Unit 1: MINERALS

A mineral is a naturally occurring inorganic substance with definite chemical compositions and physical properties. Minerals occur naturally on or beneath the surface of the earth.

Examples of minerals in Malawi include: uranium, coal, lead, limestone, gold and copper.

TYPES OF MINERALS

I. METALLIC

These are minerals that contain metal in raw form. They can be divided into two groups:

a. Non-ferrous minerals-They contain minerals such as tin, aluminium and copper.

b. Ferrous minerals-They contain iron.

II. NON- METALLIC

These do not produce metals when processed e.g. gypsum, sulphur and salt.

III. ORGANIC

These are minerals that are formed from remains of vegetation and animals e.g. coal and petroleum.

IV. ROCK

These include granite, limestone, sandstone and marble.

USES OF MINERALS

1. **Copper**

- It is used in making coins
- It is used in manufacturing of phosphor- bronze. Which can be used in making parts of engines.
- It is used in manufacture of electrical equipment as it is a good conductor of electricity.

2. **Coal**

- It is used as a raw material for production of products such as drugs and fertilizers.
- It is a source of energy
- It is used for making coke (a substance that metal refiners use to remove the mineral from an ore)

3. **Iron ore**

- It is used in steel production
- It is used for making the body structure of vehicles
- It is used for metal extraction
- It is used for making surgical equipment

4. **Gold**

- It is used as a medium of exchange. It is a basis of the world's currencies.
- It is used in manufacturing of gold paint
- It is used in the manufacture of jewelry and ornaments
- It is used for making gold tooth fillings

5. **Aluminium**

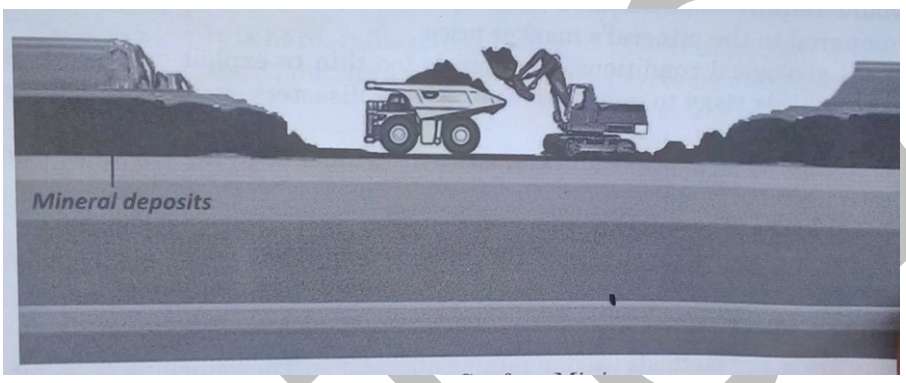
- It is used in manufacturing of aircrafts, railway carriages, buses and motor cars
- It is used for manufacturing of aluminium paint

- It is used in manufacturing of aluminium foil used in packaging of different products

6. **Uranium**
   - It is used as a source of energy (generation of nuclear power)
   - It is used in manufacturing of bombs and missiles
   - It is used to propel space ships
   - Radio isotopes are used in medicine for diagnosis and research

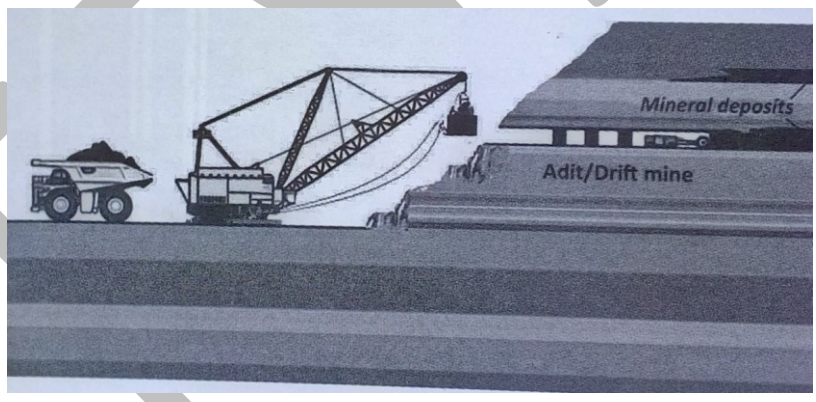
MINING METHODS

1. **Open cast mining /strip/open pit**



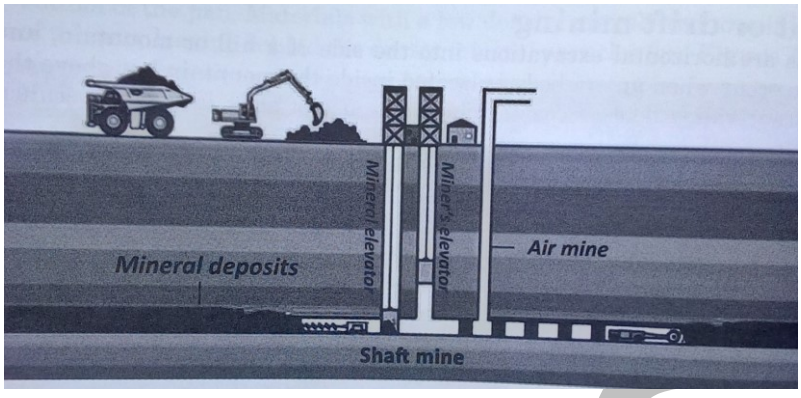
This method involves striping of overlying unwanted material. It is used in mining of minerals that are near the surface of the earth.

2. **Adit or drift**



This involves the use of horizontal tunnels to extract minerals from a gently sloping area. It is also an underground mining method.

3. **Shaft mining**



This is an underground mining method. It involves digging vertical shafts and galleries beneath the Earth's crust up to where mineral deposits occur.

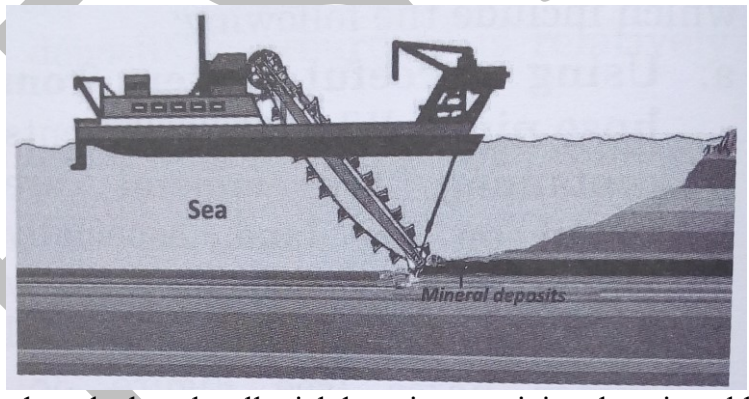
4. **Solution mining**

This involves sinking of pipes at great depth below the Earth's surface to the mineral deposits. In this method pipes are used to direct superheated water to the mineral ores with the aim of dissolving the minerals.

5. Drilling

This method is used to extract petroleum. Large metal structures called derricks are used where several steel pipes are connected until crude oil is accessed.

6**. Dredging**



This is the method used when the alluvial deposits containing the mineral lie deep down the floors of water courses like lakes, oceans and river mouths. Dredging is done using a machine called a *dredger*.

FACTORS TO CONSIDER BEFORE MININIG

- The mineral content or grade of the ore with regard to cost of mining.
- Local levels of technology and power supply.
- Market demand must exceed the environmental problems likely to be caused.

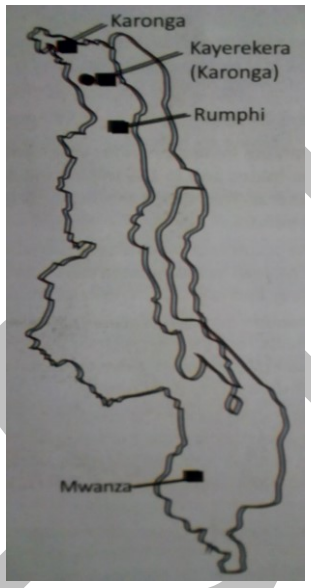
EFFECTS OF MINING ON THE ECONOMY

- Mining provides employment opportunities as people are employed as skilled and unskilled workers
- It stimulates development of infrastructure e.g. development of roads and communication networks
- Increase in export earnings when minerals are exported to different countries
- Development of settlements and towns when people move to these areas for employment

EFFECTS OF MINING ON THE ENVIRONMENT

- Loss of lives as people and animals may fall into deep pits left after mining
- Spread of waterborne diseases when water collects in the mining grounds
- Reduction and extinction of animal and plant species when land is cleared for mining activities
- Loss of top fertile soil as the soil is loosened leading to erosion
- Displacement of people when minerals are identified in a particular area.

URANIUM IN MALAWI



Map of Malawi showing areas where uranium is found

In Malawi uranium is mined in Karonga at a place called Kayerekera. This is the case despite its existence in many areas like Rumphi and Mwanza.

CHARACTERISTICS OF URANIUM

- It is one of the heaviest minerals
- It is radioactive
- It is found inside ores such as pitchblende
- It is malleable
- It is silvery white

OCCURRENCE OF URANIUM

It occurs as a pitchblende which is a black uranium oxide found in hydrothermal veins.

WAYS OF MINING URANIUM

1. **Underground mining**- This method involves the creation of underground mines by using shafts and tunnels. Miners must go underground to build machinery and access the uranium ore.
2. **Open pit mining**- This method is used to remove near surface deposits. It requires removal of rock and soil to access the ore.
3. **In-situ leaching**- It involves combining the mining and processing technology.
   A mixture of chemicals is injected into earth through a series of patterned holes. These chemicals separate the uranium ore from surrounding rock, the mixture is recovered for further processing.

PROCESSING URANIUM

Once uranium has been extracted it must be processed into usable yellow cake. This process is commonly called milling. There after it goes through the following processes.

1. **Crusher**
   Large particles of ore are ground into smaller sizes and sent to the mill through the conveyer belt for further treatment.

2. **Mill**

The ore is ground further into much smaller particles in order to increase surface area for easy extraction.

3. **Cyclone (sifting basket)**

This part uses high pressure water to separate the material by particle size due to their difference in Mass. This works like the sifting basket or whirlwind. As a result there is cyclone overflow (the fine material that is lighter) and underflow (the course material that is heavier).

4. **Pre-leach thickener**

To thicken means concentrating or putting something together. A floccuntant is added to the ore to concentrate the ore/ soil particles before sending it to the leach section. The floccuntant is the same chemical used at water treatment plant.

5. **Leaching**

To leach means to dissolve or pass out by percolating liquid or filter down through some material. Dilute sulphuric acid is added to dissolve uranium from the ore into solution. Metals dissolve in acid.

6. **Resin in pulp**

At this stage uranium is transferred from the solution into solid. The slurry (thin mixture of liquid especially water and fine particles of insoluble matter such as cement, clay, plaster and soil) which has uranium in solution is mixed with resin which absorbs the uranium like a sponge does when dipped in water. The resin is in a plastic polymer which is negatively charged.

7. **Elution**

To elute means washing one material from another using a solvent. Uranium is stripped from resin back into solution using dilute sulphuric acid.

8**. Gypsum precipitation**

To precipitate means solidifying or crystallizing something. Lime is added to the solution of uranium in order to remove calcium and other unwanted metals which are present in solution. The addition of lime is also aimed at neutralizing the acid in the solution.

9**. Uranium precipitation**

At this stage uranium is crystallized or solidified from solution. The yellow solution of uranium is mixed or reacted with hydrogen peroxide to form uranium octaoxide which is solid.

Summary: In processing uranium the following steps are followed.

- The ore is crushed and the rock is pulverized into very fine fragments.
- Water is then added to the fine fragments to form the slurry which is then mixed with sulphuric acid or an alkaline solution to release the uranium from the ore.
- Uranium oxide is precipitated from the acid or alkaline solution.
- It is then sent to another factory for further processing to enrich it and to make its products.

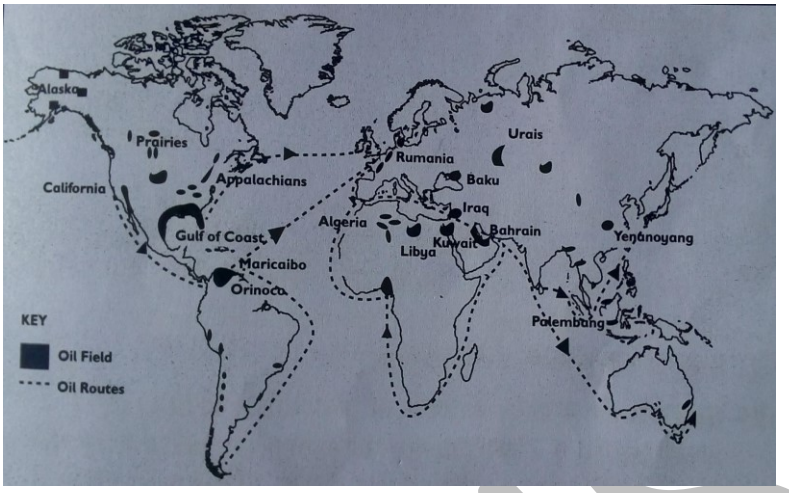
IMPORTANCE OF URANIUM MINING IN MALAWI

- It is source of foreign exchange earning
- It is source of employment to people
- It is source of revenue to government
- It has led to development through provision of social facilities

ENVIRONMENTAL IMPACTS OF URANIUM MINING IN MALAWI

- The mining of uranium has led to loss of valuable land
- It has led to destruction of vegetation resulting in migration of wildlife
- The hollow mines may be filled with water creating breading zones of mosquitoes
- In some cases the exposure of uranium to human beings can lead to genetic defects
- During open cast mining the machines produce a lot of noise leading to noise pollution

Unit 2: PETROLEUM IN THE WORLD



World map showing areas where petroleum is found

- Petroleum is an organic mineral that comprises of hydrogen and carbon occurring in the pore spaces of sedimentary rocks that form in water bodies.
- The name petroleum originates from two *Latin* words namely *Petra* which means rocks and *oleum* which means oil.
- Therefore, petroleum simply refers to the oil that originates from rocks.

The following are world producers of crude oil:

Algeria, Ecuador, Nigeria, Iran, Venezuela, Saudi Arabia, Gabon, United Arab Emirates, Iraq, Indonesia, and Libya.

FORMATION AND OCCURRENCE OF PETROLEUM

Petroleum form under the following conditions:

1. **Heat**- Presence of heat creates a good environment enabling bacteria to act upon dead plants and animals.

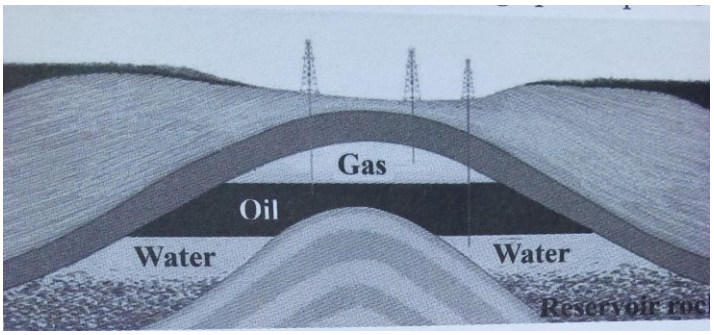
2**. Earth movements**- Movements inside to the Earth surface especially those caused by compression force for oil to be squeezed out of these sedimentary rocks and it accumulates in its own layer.

3. **Length of time**- There has to be sufficient time to give room for aquatic animals to die and produce enough fossils for oil formation.

4. Absence of gases- It is important for air molecules to be absent in the formation process so as to avoid unnecessary reactions between molecules of hydrogen and carbon. Petroleum occurs in its natural state called **crude oil** which is a compound of hydrogen and carbon.

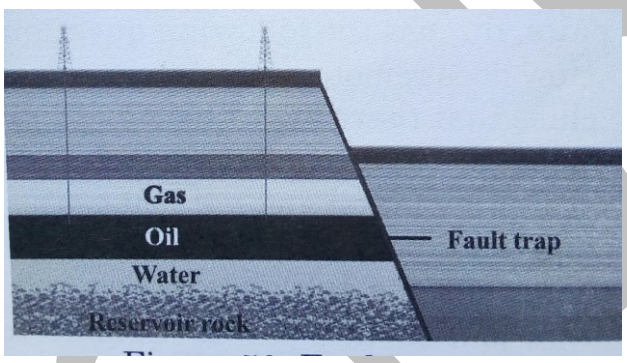
It occurs in pole spaces of sedimentary rocks that form under the sea due to accumulation of sediments brought about by erosion. It occurs in the following ways:

1. Anticlinal traps



This is the common way of oil occurrence. Earth movements in form of compression forces cause the porous rock to be folded to form anticlines and synclines**.**

2. Fault traps



- Faulting happens when Earth movements take place in form of compression and tension forces. This causes porous and non- porous rocks to be adjacent to each other.
- The oil is then trapped in the tilted layer of the reservoir rock and it is prevented from escaping by the cap and base rocks which are non-porous.

3. **Salt plugs**

- A large amount of rock salt may be pushed up when under great pressure.
- This happens through a weakness in the overlaying rocks strata and forms a steep-sided dome.
- Oil is then trapped around the side or margins of the dome.

EXTRACTION OF OIL

Oil is extracted in the following way.

- Large metal structures called *derricks* are used to drill a hole from the surface up to where oil is harboured.
- Steel pipes originate from these derricks and they are connected to each other to the point where oil is accessed.
- A drill head called *diamond cutter* or bit is fitted to the last steel pipe which cuts the rocks and soil and it is lubricated by mud mixed with water.

- When oil has been accessed it gets out naturally if under pressure and if not it has to be pumped.

TRANSPORTATION OF PETROLEUM

There are many ways of transporting petroleum.

1. PIPELINES

Pipes are laid from sources to the refinery or exporting ports.

ADVANTAGES OF PIPELINES

- It safe since it is environmental friendly
- Pipes use less energy than tracks and tankers
- It is cheap because pipes once laid can remain on the position for a long time
- It is the fastest means of transporting oil

DISADVANTAGES

- Patrolling and maintaining pipes is expensive
- In case of leakage fire accidents may occur
- Pipes are not flexible making it difficult to change route

2. OIL TANKERS

- These are used to transport crude oil over water masses.

ADVANTAGES

- They can carry more quantities at one time
- Oil can be shipped from one continent to another

DISADVANTAGES

- Aquatic life is in danger in case of oil spill
- The cost of building ships and ports is expensive
- It is a slow method of transport

3. ROAD TANKERS

- These are used to carry oil to consuming areas. Road tankers deliver oil to all cities and other urban areas in Malawi.

REFINING OF PETROLEUM

Oil is refined through *primary* and *secondary* distillation.

Terminologies

Fractionating

- This refers to the process of condensing the different hydrocarbons into fractions or petroleum products.

Purification

- This refers to separation of crude oil which is impure into different usable and pure products like natural gas, kerosene, petrol and diesel.

Thermal cracking

- This means breaking heavier hydrocarbons or fractions into lighter ones by applying large quantity of heat.

Catalytic cracking

- This refers to the process whereby catalysts like powdered platinum is added to speed up the cracking process so that more and better motor fuels can be extracted.

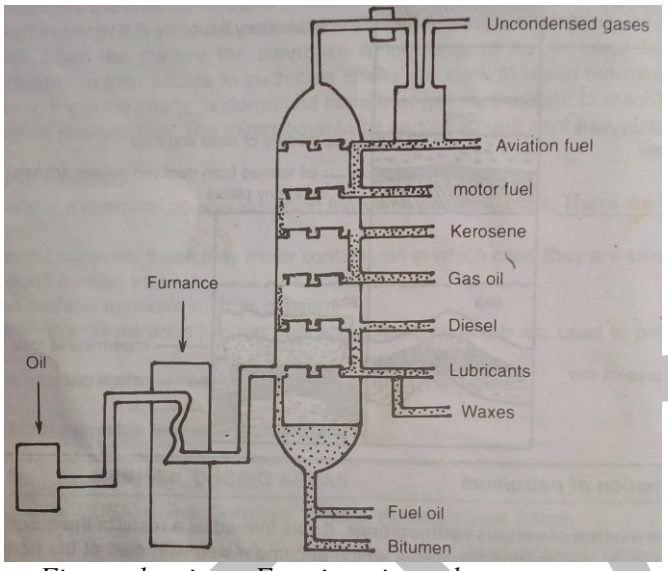


Figure showing a Fractionating column

PRIMARY DISTILLATION

- In this process the crude oil is pumped into furnace where it is heated at 300^0 c.
- It turns into vapour which flashes out into fractionating tower 30 m high and 8 m in diameter.
- Vapour with highest boiling point condenses at the bottom those with lower boiling point condenses high up the tower hence the term fractional distillation
- Lighter fuels e.g. petrol and paraffin liquefy and are collected in the middle

USES OF OIL PRODUCTS

OIL PRODUCTS	USES
kerosene	Fuel for jet air crafts, cooking heating and lighting
Natural gas	Burning and lighting
Petroleum gasses (butane, ethane, propane)	For making chemicals
Gasoline	Used by land transport
Asphalt/ bitumen	Used for making roads, roofing and water proofing material
Lubricants	Manufacturing of candles, seals and polishes

SECONDARY DISTILLATION OR THERMAL CRACKING

- In this process heavier fractions or hydrocarbons such as diesel lubricating and fuel oils which failed to break in primary distillation are converted to lighter ones through a process called *thermal cracking*.

- This result into splitting of heavy fuels to lighter fuels e.g. petrol and benzene.

LOCATION OF REFINERIES
- They can be located close to the oil reserve if the reserve is not in the remote region.
- They can also be located at the exporting terminal e.g. Persian gulf area.
- They can also be located at the port of import e.g. Singapore

ROLE OF ORGANIZATION OF PETROLEUM EXPORTING COUNTRIES (OPEC)
- It ensures that oil is supplied and regulated within the frame work of national interests of its members
- It controls the prices of crude oil
- OPEC uses oil as an economic and political weapon thus the grouping uses it to threaten countries that quarrel with its members

***Note**: All countries that produce oil are members of OPEC.*

NIGERIA'S OIL CRISIS

Despite being the largest oil producer in Africa, petroleum products are unavailable and costly to most Nigerians. This is because of the following reasons:
- Low oil refining capacity which makes the country unable to refine enough oil for domestic needs.
- The amount of production capacity is low
- Conflicts as local groups seeking a share of the wealth often attack the oil infrastructure
- Oil theft commonly referred to as "bunkering" leads to pipeline damage causing loss of production.

ENVIRONMENTAL IMPACT OF OIL DRILLING
- Extraction of oil causes death of marine or aquatic animals
- When pipes leak this eventually pollute the land
- Release of harmful gases into the atmosphere

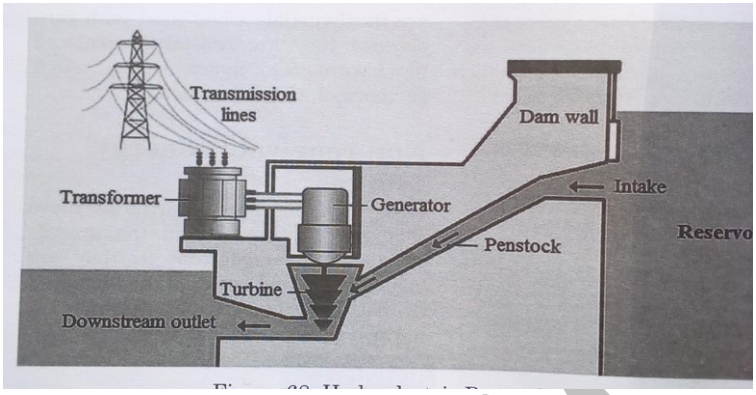
POSSIBLE BENEFITS OF DRILLING OIL IN LAKE MALAWI
- Oil extraction would solve the country's fuel shortages
- It would provide an alternative source of foreign exchange
- It would create employment opportunities

Unit 3: ENERGY
- Energy refers to the power that is derived from the utilization of physical or chemical resources especially to provide light and heat or to work machines.
- The energy resources are either renewable or non-renewable.

- RENEWABLE sources are those that are inexhaustible or they replenish after use.

- NON-RENEWABLE sources are those that are exhaustible and cannot be replaced by natural means.

HYDRO-ELECTRIC ENERGY



GENERATION OF HEP

- The power is obtained from energy of flowing water.
- Fast flowing water must fall from a good height
- Water is directed through penstocks (pipes) towards a turbine or water wheel.
- The jet of water hits the blades of turbine and makes it to revolve at high speed.
- The turbine is connected to the dynamo or generator which converts the force of running water (mechanical energy) into electric energy.
- From the generator, electricity goes into transformers and carried by the high voltage overhead transmission lines to consumers.

CONDITIONS NECESSARY FOR THE PRODUCTION OF HEP

- Sufficient head of water
- Large volume of water with a regular flow even in dry season
- Heavy capital input
- Large market

ADVANTAGES OF HEP

- Easy transportation by power lines over long distances
- It is cheaper though expensive to construct
- It's a clean type of energy
- Construction of reservoirs for HEP has promoted other human activities such as fishing, irrigation and recreation

DISADVANTAGES

- High capital expenditure
- High transmission cost to consumers
- No storage of the surplus
- Power fluctuation due to declining power levels

FACTORS THAT LIMIT THE DEVELOPMENT OF HYDRO-ELECTRIC POWER IN AFRICA

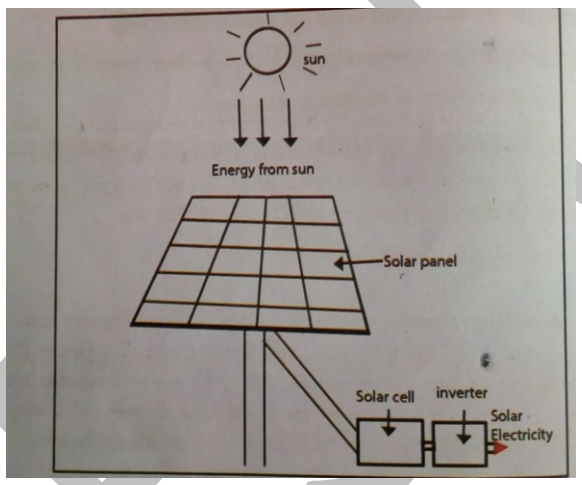
- Lack of adequate financial resources

- Lack of technical knowledge and personnel
- Limited market or demand, there are few heavy manufacturing
- The presence of alternative sources of energy like petroleum

MAJOR HEP POWER PROJECTS IN AFRICA

- Aswan dam- Egypt
- Akosombo dam-Ghana
- Sennar dam-Sudan
- Kariba dam-Zambia
- Kainji dam-Nigeria
- Cabora Bassa dam-Zambezi River, Mozambique.
- Owen falls-Uganda

SOLAR ENERGY



- This energy is derived from the sun.
- It is generated through solar panels which absorb heat from the sun and direct it to the solar cells.
- The cells then change solar energy into electrical energy.
- Inverters change the current from alternative current to direct current.

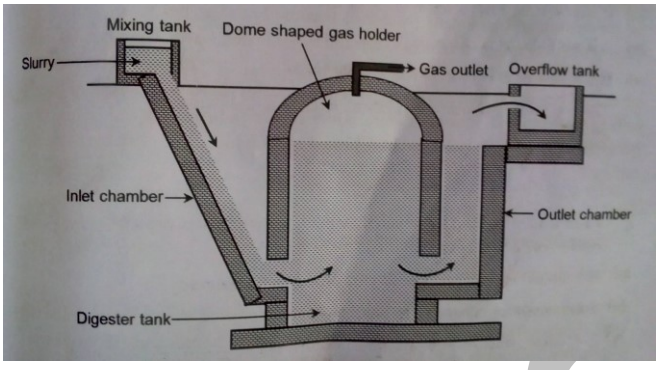
ADVANTAGES OF SOLAR ENERGY

- It is suitable for small- scale production
- It is available everywhere throughout the world
- It is environmental friendly or pollution free

DIASDVANTAGES

- Solar panels are expensive to purchase
- Sometimes it is affected by clouds and darkness
- Cells are usually inefficient as they transfer only 30% of energy from the sun

BIOGAS



- These are all forms of energy produced by use of organic matter (plants and animals).

WAYS OF PRODUCING BIOGAS

1. ANIMAL AND HUMAN WASTE
- The mixture of dung and sewage is put in a digester in which fermentation takes place.
- The process produces methane gas which is released through pipes and used for cooking and lighting.

2. AGRICULTURE AND CROP WASTE
- Sugar wastes such as molasses and bagasse, cassava and straw are used to produce fuel.
- Molasses and cassava contain starch which once fermented produce alcohol for heating or blending with petrol to produce ethanol.

ADVANTAGES
- It is renewable
- It is cheap to produce since the equipment is not expensive
- It can be stored
- Raw materials are readily available

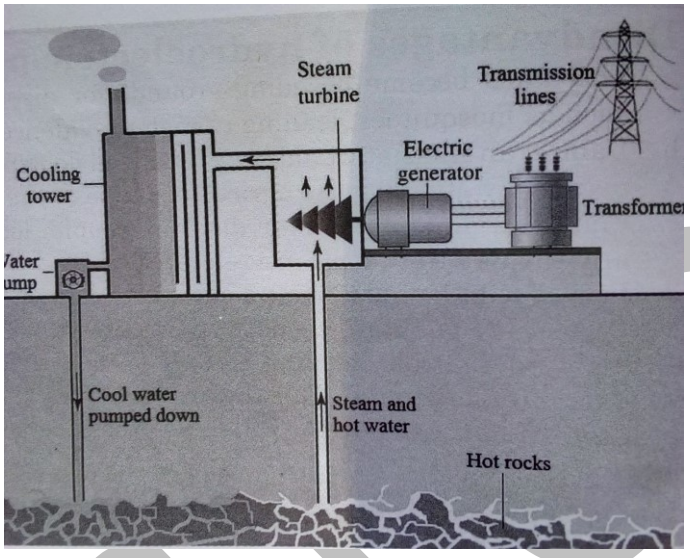
DISADVANTAGES
- Methane gas leads to pollution
- Some people oppose the use of it as they feel human waste cannot be used for cooking
- Lack of capital and technology for the rural masses to develop this form of energy.

GEOTHERMAL ENERGY

- This type of energy comes from water heated under the earth's surface.
- Hot rocks heat the water at high temperatures (200 to 300^0c).
- The heated water produces steam which is directed through pipes to turbine that is connected to generator.
- When the turbine rotates it makes the generator to produce electric energy for heating and lighting homes.

This energy can be produced in two ways:

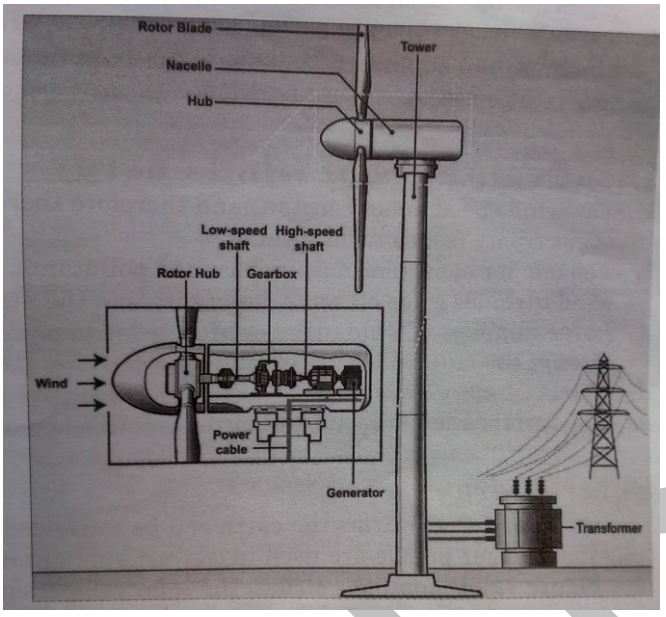
a. Through hot springs- where water from the inside earth surface is tapped and directed to homes and offices for heating and other domestic purposes.
b. Through geysers – a geyser is both superheated water and gases which are ejected explosively. Steam is piped and directed to the power house where it rotates the turbine that spines the generator to produce electricity.



ADVANTAGES
- It is renewable
- The super-heated steam can also be condensed into fresh water for drinking

DISADVANTAGES
- It is too expensive to develop
- It can only happen in areas where hot rocks are near the earth's surface

WIND ENERGY



- This is energy produced by wind.
- Wind mills are used with propellers rotated by wind.
- Rotating blades are connected to a generator which converts the mechanical energy into electricity.

ADVANTAGES
- It is a clean type of energy
- It is renewable
- Wind is free and widely available

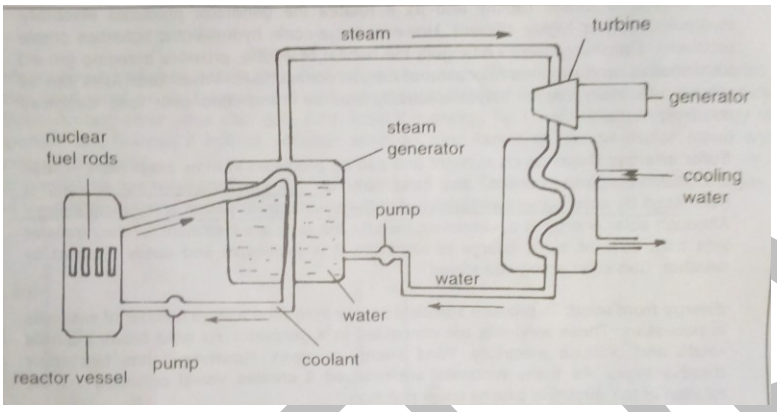
DISADVANTAGES
- It is viable in areas with stable and strong wind
- It requires many mills to produce enough energy
- Rotation of mills causes noise and visual pollution

TIDAL AND WAVE ENERGY
- This is energy produced from waves and tides. A high dam is belt on the continental shelf or estuary of a river.
- The dam has the passage that connects the sea and estuary.
- In high tides the water moves from the sea through the passage to the estuary. In low tides the water moves from the estuary into the sea via the same passage.
- In both cases the waves rotate turbine fixed in the passage and in turn the generator produces electricity.

ADVANTAGES
- Tides are reliable and easy to predict.
- It is completely renewable.
- It produces no greenhouse gases or any other wastes.

DISADVANTAGES
- Tidal barrages are very high infrastructural costs.
- It can disrupt environmental and ecological balance of aquatic life.
- There are few suitable sites for tidal barrages.

NUCLEAR ENERGY



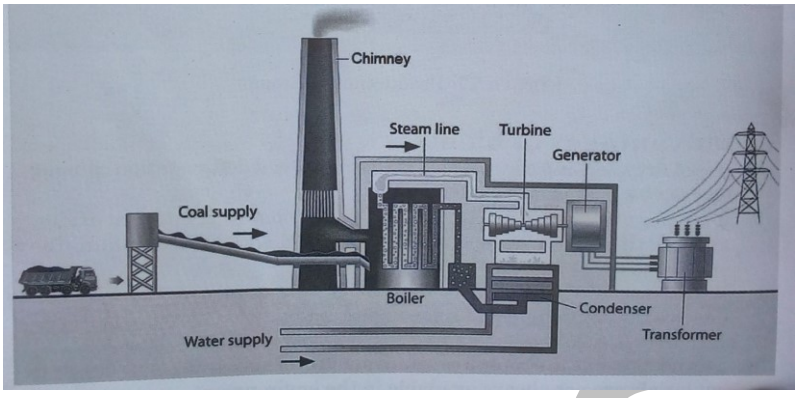
- Uranium is the most important raw material for the production of this energy.
- Uranium rods are put in a reactor vessel where radio-active changes take place releasing high quantity of heat energy.
- The heat is used to produce steam.
- The generated steam is directed to a turbine which is connected to a generator.
- The steam drives the turbine to make generator produce electricity

ADVANTAGES
- Limited raw materials needed to produce high amount of energy.
- It causes little air pollution.

DISADVANTAGES
- Nuclear energy is highly radioactive and can cause damage to human bodies.
- It is expensive to shut down old power plants.
- A lot of money has to be spent on safety.

THERMAL ENERGY

This is power produced when steam –driving turbines turn generators to give energy. It is derived from fossil fuels such as coal, oil and gas. The heat generated heats up water to produce steam which turns turbines connected to the generator to produce electricity.



ADVANTAGES

- Its raw materials are widely found in many places of the world.
  High energy out- put is obtained
- It can be transported and stored without extra security measures.

DISADVANTAGES

- Raw material such as coal is very bulky, difficult and costly to transport.
- Fossil fuels are non- renewable source of energy.
- It creates smoke and soot which pollute the environment.

IMPORTANCE OF ENERGY

- It is used in manufacturing industries as part of production
- It is used in transportation to move people and goods.
- In agriculture it is used for the production of food e.g. through irrigation.
- It is used to make our homes comfortable for cooking, entertainment and lighting.

ENVIRONMENTAL IMPACT OF VARIOUS SOURCES OF ENERGY

- Fossil fuels cause air pollution
- Creation of dams can cause flooding
- Nuclear materials are radioactive thus harmful to health

ENERGY CRISIS

This refers to any great shortfall in the supply of energy.

CAUSES OF GLOBAL ENERGY CRISIS

- Population growth that has led to less supply of energy than demanded.
- Industrial actions like union organized strikes.
- Natural disasters such as earthquakes, floods, storms and landslides.
- Political unrests such as wars which may attack important infrastructure disrupt production.
- Personal and political interests such as financial and administrative irregularities.

ENERGY CRISIS IN MALAWI

In Malawi it is caused by the following:

- Siltation of rivers due to increased erosion resulting from deforestation.
- Frequent droughts that have reduced water levels in lake Malawi
- Increased flooding that damage the electricity infrastructure.
- Availability of aquatic weed (water hyacinth) which reduce water flow velocity.
- Vandalism of transformers which affect electricity supply.
- Lack of technology and investment in energy.

EFFECTS OF ENERGY CRISIS

POSITIVE
- Energy crisis has forced people to come up with energy conservation measures.
- Foreign exchange earnings through exportation of energy to other countries.
- Development of alternative sources of energy.

NEGATIVE EFFECTS
- Increase in the prices of goods.
- High costs of living.
- Economic slowdowns.
- Increased damage to the environment.
- High unemployment rate resulting in social-economic problems.

POSSIBLE SOLUTIONS TO ENERGY CRISIS
- Research, develop and deploy a broad range of energy sources.
- Speeding up the transfer of appropriate energy technology to poor countries.
- Population control to help reduce demand for energy.
- Encourage use of public transport than use of personal cars.
- Reforestation and afforestation to restore forests.

Unit 4: WORLD POPULATION DISTRIBUTION AND DENSITY

- **Population -** Refers to the total number of people living in a specified area.
- **Population distribution -** Is the way people are spread out across the earth's surface.
- **Population growth rate -** Is the net addition through birth and migration to the existing population per year.
- **Population explosion -** Refers to the sharp increase in population within a short period of time.
- **Population implosion -** Is the reverse of population explosion and it refers to a sharp decrease in population within a short period of time.
- **Youthful population structure -** This is the population structure that is composed by young people because the population growth rate is high.
- **Population density** - Is the average number of people living in a unit area.

Population density is calculated for a particular country by using this formula:

$$PD = \frac{\text{Number of people in a particular region}}{\text{Size of that land } (km^2)}$$

FACTORS THAT INFLUENCE WORLD POPULATION DISTRIBUTION
- Availability of industries which provide employment and goods for the people.
- Rich and fertile agricultural lands which attract people for settlement.
- Good water supply to support a great population.
- Government policies may resettle people in certain areas.
- Natural hazards may influence some areas to be sparsely populated.
- Good transport and communication will attract high population than areas that are not easily accessible.

a) AREAS OF HIGH POPULATION DISTRIBUTION

1. **The Nile Valley and delta**

Reasons for high population distribution

- The Gezira plain that lies between the blue and the White Nile has the natural flooding conditions and low rainfall that make it ideal for irrigation agriculture.
- Presence of fertile soils along the river bank also creates a good environment for crop cultivation.
- Early settlement in the area due to early civilization.
- Good water transport on the Nile River and the Mediterranean Sea.
- The development of industries along river Nile provide employment for people.

2. **Monsoon lands of Asia**

The areas include: China, Japan, India, Bangladesh, Sri Lanka, Indonesia (Java) and Mekong deltas of north and South Vietnam.

REASONS FOR HIGH POPULATION

- The area is a center of commerce.
- People can find employment.
- Irrigation farming is done due to the presence of fertile soils.
- Good climate for plantation agriculture like tea and sugarcane as well as rice grown under intensive farming.
- Flat plains and low –lying areas have contributed to high population.

3. **North West Europe**

This covers Great Britain, West Germany, France and Denmark.

Reasons for high population

- Good climate for human habitation due to warm summers and mild winters.
- It has evergreen coniferous and temperate deciduous forests which are of high commercial value.
- Centre of civilization for over 1500 years.
- Improved agriculture due to scientific farming techniques and fertile soils.
- Good sea transport because of the indented coastlines has promoted trade and industrialization.
- Improved living conditions attract people especially from the developing countries.

4. **North eastern United States of America**

This area covers the coastal Atlantic Ocean in the main cities of New York, Washington DC, Philadelphia and along the great lakes region.

Reasons for high population

- Growth of industries and employment prospects.
- It has fertile soils which promote agriculture.
- Excellent natural transport due to the Great lakes and the St. Lawrence sea way which facilitates trade and industrialization.
- Improved living conditions.
- High quality raw materials which stimulates industrialization.
- The fishing industry is well developed thus people have both food and employment opportunities.

5. **Witwatersrand in South Africa**

Reasons for high population
- It is a center of trade and commerce.
- Industrial growth has attracted people seeking employment.
- People come to look for employment in the mining industry.

6. **West African coastal region**

Reasons for high population
- Presence of good agriculture land.
- Access to water and air transport which facilitates global trade.
- Good harbours for water transport which encourages trade and movements of people.

7. **Japan**

Reasons for high population
- Good harbours for water transport that encouraged business.
- It is a Centre of trade and commerce.
- The cool temperate climate is favourable for settlement.
- There are abundant sources of energy like HEP and coal which stimulate industrialization.
- There are many manufacturing and processing industries which provide employment opportunities and consumer commodities.

b) AREAS OF SPARSE POPULATION

1. Hot desert regions

These include Kalahari, Atacama, Sahara, Australian, Arabian and Mohave deserts.

Reasons for sparse population
- Infertile sandy soils allow leaching to take place which discourage farming.
- Poor transport due to the sandy surfaces which make it difficult to construct roads and railway lines.
- Type of climate is not conducive for habitation because it is absolutely hot and dry.
- Insufficient and unreliable rainfall in these regions which discourages agriculture.

2. **Mountainous region**
These include Himalayas, Andes, Rockies, Alps and Atlas Mountains.

Reasons for sparse population
- Steep Mountain and harsh climate conditions.
- Very little flat land for farming and settlement.
- Developing transport networks is a huge challenge which also discourages settlement.

3. **Tropical rainforest region**
Amazon and Congo basin.

Reasons for sparse population
- The thick forest make it difficult to construct roads.
- Wild animals discourage settlements.
- Presence of pests and diseases.

4**. Polar and Tundra region**
Antarctic and arctic region, the north and South Pole and Greenland.

Reasons for sparse population
- These regions are too cold for human habitation.
- The frozen soils do not allow agricultural activities.
- The summers are short, thus cannot support growth of plants.

c) AREAS OF MODERATE POPULATION DISTRIBUTION
These include large parts of the cool temperate forests and the temperate grasslands that is in the southern USSR (steppes), America and Canadian prairies, the Mediterranean, Europe, Africa and most parts of East Asia.

Reasons for moderate population
- Poor transport due to presence of dense and thick forest making it difficult to construct roads.
- Occurrence of disease and pests such as tsetse flies that attack people and animals.
- The soils are waterlogged making it difficult for the plants to grow.

ADVANTAGES OF HIGH POPULATION DENSITY
- There is abundant work force to utilize resources
- There is more competition which fosters development.
- There is a greater cultural diversity that can bring tourism.
- It provides bigger market for different products.

DISADVANTAGES OF HIGH POPULATION DENSITY
- More problems in distribution of wealth and resources.
- Problems with food security as pressure on land force people to cultivate on small lands.
- Tension and violence emanating from differences in opinions, needs and beliefs.
- More chances of the outbreaks of epidemics.

ADVANTAGES OF LOW POPULATION DENSITY
- The land can produce more food for its inhabitants.
- Disease outbreaks may not spread easily.

DISADVANTAGES
- Lack of infrastructure and services.

- There is boredom because entertainment centers are far away.
- There are no enough people to work.

POPULATION STRUCTURE

- This refers to how population is made up of comprising of people of different ages and sex.
- It is made up by putting two bar graphs side by side, one for males and the other one for females.

IMPORTANCE OF POPULATION GRAPHS

- It helps government in policy planning by establishing the number of economic dependents being supported in a particular population.
- It allows investors to target their market in a better way to increase the chances in their business.
- It helps to determine future jobs, schools and housing.
- It helps to predict population trends.

PYRAMID SHAPES

There are three types of pyramid shapes.

1. EXPANSIVE OR EXPANDING (TRIANGULAR)

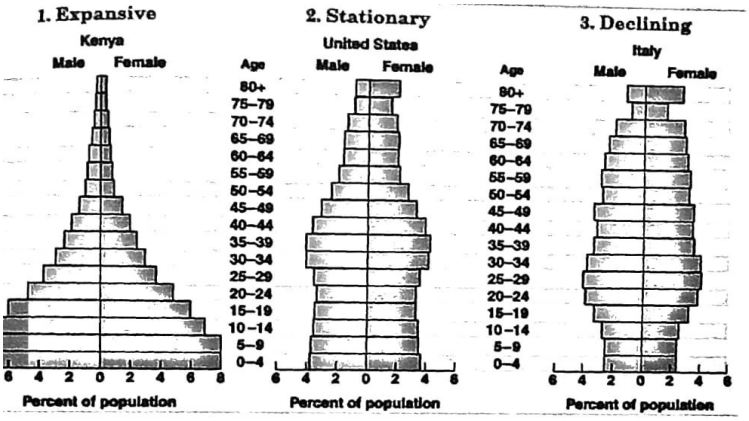
- These have a broad base but quickly taper off towards the older age groups and they are narrow at the top.
- In this case babies are being born at a faster rate than people are ageing. When the majority of people in a country are below the age of 30 the population is described as 'Young or youthful'.
- Malawi's population pyramid is a good example.

2. STATIONARY OR STABLE (RECTANGULAR)

- This has a narrow base and roughly equal numbers in each age group tapering off at the older ages.
- The base and the center of the pyramid make a box shape.
- In this case babies are being born at the same rate as people are ageing. The United States is an example of stationary population.

3. DECLINING (CONSTRICTIVE)

- This pyramid has a small base wider in the middle until the very top suggesting a low proportion of children to many older people.
- With fewer babies being born the ageing parents are not being replaced hence the declining population. Italy is an example of this population.



POPULATION STRUCTURE FOR DEVELOPING COUNTRIES (YOUTHFUL)

- They are wide at the base which means there are large number of young people in the countries.
- The pyramids are narrow at the top to show that there is small number of elderly.

CAUSES OF THIS TYPE OF PYRAMID

- High mortality rates due to lack of adequate health care.
- High birthrates due to lack of family planning methods and unemployment for women.
- Short life expectancy due to low standards of living and advent of HIV/AIDS.

ADVANTAGES OF YOUTHFUL POPULATION STRUCTURE

- Provides market for manufactured goods.
- Provides cheap and abundant labour.

DISADVANTAGES OF YOUTHFUL POPULATION STRUCTURE

- There is huge pressure on social services.
- There is high dependency ratio (the number of dependents aged 0-14 and over the age of 65) to the economically active population (aged 15-64).
- Lack of security and peace when most young people are jobless.
- Unemployment as youthful population is likely to lead to few jobs as the supply of available jobs exceeds the demand.

POPULATION STRUCTURE FOR DEVELOPED COUNTRIES (AGEING)

- Pyramids for developed countries like Japan and United Kingdom are narrow at the base, wider in the middle and stay quite wide until the very top.

CAUSES OF THIS TYPE OF PYRAMID

- Low birth rates due to high education and employment levels.
- Low death rates due to improved health care and advanced medicine.
- Long life expectancy resulting from improved standard of living.
- Have more women than men probably because men are involved in risky activities.

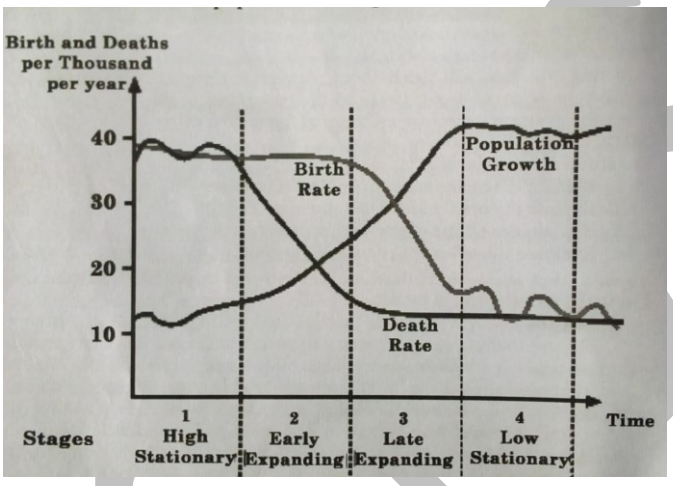
ADVANTAGES OF AGEING POPULATION

- A large independent population which is skillful and can contribute positively to development.
- Increased investment and business activities.
- Sustainability of the world's vast resources in the environment.

DISADVANTAGES OF AGEING POPULATION

- There are large unproductive dependent population as there are more old people.
- More money is needed to support the elderly in terms of pension schemes.

DEMOGRAPHIC TRANSITION MODEL



Stage 1- At this stage both the birth rate and death rate is high leading to low natural increase and low total population.

Stage 2 - At this stage birth rate is still high but the death rate is falling leading to high natural increase. This leads to population growth.

Stage 3 – At this stage the birth rate is falling while the death rate is low. This results to a decline in a population growth.

Stage 4 – At this stage both the death and birth rates are low. This results to levelling off of the population growth.

For a better understanding of the demographic transition model the following terms are important.

1**. Birth rate** – It is the number of live births per year per every 1,000 births of the total population. It is also called crude birth rate.

To calculate this, divide the number of live births per year by the total population and multiply by 1000 = crude birth rate.

2. **Death rate or mortality rate** – Refers to the number of deaths per year, per every 1000 of the total population. This is the crude death rate. It is calculated by dividing the number of deaths per year by total population and multiply by 1000 = crude death rate.
3. **Population growth rate** – It is the rate at which the population of a country or region grows. There are different types of growth rates.
a. **Rapid growth rate-** A situation where birth rates are high and death rates are low.
b. **Slow growth rate** – Refers to a nearly stagnant population growth where both the birth rates and death rates are low. It is experienced in developed countries.
c. **Zero growth rate** – Also known as constant growth rate or stationary growth rate where birth rates are equal to birth rates.
4**. Natural increase** – It is the difference between the number of births and number of deaths. It occurs when the birth rate exceeds the death rate.
5. **Natural decrease** – It is a condition that occurs when the death rate exceeds the birth rate.

CAUSES OF NATURAL DECREASE

- Epidemics such as HIV / AIDS, Ebola and plaque.
- Natural hazards such as floods and earthquakes.
- Drought which may lead to lack of food.
- Civil war in a country.

6. **Infant mortality** – It is the number of deaths per year of children below 1 year of age per 1000 in a population.
7**. Life expectancy** – This is the average number of years a person can expect to live. The life expectancy for women is higher than that of men.
8**. Population explosion** – A sudden rapid population growth. This can be caused because of the following;

- High fertility rates.
- Reduced mortality rates.
- High rates of migration into a country.

CAUSES OF RAPID POPULATION GROWTH IN MALAWI

- High birth rate.
- Low death rate.
- Immigration.
- Lack of education.
- Lack of family planning methods.

EFFECTS OF RAPID POPULATION GROWTH

- Pressure on social services.
- Pressure on land and low agricultural productivity.
- Increased rate of crime which scares away investors.
- Economic strain on the government.

STRATEGIES FOR CONTROLLING POPULATION GROWTH

- Governments need to set up family planning programs.
- Discouraging under age marriages and early child births.
- Legislation could also be enforced to limit the number of children families are allowed to have.
- Teaching people about problems of population growth.

BENEFITS OF CONTROLLING POPULATION

- Government is able to create more jobs.
- It ensures that there is availability resources.
- It promotes food security at both household and national level.
- There is less pressure on social services.

Unit 5: SETTLEMENTS

A settlement is any form of human habitation from single dwelling to the largest city.

FACTORS INFLUENCING LOCATION
OF SETTLEMENTS

- Availability of water supply for domestic purposes.
- Availability of fertile soils which are suitable for crop production.
- Defensive position.
- Availability of transport links.
- Good climatic conditions.
- Availability of resources such as wood, coal, fuel etc.

TYPES OF SETTLEMENTS

1. RURAL SETTLEMENT

They are concerned with primary activities e.g. farming.

CHARACTERISTICS OF RURAL SETTLEMENT

- The main economic activity is agriculture.
- They are sparsely populated.
- The society is mostly homogenous that is one tribe is predominant.
- Most buildings are semi-permanent.

URBAN SETTLEMENTS

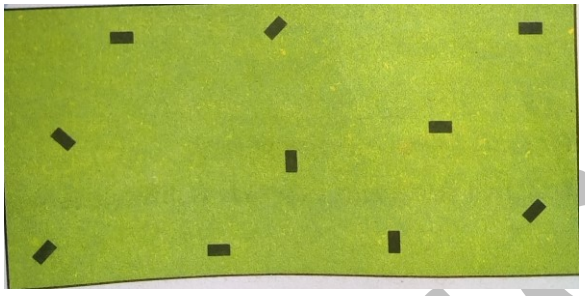
They are multifunctional and are concerned with secondary activities. E.g. manufacturing, tertiary and administration.

CHARACTERISTICS

- The value of land is high because there is high demand.
- Most buildings are permanent.
- The society is heterogeneous (composed of several tribes or races).
- There are more economic activities taking place.

SETTLEMENT PATTERNS

A settlement pattern is the shape of a settlement defined by the arrangement of buildings with respect to each other.
The following are some of the settlement patterns:
DISPERSED OR SCATTERED



This is the type of settlement pattern where houses are far away from each other and are found away from the nearest village.

Factors influencing development of dispersed settlements.

- Limited and insufficient natural resources like water and fertile soils.
- Geographical barriers such as rocky or hilly topography.
- Private land ownership causes people to move to other places in search of land.
- Low population may also lead people to settle in dispersed manner as there is no scramble for land.

ADVANTAGES OF DISPERSED SETTLEMENT

- Land is put to its maximum use.
- There is more room for privacy and freedom.
- Disease outbreaks may not spread easily.
- Environmental resources are protected.

DISADVANTAGES

- Difficult to maintain security.
- Difficult to provide social services to the people.
- Lack of unity and social interaction.

NUCLEATED OR COMPACTED SETTLEMENT

This is a cluster or grouping of several buildings with collective amenities such as markets, schools, entertainment centers and worshiping places.

Factors that influence nucleated settlements patterns

- Presence of flat or gentle land.
- Presence of social services.
- Presence of primary industries such as agriculture.
- The need to group together for defense.

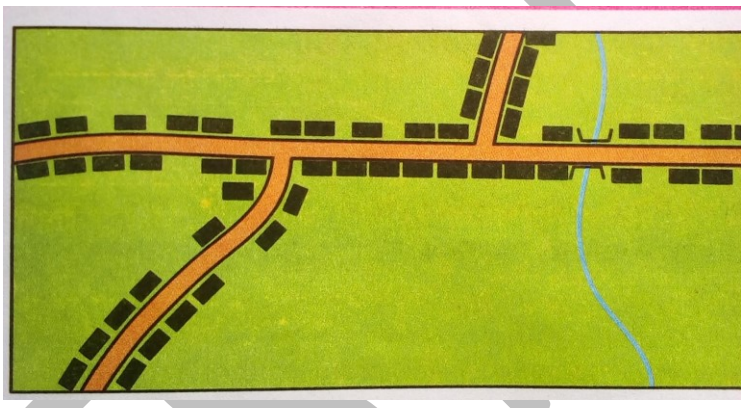
ADVANTAGES

- It enhances social cohesion and unity among people.
- It creates enough land for other vital uses.
- It eases provision of social services by the government.

DISADVANTAGES

- There is no room for privacy and freedom since people live close together.
- Disease outbreaks may quickly spread through the settlement.
- Overcrowding causes social problems such as high crime rates.

LINEAR /RIBBON/ PLANER SETTLEMENTS



In this settlement pattern, buildings follow a particular line which may be a track, road, river or railway line.

Factors that influence linear settlement patterns

- The need to provide commercial and social services needed by the passing travelers.
- The need to easily move goods and other materials from one place to another.

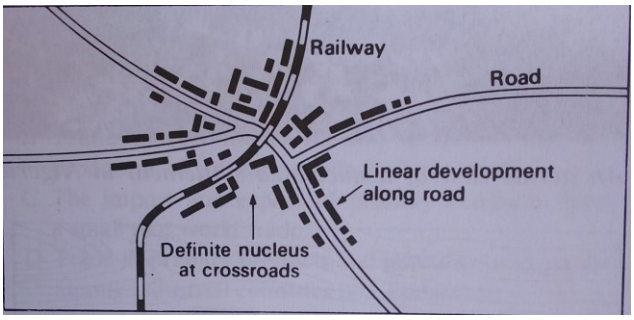
ADVANTAGES

- Easy transportation of goods and people.
- It allows enough land for business activities.
- It is easy to access social amenities.

DISADVANTAGES

- Increased incidences of accidents.
- High probability of spread of contagious diseases.
- Noise from moving vehicles and trains.

CROSS SETTLEMENT



- Two linear patterns may cross each other to form this pattern. There are more commercial activities due to increased volumes of traffic.

URBANIZATION

Refers to the establishment and growth of towns and urban centers. It is the increase in proportion of people living in towns and cities.

Factors responsible for urbanization

- Rural – urban migration: movement of people from rural to urban areas.
- High birth rates: when the birth rate is higher in urban areas through natural growth.
- Low death rates in urban areas due to availability of improved health facilities.

EFFECTS OF URBANIZATION

Positive effects

- Spread of new ideas due to concentration of people.
- Protection of ecosystem as people are not dispersed which would make them encroach natural habitats.
- Increased access to social services which has reduced illiteracy and death rates.
- Improved standard of living through access to better jobs.

Negative effects

- Traffic congestions particularly during rush hours.
- Promotion of crime, prostitution, violence and aggressive behavior.
- Breaking of the traditional family structure.
- Low food production as there is a shrinking labor force in rural areas.
- Housing problems as people live in overcrowded houses leading to formation of illegal settlements (squatters).

SOLUTIONS TO CHALLENGES ASSOCIATED WITH URBANIZATION

- Provision of social amenities in rural areas to reduce the rate at which the youth move to urban areas.
- Establishment of industries in rural areas to reduce rural – urban drift or reverse rural urban labor movement.
- Providing affordable accommodation to the urban poor.
- Provision of recreational facilities in rural areas.
- Encouraging vertical than lateral expansion of buildings by constructing multi-story buildings.

Environmental risks associated with settlements

- There is usually pressure on housing which leads to the growth of slums and squatters.
- Overcrowding has led to quick spread of diseases and pathogens.
- Lack of access to piped water.
- The use of pit latrines has resulted in high levels of pollution of underground water.
- Increased transport activities have resulted in air pollution.

Ways of dealing with the risks associated with settlements

- Ensuring that dangerous gases are not released into the atmosphere.
- Afforestation and re – afforestation around settlements.
- Burying wastes in deep holes or pits.
- Creating new towns to allow relocation to take place.

URBANIZATION OF LILONGWE

This is the capital and largest city of Malawi. It has grown up on the river banks of the Lilongwe River. It occupies the position of a large agricultural area and there are many economic activities.

Factors that have encouraged the growth of Lilongwe city.

- It's a capital city.
- Presence of good transport networks.
- It has fertile alluvial soils and flat or gentle land for cultivation.
- Availability of social amenities such as Kamuzu Central Hospital, good hotels and shopping malls.
- The Lilongwe and Lingadzi rivers are sources of water.
- It is a center of industrial activities which provides employment.

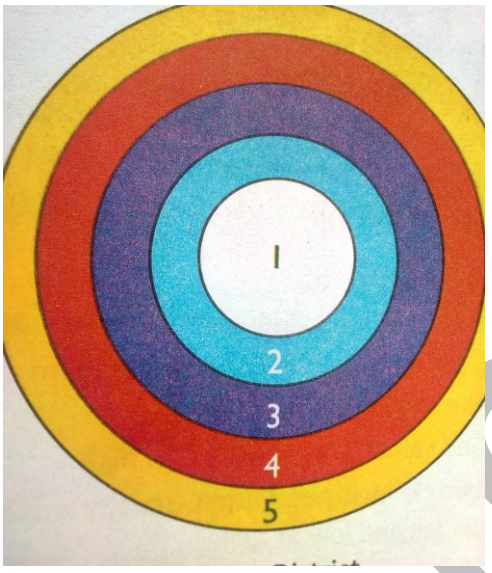
Challenges of rapid urbanization of Lilongwe

- Housing problems leading to growth of slums and squatters in areas such as Mgona and Mwenyekondo.
- High unemployment rate this has resulted into high crime rates.
- Traffic congestion especially in the morning, at lunch hour and evening.
- There is a lot of refuse from the street vendors.
- Water shortage problems.

Solutions to the challenges

- Creating rural growth centers to allow relocation to take place.
- Creating additional free ways to solve the problems of congestion.
- Proper waste disposal will improve sanitation.
- Encouraging use of clean sources of energy.

THE CONCENTRIC ZONAL MODEL OR FUNCTIONAL ZONES OF AN URBAN AREA



i) CENTRAL BUSINESS DISTRICT

The CBD forms the city center.
CHARACTERISTICS OF THE CBD

- High land value.
- It is centrally located in the urban center.
- Transport routes converge here.
- It has tall buildings or sky-scrappers.
- High rental values.
- High population especially during the day.

ii) TRANSTION ZONE
This zone surrounds the CBD.
CHARACTERISTICS

- It has older buildings.
- It has offices, shopping malls, super markets and some hotels.
- The land value here is moderate.
- There is moderate to low population density.

iii) INDUSTRIAL ZONE/LOWER CLASS
This zone has industries.
CHARACTERISTICS

- It has the highest concentration of industries.
- Land values are moderate to high.
- There is high population during the day and low at night.
- It has narrow and crowded streets.
- It is linked by road and railway line.

iv) RESIDENTIAL ZONE
This zone is occupied by the working class.
CHARACTERISTICS

- It has houses near the industrial zone.

- High population densities.
- Moderate land values.
- The zone is occupied by the middle class immediately after the law class residential units.

Note: *People are attracted in this zone because;*

- Housing is affordable.
- Land is cheap.
- Are attracted by industrial activities therefore, people come to live and work there.

v) COMMUTER/ SUB-URBAN ZONE

It is occupied by the urban residents who can commute to their places of work in the CBD and industrial zone. It is surrounded by agricultural land.

CHARACTERISTICS

- It has houses for the upper class.
- It has spacious residential units.
- It has high land values though not as high as the CBD.
- It has low population densities.
- It has broad streets.

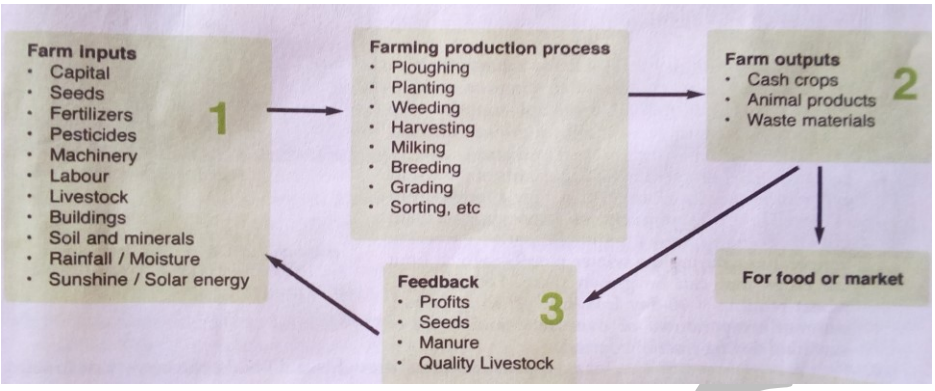
SETTLEMENT TERMINOLOGIES

- **Hamlet** – A settlement where there are two or three houses without shops, school and other social services.
- **Conurbation** – Is a situation where several towns are merged.
- **Megalopolis** – This is where many cities are joined together e.g. Osaka and Kobe in Japan.
- **Metropolis** – Refers to the main city of a region on which surrounding towns depend.
- **Homestead /farmstead**– A compound of one to five houses mostly in rural areas where agricultural activities dominate.
- **City**- a large town where people live and work.
- **Village**- a denser grouping of several farmsteads.
- **Slum**-a dirty and heavily populated urban area inhabited by very poor people.
- **Squatter settlement (shanty town**)-a residential area usually with inadequate infrastructure and services, which develop without legal claims to the land or permission from authorities to build.
- **Site**: This refers to actual piece of land on which a settlement is built and a physical nature of the land in terms of relief, drainage and the soil characteristics.
- **Situation**: This refers to relationship of a settlement with its immediate environment.
- **Pattern:** This is the situation of buildings with respect to each other.

Unit 6: WORLD AGRICULTURE

Agriculture is the production of crops or animals for consumption or commercial purposes.

AGRICULTURE AS A SYSTEM



- Farming is considered as a system because various components or activities interact.
- For example all things required for farming are called inputs.
- **Inputs** can be classified into human and natural.
- Anything harvested or benefited from the farm is called ***output.***
- Whatever is re-invested into the farm is called ***feedback*****;** that is proceeds from the sale or waste material.
- **Farming processes** include; ploughing, planting, harvesting, milking, breeding etc.

FACTORS INFLUENCING WORLD AGRICULTURE

a) Physical factors

- **Climatic factors**- Both temperature and rainfall determine the type of agriculture to be carried out in a particular area or region.
- **Topographical factors** -Some crops do well in areas of low altitudes and others grow well in higher altitudes.
- **Soil**-The type of crops to be grown in an area will depend on the type of soil in a particular area.
- **Biotic factors**-The presence of parasites and pests will damage crops and hamper animal production.

b) Human factors

- **Availability of land** - Sparse populated areas have sufficient land for commercial extensive farming while in highly populated areas intensive farming is practiced.
- **Government policies** -Providing farm input subsidies to encourage production. Additionally, quotas are also given to control production.
- **Religion and culture** -Some traditions and religious beliefs can hinder agricultural development as some do not believe in producing certain animals and crops. Similarly, the *Maasai* and *Fulani* practice nomadic pastoralism because of their nomadic way of life.

c) **Economic factors**

- **Capital**-Money is very important when setting up a farm, purchasing of inputs require money.

- Markets and transport expenditures determine the type of products to be produced.

d) **Technological factors**

- Repair of machines after breakdown or replacement is another factor that influences agriculture especially for commercial purposes.
- Use of chemical fertilizers has made agriculture possible in poor soil areas.
- Irrigation has also extended the area of production by making drought stricken areas productive.

CLASSIFICATION OF FARMING SYSTEMS.

It is classified according to;

- Size of land.
- Purpose of growing crops and rearing animals, that is for consumption or sale.

SUBSISTENCE FARMING

It is the type of farming which is carried out with the aim of producing food for family consumption.

CHARACTERISTICS

- Employment of family labour.
- Use of simple tools.
- Farmers own small pieces of land.
- A wide range of crops and animals is produced on the farm.

ADVANTAGES

- It does not involve high costs as family labour is used.
- Farmers are not taxed as in case with other systems.
- It leads to farmer's independence in food production as they do not need to buy food elsewhere.

DISADVANTAGES

- It does not give government revenue since farmers are not taxed.
- It does not favour mechanization due to existence of small plots.
- It quickly leads to soil degradation since it uses simple tools and techniques.

Shifting cultivation is an example of a primitive form of subsistence farming.
It involves clearing and burning (slush and burn) of vegetation to grow crops.
The land is abandoned once its fertility declines.

ADVANTAGES

- Control of weeds is easy by burning the bush.
- Burning the bush saves time and labour costs.
- Burning produces ash which provides nutrients to the soil.

DISADVANTAGES

- It is only possible in sparsely populated areas.
- Burning destroys humus and vegetation causing erosion and drought.
- There is no land improvement since farmers have no permanent settlements.

Table showing names and areas of subsistence farming.

NAME OF SUBSISTENCE FARMING	AREA WHERE IT IS PRACTICED
Milpa	Zimbabwe and Mexico
Ladang	Malaysia and Indonesia
Tamrai	Thailand
Taungya	Burma
Roca	Brazil
Caingin	Philippines
Poda or bewar	India
Chitemene	Zambia
Visoso	Malawi
Masole	DRC
Chena	Sri lanka

SUBSISTENCE ANIMAL FARMING

NOMADIC PASTORALISM

This is the system of rearing animals, where animals are moved from place to place in search of pastures.

It is practiced in areas of sparse population.

Table below shows areas of nomadic animal farming.

AREA	GROUP OF PEOPLE
Central Asia	Kirghiz, kazakhs
Ethiopia	Nubians
Sudan	Nubians
Saud Arabia	Bedouins
Sahel region	Fulani
East Africa	Maasai
North Africa	Tuaregs
Scandinavia	Lapps

CHARACTERISTICS OF NOMADIC FARMING

- Each family in a group rears the same type of animals such as cattle.
- People move from one place to another in search of pastures.
- They live in temporary dwellings.
- They rely on the animals for food, clothes and transport.
- They keep large herds of animals as symbols of status and prestige.

COMMERCIAL FARMING

This aims at producing crops or animals for sale.

CHARACTERISTICS

- Large capital to buy machinery, pay labour and purchase of fertilizers.
- Yields are generally high.
- Scientific techniques are applied.

ADVANTAGES

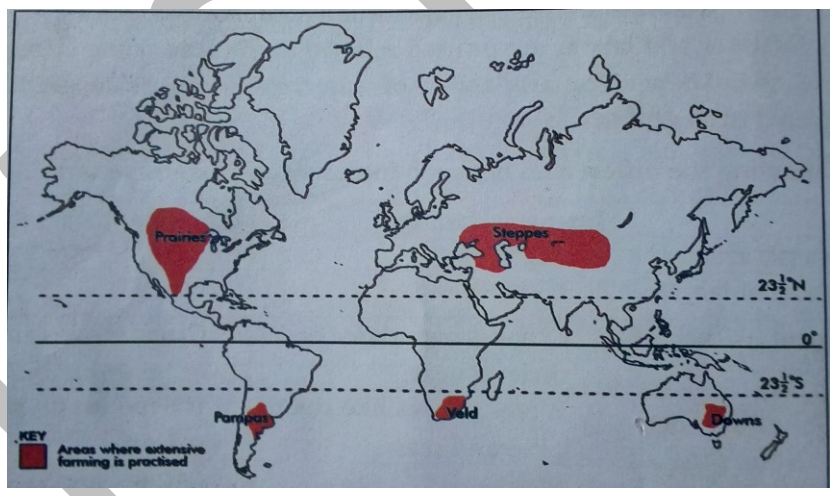
- It provides revenue to government since farmers are taxed.
- It provides employment to many people and uplifts their living standards.
- It favours mechanization since farms are often large.

DISADVANTAGES

- It emphasizes in production of cash crops.
- Continuous mono – cropping leads to soil degradation.
- It is subjected to high risks in times of drought.
- It requires heavy capital outlay for machinery and other inputs.

CLASSIFICATION OF FARMING SYSTEMS ACCORDING TO INTENSITY OF LAND USE

EXTENSIVE FARMING



Map showing areas of extensive farming

This type of farming system uses small inputs of labour, capital and fertilizers, relative to the land area being farmed.

- It may be crop or livestock farming. Extensive animal farming is called ranching.
- Animals are kept in farms called, ranches.

- Extensive farming is commonly practiced in Canada, Australia, Russia, South Africa, Argentina and USA.

CHARACTERISTICS

- Large farms are involved.
- It is monoculture i. e. one type of crop or animal is raised.
- Mechanization is common.
- Low yield per unit area of land.

ADVANTAGES

- Less labour required since machine is used.
- Lower requirements of inputs as compared to intensive farming.
- Improved animal welfare since animals are not kept in stifling conditions.

DISADVANTAGES

- Since it is monoculture risks are very high in times of drought and pests infestation.
- Irrigation is impossible in times of drought since farms are large.
- It requires flat land to permit mechanization.
- Large land requirements limit the habitats of wild species.

INTENSIVE SUBSISTENCE FARMING

This involves maximum utilization of the available land for cultivation.
It is mainly practiced in areas with very high population densities. E.g. Japan, China and other countries in Asia.

CHARACTERISTICS

- The farms are small in size.
- Farms are intensively cultivated.
- Double or treble cultivation is practiced.
- Utilize manual labour.
- Use of animals such as buffaloes and oxen to plough the land.
- Keeping animals is rare since there is no land for pasture.

ADVANTAGES

- It is easy to irrigate in case of drought.
- Farmers can harvest twice or thrice ensuring that there is enough food for the growing population.
- It helps the farmer to easily monitor land and protect the crops.

DISADVANTAGES

- It leads to loss of soil fertility.
- It is negatively affected where labour is insufficient.
- A lot of capital required may not be recovered since the purpose of the system is mainly subsistence.
- The use of chemicals and herbicides cause environmental pollution.

IMPORTANCE OF AGRICULTURE TO DEVELOPMENT

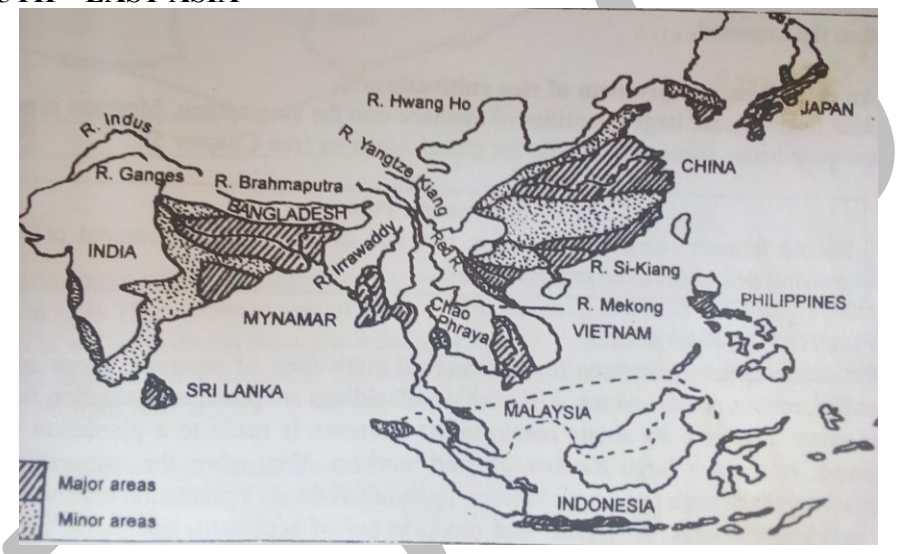
- It provides food to a country in form of maize, rice, meat and milk.
- It provides employment opportunities to people.

- It provides raw materials for various industries.
- It provides foreign exchange earnings when the products are exported to other countries.
- Source of government revenue through taxes imposed on agriculture products.

ENVIRONMENTAL IMPACT OF AGRICULTURE

- Climate change through emissions of green-house gases into the atmosphere by chemicals and livestock.
- Soil erosion and degradation when farm land is ploughed.
- Destruction of natural forests through clearing of the land to increase food production.
- Destruction of water bodies through irrigation.

Unit 7: INTENSIVE RICE FARMING IN SOUTH – EAST ASIA



Map showing countries of South- East Asia.

Countries in South-East Asia where rice is grown include China, India, Vietnam, Thailand, Bangladesh, Philippines, Cambodia, Indonesia, Malaysia and Myna mar. India and China are the world's leading rice producing countries.

TYPES OF RICE CULTIVATION

There are two types based on how it is cultivated.

1. LOWLAND OR WET RICE

- Is grown on flat coastal and river delta plains that are flooded by irrigation.
- Rice fields called paddies are made by enclosing a levelled plot of land with earth walls called bunds.
- The bunds help to retain water in the field.
- This type of rice is intensively grown in the valleys and deltas of the Ganges in India and Yangtze in China.

2. UPLAND OR DRY RICE

- This type is grown in hilly areas where flood irrigation is impossible.

- It depends on rainfall.
- Terraces are made on hill slopes to retain the excess water flowing down the slopes.
- It is commonly grown in Burma, China, Philippines and Japan.

CONDITIONS FAVOURING RICE GROWING

1. Physical conditions

- Topography – rice requires flat land since fields need to be flooded or irrigated.
- It requires soils that can retain water so that they are able to hold water when irrigation is done.
- Heavy rainfall of over 2000 mm annually with at least 120mm per month.
- Temperatures of about 15.5^0c to germinate and over 21^0c to grow.

2. **Human conditions**

- It requires high labour throughout the growing period.
- High population puts pressure on land and this result into small sized farms.

Table below showing circle of seasons on the rice field in South- East Asia

Time/Month	Season	Activities
May	Rainy season approaches	Field and nursery preparation.
June and July	Onset of the rainy season	sowing
August	Rainy season intensifies	Transplanting
September and October	The rains begin to subside	Field maintenance i.e. weeding, fertilizer application, control of pests and water levels
November	Onset of northeast monsoon which brings dry cool air and little precipitation to the mainland.	Draining off the fields
December	Dry season	Harvesting, processing and storage
January	Dry season	Field and nursery preparation for the second crop
February to April	The dry northeast monsoon subsides	Sowing, field maintenance, harvesting

CULTIVATION OF RICE

- Preparation of the rice nursery starts one month before sowing. The soil of the nursery should be loose, without weeds, moist and fertile.
- Preparation of the rice fields starts about one or two months before rice is transplanted. The fields are first flooded with water, then ploughed by hand (hoe) or by animal. Then levelling is done by a shovel or a rake.
- Transplanting of the seedlings is done approximately one month after sowing the nursery. Only strongest seedlings are transplanted with proper spacing between them in straight rows.
- Control of water level is done to avoid submerging and damaging the rice plant.
- Weeding usually starts two weeks after transplanting and continues throughout the growing season. It is done by hand.

- Fertilizer application is done one month before transplanting, one month after transplanting and one month after flowering.
- Pests such as birds, rats and insects are controlled when the crop reaches maturity in about six months.
- Rice fields are drained two to three weeks before harvesting to allow the crop to ripe.
- Harvesting is done by cutting when the heads are yellow by using a sickle and the stocks are tied in bundles. The bundles are sun dried, threshed, and then winnowed by tossing them in a bamboo tray.

Note: Most Asian farmers do not use machines because;

- Their fields are very small.
- Most of them are too poor to buy or hire machines.

CHALLENGES ASSOCIATED WITH RICE FARMING IN SOUTH – EAST ASIA

- Decline of soil fertility since cultivation is continuous.
- Rheumatism (painful muscles and joints) is a serious problem to farmers.
- Waterborne diseases is also a serious problem to farmers working in wet conditions.
- Presence of mountains creates problems in irrigation.

IMPORTANCE OF RICE FARMING IN SOUTH-EAST ASIA

- Rice is the staple food in South-East Asia.
- It is a source of foreign exchange earnings to countries.
- It is source of income to people who work in rice fields.
- Rice is used in the manufacturing industry as it is raw material in the production of other food products.

RICE FARMING IN MALAWI

Rice production is done in specific areas like Karonga and Nkhatabay in the northern region, Salima and Nkhotakota in central region, Zomba, Machinga and Phalombe in southern region. Almost 100,000 tons of rice harvested in Malawi comes from Lake Chilwa wetlands.

FACTORS THAT LIMIT RICE PRODUCTION IN MALAWI

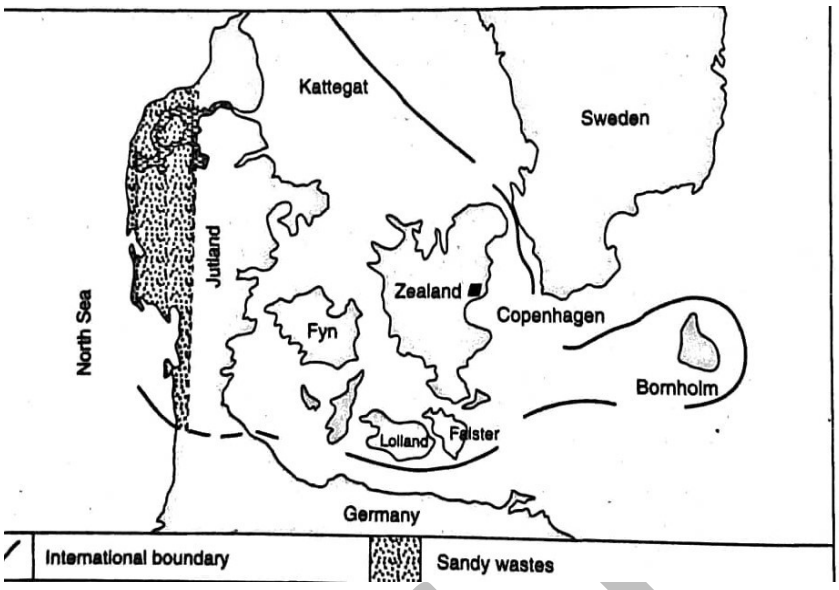
- Decline in soil fertility due to increased erosion.
- Lack of adequate knowledge in rice production practices.
- Droughts in most parts of the country negatively affects rice production.
- Lack of better seeds as most farmers use recycled seeds which give poor yield.

EFFORTS TO IMPROVE LOCAL RICE PRODUCTION

- Expansion and establishment of irrigation schemes throughout the Green Belt Initiative.
- Investing in research for better seeds that are affordable to poor farmers.
- Searching for international markets for farmers to export their rice and get profits.
- Investing in simple machinery such as treadle pumps for irrigation.

Unit 8: INTENSIVE ANIMAL FARMING IN DENMARK

- It is a small country in northern Europe consisting of the peninsula of Jutland and islands of Fyn, Zealand, Falster and Lolland.
- It is almost flat and surrounded by water which makes it possible to rear dairy cattle.
- It is the second and third exporter of butter and cheese in the world respectively.



Map of Denmark

FACTORS FAVOURING DAIRY FARMING IN DENMARK

- Cool, wet climate which promote the growth of fresh pastures and fodder crops.
- Fertile soils which has allowed the growth of fresh and high grade pastures, legumes and other plants.
- The country is highly urbanized which provides market for the products.
- The country has mechanized farm operations which improve breeds of dairy cattle.
- The country has highly skilled work force which assist in yielding most desirable results.
- The country has rich entrepreneurs who manage to purchase high yielding breeds and farm machinery.

CROPS ASSOCIATED WITH DAIRY FARMING IN DENMARK

- The crops grown are wheat, barley, potatoes and sugar beets.
- These crops are fed to animals during the winter when it is too cold for outdoor grazing.

FARMING ACTIVITIES ON A DAIRY FARM IN DENMARK

1 – SPRING

- March, April and May are spring months.
- This period is when cows produce the most milk. In this period also the following things take place:
- Mating occurs in order to get the cows in calf for next season.
- Mating is by artificial insemination.
- Young calves are often housed in buildings for five to six weeks to keep them out of the weather.
- Crops that might be needed for the feeding to the cows in summer are planted.

2 – SUMMER

- June, July and August are summer months.

- Days are much longer than nights.
- The amount of milk cows produce drops.
- Cows are given pregnancy tests to help farmers in decision making for the remainder of the season.

Other activities include;
- Hay making.
- Watering pasture through irrigation.

3 – AUTUMN
- September, October and November are the months.
- This is the dry period.
- Root crops are harvested.
- The period is used to tackle major maintenance and development projects on a farm such as fencing, drainage and shed maintenance.
- Farmers have time to enjoy lifestyles and leisure as well as plan ahead for the next season.

4 – WINTER
- December, January and February are winter months.
- This time most cows have stopped milking.
- Cows are fed enough to maintain their body condition.
- It is the time for feeding hay and silage.

TYPICAL DANISH DAIRY FARM
- Danish dairy farm is about 50 to 60 hectares.
- It consists of farm buildings, such as farm house, animal sheds, barns, milking parlours, shed for machines and tool shed.
- A standard dairy farm has the following equipment: cream separator, cheese-making machine, churns, refrigerated storage tanks and pasteurizer.
- A farm is fenced and divided into several grass fields in which cattle are grazed. Animal manure and artificial fertilizers are applied to improve the soils.

DAIRY BREEDS RAISED IN DENMARK
Milking short horn, Guernsey, Friesian, Brown Swiss, Alderney, Red Danish and Jersey.
Poultry, sheep and pigs and beef cattle are also raised for their products.

PRODUCTS FROM DAIRY FARMS
Butter, cheese, yogurt, ice cream, powdered milk, condensed milk.

THE ROLE OF COOPERATIVES IN DAIRY FARMING IN DENMARK
Cooperatives are groups in which farmers put their resources together to achieve a common and desirable result.

Cooperatives help individual farmers by;
- Purchasing of farm inputs in bulks and then distributing them to members at low prices.
- Marketing farmers produce in big and reliable markets making them serve time and money.

- Farmers are able to get cheap loans in form of money or in-kind.
- Researching and advising farmers on new improved dairy farming techniques.

IMPORTANCE OF DAIRY FARMING IN DENMARK

- It is source of income to farmers.
- It provides manure that improves soil fertility.
- It creates employment for the people.
- It is source of raw materials for the production of drugs, plastics and synthetic fibers.

PROBLEMS OF DAIRY FARMING IN DENMARK

- Long and severe cold winters which restrict animals to indoor grazing.
- Scarcity of labour as many young people opt for white collar jobs rather than farming.
- Land for dairy farming is becoming scarce due to rapid population growth.

FOLK HIGH SCHOOL

- These are private adult education schools which aim at assisting farmers to have knowledge on dairy farming and management.
- From November to April men learn latest agriculture techniques.
- From May to August women learn home economics.

Unit 9: IRRIGATION FARMING

It is the artificial supply of water to an area to meet moisture requirements for crop production.

CONDITIONS NACESSARY FOR IRRIGATION FARMING

- Abundant and regular supply of fresh water from either the lake or the river.
- Availability of gently sloping land to allow free flowing of irrigated water by gravity with little need for pumping.
- The soils should have the water holding qualities like the clay soil.
- Occurrence of drought or hot and dry climate.
- Heavy capital outlay to purchase pipes and construction of canals.

TYPES OF IRRIGATION

Irrigation methods are classified into **traditiona**l and **modern.**

TRADITIONAL

1 **– Flood or basin irrigation**

This is where water is pumped or brought to the fields and allowed to flow along the ground among crops.

ADVANTAGES

- Water covers the entire surface of the field and soak into the soil.
- It does not require any technical knowledge hence it has less economic investment.

DISADVANTAGES

- Much of water used ends up not getting to the crops hence wasting a lot of water.
- It also encourages soil erosion, water logging, leaching of nutrients and salinity of the soil.

2 – **Furrow irrigation**

In this method narrow ditches called furrows are constructed between plant ridges through which water flows. The water seeps into ridges as it flows through the ditches.

ADVANTAGES

- It is cheaper.
- It allows large area to be irrigated at a time.

DISADVANTAGES

- A large amount of irrigation water is wasted as it runs off washing away soil nutrients.
- It is difficult to regulate uniform distribution of water to crops.

MODERN METHODS OF IRRIGATION

1 – **Trickle or drip irrigation**

In this method water is sent through plastic pipes that are either laid along the rows of crops or buried along their root-lines. The pipes have tinny openings from which water trickles into the soil.

ADVANTAGES
- It is efficient when it comes to water saving.
- Fertilizers can be supplied to the plants together with water.
- Weeds do not spread because water reaches only near plants and does not spread in the whole field.

DISADVANTAGES
- It is expensive to install and to maintain.
- It requires special technical knowledge for successful operation.

2 – **Sprinkler irrigation**

In this method water is supplied through pipes that lie on or above the ground which supply water evenly to crops using nozzles.

ADVANTAGES
- It does not waste much water due to uniform water distribution.
- It does not require much leveling of land since pressure is used to pump water.

DISADVANTAGE
- It has high initial costs since it requires machinery such as pumps.
- Under strong wind condition water may be lost.

IMPORTANCE OF IRRRIGATION FARMING
- It enables cultivation of crops in arid and semi – arid regions.
- There is a regular and reliable supply of water to crops.
- The multipurpose dams can also be used for hydro-electric power production and fishing.

CHALLENGES FACED IN IRRIGATION FARMING
- The moving water carries away sediments which leads to siltation in water masses.
- The water that infiltrates the soil can wash away nutrients through leaching.
- Occurrence of water borne diseases especially in clay soils where water is retained.
- High costs to construct dams and canals.

SOLUTIONS TO CHALLENGES FACED IN IRRIGATION FARMING
- Using efficient irrigation methods.
- Using desalination processes to remove salts in water.

- Water can be treated and reused to irrigate crops.
- Restoring plant cover to maintain the precipitation pattern and water resources.

IRRIGATION FARMING IN MALAWI

The low lying areas of Malawi have semi-arid climate and it is where most of the irrigation farming is taking place. These areas include:

- The Nchalo Sugar Irrigation Scheme in Chikwawa.
- The Dwangwa Sugar Irrigation Scheme in Nkhotakota.
- Limphasa Rice Irrigation Scheme in Nkhatabay.
- Wowve and Hara Rice Scheme in Karonga.
- Likangala Rice Irrigation Scheme in Zomba.
- Bwanje Rice Irrigation Scheme in Dedza.
- Kasinthula Rice Irrigation Scheme in Chikwawa.

REASONS FOR IRRIGATION IN THESE AREAS

- The areas have low food production since they experience natural disasters like floods and droughts.
- Lie in flood plains where water is abundant even during dry season.
- Have fertile soils due to deposition of nutrients by frequent floods.

PROBLEMS FACING IRRIGATION IN MALAWI

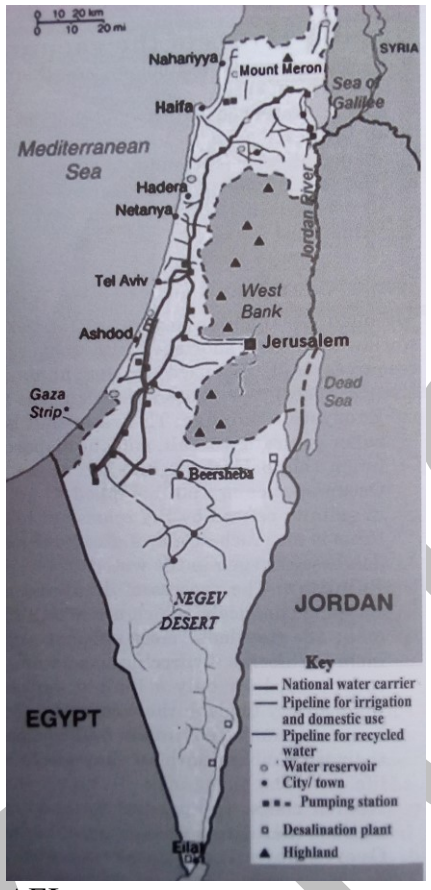
- Lack of political will to promote small irrigation schemes as government fail to fund the projects.
- Limited of community participation in irrigation projects make them lack ownership.
- Siltation of water bodies force farmers to locate their plots closer to water sources.
- Lack of skills by farmers to use irrigation technologies.
- Theft of irrigation pipes. E.g. at Nchalo

WAYS OF IMPROVING IRRIGATION IN MALAWI

- Investing in irrigation development at the smallholder level e.g. Oxfam works with poor farmers.
- Rehabilitation of existing irrigation schemes.
- Training farmers on proper land and water management practices.
- Encouraging organic farming to minimize water pollution and contamination.
- Increasing capital outlay by giving loans and implements to smallholder farmers.

Unit 10: IRRIGATION FARMING IN ISRAEL

- Israel's agriculture is characterized by high-level technological systems, controlled mechanization and use of high quality seeds.
- Water scarcity is the main limiting factor in Israel's agriculture.
- The country depends on irrigation to increase its crop yields.
- About 50% of land is irrigated.



RELIEF REGIONS OF ISRAEL

i. **Mediterranean coastal plains**
- It is flat and fertile.
- It has abundant source of water.

ii**. Hilly region**
- It is bounded by Sea of Galilee in the north, Judea hill in the Centre and Jordan valley in the east.
- The region is badly eroded.

iii. Negev desert
- It is hot and dry with no rainfall from May to October.
- It is where irrigation is done.

iv. **The Great Rift Valley**
- It forms a series of valleys running generally south to the Gulf of Aqaba.
- The Jordan River marks part of boundary between Israel and Jordan.
- The Jordan River flows south into fresh water Lake Tiberius or the Sea of Galilee.

CLIMATIC REGIONS OF ISRAEL

Israel has three climatic regions:
- In northern and central Israel there is Mediterranean climate characterized with hot summers and rainy winters.
- The coastal plain is humid during the summer and comfortable during the winter.
- In the mountains summers are dry while winters are cold.

SOIL

- There is poor sandy soil in the Negev desert which lose a lot of water through leaching.
- This implies that there should be constant water supply.

NATURAL SOURCES OF WATER IN ISRAEL

- Sea of Galilee or Lake Kinneret
- Yarkon river
- Ground water
- Dead Sea

Problems experienced in using the Sea of Galilee to irrigate the Negev desert

- The lake is about 210 meters below sea level, so water has to be pumped from this altitude to about 200 meters above sea level in order to cross Galilean mountains.
- The distance from the lake to the Negev desert is about 160 km, so it is very expensive to pump water.
- Drought and heavy pumping have brought the lake to dangerously lower levels.

METHODS OF IRRIGATION PRACTICED IN ISRAEL

The major methods used in Israel include;

- Drip or trickle irrigation – it is widely used in order to save water
- Sprinkler irrigation- it is automated to regulate amount of water supply and used to irrigate crops in entire field.
- Buried irrigation- where pipes are buried in soil to save water from excessive evaporation.
- Canal irrigation – These are used in the northern section because this region is rainy and cool.

PROBLEMS ASSOCIATED WITH IRRIGATION IN ISRAEL

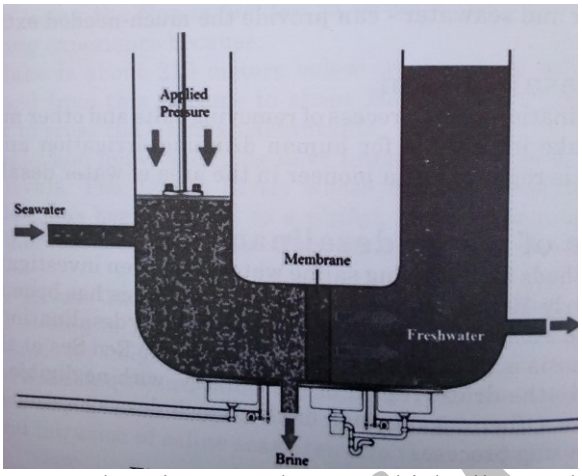
- Insufficient sources of water.
- It is costly to pump water from Lake Tiberius which is 210 m below sea level.
- Loss of water through evaporation in the Negev desert and leaky pipes.
- Conflict with neighboring countries over the use of other water bodies such as the Jordan River.

WATER DESALINATION WORKS IN ISRAEL

Water desalination is a process of removing salts and other minerals from water to make it suitable for use.

Methods of water desalination in Israel include:

REVERSE OSMOSIS (MEMBRANE PROCESS)

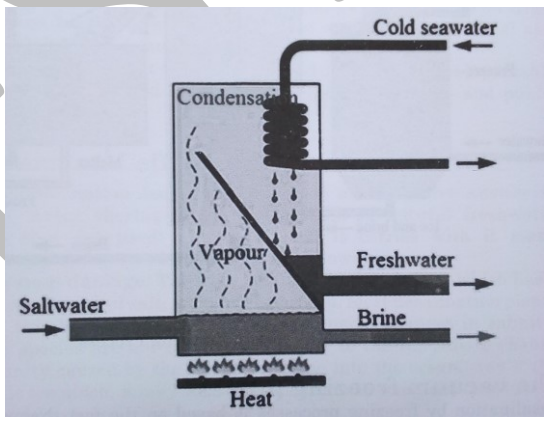


In this process salt water is pressed against membranes which allow only water to pass through preventing passage of salts. Water passing is desalinated and remaining water is brine (salts). The leading desalination project is located near Eilat, a city on the Red Sea.

ADVANTAGES
- It uses less energy hence reducing desalination costs.
- It is very efficient and supplies water of high quality.

DISADVANTAGES
- It uses very sophisticated technology.
- The membrane sometimes is blocked, therefore, it is not suitable for brackish water with high salt.

DISTILLATION /EVAPORATION PROCESS



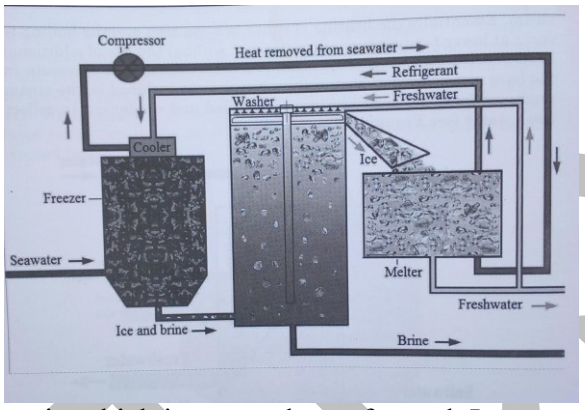
Water is heated in a vacuum unit to turn into steam. When water evaporates, salts and other contaminants remain in the base because they are too heavy. The steam is cooled and condensed to collect fresh water.

ADVANTAGES
- It produces good quality water.
- It can effectively treat a wide range of impure water even that with very high concentration of salts.

- It is less expensive since it does not require sophisticated equipment.

DISADVANTAGES
- It consumes high amount of energy hence suitable only in countries with cheap power sources.
- It may increase greenhouse emissions and pollution due to high energy consumption.

VACUUM FREEZING PROCESS



Sea water is pumped into a freezer in which ice crystals are formed. Ice crystals are pumped to the washer they are separated from the brine. The ice crystals are cleaned to remove the brine. The ice crystals are then melted to produce fresh water.

ADVANTAGES
- It has low energy requirements.
- It is suitable for difficult brackish water.

DISADVANTAGES
- It uses advanced technology which require huge capital.
- The desalination plant needs a huge land to construct.

ENVIRONMENTAL EFFECTS OF WATER DESALINATION
- There is ecosystem damage if too much brine is released into the environment.
- Some cleaning chemicals used before desalination pollute the environment when they are dumped.
- Purified water is not healthful because there are no necessary minerals.

WATER RECYCLING

Israel also recycles used water and it is the largest water recycler in the world.

ADVANTAGES OF WATER RECYCLING
- Fresh water is freed up for domestic needs.
- Recycling solves waste disposal problems and reduces fertilizer requirements.

Water is recycled at Shafdan Treatment and Reclamation Plant. It is responsible for the following;
- Treating wastewater originating from nearly 2.3 million residents in Tel Aviv.
- Purifying approximately 130 million cubic meters annually of wastewater for irrigation purposes.

METHODS OF RECYCLING

1- ELECTRO-FLOCCULATION SYSTEM

This method speeds up the settling process of water by releasing metal electrodes with positively charged electrons to pull the negatively charged particles downward.

2- MAGNETIC BASED WATER TREATMENT

This is the process that uses magnetic particles to separate toxic organic substances, such as oil, detergents, and heavy metals from the water.

3- AGAR (Attached Growth Airlift Reactor)

This system increases surface area of biological purification treatments by using biomass carriers.

4- LASER BASED ANALYSIS

This uses online laser-based, particle size analyzers to detect solids in water, from lime deposits objects such as viruses.

5- UV LIGHT PURIFICATION

This is a disinfecting system in which water passes through in a specialized quartz tube that bounces beams of ultraviolet light through it. This process kills billions microbes.

6- ELECTRO-COAGULATION

This treatment removes heavy metals from water.

CROPS GROWN UNDER IRRIGATION IN ISRAEL

- Citrus fruits, tomatoes, sunflower, sugar beet, potatoes, grapes, apples and cotton.

THE NATIONAL WATER CARRIER

It is also called Kinneret-Negev Conduit. This is an extensive system of giant underground pipelines and canals. It stretches from Lake Kinneret to the Negev desert.

Purpose of constructing this expensive water system was to;

- Supply water to entire Israel population.
- Convert desert land into settled and agricultural land.
- To increase food production for the country's growing population.
- To add business and employment opportunities.

Unit 11: PLANTATION FARMING

This is a type of commercial farming where a single perennial crop is grown on a farm at large scale and sold for cash and export.

CROPS GROWN UNDER PLANTATION FARMING

CROP	AREAS WHERE THEY ARE GROWN
Rubber	Malaysia, Thailand, Nigeria, Liberia
Sugar cane	Cuba, Brazil, Australia, South Africa, India
Cocoa	Ivory coast, Ghana, Nigeria, Peru,
Tea	India, China, Japan, Kenya, Malawi,
Coffee	Brazil, Venezuela, Colombia, Kenya,
Oil palm	Nigeria, DRC, Cameroon, Gabon,
Banana	Ecuador, Brazil, India, Caribbean Islands, Costa Rica

Oil coconut	Philippines, Indonesia, Malaysia, Singapore, Ivory Coast

CHARACTERISTICS OF PLANTATION FARMING

- It requires the application of new agricultural technology.
- Foreign ownership as estates are owned and managed by foreign companies.
- The system is monoculture.
- It is done on large farms called plantations.
- Estates have facilities that process the crop.
- It requires a large capital outlay.
- It is export oriented where crops are solely for commercial purposes.

ADVANTAGES

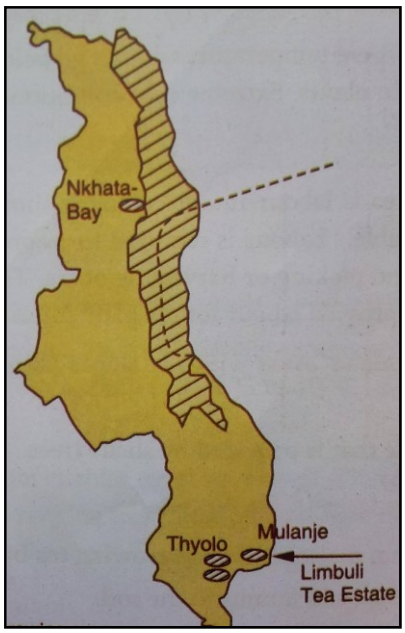
- Effective use of vast land.
- More job opportunities for the people.
- Source of high income earnings for a country through export revenue.
- There is better provision of electricity and water as well as other social services.

DISADVANTAGES

- Loss in value of crops may be experienced since they take more than a year to mature.
- Local people may be exploited as cheap labour.
- They require heavy capital outlay since they involve modern machinery.
- There is loss of biodiversity when estates are opened.
- Delays in processing the crop would lead to loss in value.
- Most of the profit is invested in the multinational corporations.
- Natural disasters such as winds and droughts may affect the entire crop and cause massive loss.

Unit 12: TEA PLANTATION IN MALAWI

- Malawi is the second tea producer in Africa after Kenya.
- The country has three tea producing areas namely; Mulanje, Tchyolo and Nkhatabay.



Map showing areas where tea is grown in Malawi

CONDITIONS FAVOURABLE FOR TEA GROWING

- Cool temperatures of about 18^0 c throughout the year.
- Heavy rainfall of over 1,500 mm per annum, which is distributed uniformly to allow sprouting of new leaves.
- Well drained loam soil preferably at a higher altitude.
- High humidity which prevents loss of water from plant leaves enabling the young leaves to grow quickly.
- Abundant labour supply especially during harvesting.

ACTIVITIES ON THE TEA PLANTATIONS IN MALAWI

i. Clearing of the land.

This is done by removing tree trumps in order to prevent the fungal disease called armillaria.

ii. Cultivation of tea

There are two methods of growing tea namely direct planting of seeds or using cuttings from improved tea trees.

- Direct method – Seeds are germinated in wet sand then removed and transported to nurseries. The trees are re-transplanted to the plantation six months later.
- Seedlings are planted in straight rows at 1.5m apart.
- Using cuttings (clones) from improved tea trees - Cuttings are raised in a nursery and when plants reach a height of 20 cm they are transplanted into the field.
- They are then planted in rows on the plantation.

iii. **Weeding**

- It is done at regular intervals in order to stimulate growth.

iv. **Fertilizer application**

- It is done to facilitate growth of tea bushes.
- It is done between September and

October.

v. **Pruning**

Old tea bushes are pruned to a height of 1.2 to 1.5 metres. The main reasons for pruning are:

- To stimulate growth of new shoots.
- To prevent flowering and fruit formation.
- To maintain a health frame.
- To maintain a good height for easy harvesting.

vi. **Topping**

- This refers to the cutting of tops of tea bushes.
- It is normally done with the aim of obtaining a flat plucking table.

vii. **Picking or harvesting**

- Tea picking requires skill, patience and good judgment.
- It is normally done by women who are described as good pickers.
- Tea is picked from November to March and can be picked after second year.
- Two tender or young leaves and a bud or shoot at the tips of branches are the first to be picked.
- This is because they have high tannic acid concentration that gives the tea its flavor.

STAGES INVOLVED IN PROCESSING TEA

There are different classifications of tea which are determined by the method of processing leaves. The following are more prominent classes of tea; "black", "green", and "oolong'' tea.

PROCESSING BLACK TEA

i. Withering

- Leaves are put in troughs in which hot air is blown to reduce moisture by 50%.

ii. **Rolling**

- Weathered leaves are directed to rollers where rotating vanes break leaves into small pieces.

iii. **Sifting**

- This is the process whereby old tea leaves, unwanted stems and midribs are removed.

iv. **Fermentation**

- Tea is spread on aluminum trays or concrete tables in a cool moist room where temperature and humidity is kept constant at 24^0 c.
- It is done to reduce tannic content and to preserve its flavor.
- Tea changes from green colour to copper.

v. **Firing or roasting**

- Tea is put in a conveyer belt and passed through hot air chambers in order to dry it.
- The leaves then become dark brown.

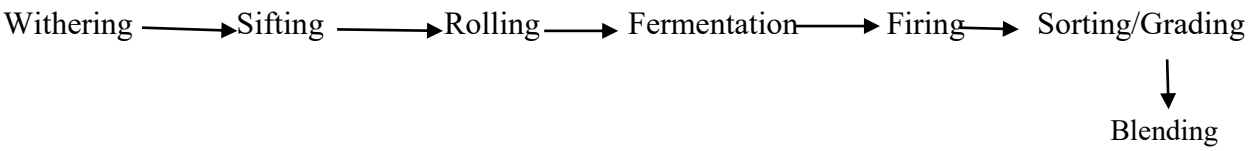
vi. **Sorting and grading**

- The black tea is then passed into various machines where it is sorted into different grading holes and then it is packed to its grade.

vii. **Blending**

- This is done by mixing different grades of tea in order to improve their quality.

Below is the flow diagram to show how black tea is processed.



GREEN TEA

The process is the same only that leaves do not undergo the fermentation process.

OOLONG TEA

The leaves are semi-fermented, which means that they are left to dry in the shade for 5 hours, afterwards they are roasted over a fire for 10 minutes, rolled and twisted, then re-fired in a bamboo basket for 3 to 12 hours before parking.

SMALLHOLDER TEA INDUSTRY

It started as a political project which aimed at preventing the monopoly of the commercial crop by white farmers in large companies. There are 10,000 smallholder farmers which accounts for between 10 to 15 percent of the total tea hectare in the country.

Reasons for this political move was to:

- Make local population to have an alternative source of income.
- Make farmers utilize the knowledge of growing tea they acquired in estates to benefit themselves.

THE SMALLHOLDER TEA AUTHORITY (STA)

It was created by Malawi government. Farmers sign contracts with the authorities to grow the cash crop and sell it through them.

FUNCTIONS OF SMALLHOLDER TEA AUTHORITY

- Marketing of green leaf grown by smallholders to Malawi Tea Company (MATECO).
- Transport of green leaf from smallholder plots to factory.
- Maintenance of infrastructure .e.g. the roads and bridges to facilitate transport of green leaf.
- Procurement of inputs for smallholder farmers such as fertilizers, pesticides and leaf collection bags.
- Provision of credit to smallholder farmers.

IMPORTANCE OF TEA INDUSTRY TO MALAWI'S ECONOMY

- It is source of foreign exchange earnings.
- Tea industry is source of employment to people.
- It is a source of income to farmers.
- It has led to the development of infrastructure for instance, roads.
- It is source of tea leaves for local consumption.
- It has brought industrial development
  e. g. tea factories.

CHALLENGES FACING THE TEA INDUSTRY IN MALAWI

- Price fluctuation: falling prices of tea have resulted in low wages and poor working conditions at the plantations
- Pests and diseases: controlling pests and diseases is very expensive to smallholder farmers
- Rising cost of production: this has forced many farmers to remove the tea plants from their plots and put the land into other uses
- Foreign competition from other countries that produce tea forces producers to cut prices so that they make sales

Unit 13: INDUSTRIALISATION

This is the process in which a society or country transforms itself from a primarily agricultural society into one based on the manufacturing of goods and services.

FACTORS NECESSARY FOR INDUSTRIALISATION

- Invention of new and modern technologies such as machine and engines that stimulates the process of industrialization.
- Availability of mineral deposits for production of iron and steel.
- Increasing human population which encouraged production of more goods to meet their needs.
- Availability of finances which encouraged people to take risks with investments and trade.

ADVANTAGES

- It helps a country to become self-sufficient.
- It raises the living standards of people.
- It creates employment opportunities.
- It has encouraged effective use of natural resources.
- It has assisted in development of infrastructure and growth of towns.
- It has facilitated the production of export goods, thereby encouraging international trade.

DISADVANTAGES

- It leads to urbanization which causes erosion of cultural and traditional values.
- It displaces people who settle in other areas.
- It creates unemployment especially in industries that use a lot of machines that replace human labour.
- It leads to pollution of water, air and land.

MAJOR FACTORS THAT HAVE ENCOURAGED THE DEVELOPMENT OF INDUSTRIALISED REGIONS

Industrial Region	Factors
North America	No wars, abundance natural resources, large markets, energy supplies and cheap transport
Western Europe	High technology advancement, availability of raw materials, urbanized population.
Asia	Heavy foreign investments, cheap transport due to open coastal areas, large local market, center of coal and iron/ steel production, textiles
Ukraine, western Russia	Large local market, converging transport routes, large labour force, high quality machine building, chemical production, metallic ores production.

Unit 14: INDUSTRY

An industry is an organized activity involved in the production of goods and services or extraction of natural resources.

TYPES OF INDUSTRIES

i. **Primary industries**

These are industries that involve the production, collection and extraction of raw materials or natural resources.

ii. **Secondary industries**

These are industries that transform or change raw materials produced by primary industries into consumable products.

iii. **Tertiary**

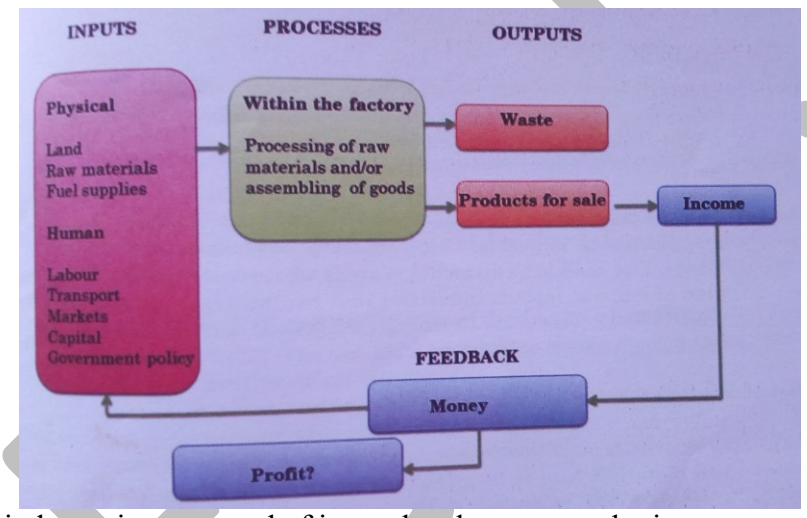
These are industries that are concerned with the provision of social services to consumers. They are also called service industries because they provide for the needs of the population.

iv. **Quaternary industries**

These industries are concerned with research, dissemination of information and advisory services. E.g. Universities can do

Research which can be used to improve production of products.

AN INDUSTRY AS A SYSTEM



As a system an industry is composed of interrelated parts namely, inputs, processes and outputs. An industry is one of the open systems because there is always an output. Therefore, any of the four types of industries will have these three components as a system.

TYPES OF MANUFACTURING INDUSTRIES

Manufacturing is the transformation of raw materials into finished products for sale using machines and labour.

a. **Heavy manufacturing industry**

These are industries that use large quantities of heavy and bulky materials. They are located near to the source of their raw materials.

b. **Light manufacturing industry**

This industry uses light raw materials and components to produce small, light, high value goods. They are termed "footloose" because they are not tied to location of raw materials.

c. **Cottage industry**

These are small-scale industries where production of commodity takes place in homes and labour is supplied by families.

FACTORS FOR THE LOCATION OF MANUFACTURING INDUSTRIES

- Availability of raw materials.
- Energy or power supply.

- Labour supply.
- Availability of markets.
- Good transport systems to allow movement of raw materials and finished products.
- Capital.
- Government policies.
- Availability of land.

INDUSTRIAL INERTIA

This is the tendency for an industry to stay on in an area even when the original factors for its location change or no longer exist.

Factors for industrial inertia could be:

- The presence of skilled and experienced workers who might resist shift to another area.
- The existence of infrastructure at the present site which could be expensive to build in a new area.
- Fear of disrupting business.

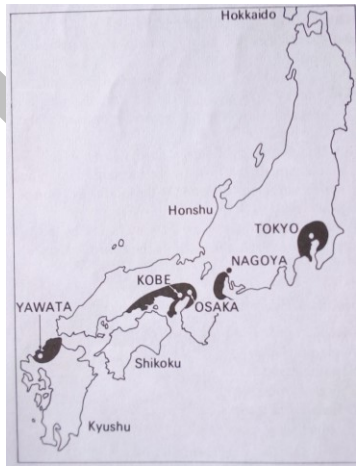
DISASTER, HAZARD AND DISASTER RISK MANAGEMENT ISSUES RELATED TO INDUSTRIES

- Acid rain is caused when industries emit gases such as sulphur dioxide which combines with water.
- Global warming which has caused the earth's surface to receive high temperature from solar radiation trapped in the atmosphere.
- Floods and landslides caused due to destruction of natural barriers such as swamps, wetlands and forests.
- Epidemics such as HIV/AIDS due to social instability and sexual exploitation.
- Water pollution and contamination through toxic material which might be released into water bodies.

WAYS OF REDUCING RISKS ASSOCIATED WITH INDUSTRIES

- Chemical risk assessment.
- Creating awareness on how to reduce risks within industries.
- Proper storage of hazardous materials.
- Provision of safety gears to workers.
- Residential areas should be located far away from the industrial areas.

Unit 15: MOTOR VEHICLE INDUSTRY IN JAPAN



Map showing industrial regions of Japan

THE TOKYO-YOKOHAMA INDUSTRIAL ZONE

- This is the main industrial zone of Japan.
- The main car manufacturing towns in this zone include; Yokohama, Tokyo, Kawasaki, Chiba and Hitachi.
- Hitachi also has leading electrical products.

OSAKA- KOBE INDUSTRIAL ZONE

- It is the second leading industrial zone.
- It is located on Honshu Island.
- It includes cities of Osaka, Kobe, Kyoto, Nagasaki, Otsu, Akashi and Wakayama.

THE NORTH KYUSHU ZONE

- This is found in Kitakyushu city.
- The city is covered by heavy industries which include the steel making and ship building industries based upon local coal fields.

NAGOYA INDUSTRIAL ZONE

- It is the leading center of the car industry.
- It is also the third largest industrial zone located on Honshu Island between Tokyo and Osaka.
- The major cities include Toyota, Nagoya, Honda, Okazaki and Yokkaichi.
- The automobile industries are concentrated at Toyota city.

Note: *The car models from japan include; Toyota, Honda, Daihatsu, Nissan, Suzuki, Kawasaki, Mazda, Mitsubishi, Subaru, Isuzu and Yamaha.*

FACTORS FOR THE GROWTH OF THE MOTOR VEHICLE INDUSTRY IN JAPAN

- Availability of capital for the industry.
- Good education system that promotes industrialization.
- Large markets both locally and internationally.
- Access to cheap water transport.
- Availability of hydro-electric power.
- Advanced technology in making high quality cars.

STAGES OF MOTOR VEHICLE PRODUCTION IN JAPAN

The car manufacturing process is divided into three main stages; car body design, building production technology and production.
Thousands of people and tens of robots are engaged in the process.

1. CAR BODY DESIGN

With the help of computers, designers develop basic concept drawings that help them visualize the proposed vehicle's appearance.

2. BUILDING PRODUCTION TECHNOLOGY

Car manufacturing tools, such as pressing machines which precisely create the body parts and frame work.

3. PRODUCTION

It follows the following process:

a. **Components supply and collection**
- Parts that will be used in the chassis are delivered to one area usually by truck or railway.
- Those that will comprise the body are unloaded at another place.

b. **Chassis and engine assembly**
- The car is constructed from the ground up and out.
- The frame forms the base on which the body rests.
- With the use of robots heavy components inside the engine compartment e.g. gear boxes, drive shafts and braking systems are installed.

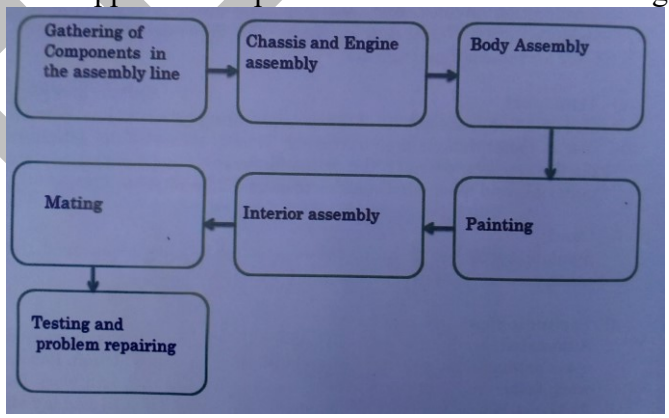
c. **Body welding**
- Steel sheet components which have undergone press processing are welded to form a body.
- The front and rear door pillars, roof and body side panels are built.

d. **Painting**
- Several layers of paint are applied to the assembled body.
- The body is then polished to give a shining and beautiful finish.

e. **Interior assembly**
- Once painting has been finished for the body several thousand parts are attached including interior components, instruments, electrical parts, wiring, tires and engine.

f. **Mating**
- Meeting of the chassis assembly and the body shell conveyor happens at this stage. Assembly workers bolt the car body to the frame.
- The automobile then goes to receive components such as battery, tires and gasoline.

g. **Inspection/testing**
- A completed car is subjected to rigorous and different tests for parts such as breaks and headlights.
- The cars are then shipped as completed vehicles with outstanding quality.



THE ASSEMBLY LINE TECHNIQUE

An assembly line is an arrangement of machines, equipment, materials and workers in such a way that work passes from operation to operation in a direct line until the product is assembled. Assembly line has two basic elements;

a. A conveyor system which brings car parts to workers stationed at various points.
b. The limitation of each worker to a single repetitive task.

ADVANTAGES OF ASSEMBLY LINE PRODUCTION
- Speedy production since each worker is given a single task which brings specialization.
- Low labour cost as people are involved in specific operations.
- Easy automation because machines may only be able to perform a limited number of specific tasks.

DISADVANTAGES
- Low wages since workers on a line are less skilled and require little training.
- High capital and energy costs as the conveyor belt require power.
- Boredom since workers are assigned to a single repetitive task.

ADVANTAGES OF AUTOMATION
- Improved worker safety since robots can carry out tasks that are too dangerous to humans.
- High product quality since there is consistency of product quality.
- Low cost of production because robots do not have to be paid wages.
- Reduced mistakes since robots carry repetitive and boring tasks humans tend to fail to perform.

DISADVANTAGES
- Huge capital investments since robot technology is very expensive to set up.
- Loss of jobs since robots take peoples job causing unemployment.
- Robots cannot make decisions will always depend on humans to do the programming, lubrication and repairing.

SIGNIFICANCE OF THE MOTOR VEHICLE INDUSTRY IN JAPAN
- It is source of revenue to the government through taxation.
- There is great opportunity to enjoy leisure time at any distance because of available transport.
- It is source of foreign exchange earnings.
- The industry creates employment opportunities to people.

PROBLEMS ASSOCIATED WITH THE MOTOR VEHICLE INDUSTRY IN JAPAN
- Air pollution.
- Increased exploitation of fossil fuels.
- Traffic jams.
- Noise because of growing numbers of vehicles in streets.
- Fatal accidents
- Decline of public transport.

Unit 16: TOURISM IN AFRICA

This is an economic activity where people travel to visit places of interest for pleasure, business or education.

A tourist therefore, is any person who travels to places of interest for different purposes.

AIMS OF TOURISTS
- Rest and relaxation.

- To see new places of interest.
- To understand how the rest of the world lives.

FACTORS THAT PROMOTE TOURISM IN AFRICA

i. **Economic factors**

- Many African countries have good accommodation facilities, good road networks and a wide variety of tourist facilities where visitors can enjoy.

ii. **Cultural and historical factors**

- Africa has diverse cultures which attract tourists. There are many cultural centers and historical places.

iii. **Physical factors**

- Availability of beautiful scenery such as mountains, lakes, rivers, waterfalls, beaches and wildlife.

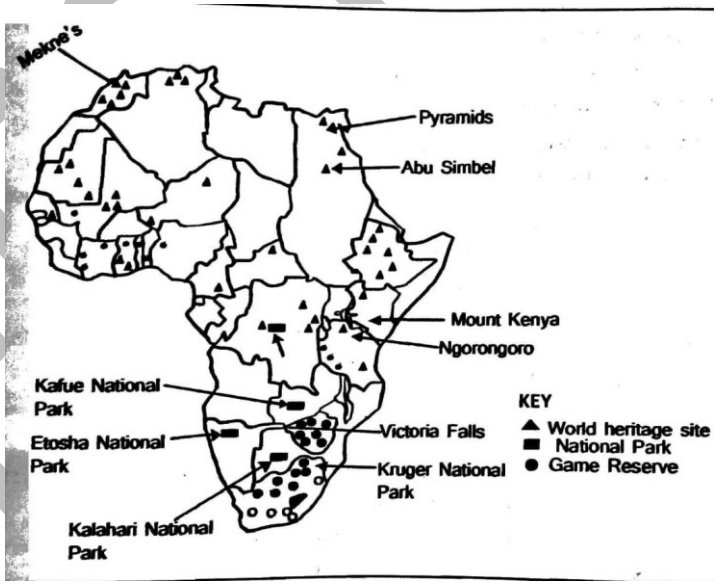
iv. **Climatic factors**

- Africa has warm, sunny climate throughout the year which attract tourists.

v. **Political factors**

- Many African countries strive to make their nations great tourists destination. Peace which exist in a country will also attract tourists.

MOST POPULAR TOURIST DESTINATIONS IN AFRICA



Map of Africa showing tourism centers

- The pyramids of Egypt.
- Victoria falls between Zambia and Zimbabwe.
- Masai Mara national reserve in Kenya.
- Djenne in Mali.
- Cape Town in South Africa.

- Mount Kilimanjaro in Tanzania.
- Marrakech in Morocco.

IMPACT OF TOURISM IN AFRICA

POSITIVE IMPACT
- It provides opportunities for employment in services such as transport, accommodation, catering and entertainment.
- Generation of extra revenue which can benefit the economy of the country.
- Preservation of culture through traditional art works.
- Promotion of cottage industries when tourists purchase items produced by the locals.
- Development of infrastructure e.g. roads, hotels, airports and railways.

NEGATIVE IMPACT
- Pressure on local resources due to increase in population of the host country.
- Seasonality of employment for those working in tourists facilities.
- Foreign diseases may come in resulting in wasting resources in order to fight them.
- It may leads to erosion of local cultures and traditions which force people to adopt foreign values.

TYPES OF TOURISM

1. MASS TOURISM

This involves large number of tourists visiting a destination at one time.

ADVANTAGES
- It brings more money due to large number of tourists involved.
- It strengthens international relations since it brings together many people from different countries.
- Many people are employed in the service industries.

DISADVANTAGES
- It can ruin areas of natural beauty through creation of many infrastructures.
- It can also pollute air due to increased number of cars and air crafts.
- Large number of tourists can undermine traditional values and beliefs.

2. ECO- TOURISM

This is a specialized form of tourism where people want to see and experience relatively untouched environments.

ADVANTAGES
- It discourages poaching and this contributes positively towards the protection of wildlife.
- Educates local people on environmental conservation.
- The visitors take new ideas home to influence their own environment.

DISADVANTAGES
- Reduced employment opportunities because only few people are involved.
- Less money is obtained.
- It causes relocation of people so that the ecosystem and habitats are not disturbed.

3. HEALTH TOURISM

This is when travelers visit different places to relieve stress and a variety of body disorders. For example, they may travel to isolated natural places like forest reserves or national parks to escape noise and stressful city life.
Others travel to warmer climates to temporarily stay away from cold climates; all for health reasons.

4. CULTURAL / RURAL TOURISM

In this form of tourism, focus is on interacting with villages that have attractive and unique traditional way of life, rich culture, nature, crafts and livelihood.
The tourists travel to learn from other cultures to broaden their perspective.

5. URBAN TOURISM

Visiting historical interesting cities such as Rome, London etc.

FACTORS THAT HAVE SLOWED DOWN DEVELOPMENT OF TOURISM IN AFRICA

- Foreign ownership and management which makes money brought by tourists to be sent out of the country.
- Heavy tax or levy that force small scale operators to close their services.
- Deforestation resulting in siltation of lakes which house some of the marine animals.
- Limited infrastructure such as poor roads and airports.
- Political instability like civil wars prevent people to visit some places.

Unit 17: MAJOR WORLD TRANSPORT ROUTES

The term transport refers to the carrying of goods and people from one place to another.

TYPES OF TRANSPORT

1. WATER TRANSPORT

This is the movement of goods and passengers on water ways.
Steamers, boats and ships are used.

ADVANTAGES

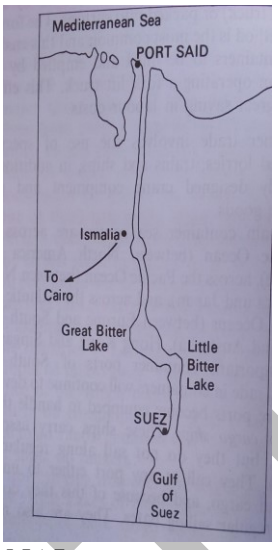
- It is a relatively economical mode of transport for bulky and heavy goods.
- It is a safe mode with reference to occurrence of accidents.
- Most of the routes are natural therefore, costs on construction of routes is low.
- It promotes internal trade.

LIMITATIONS OF WATER TRANSPORT

- There are high risks and losses involved when accidents occur.
- It is very slow because the routes are indirect.
- The movement of ships may be obstructed by rapids and waterfalls.
- It is affected by weather conditions such as storms, fogs and ice.

IMPORTANT CANALS AND WATERWAYS
THE SUEZ CANAL

- It connects Mediterranean and Red Sea.
- It was opened in 1869 and it's 160 km long.
- It has no locks.
- It is a one way traffic.
- Oil from the Persian Gulf region is the main cargo transported through it.



ADVANTAGES OF SUEZ CANAL

- Since it has no locks it permits easy movement of ships through it.
- It provides a shortcut for ships travelling between Europe and Asia.

DISADVANTAGES

- It is too small for today's large ships.
- Ships can only travel through the canal in one direction.
- The canal is in a region of political instability- the Middle East.

THE PANAMA CANAL

- It connects Caribbean Sea and Pacific Ocean.
- It was completed in 1914.
- It has three locks.

ADVANTAGES

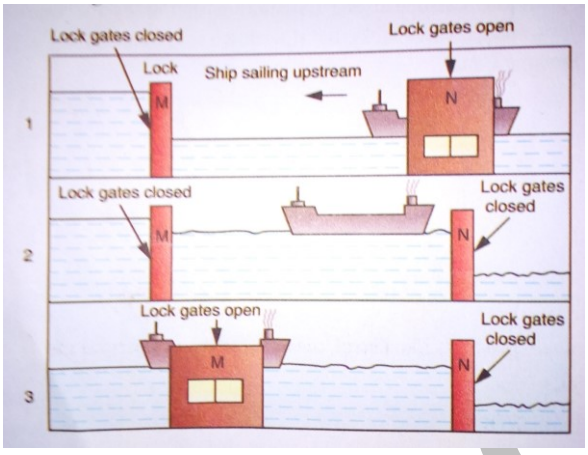
- It shortens the distance that ships travel from the Atlantic to the Pacific Ocean.
- It provides safer travel than the rough waters of the Cape Horn.

DISADVANTAGES

- The three locks slow down movement of ships through it.
- It cannot accommodate large ships.
- It has limited water supply which limits expansion of the canal.

LOCK OPERATION

UPSTREAM OPERATION



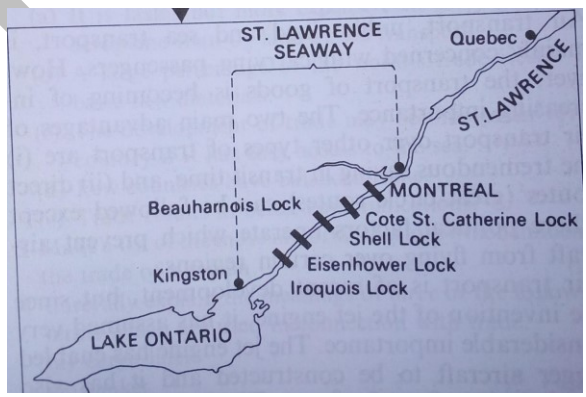
- In 1, the arrival of the ship at N, will make the gates sluices opened so that the water level between M and N is the same. This enables the ship to pass through N.
- In 2, Lock N and M are closed, so that water level rises. The ship rises with it.
- In 3, when the water level between M and N is the same, the gates of lock M are opened for the ship to sail through.

DOWN STREAM OPERATIONS

- Going back to Sea, the process is reverse.
- The ship enters the first lock and the valve is opened to allow water to drain from the first lock into the second lock which is lower.
- When the water level between the two locks has equalized lock doors are opened to allow the ship move into the second lock.
- This continues until the ship reaches the sea.

THE ST.LAWRENCE SEA WAY

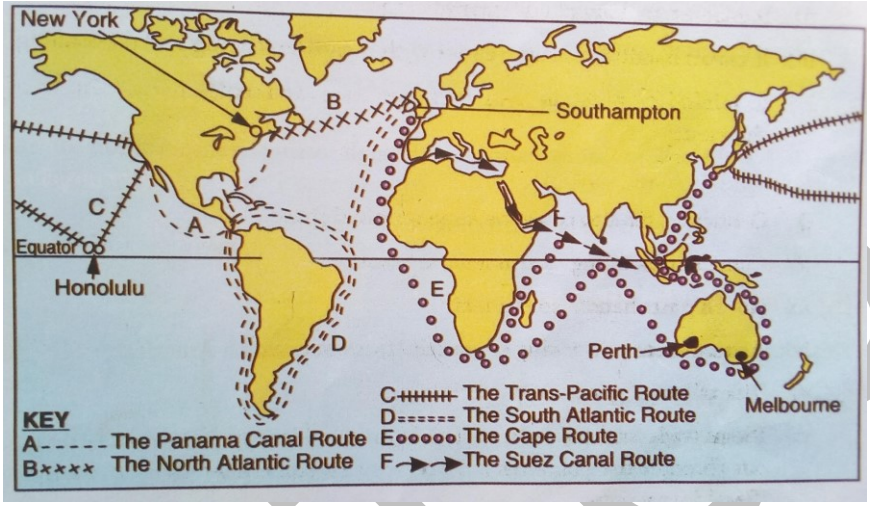
- It has locks which help the ships sail from Great Lakes to Atlantic Ocean.
- Cargo carried in this route include; wheat, corn, soybeans, barley and oats.
- Iron ore from mines in Labrador, Quebec and Ontario.
- Containers, steel and machinery.
- Coal from the Appalachians to Great Lakes.



DISADVANTAGES

- Severe winters that hit the region result in freezing of the river causing it to close for about four months.
- The size of the canals prohibits super-sized ships from using the watercourse.

MAJOR SHIPPING ROUTES OF THE WORLD



World map showing major sea routes

i. THE NORTH ATLANTIC ROUTE

- This is the world's busiest route linking Western Europe and eastern North America.
- It handles goods such as, wheat, meat, petroleum, cotton, tobacco and metallic ores from North America to Europe.
- In turn manufactured goods move from Europe to America.
- These include; textile, chemicals, wine, machinery and fertilizers.

ii. THE SOUTH ATLANTIC ROUTE

- This route links South America to North America and Europe.
- It handles wheat, coffee, meat, dairy products and manufactured goods.

iii. THE PANAMA CANAL ROUTE

- This route mainly handles oil, cotton, coffee, ores and manufactured goods.

iv. THE TRANS-PACIFIC ROUTE

- This is the longest route in distance.
- It has led to rapid economic development of USA, China, Japan, Australia and New Zealand. Goods handled in this route are mainly wheat, meat and wool and other manufactured products.

v. THE CAPE ROUTE

- This sails around the Cape of Good Hope in South Africa. It is one of the oldest routes.

- Its economic importance was severely affected by the opening of Suez Canal which cuts the distance of as much as 6440 km.
- Goods handled in this route include; gold, copper, diamonds, sugar, meat, cotton, tobacco and manufactured goods.

2. AIR TRANSPORT

This is the mode of transport concerned with carrying people and goods of high value. Major international air routes are concentrated in North America, Europe and South-East Asia. These are density populated regions with a lot of socio-economic development. **London** to **New York City** is the world's busiest route with over 30 daily flights.

ADVANTAGES OF AIR TRANSPORT

- It is the most comfortable means of transport.
- Airplanes move according to a specified time schedule.
- It is not affected by congestion thus does not experience traffic jam.
- It is the fastest means of transport.

DISADVANTAGES OF AIR TRANSPORT

- It is expensive as compared to other forms of transport.
- Air transport is not suitable for bulky goods.
- Airports are expensive to construct hence they cannot be found everywhere.
- It is affected by bad weather e.g. fog.
- The losses are great in case an accident occurs.
- The routes are fixed

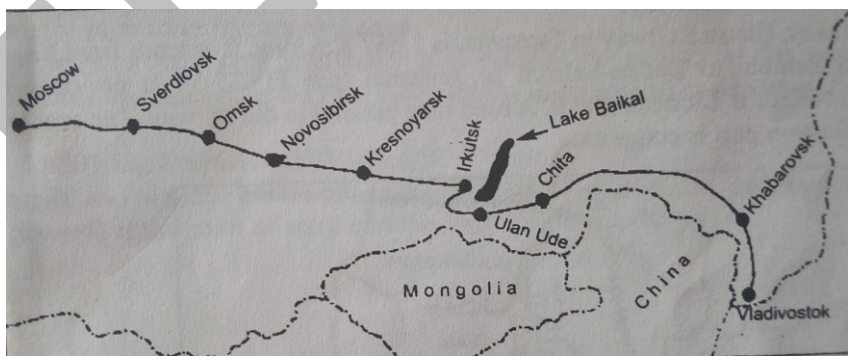
3. LAND TRANSPORT

The modes of transport used over land are road, railway and pipelines.

ROAD TRANSPORT

This is the movement of passengers and goods by cars, buses, trucks, motorcycles and bicycles.

TRANS-SIBERIAN RAILWAY



- It is 9289 km long.
- It connects Russian capital Moscow with Vladivostok in the Far East.

IMPORTANCE OF THE TRANS-SIBERIAN RAILWAY

- It has increased commerce in the region it serves.

- It opened settlements in eastern regions of Russia by providing efficient transport.
- Several mining activities were established since transportation was now easy for bulky materials.

THE TRANS – CANADIAN RAILWAY

There are two railways namely,

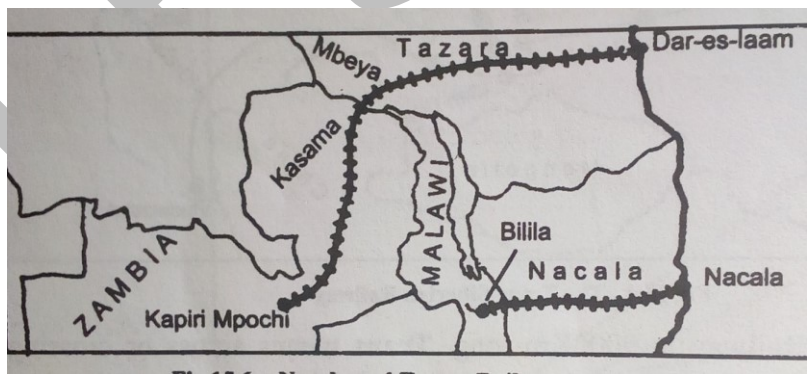
a. **The Canadian National.**

- The Canadian National runs from Halifax on the Atlantic coast to Prince Rupert on the pacific coast.
- It is the busiest railway line in Canada.
- It is 5600 km long.

b. **The Canadian pacific.**

- It is 4800km long.
- It stretches from Vancouver to Montreal.
- Materials transported in these railway lines include, wheat, coal, oil, timber, iron and many other resources.

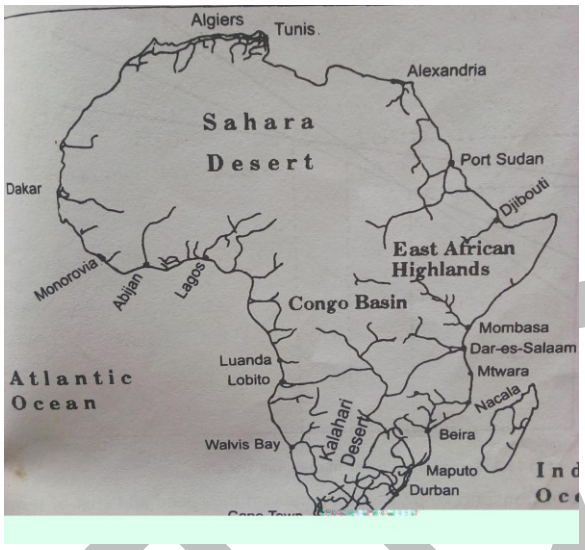
MAJOR RAILWAY LINES IN AFRICA



- The main railway lines in Africa include the following;
- South Africa railway line which is the longest in Africa.
- Tanzania-Zambia Railway Line (TAZARA) which links the Zambia copper belt to Dar-es-Salaam in Tanzania.
- Benguela railway line from the Zambia copper belt to Angola.

- The historic Kenya –Uganda railway line which runs from the port of Mombasa to Uganda.
- The Nacala railway which is 800 km long from Blantyre to the port of Nacala in Mozambique.

FACTORS AFFECTING THE DISTRIBUTION OF RAILWAY LINES IN AFRICA



- The relief of the region through which the railway passes.
- Productivity of the region to be served.
- Lack of adequate capital by countries to build railways.
- Different political ideologies which hinders collective efforts among countries to build railway lines.
- The civil wars in some countries hinder rail development.
- Deserts and dense forests prevent railway constructions.

SPECIFIC FACTORS THAT INFLUENCE THE DISTRIBUTION OF RAILWAYS IN AFRICA

1- NORTH AFRICA
The region has low railway network because of;

- Presence of the Sahara desert which has sands that cover railway lines.
- Low productivity in the region.

2- CENTRAL AFRICA
There is low rail network because there is;

- Low agricultural productivity because of the presence of tropical forests.
- Frequency of landslides due to heavy rains.
- Presence of mountains also hinders development of railways.

3- SOUTH AFRICA
The level of railways is high in this region because;

- The level of industrial development is high.
- Flatness of the land has also contributed towards good railway network.
- There is high level of economic activities.

4- NORTH EAST AFRICA

There is little railway network because,

- It is a hilly region due to presence of Ethiopian highlands where there are several hills and deep valleys that hinder construction.

PIPELINE TRANSPORT

This is the transportation of liquid goods through pipes. Most liquids transported include; petroleum, water, beer, sewage and gases.

ADVANTAGES OF PIPELINE TRANSPORT

- It is the most efficient way of transporting fuels and natural gases over land.
- It is economical since it serves time, money and labour.
- There is no congestion.
- They are free from weather influences.

DISADVANTAGES OF PIPELINE TRANSPORT

- They can be vandalized and lead to heavy losses.
- They are not flexible once they are fixed.
- They cause water and land pollution if leakage occurs.
- It is difficult to detect leakage underground.
- They can only be used to transport one type of commodity.

CONTAINERISATION

- This is transportation of goods using containers.

ADVANTAGES

- It is faster and safer.
- It makes handling of cargo easier with regard to loading and off-loading.

DISADVANTAGES

- Container handling instruments are expensive.
- Risk of loss of goods in transit is high.
- It mostly used for illegal trade commodities such as drugs.

FACTORS THAT INFLUENCE THE TYPE OF TRANSPORT TO BE USED

- Cost of transporting the items if the money is not enough to transport that item one may opt to use cheaper means of transport.
- Nature of the items to be transported e.g. heavy commodities are transported by rail or water.
- Urgency or speed with which the items need to be transported.
- Perishability of the commodity.
- Distance to be covered.

CHALLENGES FACED BY LANDLOCKED COUNTRIES LIKE MALAWI

- They depend on their neighbours' infrastructure which may not always be the best.
- They experience low volumes of trade.
- Civil wars in transit countries may affect landlocked countries depending on these routes.
- The neighbour with coastal border can block goods in transit to the landlocked countries if they are in diplomatic conflict with each other.

Unit 18: REGIONAL AND

INTERNATIONAL TRADE BLOCS

- Regional trade refers to reciprocal exchange of capital, goods and services between two or more trade partners within a certain region or territory.
- International trade refers to the exchange of capital, goods and services across international borders or territories.
- A trade bloc refers to an organization of various countries within a given geographical region aimed at achieving similar economic goals for each member state.

REGIONAL TRADE BLOCS

i. SOUTHERN AFRICA DEVELOPMENT COMMUNITY (SADC)

- It was established in Arusha, Tanzania in 1979 and officially launched in Lusaka, Zambia in 1980.
- Members include; Angola, Botswana, Malawi, Mozambique, DRC, Namibia, Swaziland, South Africa, Tanzania, Zambia, Zimbabwe, Mauritius, Seychelles, Lesotho, Madagascar and Zanzibar.
- Its headquarters is in Gaborone, Botswana.

AIMS / OBJECTIVES OF SADC

- To achieve sustainable utilization of natural resources.
- To promote and defend peace and security in the region.
- To alleviate poverty through economic development.
- To set up common political values, systems such as human rights and good governance.

ACHIEVEMENTS OF SADC

- It has consolidated and maintained peace among the member countries.
- It has uplifted the living standards of people of member countries.
- It has set up trade links with other groupings such as European Union.
- It has encouraged self - reliance among member states.

ii. THE COMMON MARKET FOR EASTERN AND SOUTHERN AFRICA (COMESA)

- It was established to replace the Preferential Trade Area (PTA).
- Member states are; Angola, Tanzania, Burundi, Comoros, DRC, Djibouti, Ethiopia, Eritrea, Kenya, Zimbabwe, Lesotho, Mozambique, Mauritius, Malawi, Rwanda, Seychelles, Somalia, Sudan, Swaziland, Uganda, Zambia and Madagascar.
- Its headquarters is in Bujumbura, Burundi.

AIMS / OBJECTIVES OF COMESA

- To create conducive environment for both domestic and foreign investment.
- To enhance cooperation in economic activities.
- To foster peace, security and stability.
- To eliminate trade barriers on selected commodities to be traded among member states.

ACHIEVEMENTS

- There is the common market for member countries to exchange their goods and services.
- It has increased productivity and specialization because of increased competition.

- Member states are able to plan and undertake joint ventures e.g. road and railway construction.
- It has abolished some taxes thereby increasing volume of trade.
- It works easily with other international organizations such as European Union.

iii. ECONOMIC COMMUNITY OF WESTERN AFRICAN STATES (ECOWAS)

- It was founded in 1976.
- It has 16 member states from West Africa.
- Its headquarters is in Abuja, Nigeria.

AIMS / OBJECTIVES

- To bring about free movement of people in the region by eliminating visa requirements.
- To develop a common market amongst member states by eliminating tariffs.
- To bring development and cooperation in fisheries, agriculture, transport and telecommunication.

***NOTE**: There are no much achievements due to divisions arising from historical connections to either France or Britain. Therefore, individual member states have directed their trade either to France or Britain.*

WORLD TRADE ORGANIZATION (WTO)

- It was established in 1995 in Uruguay.
- Its headquarters are in Geneva, Switzerland.
- It has 164 members.

AIMS / OBJECTIVES

- To remove tariffs so as to facilitate global trade on goods.
- To ensure global trade is carried smoothly and freely.

ACHIEVEMENTS

- It provides a forum for negotiations and settling trade disputes.
- It provides technical assistance and training for developing countries.
- It helps to improve the welfare of the people living in the member states.

PRINCIPLES OF WTO

- Non-discriminatory in carrying out international trade.
- Transparency among members by publishing their regulations.
- Safety values on products to protect people and environment.

BENEFITS OF REGIONAL TRADE BLOCS

- It promotes peace and stability among member countries.
- It encourages specialization of production and increased productivity.
- It improves living standards of people of member states.
- It eliminates trade barriers which in turn increases opportunities for trade.

CHALLENGES OF TRADE AGREEMENTS IN TRADE BLOCS

- Women traders complain of harassment at ports of entry to the member countries.
- Traders complain about visa restrictions which stifle their businesses.
- Civil wars in some countries cause insecurity which affect trade negatively.
- Political differences among members affect trade in these countries.

BENEFITS OF ABOLISHING TAXES OR IMPORT DUTIES WITHIN TRADE GROUPINGS

- It increases volume of trade in the member countries.

- It ensures economic growth of member countries.
- It improves living standards of the people of the member countries.

CUSTOMS IN INTERNATIONAL TRADE

- It is the place at the port, airport, or frontier where officials check incoming goods, travelers or luggage.

ROLE OF CUSTOMS

- To collect revenue, regulate and document the flow of goods in and out of the country.

Unit 19: WORLD FISHING

Fishing is a primary activity involving the catching of all aquatic animals from a water source.
Fishing piracy refers to illegal fishing of endangered species.

FACTORS THAT INFLUENCE DEVELOPMENT OF THE FISHING INDUSTRY

1. HUMAN FACTORS
- Presence of large population which provide labour and market.
- Skilled personnel in development of fishing equipment like, ships, boats and nets.

2. PHYSICAL FACTORS
- The meeting of warm and cold ocean currents which encourages the growth of planktons.
- Presence of good natural harbours.
- Availability of shallow water on continental shelves which allow planktons to grow.
- Existence of cool climate which help fish to survive and growth of planktons.
- Presence of mountains, infertile soils and absence of minerals which force people to undertake fishing as a way of livelihood.

3. ECONOMIC FACTORS
- Availability of market.
- Good transport and storage facilities.
- Capital to be used on purchasing fishing equipment.

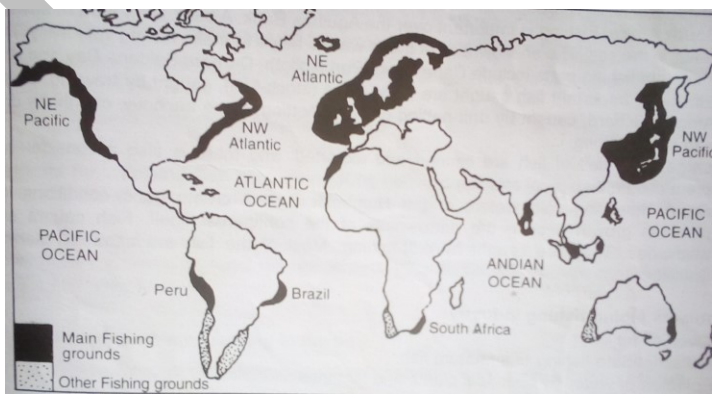
TYPES OF FISH

1. PELAGIC
- These are found near water surface e.g. herring, tuna, mackerel, pilchard, sardines etc.

2. DERMERSAL
- These are found near the sea beds of continental shelves e.g. sole, cod, halibut etc.

LOCATION OF MAJOR FISHING GROUNDS

There are five main fishing grounds of the world.



World map showing major fishing grounds

1. NORTH WESTERN PACIFIC/ NORTH EAST ASIA

- The region extends from Bering Sea to China Sea. The region has China and Japan as major fishing countries. Fish caught include sardines, tuna, herrings and mackerel.

REASONS FOR LARGE SCALE FISHING

- High demand for fish and its products due to high population.
- Good transport network.
- Advanced technology.
- Presence of indented coastlines.
- Industrialization has enabled fishing to be scientific thus more efficient.

2. NORTH WEST ATLANTIC / EASTERN CANADA

- Fishing in the area is centered on Grand Banks of the coast of New Found land.
- Fish caught in the area include; herring, mackerel, sardines, cod, hake etc.

REASONS FOR LARGE SCALE FISHING

- It has indented coastline with good natural harbours.
- The meeting of north Atlantic drift and Labrador currents facilitates precipitation of nitrates for plankton growth.
- Cool temperate climate.
- Availability of timber for boats construction.

3. NORTH EAST ATLANTIC/ NORTH WESTERN EUROPE

- Fishing countries in this region include; Ice Land, Norway, France, Denmark, Spain and Great Britain.
- Fish caught include; mackerel, haddock, halibut, sole, herring etc.

REASONS FOR LARGE SCALE FISHING

- Presence of ports and fish breeding places.
- Ideal cool climate for planktons and fish growth.
- Large market for the fish.
- Improved technology enabling mechanization to take place.
- Good and wide continental shelve

4. NORTH EAST PACIFIC/ NORTH WEST AMERICA

- The region extends from California to Alaska.
- Most important catch in this area include; salmons, hake, halibut, cod etc.

REASONS FOR LARGE SCALE FISHING

- Advanced technology.
- Indented coastline with good harbours.
- Cool climate which favours growth of plankton

5. PERU

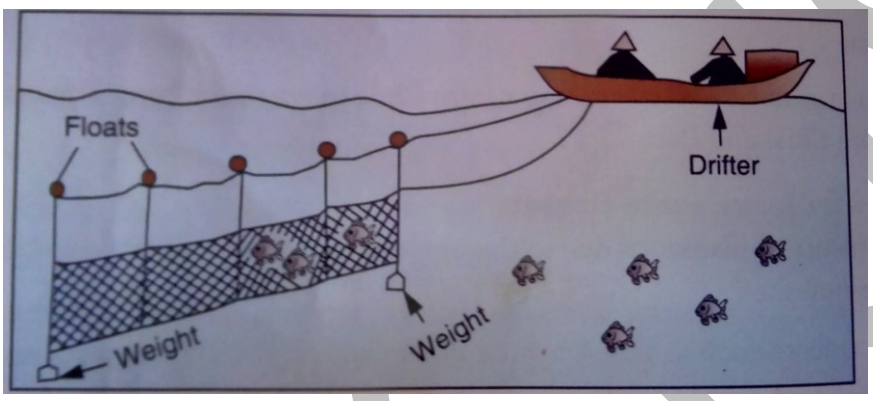
- The region extends from southern Chile to northern Peru. The main nations are Chile and Peru.
- Most of the fish caught are used for making fertilizers and fish meals.
- Examples of fish are; bonito, herring, sea bass and tuna.

REASONS FOR LARGE SCALE FISHING

- It has plenty planktons due to upwelling of the cold water.
- An indented shoreline with good natural harbours.

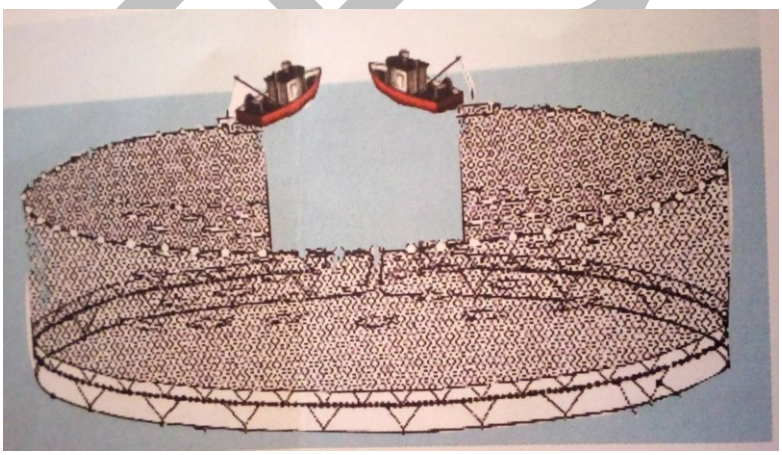
METHODS OF FISHING

a) DRIFT NETS



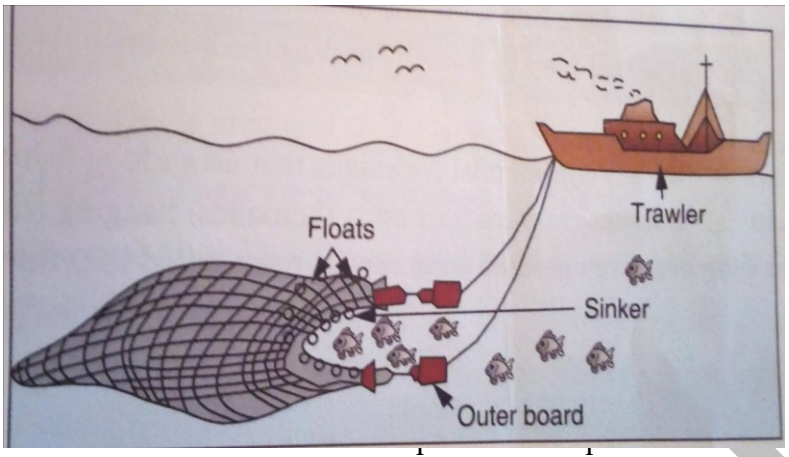
- They are weighed along the bottom age and supported along the top edge by floats.
- They are used to catch pelagic fish and are caught by their gills.

b) PURSE SEINE NET



- These are nets whose mouths are kept wide open by systems of floats and sinkers.
- The nets are stretched between two fishing boats to surround a shoal of fish.
- They are used to catch pelagic fish.

c) TRAWL NETS



- The mouth is kept wide open by the system of floats on top and weights at bottom.
- The fish is caught by dragging the net along the sea bed by trawlers.
- They are used to catch dermersal fish.

d) LINE FISHING

- This one uses a line with several baited hooks hanging.
- Long lining is a commercial technique that uses a long fishing line with a series of baited hooks hanging from the main line.
- The long lines are operated from special boats called **long liners**.

IMPORTANCE OF THE FISHING INDUSTRY

- It attracts tourists who study and do research on various species of fish.
- It is source of income to fishermen.
- It is source of raw materials for production of fertilizers, fish meals, glue and oil.
- It is source of food and it provides much needed proteins and minerals.

Note: *Fishing is also called a robber industry because the catching of fish is not balanced by replacing the stock. This is due to rapid population growth.*

OTHER RESOURCES FROM THE SEA

- Fresh water.
- Sand and gravel brought about by erosion.
- Oil formed from dead marine plants and animals.
- Natural gas
- Metals such as iron, gold, tin and manganese.
- Sea weed used as raw materials for making ice cream, cheese, chocolate etc.
- Minerals such as potassium, sulphur etc.
- Salts which are obtained from saline water.

CHALLENGES FACED BY FISHING INDUSTRY

- Pollution of the sea caused by disposal of wastes by industries.
- Overfishing as a result of rapid population growth.

- Destruction of fishing grounds whereby they are used by other activities such as sports and recreation.
- Indiscriminate fishing as fishermen catch immature fish by using nets whose mesh size is very small.

SOLUTIONS TO THE CHALLENGES

- Removal of all poisonous and harmful chemicals from industrial waste before it is discharged into rivers.
- Enacting and enforcing international laws that protect fish.
- Restocking fish species in the overfished waters.
- Making sure that the fishing breeding seasons are observed to allow their population to increase.
- Encouraging fish farming in order to supplement fish from lake

FISHING IN MALAWI

- The major fishing grounds include Lake Malawi, Malombe, Chilwa and Shire River.
- Fish is caught using trawlers, baskets/traps (mono), hand nets, seine nets and fishing lines.
- The types of fish caught include; tilapia, ntchila, chambo, utaka, usipa, kampango, mlamba and mcheni.
- Problems and solutions of the fishing industry in Malawi are similar to those faced worldwide.

Unit 20: WETLANDS

A wetland is an area of land that is covered with surface or ground water throughout the year or part of the year. These are marshes, swamps and bogs.
In Malawi wetlands are: Vwaza, Lake Chilwa, Elephant, Ndindi marshes; Bana and Dzaza swamps and shallow areas of Lake Malawi.

WETLANDS AS RAMSAR SITE

A Ramsar site is a wetland that is regarded to be of international importance under the Ramsar Convention.
In Malawi there are two sites, namely; Lake Chilwa and Elephant marsh.

FLORA AND FAUNA IN MALAWI WETLANDS

Examples of flora (plants) in Malawi wetlands include: pondweeds, reeds, duckweeds and common water weeds.
Examples of fauna (animals) in wetlands include: beetles, crane flies, water bugs, snails, snakes, frogs, hippos, fish, crocodiles and mayflies.

IMPORTANCE OF WETLANDS

- They are home to a wide variety of plants and animals.
- They act like giant sponge or reservoirs by absorbing excess water and release it slowly into rivers thus reducing effects of flooding.
- They purify water by filtering the wastes and absorbing chemicals removed from farms.

- They are used as grazing lands for animals.
- They act as areas of tourist attraction due to their scenery.
- Grasses such as reeds are used for domestic purposes.
- They are areas for fishing.

HUMAN ACTIVITIES THAT THREATEN WETLANDS

- Draining and reclaiming of wetlands for agricultural and settlement activities
- Damming of rivers.
- Deforestation and land degradation upland which cause siltation.
- Water pollution due to poor waste disposal.

STRATEGIES FOR MANAGING WETLANDS

- Awareness campaigns or civic education on the importance and dangers of interfering with wetlands.
- Legislation on conservation of wetlands.
- Proper waste disposal.
- Planting trees to keep soil in uplands intact.

Unit 21: WILDLIFE IN MALAWI

Wildlife refers to the undomesticated plants and animals as found in their natural habitat.

IMPORTANCE OF WILDLIFE IN MALAWI

- It promotes tourism thus is a source of foreign exchange.
- It helps to maintain the ecological balance.
- It is source of employment through tourism as people are employed as drivers and tour guides.
- It offers opportunities for research hence is source of knowledge.

WILDLIFE RESERVES IN MALAWI

Malawi has many wildlife reserves and these include:

- Vwaza Game Reserve
- Nyika National Park
- Kasungu National Park
- Nkhotakota Game Reserve
- Lake Malawi National Park
- Liwonde National Park
- Majete Game Reserve
- Lengwe National Park
- Mwabvi Game Reserve

HUMAN ACTIVITIES THAT ENDANGER WILDLIFE IN MALAWI

- Overfishing which results in reduction of fish species.
- Poaching which leads to the depletion and extinction of wildlife.
- Drainage of swamps and marshes which has destroyed the habitat for marine species.
- Poor waste disposal which contributes greatly to pollution of the environment.

- Deforestation which degrades or destroys habitats of wild species.

MEASURES TO CONSERVE WILDLIFE SPECIES
- Protection of rare and endangered species in protected areas such as national parks and sanctuaries.
- Holding public awareness campaigns or civic education forums on wildlife conservation.
- Relocating endangered species to where they can be protected.
- Proper waste management and reduce pollution in wild habitats.
- Creating fire breaks around the protected areas.

REASONS FOR PRESERVING ENDANGERED SPECIES
- Saving ecosystem.
- Some of the species provide medicines to combat specific diseases.
- They provide economic benefits through tourism.
- Plants provide good air and regulate weather

NEGATIVE EFFECTS OF WILDLIFE
- Destruction of food crops and human attacks when some animals are astray from their natural habitat.
- Loss of agricultural land when government decides to declare some areas for wildlife conservation.
- Transmission of wild animal diseases such as anthrax, rinderpest and East coast fever which are dangerous to livestock and human beings as well.

Unit 22: WASTE MANAGEMENT

- **Waste** refers to any material, substance or by product that is no longer useful.
- **Waste management** refers to all activities aimed at correctly handling waste.

These activities include:

RE-USE
- This means use of a product on more than one occasion e.g. returning empty glass bottles.

RE-CYCLING
- This is where a waste material is treated to make it suitable for subsequent re-use either for its original form or for other purposes.

INCINERATION
- This is a process of destroying waste material by burning it.
- It is the method commonly used to treat hazardous waste material such as biological waste.

LANDFILL
- It is the disposal of waste material by burying it in natural or excavated holes.
- It is the most traditional method of waste disposal.

ADVANTAGES
- It is cheap.
- The waste products can be used as fuel.

- When landfill reaches a saturation point it can be reclaimed and used for other purposes such as farming.

DISADVANTAGES

- Landfills generate liquid which may leach into the surrounding area and ground water system.
- Landfills can result in dangerous disease in the surrounding communities.
- It requires vast land which is not possible in populous areas.

Note: *Two main types of wastes are liquid waste and solid waste.*

EFFECTS OF POOR WASTE DISPOSAL

- Air pollution.
- Land pollution.
- Loss of aquatic life when waste is dumped in water masses.

- It causes diseases such as cancer.
- It affects tourism since it makes the environment unattractive and unhealthy

IMPORTANCE OF MANAGING WASTE

- It prevents healthy problems.
- It helps to control climate change.
- It helps to maintain the biodiversity.
- It helps to minimize unnecessary injuries

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- ***This pamphlet was written using series of books that respond to the Secondary School Curriculum and Assessment Review (SSCAR). The topics covered in this pamphlet will respond to student's needs as they prepare for MSCE Examination.***