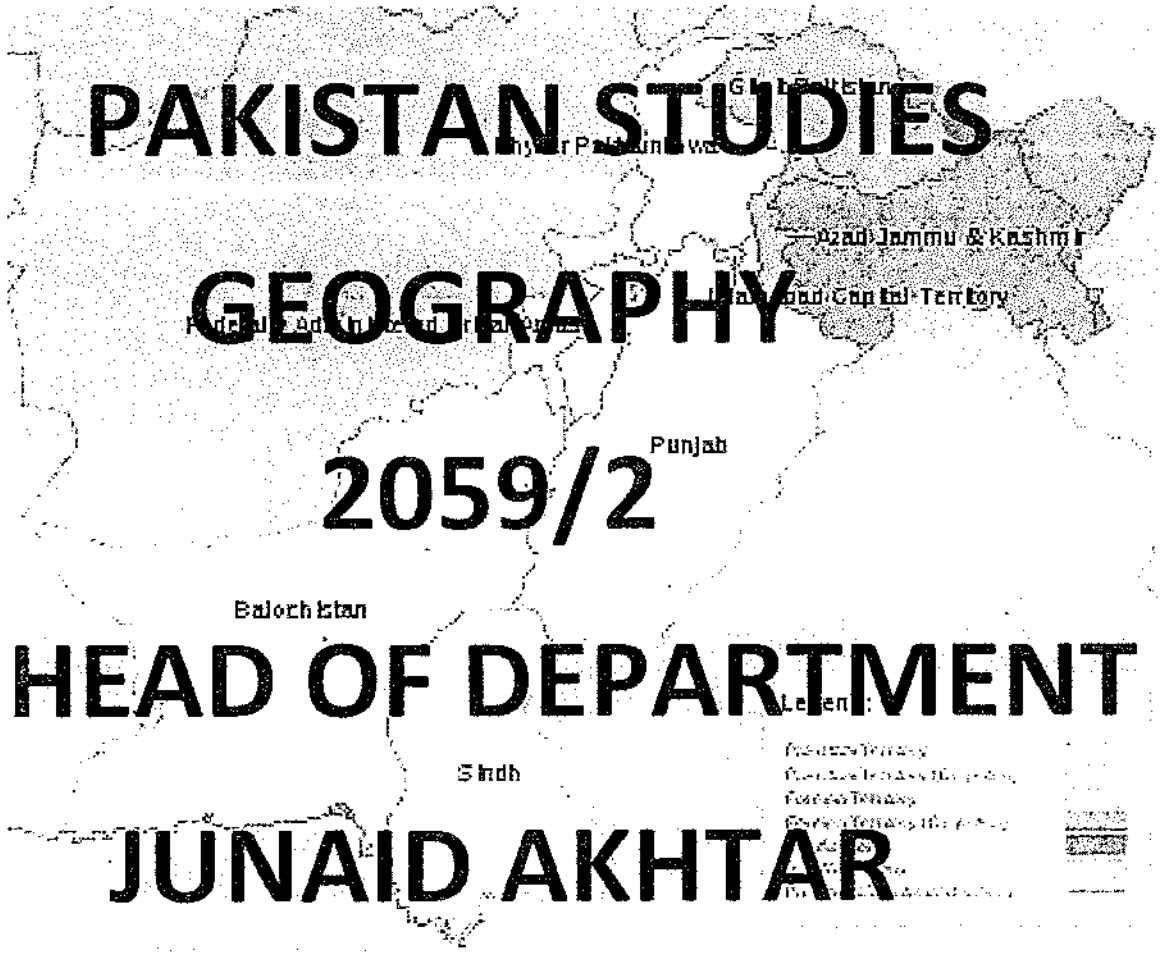
Saniya Shahzad

O'LEVEL 2

PAKISTAN STUDIES

GEOGRAPHY

2059/2



HEAD OF DEPARTMENT

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FORESTS

BASIC DEFINITIONS:

FOREST: An extensive area covered by trees is called a forest. The desired level of forests is between 20-30% of the whole area of the country. Pakistan has only 5% of area covered with forests.
CANOPY: When the branches of trees merge or try to merge to give shade in the areas under them.
HUMUS: When the leaves & branches of the trees fall down, they decompose & mix with soil.
AFORESTATION: Planting of the trees in a new area which was never planted in the past ever.
REAFFORESTATION: Planting of the trees in a deforested area.
TREE LINE: The area without soil cover or high altitude area which does not support trees to grow.
SNOW LINE: The area where snow does not melt throughout the year around (4500m+)
FUEL WOOD: Low quality wood used as fuel.
TIMBER: High quality wood used in furniture & other industries.
RANGE LAND: Land which is neither forested nor under cultivation.
WATER SHED: The area which acts as a dividing line between two river systems.
EVER GREEN: The plants without leaves falling even in autumn.

	Productive forests	Protective forests
1.	They provide wood or timber for various industries	They are for scenic beauty
2.	They are large scale forests	They are small-scale forests
3.	We get fruits in large quantities	We get food in small quantity
4.	Canopy would be closed	Canopy would be open
5.	Provide natural habitat for animals	Provide less natural habitat for animals
6.	They give rise to tourism	Do not give rise to tourism
7.	They also prevent soil erosion	They prevent soil erosion

Importance or advantages of Forests

- Provide timber and wood for various industries
- Prevent soil erosion
- Provide shelter and natural habitat to wildlife
- Increase scenic beauty which gives rise to tourism
- Clean the environment
- Regulate water supply
- Control floods
- Provide recreational activities
- Provide employment to many people
- Provide food to people and wildlife
- Increase evaporation which gives rise to rainfall.
- More Humus formation increases the soil fertility.
- Provide various types of fruits
- Provide herbs for medicines

DISADVANTAGES OF FORESTS:

Trees cover the space where nothing can be done.
Trees catch fire which can destroy life & property.
Trees provide shelter to wild beasts which can harm the human beings.
Trees & their roots can destroy or damage the property.
Trees cause heaps of leaves during autumn.

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FOREST TYPES:

TYPES	AREAS	DESCRIPTION	USES
ALPINE	N-AREAS DIR CHITRAL KOHISTAN	• STUNTEDGROWTH DUE TO LOW TEMP. • SLOPY BRANCHES. • NEEDLE-SHAPED LEAVES	FUEL WOOD MOSTLY.
CONIFEROUS (Oak,maple)	FATA (N-AREAS) FANA (SWAT,SHANGLA) PUNJAB (MURREE,RAWL) QUETTA & KALLAT	• TALL TREES • SLOPY BRANCHES. • NEEDLE-SHAPED LEAVES. • EVERGREEN TREES • NO/LITTLE HUMUS	• PROTECTION OF ENVIRONMENT. • SCENIC BEAUTY & TOURISM. • HIGH QUALITY WOOD USED AS TIMBER.
RIVERIAN/ BELA	BANKS OF RIVER INDUS & TRIBUTARIES	• LINEARPLANTATIONS. • PERFECT GROWTH DUE TO WATER & ALLUVIUM. • HIGH QUALITY TIMBER SHISHAM & BABUL	HIGH QUALITY SHISHAM & BABUL IS USED FOR FURNITURE, SPORTS GOODS ETC.
IRRIGATED	• CHANGA MANGA • CHICHA WATNI • WAN BACHRAN • GUDDU	• LINEAR PLANTATIONS. • ROWS & COLUMNS. • EQUALLY SPACED. • DIFF. SPECIES IN DIFF. AREAS. • HIGH QUALITY TIMBER SHISHAM & BABUL.	HIGH QUALITY SHISHAM & BABUL IS USED FOR FURNITURE, SPORTS GOODS ETC. TOURISM. EMPLOYMENT. DEVELOPED BY THE BRITISH.
TROPICAL THORN (RAKH)	MANY AREAS OF DIFF PROVINCES	• LOW HEIGHT. • THORNY HARDWOOS BUSHES. • SCATTERED PLANTS. • LOW QUALITY SPECIES FOR FUEL.	FUEL WOOD AND GRAZING OF ANIMALS.
SUB - TROPICAL THORN (SCRUBS)	MANY AREAS OF PUNJAB(GUJRAT, JEHLUM…..) & KPK(ABBOTABAD, MARDAN, PESHAWER & KOHAT)	• THORNY HARDWOOS BUSHES. • SCATTERED PLANTS. • BROAD LEAVES. • LOW QUALITY SPECIES FOR FUEL	FUEL WOOD AND GRAZING OF ANIMALS.
MANGROVES	• INDUS DELTA • HAB DELTA	• LOW HEIGHT DUE TO POLLUTION.(3m) • ONLY PLANTS CAN SURVIVE INTO WATER. • DIFF. SPECIES FOUND IN PAKISTAN. • KEEP THE COASTAL AREAS INTACT & ABSORD THE SHOCKING WAVES OF EARTH QUAKE.	• FUEL WOOD. • PEOPLE CUT THEM FOR FUEL, FODDER FOR ANIMAL & MAKING HUTS. • BREEDING GROUNDS FOR SHRIMPS & FISH.

- SNOW LINE (4500m)
- ALPINE (4000m- 4500m)
- CONIFEROUS (1000m- 4000m)
- RAKH
- SCRUBS
- RIVERIAN OR BELA
- IRRIGATED
- MANGROVES (0m)

Deforestation and its causes:

Deforestation is the cutting down of trees for various purposes. Some of its causes are listed below.

- Urbanization in which the backward areas are developed
- Cutting down of trees for timber for various industries
- Cutting down of trees for fuel wood
- Building of roads, highways and houses
- Overgrazing of land due to cattle.
- Clearing of land for farming.

Affects of Deforestation:

NEGATIVE:

- It causes extinction of species
- It causes air pollution
- There is a loss of natural habitat
- Soil is exposed due to this which causes wind and water erosion
- Duet to erosion, siltation takes place, which is very harmful.
- Climatic changes take place which increases aridity.
- Less forest mean less evapotranspiration, means less rainfall.
- It disrupts water supply, which causes floods.
- Due to flood there is a loss of crops and life.

POSITIVE:

- Space for farming, building and other uses.
- Less or no threat of wild fire.
- Less or no threat of damaging of property.
- Less or no threat of wild beasts.
- Clean areas during autumn.

Describe solutions to the problems caused by deforestation

- By providing irrigation facilities to the deforested areas
- By reserving compact land for fuel wood
- Creating awareness among the people about the importance of forests
- By improving techniques of raising nurseries and planting trees
- Selective cutting method should be used
- Heavy machines like bull-dozers should not be used
- Forest laws should be implemented
- Enforcement of rural and urban Forest programs.
- By planting fruit trees on slopes of hills.

MOUNTANOUS AREAS:

- **Terracing** (in which steps are cut into flat hillsides and front is covered with mud to hold the water and soil.)
- **Contour ploughing** (on the sides of a hill various crops are planted parallel to the counters)
- **Strip farming** (in this two or more crops are grown in a field with big trees to hold the soil)

Explain how human factors have given rise to a decline of mangrove forests?

Reckless cutting for fuel wood, over-grazing of the animals, making huts and water pollution due to industries when they dump toxic wastes into water.

Why do we have various types of forests in various areas?

- Areas with different altitudes have different types of forests.**(Alpine)**
- Aridity prevailing over the Baluchistan plateau and the southern part of the Indus plain does not support plant growth and results in **thorny bushes and scrubs**.
- More than normal precipitation in the northern mountain encourages the growth of **Coniferous** (evergreen) forests.
- Costal conditions towards the south encourage the growth of **mangrove** vegetation in the Indus Delta and adjoining areas.
- Edaphic factors (types of soil) also determine the type and density of forests in different areas of Pakistan. **(Riverian and Irrigated)**

The planting of trees at certain periods of the year is encouraged in Pakistan. Explain how the periods of the year have been selected.

The condition should be suitable. In Pakistan we have monsoon rain in July to August and the rain from western depression in January to March are the periods, which are selected for plantation in Pakistan because due to natural rain plant growth is more than any other months.

If we provide natural gas to Muree; what changes would come in the life of the people there?

- Industries would develop there
- Deforestation would stop for the purpose of various industries and fuel wood.
- More jobs would be there for the people, which would raise their standard of living.
- More trees would increase natural beauty and clean the environment. It will also attract
- More rain.
- Tourism would increase due to more scenic beauty.

Describe various forest products.

Fuel Wood: It is cheap quality wood which, is used for burning.

Timber: It is good quality wood which, is used in various industries.

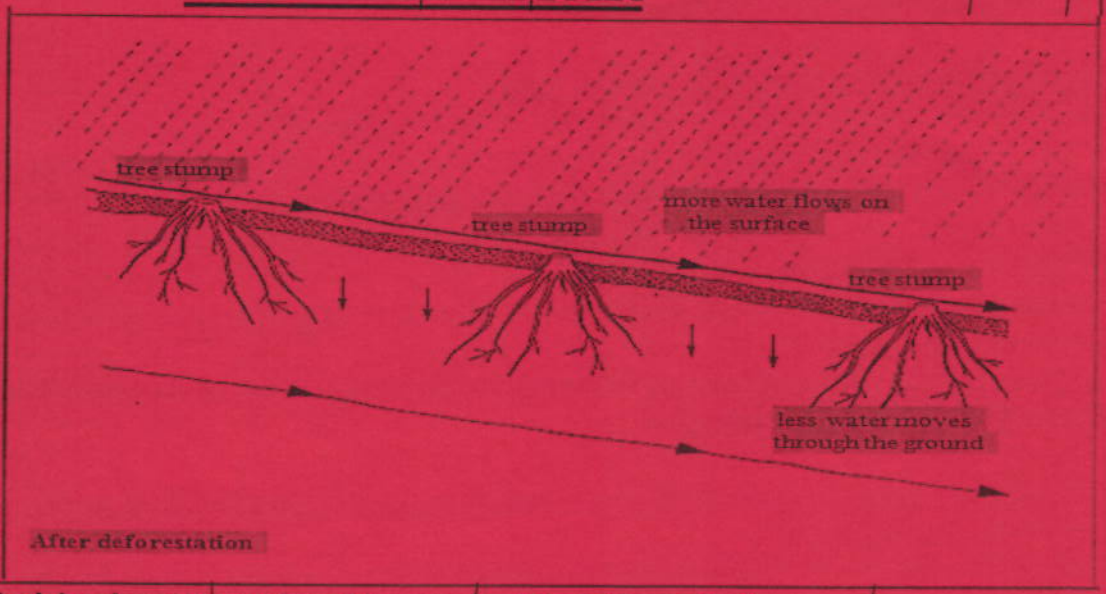
Resin: It is used for making Varnishes.
Mazri: It is used for making mats, baskets etc.
Ephedra: It is a medicinal plant which, is used by pharmaceutical companies.

Describe various Afforestation projects of Pakistan.
*The Tarbela/Mangla Watershed Management Project.
*Rachna Doab Afforestation Project.
*Agha Khan Rural Support Program (AKRSP)

DESCRIBE THE SUSTAINABLE FORESTRY:
In this type of forestry the plantation of trees is done as soon as possible after deforestation. If the trees are cut down for urbanization then new areas of plantation should be developed. The process of deforestation should be slower than the plantation of trees.

USES OF FORESTS IN TRANSPORT:
Bodies of buses & trucks. Ships & Boats. Carts. Railway sleepers & Boggies

USE OF FORESTS IN INDUSTRIES:
Paper industry. Construction industry. Sports goods industry. Furniture.



Explain why scenes such as this are caused by deforestation?

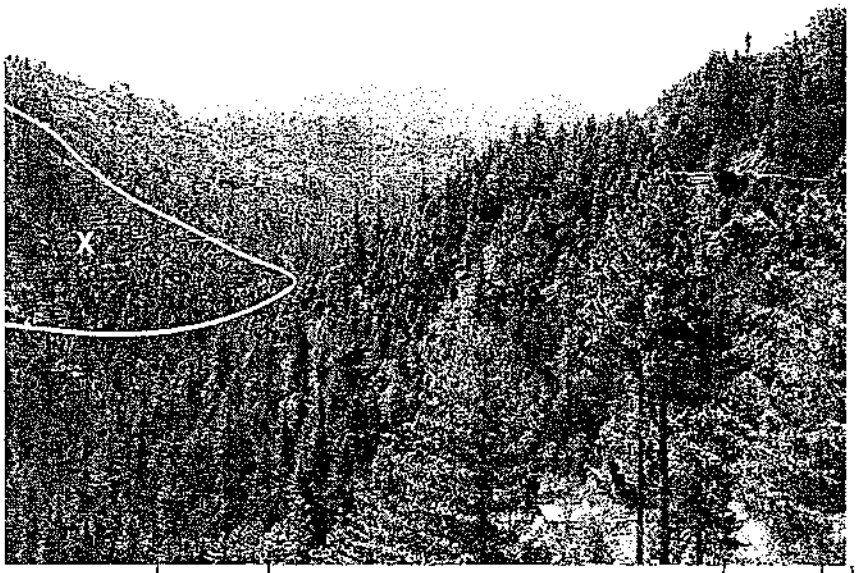
- no roots to hold soil together
- runoff erodes soil/soil erosion
- no interception
- less infiltration/more runoff
- loss of leaf fall
- lack of decomposition
- nutrient cycle broken
- loss of fertility
- leaching
- less rainfall
- more exposure to sun and wind

[4]

The area of this forest (Mnagroves) has decreased in size in recent years. How and why has this affected the local fisheries?
How (Res 1)
Fewer fish

Why (Res 1)
Roots provide shelter for young fish
Less food
Breeding ground 2 @ 1 [2]

Photograph A for Question 2



Study the photograph A of an area in Shangla District in NWFP.

(a) (i) Describe in not more than two words, the topography(relief) shown in the photograph.
mountainous / wooded / coniferous(trees)/ steep slopes/deep valleys [1]

(ii) What type of trees are shown in this photograph?
coniferous / spruce / fir / deodar/kail/chir [1]

(iii) At what altitude do these trees grow in NWFP?
1000-4000 metres [1]

(iv) How is this type of tree adapted to the climate in this area?
- Conical shape to shed snow
- Small leaves }
- Thick, leathery leaves } to reduce transpiration
- Evergreen to take advantage of short growing season [3]

(b) (i) Trees have been cut down in Area X. What effects may this have on the soil there?
- leaching
- soil erosion
- gullying
- landslides/total soil loss/only rocks left credit effect + dev [3]

(ii) How can deforestation affect water supplies?
- Too little: Muddy water undrinkable/polluted
- Reduced evapotranspiration so less rain
- Silt in reservoirs reduces storage
- Silt blocks irrigation channels
- Irregular flow/ comes in bursts
- Too much: Flooding/faster runoff [4]

(c) Why are there irrigated plantations in the Indus Plain?

- Construction }
- Firewood }
- Furniture } uses max 2
- Boxes }
- Agricultural implements }
- Irrigation available
- Shade
- Prevent erosion of banks
- Reduces air pollution
- For shade
- Reduce timber imports
- Etc.

[4]

(iii) State and explain one way in which the damage done by deforestation can be reduced

- ways: regeneration programmes
- education / better management
- forest reserves
- legal controls on commercial cutting / selective cutting
- restricting use of heavy machinery
- supply of gas to Northern areas to reduce need for firewood
- terracing
- explanation: credit according to way stated in answer
- 1 mark for way plus 2 for explanation

[3]

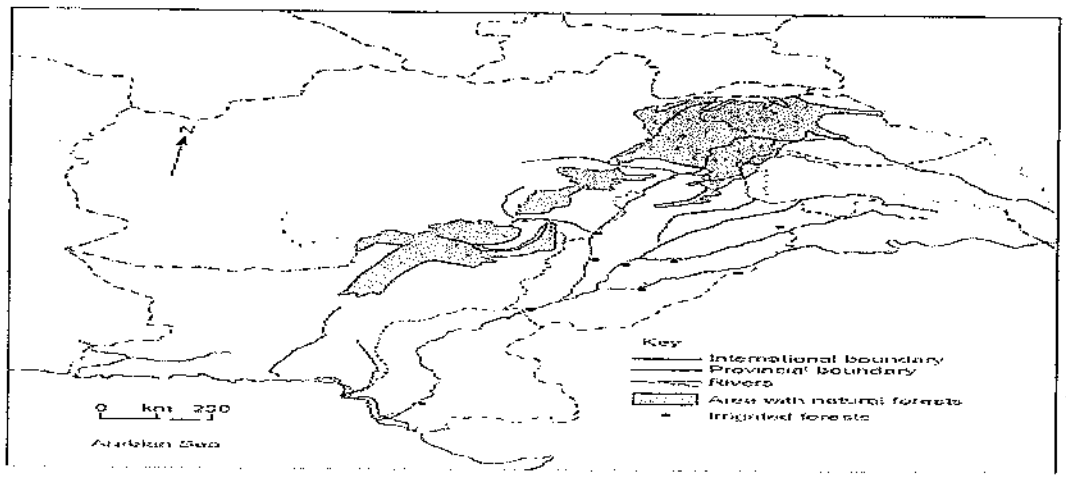


Fig. 2

(a) Describe the distributions of both the areas with *natural forests* and the *irrigated forests* shown on Fig.2. [4]

DISTRIBUTION OF FORESTS ON MAP(Fig-2)

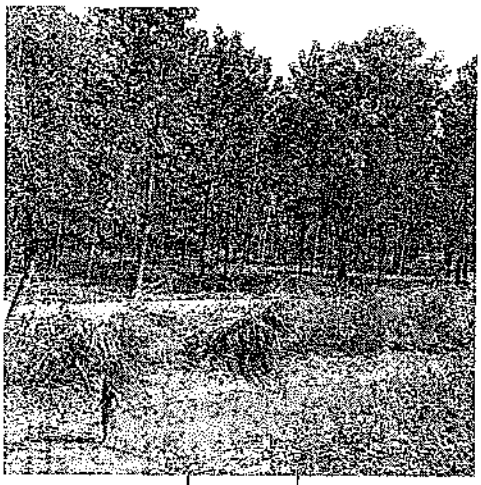
(i) 'Areas with forests'

- northern mountains/northern NWFP/Northern Area
- (some on) Potwar Plateau/Salt Range
- western highlands/(western) NWFP/NW Pakistan/Afghan border
- northern Balochistan (Plateau)/central Brahui Range
- Indus delta/Hab delta/Sindh coast

(ii) 'irrigated forests'

- most by rivers/by Indus
- 6/7 in Punjab/most in Punjab/uip
- 1 in Lower Sindh/near Hyderabad/lower LIP
- 1 on border of Punjab and NWFP/confluence of Indus and Gomal
- named plantation (max 1)
- Reserve 1 for each group. **Float of 2 marks.**

4 @ 1 [4]



(a) Study Photograph A (Insert), which shows part of the Changa Manga plantation.

(i) What evidence in Photograph A shows that this is a plantation?

- Trees in lines/rows/equally spaced/grid
- Same age/height
- Same species [2]

(ii) What is used to line the canals, and why is this necessary?

Clay/cement/bricks

To prevent seepage/leakage/water getting out [2]

(iii) Why is the plantation being irrigated?

- Low rainfall/there is not enough rainfall
- For a constant/regular supply/rainfall is unreliable
- Trees need a moderate to good water supply
- High rate of evapotranspiration/evaporation/transpiration [2]

(iv) Why is the water level in the canal lower than the ground around it?

To avoid waterlogging to keep the water table low

Trees do not want their roots in water [1]

(b) (i) State two domestic uses of wood.

Firewood heating/cooking/house building/furniture/fencing (2 at 1 each) [2]

(ii) Explain how wood is used in industry and transport.

- construction of building, bridges, etc.
- means of transport – railway sleepers (not fuel), bridges, lorry chassis/carts
- chemical such as – resin, varnish, mazri (for mats), pharmaceuticals, medicine, etc.
- farm/agricultural use such as fences, gates, implements
- paper production from pulp
- sports goods such as bats, rackets. etc.
- crafts such as ornaments, beads, etc.
- furniture such as chairs, tables. etc. [4]

(c) (i) What is sustainable forestry?

- ensuring supplies are there for the future selective cutting
- replanting trees that have been cut down/re-afforestation
- maintaining/looking after forests
- planting species that do not need irrigation [3]

(ii) Why does Pakistan need to increase the area of irrigated plantations?

- Too many trees have been cut down/too much deforestation
- To provide more wood for industry, increase in population etc.
- To relieve water logging and salinity.
- To prevent erosion of banks/slopes
- To replace areas where forests cannot be replaced (e.g. due to soil erosion or urbanisation)
- For tourism
- To reduce imports

[3]

(d) (i) Why is afforestation called a 'long-term investment'?

- trees take many years to grow
- many years before financial return/start production/results are seen
- high cost of planting
- costs during growth

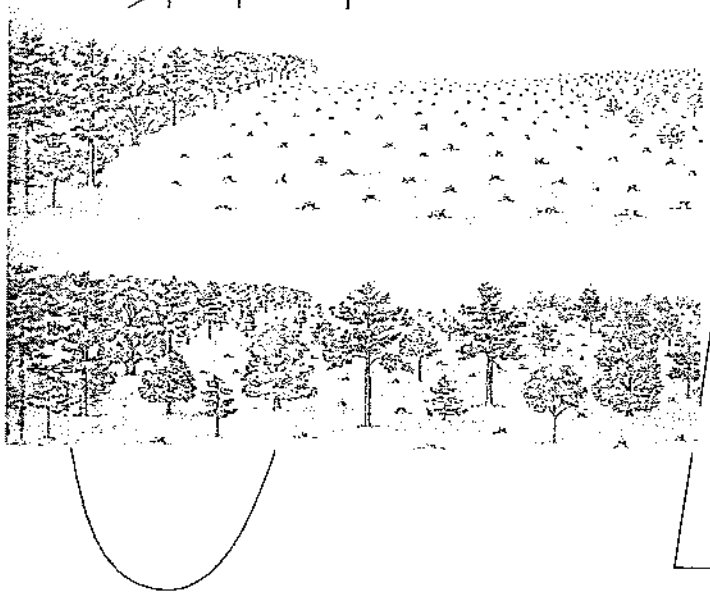
[2]

(ii) What are the advantages and disadvantages of developing a forest area for tourism?

Advantage (res. 1)
Employment opportunities
Source of income
Provision of named infrastructure/electricity, roads, water, sanitation (max 2)
Provision of other modern facilities, e.g. shops
Reduces the effects of deforestation/destruction of habitats/soil erosion (max 1)

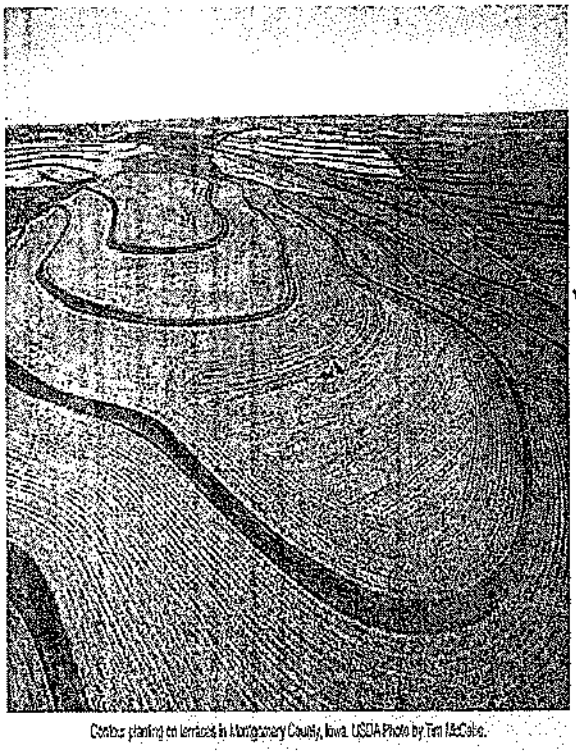
Disadvantage (res. 1)
High cost of development/money could be spent on other things
Effects on habitats/damage to trees
Litter/garbage
Resettlement of local people
Tourists may not come, problems of security, etc.
Loss of culture

[4]



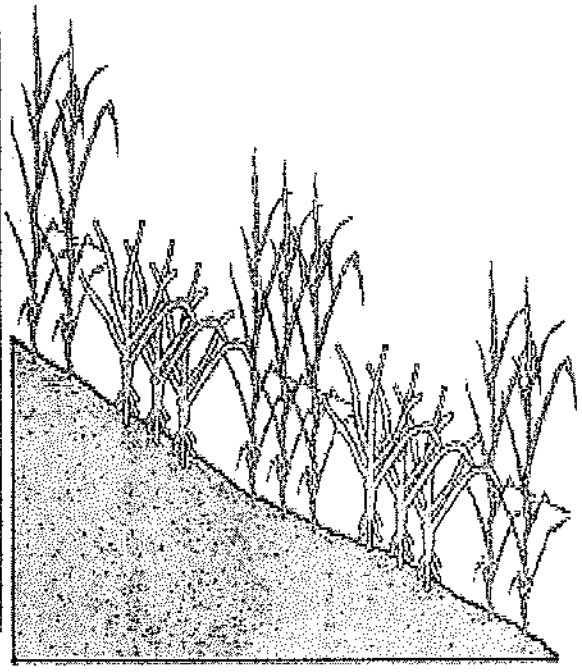
SELECTIVE CUTTING

TERRACING



Contour planting on terraced in Montgomery County, Iowa. USDA Photo by Tim McCabe.

CONTOUR PLOUGHING



STRIP FARMING

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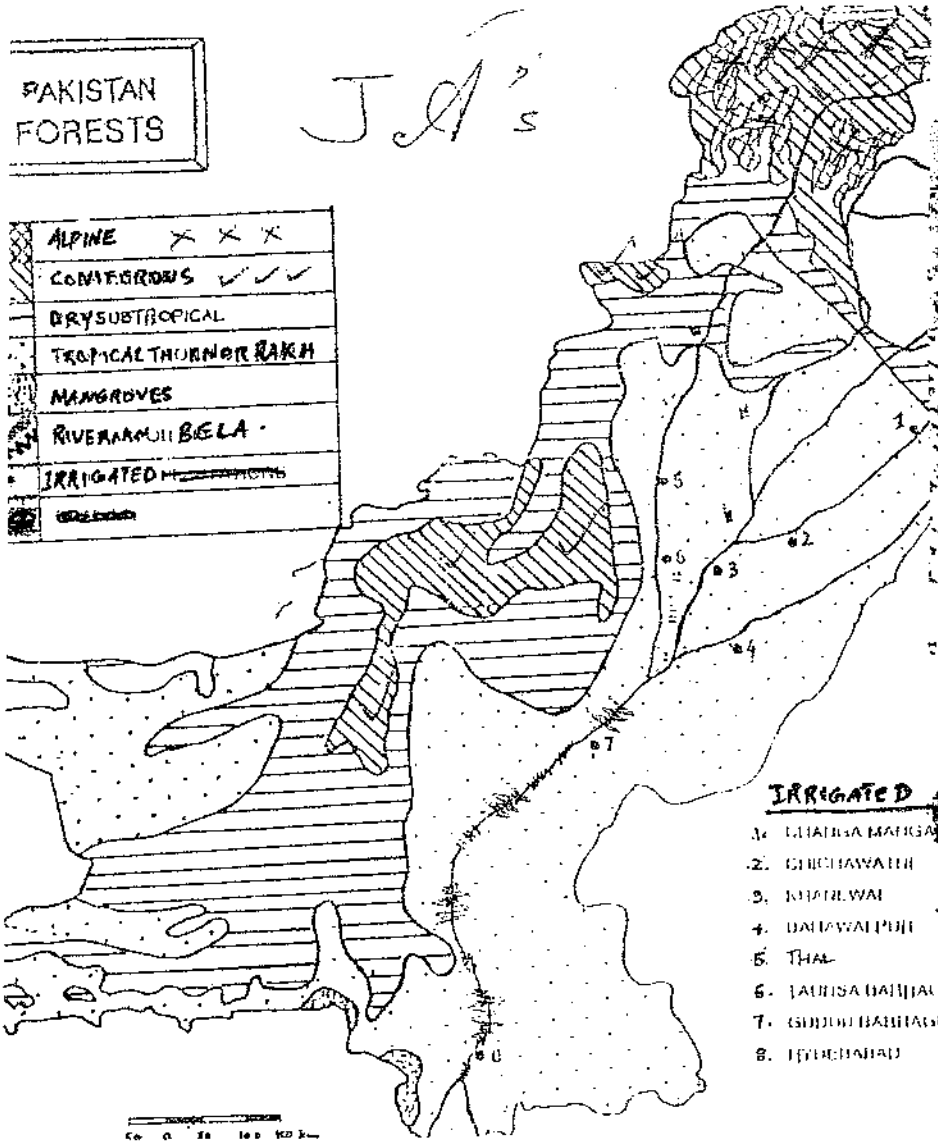
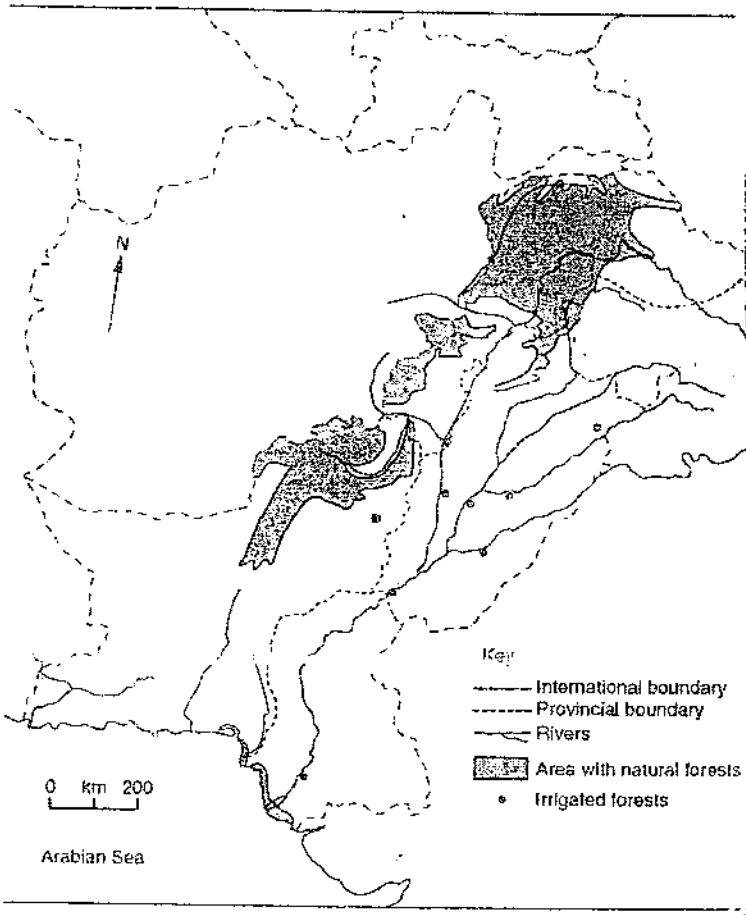


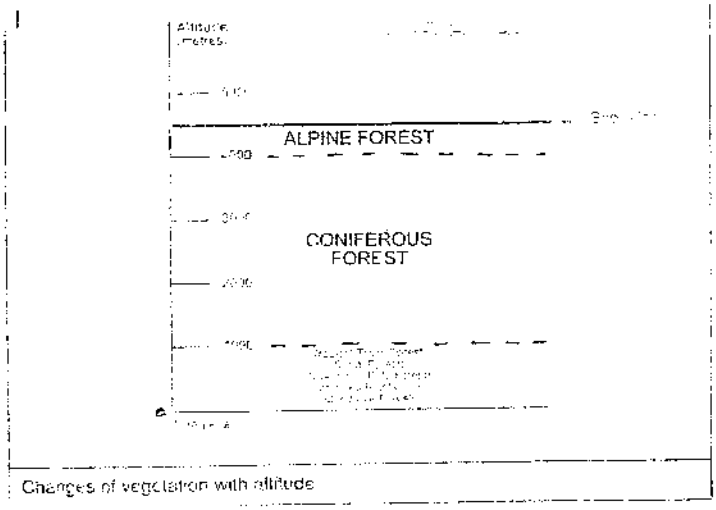
Photograph B

Hazarganji-Chiltan National Park, near Quet

Photograph A

Chitral Gol National Park, Hindu Kush





Changes of vegetation with altitude

MINERAL RESOURCES

Define the following terms:

Mineral: Any naturally occurring substance with a definite structure & shape.
Exploration: To find any mineral or naturally occurring substance.
Exploitation: The use of explored minerals is called exploitation
Extraction: Taking the mineral out from Nature.
Mining: To extract the mineral by digging.
Quarrying: To break the mineral into small pieces.
Renewable Resources: The resources, which would not be exhausted after a specific time. We can use them again and again. e.g. sunlight, water, wave and wind energy
Non-renewable Resources: The resources, which would be exhausted after a specific time. We can not use them again and again. e.g. oil, coal and gas, etc…
Power minerals: The minerals which are used for thermal power generation like coal, oil & gas.

	Metallic Minerals	Non-Metallic Minerals
1.	Economically more valuable	Economically less valuable except for power minerals like (oil, gas)
2.	Generally hard, tough, and shinning	Softer, rough and may not shine(Dull)
3.	Can change shape without breaking	Breaks away when shape is changed
4.	Can be stretched and compressed	Cannot be stretched or compressed.
5.	Good thermal and electrical conductors	Poor thermal and electrical conductors
6.	More reactive with water and acid	Less reactive with water and acid

MINING METHODS:

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

Open-cast Mining (Open Pit): Some minerals like coal and iron often lie near the surface. Open cast mining scoops up these minerals from near the surface. The mineral-bearing rocks are stripped-off by giant excavators and power shovels, which then load the material into Lorries or railway wagons to be carried away.

Placer Mining or Mining in Water: Some minerals like manganese are found underwater. They are extracted by this method.

Hnad Panning: It is used in the areas where the mineral is exposed to the river banks and due to erosion the particles of the minerals are mixed with sand. So by using sieves & pans minerals are separated by shaking process like in case of Gold.

Underground Mining:

1) Shaft Mining: Vertical shafts are dug down to the minerals, especially for coal. Tunnels are then dug horizontally to the layers or seams of the mineral, which is then removed through tunnels. This method is expensive and dangerous. Consideration must be given to the problems of ventilation and underground transport. Dangerous gases are also present underground, with the risk of poisoning and explosions, causing the tunnel roofs to collapse. Miners have been trapped underground on many occasions.

2) Adit Mining: Adit is an opening or passage. It is done in hilly areas where mineral seams are exposed on a hillside. Adit might be horizontal or vertical depending on the nature of the mineral.

Describe the effects of mining on the environment.

- Environmental loss means there is damage to the whole atmosphere.
- For mineral exploration plants & trees are cut down causing soil erosion.
- Natural scenic beauty is destroyed due to construction of roads & houses for labours.
- The use of dynamite for blasting damages the earth.

- Depressions formed due to blasting may be flooded.
- Due to blasting noise pollution increases.
- Old methods of mining are dangerous for the miners.
- Due to mining waste land pollution takes place.
- Due to mineral waste water pollution takes place.
- Due to dust & smoke air pollution increases.

How can we protect the environment from Mining hazards?

- To avoid environmental losses special measures to be taken.
- To avoid deformation depressions should be filled & surface should be leveled.
- The mining wastes to be dumped properly & it should not remain at the place of mining.
- Miners should be given proper protection against various hazards.
- The area under mining should be used to plant trees & afforestation programs to be started.
- To provide clean water proper treatment plants to be set up.

Problems in the mineral sector.

- Lack of Finance
- Lack of technical knowledge or experts
- Lack of accessible mineral deposits
- Lack of Institutional management
- Lack of Machinery
- Lack of Govt. Priority given to mineral extraction.
- Lack of stable political situation.
- Lack of Public support due to political influence

How can we overcome these problems? Or solutions:

- By providing funds to this sector.
- By creating investment opportunities for foreign companies
- Development of Infra structure facilities
- By creating awareness among the people
- By providing tax exemption on import duty of machinery required for mining
- Government should give priority to find more mineral resources
- Various trainings should be conducted for the people.
- By creating stable govts.
- By giving awareness to the people about its importance & royalty

Name the organizations working for Mineral Sector in Pakistan.

*Geological Survey of Pakistan *Pakistan Mineral corporation
*Resource Development Corporation *Gemstone Corporation of Pakistan

Describe the process of Cement preparation.

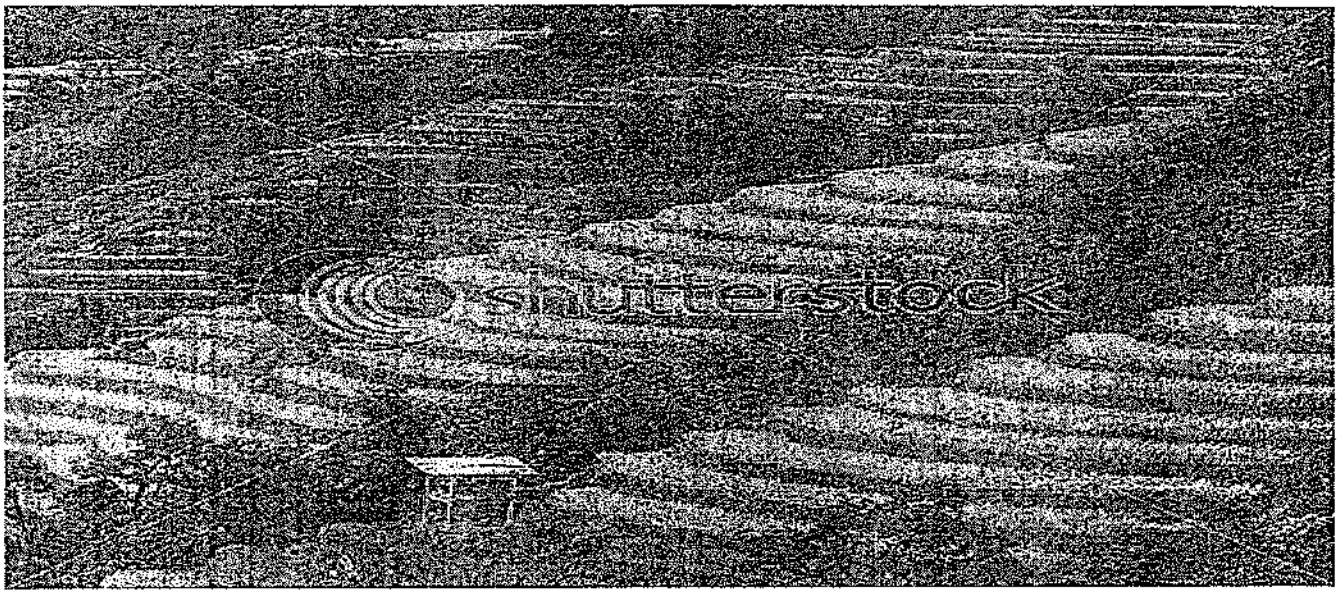
The raw materials Limestone, Clay or Shale are ground & **mixed**. Then they are **heated** in a rotary Kiln. When the Clinkers are prepared. The kiln products are **ground then mixed** with Gypsum to make cement.

MINERAL POLICY OF GOVT. OF PAKISTAN:

To attract the local & foreign investors the govt. of Pakistan would provide them land; security; infra structure facilities; tax exemptions on machinery & extensive visas for foreign staff.

IMPORTANCE OF NON-METALLIC MINERALS:

- Provision of employment.
- Source of foreign exchange earnings due to exports.
- Improves GDP & GNP.
- More development in the areas with minerals.
- More local & foreign investment.
- Less rural-urban migration



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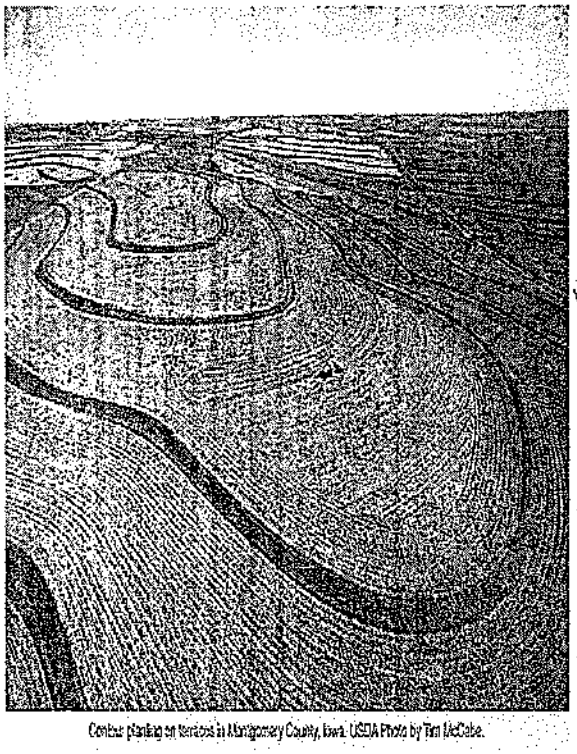
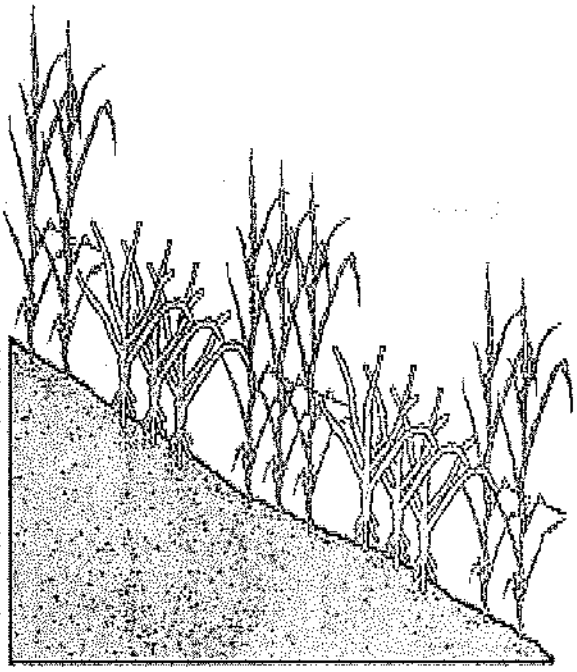
TERRACING



Contour planting on terraces in Montgomery County, Iowa. USDA Photo by Tim McCabe.

CONTOUR PLOUGHING



STRIP FARMING

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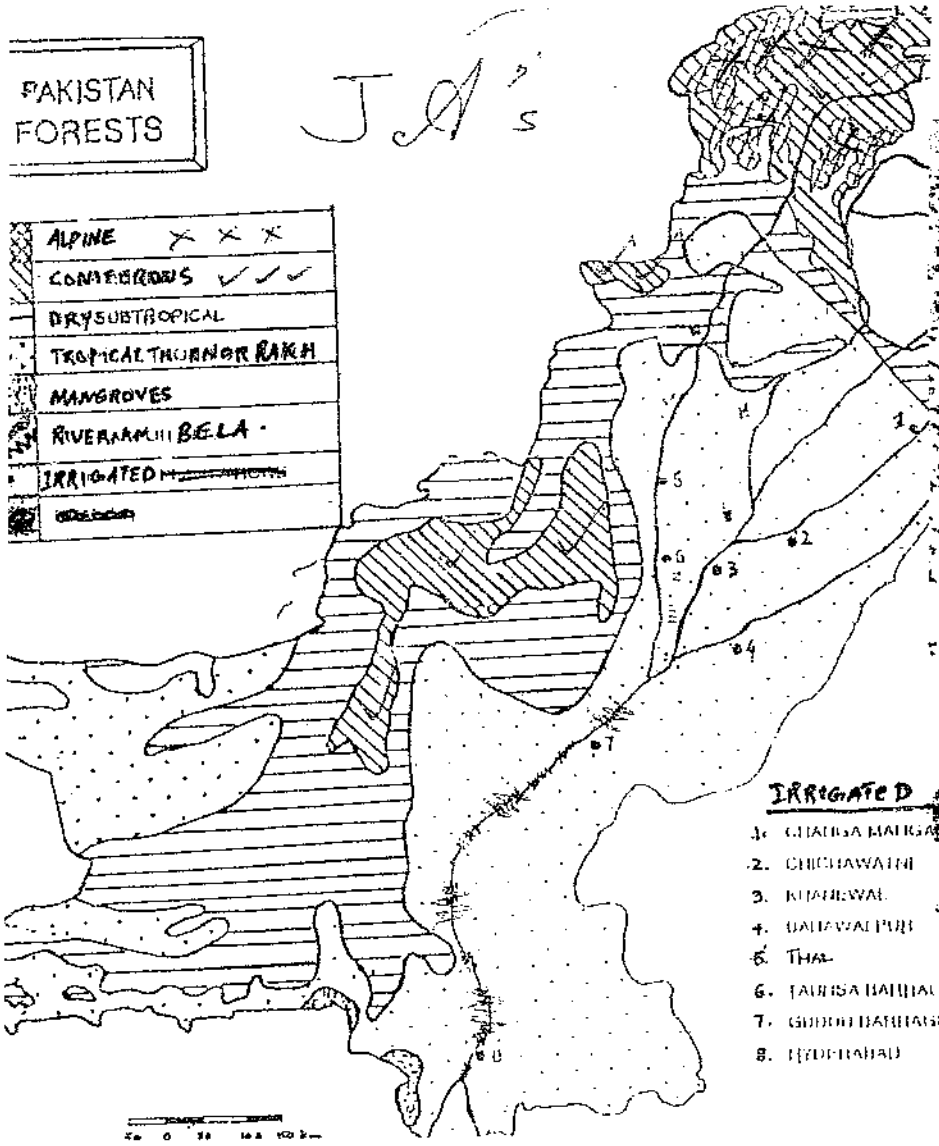
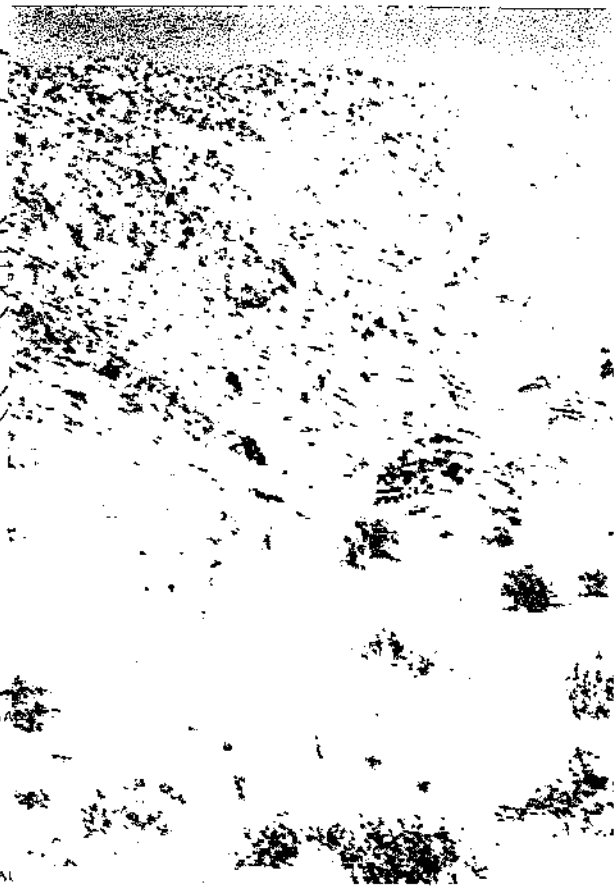
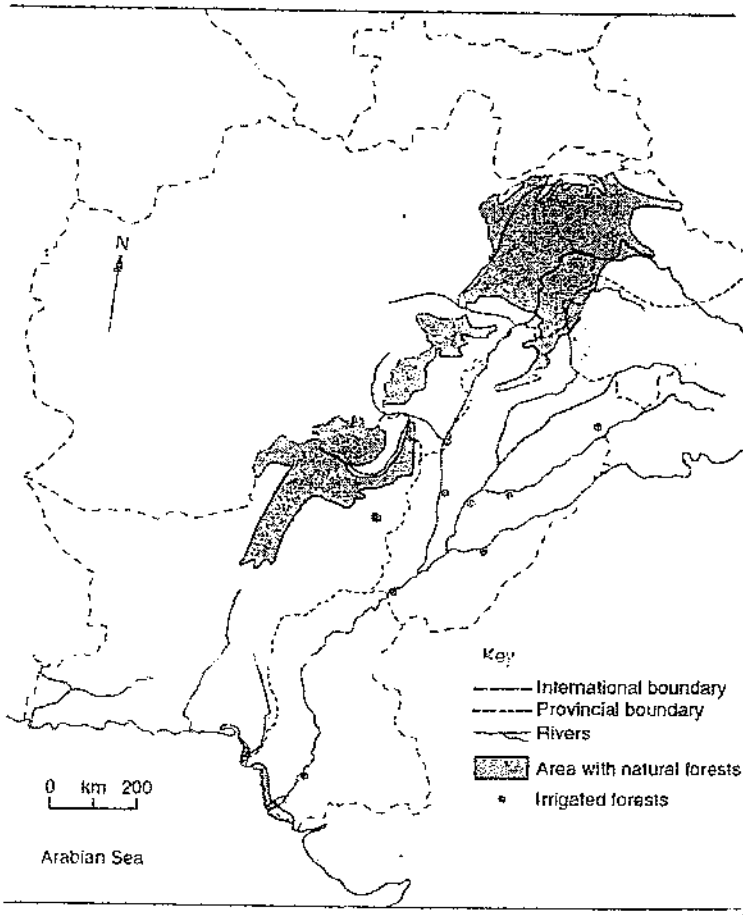


Photograph B

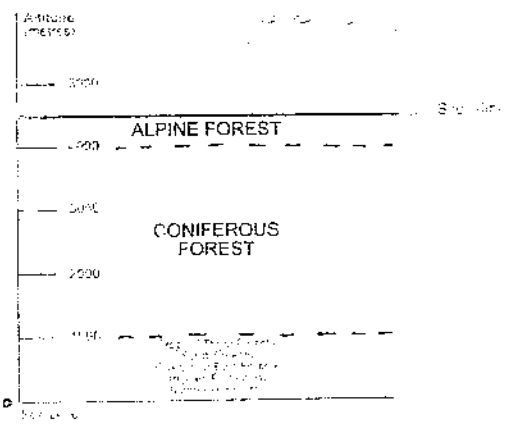


Hazarganji-Chiltan National Park, near Que



Photograph A

Chitral Gol National Park, Hindu Kush



Changes of vegetation with altitude

MINERAL RESOURCES

Define the following terms:

Mineral: Any naturally occurring substance with a definite structure & shape.
Exploration: To find any mineral or naturally occurring substance.
Exploitation: The use of explored minerals is called exploitation
Extraction: Taking the mineral out from Nature.
Mining: To extract the mineral by digging.
Quarrying: To break the mineral into small pieces.
Renewable Resources: The resources, which would not be exhausted after a specific time. We can use them again and again. e.g. sunlight, water, wave and wind energy
Non-renewable Resources: The resources, which would be exhausted after a specific time. We can not use them again and again. e.g. oil, coal and gas, etc…
Power minerals: The minerals which are used for thermal power generation like coal, oil & gas.

	Metallic Minerals	Non-Metallic Minerals
1.	Economically more valuable	Economically less valuable except for power minerals like (oil, gas)
2.	Generally hard, tough, and shinning	Softer, rough and may not shine(Dull)
3.	Can change shape without breaking	Breaks away when shape is changed
4.	Can be stretched and compressed	Cannot be stretched or compressed.
5.	Good thermal and electrical conductors	Poor thermal and electrical conductors
6.	More reactive with water and acid	Less reactive with water and acid

MINING METHODS:

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

Open-cast Mining (Open Pit): Some minerals like coal and iron often lie near the surface. Open cast mining scoops up these minerals from near the surface. The mineral-bearing rocks are stripped-off by giant excavators and power shovels, which then load the material into Lorries or railway wagons to be carried away.

Placer Mining or Mining in Water: Some minerals like manganese are found underwater. They are extracted by this method.

Hnad Panning: It is used in the areas where the mineral is exposed to the river banks and due to erosion the particles of the minerals are mixed with sand. So by using sieves & pans minerals are separated by shaking process like in case of Gold.

Underground Mining:

1) Shaft Mining: Vertical shafts are dug down to the minerals, especially for coal. Tunnels are then dug horizontally to the layers or seams of the mineral, which is then removed through tunnels. This method is expensive and dangerous. Consideration must be given to the problems of ventilation and underground transport. Dangerous gases are also present underground, with the risk of poisoning and explosions, causing the tunnel roofs to collapse. Miners have been trapped underground on many occasions.

2) Adit Mining: Adit is an opening or passage. It is done in hilly areas where mineral seams are exposed on a hillside. Adit might be horizontal or vertical depending on the nature of the mineral.

Describe the effects of mining on the environment.

- Environmental loss means there is damage to the whole atmosphere.
- For mineral exploration plants & trees are cut down causing soil erosion.
- Natural scenic beauty is destroyed due to construction of roads & houses for labours.
- The use of dynamite for blasting damages the earth.

- Depressions formed due to blasting may be flooded.
- Due to blasting noise pollution increases.
- Old methods of mining are dangerous for the miners.
- Due to mining waste land pollution takes place.
- Due to mineral waste water pollution takes place.
- Due to dust & smoke air pollution increases.

How can we protect the environment from Mining hazards?

- To avoid environmental losses special measures to be taken.
- To avoid deformation depressions should be filled & surface should be leveled.
- The mining wastes to be dumped properly & it should not remain at the place of mining.
- Miners should be given proper protection against various hazards.
- The area under mining should be used to plant trees & afforestation programs to be started.
- To provide clean water proper treatment plants to be set up.

Problems in the mineral sector.

- Lack of Finance
- Lack of technical knowledge or experts
- Lack of accessible mineral deposits
- Lack of Institutional management
- Lack of Machinery
- Lack of Govt. Priority given to mineral extraction.
- Lack of stable political situation.
- Lack of Public support due to political influence

How can we overcome these problems? Or solutions:

- By providing funds to this sector.
- By creating investment opportunities for foreign companies
- Development of Infra structure facilities
- By creating awareness among the people
- By providing tax exemption on import duty of machinery required for mining
- Government should give priority to find more mineral resources
- Various trainings should be conducted for the people.
- By creating stable govts.
- By giving awareness to the people about its importance & royalty

Name the organizations working for Mineral Sector in Pakistan.

*Geological Survey of Pakistan
*Pakistan Mineral corporation
*Resource Development Corporation
*Gemstone Corporation of Pakistan

Describe the process of Cement preparation.

The raw materials Limestone, Clay or Shale are ground & **mixed**. Then they are **heated** in a rotary Kiln. When the Clinkers are prepared. The kiln products are **ground then mixed** with Gypsum to make cement.

MINERAL POLICY OF GOVT. OF PAKISTAN:

To attract the local & foreign investors the govt. of Pakistan would provide them land; security; infra structure facilities; tax exemptions on machinery & extensive visas for foreign staff.

IMPORTANCE OF NON-METALLIC MINERALS:

- Provision of employment.
- Source of foreign exchange earnings due to exports.
- Improves GDP & GNP.
- More development in the areas with minerals.
- More local & foreign investment.
- Less rural-urban migration

3 (a) Fig. 3 shows how cement is made.

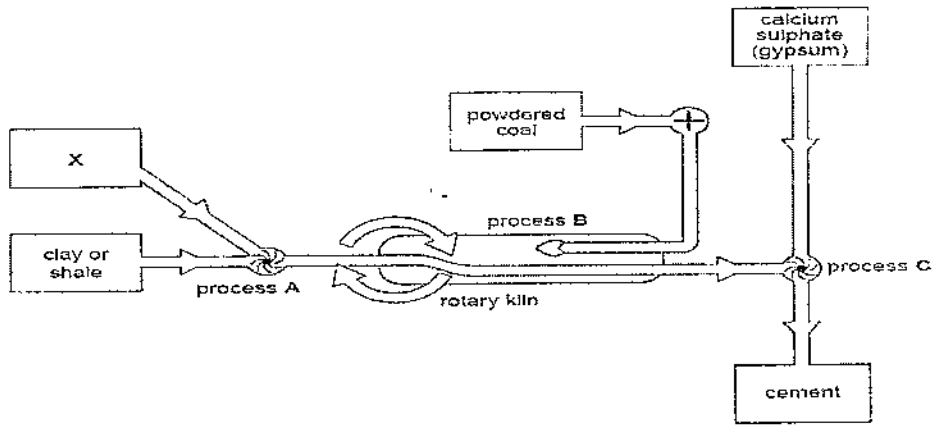


Fig. 3

Describe the process of Cement preparation.

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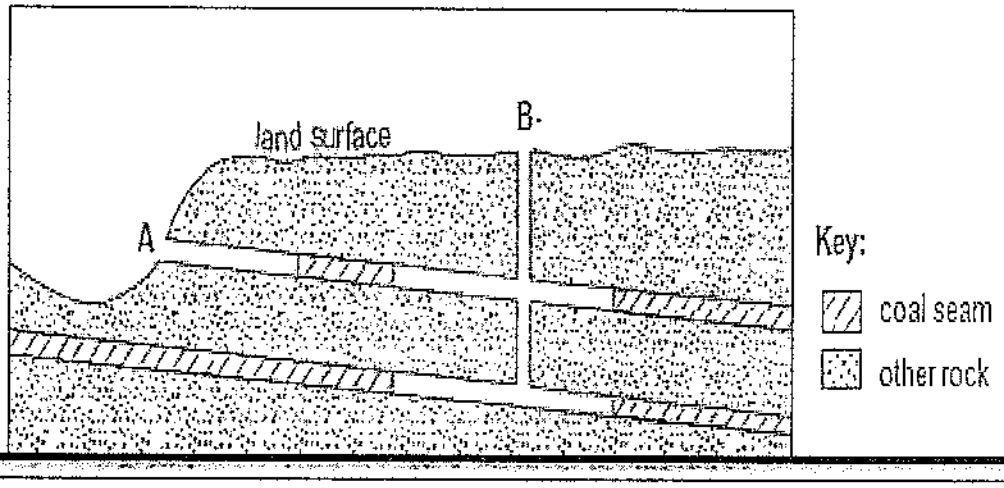
(ii) State three natural inputs that are needed to make cement. [3]

- limestone
- gypsum/calcium sulphate
- natural gas/coal
- clay/shale
- water
- sand

2 (a) Study Fig. 4, a cross section showing two types of coal mine.



(a) For each of the mines A and B

(i) Name the type of mine, A – adit/drift B – shaft [2]

(ii) Explain why that is the type of mine there,

A – coal (seam) exposed on a slope/can dig tunnels along the seam [1]

B – coal (seam) underground / does not outcrop [1]

(iii) Describe the method of mining coal in the mine.

- Adit mine
- Horizontal shaft into hillside
- Possibly several shafts at different levels
- Pick and shovel/trepanner (only credit once)
- Dynamite on seam (only credit once)
- Buckets/trucks/trolleys/conveyor belt/donkeys to surface
- Shaft mining
- Main shaft (vertical or sloping)
- Tunnels/side shafts along seams
- Pick and shovel/trepanner (only credit once)
- Dynamite on seam (only credit once)
- Buckets/trucks /trolleys to main shaft
- Lifted to surface/elevator [Res 2 for each type of mine, float of 1]

[5]

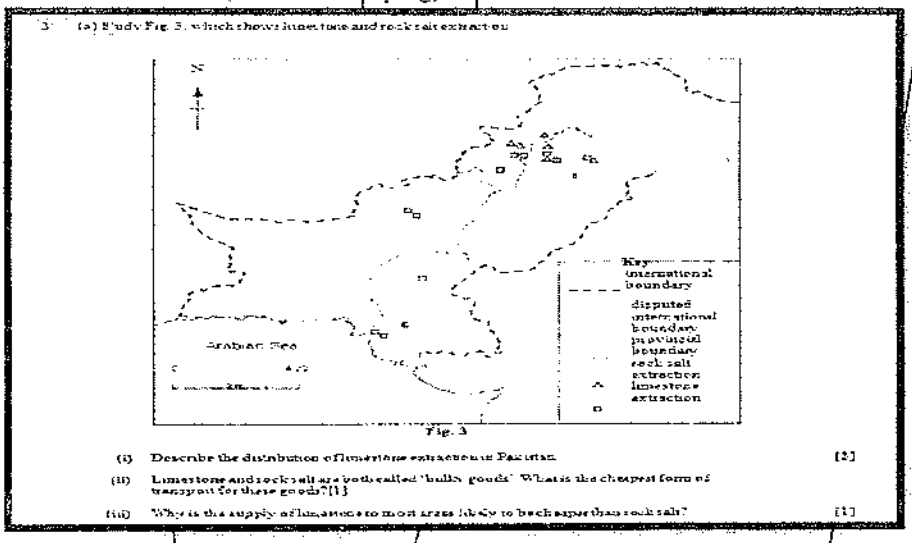


Figure-3

(a) Study Fig. 3 which shows limestone and rock salt extraction.

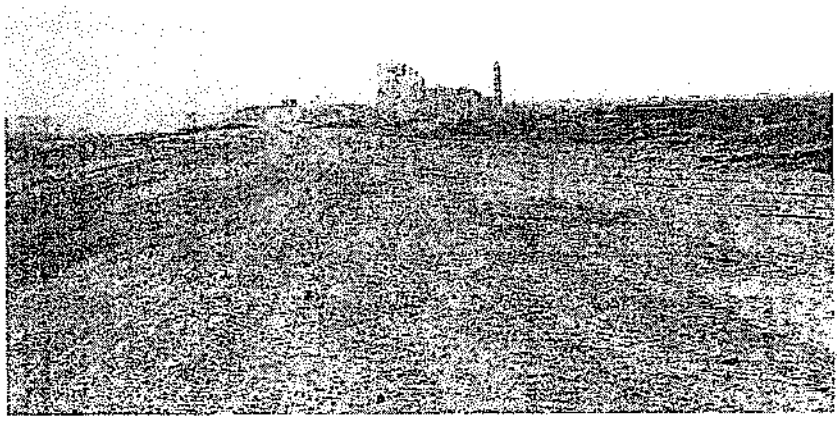
(i) Describe the distribution of limestone extraction in Pakistan. [3]

- Widespread
- NWFP-Punjab border/Potwar Plateau
- N(E) Baluchistan
- S Sindh/near Karachi
- Central Sindh

(ii) What is rock salt used for in Pakistan? [2]

Cooking, preservation, soda ash, bicarbonate, caustic soda for tanning, textiles,laundries Table salt
(Credit 2 uses, or one with development)

Photograph B for Question 3



(c) Study Photograph B (Insert) showing a cement factory near Ghulamullah, in Thatta Dist.

(i) Describe the scene in the photograph. [4]

- Flat
- Dry/bare/barren/unpopulated
- Rough road to factory
- Vegetation in background
- Chimney
- Smoke/dust/air pollution
- Low flat-roofed building
- Stones/rocks
- Tyre tracks

(iii) Explain the importance of three human inputs at a cement factory and the difficulty of providing them at this site. You should refer to Photograph B and your own knowledge. [6]

- inputs
- electricity for power
- road/railway for transport
- labour for good production
- telecommunications for supply/sales etc.
- machinery for fast/efficient production
- capital for investment
- difficulty
- remote from settlement
- lack of skilled/educated workforce
- unreliable labour force
- lack of named infrastructure
- hot/dry climate
- lack of local entrepreneurs

(input + difficulty 1+1)

(d) Why is there a large demand for cement in Pakistan? [4]

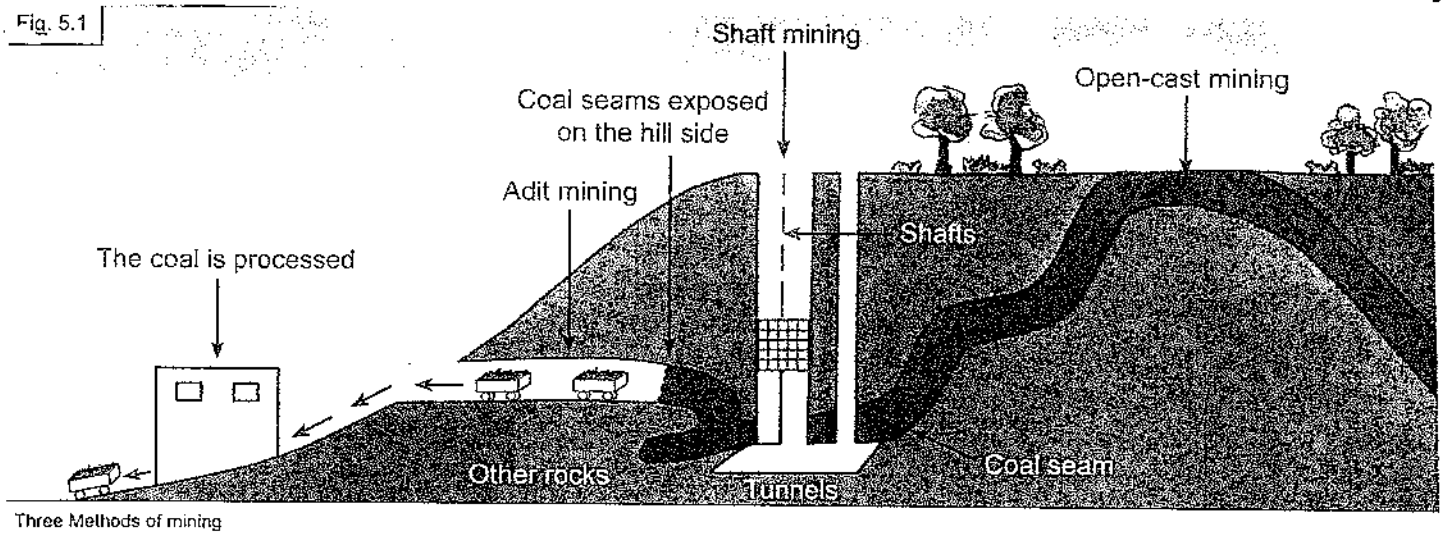
- Domestic construction e.g. houses
- Industrial construction e.g. Factories
- Institutional buildings/schools/hospitals/offices etc.
- Communication e.g. roads, bridges, railway sleepers
- Port developments
- Water management e.g. Dams, canals, embankments.

Name	Description and uses
1. (a) Rock Salt KHEWRA WARCHA (b) Brine	Seams of rock salt vary in thickness from between 20 to 100 meters thick. The rocks are white or pink in colour. The salt is overlain by gypsum and clay. Rock salt is used for cooking and preservative purposes and for the manufacture of soda ash, bicarbonate of soda, caustic soda and other sodas for laundries, textiles, and tanning. Used in the chemical and fertilizer industry.
2. Limestone MURLI HILLS MANGO PIR (KARACHI) GANJU TAKAR (HYDER NGR)	Limestone is a major sedimentary deposit and is widespread in Pakistan. It is the main raw material for cement and also used in the manufacturing of lime, bleaching powder, glass, soap, paper and paints.
3. Coal THAR (S) LAKHRA, SONDA, JHAMPIR (B) DARGAI, MACH, SOR RANGE (P) SALT RANGE, DANDOT, PIDH (N) * MAKARWAL	Pakistan has low-quality coal. Coal is mainly used in brick kilns, some is used to make coke and coal briquettes and a small percentage is used for power generation. It is planned to build a thermal power station to use the coal from a new coalfield in Thar District.
4. Natural Gas SUI, PIRKOH, MARI	Domestic and Industrial uses are discussed in detail in "Power Resources".
5. Mineral Oil (petroleum) POTWAR PL., BADIN	It is used as a power source, as a lubricant for machines, and as motor fuel. It is discussed in detail in "Power Resources".
6. Gypsum SAIDUWALI DAUD KHEL	Found in grey, white and pink colour. It is used in the manufacture of paints, fertilizers and pre-fabricated constructions boards. White gypsum is used for making cement and Plaster of Paris.
7. Marble MULAGAURI MANERI	Found in bands of white, grey, yellow and brown. It is used in buildings and for making chips for flooring and decorative pieces.
8. Clays SHAH DERI	Clays are fine-grained minerals. In Pakistan, the most important industrial clays are China Clay, Fire Clay and Fuller's Earth. i. China Clay is used in the ceramic industry, for a special type of cement and has other industrial uses. ii. Fire Clay is used in refractories to make fire bricks and insulating bricks. It is also used to make pottery and chemicals. iii. Fuller's Earth is used in steel mill foundries, oil drilling and oil refining.
9. Magnesite SPIN KAN	It has a high percentage of magnesia (about 50 %). It is used in the manufacture of cement, paper pulp, rayon, fertilizer, chemicals and pharmaceuticals.
10. Sulphur KOHI SULTAN / SANNI	Sulphur is used to manufacture sulphuric acid, explosives, paints, dyes, rayon and fertilizers.
11. Celestite THAND BUKHAN	Found in the cavities of sedimentary rocks. Uses: tracer bullets, firework, ceramics, paints and plastics.

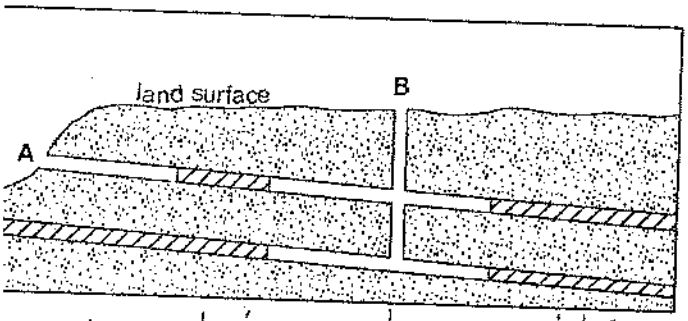
Non - Metallic Minerals

Name	Uses	
1. Chromite	Chromium is used in steel and electroplating. It is used for bridges and railway carriages. It is also used as a lining in metallurgical furnaces and for making engineering tools.	THATTA
2. Iron Ore	Steel-making, construction and heavy engineering industry.	MUSLIM BAGH
3. Copper	Making electrical wires and other electrical appliances, especially because of their very good conductivity. Used in making alloys.	SAINDAK
4. Manganese	Used in making dry cell batteries, paints. It is a vital alloy in steel making.	
5. Bauxite	Aluminium is mainly obtained from bauxite and is a valuable metal.	

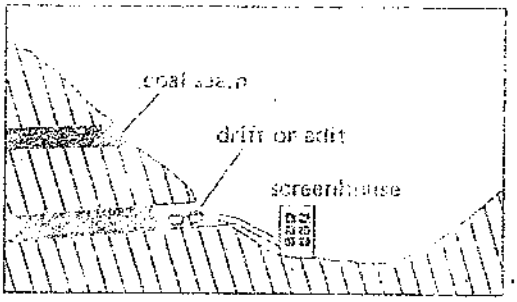
Fig. 5.1

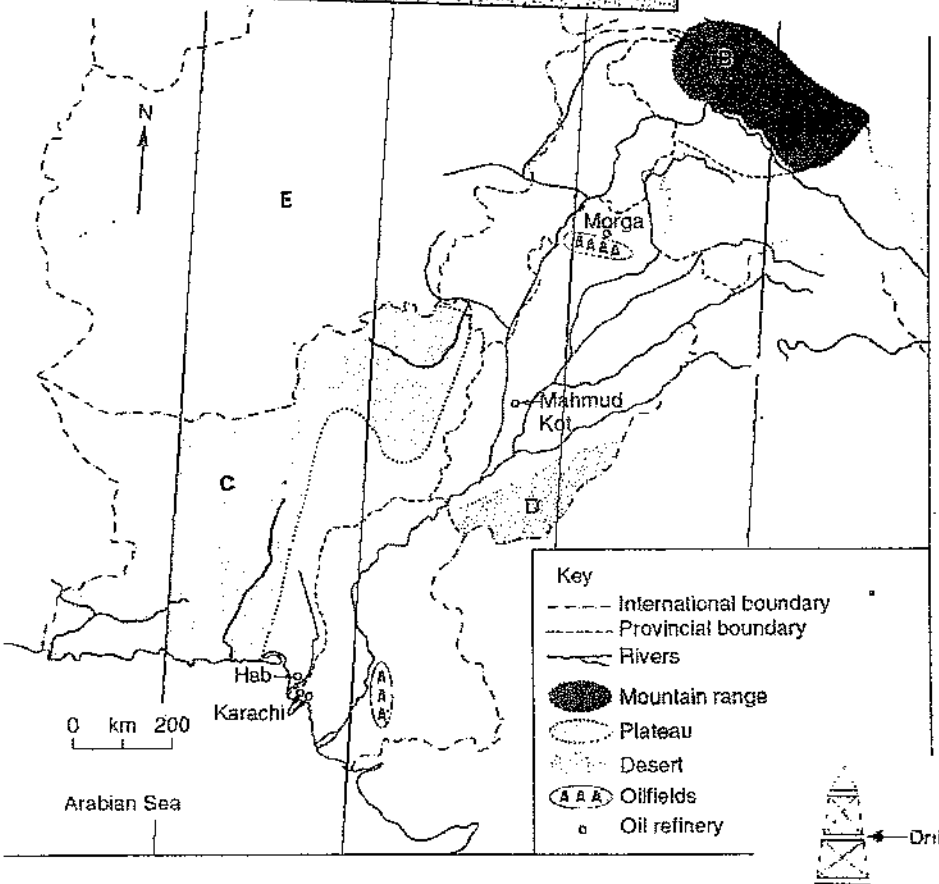


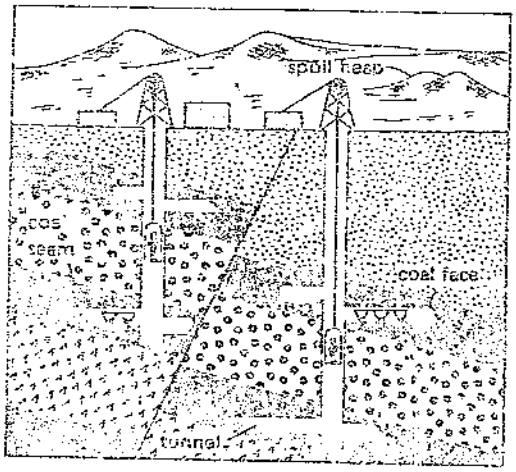
Three Methods of mining

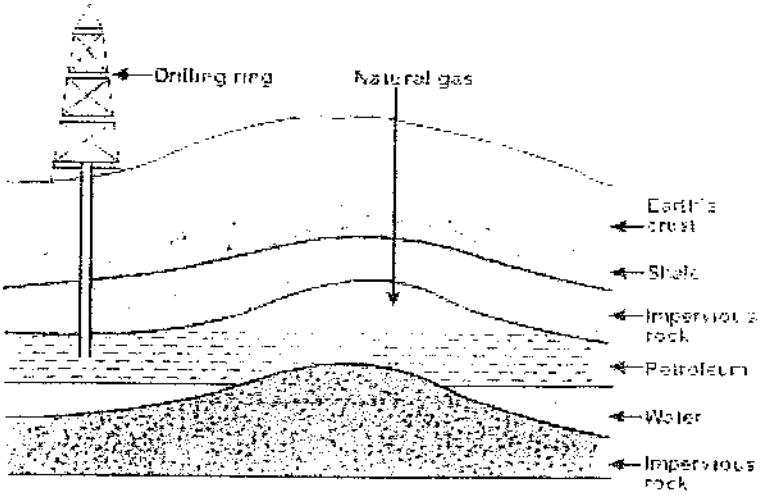


Key:
- coal seam
- other rock









19

POWER RESOURCES

COAL

COAL FIELDS OF PAKISTAN.

1. Baluchistan: **Quetta Coal field** (Sor range, Mach, Dargai)
2. Sindh: **Lower Sindh Coal field** (Lakhra, Sonda, Jhampir, Thar 94%)
3. Punjab; **Salt range Coal field** (Dandot, Pidh)
4. Khyber Pakhtoonkhawa (NWFP): **Makerwal coal field** (Makerwal Gullakhel)

FORMATION OF COAL.

Thousands of years back the whole earth was covered with sea water. We got some dry areas with thick vegetation but those trees were buried beneath the earth surface due to various natural hazards like earthquakes etc. Due to the over burden of the rocks & the heat beneath the earth surface decomposed those trees and coal was formed.

VARIOUS KINDS OF COAL.

Peat: Lowest quality coal with less Carbon & more impurities. It's like animal dung.
Lignite: Better than Peat but it also contains high moisture & ash content.
Bituminous: It is consisted of Steam Coal which, is little better with more carbon. Another is Cooking Coal which, is burnt to produce coke & used in Blast Furnace.
Anthracite: The best quality coal which, is hard & contains more Carbon content.

DESCRIBE THE FACTORS THAT INFLUENCE MINING & USE OF COAL IN PAKISTAN.

Pakistan is a developing country and we cannot use renewable power resources due to lack of finance and technical assistance. We do not have alternative sources of energy due to the requirement of the people and various industries we do mining of coal and use of the various industries especially in thermal power plants. We have fewer deposits of oil & low quality coal.
Uses of Coal: Brick Kiln, Thermal power plants, Domestic.

WHY IS COAL OF LIMITED VALUE TO PAKISTAN?

NATURAL OR PHYSICAL FACTORS.

- In Pakistan we have the quality Lignite to sub-Bituminous coal.
- Low carbon and high ash, sulphur and volatile content.
- Coal seams range from 1-3ft. thick
- Reserves of coal in Pakistan are present with scattered deposits.

ECONOMIC OR HUMAN FACTORS:

- 90% of coals is used in minor industries like ice plants, brick kiln, and lime kiln
- 40% of coal is destroyed due to collapse and fire
- Mining of coal in Pakistan is less profitable, it is highly risky, tough job and low income
- Organizations are not interested to invest.
- The mining of coal is tough & risky.
- Low standard of living of the Coal miners due to less profit.

MINERAL OIL

OIL FIELDS OF PAKISTAN:

1. Upper Punjab (Potwar Plateau)
2. Lower Sindh (Badin)

OIL REFINERIES AND THEIR REASONS BEHIND LOCATION IN PAKISTAN.

1) "**Attock Oil Refinery**" in the Potwar region at Morga due to presence of oil deposits in that region. It should be near the oil fields because the transportation of oil is expensive, time consuming and dangerous.

2) "**Pak-Arab Refinery Company (PARCO)**" at Mehmodkot Multan because it is centrally located and can fulfill the requirements of upper & lower areas of Pakistan.

3 & 4) "**Pakistan Oil Refinery and National Oil Refinery**"are located in Karachi due to ports of imports because we import oil by ship at Kemari & Port Qasim.

5) "**Hab Oil Refinery**" in Balochistan because of Gwader Port & to fulfill the requirements of Balochistan

PROCESS OF OIL EXPLORATION

To explore oil from a place, first of all **surveying** is done with modern methods, then **geological data is studied by Geologists**. On the basis of the data the **final location of oil** exploration is decided, then a **rig is set up** and finally **drilling** is done with the help of **Diamond Bit. Pipes** are lowered & **Pumps** are used to extract oil which is crude oil. Then it is sent to the refinery to purify. Where the process of **Fractional Distillation** takes place to separate various oil fractions.

CRUDE OIL: It is dark, viscous impure oil having much smell and a mixture of various compounds of carbon in it.

PRODUCTS OF OIL:
Petrol, jet oil, diesel & Kerosene oil

BY-PRODUCTS OF OIL:
Paraffin, Pesticides, Petroleum jelly, Plastic, Wax, bitumen (Coal tar)

Uses of Oil: Transport, Power Plants, Industry, Domestic, Agriculture.

TRANSPORTATION OF OIL:

PIPELINES: Its **advantages** are easy, safe, fast, no threat of theft & a large amount can be transported but the **disadvantages** are like it is difficult to be laid in rugged areas, its construction & maintenance cost is high, threat of oil theft & leakage can not be detected.

TANKERS: It is portable and no threat of theft but its **disadvantages** are like it is expensive, bulky, dangerous, difficult to transport & only limited amount can be transported.

DEVELOPMENTS:

- Discoveries of new oil fields
- Use of modern methods of mining & drilling
- More foreign investment like British Petroleum
- More Plastic, pesticides, Lubricant & Fertilizer industries
- Favourable Govt. policies
- More industries need more oil for generators.
- More use in agriculture like in Tube wells & Machinery.

WHY DO WE IMPORT OIL?

- Discoveries of less oil reserves.
- Many vehicles in Pakistan.
- Many industries & lubricant industries.
- More use of generators.
- More use of electrical appliances.

EFFECTS OF SO MUCH IMPORT OF OIL:

- Economic burden
- Negative balance of payment.
- High inflation rate.
- More foreign debt.
- Less money for other projects.
- Foreign dependency.
- Loss of valuable foreign exchange.

NATURAL GAS

GAS FIELD OF PAKISTAN:
SUI, MARI, PIRKOH, MEYAL, DHURNAL, KANDHKOT, TUT, ADHI

DISTRIBUTION OF GAS PIPELINE:
The distribution of the main gas pipeline is from Sui. It goes to Karachi while from Khairpur also a pipeline goes to Karachi. From Khairpur it goes to Quetta, Multan & Faisalabad. From Faisalabad it goes to Lahore, Sialkot & then Azad Kashmir. From Faisalabad it goes to Islamabad then to Peshawar.

WHY THERE IS NO GAS PIPELINE ABOVE PESHAWER & AZAD KASHMIR?
Above Peshawar and Azad Kashmir there is no pipeline because they are mountainous area & due to low temperature it converts into Liquefied Petroleum Gas (LPG). In hilly areas due to height the pressure also reduces a lot.

ALTERNATIVES: In northern areas people use coal, wood, kerosene oil, and LPG as alternatives.

WHY NATURAL GAS IS IMPORTANT FUEL?

- Many reserves in Pakistan.
- Easily & cheaply available.
- Developed system of gas pipelines.
- Enviropment friendly without smoke.
- Unlimited supply to various far flung areas.

TRANSPORT OF GAS & THEIR ADVANTAGES & DISADVANTAGES.
PIPELINES
TANKER/ CYLINDER
DISTRIBUTION OF GAS:
Sui southern gas company (SSGC) & Sui Northern gas company (SNGC)
CNG: Compressed Natural Gas
LPG: Liquefied Petroleum Gas
Uses of gas: Power Plants, Fertilizer industry, Household, Industry, Commercial, Cement & Transport.

State the meaning of the term 'Fossil Fuels' with examples
Any naturally occurring carbon or hydrogen deposit is called "Fossil Fuel." Decomposition of pre-historic animals/organisms formed these fuels e.g. Coal, oil and gas

Name the body that was established in 1959 to promote the development of electricity in Pakistan, including rural areas.
The Water and Power Development Authority (WAPDA)

POWER GENERATION:

Thermal power stations (70%)

ADVANTAGES:

- Can be installed anywhere.
- Low installation cost.
- Less space is required for installation.
- Easy to provide power to local areas with less wastage.

DISADVANTAGES:

- Fossil fuels will eventually be exhausted
- Fossil fuels cause pollution when burnt; not environmentally friendly
- Highly dangerous way to generate electricity.
- Can cause acidic rainfall.
- Hot water drained into sea causes destruction of plants & sea life.

Hydroelectric Power Plant/ HEP or Hydel Plants:(28.3%)

ADVANTAGES:

- Water is a renewable source, which is used to generate HEP and will not be exhausted
- HEP is referred to as white coal; produces power without burning--environmentally friendly.
- Very low running cost.
- Safest way to generate energy.

DISADVANTAGES:

- Have certain physical and climatic requirements for their development
- Initial construction costs are high.
- Large area is required as reservoir.

PRODUCTION OF ENERGY THROUGH HEP (DAM)

A dam stores water behind its wall then water is released through a narrow channel (HEAD) called **PENSTOCK**. Water falls on the **TURBINE OF GENERATOR** which converts the energy into electrical form. It goes to **NATIONAL GRID STATION** then through **CABLES** it goes to **LOCAL GRID STATION** which transmits the energy through **CABLES & PYLONS** to other areas.

LOAD SHEDDING: Planned power cut off

CAUSES OF LOAD SHEDDING:

- There are many financial & technical problems in many power plants.
- In winter the amount of water reduces in dams causing less HEP generation.
- Long transmission lines from the grid stations causing wastage of energy.
- In many dams siltation causes less storage of energy.
- Price of fossil fuel & furnace oil is very high.
- More demand due to industrialization, urbanization & rural electrification.
- Power theft (Kunda System) causing misuse of energy
- A large amount of electricity is given to tribal areas free of cost.

EFFECTS OF LOAD SHEDDING:

- Less working hours of factories.
- Less production in factories.
- Difficult to pay the wages to labour.
- Factories can be shut down.
- Difficult to meet the targets so loss of foreign contracts.
- High production cost due to use of generators & dynamo.

Explain why at some hydroelectric power stations in Pakistan additional dams' wall reservoirs have been made over recent years

This is due to the problem of siltation. Due to accumulation of silt at dams, their capacity to store water decreases and there is a danger of overflow of water, which can be responsible for floods in the nearby areas. So to prevent any type of harm or damage to the dams, additional dam's wall reservoirs have been made.

Nuclear power plants:(1.7%)

ADVANTAGES:

- It provides a large amount of energy continuously.
- It can be installed anywhere.
- It is renewable because of fission & fusion.
- Requires less space.
- Environment friendly.

DISADVANTAGES:

- Fuel rods in reactors produce dangerous rays. People exposed to rays get cancer and their children can be born deformed.
- Difficult to obtain the parts.
- Bans and sanctions are imposed on nuclear states.
- Requires many precautions

WORKING OF NUCLEAR POWER PLANTS:

Nuclear fission releases a large amount of energy within the reactor core. Water passing through the hot core heats a second water supply and turns it to steam, which is sent to the turbine outside.

NUCLEAR POWER PLANTS IN PAKISTAN:

- Karachi Nuclear power plant (KANUPP) Sponsored by Canada
- Chashma Nuclear power Plant (CHANUPP) Sponsored by China
- Chashma 2 Nuclear power Plant (CHANUPP 2) UNDER CONSTRUCTION

ORGANIZATION TO CONTROL NUCLEAR PLANTS:

ATTOMIC ENERGY COMISSION OF PAKISTAN.

State two factors, which have been taken into consideration in deciding the order of villages, which would be supplied with electricity.

The first factor is the return of the cost of laying and maintaining transmission lines and other expenditures. The second factor is population because it is not feasible to provide electricity to villages with a population fewer than **1,000 people in Khyber Pakhtoonistan(NWFP) and Sindh and fewer than 300 in Baluchistan.**

Explain how the provision of electricity has raised the living standards of the people in many areas of Pakistan

- Tube-wells can be installed in villages
- Small-scale industries can be set up in village areas
- Standard of living of people can-be raised.
- People can receive electronic media and have access to IT
- More jobs can be created in the village areas, which will stop migration from villages to city areas.

SOLAR POWER:

The energy from sunlight, solar power, is used in several ways. One way is to collect it in solar cells (photovoltaic cells). They 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. In Pakistan, there is enough potential for solar energy, as there are 250-300 days in several parts of the country. Continuous cloudy days are rare. It can be used for rural electrification, water heating, and pumping water from wells and for cooking purposes. It has the advantage of being safe, pollution free, efficient and in limitless supply. But the construction of power stations is expensive and requires further advancement in technology.

BIOGAS:

It is produced from animal and plant waste. Fermentation of cow-dung gives off methane gas, which is then, used for cooking, heating, and other purposes.
Biogas projects are in the process of development. Although, Biogas is a cheap source of energy, it means that 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 organic nutrients. Moreover, it would increase pollution because methane is a greenhouse gas.

WIND ENERGY: It can be developed in those areas where heavy wind blows. It is very cast, safe, environment friendly and renewable source. Recently in Gadani and other areas of Pakistan have been chosen for its installation.

Non-renewable sources of energy will be eventually exhausted; explain the problems and prospects of developing renewable resources in Pakistan.
Non-renewable power resources will eventually be exhausted because everywhere in the world the deposits are preserved in a limited amount. So after its consumption they will be finished. Due to these reasons and the fact that we do not have much reserves of oil, we have to find ways to use renewable sources of power but we have the following problems due to which we cannot use solar energy, wave energy and wind energy – the sources of renewable power:

- Lack of finance
- Lack of technical assistance
- Lack of machinery required for mining
- Lack of political stability
- Lack of awareness amongst people
- Inaccessible area

Explain why in the Sixth Five-Year-Plan, for example, emphasis was placed on the use of renewable rather than non-renewable sources of energy.
This is because Pakistan is a developing country with fewer deposits of fossil fuels. We have to import mineral oil form other countries to run our industries and thermal power stations, which puts a burden on our economy. So to save our valuable foreign exchange we should use solar energy, wind or wave energy as substitute for oil.

SOLAR POWER

Advantages

- safe.
- Less space required.
- pollution free.
- efficient .
- Low running cost.

BIO-GAS

Advantages:

- Safe and efficient.
- Less deforestation
- Saving of chemical fertilizers by using bio-slurry.
- Less space required.
- Low running cost.
- No skilled labour is required.

WIND ENERGY

ADVANTAGES:

- Require less space and land beneath can be used.
- Environment friendly
- Renewable source
- Low running cost because wind is free.
- Can be set up in the areas away from fossil fuel.

BIO-MASS:

ADVANTAGES:

- Always available when needed.
- Growing bio-mass crops will produce more oxygen and will absorb carbon dioxide.
- Less money spent on foreign oil.
- Can be installed easily.
- Less space and low running cost.

GEO THERM:

ADVANTAGES:

- Reliable source
- Large amount of energy is produced.
- Environment friendly.
- If technology is good can be installed anywhere.
- More jobs for locals.

WAVE ENERGY:

ADVANTAGES:

- Can produce a large amount of energy.
- Waves are predictable for energy generation.
- It does not produce green house gases.
- Safe way to generate energy.

DISADVANTAGES:

- construction of solar power station is expensive.
- Skilled labour is required.
- Can not be used in cloudy & rainy days.

DISADVANTAGES:

Causes pollution

- Limited amount of gas is produced.
- Land would be infertile due to use of natural manure.
- Can cause food crisis with limited agricultural land.
- Can not be used in city areas.

DISADVANTAGES:

- Difficult to maintain
- Causes noise if not maintained regularly
- Can cause problems of signals of mobile & TV.
- Birds & bats can be killed.
- Not always reliable depends upon wind power.

DISADVANTAGES:

- Agricultural waste will not be available for basic crops.
- Additional cropping is required in those areas.
- Some are associated with animal waste and are relatively small.

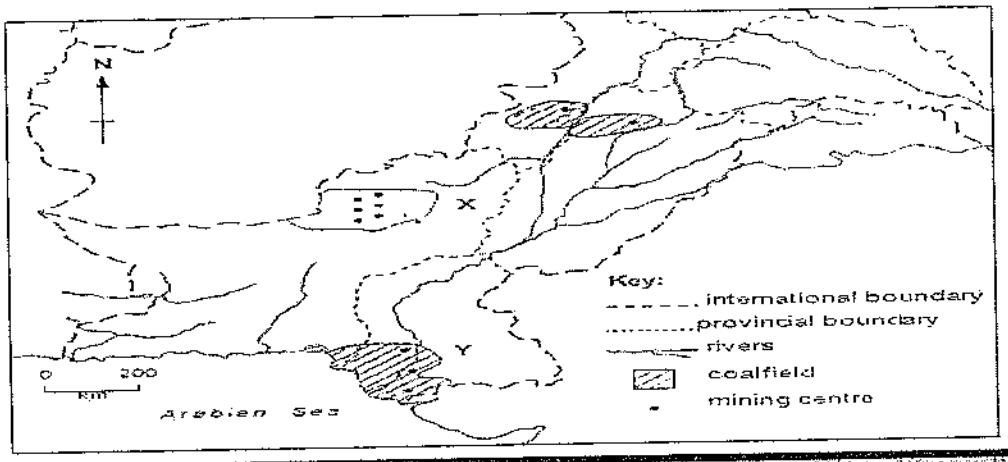
DISADVANTAGES:

- High installation cost.
- May release harmful gases.
- Can't be used in those areas where steam is not available.
- Can destroy plants due to heat.

DISADVANTAGES:

- High initial cost.
- Highly qualified people are required.
- Difficult to maintain.
- Requires specific Coastal conditions.

(b) Study the map Fig. 5 showing coalfields and coal mining centres in Pakistan.



Study the map Fig. 5 showing coalfields and coal mining centres in Pakistan.

(b) (i) Name the coalfield X and one of the mining centres there.

Quetta (coalfield) [1]
Sor Range, Degan, Mach, Khost, Shahrig, Harnai [1]

(ii) Name the coalfield Y and one of the mining centres there.

Lower Sindh (coalfield) [1]
lakhra, Jhimpir, Sonda [1]

State the two main uses of coal mined in coalfield X

Brick making/brick kilns
(mixed with imported coal) For steel making/in the blast furnace Briquetting [2]

(c) Explain why coal has to be imported.

Not good enough for iron smelting/no metallurgical coal/needed for Pakistan Steel
Need for coal to mix with poorer grade
Difficult to mine/seams thin/seams contorted
Not enough mined in Pakistan/lack of technology/lack of finance [3]

(d) Hydro-electric power (HEP) is called a 'renewable' source of power.

(i) State three physical conditions necessary for the development of an HEP scheme.

- Wet climate/moderate/high rainfall/over 750 mms
- Water from glaciers/snowfields
- Deep valley
- Steep sided valley
- Narrow valley
- Impervious/impermeable rock
- Large drainage basin/large river/large catchment area
- Cool climate/low evaporation
- Strong/hard rock
- Reliable water supply [3]

(ii) Why is it important for Pakistan to develop renewable power sources?

- Reserves of fossil fuels running out
- Named pollution/not environmentally friendly/causes global warming/greenhouse gasses
- More readily available

- Schemes in remote areas/can be built away from fuel resources
- Low running costs of HEP, solar power, wave energy etc./cheaper in the long term
- Fossil fuels expensive
- Fossil fuels are imported
- Nuclear power dangerous

[4]

(ii) Suggest why the amount of water stored in the reservoir is decreasing.

- Siltation/silting
- Due to soil erosion/deforestation/overgrazing/river deposition
- Less water supply
- Due to climatic change/lower rainfall/higher temperatures/more evaporation
- Increased usage (max 1)

[2]

(iii) What can be done to stop the amount of water in the reservoir from reducing further?

- Silt traps
- Afforestation }
- Terracing } of slopes
- Dredging/removal of silt
- Reducing wastage/pollution

[3]

(d) (i) Why is HEP (hydel) a cheap source of electricity?

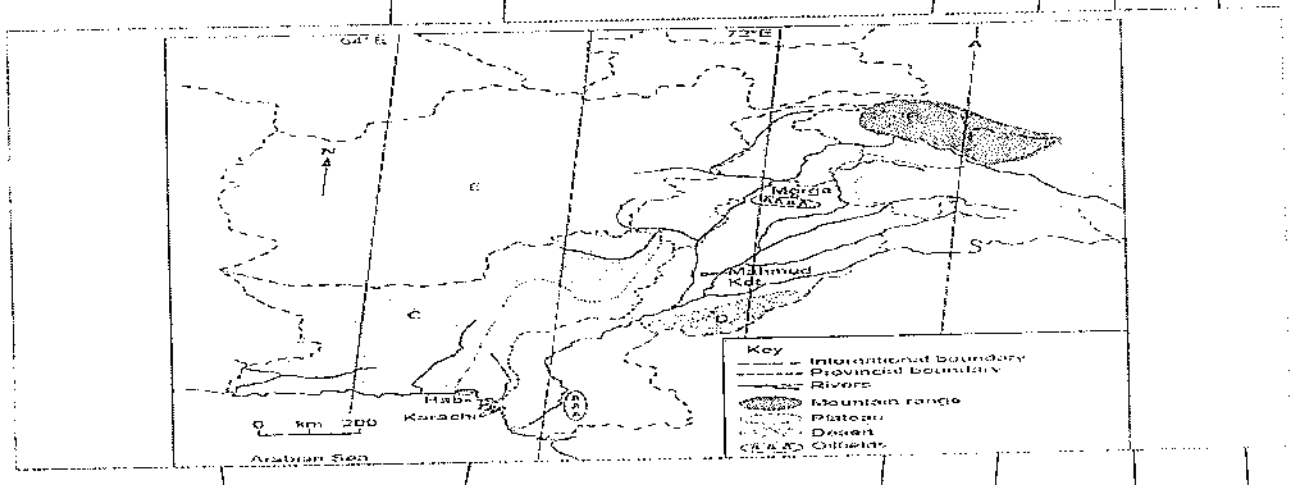
- Free raw material/rain in mountains
- Will never run out/renewable
- Not imported/mined/drilled
- Efficient/high power output

[2]

(ii) What problems occur when supplying electricity from reservoirs to areas of high population?

- Long distance to areas of use/high population
- Cost of wires and poles/difficult terrain/Pakistan cannot afford this/shortage of
- money
- Loss by damage
- Loss by theft
- Loss of power by resistance/transmission

[3]



(a) (i) Locate an oil refinery near the coast, and give one reason why it is there.

Refinery:
Karachi / Keamari / Bin Qasim

Reason:
Imported oil
Demand from named area
Oilfields in Southern Sindh (1+1) [2]

(ii) Locate an oil refinery in the province of Punjab, and give one reason why it is there.
Either:
- Mahmood Kot / PARCO
- Pipeline from Karachi / port
- Demand from named area / Multan

or:
- Attock / Morga
- Local oilfield in Potwar plateau
- Demand from named area / Islamabad / Rawalpindi [2]

b) State two ways in which refined oil can be transported in Pakistan, and give an advantage and disadvantage of each.

Pipeline
- Bulk transfer / large quantities
- Cheap (after cost of building)
- But – only to a few big centres
- Costly to build and maintain
- Problem of leakage
- Only a single product (e.g. Diesel)

Railway
- Can go to more places than pipeline
- More products can be carried
- But – smaller quantities
- Expensive
- Chance of accidents (NOT explosion)

Tanker / Lorry
- Can go anywhere by road
- More products can be carried
- But – expensive
- Heavy / can only carry small amounts
- Chance of accidents
- Theft 1 + 1 + 1 for each of 2 ways [6]

Study Fig. 3 which shows some examples of the four main uses of oil.

(c) (i) Name another by-product A.
wax / synthetic rubber / detergent / pharmaceutical products / furnace oil / etc. [1]

(ii) Name the fourth main use of oil B.
fuel [1]

(iii) With reference to Fig. 3 and using your own knowledge, explain how oil products are important to either farming or manufacturing.

farming
- fuel for machines
- fuel for transport
- electricity generation – for power
- fertiliser – for growth } raw material
- pesticides – for healthy growth }
- tarmac for better roads / metalled roads
- lubricants for machines

manufacturing
- fuel for machines
- fuel for transport vehicles
- electricity generation – for power / heat / light
- fuel for heating
- raw material for named product
- tarmac for better roads / metalled roads
- etc. (the candidate may choose to link this answer to Fig. 3)
- (credit ONLY farming OR manufacturing, general answer max. 2) [6]

(d) (i) Which gas field produces most natural gas in Pakistan?

Sui [1]

(ii) Name two industries in Pakistan that use natural gas as a raw material.

- fertiliser
- cement
- chemical
- (not power) [2]

(iii) Why is natural gas an important fuel in Pakistan?

- Can reach remote areas in cylinders
- Easier to transport than coal
- Alternative to oil in vehicles
- Used in power stations
- Cleaner than oil or coal
- Reduces dependence on imported fuels
- Shortage of coal and / or oil in Pakistan
- Cheaper compared to another named fuel

[4]

(iii) Why is coal imported in addition to that produced in Pakistan?

- Poor quality of local coal
- Mixed with local coal
- Not enough local coal

[2]

(a) Most hydro electric power (hydel) schemes are in Northern Pakistan.

(i) Name two large dams and the rivers on which they are built.

- Tarbela on river Indus
- Mangla on river Jhelum
- Warsak on river Kabul
- Must name both dam and river for one mark [2]

(ii) Why do the reservoirs of these dams hold large quantities of water?

Deep valley/large valley/high dam
Steep sides
Large river/permanent flow/water from snowfields/glaciers
Low evaporation/cool climate,
High rainfall [3]

(b) Study Fig. 4, a diagram showing how hydro electric power is made.

Name the machine A, and explain how it uses the flow of water to make electricity.
A – turbine/generator/power station
Turbine spins/rotates/moves [2]

(c) Study Fig. 5, a pie chart showing the percentage use of electricity.

(i) Which sector uses the largest percentage of electricity?

Domestic/homes [1]

(ii) State two other large users of electricity shown on the chart and explain what they use it for.

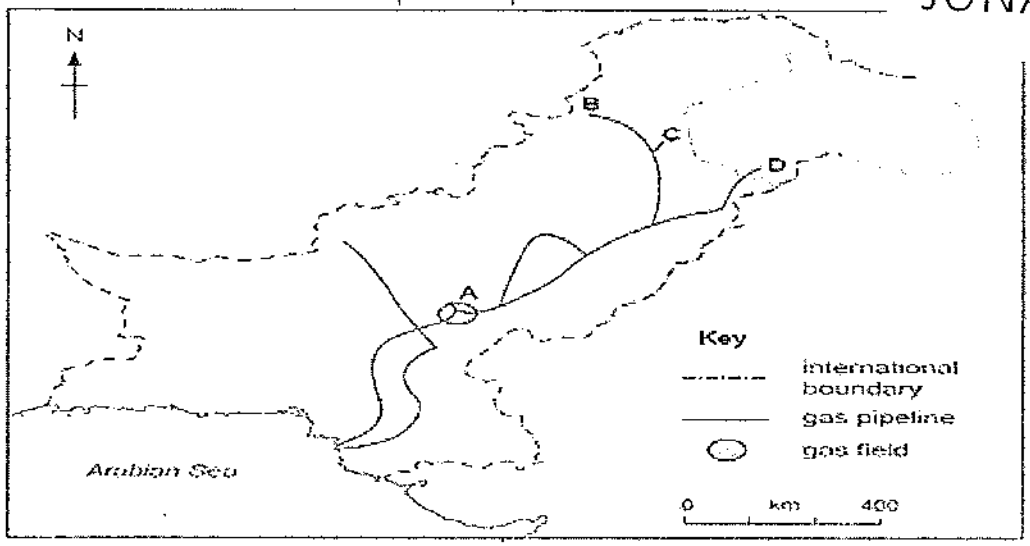
Industry – for machinery, computers, lighting, air conditioning etc
Farming – for much of above, tubewells, drying crops, etc.
Offices – computers, lighting, communication, air conditioning etc.
One mark for two large users
Three marks for how the electricity is used (2+1) [1+3] [4]

(iii) What problems are caused when the electricity supply to factories breaks down?

- Stops production/slows production/output reduced
- Damages machinery short circuit/explosion
- Damages goods/affects the quality e.g. food, cloth
- Delays contracts/orders
- Loss of money/profit/orders [4]

(d) (i) Name 2 environmentally-friendly ways of making electricity other than HEP.
Any two of solar, wind, tidal, biogas, bagasse, geothermal [2]

(ii) Explain why each of the two ways you have named could be used in Pakistan.
Solar – long hours of sunshine/many sunny days/many days of clear skies
Wind – Indus plain flat, on mountains, windy in coastal areas, Balochistan, mountains
Tidal – for coastal areas esp. Karachi
Biogas – cheap, small scale, disposes of waste product
Bagasse – many sugar cane factories, disposes of waste product, cheap, small scale
(Geothermal – not in Pakistan) [2]



(a) Study Fig. 4, which shows the gas pipelines in Pakistan.
(i) Name the gasfield A.
Sui [1]
(ii) Name the cities B, C and D at the ends of the pipelines.
B Peshawar, C Islamabad, D Sialkot/Jammu [3]
(iii) State two ways in which gas can be supplied to areas away from pipelines.
Changed to a liquid/LPG/CNG
Cylinders
(Pressurised) tankers [2]
(b) Study Fig. 5, which shows the uses of natural gas in Pakistan.
(i) State the largest use of natural gas.
power [1]

(ii) Name a use in the 'other' sector.
commercial/office
cement
transport/cars/lorries/motor vehicles
named industry (not on pie chart) [1]

(iii) What is natural gas used for in homes and why is this fuel chosen?
Use (res. 1)

Heating
Cooking

Why (res. 1)

- Available in cities/towns
- Cheaper than oil or coal
- Easier than collecting firewood
- Less bulky/easier to transport than coal/wood
- Cleaner than coal/wood/oil

(Reserve 1 for each of use and why) [3]

(iv) Why is natural gas called 'non-renewable'?

it will run out/is not being replaced/etc. [1]

(c) (i) Name two raw materials, apart from natural gas, which are used to make fertiliser.

- Nitrogen
- Sulphur
- Gypsum
- Potassium/Potash
- Phosphate
- Ammonia
- Fish/animal remains/bones [2]

(ii) Explain why most fertiliser factories are in the Punjab and northern areas of Sindh.

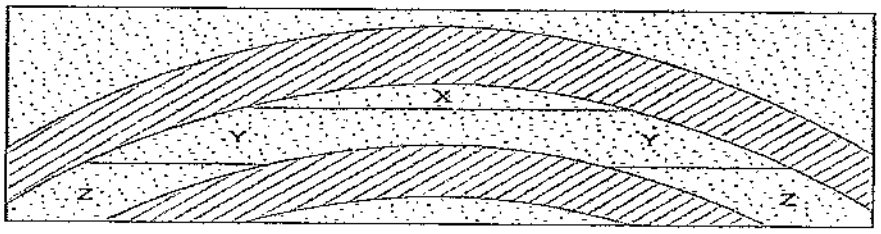
- Main farming area }
- Deep soil/fertile soil } max 2 for natural farming inputs
- Good irrigation }
- Less flooding now to replace nutrients
- Large population to feed
- Good roads for transport/low transport costs
- Named raw material near, e.g. Rock salt and Gypsum at Khewra/Salt Range
- Gas at Sui [4]

(iii) Why is it important that Pakistan manufactures its own fertilisers?

- Expensive (to buy)
- Reduce imports/cannot afford to import fertilisers
- Improves balance of payments/fertilisers burden the economy/greater crop production
- improves the economy
- Heavy to carry very far
- Produce more food for large population reduces malnutrition
- Produce more crops for export
- Increases employment/reduces poverty [3]

(d) What environmental damage can occur when a new fertiliser factory is built in a rural area?

- Loss of farmland/land lost for factory and roads
- Damage to roads
- Water pollution/pollution of river/canal/irrigation water/water supply
- Noise pollution
- New quarries/pits
- Dumping of waste (only credit if not given as a form of pollution)
- Land clearance/loss of habitat/soil erosion
- Traffic congestion
- (example of damage linked to a location max.1) [4]



(a) (i) The area of rock containing oil. Y [1]
(ii) The area of rock containing natural gas. X [1]

(b) (i) What is meant by the term 'porous rock'?
Has pores/holes/spaces (to hold liquids/gases)
(to let liquids/gases pass through) [1]

(ii) Why is the feature in Fig. 5 called an oil 'trap'?
- Cannot get through rocks around it
- Between layers of non-porous/impervious/impermeable rock
- Rises to top of anticline/top of bend [3]

(iii) How is oil extracted from this 'trap'?
- Derrick/drilling rig built
- Drilling (oil well)/oil well constructed/pipes inserted
- Diamond/tough metal drills into rock
- Cooled with mud mixture/water
- Oil rises when pressure released/pumped up/sucked up
- Valves to control flow into pipeline
- Derrick removed/dismantled after oil is flowing [5]

In a recent study it was stated that over 46% of thermal power in Pakistan is generated in the area around Karachi.

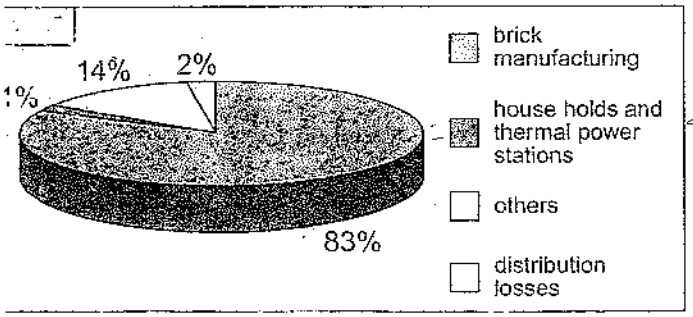
(d) (i) Why is so much thermal power generated in this area?
- Gas/Oilfields in Lower Sindh
- Named oilfield (max. 1)
- Coal mines in Lower Sindh
- Named mining centre/Lakrha/Jhimper/Sonda
- Gas pipeline from Sui
- Imports of oil at Karachi
- Demand from industry
- Demand from large population
- Other demands e.g. railway (max. 2)
- Oil refineries at Karach [3]

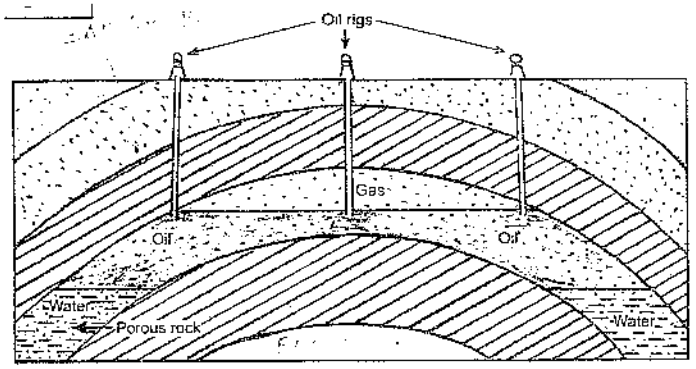
(ii) What problems are created when there are many thermal power stations in one area?
- Air pollution and details (max. 2)
- Shortage of oil/gas/coal supply
- Depletion of oil/coal reserves in the area
- Lack of investment in renewable energy generation
- Hot water flows out into rivers

(e) What is 'load shedding', and how does it affect industry and business in Pakistan?
- **Definition (res. 1) Planned power cuts**
- Effects Interrupts production
- Damages machinery
- Cannot meet deadlines
- Loss of quality
- Loss of orders
- Loss of money/profit
- Cost of generators
- Lights/computers/freezers/air conditioning/heating etc. stops (max 2)
- Transport/traffic problems

[4]

ectoral consumption of coal (Fig 8.1)

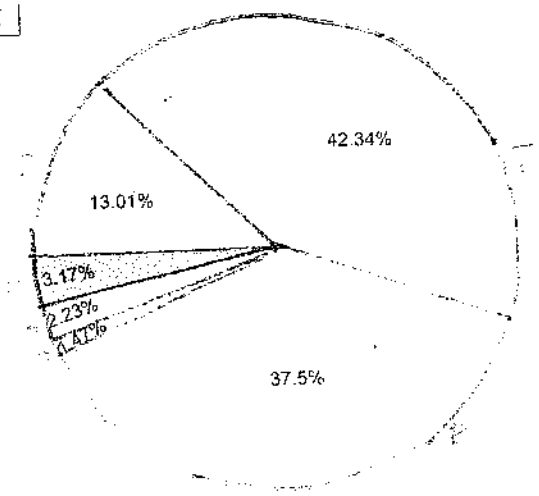




KEY	
	Porous rocks
	Non-Porous rocks

An anticline oil trap. (Fig 8.3)

Fig. 8.

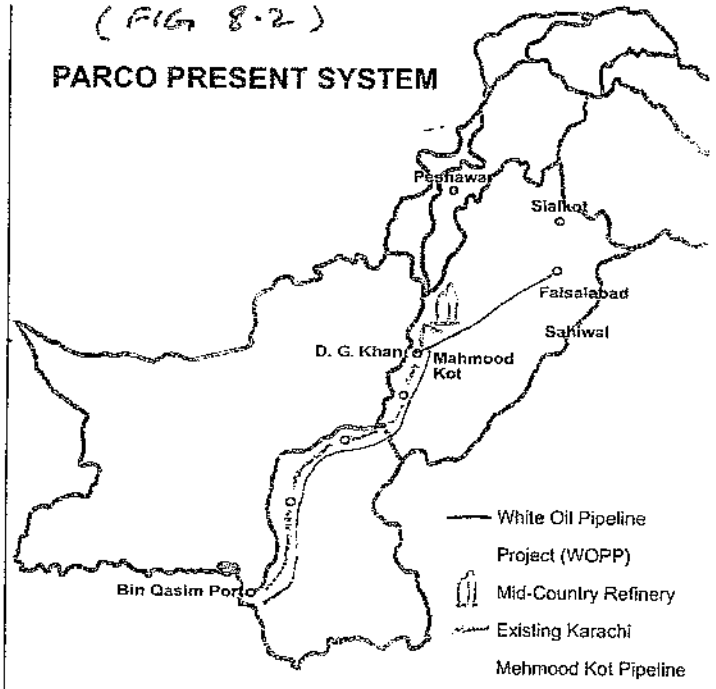


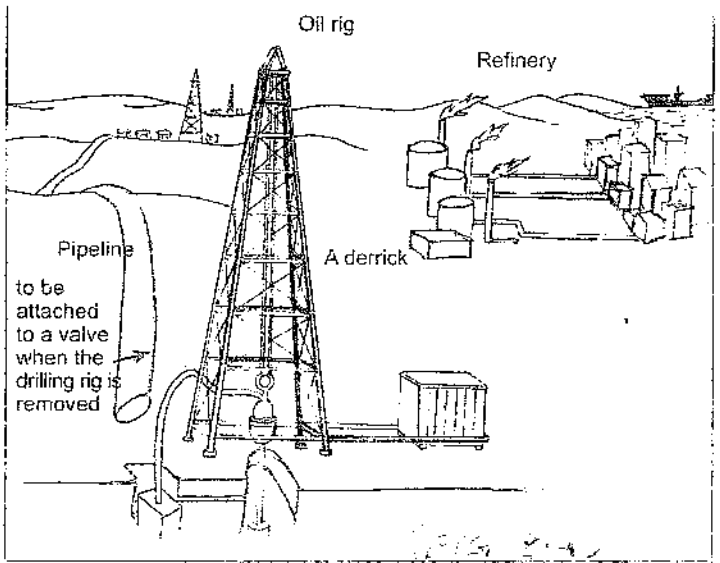
Sector

Transport		Domestic	
Power		Government	
Industry		Agriculture	

Sectoral consumption of Oil and Oil Products

(Fig 8.2)





The derrick is dismantled after oil has been found. The drilling rig is replaced by pipes and valves which control the flow of the oil. Then it is transported through pipelines to the refineries.

Supply of natural gas to major cities of Pakistan through pipelines from Sui

JUNAID AKHTAR

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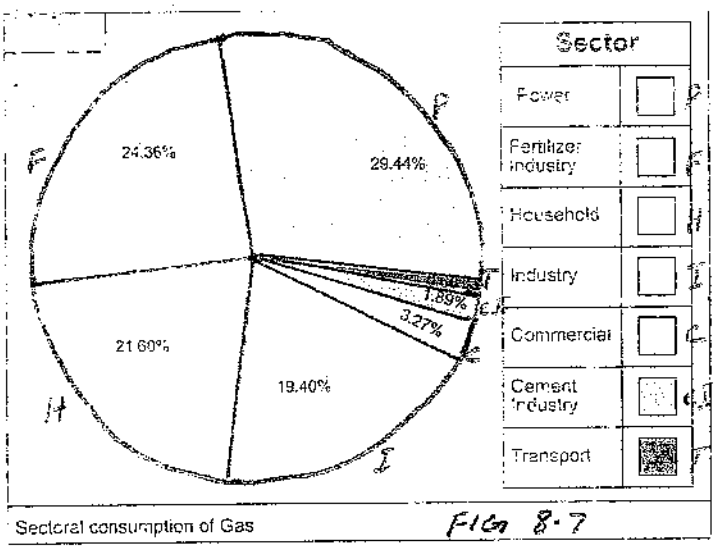
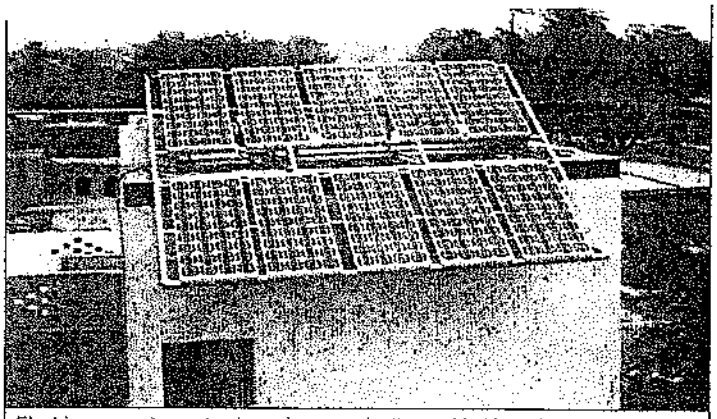
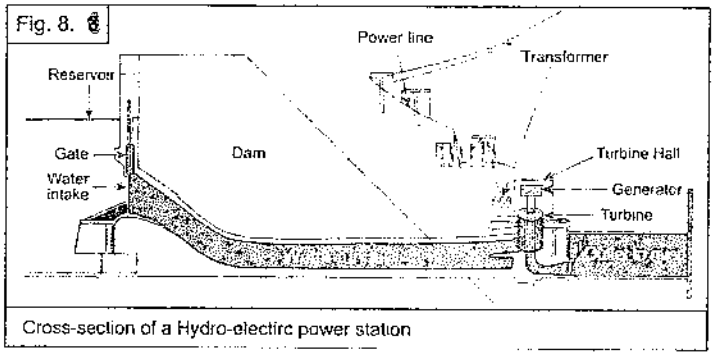


Sectoral consumption of Gas

FIG 8.7



Electric power at remote places is conveniently provided by solar power systems like this one, installed at the Womens Art Centre, Okara. (FIG 8.9)



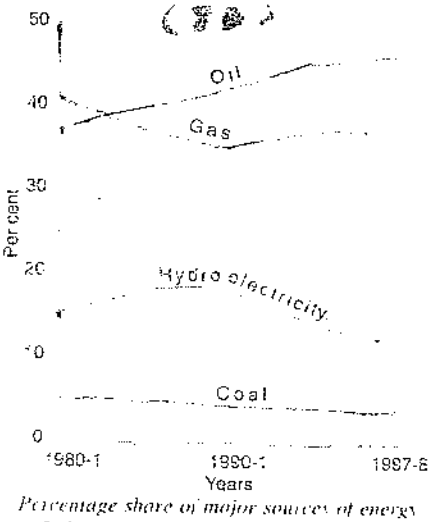
Cross-section of a Hydro-electirc power station

000

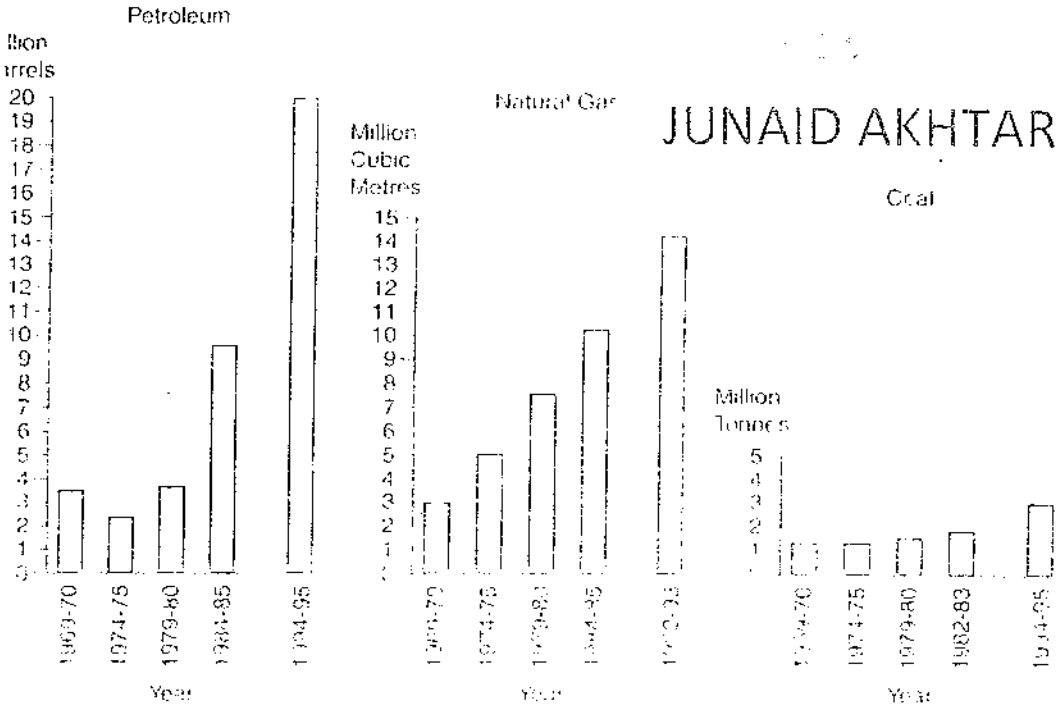
(8C)

Year	Hydroelectricity	Thermal	Nuclear	Total
1971-2	3 679	3 789	104	7 572
1980-1	9 043	6 869	150	16 062
1990-1	18 243	22 345	385	40 973
1999-2000	19 288	46 064	399	65 751

Source: The Economic Survey of Pakistan 2000-1, and other years

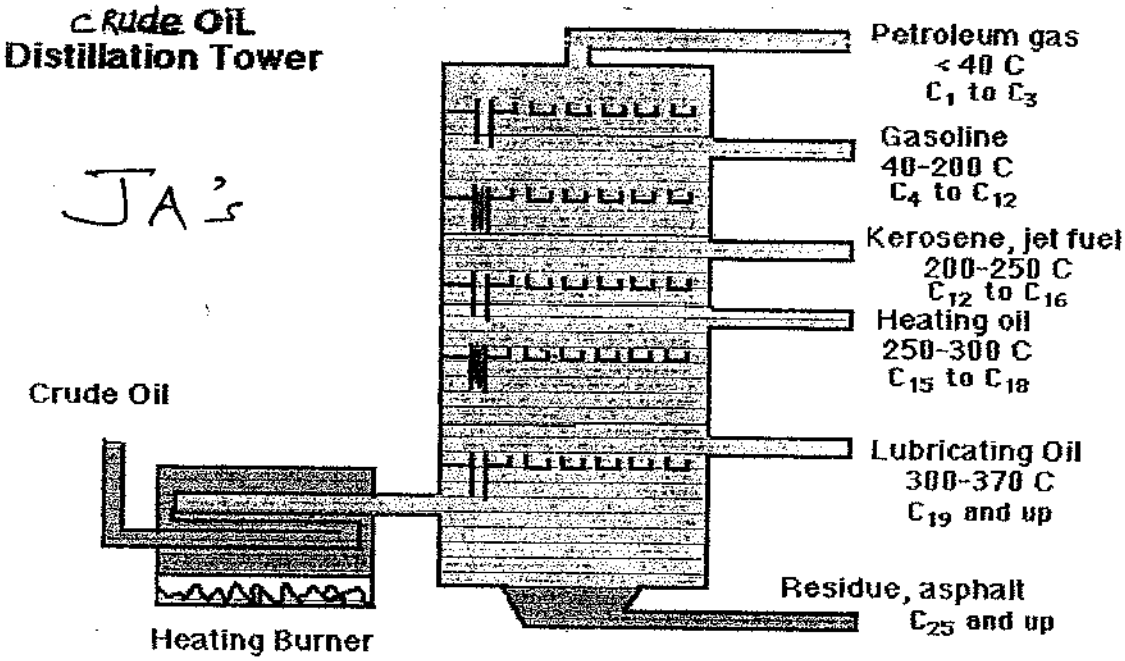


Percentage share of major sources of energy in Pakistan.

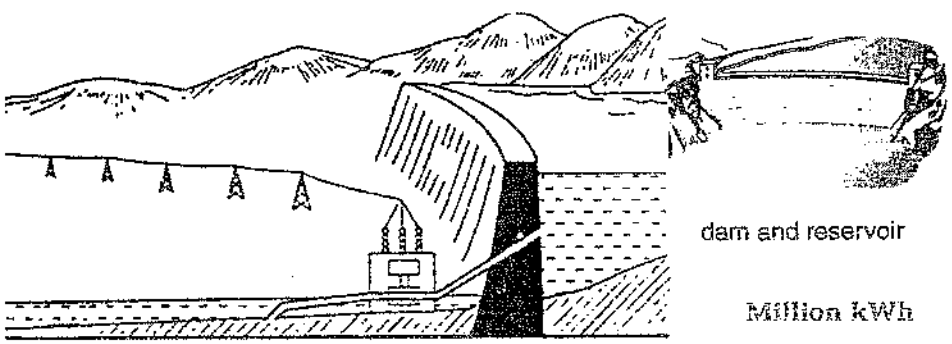


c Rude Oil Distillation Tower

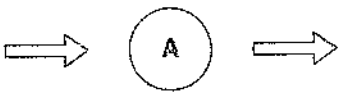
JA's

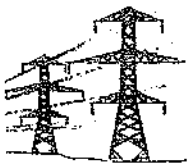


C. Ophardt c.1998

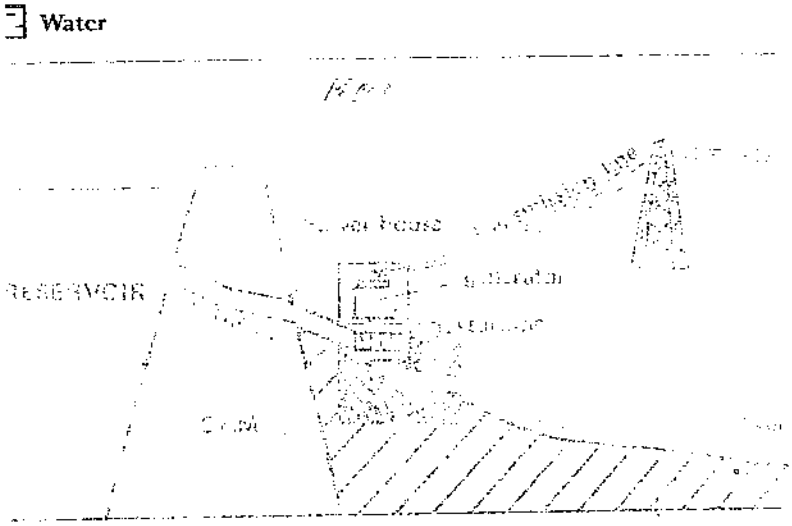


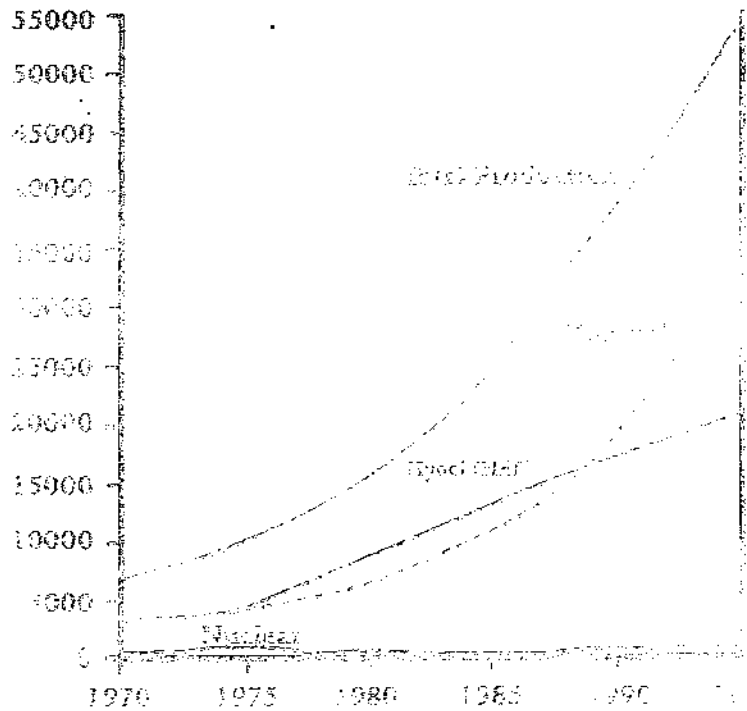
dam and reservoir



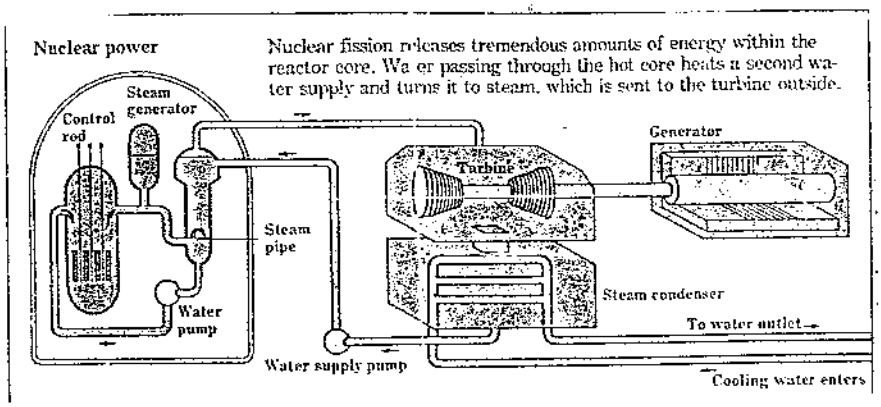


transmission g





Generation of Electricity in Pakistan



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