The Karachi Nuclear Power Plant was commissioned in 1971 as the first nuclear power station.
- It has an installed capacity of 137 MW.
- The second Nuclear power plant, Chashma Nuclear Power Plant was constructed under a contract between the Pakistan Atomic Energy Commission and the China National Nuclear Corporation. The plant was commissioned in 1999.

(5) THERMAL ELECTRICITY:

- Electricity is a flexible form of energy that can be easily converted to heat, light or sound energy.
- Electricity that is generated by non- renewable resources like coal, gas, nuclear fuel is called "thermal electricity".
- Fossil fuels and nuclear power stations produce heat energy .this is used to turn water into steam which is then used to run turbines.

Renewable energy resources:

HYDRO ELETRIC POWER (HEP)

- HEP stations use the force of flowing water to spin the hydro-turbines.
- From a hydro turbine there is a shaft going into the generator.
- Because the water has made the hydro turbine spin rapidly this shaft spins rapidly inside a magnetic field in the generator and this generates electricity.
- The electric current is regulated by the transformer and sent through the power line at the required voltage.
- HEP is best developed in the mountainous regions where precipitation is adequate and there is a steep slope or gradient.

The locations for HEP

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- Kurramgari, Warsak , Dargai, Malakand, Tarbela, Mangla, Rasul, Shadiwal, Nandipur, Renalakurd, Chichokimalian

The location thermal power station:

- Daudkhel, Shahdara, Sahiwal, Multan, Quetta, Guddu, Sukkur, Kotri, Hyderabad

The location for nuclear power station:

- Chasma, Karachi

Profile of electricity generation:

- WAPDA and KESC are the main organizations involved in power generation, transmission and distribution of electricity.
- The Karachi nuclear power plant (KANUPP) a public sector organization and some independent private producers (IPP) are also involved in power generation.

Installed Generation Capacity:

- HEP produces 4,825 MW (41.72%)
- Thermal produces 6,741 MW (58.28%)

SOLAR POWER

- The energy of sun light, solar power is used in several ways.
- One way is to collect it in **solar cells** (photovoltaic cells).
- Solar cells can power radios and even small cars.
- **Solar furnaces** use giant mirrors to focus the sun's rays on a boiler.
- Steam from the boiler is used to make electricity.
- **Solar panels** collect heat energy from the sun.
- Pakistan has the potential for solar energy as there are 250-300 sunny days.
- Solar power is safe, pollution free, efficient and limitless.

BIO GAS:

- Bio gas is produced from animal and plant waste.
- Fermentation of cow dung gives off methane gas, which is used for cooking, heating and other purposes.
- Biogas projects are in the process of development.
- Although bio gas is a cheap source of energy, it means cow dung can no longer be used as manure.
- If this happens on a large scale it will aggravate the deficiency of a soil already lacking in organic nutrients. Moreover it will increase air pollution because methane is greenhouse gas.

Wind turbines operate on a simple principle. The **energy** in the **wind** turns two or three propeller-like blades around a rotor. The rotor is connected to the main shaft, which spins a generator to create electricity.

UNIT 9

SECONDARY AND TERTIARY INDUSTRIES:

Secondary Industries:

- SI is concerned with changing raw material from the primary sector or secondary products, to form a semi- finished or finished product.
- It is regarded as a system with **inputs, process** (smelting, weaving, spinning, dyeing, printing, knitting ,molding) and **outputs** (cement, cotton yarn, ghee, lime , sugar, wheat flour, soft drinks, packets often, tinned fruit, bottles, cotton cloth, nuts and bolts, steel sheets, wire , electric motors, wheel hubs, drugs, fans, garments, motor cycles, factories, office blocks, hospitals and school etc).
- The inputs can be grouped into:
 - (i) **Capital:** the finance to establish and manage the factories.
 - (ii) **Enterprise:** business skills needed to develop ideas for products to manufacture and market them in a successful way.
 - (iii) **Land:** the actual place where the industry is located.
 - (iv) **Raw material:** every industry uses power. Some like smelting have high power consumption whilst others, like stitching, have much less.
 - (v) **Labor:** the number, skills and other characteristics of the work force.

Factors for industrial Location:

- **Physical:** Natural routes, Site requirements
- **Human:** raw material, access to market, capital, government policies, skilled labor, industrial linkages, power supply.

Principal factory industries in Pakistan:

- (i) **Cotton textile industrial:**
 - CTI is the largest industry in Pakistan.
 - It provides employment to 50 % of the industrial labor force.
 - Karachi, Hyderabad and Faisalabad are the main centers of the CTI.
 - Raw cotton, cotton yarn, cotton cloth, ready made garments are all exported to many countries as well as being consumed domestically

Importance of cotton textiles for Pakistan:

- The textile industry is the largest and the most important sector of the economy.
- It comprises cotton yarn, cotton fabrics and finished goods like towels, hosiery, knitwear and ready made garments.
- It possesses nearly 60 % of total export.
- It contributes 7 % of the GDP.

- (ii) **Sugar industry:**

- Sugar is mainly made from sugar cane.
- Sugar mills are located in Punjab, NWFP, and Sindh. Balochistan does not have any sugar mills.
- Sugar mills have to be located near the sugar cane fields because
 - (a) Sugar cane starts losing its sugar content as soon as it is harvested. It needs to be crushed immediately.
 - (b) Sugar cane is bulky and heavy and so it is expensive to transport.

- Uses of the **by products** of the sugar industry:

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- (a) **Bagasse:** can be used as fuel in sugar mills. used to make chipboard, paper and animal feed.
(b) **Molasses:** used to manufacture various types of acids in the chemical industry.

(iii) **Fertilizer industry:**

- Chemical fertilizers have considerably increased since the green revolution in the 1960s.
- Fertilizers are very important for increasing agricultural production.
- Various raw materials e.g sulphur, phosphate, gypsum are used to make different types of fertilizers.
- Natural gas has become the main raw material.
- Faisalabad and Daud Khel in Punjab, Haripur in NWFP and Dharki in Upper Sindh are the main locations.
- Nitrogenous fertilizer is most commonly used (92%) because the soils are deficient in inorganic matter.
- The Pak Arab Fertilizer Factory at Multan started production in 1979.

(iv) **Cement Industry:**

- There are many favorable factors for the development of cement industries locally.
 - (i) availability of raw material (limestone and gypsum)
 - (ii) Good domestic market with high demand from the construction industry.
 - (iii) Natural gas is used as a cheap fuel.

All Pakistan cement making association (APCMA) is the apex body of the cement manufacturers of Pakistan. It is registered body under section 3 of the Trade Organization Ordinance 2007 wide license no 14, dated April 26, 2008 issued by Ministry of Commence. It was incorporated on 14th of September 1992 under section 32 of the Companies Ordinance 1984.

(v) **Steel Industry:**

- The establishment of steel industry is considered to be a milestone on the road to industrialization.
- **Pakistan steel mill corporation** with technical and financial assistance from USSR was established on December 30, 1973 at Pipri (40km east Karachi on Ghara creek near port Qasim)
- Pakistan steel provides raw materials to the engineering and construction industries.
- These industries depend on Pakistan steel's products (coke, pig iron/hot metal, rolled and cast billets, galvanized products and raw steel) and by products as inputs.
- The **Heavy Mechanical Complex Ltd (HMC)** was established at Texila in 1979 with Chinese assistance.
- HMC is helpful in manufacturing of industrial plants and machinery.
- The Heavy Forge Factory (HFF) at this complex has also provided crucial for Pakistan's defense production needs.
- HMC is also manufacturing equipment for hydroelectric power plants, thermal power plants, oil and gas processing plants and chemical plants.
- Boilers, cranes, construction machinery, material handling equipment, steel structures and railway equipment are some of the other products besides sugar mill machinery.

Industrialization and the private sector in the early years:

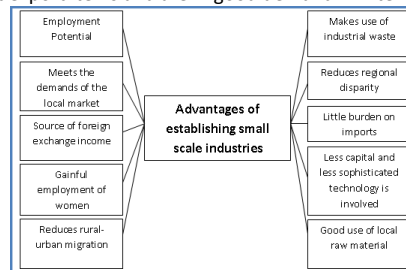
- After 1947 the private sector was reluctant to invest in capital intensive industries.
- The Pakistan Industrial Development Corporation (PIDC) established to invest in industries (fertilizers, textiles, cement, chemicals, sugar, paperboard) in which the private sector was reluctant.
- Later PIDC transferred some of their projects to the private sector when the risk was reduced.
- This encouraged the private sector and stimulated industrial activity during the 1960s.
- During 60s, the country became self-sufficient in most of the agro-based industries. This period is known as the Era of "Industrialization".

Cottage / Craft small – scale industries in Pakistan:

- Cottage or household industries hold an important position in the rural set up.
- Most villages are self-sufficient in the basic necessities of life.
- They have their own carpenters, blacksmiths, potters, craftsmen and cotton weavers.
- Many families depend on cottage industries for their income.
- CI has also gained immense importance in cities and towns.

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- There is great demand for hand woven carpets, embroidered work, brassware, rugs and traditional bangles.
- These are also considered important export items and are in good demand in international markets.



Government policy towards small scale and cottage industries:

- Pakistan's small scale corporation
- Punjab small industries corporation
- Sindh small industries corporations
- The small industries development board KPK
- The directorate of small industries Balochistan

How does industrial pollution affect people?

- Serious health hazardous in the form of various diseases
- Containment of sub soil water affects food crop and supplies of drinking water from wells
- Dumping of industrial waste causes land pollution
- Industrial wastewater is harmful for the irrigation of crops including food crops
- Threat to marine life
- Threat to mangroves –reduction in fish production
- Seaport pollution due to nearby industries
- Creating noise pollution

TERTIARY INDUSTRY:

- TI is concerned with providing a service and is sometime known as a service industry.
- It can be divided into a number of different groups such as public administration, transport, defense and tourism.

Tourism:

- Tourism means the whole business of providing accommodations and recreation facilities for those people who are traveling and visiting or staying in a place for a relatively limited period of time.
- The purpose for the visit or stay is primarily for pleasure.
- Recently tourism has the world's fastest growing industry.
- It has become an important factor in the economy of most developed countries as one of the possible ways to obtain income and create jobs.
- In Pakistan domestic and foreign tourism is small scale at present.
- Except for a small group of dedicated mountaineers, mainly foreigners, very few people visit Pakistan.

International visitors to Pakistan:

- There are three main groups
 - (a) visitors on business
 - (b) people visiting families
 - (c) tourists

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The natural attractions of Pakistan:

- Northern areas
- Kaghan valley
- Swat valley
- Gilgit valley
- Skardu
- Hunza valley
- Chitral

Cultural attractions in Pakistan;

- Archaeological sites (moen-jo-daro, harappa, taxila)
- Historic sites (Khyber pass, badshahi mosque, muhabat khan in Peshawar, Shalimar gardens Lahore, allama iqbal's tomb)
- Modern buildings (faisal mosque, parliament building and presidential palace mausoleum of quaid, minaret pakistandams and barrages)
- Salt mines
- Traditional bazaars

UNIT 10

TRADE

What is trade?

- No country in the world is self-sufficient in all the commodities needed by its people.
- To provide goods and services an exchange needs to be done.
- This exchange of goods and services between different areas is called trade.

How do we benefit from trade?

- Specialization of production
- Promotes industrialization
- May lead to rise GNP
- Production of value added goods
- Transfer of information technology
- Creation of employment opportunities

Exports and Imports:

- Every country needs to trade in order to survive.
- Each year we sell millions of rupees worth of goods and services to other countries, these are **exports**.
- An export is represented by a flow of foreign exchange coming into the country.
- At the same time we also buy millions of rupees worth of goods and services from other countries, these goods are **imports**.
- An import is represented by flow of foreign exchange leaving Pakistan.

Imports of Pakistan:

- Wheat, edible oil, sugar, pulses etc.

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- Machinery e.g textile, electrical, construction, mining and agricultural.
- Petroleum and petroleum products
- Textile e.g synthetic fibres
- Fertilizers and other chemicals
- Metals e.g iron and steel

Major exports:

- Cotton products 58.4 %
- Leather 6.1 %
- Synthetic textile 1.2 %
- Rice 6.9 %
- Sports goods 1.9 %
- Others 25.5 %

The balance of payments position:

- Balance of payments = value of exports – value of imports
- Pakistan has always had a negative balance of payment because the value of its imports exceeds that of its exports.

Measures to correct the negative balance of payments:

- By increasing exports
- By restricting imports
- By curtailing imports related to the tertiary sector

Export processing zones:

- Export processing zones contain industrial units which manufacture the products with export potential.
- EPZ authority, Pakistan was established in 1980 with the mandate to plan, develop and operate Export Processing Zones in Pakistan.

- 1) Karachi Export Processing Zone (KEPZ)
- 2) Sialkot Export Processing Zone
- 3) Gujranwala Export Processing Zone

Infrastructure required for the EPZs:

- EPZs should be established near the seaport to facilitate export and import of goods and the import of the required machinery.
- Consistent Government policies help to bring stability in the investment climate of a country thus attracting more local and foreign investors.
- Adequate air travel facilities should be available.
- Adequate transport facilities for the marketing of finished goods.
- Efficient transport links to raw material sources.

Strategic geographical situation of Gwadar:

- Gwadar's location between Karachi and UAE on the one hand, and on the door step of the central Asian States (CAS) on the other, could be suitable for EPZs due to a number of factors.
 - (i) Foreign investment along with Hi Tech for EPZs could be attracted to Gwadar and Ormara being port cities with access and exposure to the CAS.
 - (ii) The port of Gwadar can serve as "regional trade hub" with the recent geo political developments in the region such as rehabilitation and development of Afghanistan and the CAS.
 - (iii) The deep water port and export processing zone can be developed simultaneously.

Functions of Export Promotion Bureau:

- EPB was formed by the government of Pakistan for organizing and regulating export activities. its functions includes:
 - (i) Creating awareness among the manufacturing service sector about potential exports.

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- (ii) Exploring and identifying market opportunities abroad.
- (iii) Assisting Pakistan's entrepreneurs to secure entries in the international market.

World trade organization:

- WTO is an international institution to allow free trade between its members countries by reducing or abolishing certain restrictions imposed by the governments of these countries on their exports and imports.
- It came into being in 1995.
- It is the successor to the General Agreement on Tariffs and Trade (GATT) established in the wake of the 2nd world war in January 1948 to boost trade liberalization.
- After joining the WTO, Pakistan's accessibility into international markets would be on the basis of its competitiveness.

Trade development Authority of Pakistan:

- TDAP has formally replaced the export promotion bureau which has been responsible for the export promotion for Pakistan for the last 43 years.
- TDAP will be under the administrative control of the ministry of commerce in order to ensure that the TDAP's policies are in line with the overall policies of the federal government.

UNIT 11

TRANSPORT AND COMMUNICATION

- The development of transport system provides a sound base for the socio economic growth of a country.
- With a growing population and expansion in agriculture and industry, the demand for efficient transport has increased over the years.
- There are four major means of transport in Pakistan
 - (i) Rail
 - (ii) Road
 - (iii) Air
 - (iv) Water

(1) Pakistan railways:

- The network of PR extends to 8775 km of track with about 900 stations & 54 train halts.
- It stretches from Karachi to Peshawar & from Peshawar to Dargai.
- A branch of railway extends its way from Sukkur to Sibi & on to Quetta.
- From Quetta one branch terminates at Chaman and the other goes to Zahidan in Iran.
- There is a dense railway network in Punjab and Sindh.

Gauge system of PR:

- PR has a multi gauge system.
 - (i) broad gauge (5 feet 3 inches wide)
 - (ii) metre gauge (3 feet 3 inches wide)
 - (iii) narrow gauge (2 feet 6 inches)

Causes for PR deterioration:

- lack of investment
- worn out rails & sleepers
- operational inefficiencies
- overstaffing & corruption
- uneconomic stations
- a poor reservation system
- absence of dual line

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- 65 % rails, 55 % sleepers, 60 % diesel locomotives and 100 % steam & electric locomotive are outdated.
- Track increased from 8570 km to 8775 km from 1960 to 2000.

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- Track increased from 8570 km to 8775 km from 1960 to 2000.

Developments in PR:

- Replacement of steam engines with diesel engine
- Introduction of faster trains from Karachi to Lahore
- Electric traction on 289 m from Lahore to Khanewal.
- Establishment of repair workshop (Moghalpura)
- Construction of Karachi Circular Railway
- Construction of railway track to Gwadar.
- Computerized ticketing system

Karakorum express:

- Major development by PR was the launching of a new Chinese made train in 2002.
- 200 \$ financed by Exim bank, met 88 % of total financial requirements.
- It has 14 coaches with 9 compartments & 6 berths, which are air conditioned.

(2) Dry ports:

- Some inland cities which are far from the seaports have established dry ports to promote foreign goods.
- It also speeds up export & import procedures.
- At present there are 9 dry ports

At present, there are six dry ports running under the management of Pakistan Railways:

- Lahore Dry Port Established in 1973
- Karachi Dry Port Established in 1974
- Quetta Dry Port Established in 1984
- Peshawar Dry Port Established in 1986
- Multan Dry Port Established in 1988
- Rawalpindi Dry Port Established in 1990

Aims of establishing dry ports:

- To reduce the workload at Karachi port & port Qasim in order to speed up the checking and clearance of cargo.
- To help govt. in the smooth collection of revenue.
- To provide hassle-free transportation of cargo from their production point to the sea port directly.
- To stimulate foreign trade activities in those cities which are far way from the sea port.

Requirements for the dry ports:

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- Highly efficient rail transport with a container service to carry bulk cargo.
- Efficient managerial staff.
- Huge storage sheds & open areas.
- Refrigeration facilities for perishable items.

(3) Roads:

- Road transport carries 82 % of the total passenger traffic & 54 % of the total freight in the country.
- Total network is 181836 km, 118194 km are metalled & 63642 non metalled,
- Little development in KPK & Baluchistan.
- The National highway authority is responsible for the construction and maintenance of all national highways.

Principle roads of Pakistan:

(1) The N5

N5 stretches for 1260 km from Karachi through Lahore and Peshawar to Turkham. It changes name at Lahore.

(a) The National highway:

- 1 The N5 is called the national highway from Karachi to Lahore.
- 2 It passes through Hyderabad, Sukkur, Bahawalpur and Multan.

(b) the Grand trunk road:

- 1 From Lahore to Peshawar the N5 is called GTR.
- 2 Built by Sher Shah Suri. Linking Kabul, Peshawar, Rawalpindi, Lahore, Delhi and Bengal.
- 3 Its total network is 181836 km.

(2) The Indus Highway:

The **Indus Highway**, also known by its technical designation **N-55**, is a 1,264 km long four-lane highway that runs along the Indus River in Pakistan connecting the port city of Karachi with the north western city of Peshawar via D.G.Khan. It is part of Pakistan's National Highways network and is maintained and operated by Pakistan's National Highway Authority. The Indus Highway passes through the Kohat Tunnel.

In 1980, the Indus Highway was proposed to provide an alternative and shorter route to the heavily used N-5 and to also aid the development of western Sindh province and eastern Khyber Pakhtunkhwa province. Construction began in 1981 from Karachi and was completed in 1985 in Peshawar.

(3) the RCD highway:

- connects Karachi to Quetta over 600 km away
- After passing through Lasbela, Khuzdar, Quetta, Nushki and Nok Khundi in Pakistan, it then leads to Iran & Turkey.

(4) Lahore – Quetta

(5) Sukkur-Quetta

(6) Karakoram Highway

The **Karakoram Highway (KKH)** is the highest paved international road in the world. It connects China and Pakistan across the Karakoram mountain range, through the Khunjerab Pass, at an elevation of 4,693 metres (15,397 ft). It connects China's Xinjiang region with Pakistan's Gilgit-Baltistan and Khyber Pakhtunkhwa regions and serves as a popular tourist attraction. Due to its high elevation and the difficult conditions in which it was constructed, it is sometimes referred to as the "Eighth Wonder of the World."

The Karakoram Highway is known informally as the **KKH** and — within Pakistan — officially as the **N-35**; within China, officially as **China National Highway 314 (G314)**. It is also a part of the Asian Highway AH4.

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(7) **Makran Coastal Highway** is a 653 km-long coastal highway along Pakistan's Arabian Sea coastline. It is a part of Pakistan's National Highways network. It runs primarily through Balochistan province between Karachi and Gwadar, passing near the port towns of Ormara and Pasni. The official and technical designation of the Makran Coastal Highway is **N10**, which is the abbreviation for **National Highway 10**.

(8) The **Motorways of Pakistan** are a network of multiple-lane, high-speed, limited-access or controlled-access highways in Pakistan, which are owned, maintained and operated federally by Pakistan's National Highway Authority.

Why Need Motorways:

- Quicker and faster mode of transport
- Industrial estates to be established close to highway
- Promote industrial growth
- Employments opportunities
- The motorways can be connected to Afghanistan and central Asian States to provide all year round sea access to landlocked countries

(4) Air Transport:

HISTORY:

- In 1947, orient Airways , a small air company operated in Pakistan.
- By 1949 , Pakistan Airways , Orient Airways & Crescent Airways were operating in Pakistan.
- PIA was established in 1955 to provide safe & efficient national & international airways.
- Some private airlines like Aero Asia , Shaheen & Air Blue are operating in Pakistan.

Development of Air Transport:

- Faster means of communication
- Rise in general living of standard.
- Air transport can be accessed through the mountains while roads and railways mainly operate in plains.
- Large numbers of people have now settled in Middle East, Far East, European Countries and America.
- The world has turned into a Global village due to improvement in Communication as more and more people opt for air transport.
- Karachi is an important air transit air route to and from Europe and East – Asia and vice versa.
- Frequent visits of diplomats and foreign delegations.
- Faster movement of perishable items

(5) Water Transport

- WT in Pakistan developed only for international transport as no intercity water transport is available
- Kemari port and Mohammad Bin Qasim are two important ports of Karachi.

Kemari Port:

- It is deep sea port
- It has larger coaches
- Flyover & overhead etc. are being developed to ease out traffic problems.
- Extension in the facilities to handle cargo.
- Provision of navigational aids & radars.
- Expansion in the storage & refrigeration facilities.
- Environment protection equipment to keep sea water clean.

Port Qasim:

- It is located at about 20 km South East of Karachi at the Gharo Creek.
- It is also deep sea port and was built in 1980.

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- It has modern facilities to handle raw material for Pakistan steel.
- It is integrated multipurpose deep sea port and the industrial zone.
- It is spread over 12,000 acres of land.

Pakistan National Shipping Corporation (PNSC)

- It was established in 1979 to develop the maritime shipping industries.
- Its objective are to serve as an operational links between major trading partners
- To maintain influence on the freight rate
- To save foreign exchange

Gwader Port:

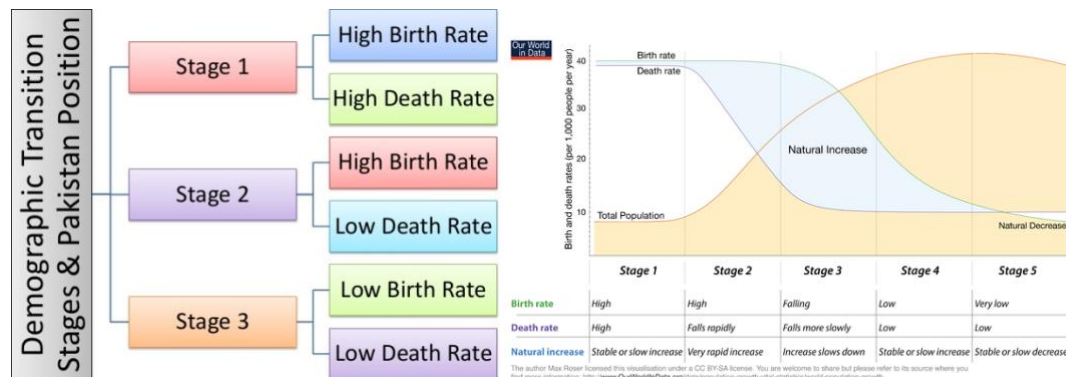
- It is located on the Makran coast in Baluchistan.
- Gwader could be a support port for bin qasim and Kamari.
- It can provide a short way to central Asian States
- Central Asian States can open their warehouses at Gwader.
- The total area would be 2500 acres.
- The idea was initiated in 1993 but in 2001, Pakistan sign an agreement with China so that the plan could go ahead.

Future Prospects of Gwader:

- Baluchistan, being the largest province has to be provided with its own fully developed sea port.
- Support port to bin Qasim & Kamari
- It can help industries to be set up in the region.

Unit 12 POPULATION

Demographic Transition Model:



Population:

- The number of people living in an area at a particular time.

Overpopulation:

- When the population of a country couldn't generate its resources according to their need, this situation is called overpopulation.

Birth Rate:

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- No. of babies/infant born per thousand or per hundred in one year.

Death rate:

- No. of people dying per thousand or per hundred in one year.

Growth rate:

- Birth rate-death rate.

Life expectancy:

- No. of years a person is supposed to live unless killed by an unnatural way (calamity, murder & accidents etc.)

'Sustainable population growth':

- Population size that can be supported by available resources

Population density:

- No. of people living per square area
- $200000000/796096=251$ people/km

Causes of High Population Growth rate:

Early marriages:

- About 60 % the population lives in villages where an early marriage takes place more frequently.

Religious Controversies:

- Allah is undoubtedly the sole provider so the people think that he would nourish all the souls.

opposition to contraceptives

wish to have son

illiteracy

refugees (afghan)

frequent changes in government hinders population welfare programmes

children are employed as labour force in the farms and in the cottage industry

Larger families are preferred in villages to be employed in agricultural fields.

Solution to high population:

educating the people

Convincing the people about use of contraceptives

Convincing the ulemas to give fatwas about the population planning

Improving the role of NGOs and other organization.

Delayed marriages

Educating the women.

Migration:

- The process of moving from one place to another with intent of staying at the destination, permanently or for a long period of time.

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- The **difference between** “immigrate” and “emigrate” is that “immigrating” is the act of entering a foreign country to live while “emigrating” is the act of leaving a country to live in another.
- Migration can be done by **push factor** or **pull factor**.

One of the factors affecting population growth is international migration. In recent years Pakistan has experienced more emigration than immigration. Explain the advantages and disadvantages of international emigration for the people of Pakistan.

Advantages

Can earn higher income / better/prospects/Remittances sent home/Jobs for educated eg. doctors, engineers, university lecturer/Jobs for construction in Middle East / domestic, restaurants, shops /Better living condition eg. Housing, electricity, sanitation etc./Social benefits eg. Education, healthcare etc./Religious freedom /Better food

Disadvantages

Loss of educated workers eg. doctors, teachers/Qualifications may not be accepted / language/problems/High cost of living abroad/Prejudice eg. Thought to be extremist/Too many people there already/Need for permits eg. to enter country, work permit/Exploited by traffickers / poor working and living conditions etc./Homesick / different culture etc

Rural Push Factor:

- Lack of study opportunities
- Lack of job opportunities
- Social discrimination
- Less medical facilities
- Religious discrimination lawlessness
- Lack of infrastructure
- Political instability

Urban Pull Factor:

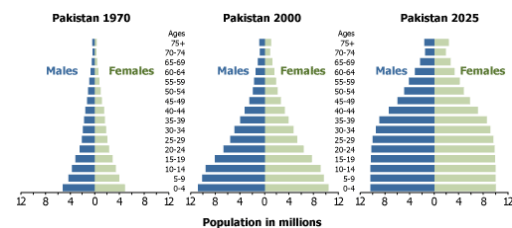
- Study opportunities
- More jobs opportunities
- More or less social equality
- More medical facilities
- Less religious discrimination
- Law is properly followed and obeyed
- More infrastructure

Population structure

Population structure means the 'make up' or composition of a **population**. Looking at the **population structure** of a place shows how the **population** is divided up between males and females of different age groups. **Population structure** is usually shown using a **population pyramid**.

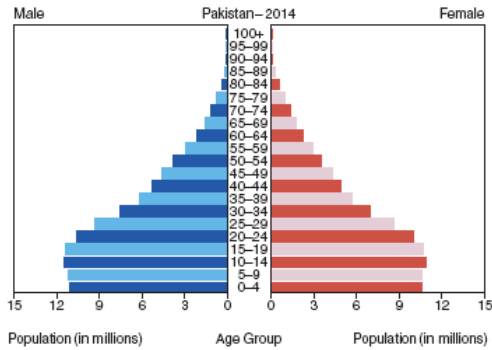
Population Pyramid

A population pyramid illustrates the age structure of a country's population. The population is distributed along the horizontal axis, with males shown on the left and females on the right. The male and female populations are broken down into 5-year age groups represented as horizontal bars along the vertical axis, with the youngest age groups at the bottom and the oldest at the top. The shape of the population pyramid gradually evolves over time based on fertility, mortality, and international migration trends.



Study Fig. 2 (Insert) which shows two population pyramids for Pakistan.

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- (i) What information is displayed in a Population pyramid?
- (ii) Identify **two** ways in which Pakistan's population structure is forecast to change between 2014 and 2040.
- (ii) Give **one** possible reason for **each** change identified in (ii).

