amosoboiero7@gmail.com

GEOGRAPHY FORM 4 NOTES

WhatsApp/Sms/Call 0706 851 439

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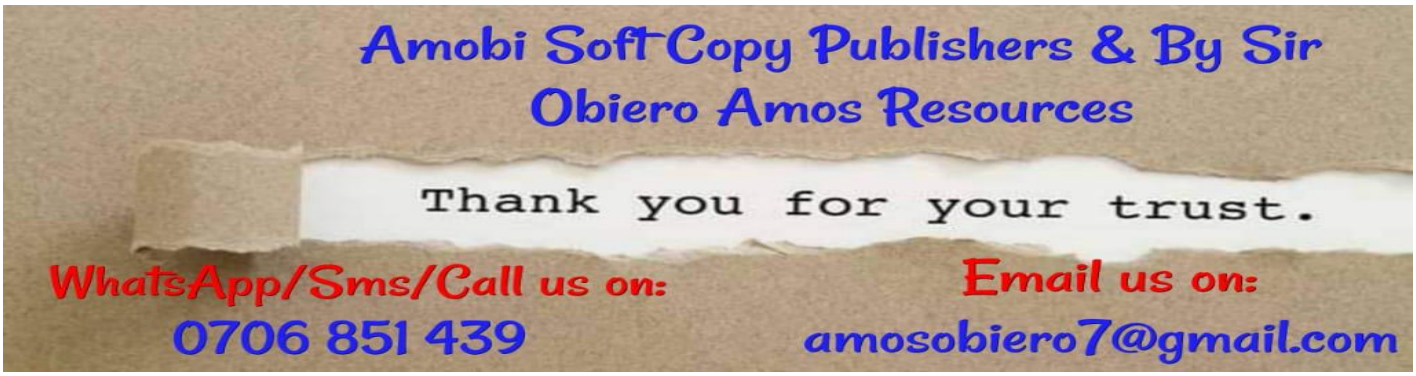


LAND RECLAMATION

Land reclamation is the process of converting wasteland into farm land for growing of crops and keeping of animals while land rehabilitation is the process of restoring land to its former productive state.

Importance

1. Intensify food production to feed the ever increasing population
2. To overcome land shortage and pressure.

Methods of Land Reclamation

Irrigation

- Artificial method of supplying water to a region which doest receive adequate rainfall or to ensure continuous crop production.
- Done in dry areas with low rainfall and regions experiencing dry periods to sustain growth of crops.
- Dams are used to store water.

Advantages

(a) Can be used for HEP generation
(b) For fish farming
(c) Supply water for domestic use
(d) Control floods.

Negative effects

a) Can be a cause of deaths by drowning
b) Breeding ground for mosquitoes which transmit Malaria.
c) breakage can cause destruction of life and property

Factors Determining the Amount of Water Required for Irrigation

a) Climate: Areas receiving low rainfall require more water.
b) Soils: Sandy soils require more water than clays due to low water retention ability.
c) Crop: Paddy rice requires water logged soils while vegetables require wet and well drained soils.
d) Size of fields: Small plots require small amounts of water while large plots require large amount of water.

Methods of Irrigation

(a) Water lifting method

- Lifting water from a source by using a bucket or watering can and pouring it on the crops.

- Used widely in market gardens and on farms adjacent to the water.

(b) Flood/basin irrigation

- Diverting river water into a canal then to plots where it's flooded.
- Commonly used in irrigation schemes.

(c) Sprinkler or overhead irrigation

- Taking water to the fields by pipes and applying it on crops by rotating sprinklers mounted on vertical pipes.
- Used on golf courses and market gardening.

(d) Trickle irrigation

- Plastic pipes with holes laid in the fields through which water trickles to the base of plant.
- Popular where fruits and flowers are grown.

(e) Canal irrigation

- Directing water through canal to farms.
- Commonly used in areas experiencing low rainfall e.g. Yatta in Machakos

(f) Drip irrigation

- Inverting bottles filled with water into the roots of a plant.
- Used in low rainfall areas to grow trees, fruits and flowers.

Drainage of Swamps

- Process of draining excess water from the land.
- Problems of land with excess water are:

a) Is breeding ground for disease causing vectors.
b) Is water logged and unsuitable for agriculture.
c) Is prone to flooding which destroys life and property.

Processes Involved

(a) Digging ditches for water to ooze into and flow away by gravity
(b) Planting eucalyptus which takes up a lot of water e.g. at Kakuzi in Makuyu.
(c) Laying perforated pipes in ditches which water will seep into and flow away by gravity.

- Areas in Kenya with have been reclaimed by draining are:

(a) Yala on lower courses of R.Yala
(b) Bunyala on lower courses of R.Nzoia.

- The project was conceived in 1970.

Objectives of the Project of Draining Them

(a) Free the area of pests.
(b) Prepare land for settlement and agriculture.

(c) Ease population on Kano plains.
(d) Reduce flooding and associated hazards.
(e) Develop the otherwise remote area.

Achievements

(a) Flooding has been controlled.
(b) About 800 hectares are available for agriculture and settlement.
(c) Water borne diseases have been brought under control.

Control of Pests

Mosquitoes
(a) Fumigation
(b) Draining of stagnant water
(c) Spraying
(d) Clearing of bushes near settlements.
Rodents, birds, squirrels and porcupines
(a) trapping
(b) poisoning
(c) hunting
(d) Scaring away
Tsetse flies

- They thrive in damp areas with high temperatures and prefer bushy vegetation as breeding grounds.
- Examples of tsetse fly infested areas are Lambwe valley in Kenya and Miombo woodland in Tanzania.
- The control of tsetse fly at Miombo woodland was aimed at:
- The control was done by The International Centre for Insect Physiology and Ecology (ICIPE).

a) Eliminating the pest to obtain land for agriculture.
b) To treat the sick people and animals to check the spread of resultant diseases.

Measures Taken

Bush Clearing

- Selective clearing of bushes was applied to prevent soil degradation.
- Caused tsetse fly to lack a place to breed and killed adult flies and pupae due to low humidity.

Bush Spraying

- Spraying from the ground or from a low flying aircraft.
- Doesn't affect other organisms.

Disadvantages

a) Some insecticides such as DDT have serious environmental effects.
b) The fly develops resistance and a high dose of chemicals has to be used.
c) Kills other useful organisms.

Sterilisation males

- Making the insect unable to reproduce by obstructing its reproductive organs.
  - Luring the male flies to some chemical substance which sterilises them.
  - When they mate with the females fertilisation doesn't occur which reduces insect population.

Traps

(a) Square of black cloth coated with glue on which the insects stick.
(b) Traps impregnated with insecticides which kills the insects.

Creation of Buffer Zones

-Belt of 5 km wide with dense cultivated vegetation to create barrier which the fly couldn't cross.

Killing of the Hosts

Wild animals which the fly fed were selectively hunted and killed.

Methods of Land Rehabilitation

Afforestation and Reafforestation

- Improve the productivity of land in the following ways:

a) Controls soil erosion by:
- Acting as wind breakers
- Leaves reduce impact of raindrops on the soil
- Roots hold/bind the soil particles together.

b) Vegetation reduces runoff and increases the rate of infiltration of rain water ensuring there is a complete water cycle.
c) Decayed vegetation provides humus which restores soil fertility.
d) Roots help moisture to percolate deeply into the ground.
e) Modifies the climate of an area by moisture being released to the atmosphere causing higher rainfall and lowering the temperature.

Bush Fallowing

- Cultivating a field for a period of 2-3 years then abandoning it for another so that it may regain fertility naturally by wild vegetation adding humus into the soil.

Grass Strips and Cover Crops

- Grass and cover crops e.g. sweet potato vines, beans and peas reduce the speed of running water thus helping to check soil erosion.

Mulching

- Covering the soil using crop residues or artificial materials such as polythene sheets.
- Helps to conserve the soil in the following ways:

a) Reduces evaporation helping to conserve moisture in the soil.
b) Help to check the speed of running water.
c) Reduces the splashing effect of rain drops.
d) Reduces runoff and increases infiltration ensuring more moisture is going to be available for plants growth.
e) Mulch from crop residues decomposes releasing nutrients into the soil.
f) Controls weeds.

Application of Manure and Fertilizer

- Replenishing nutrients depleted from the soil by constant application of manure or chemical fertilizers.

Controlled Grazing

To solve the problem of overgrazing:

a) The government is advising the farmers through extension officers on the importance of matching the number of livestock with the carrying capacity of land.
b) Emphasizing on quality than quantity by introducing exotic breeds and cross breeds.
c) Establishing ranches in livestock farming regions e.g. Kaptuei group ranch.
d) The land should be subdivided into paddocks so that different sections have time to regain pasture at different intervals.

Filling Quarries

- Filling the pits with rocks and topping with fertile soils e.g. Bamburi Nature Trail where trees have been planted and animals introduced.

Drainage Trenches

Flooded areas can be rehabilitated by:

- Digging trenches to drain off excess water to rehabilitate flooded areas.
- Another method is to construct dams across rivers.

Planting Drought Resistant Crops

- Planting in Arid and Semi Arid Lands drought resistant and quick maturing crops which take advantage of the short wet season e.g. Pigeon peas, cassava, millet, sorghum, Katumani maize etc.

Irrigation Schemes in Kenya

Mwea Irrigation Scheme

- Located in Kirinyaga district in central province in Mwea plains on the foot of Mt. Kenya.
- Started by the colonial government in 1954.

Objectives

a) To reclaim the unproductive land from semi-arid conditions.
b) To occupy detainee labour since Mwea was a detention camp for political detainees during 1952s state of emergency.
c) To settle former detainees and the landless.
d) To create employment for former detainees.
e) To increase agricultural production.

Factors Which Influenced the Location of the Scheme

Physical Factors

a) Availability of extensive land which made created room for future expansion.
b) Black cotton soils with high water retention capacities suitable for rice growing.
c) Freely draining clay loamy soils suitable for growing of other cash and food crops.
d) Gently sloping land which allows use of tractors and allows water to flow by gravity reducing the cost of pumping it to the fields.
e) Availability of plenty of water from permanent rivers Thiba and Nyamindi draining the area.
f) Experiences warm weather during the second part of the year suitable for rice growing.

Human Factors

a) The land was not inhabited due to its arid conditions therefore there was no displacement of people from the area.
b) Availability of labour for rice growing to presence of former detainees.
c) Desire by the colonial government to start a project that could occupy detainees.
d) Location near major urban centres such as Nairobi, Embu, Nyeri and Kerugoya which provide immediate market for rice.

Irrigation/Cultivation Method Used

a) Basin irrigation.

- The ground is levelled.
- Embankments are constructed.
- Water to the enclosed sections.
- The paddy fields are flooded to a depth of 10 cm.

b) Furrow irrigation.

- Water flows from irrigation canals to furrow which are in between rows of crops wetting them.

Crops Grown

1. Wet paddy (rice).
   a) Basmati/Pishori which more valuable.
   b) Sindano which is resistant to diseases.
2. Subsistence crops e.g. maize, peas and beans in small scale.

Horticultural crops e.g. tomatoes, French beans, melons, etc.

Organization of the Scheme

- The scheme is divided into Mwea, Thiba, Wamumu and Tebere sections.
- 6000 hectares are under rice cultivation.
- Tenants live in 36 small villages.
- There are 17 primary schools and more than 5secondary schools one of which is for disabled and one mission hospital (Karira).
- The area under rice cultivation is divided into one acre which is surrounded by a bank of earth (bund) for keeping water within the field.
- Each tenant is given 4 acres of land and expected to maintain a nursery covering 1/8 of an acre.

Marketing

Farmers sell rice to local consumers in the urban centres especially Thika and Nairobi.

Benefits of the Scheme

a) Saving the country foreign exchange by contributing most of Kenya's rice production.
b) Providing income to farmers, traders etc. which alleviates poverty and raises the living standards.
c) Provided land to thousands of landless.
d) Reservoirs created have helped in controlling flooding.
e) Improvements of infrastructure as roads have been built to transport rice from the fields to market.

f) Provision of social amenities such as schools and hospitals which have improved the people's standard of living.
g) Provision of employment to many people in farms, local mills and trading.

Problems Facing the Scheme and Possible Solutions

Stagnant water has become a breeding ground for mosquitoes and snails which transmit malaria and Bilhazia respectively.
Insecticides should be sprayed on stagnant water to reduce the breeding rate the vectors hence rate of infection.
Shortage of water due to excessive droughts and diversion of water into 'Jua Kali' rice farms.
More reservoirs should be built and farmers should pay a fee to facilitate maintenance of water distribution.
Pests and diseases e.g. case warm and leaf miner which attack crops lowering the yields and Quelea birds which feed on rice leading to a major loss of the crop.
Using clean planting seeds, burning residues after harvesting and use of explosives to scare birds.
Inadequate capital on the part of farmers since the co-operatives collapse making them unable to acquire inputs forcing them to lease out all or part of their farms. The solution is to take politics out of co-operatives so that they can be empowered to supply inputs and credit to farmers.
Shortage of labour during the planting and harvesting season which forces the farmers to hire labour from outside at a high cost.
- Improved marketing by NCPB to resume so that farmers can earn enough money to meet their expenses.

Siltation and growth of weeds in the canals which interferes with the flow of water.
- Control weeds using chemicals and farmers to avoid cultivating on the river banks.

Inadequate health centres which necessitates travelling for long distances losing many working hours.
Construction of more health centres.
Poor access roads which make transport expensive.
Government to improve the existing roads and construct new ones.

Perkerra Irrigation Scheme

Established in 1954.
Located in Marigat division in Baringo in the RV province.

Aims of Setting up the Scheme

(a) To utilize detainee labour.
(b) To develop land for agricultural production.
(c) To settle the pastoralists as farmers.
(d) To control the seasonal floods of R. Perkerra this used to affect the area.
(e) To utilise the excess water of R. Perkerra this used to go to waste.

Factors which Influenced the Establishment of the Scheme

Physical Factors

Gentle slope of the area which allows mechanisation and flow of water to the fields by gravity.
Presence of fertile loamy soil on which a variety of crops can be grown and which also reduces use of fertilizers.
Semi arid conditions of the area which necessitated the use of irrigation as the only way to make food production possible.
Extensive area of land meaning large scale cultivation of crops was possible.
R. Perkerra which ensures a constant supply of water for irrigation.

Human Factors

Sparse population due to harsh climate which made it easy to establish the scheme.
Large population of detainees which required to be occupied in a productive way.
Desire of colonial government to start a project to occupy political detainees.

Irrigation/Cultivation Method

- Ridges and furrows are made.
- Crops are planted on the ridges.
- Water is directed to the furrows and allowed to soak slowly.
- Seed maize is planted in male and female maize lines.
- From male lines it's taken for consumption.
- That from male lines goes for processing.

Crops

They grow seed maize for Kenya Seed Company and paw paws are gradually being reintroduced.

Organisation of the Scheme

Management is under NIB which provides infrastructural facilities, accounting and extension services.
Each house hold is allocated 3-4 acres and an additional ½ acre for the homestead.
Farmers are tenants but plans are underway to issue them with title deeds.

Marketing

(a) Seed maize is graded, dried and delivered for shelling.
(b) Shelled maize is delivered to Kitale for further processing.
(c) The seed is delivered to KSC which pays on delivery.
(d) Scheme management pays farmers after deducting the fees for services given.

Achievements of the Scheme

Has turned arid land into a productive land.
Source of livelihood for farmers and their dependents.
Seed maize raises revenue for the government.
Has settled previously landless people.
Has improved infrastructure and led to provision of social amenities such as schools, shops, electricity, etc.
Has created employment opportunities for local people.
Source of foreign exchange when sees maize is exported.

Problems of the Scheme and possible solutions

(a) Fluctuation of water in R. Perkerra due to droughts and obstruction causing crop stress and reducing the acreage that can be cultivated.
- Dam construction on the upstream side.

(b) Livestock human conflict when farmers go to graze in the region due to attractive vegetation.
- Solving the conflict through elders.

(c) Intense ethnic conflict between Tugen and Jemps tribes because the scheme lies on the Jemps' land while Tugen are the majority.
- Government to issue farmers with title deeds.

(d) Financial problems causing the farmers to be unable to prepare the land.
- Start co-operatives to offer affordable credit facilities.

(e) Poor transport and communication which hinders production of perishable crops.
- Government to improve the existing roads and construct new ones.

(f) Limited market for products because the surrounding areas are sparsely populated.
- Transporting produce to distant markets with dense population.

Significance of Irrigation Farming in Kenya

(a) Resettlement of landless people e.g. in Mwea.
(b) It has made barren land reproductive.
(c) Enables farmers to earn an income when they sell farm produce.
(d) Provision of employment opportunities which has alleviated poverty and improved the standard of living.

(e) Creation of settlement for landless.
(f) Earning of foreign exchange by the country after exportation chillies, flowers, peas, fruits, etc.
(g) Saves some foreign exchange that would be used to import the entire amount of food needed in the country.
(h) Development of infrastructure and social amenities e.g. roads,
(i) Promoted industrial development through providing raw materials e.g. rice mills, pineapple processing, sugarcane factories, etc.
(j) Has assisted in the control of environmental hazards such as droughts and floods.
(k) Has enhanced food security in the country by encouraging growing of food crops such as maize, beans, rice, etc.

Problems Experienced in irrigation Farming in Kenya

Physical Problems

Destruction of crops when excess water goes to the fields causing flooding.
Pests and diseases lead to low cotton yields.
Inadequate water as a result of catchment areas receiving unreliable rainfall meaning the land can't be fully utilised.
Growth of weeds on furrows and canals causing reduced water flow to the farms.
Silting of the canal which prevents water from flowing smoothly to the farms.
Sheet erosion resulting from overhead irrigation when practiced on hot dry regions.
Salinisation as a result of application of excess water in dry regions.
Leaching taking nutrients to the lower horizons where they can't be accessed by some plants leading to lower yields.

Human Problems

(a) Diseases such as Bilhazia and malaria transmitted by vectors living in stagnant water which weaken and even kill farmers.
(b) Payment of low prices to the farmers which kills the morale of farmers and sometimes causing them to lease out part or whole of the field.
(c) High cost of production making the farmers to sell their produce at high cost meaning the produce can't compete favourably in the world market since the buyers will prefer cheaper produce.
(d) Exhaustion of soil nutrients as a result of continuous cultivation leading to poor yields.
(e) Mismanagement of irrigation bodies leading to losses, lack of credit and low prices as each farmer tries to market his or her own crop.

(f) Farmers lack the necessary technical advice to enhance their agricultural production as there are very few extension officers.
(g) Shortage of labour during planting, weeding and harvesting giving the farmers the burden of hiring labour at high cost.
(h) Limited markets as a result of some schemes being located in sparsely populated areas e.g. Perkerra.

Land Reclamation in the Netherlands/Holland

- Most of coastal land has been reclaimed from the sea.
- Land reclaimed from the sea and enclosed by walls is called a polder.
- The work of reclaiming land was done under 2 main projects namely:

Zuider Zee Project

- Project of Zuider Zee area to the north of Holland.
- Assignment was given to a Dutch called Cornelius Lely in 1927-1932.
- Aim was to increase land for cultivation and control further flooding.

Sections

1. Creation of a high dam across the highland of Wierengen and between provinces of N. Holland and Friesland.
2. Reclamation of 4 polders that would not be affected by rising tides and creation of a fresh water lake from R.Ijsel a tributary of R.Rhine converting the inland tidal sea into L. Ijsel.

Stages in the Reclamation of Land from the Sea in Netherlands

- Dykes were constructed to protect the land from getting flooded during high tide.
- Ring canals were constructed to carry water from the area to be reclaimed into the sea.
- Pumps were installed to pump out water from the area enclosed by dykes.
- Reeds were sowed to use up excess water.
- Drainage pipes were laid in ditches to drain water from the water table.
- The soil was treated with chemicals to lower salinity.
- Drained land was flushed with fresh water to remove salt from the soil.

Benefits of Zuider Zee Project

a) Increased arable land by 10%.
b) Fresh water lakes created provide fresh water for domestic and industrial use.
c) Ensured better drainage for reclaimed area in the former Zuider Zee.
d) Reduced the risk of flooding.
e) Shortened road connection between the provinces of N. Holland and Friesland.

Delta Plan Project

- Intended to reclaim the S.W region of the country.
- Involved closing estuaries namely Haringvliet, Brouwersha, Venschegat, Scheldt and Veersche by means of dams.

Benefits of the Delta Plan

(a) Controlled pollution and salinisation of inland water.
(b) Improvement the soil thus increasing land for agriculture..
(c) More recreational lakes created by the newly formed lakes.
(d) Fresh water reservoirs created provides S.W region with water for irrigation, domestic and industrial use.

Comparison of Land Reclamation in Kenya and Netherlands

Similarities

- In both countries flooding was a common problem.
- Drainage ditches were used in both countries.
- Canals were used in both countries.
- The intention in both countries was to increase land for settlement and agriculture and control flooding.

Differences

- Canals, dams and dykes were used to reclaim land in Netherlands while Kenya used ditches, irrigation, clearing of bushes, etc.
- In Netherlands land was reclaimed from sea while in Kenya, it was above the sea level.
- Netherlands had two projects while Kenya had more.
- In Netherlands it was large scale while in Kenya it was in small scale.
- In Netherlands it involved use of advanced technology such as dams, dykes, pumping stations etc. while in Kenya it involved less advanced methods such as irrigation, afforestation, clearing of bushes etc.
- In Netherlands the coastal land was being reclaimed while in Kenya, land distant from the sea was reclaimed.

FISHING

- The act of catching fish and other aquatic animals.

- Fisheries are fishing grounds or areas where water resources such as fish, seals, clubs, whales, etc. are exploited.

Factors Influencing Fishing

Physical Factors

Presence of Plankton

- Large shoals of fish are found in shallow waters of lakes and seas where there is plenty of plankton. They thrive where depth of waters less than 180 m deep because it is up to where suns rays can reach.

Nature of the Coastline

- There is more fish on coasts with sheltered inlets and estuaries because of calm water and shelter from natural enemies like predators e.g. Fiords of Norway.

Relief

- People in some countries engage in fishing due to mountainous landscape which hinders other economic activities such as agriculture e.g. Japan, Norway and Alaska.

Climatic Conditions

- In temperate regions there is more fish because there is cool waters which plankton requires to grow while in tropical lands there is less fish due to high temperatures resulting in warm waters which hinders plankton growth.

Convergence of Cold and Warm Ocean Currents

- There is plenty of fish in areas where warm and cold ocean currents meet because upwelling takes nutrients to the surface and improves the circulation of oxygen and cold ocean currents cool waters in tropical regions resulting in conducive conditions suitable for plankton thriving e.g. the coast of Namibia washed by the cold Benguela current.

Human Factors

Supply of Labour

- Fishing is intensively carried out in Europe, Asia and N. America due to labour availability as its labour intensive.

Market

- Fishing is done extensively in highly populated and developed regions with a ready market because fish is a perishable commodity e.g. in Norway, Japan, China, etc.

Fish Eating Culture

- Fishing is extensively done in areas where there is a habit of eating fish e.g. Norway and Japan.

Transport and Preservation Facilities

- Fishing is done extensively in countries with transport and refrigeration facilities because fish is perishable and has to be transported in refrigerated lorries and ship.

Capital

- Fishing is extensively done in developed countries because they can afford huge sums of money required for hiring labour force, buying fishing equipment and preservation facilities.

Technology

Rapid growth of fishing industry in developed countries is as a result of presence of advanced equipment like large refrigerated ships, trawl nets, fish detecting equipment, etc.

Types of Fishing

Pelagic Fishing

- Catching of fish which live close to the surface e.g. mackerel, menhaden, herring, sardines and tuna.
- Best method to catch pelagic fish is drifting and seining.

Demersal Fishing

- Catching fish that live at the bottom of deep water bodies e.g. cod, haddock, Pollock and halibut.
- Methods are trawling and long lining.

Inshore Fishing

- Fishing close to the shores in shallow sheltered coastal waters and the lower stretches of rivers.
- Fish caught are shell fish, lobsters, prawns, shrimps and crabs.
- Methods involved are casting nets, hooks and line.

Fresh Water Fishing

- Fishing done in fresh water bodies such as streams, rivers, lakes, ponds and paddy fields.
- Examples of fresh water fish are sturgeon, carp, tilapia and trout.
- Methods are line and drifting methods.

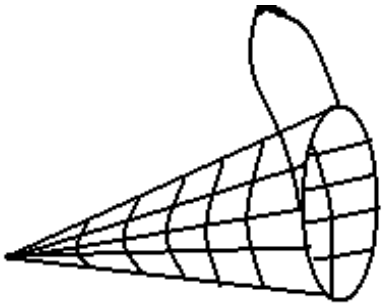
Methods of Fishing

Traditional Fishing Methods

- Commonly practised in tropical areas along the African coast and the inland fisheries.
- Fishing is mainly done for subsistence purposes.
- Simple hand- made equipments are used.
- The methods are employed in small scale.

Types

Basket Method

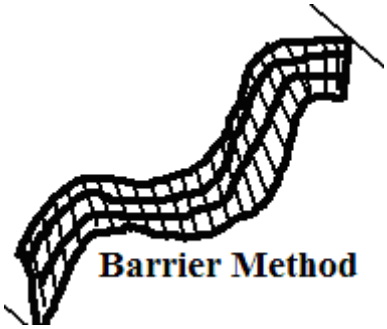


- A basket with a cone opening with bait inside is used.
- It is placed at the shallow end of the water.
- The fish are attracted by the bait.
- Fish run to hide in the basket get inside and are trapped.
- The catch is relatively small.

Harpooning

- Using a sharpened arrow or stick to strike Fish.
- One fish is caught at a time.
- Dangerous in waters infested with crocodiles and hippopotamuses.

Barrier Method



- Using Barriers made of reeds or sticks to catch fish in flood waters.

- Are placed on the downstream side of a flooded region and when water levels drop the fishermen scoop the fish.

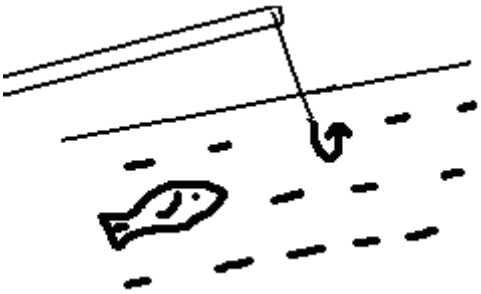
Herbs

- Sprinkling crushed herbs in waters making fish to become unconscious then the fishermen collect fish from the river using hands.

Use of Lamp and Net

- Placing a lit lamp on the edge of the boat to attract fish.
- Fish swim towards the light and are caught using net.

Hook and Line



- Throwing a line with a baited hook into the water.
- The fish are attracted by the bait which they swallow together with the hook.
- The line is pooled from the water together with the fish.

Gill Nets

-Nets with mesh which lets only the head of a fish through and then traps it by the gills.

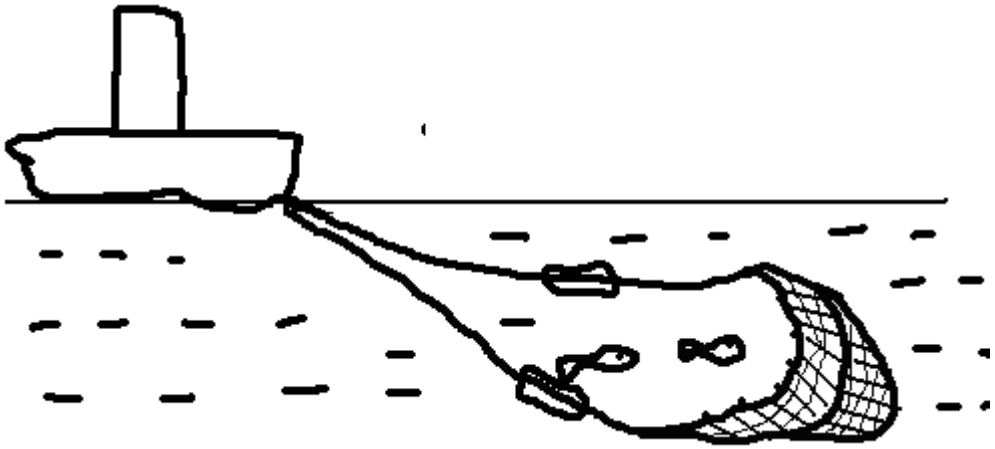
-They can be swerved across or round the river on the path of fish.

Modern Fishing Methods

Seining

- Method is used to catch pelagic and anadromous/migratory fish which swim in shoals.
- A Bag like nets with small meshes (seine) attached to two boats on each end is cast into the sea.
- It's kept open and held in position by floats on top and weights at the bottom.
- Fish move towards the net and get trapped.
- The net is hauled over and fish emptied onto the ship or the net is hauled to the shore (haul seining).
- Leads to overfishing because it doesn't discriminate the ages of fish caught.

Trawling



- Mainly used to catch demersal fish.
- A bag shaped net is attached to a trawler (ship) is is cast into deep waters
- The upper part is kept open by floats and lower part kept down by weights.
- The net is dragged by the trawler along the sea bed.
- The trawl net sweeps in the fish.
- The net is hauled into the trawler and the fish is emptied onboard.
- Also catches immature fish.

Line Fishing

-The method is used to catch demersal fish.

- Fishing boats spread out long line with several baited hooks on them.
- Floats keep the lines suspended and also show the fishermen where the lines are.
- Baited hooks catch the fish as they compete to feed.
- Hooks are drawn and fish unhooked and put in refrigerated containers.

Distribution of Major Fishing Grounds in the World

The Atlantic Fishing Grounds

N.W. Atlantic Fishing Grounds

- Located along the E. coast of N. America.

- Fishing grounds are Grand bank, Sable bank, George bank and Nova Scotia.
- Fish caught are cod, herring, mackerel, lobsters, etc.

Factors That Have Led To High Development of Fishing

(a) Large continental shelf providing an extensive area over which plankton can grow.
(b) Convergence of warm Gulf Stream current and cold Labrador Current resulting in cool temperatures favourable for the thriving of plankton and which also makes the area to be ice free most of the year.
(c) Adjacent lands have a cold climate and a rugged landscape unfavourable for agriculture making the alternative to be exploitation of fishing grounds.
(d) There is a dense population in the surrounding areas which provide a ready market for fish e.g. Massachusetts and Connecticut.
(e) There is a highly developed technology which allows fishing to go on throughout the year e.g. large and self contained ship with radar to forecast storms, wireless communication and processing and storage facilities

N.E. Atlantic Fishing Grounds

- Location in W. coast of Europe.
- Major fishing grounds are coasts of France, Germany, Denmark, Britain and Norway.
- Fish caught are herring, mackerel and cod.

Factors That Have Led To High Development of Fishing

a. Numerous sea inlets which provide shelter for the spawning of fish and anchoring of fish boats e.g. fiords of Norway.
b. Ruggedness of landscape by glaciated features which is unfavourable for agriculture making fishing another economic activity.
c. Warm Atlantic Drift Current which raises the temperature making conditions to be favourable for plankton growth and making fishing possible throughout the year.
d. Large continental shelf providing an extensive area for plankton growth.
e. Land derived minerals brought by the icebergs from the land which provides plenty of food for plankton which fish eat.
f. Dense and affluent population of W. Europe which provides ready market for fish.
g. There is a highly developed technology which allows fishing to go on throughout the year

S. Atlantic Fishing Grounds

1. N.W Africa

- Located along the Coastland of Mauritania

Factors

(a) Presence of cold canary current that cools the warm ocean waters.
(b) Wide and fairly shallow continental shelf providing an extensive area for the growth of plankton.

2. S.W. Africa

- Located in and Cape Province of S. Africa.

Namibia **Factors**

(a) Washed by cold Benguela current which cools the warm tropical waters hence favouring the growth of plankton**.**

3. West Coast of S. America

- Location is the coast of Peru.

Factors

(a) Presence of a continental shelf.
(b) Prevailing Peruvian current which favours plankton growth.

Pacific Fishing

N.E. Pacific Fishing Grounds

- Located along the W. Coast of N. America.
- Fishing grounds are from Alaska, British Columbia, Oregon states to California.
- The main fish caught is salmon.

Factors

(a) The coast is washed by N. Pacific current which makes water favourable for plankton growth and ice free enabling fishing to be done throughout the yea.
(b) Many inlets which form favourable shelter for breeding of fish and good sites for fish ports e.g. fiords and river estuaries.
(c) Presence of several rivers and lakes which form suitable breeding grounds for species such as salmon.
(d) Rugged mountainous landscape and dense forest cover which has made the area unconducive for agriculture and forced people to carry out fishing as an alternative economic activity e.g. British Columbia.
(e) Ready market because of sound economies of the industrialised USA and Canada enabling people to have economic power to purchase fish and capital for the development of fishing industry.

N.E. Pacific Fishing Grounds

- Located along the coast of N.E. Asia.
- The world's largest fishing ground.
- Stretches from Beijing southwards to China Sea in Japan, Malaysia and Indonesia.
- Fish caught are salmon, mackerel, cod, sardines, eels, trout etc.

Factors

(a) Broad continental shelf which favours plankton growth leading to more fish.
(b) Convergence of cold Oya Siwo and warm Kuro Siwo currents which result in cool well oxygenated and ice free waters ideal for fishing throughout the year.
(c) Numerous islands, bays and sheltered inlets which favour fish breeding and provide good fishing ports.
(d) Mountainous landscape especially in Japan which hinders development of agriculture making fish an alternative source of food and income.
(e) Large and ready market due to high population in the Asian countries.
(f) Advanced technology e.g. Japan has large modern vessels with refrigeration facilities, Processing equipment, electronic communication making fishing to be very efficient.

Fresh Water and Marine Fisheries in East Africa

Marine Fishing

- Fishing grounds found in oceans and seas.
- Carried off the coast of Kenya and Tanzania in the Indian Ocean.
- Uganda doesn't have marine fisheries because she is landlocked.

Kenya and Tanzania

- Contributes only about 10% in Kenya and 13% of the total catch in Tanzania.
- Relatively warm waters of the tropics don't favour breeding of a large number of fish.
- Indian Ocean is warmer and hence has little plankton.
- Continental shelf is narrow with little fish resources.
- Warm Mozambique current and deep continental shelf discourages the flourishing of fish.
- They use simple tools.
- Fish caught include pelagic fish such as tuna, kingfish, mullet, bonito and sardines.
- Fishing is done in small scale for both subsistence and commercial purposes.

- In Kenya small boats and a few of them motorised without refrigerators are used while in Tanzania, fishermen use small rarely motorised dhows which are guided by trade winds which travel into deep sea.
- In Tanzania most of the coastal communities take part in fishing industry particularly in the islands of Mafia, Pemba and Zanzibar and along the coast around Tanga, Mtwara, and Dar-es-Salaam.
- Dense coastal population provides a ready market for fish.
- Fish is more popular than beef in Pemba and Zanzibar.

Problems Facing Marine Fishing

a) Inadequate market due to low purchasing power of the surrounding community, Poor transport network to the interior of the country and availability of agricultural products in some coastal areas which reduces the rate of fish consumption.

(f) Inadequate capital which causes fishermen unable to afford expensive equipment used in deep sea fishing which restricts them to fish near the shore hence the low catch.

a) Stiff competition from industrialised countries mainly Japan and Korea which have modern fishing equipment and are able to tap fish in the deep sea.

b) Lack of refrigeration facilities to enable them transport fish to distant markets.

c) Unpopularity of fishing as an economic due to fish prices being high which discourages people from eating it regularly.

d) Strong sea tides which are a great menace to local fishermen who use small boats which are not motorised which forces them to go fishing when the sea is calm making them to catch only a limited stock.

Fresh Water Fisheries

- Found in inland in lakes, rivers and ponds.

Kenya

- Lakes are the main suppliers of fish and their resources are more exploited than those of the Indian Ocean because they are calm than seas enabling fishermen to reach deep areas where there is a large catch.
- The fresh water lakes containing fish are Lakes Victoria, Naivasha, Baringo, Jipe, Chala, Balisa and Shakababo in lower Tana and Kanyaboli and Sare in Yala Delta.
- The only alkaline lake containing fish is L. Turkana,
- Most fishermen use simple equipment but around L. Victoria trawlers are used.

- Many fishermen don't belong to a co-operative hence they sell their catch to the middlemen at minimal prices.
- The middlemen with refrigerated lorries transport the fish to urban centres where they make a huge profit while the rest of the fish is smoked, salted or sun dried and transported to local markets.
- L. Victoria forms the main centre for inland fishing contributing the largest fresh water catch.
- The main species of fish is tilapia and others are herring, Nile perch and omena.

Factors Which Have Favoured Fishing in L.Victoria

2. Shallow waters which allow plankton to thrive in abundance.
3. Several beaches and highlands within the lake which provide good landing sites for fish boats e.g. Asembo and Mbita.
4. Large and ready market within major towns because of dense population e.g. Kampala, Kisumu and Mwanza.
5. Presence of a variety of species which are of economic value.
6. Presence of fish eating culture as it is a traditional diet of the people around.
7. Fishermen have formed co-operatives which help them in marketing of fish.

Problems Facing Inland Fishing

1. Overexploitation due to accessibility of L. Victoria. Tilapia from L. Turkana is cheap and thus in high demand.
2. Indiscriminate fishing leading to catching even immature fish.
3. Boundary conflict over L. Victoria especially with Uganda e.g. recently over Migingo
4. Water hyacinth in L. Victoria.
5. Lack of capital leading to lack of modern fishing equipment which restricts the catch per day.
6. In L. Victoria Nile perch preys on the other fish such as tilapia lowering their stock.
7. Communities neighbouring L. Turkana such as Turkana, El Molo, and Rendile are pastoralists and sparsely populated so they can't provide reliable market for fish.
8. The damming of river Omo in Ethiopia has reduced the amount of water flowing into L. Turkana drying of Ferguson bay which is the main fishing area.

Fish Farming in Kenya

- Rearing of fish in ponds where the farmer provides an environment conducive for the survival of fish.

- Fish farms are mainly found in Nyanza, Western, Central, Coast and parts of Rift Valley.
- Fish ponds are built in areas with heavy clay or loamy soils which are usually impervious.
- The ponds must be located near a river to ensure a steady supply of water to ensure the water remains fresh providing natural environment for fish.
- After establishing a pod the farmer gets fingerings from hatcheries set up at Sagana, Kabaru, Kibos, and Aruba and put them in the pond.
- The main types of fish kept are tilapias which are more popular because they breed fast, are resistant to diseases and can survive in different environments, trout suited to cool areas such as the slopes of Mt. Kenya and mudfish.
- Fish are fed regularly on grass, vegetables, grains, compost manure and remains of processed fish.
- Some plants are grown in the pod to provide oxygen.

Fishing in Tanzania

- More intensive than in Kenya and Uganda.
- Inland fishing grounds include lakes Victoria, Tanganyika and Rukwa which form substantial fishing grounds, Lakes Rukwa and Malawi and rivers Mara, Malagasi, Ruvu, Pangani, Ruaha, Rufiji, Kagera and Wami.

L.Victoria

- About 49% of L.Victoria is in Tanzania.
- There are many fishermen who use modern techniques and equipment.
- Fishing boats are large and carry large stocks of fish which enables fishermen to travel deep into the lake where there is more fish.
- The neighbourhood of the lake is densely populated with large towns as Bukoba, Mwanza and Musoma which provide a ready market and processing facilities for the fish.
- Lack of well developed transport limits the marketing of fish to the interior towns.
- L.Tanganyika deep and is the richest in the region in fish.
- Fishing has been an old tradition of the people living around the lake.
- The main type of fish caught is dagaa usually caught at night when attracted by light using special nets with small meshes.
- The factory at Kigoma preserves and processes fish for sale to other parts of the country while some of the fish is smoked or dried and exported to Zambia.
- Fishing is concentrated along the shore because rough storms discourage fishermen from going far into the lake.

- Sparse population around the lake doest offer a ready market for fish but the large surplus is transported by rail to other parts of the country.
- Rukwa's biggest problem is fluctuation of water levels which affect survival of fish.
- A section of L. Malawi is in Tanzania enabling Tanzanian fishermen to catch a lot of fish which is dried and sold in the southern districts of Mbeya and Songea.

Fishing in Uganda

- Inland fishing grounds include lakes Victoria, Kyoga, Albert, George, Edward, Katwe and in rivers Nile, Kagera, Kafu, Semliki and Katonga.
- Fishing industry has been interrupted by a long civil strive in the country reducing it to a subsistence economy.
- L.Victoria is the main fishing ground.
- 46 % is in Uganda.
- Many fishermen own motorised boats enabling them to travel deep into the lake and catch a lot of fish.
- Numerous highlands provide anchoring and resting places for fishermen.
- The fishermen sell their fish to co-operatives which organise processing and marketing.
- The dense population around such as in major towns of Entebbe, Kampala and Njinja provide a ready market for fish.
- Fish is also dried and sold in other parts of Uganda.
- Fish is popular as a diet of majority of Ugandans.
- There are fish processing factories in Njinja where fish is filleted.

Significance of the Fishing Industry in Kenya

(a) A source of income to fishermen and traders when they sell their catch to co-operatives and customers at a profit.

(b) A source of employment such as for those employed to catch fish, in fishing related industries such as making and repairing of boats and officers and clerks of co-operatives.

(c) It is a tourist attraction as it is a sporting activity done for enjoyment which is a source of foreign exchange and revenue to the government.

(d) A source of protein and food because it's a major dish to some communities such as around L.Victoria and along the coastal strip.

(e) Has led to development of industries such as those depending on fish as a raw material e.g. fertilizer plants, for making cod liver oil, etc.

(f) A source of medicine whereby cod liver oil is used in alleviation of chest problems a

(g) Fish oil is used directly or indirectly as a source of cooking fat.

(h) For biological control of mosquitoes by introducing it in water so as to feed on mosquito larvae thereby reducing mosquitoes and hence incidents of malaria transmission.

(i) Has led to development of transport system by e.g. an all weather road from Kitale to Kalokol has made it easier for the fish from L.Turkana to get to the market.

Problems Facing Fishing Industry in Kenya and Their Possible Solutions

(a) Overfishing resulting from use of small meshed nets and unlicensed fishermen resulting in extinction of such species.

- Restrictions should be made on the type of net that should be used.
- Licensing a selected number of fishermen and limiting their catch per day.
- Fish farming to ease pressure on natural fishing grounds.

(b) Pollution of water bodies by oil spillage and seepage of industrial and agricultural chemicals into water which kills marine organisms and prohibits introduction of fish into such waters.

- Agricultural activities should be prohibited close to fishing grounds.
- Legislation should be put in place to check disposal of wastes from industries.

(c) Transport problem as key fisheries being far from centres of population which causes many places to rarely receive fresh fish e.g. L.Turkana.

- Roads should be tarmacked for efficient transportation of fish.

(d) Lack of adequate market due to many communities having not developed fish eating culture, availability of agricultural products such as beef and pork, many fishing grounds being found in sparsely populated areas, many fishing grounds being found far away from potential markets and inability by many people to afford fish due to being expensive due to transport costs being passed on to consumers.

- Roads to the potential markets should be improved.
- People should be educated on the importance of fish in the diet so as to develop fish eating culture,

(e) Inadequate capital making fishermen unable to afford fishing equipment with speed and greater capacity making them unable to venture into deep waters where there is more fish and modern preservation facilities limiting their catch per day.

- Fishermen should form co-operatives so as to get financial assistance.

(f) Location of marine waters within tropical latitudes where there is warm water limiting the growth of plankton.

(g)Narrow continental shelf hence less fish.

- Modern fishing methods and equipment can enable fishermen to go into deep waters where there is abundant fish.

(h)Fluctuation of volume of water in rivers and lakes due to seasonal variation of rainfall and prolonged droughts which causes fish death or migration e.g. Turkana after damming of R. Omo in Ethiopia.

- Conserving water catchment areas to ensure regular supply of water.

(i) Growth of weeds e.g. water hyacinth in L.Victoria which prohibits movement of vessels thereby lowering the catch.

- Mechanical or biological removal of weeds.

(j) Human activities near fishing grounds which cause soil erosion which causes siltation which lowers the depth of water affecting fish breeding.

- Discouraging agricultural activities near fishing grounds and planting of cover crops around fishing grounds to reduce siltation.

(k)Boundary conflict between Kenya and Uganda over Migingo.

- Survey the boundaries to establish the rightful owner of the island.

Fishing in Japan

- The leading fishing nation producing 1/6 of the world's fish output.

Factors Making It to Be the Leading Nation

Physical Factors

1. Rugged mountainous landscape which doesn't offer favourable conditions for agriculture making fishing to be an alternative economic activity.
2. Extensive shallow continental shelf that hosts a lot of fish.
3. Convergence of warm Kuroshiwo and cold Oyashiwo currents providing a suitable habitat for plankton on which fish feed.
4. Natural indented coasts that provide good breeding ground as well as excellent natural fishing ports e.g. Yokohama and Nagasaki.

Human Factors

5. High technology such as large ships with refrigeration and processing facilities which carry large stocks and enable fishermen to carry out fishing in deep seas and over long periods and equipment to detect where there are abundant fish.
6. Large market for fish due to fish being a popular meal, population being large and with a high purchasing power.

7. Fish farming is carried out in the fresh waters and dams which are intensively managed allowing maximum returns.
8. Fish marketing is done through co-operatives which advance loans to fishermen to improve and expand their fishing.

Problems Facing Fishing in Japan

1. High pollution of Japanese waters by industrial effluent sand oil spillage which has interfered with aquatic life.
2. Overfishing along coastal waters as a result of increase in the fishing fleet which has resulted into depletion of some fish species.
3. Restriction of Japanese fleet from other nations territories e.g. to the west where they are kept away by the Korean government.

Comparison between Fishing in Kenya and Japan

Similarities

- Both countries carry out inland and marine fishing activities.
- There is overexploitation of fish resources in both countries.
- There is fish farming in both countries to supplement natural fisheries.
- Both countries experience the problem of pollution whereby in Kenya it's by industrial effluents and agricultural chemicals and in Japan by industries dumping mercury into the sea.
- Modern methods of preserving and processing fish such as refrigerated vessels and fish filleting are used in both countries.
- Fish is consumed locally and exported in both countries.
- In both countries fishermen have organised themselves into co-operatives.
- In both countries fishing faces the problem of restriction e.g. in japan by Korean Government while in Kenya they are restricted from Ugandan and Tanzanian waters.

Differences

- In Kenya fishing is mostly concentrated in inland waters while in japan fishing is mostly concentrated in the N.W. Pacific fishing grounds.
- In Kenya fishing is carried a few kilometres off the shore but in japan it is done in deep seas even far beyond their territorial waters.
- Less fish is found in Kenya due to warm waters and narrow continental shelf while in japan there plenty of fish in marine waters due to broad continental shelf and convergence of warm and cold current.
- In Kenya there is low demand for fish than in Japan.

- In japan the fish species caught are cod, Mackerel, Alaska Pollack while in Kenya it is Tilapia, Nile Perch Dagaa and black bass.
- In Japan marketing of fish is done mainly by co-operatives while in Kenya it's mainly done by individual fishermen although there are few co-operatives.
- Marine fishing in Kenya faces competition from other countries such as Japan and Korea while in japan it doesn't.
- Japan has more advanced technology than Kenya that ensures heavy catch while Kenya has limited technology leading to low catch.

Management and Conservation of Fisheries

- Management of fisheries refers to effective planning and control of fish resources and their habitats while conservation of fisheries is careful use and protection of fish resources from overexploitation by people.

Management Measures

(a) Establishment of research stations to come up with fish species which can do well in various conditions and know fish predators and separate them from fish.
(b) Educating people on the importance of fishing grounds and fish resources such as by advising farmers not to cultivate near fishing grounds to prevent siltation and industrialists to treat wastes before disposing them.
(c) Government inspecting inland water resources to ensure people don't interfere with regular flow of water through activities such as damming which lead to fluctuation of water which affects migratory fish and which may also cause their death.

Conservation Measures

(a) Enact law banning of small meshed nets to prevent catching of immature fish which leads to depletion of fish stocks in water bodies.
(b) Improve transport infrastructure to enable exploitation of fishing grounds in remote areas in order to reduce overexploitation of the few accessible fishing grounds such as L.Victoria.
(c) Fish farming to ensure fish caught in natural waters aren't overexploited and depleted.
(d) Restocking overfished waters using fingerings from hatcheries or from overpopulated fishing grounds.
(e) Banning fishing temporarily whenever over fishing is detected to let fish to mature and breed.
(f) Licensing fishermen to regulate the rate at which fish are exploited to prevent their depletion.

(g)Regular patrols to ensure that foreign fishermen don't trespass Kenya's marine waters to reduce competition for fish.

WILD LIFE AND TOURISM

- Plants (flora) and animals (fauna) in their natural habitats.

Factors that Influence Distribution of Wildlife in E. Africa

Climate

- Heavy rainfall results in big forests which favour animals such as elephants and buffaloes e.g. Mt. Kenya forest.
- Arid and semi-arid climate supports hardy animals which can stand scarcity of water e.g. hart beast and gerenuk which can stand scarcity of water.

Relief

(a) Aspect

- Windward sides which receive heavy rainfall support big forests which favour animals such as elephants while leeward sides of mountains which experience low rainfall favour grasslands which favour carnivores which in turn attract herbivores e.g. Amboseli.

(b) Terrain

- Hunting animals like cheetah are found in plains and plateaus which are relatively level where they are able to run for long distances chasing their prey.

Soils

- Infertile and shallow soils favour grasslands which suit many herbivores and carnivores.

Vegetation

- Birds live where there are trees so as to have shelter.
- Savannah woodlands with more acacia trees favour giraffes which feed on foliage from the trees.
- Desert and semi-desert vegetation supports hardy animals such as grants gazelle.

Availability of water

- Fish are found in rivers, lakes and oceans e.g. Lakes Victoria Kyoga and Indian Ocean.
- Some animals such as hippos and crocodiles live mainly in fresh water in rivers and lakes e.g. R. Nile and L. Naivasha.

Human activities

- Man hunts animals illegally threatening some species with extinction.
- Man has displaced animals from their natural habitat by clearing vegetation for agriculture and settlement.
- Man has taken measures to conserve endangered species of wildlife through establishing national parks, game reserves and sanctuaries.

National Parks

- Area set aside for preservation of scenery, wildlife and historical sites e.g. Tsavo, Mombasa marine, Amboseli, Samburu in Kenya, Kilimanjaro, Arusha and Serengeti in Tanzania and Kipendo valley and Ruwenzori in Uganda.

Characteristics

a) Established by an act of parliament
b) Managed by the government
c) No other form of land is permitted.
d) May be fenced off to keep off people and prevent animals from going out.

Game Reserve

- An area set aside for preservation of wildlife e.g. Maasai Mara in Kenya, Selous game reserve in Tanzania and Kigezi wildlife reserve in Uganda.

Characteristics

a) Managed by local authorities.
b) Accommodates both wildlife and livestock.
c) May be or not fenced off.

Game Sanctuary

An area set aside for protection of birds or other kinds of animals which are endangered e.g. Kisumu Impala Sanctuary, Rhino Sanctuary at L. Nakuru National park and Mwaluganje Elephant sanctuary.

Characteristics

a) Hunting isn't permitted.
b) Predators are controlled.
c) Breeding and keeping young ones until they are fit for release.

Significance of Wildlife

a) Tourist attraction which brings foreign exchange and revenue for the government by paying entry fee to the national parks and reserves.
b) Wildlife conservation has led to proper utilisation of marginal areas of marginal areas where crop growing is difficult due to unreliable rainfall.
c) Creates employment for people raising their standards of living e.g. game rangers, tourist guides and drivers and workers in tourist hotels.
d) Wildlife preservation helps to preserve and protect water catchment areas and soil and also modifies the climate resulting in increased rainfall.
e) A source of food e.g. animals meet and honey from bees.

f) Wild plants such as *Muarobaini* are used as a source of medicine.
g) It has led to development of industries by providing raw materials e.g. trees provide timber used in the building and construction industry.
h) It has led to development of infrastructure when good roads are built to make Game Parks more accessible to tourists.
i) It has diversified the economic base of East African countries instead of relying on agriculture as a major source of revenue.

Problems Facing Wildlife in East Africa

a. Poaching which is likely to bring rare species of animals to extinction e.g. rhinos and elephants.
b. Adverse climatic conditions which causes death of some animals due to shortage of water and pasture.
c. Floods which drown animals and destroy plants depriving animals of pasture.
d. Bush fires which destroy large tracts of land and kill animals which may cause extinction of rare species and expose land to agents of erosion.
e. Overgrazing by high population of herbivores resulting in destruction of vegetation which exposes land to agents of erosion destroying habitats of animals causing them to migrate to areas with adequate pasture.
f. Wildlife-human conflict where by pastoralists kills carnivores which kill their livestock.
g. Pests and diseases such as Feline Immunodeficiency Virus which threatens to reduce the lion population in many parts of Africa.
h. Human activities e.g.

1. Overgrazing by livestock where grazing is allowed leading to destruction of the natural habitat for wildlife.
2. Destruction of vegetation by tourists' vehicles which reduces the amount of food for browsing animals.
3. Encroachment of land which was formerly reserved for wildlife by clearing land for settlement and agriculture which has led to killing of animals.
4. Overfishing which threatens the survival of certain species of fish and other marine life.
5. Environmental pollution such as release of sewage from lodges which pollutes the water leading to the poisoning of animals which drink it e.g. at L. Nakuru where it has led to the death of flamingos and noise pollution from vehicles and people which disturbs animals making them unable to feed well.

Management and Conservation of Wildlife

Wild life management is effective planning and control of wildlife while wildlife conservation is protection of wildlife against interference and destruction by people.

Management Measures

(a) Educating people through print and electronic media on the need to preserve wildlife.
(b) Establishing wildlife clubs in schools to create awareness on the importance of wildlife conservation.
(c) Formation of wildlife conservation bodies e.g. Kenya Wildlife Service charged with management and conservation of wildlife.
(d) Initiating game ranching or wildlife farms to control overexploitation of wildlife resources from the natural habitats.
(e) Culling of old animals to give room for the younger ones and to control the animal numbers.
(f) Translocation of animals whose population increases beyond the capacity of park to other parks where their number is small to prevent the problem of overgrazing.
(g) Encouraging of domestic tourism by lowering entry fee into parks to help people to appreciate the value of wildlife and thus accept conserving it.

Conservation Measures

a) Banning hunting in order to prevent extinction of endangered species.
b) Banning trade in wild game and trophies to prevent endangered animals from becoming extinct.
c) Setting up of game parks to protect wildlife against destruction by people.
d) Setting up of wildlife sanctuaries to protect the endangered species of wildlife.
e) Employment of paramilitary personnel by the government to combat poaching.

Tourism

- Process of travelling to other places for pleasure, business or education.

Types

Eco-tourism

- ~~s~~ environmentally friendly tourism or tourism emphasizing environmental conservation where tourists and local communities are involved in enjoying nature as well as conserving it or.

Aspects/Characteristics of Ecotourism

(a) Tourists are guided along marked trails instead of driving to the areas where there are animals.
(b) Telescopic viewing of animals to avoid disturbing animals.

(c) Use of camping sites rather than big tourist hotels so as not to put pressure on resources which animals depend on.
(d) Prohibiting off road driving and travelling by foot.
(e) Allowing particular types of vehicles.
(f) Warning people against throwing cigarette remains on dry vegetation.

Its encouraged by:

- Creating awareness among the local communities to understand and appreciate nature by visiting Game parks.
- The local community directly benefits from income from tourism which provides them with incentive to conserve wildlife.

There are two types of tourism namely:

Domestic tourism involves local people visiting tourists' attractions which are within their own country.

Why Domestic tourism is Encouraged

- To understand features available in the country so as to appreciate them.
- Understand and appreciate the need to conserve wildlife.
- To compensate for the low turn outs of international tourists in April and October this helps to run the hotels without relying on tourists from outside.

Its encouraged by:

- Lowering entry fee to game parks.
- Lowering charges in tourists' hotels for Kenyans who want to stay in them.

Mass tourism is where large institutional groups of students of staff visit tourists' attractions.

Green Tourism is where people travel seeking to protect and restore the damaged environment e.g. by planting trees.

International tourism involves movement of persons from one country to another for leisure.

Factors Influencing Tourism in Kenya

Physical factors

(i) Tropical location which causes tourists from temperate countries to come to Kenya to escape the harsh winter cold.
(ii) Attractive scenery such as snow capped Mt. Kenya, unpolluted sandy beaches, Great Rift Valley, hot springs and geysers, great rivers with falls etc which attract tourists.

(iii) Richness in wildlife e.g. many plants because of warm climate e.g. rain forests and acacias of savannah and tropical animals and birds which are conserved in their natural habitat. Its home to the famous wildebeest in the Mara.

Human Factors

(i) There are different ethnic groups with unique way and dancing, handicrafts, and dressing which attracts tourists.
(ii) Presence of historical sites which feature artefacts of iron age e.g. Kariandusi in Nakuru and Orgesailie near Magadi which attract tourists.
(iii) Political stability which assures tourists of their safety.
(iv) Accessibility of many tourist sites by road, air and water and also there are communication facilities throughout the country.
(v) There are comfortable tourist accommodation facilities e.g. high-class hotels and lodges in major towns and game parks.

Tourist Attractions in Kenya

-Grouped into two:

Main Attractions at the Coast

(b) Beautiful natural uncrowded and unpolluted sandy beaches which are ideal for sun-bathing (sitting or lying in strong sunlight in order to make the body brown).
(c) Warm and sunny climate due to tropical location which attracts tourists from temperate regions who escape from the harsh winter cold and come for health purposes.
(d) Water sports like yatching, surfing and sport fishing which are carried out in the Indian Ocean.
(e) Historical sites such as Fort Jesus, Gedi ruins, Vasco Dagama and slave caves in Malindi and Shimoni.
(f) Traditional culture of the coastal people e.g. they have a unique way of dancing, songs, clothing and handicrafts and shrines e.g. Kaya of the Mijikenda which attracts tourists.
(g) Mangrove swamps which have unique plants and different species of fish, snails, snakes, birds etc.

Main Attractions Inland

(a) Wild life conserved in National Parks and Game Reserves. Wildlife is conserved in their natural habitats.
(b) The Famous wildebeest migration in the Mara.
(c) The sunny warm climate which attracts tourists from temperate countries.

(d) Attractive scenery such as the snow capped Mt. Kenya, the Great Rift Valley and its lakes and hot springs and geysers and great rivers with waterfalls.
(e) Diverse culture of inland people e.g. the Maasai way of dressing, dancing, housing.
(f) Historical attractions such as Kariandusi near Gilgil and Orgesailie near Magadi featuring artefacts of Iron Age.
(g) National museums of Kenya in Nairobi.

Significance of Tourism

1. Tourism earns the country foreign exchange by paying for their services in foreign currency which is used to trade with other countries.
2. It employs many people enabling them to earn an income and hence raise their standard of living e.g. tourists guides, drivers, in tourist hotels etc.
3. Source of revenue for the government from licenses from tour operators, entry charges to game parks rental fee paid by game lodges etc.
4. Has led to improvement of infrastructure resulting when new roads are constructed and existing ones improved and also airstrips constructed which benefits people living along the routes which in turn stimulate development.
5. Promotes international understanding resulting in peace between countries by bringing together people from different countries of the world..
6. Promotes conservation of wildlife and historical sites sine they are tourist attractions.
7. Promotes agriculture as tourist hotels rely on farmers for the supply of food e.g. fruits and vegetables.
8. Promotes development of industries e.g. craft industries when tourists buy curios e.g. wood and stone carvings and *ciondos.*

Problems facing Tourism in Kenya

1. Insecurity whereby tourists are robbed of their belongings which discourages potential tourists from visiting the country. The government is increasing security patrols in the areas frequented by tourists.
2. Ethnic classes in tourist attraction areas which make tourists to stay away than put their lives at risk e.g. ethnic clashes in Molo. The solution is preaching peace among the tribes since the clashes are fuelled by ethnic hatred.
3. Illegal hunting of animals which reduces some rare wildlife species which attract tourists which reduces the number of tourists visiting the country. Some tourists encourage poaching by buying trophies and involvement in smuggling skins, ivory and other articles out of the country. The solution using game rangers to

patrol game parks to hunt for illegal hunters and banning trade in game trophies and inspecting tourists at departure.

4. Terrorism attacks such as the bombing of tourist resort at Kikambala which causes foreign countries to issue travel advisories to their citizens which reduces the number of tourists. Security personnel are being trained on ways of detecting and countering terrorism.
5. Pollution of aquatic systems such as L. Nakuru which has caused the death of flamingos reducing the number of tourists since some are specifically attracted by flamingos. The solution is regular inspection of factories to ensure treatment of effluents before they are released to water bodies.
6. International media giving negative publicity of Kenya by portraying it as an insecure country. There should be established tourism promotion bodies in foreign countries to report positively to counter lies.
7. Air fares from and to many parts of the world is high due to high fuel prices which discourages tourists from coming to Kenya.

Problems Associated With Tourism

1. Local people borrowing from tourists some social cultural values with negative consequences e.g. homosexuality and lesbianism which could lead to breakage of marriage life and spread of S.T.Ds.
2. Government neglecting other sectors of the economy such as agriculture and development projects like health and education by using a lot of money on tourist infrastructure such as construction of roads and airstrips in tourist areas some of which are rarely used.
3. Some tourists encourage poaching by buying and smuggling souvenirs in form of game trophies which make poachers to kill animals so as to meet demand for these products.
4. Destruction of vegetation by tourist's vehicles as they move over it which reduces the amount of pasture available for browsing animals.
5. Tourists chasing animals while trying to get close-up photographs which destructs the animals feeding and bleeding habits. Noise from vehicles and people also disturb animals.
6. Some tourists come with the purpose of trafficking drugs and some introduce youths to drugs leading to drug abuse and its related consequences.
7. It may cause some male and female children to drop out of school to be showing the tourists around and obtain money by befriending tourists e.g. beach boys.

Tourism in Switzerland

-A country in C. Europe which is landlocked.
-60% of the country is mountainous.
-Its one the leading world destination for international tourism.
-Tourism is highly developed and is the leading foreign exchange earner for the country.

Factors Influencing Tourism in Switzerland/Why it gets more tourists than Kenya.

1. Beautiful scenery produced by Alps which is the main tourist attraction in summer. There are features formed by glacial erosion. There are features such as snow capped mountain peaks, clear blue lakes, waterfalls etc.
2. Climate whereby tourists like visiting there during warm summers and especially the southern region of Ticino which receives more tourists as it experiences a warmer summer due to proximity to Mediterranean Sea.
   The country also experiences winter in which the mountain peaks and slopes provide excellent ground for skiing and skating.

1. It has Excellent infrastructural facilities with a well developed network of roads, railways, electrified rail cars and cable cars which enable tourists to travel easily to centres of attraction.
2. The policy of neutrality which makes people from all the parts of the world to feel at home while there.
3. Several major languages of Europe are spoken which makes it possible for tourists to get excellent services in the country.
4. Accessibility due to its location in C. Europe for tourists from countries from France, Italy, Spain, Germany and Belgium.
5. It has excellent accommodation facilities which are fairly priced and offer discounts to mass tourists.
6. It's highly industrialised and many people are employed and earn a good income enabling people to save for holidays.
7. It's a centre for international meetings since the UN headquarters are in Geneva and the people who go for meetings take time to tour various parts of the country.
8. Tourists organise themselves into groups in order to negotiate for air travel and hotel accommodation making tourism possible for a cross section of the society.
9. The country has favourable banking laws so people visit that country as they go to bank their money.

10. It has one of the lowest crime rates in the world which make many tourists to tour it because their security is guaranteed.

Significance of tourism to Switzerland

1. Earns the country foreign exchange which is used to finance development.
2. The country earns revenue through taxation and direct fee collection.
3. Creates employment in both Switzerland.
4. It has encouraged development of other industries e.g. banking, insurance and transport.
5. Has opened up unproductive areas for development e.g. glaciated landscapes.
6. Switzerland has gained good international reputation and fame through tourism.

Comparison between Tourism in Kenya and Switzerland

Similarities

- Both counties have similar tourist attractions e.g. snow capped mountains, waterfalls and rich culture.
- Both countries have well established hotel industry offering excellent accommodation to tourists.
- Both countries have health spas with mineral water which people consider to cure certain ailments. In Switzerland they are at Mt. Moritz and in Kenya at L. Bogoria.
- In both countries tourists visit all year round.
- In both counties tourism sector earns a significant fraction of foreign exchange.
- Both countries enjoy a peaceful political environment suitable for tourism.
- Tourists in both countries are attracted by waterfalls. In Switzerland they are associated with hanging valleys while Kenya's are along her rivers.
- Both countries have national parks e.g. Swiss National Park in Switzerland and Amboseli National Park in Kenya.

Differences/ What Tourists Go To See In Kenya Which They Cant See In Switzerland and Vice Versa

- Kenya has more physical features which attract tourists than Switzerland e.g. Rift valley, lakes, mountains.
- Kenya's climate is warm throughout the year while Switzerland experiences warm summers and cold winters.
- Kenya has tropical wildlife such as the elephant, cheetah, lion etc. which Switzerland lacks.

- Kenya is richer in traditional culture than Switzerland due to its many ethnic groups.
- Switzerland receives more visitors than Kenya and revenue from the industry is far much higher compared to Kenya's.
- Kenya has marine attraction which Switzerland lacks because it's a landlocked country.
- In Kenya animals are kept in game parks while in Switzerland they are kept in zoos.
- Switzerland has winter sports such as skiing and ice-skating which Kenya lacks.
- In Switzerland domestic tourism is more pronounced than in Kenya due to high levels of income.

Reasons Why Many Kenyans Don't Visit Other Places as Tourists

(a) Shortage of accommodation especially during the tourist peak season making accommodation expensive and hence unaffordable.

(b) Unemployment which makes many people unable to afford to travel let alone pay for food and hotel accommodation.

(c) Low income from employment making many people unable to afford holidays in tourist attraction areas.

(d) Some employees are unable to get leave so as to be able to visit tourists' attractions.

(e) Many people haven't developed the habit of going to visit areas with tourists' attractions during holidays.

The Future of Tourism in Kenya/Ways in which Kenya is Planning to Expand her Tourism

Tourism in Kenya has good prospects and may expand in future if the following factors are implemented:

1. Improvement of infrastructure in semi-arid areas which have tourist attractions e.g. N. Eastern Province.
2. Aggressive promotion and marketing of Kenya as a tourist destination in other countries which is done by (KTDC) Kenya Tourist Development Corporation and (KTB) Kenya Tourism Board.
3. Encouragement of domestic tourism by showing documentaries through the electronic media on Kenya's tourist sites e.g. 'Out and About'
4. Offering domestic tourists favourable rates of accommodation in the hotels during the off peak tourist season.

5. Beefing up security to ensure tourists don't gain access to the country in order to make tourists to choose Kenya as their destination since their safety will be guaranteed.
6. Lowering tariffs levied particularly on food and accommodation in tourists hotels to encourage tourists to come and spend more days.

ENERGY

-The power required to carry out an activity e.g. diesel, electricity, etc.

Sources of Energy

-Classified into 2 types: renewable and non-renewable sources of energy.

Renewable Sources of Energy

-Which can be regenerated and used over and over again.

Types of Renewable sources of Energy

1. Sun
2. Wind
3. Water (geothermal, hydro power, tides and waves).
4. Biomass (wood, biogas)
5. Animals.

Sun

Energy from the sun is called solar energy.
The sun is the primary source of all types of energy.
Solar radiation can be converted into 2 types of energy.

Heat

Solar panels are used to tap solar energy which is then used to heat water in coiled pipes which are inside which are painted black.
Mirrors are used to converge rays of the sun on one spot which are then used to heat water or cook food in a pot.
Suns rays are reflected and focused on crops to dry them.

Electricity

Photo- voltaic cells are used which when sunlight shines on them they generate electricity which is then stored in batteries.

Advantages of Solar Energy

(a) Cheap because it's obtained from sunlight which isn't paid for.
(b) Requires minimal maintenance once tapping equipment has been installed.
(c) It doesn't pollute the environment like fossil fuels (environmentally friendly)
(d) Can be stored in batteries and used when there is no sunlight.
(e) It's inexhaustible i.e. available as long as the sun continues to shine.

(f) Available in all parts of the world.

Disadvantages

(a) Can't be used to run heavy machinery.
(b) Tapping equipment e.g. solar panels are expensive to buy.
(c) The batteries which it's stored in are cumbersome to carry around.
(d) It fluctuates in various seasons throughout the year.
(e) Large numbers of solar panels are required to produce useful amounts of energy.

Wind

Wind energy is mainly used in arid and semi-arid areas where wind flow isn't obstructed by vegetation.

- Wind is harvested using wind mills and converted into mechanical energy which is used for pumping water, grinding grain and generating electricity.
- Wind energy is also used to propel ocean going vessels e.g. dhows.

Advantages

(a) It is an inexhaustible source of energy.
(b) It doesn't pollute the environment.
(c) Land between the windmills can be used for other purposes.
(d) Can be produced on small scale basis for local consumers.

Disadvantages/ Problems.

Wind mills for harvesting it are expensive to buy and install.
The equipment for harvesting is relatively expensive to maintain.
Many windmills are required to provide a significant amount of electrical energy.
It fluctuates when the strength and direction of wind changes.
The large tracts of land it requires (wind farms) alter the environment beauty.
It's not available in many areas except in open areas.

Water

Geothermal Power

Steam from underground is heated when in contact with hot rocks.
The steam finds its way to the surface through fissures or cracks.
The steam is tapped and used to turn turbines and thus generate electricity e.g. at Olkaria in Kenya.

Advantages

Cheaper as no fuel is required to turn turbines.
It is Continuous.
It's inexhaustible unlike hydro-power which depends on water levels.

The cost of operating geothermal power station is low compared to hydro-power station.

A good supplement for other sources of energy.

Disadvantages

(a) Causes noise pollution from generation plant.
(b) Not available in many areas where there aren't hot springs and geysers.
(c) Gases released with steam may pollute the environment e.g. sulphur dioxide, hydrogen sulphide, methane, ammonia, etc.
(d) Its exploration is expensive because it requires expensive technology.

Hydro/Water-power

-Power obtained from falling water.
-Most widely used renewable source of energy.
-Used to generate electricity (HEP) when falling water is directed to turn turbines connected to generators to produce electricity.

Advantages

(a) It doesn't pollute the environment.
(b) It's inexhaustible.
(c) Hydroelectric power can be transmitted over long distances using cables.
(d) Dams for HEP generation create lakes which can be used for recreation, irrigation and fishing.
(e) HEP can be used for many purposes e.g. transport, cooking, etc.
(f) It's reliable because significant levels of energy are produced.

Disadvantages

(a) Affected by fluctuation of water levels in reservoirs.
(b) Construction of HEP generation dams displaces many people.
(c) It causes inconvenience to migratory species of fish.
(d) The cost of constructing and running hydro-power plants is high.
(e) Dams may break and destroy a lot of property and lives downstream.
(f) Not available throughout the world.

Tides and Waves

-Dams are built across an estuary.
-Incoming and outgoing tides rotate turbines and electricity is generated in similar way as hydro-power.

Biomass

-All forms of energy released by plants and animal wastes.

Wood fuel

Firewood, charcoal and saw dust which are used for cooking and heating.
It can be exhausted if its cut at a higher rate than they are being replaced. so it requires management if it has to be sustained.

Advantages of Wood

(a) It's a cheap source of energy.
(b) Available almost throughout the world.
(c) No maintenance cost is needed.
(d) Ashes from burned firewood can be used for plastering houses and as a fertilizer.

Disadvantages

(a) Dirty because when burning it gives off smoke and soot.
(b) Pollutes environment through the gases it emits.
(c) Requires a big storage area.
(d) Its overexploitation leads to deforestation leading to problems of soil erosion, global warming and shortage of water.

Power Alcohol

Agricultural wastes e.g. straw, molasses and cassava are fermented to produce power alcohol which is directly used to heat or blended with gasoline to run machines.

Biogas

Human and animal wastes are used to produce methane (biogas) through fermentation which is used for cooking and lighting.

Advantages of Biomass

(a) An inexhaustible source of energy.
(b) Fuels are efficient and relatively clean.
(c) Cheap because it makes use of waste products.
(d) Production of biogas is cheap as it doesn't require advanced technology.
(e) Biogas gives twice as much heat as natural gas.
(f) Slurry left behind when biogas is being made can be used as fertilizer.
(g) Available throughout the world.

Disadvantages

(a) Biogas digesters require a lot of space and can't be set in congested areas.
(b) Can't be transported to distant places.
(c) Contributes to pollution which causes global warming.

Animals

Examples of Animals and Their Uses

(a) Oxen for ploughing and pulling carts.
(b) Horses for transporting by riding on their backs.
(c) Donkey for transporting of goods on their backs or by pulling carts.
(d) Camel for transporting goods and people on their backs.
(e) Elephant in Burma and India for transporting logs from forests

Advantages

(a) Inexhaustible because animals keep multiplying as a result of production.
(b) Available in all parts of the world.
(c) Cheep to maintain as they only require food and water.
(d) Animals are flexible because they are able go through forests and narrow paths unlike motor vehicles.
(e) Some are slaughtered for meat when they outlive their usefulness e.g. oxen, camels etc.

Disadvantages

(a) They are prone to diseases and fatigue.
(b) They can die as a result of too much work.
(c) Their use is restricted only to rural areas.
(d) They can only transport small loads.
(e) They can only do limited work because they tire easily.

Non-renewable Sources of Energy

-Sources of energy which are exhaustible if they aren't well managed.
-They include petroleum, coal and uranium.

Coal

-A black or brown rock made of carbon.

- Mud, sand and other materials are deposited over vegetative matter such as tree trunks and branches.
- Deposited material prevents decomposition and also exerts pressure on it causing great heat.
- Peat layers are formed which gradually change into coal.

Usage of coal has declined due to:

1. Discovery of other forms of energy such as petroleum.
2. Exhaustion of old accessible mines.
3. High cost of mining coal.

Advantages of Coal

(a) More efficient in thermal generation of electricity than oil.
(b) Most suitable in the smelting of iron.

Disadvantages

It leaves a lot of dirt on any surface it touches.
It leads to formation of smog and smoke which is a health hazard.
Its mining leads to environmental degradation.

Petroleum

-Consists of gaseous and liquid hydrocarbons from animal and vegetation matter laid on sedimentary rocks.
Natural gas and petroleum are extracted from the same oil wells.
Petroleum is refined to get by-products such as motor oil, diesel, kerosene, gasoline, jet fuel, lubricants, liquid and petroleum gas.
Natural gas occurs alone or is found on the upper layers of crude oil.
It's a mixture of hydrocarbons with methane making about 90% and other gases such as propane, ethane and butane.
It's used for domestic purposes, generation of thermal electricity and for industrial activities.

Advantages

(a) A clean source of energy to use.
(b) Cheap to transport by pipes to distant areas.
(c) Transport and maintenance costs are low.
(d) Easy to use as one needs only switches and burners.
(e) Free of the effects of weather changes.

Disadvantages

(a) An exhaustible source of energy.
(b) Accidental fires can occur incase the gas leaks or the pipe is damaged.
(c) It can greatly pollute the environment incase of accidental fires occurrence.
(d) Expensive for low income groups.

Uranium

-A naturally occurring radioactive material used to produce nuclear energy in fusion and fission in reactors.
A lot of heat is produced and the water used to cool the heat producing core is heated and turns into steam used to generate electricity.

Advantages

(a) It's a long lasting supply of raw material.
(b) It produces large amounts of energy.
(c) It doesn't produce green house gases.

Disadvantages

(a) It's expensive to construct a nuclear reactor.
(b) Wastes from a nuclear power station are difficult to dispose because they are radioactive for 100 years.
(c) It is an exhaustible source of energy.

HEP Projects in Kenya

Factors Favouring Development of HEP

Physical Factors

1. A large and constant volume of water such as R. Tana and its tributaries.
2. Can be located on areas with falling water such as on rapids, water falls, and Knick points.
3. Deep and narrow valley. Deep to ensure a large capacity for the reservoir and narrow to minimize the cost of constructing the dam.
4. Hard basement rocks to reduce the amount of infiltration and also to provide a strong foundation for the dam.

Human Factors

Area for dam and reservoir construction should be sparsely populated to minimize the cost of relocating people.

There should be presence of industries and urban areas to provide market for electricity to make the project economically viable or bring a profit.

Construction of an HEP station requires adequate capital because it's expensive to construct a dam, to maintain it, to transmit power and to compensate the displaced people. Kenya is financed from external source e.g. Sondu Miriu which is financed by Japanese government.

When referring to Kenya you should say: 'There is presence of …'

Development of HEP in Kenya

By the dawn of independence there was few industries and hence low demand for electricity.

Few HEP stations available were set up to supply power for agricultural processing.

The earliest stations were **Mesco** on R. Maragua, **Ndula** on R. Thika and **Sagana** on R. Sagana.

The rest of power supply came from diesel plants in Kipevu.

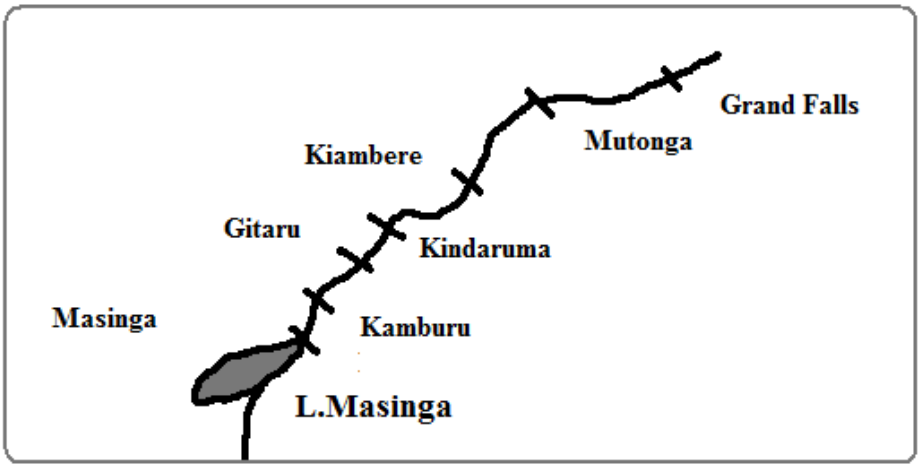
There was power which was being imported from Uganda which was connected in 1955.

Demand for electricity increased as more industries were established.

The country opted to use her water resources to provide electricity and reduce her reliance on power from Uganda.

R. Tana was identified as the one with the largest potential.

Seven sites appearing as a cascade were identified along the river where the **Seven Forks Scheme** was launched.



- Kindaruma was the first project to be established which was completed in 1968.
- Kamburu followed which was completed in 1974.
- Gitaru was next which got completed in 1978.
- Masinga which is a multipurpose project was completed in 1981. It has the largest lake. It's a reservoir for the rest of the dams downstream and the water is also used to provide water for irrigation.
- Kiambere was the last station downstream completed in 1988.
- The other proposed power stations to complete the Seven Forks project are Mutonga and Grand Falls.
- The other HEP stations are Turkwel Gorge on R. Turkwel which was completed in 1991 and Sondu- Miriu which was expected to be completed in 2008.

It's the main source of electricity accounting for 72% of power production. The stations are maintained by Ken Gen which sells power to KPLC which distributes it to consumers at a fee.

Benefits of Tana River Projects

1. The reservoirs provide power for irrigation and domestic use.
2. The dams promote transport by serving as bridges across the rivers.
3. The dams are a tourist attraction e.g. Masinga tourist lodge provides recreational facilities.

4. The dams provide fresh water fisheries.
5. The projects have generated employment to people thus raising their standard of living.

Problems Facing the Tana River Projects

1. Shortage of capital to purchase spare parts which has interfered with maintenance of machinery in the power house.
2. Fluctuation of the water levels of R. Tana due to drought in the catchment areas and evaporation due to flowing through the dry Nyika region which affects power generation.
3. Siltation of dams which occasionally blocks the tail race tunnels leading to a low volume of water and dredging is required which is expensive.
4. Inadequate skills and technology which causes failure to maximise on power production.

HEP Projects in Uganda

It has the largest renewable fresh water resources in E. Africa.
It is endowed with numerous rivers and lakes with high potential of electricity generation.
The country receives an average of 1000mm of rain throughout the year.
R. Nile which flows out of L. Victoria has the highest potential.
Where it flows out it has provided a natural water fall.
Owen Falls Dam was built on the site in 1954.
It's the Africa's largest storage dam.
It supplies most of Uganda's electricity (162MW) and exports 30MW to Kenya.
The presence of power was a catalyst to industrial development e.g. Njinja town a few metres from the dam became a scene of several industries to use the cheap electricity nearby.
The country is developing another power station below the Owen Falls.
Kikagat River to the south provides power around Mutukula and Kabale areas in S.W Uganda.
Mobuku River supplies most of the power used in the copper mines at Kilembe.

HEP Projects in Africa

Africa has the largest concentration and potential areas of HEP generation. The potential hasn't been utilised due to:

1. Inadequate financial resources. Where the projects are to be established the countries seek external borrowing of money which is paid for many years overburdening the concerned countries.

2. Some of the potential areas being in remote areas far away from densely populated areas and industrial areas.
3. Some of the countries are lowly industrialised which means there isn't adequate market for HEP making the venture economically unviable.
4. Some of the rivers with potential for HEP generation don't have constant volume of water throughout the year due to seasonal fall of rain which affects power generation.

Some of the major projects are:

- Aswan on R. Nile
- Kariba (shared among Zambia and Zimbabwe) and Cabora Bassa on R. Zambezi.
- Kainji on R. Niger
- Akosombo in R. Volta (Ghana)
- Owen Falls (Uganda) and Sennar on R. Nile
- Vanderkloof on R. Orange
- Inga and R. Le Marinel on R. Congo.

HEP Projects in Tanzania

- Nyumba ya Mungu dam and Hale dam on R. Pangani.
- Kagera
- Malagasi

Geothermal Power Projects in Kenya

Geothermal electricity is generated in areas which experience Vulcanicity where:

- Magma or hot rocks come into contact with percolating water.
- The water is heated beyond its boiling point (superheated).
- The steam escapes through cracks and holes to the surface
- The steam is harnessed using pipes and used to turn turbines that drive electric generators.

In Kenya areas with the greatest potential for geothermal power are found within the Rift Valley from L. Magadi to L. Turkana on Kenya-Ethiopia border.
Geothermal power generation is carried out at Olkaria to the south of Naivasha.
It accounts for 10% of the country's power needs.
Other potential areas are:

- L. Bogoria which has the highest potential with numerous hot springs and geysers by it shores.
- Eburu to the north of L. Naivasha

- Menengai crater region
- Areas around L. Baringo
- Magadi
- South of L.Turkana.
- Between mountains Longonot and Suswa

Problems of Energy Development in Kenya

The aim is to reduce overdependence on imported oil.

1. Inadequate capital which causes the country to seek external borrowing of money which is paid for many years overburdening the country.
2. Small market for power because of the high cost of connection which prevents its horizontal spread.
3. Seasonal fluctuation of water levels in dams due to low rainfall on catchment areas and some rivers flowing through dry areas where much of water is lost through evaporation which leads to inconvenience to consumers because of power rationing.
4. Regular siltation of dams due to deposition of soil which requires regular dredging which is quite expensive.
5. Location of some power generation plants in remote areas making it expensive to transport power for long distances.
6. There is limited spread of solar power in rural areas because the equipment is expensive to install and lack of acceptance because it fluctuates with seasons.
7. There is lack of acceptance of wind power and many people use diesel to pump water instead of it.
8. There is problem of overexploitation of wood fuel as a result of population increasing at a faster rate which has led to deforestation leading to soil erosion and reduced amounts of rainfall as a result of the effect on water cycle.

Significance of Energy

1. For domestic use e.g. wood and charcoal for cooking and heating, etc.
2. For use in industries e.g. electricity, petroleum, etc.
3. Used in transportation e.g. electric cars, diesel and petrol used in motor vehicles, etc.
4. Used in agriculture e.g. diesel for tractors which draw ploughs, electricity for milking machines, etc.
5. Used in water supply where diesel engines wind mills and solar power is used to pump water.

6. Used for medical purposes where electricity is used to run equipment for diagnosis e.g. X-Ray and scanning machines and in refrigeration to preserve specimens on medicine research.

The Energy/Oil Crisis

Situation whereby the demand for oil is higher than the amount that is being supplied leading to high oil prices.

Causes

1. Over-reliance on petroleum and its products.
2. High oil prices due to sharp rise in oil demand.
3. Economic and political sanctions
4. Uncertainties in oil supplies to consumers.
5. Rapid depletion of oil reserves.
6. Conflict in the Middle East especially between Israel and Palestine.
7. Exhaustion of wood fuel
8. Mismanagement of energy
9. Oil production limits set by OPEC
10. Artificial shortages by countries like Russia and USA relying on oil from other countries and conserving their own.

Examples of Energy Crisis in the Past

- 1973 and 1974 when there was war between Israel and Arab countries. The Arab countries which are OPEC members withheld oil supply to Israeli supporting countries e.g. USA and the result was sharp increase in oil prices.
- 1991 first Persian Gulf war caused by triggered by Iraq invasion of Kuwait caused by:

(a) Iraq's claim that Kuwait was its territory.
(b) Kuwait was taking oil from Iraq's oil from Rumaila fields which lay beneath both countries.
(c) Kuwait was exceeding the oil production limits set by OPEC.

Many Kuwait's oil fields were set on fire and Iraq dumped about 465 m gallons of Kuwait's crude oil to the Persian Gulf.

There resulted a major oil crisis which was worsened by the trade embargo.

- 2003 second Persian Gulf War. Iraq had failed to destroy weapons of mass destruction which she had agreed to do for the 1991 war to end. The war led to a rapid increase in oil prices from US$35 at the start of war to US $50 by 2004. It

forced OPEC members to increaser daily crude oil outputs by 8% to stabilise prices.

Impact of Energy Crisis

(a) Increase in the prices of many commodities as a result of increase in the cost of production and transportation where oil is used to provide power and as a raw material in some industries.
(b) Increase in the prices of imports due to high crude oil prices which affect the balance of trade by causing earnings from exports to be lower than the cost of imports.
(c) High rates of inflation or devaluation of currency as a result of commodity prices rising high due to the cost of imports being passed to the consumers.
(d) Industries are forced to lay off workers because of the high cost of production which can cause losses.
(e) It causes the price of other forms of energy e.g. charcoal and gas also to become expensive.
(f) Developing countries running into heavy dept as a result of borrowing heavily to pay for oil loans which are paid at high interest rates making the country unable to invest in development projects.
(g) Decrease in agricultural production as a result of decrease in the use of agricultural inputs such as fertilizers due to their high cost brought about by increase in oil prices.
(h) Decline in the number of tourists as a result of escalation of oil fares making it very expensive to travel.
(i) Environmental degradation as a result of environmental degradation brought about by the high demand for charcoal and firewood which leads to soil erosion and low rainfall amounts.

Solutions

(a) Developing alternative sources of energy e.g. solar, biomass, Geothermal and HEP.
(b) Management and conservation of energy.
(c) Developing nuclear energy to enhance self sufficiency in energy provision.
(d) Encouraging industries to use coal which is slightly cheaper than petroleum.

Management and Conservation of Energy

Management of energy is effective planning and control of energy resources.

Management Measures

(a) Control of importation of vehicles with large engine capacity which consumes a lot of fuel.
(b) Encouraging many people to use public transport in order to reduce the number of vehicles on roads and thus fuel consumption.
(c) Educating people through mass media to create awareness on the importance of conserving energy.
(d) Improvement and proper planning of road network to reduce traffic jams in which a lot of fuel is wasted.
(e) Agroforestry, afforestation and reafforestation programmes to reduce overexploitation of natural forests.
(f) Banning logging, selective felling of trees and resettling people who have settled into forests.

Conservation of Energy

Conservation of energy is using available energy resources in the most effective manner to ensure there isn't wastage.

Conservation Measures

(a) Putting off electricity gadgets when they are not in use.
(b) Proper motor vehicle maintenance in order for them to use fuel efficiently.
(c) Encouraging use of public transport which carries many people at a go e.g. buses.
(d) Encouraging use of renewable sources of energy e.g. solar, wind and biogas to save on oil and wood.
(e) Encouraging use of energy saving stoves which use little charcoal and produce a lot of energy.

INDUSTRY

Industry-any form of economic activity through which people produce goods and services for their consumption.

Industrialisation-process through which a country establishes manufacturing industries.

A country is referred to as **industrialised** when production of manufactured goods is the main economic activity in that country. Less industrialised countries mainly produce agricultural raw materials.

Factors Influencing Location and Development of Industries

Raw Materials

- Industries are located near sources of raw materials to reduce transportation costs e.g. sugar milling factories in sugar growing areas, mostly in urban areas near airports and oil refineries at the coast since oil is bulky and expensive to transport inland.
- They are also established where there is a steady source of raw materials in order for them to be economically viable e.g. oil refineries at the coast

Power

- They are located near main power supply pints to reduce the cost of transmitting power e.g. those in Jinja town near Owen falls dam.

Transport and Communication

- They are located where transportation system is well established to ensure efficient and quick transportation of raw materials to industries and finished goods to the market e.g. in urban centres.
- They are located where there is efficient communication so as to stay in touch with their suppliers and their consumers.
- Well developed communication systems also lower the transport cost.

Market

- They are located where buyers of products are available or in areas with dense population to make their operation to be economically viable since they are established for commercial purpose to make a profit e.g. in urban areas, Kenya highlands, lake region and coastal strip.
- Location near markets is also due to the nature of goods e.g. perishable goods have to be consumed before they go bad e.g. bread and daily products. Industries making fragile goods are located near markets to prevent the high risk of breakage during transportation e.g. glass, bricks and roofing tiles.

Labour

- Labour intensive industries are located in densely populated areas where there is adequate and cheap labour to reduce production costs.
- Also so as to reduce the cost of transporting and housing workers.
- A country with skilled manpower has faster industrial growth than that without which are forced to depend on expatriates who are costly to hire and maintain which lowers the profits of such industries.
- Industries also require skilled manpower and management skills to ensure maximum output and low production costs.

Water Supply

- Some are located near sources of water such as large permanent rivers and lakes to provide water for processing raw materials e.g. coffee pulping, sugar milling e.g. Mumias near R. Nzoia, Sony near R. Migori and Chemilil near R. Nyando.

Government Policies

- Decentralisation of industries or encouraging by providing incentives location of industries from urban to rural areas.

Incentives

1. Tax exemptions
2. Protection from foreign competition.

Aims

1. Develop all parts.
2. Create jobs in rural areas to minimize rural-urban migration.
3. Take industries where labour is found.
4. Open remote or underdeveloped areas for development.
5. To reduce congestion in the capital city.
6. Environmental reasons whereby industries are located away from residential areas because they produce harmful fumes and a lot of noise.
7. Security reasons to prevent industries from being attacked by terrorists because if they were all together there would be a great loss.

E.g. EPZ industries located at Athi River to reduce congestion in Nairobi industrial area and Mariakani and Kikuyu Steel Rolling Mills established in their respective areas to open up the region for development

Industrial Inertia

-Tendency of an industry to remain in a particular place even when the factors for its location no longer exist e.g. industries in the Ruhr Region of Germany have remained at the same place despite closure of coal fields and decline in coal as an energy source.

Causes

- It may be expensive to move to a new place because new factory buildings would have to be constructed, buying new machinery and equipment.
- Due to availability of experienced workers.
- To avoid the problem of transportation and other basic infrastructural facilities.

Capital

- A lot of capital is required in establishing and developing industry e.g. for purchasing land, putting up buildings and purchasing machinery and equipment.
- Countries with plenty of capital industrialise with greater ease than those with little capital which often rely on foreign aid and multinational corporations to set up domestic industries which reduces benefits accruing from such industries.

Personal Decisions

- Security to allow secure operations.
- Where they can get maximum benefits.
- To set industries in their home areas to offer jobs to their local people.

The Cost of Land

- A place where land is expensive discourages industrial development e.g. industries are now being established in the neighbouring towns of Kitengela, Ruiru and Athi River because land is expensive in Nairobi.

Types/Classification of Industries

According To Raw Materials Used, Products and Level Of Production

Primary /Processing Industries

Industries involved in the exploitation of natural resources (e.g. mining, fishing, forestry and agriculture) or processing raw materials into more useful and valuable form which are used in making final products e.g. coffee pulp factories, cotton ginneries, milk dairies, sugar factories, saw mills, abattoirs, leather tanneries, posho mills and sisal factories.

Secondary /Manufacturing industries

-Ones which rely on processed goods to make final products or which make final products directly from raw materials e.g. sweet industries, bread, cement factories, oil refineries, cigarette making, pulp and paper industries, etc.

Tertiary /service industries

-Industries involved in providing services and don't produce tangible goods e.g. transport and communication, trade, banking, tourism, administration, education, medical, etc.

According To the State of Finished Goods

Heavy Industries

- Manufacture heavy and bulky products.
- Use heavy raw materials.
- Involve heavy investment in their production.
- Production is in large scale e.g. ship building, car manufacturing and assembling, oil refineries, steel rolling mills, fertiliser making plants, glass industries etc.

Light Industries

Ones involved in making goods with little volume and weight e.g. textile, cosmetics, plastic, printing, electronics, cigarette, etc.

Distribution of Industries in Kenya

Agricultural Industries

1. Agricultural Food Processing Industries

-located where raw materials are produced because they require immediate processing e.g. tea factories, sugar factories, milk Processing plants in the leading dairy farming regions e.g. Eldoret, Nakuru and Kiganjo, coffee factories in coffee growing areas e.g. Kiambu, Nyeri, Embu, fruit canning e.g. Del Monte in Thika and Kenya Orchards Company in Mua Hills in Machakos, Maize milling e.g. Unga Ltd in Eldoret Kisumu and Nairobi, Brewing industries e.g. East African Breweries at Ruaraka, KMC plants at Athi River, etc.

2. **Agricultural Non-Food Processing Industries**

-Cotton ginneries, sisal factories, Bata Shoe Company in Limuru, cigarette making e.g. mastermind and BAT, Lumbering industries e.g. Pan African Paper Mills in Webuye near extensive pine plantations in Turbo And Webuye, textile industry e.g. Kisumu Cotton Mills in growing areas of W. Kenya.

Non-Agricultural Manufacturing Industries

-many are located in urban areas where there is a large ready market, reliable power supply and adequate labour force e.g. cement factories at Athi River and Bamburi, Oil refining at Changamwe in Mombasa, steel rolling mills in the industrial area of Nairobi where scrap metal is available, Central glass company at Kasarani, clay products industries near Ruiru and Githunguri near sources of clay, Vehicle Assembling industries which import car components and join them to make cars e.g. General Motors in Nairobi and Associated vehicle Assemblers in Mombasa, pharmaceutical industries which manufacture medical products e.g. Glaxo Smithkline and Beta Health Care in Nairobi.

Cottage Industries

-Industries involved in making products particularly in homes using hands and simple tools.

Characteristics

1. Locally available materials are used.
2. Capital infested is small.
3. Most of the products are sold to the local market but few are exported.
4. Skills are acquired informally.
5. Use of hands and simple and sometimes advanced tools.
6. Usually involve an art or skill possessed by a person to produce items that are in demand in the neighbourhood.
7. it's labour intensive.
8. Very few items are made because the market for items is usually small.

Examples of Cottage Industries

Pottery

-Cottage industry in which pots and flower vases are made using clay.
Its practised mainly in eastern and central provinces and by women.
Examples of areas are Kwale and Muranga.

Wood and Stone Carving

-Involves curving of wood and stone into various shapes of animals, humans, etc.
Wood carving is practised in Kitui and Machakos while soapstone (soft metamorphic rock) carving is done in Kisii.
Some products are sold locally while the rest are exported with some being bought by tourists as souvenirs (reminder).

Weaving

-Involves using sisal, dry palm leaves dry papyrus, nylon fibres etc to make products such as baskets, mats, and fish traps etc.

Baskets mainly known as *Ciondos* are mainly done by Agikuyu women and are sold locally and to tourists.
Weaving is also practised along the coastal region where dry palm leaves are used to make baskets, mats, etc.

Other cottage industries are such as those making use of scrap metal to make metal boxes, wheel barrows, energy saving jikos, rain harvesting gutters, poultry harvesting equipment, swords, knives, spears, jembes, iron bells and jingles and boat making common among communities living around L. Victoria and along the coast.

Jua Kali Industries

-The most common and popular cottage industry.
Jua kali practitioners include those who are employed in all informal sectors of the economy such as shoe repairers, tailors, carpenters, watch repairers, barbers, mechanics, and tyre-menders,
Jua kali industries are found in all urban centres.
The most common activity is reprocessing old scrap metal to produce useful products listed above.
The government has realised the importance of the industry and is encouraging its development in the following ways:

1. The ministry of Trade and Industry has set up a department to promote this industry.
2. KIE provides loans to Jua Kali industry for the purchase of materials.
3. KIE has put permanent structures/sheds where the artisans can operate at low costs.
4. The local authorities have set aside land for use by Jua Kali artisans
5. Jua Kali artisans have been encouraged to form cooperatives to assist in the marketing of their products.

Importance of the Jua Kali Sector

1. Has created employment opportunities to many people who would otherwise be jobless offering them a means of livelihood, alleviating poverty.
2. It has helped to raise the standard of living of many Kenyans who rely on it for income.
3. it utilises materials that would otherwise be thrown away to make items.
4. Jua Kali products earn the country substantial foreign exchange when they are exported to COMESA countries.

5. The industry produces cheaper goods than those produced in the formal industries.

Significance of Industrialisation to Kenya

1. Kenya earns foreign exchange after exporting her manufactured goods which is used to develop other sectors of the economy such as education, health care and transport.
2. Industries employ people providing them with income which helps to raise their standard of living.
3. Industrialisation has led to development of transport and communication and social amenities such as power, water, schools and medical facilities where industries have been established.
4. Agricultural based industries have led to increased agricultural production in the process of meeting the rising demand for raw materials.
5. Establishment of industries has led to diversification of the economy thereby helping the country to earn revenue throughout even when agriculture which is the backbone of the economy fails as a result of adverse weather conditions.
6.
    - Workers in industries have joined together and formed co-operatives in which they save money and are then given loans which they use to start projects or generally enhance their living standards.
    - The government also gets revenue through taxation of the dividends got at the end of the year from the profits of SACCOs.
7. Industrial exports help in maintaining a balance of trade between Kenya and her trading partners by reducing over reliance on imports.
8. Industrial exports to other countries create a trading co-operation which in turn helps to foster good relationships among countries of the world.
9. Industries based on locally available materials encourage utilisation of resources which would be otherwise be idle.
10. Establishment of industries promote development of urban centres because it encourages people to move to the area in search of jobs and accommodation and other services are provided.
11. Industrialised countries are likely to produce adequate goods making them to be self-sufficient in industrial goods.

Problems of Industrialisation and Their Possible Solutions

1. Kenya lacks adequate capital for industrial establishment forcing her to get loans from financial institutions such as I.M.F and World Bank whose interest rates are very high and sometimes come with strings attached.
    - The solution is government to give incentives such as tax exemptions to investors in order to establish industries.
    - Local financial institutions should assist by giving long term loans at affordable loans.
2. Industries suffer from the problem of raw materials e.g. agricultural industries when agriculture fails due to adverse weather conditions. Timber industry suffers due to trees taking long time to mature and those depending on imported raw materials suffer when strict exchange control are put in place.
    - The solution is supplementing local raw materials with imported raw materials.
    - Planting more trees to increase raw materials required for timber related industries.
3. Local market for industrial goods isn't sufficient to sustain production due to low purchasing power, the cost of manufactured goods being too high due to the high cost of raw materials and the preference of some people to buy imported products thinking they are of better quality.
    - Government should explore market within regional trading like COMESA, EAC, etc.
    - It should also provide technical assistance to local manufacturers so that produce goods of high quality in order to be able to compete favourably in the world market.
    - Government to lower tax on raw materials in order to reduce the prices of manufactured goods.
4. Lack of skilled labour due to brain drain forcing the government to employ expatriates whose salary package is very high thus lowering the profits. It may also lead to poor management leading to losses and eventual close down of some industries.
    - More people should be trained in respective fields to make up for shortage.
    - Improvement of salaries and working conditions to check the brain drain.

5. Locally produced goods compete with imported goods which are in most cases cheaper leading to the decline or death of local industries. There for instance is importation of 2nd hand clothes which has led to the decline of textile industry.
    - Imposing heavy duties on imported products which are also produced locally.
    - Improving the quality of locally manufactured goods so that they can compete favourably.
    - Eliminating corruption in the importation sector to ensure goods aren't imported illegally.
6. There is the problem of the high cost of energy due to importation of petroleum at very high cost causing the industrial costs to tremendously increase thus affecting the marketability of the products as they become affordable.
7. Industries cause environmental degradation e.g. pollution from the emissions they release into the air and effluents they release into water bodies. Atmospheric has led to global warming and water pollution to death of fish. Industries such as cement manufacturing make land derelict by depositing rock wastes on the ground.
    - The problem can be reduced through strict legislation against dumping of industrial wastes and inspection of industrial activities to ensure wastes aren't released to the environment before treatment.
8. Has led to the neglecting of agriculture when able bodied people move to urban areas to look for jobs in industries, when people neglect food crops and take up cash crop production.
    - The problem can be solved by offering better prices for agricultural produce to make agriculture more attractive.
    - Farmers should be encouraged to diversify their activities.
9. it has led to unemployment as it has led to technological innovations such as computers and robots and other automatic gadgets which have replaced physical manpower.
    - People are being encouraged to become self employed.
    - Industries are also discouraged from laying down their staff.
10. Has led to displacement of people by forcing people to vacate the area where manufacturing industries are being established e.g. the preparation for titanium mining at Kwale District.
    - The solution is compensating and resettling the displaced residents.

- Efforts should be made to locate industries in sparsely populated areas.

11. Causes rural to urban migration as a result of establishment of industries in urban areas where rural dwellers go to seek for jobs. This has caused shortage of labour in rural farms, congestion in urban areas leading to pressure on existing social amenities, inadequate job opportunities leading to crime and other social evils, etc.
    - The government should ensure equitable distribution of industries throughout the country.
    - It should encourage industries to be put up in rural areas through tax exemptions.
    - Provision of amenities such as electricity, clean water and entertainment facilities in rural areas.

Cottage Industry in India

The major areas in which it's highly developed include Mumbai, Jabalpur, Magpur, Bhopal, Bhutan, Madras, Calcuta, Bangalore, Lucknow and Moradabad.
The industry involves weaving, making clothes, brass, Copper and silver ware ornamental ivory, jewellery, carpets, safety matches, etc.

Characteristics of Cottage Industry in India (Comparison)

1. The cottage industries are rural based while in Kenya they are rural and urban based.
2. The craftsmen are highly skilled while in Kenya not all are highly skilled.
3. Labour in the industry is provided by individuals or members of the family while in Kenya its individuals or members of groups.
4. Industry is owned by the family in India while in Kenya it's owned by individuals.
5. In India cottage industries are found almost everywhere (ubiquitous) while in Kenya they are mostly in urban areas and some few homes.
6. There are middlemen who supply raw materials to the industry while in Kenya they obtain raw materials directly from their sources.
7. Other characteristics are typical of cottage industries.

Factors for the Development of Cottage Industry in India

1. The industry requires little capital outlay to establish.
2. Majority of Indians are very skilled weavers and ornamental ware makers.
3. The high demand for products in the populous sub continent has led to the development of the industry.
4. India has a huge population which ensures a steady supply of cheap labour.

5. The industries don't require big space so they can be established anywhere e.g. in homes and small rented rooms.
6. Abundant supply of locally available raw materials which are used in the cottage industry.
7. Availability of hydroelectric power which is well distributed within the rural towns.
8. The urge of people to earn an income in order to uplift their living standards.
9. Availability of simple and affordable tools and machines.

Problems Faced By Cottage Industries in India

1. Difficulty in obtaining raw materials at affordable prices.
2. Shortages of capital as most of the people are poor and have little access to modern banking facilities.
    - Artisans could form co-operatives through which they could get raw materials and loans.
3. Competition from other industries making similar products.
4. Difficulties in making the products.
5. Exploitation of the artisans by the middlemen when they sell raw materials to them at high prices.
    - Government of India to introduce policy to stop the interference of the middlemen.

Iron and Steel Industry in the Ruhr region of Germany

Ruhr Region derives its name from R. Ruhr a tributary of R. Rhine.
Its one of the most industrialised regions of the world. Other areas of the world which are highly industrialised are:

1. Pittsburgh industrial region of U.S.A.
2. Moscow area of former Soviet Union.
3. Tokyo-Yokohama region of Japan.
4. S.E England in Britain and
5. Rotterdam area in the Netherlands.

One of the leading industries deals in iron and steel which is one of the most important industries in the present advanced technological world as it provides raw materials to many other industries.
The basic raw materials are iron ore, coal and limestone mixed in the blast furnace to get iron.

Factors Which Have Led To the Development of Iron and Steel Industry in the Ruhr Region of Germany

1. There is availability of raw materials because the region has coal, iron ore and limestone making it economical to set up iron and steel industry there.
2. There is availability of cheap water transport for transportation of raw materials and finished products because the region is served by navigable rivers and canals e.g. R. Ruhr, Lippe, Dortmurd-Ems Canal, etc.
3. There is availability of ready market for iron and steel from the dense and affluent population in C. and W. Europe.
4. There are abundant sources of power such as coal, oil and H.E.P. necessary in iron and steel industries.
5. There is availability of capital for development of iron and steel industry due to presence of rich companies, companies and capital accrued from other industries like coal.
6. The region is centrally located in Europe which offers easy access to all parts of Europe.

Significance of Iron and Steel Industry in the Ruhr Industrial Region

1. Led to the improvement of transport network due to the need to transport raw materials and finished products related to iron and steel industry.
2. Led to growth and expansion of towns e.g. Essen, Dortmund and Duisburg.
3. Many people have been employed in the iron and steel industry as loaders, clerks, drivers and operators.
4. Has led to promotion of agriculture due to the need to feed the huge population in the industrial towns in the Ruhr region.
5. Led to provision of social amenities to cater for the workers in the industrial region e.g. schools, health centres, housing and recreational facilities.

Problems Facing the Ruhr Industrial Region

1. There is environmental pollution from smoke and fumes from coal which is the major fuel and solid wastes which are discharged into the rivers.
2. There is congestion and overcrowding in housing and social amenities due to the large influx of people to the Ruhr region in search of employment.
3. Depletion of coal mines due to coal being a non-renewable resource and continued mining. Coal mining has become expensive as it has to be brought to the surface from great depths.

Car Manufacturing and Electronics Industry in Japan

Japan is a country to the east of Asiatic continent made of numerous major/large and minor/small islands.

Major Islands

- Hokkaido
- Honshu
- Kyushu
- Shikoku

Minor Islands

- Okinawa
- Nancei
- Zu
- Kagoshima and
- Chisima

80% of the land consists of the rugged mountainous landscape which doesn't favour agriculture making the Japanese to concentrate on the development of manufacturing industries such as chemical, textile, iron and steel and automobiles (car manufacturing) and electronics which become very important.

Examples of automobile companies include the Mitsubishi and Toyota Motor Corporations while examples of electronics companies include Sony and Toshiba.

Factors Favouring Electronics and Car Manufacturing In Japan

1. Advanced technology e.g. all the plants dealing with electronics and automobiles are automated (robots controlled by computers) which increases efficiency leading to production of large number of units, lowers production costs and leads to production of high quality goods which are competitive in the world market.
2. Cars and electronics manufactured in Japan aren't expensive compared with those from European countries which make them to be in high demand all over the world.
3. 80% of the land consists of the rugged mountainous landscape which doesn't favour agriculture making the Japanese to concentrate on the development of manufacturing industries of which automobiles (car manufacturing) and electronics have become very important.
4. Japan produces cars which are fuel efficient which creates a high demand for them in the world market encouraging the country to produce more.

5. There is availability of a ready market due to Japanese high population with high purchasing power and high demand for Japanese cars and electronics due to their high quality, affordability and fuel efficiency of their automobiles in Africa, S. America, Asia and Europe.
6. There is availability of capital from the profits accrued from other industries like ship building, machinery, textiles, fishing and tourism which are invested in the development of other industries including automobiles and electronics.
7. There is availability of skilled, dedicated and hardworking manpower is available in Japan which has led to production of quantitative and qualitative automobiles and electronics products which reduces production costs and makes goods to be of high demand which in turn stimulated more production.
8. Japan is located in a strategic position making it accessible from all directions via the sea enabling the raw materials and manufactured goods to be transported to or from any part of the world through the modern ports of Tokyo, Nagoya and Osaka.
9. There is abundant water from the lakes, many rivers within the highlands and the Pacific Ocean surrounding Japan which is a prerequisite in a manufacturing plant. It is used in the iron and steel industry whose products are in turn used in the automobile and electronics industry.

Major Car Manufacturing Zones in Japan

Tokyo-Yokohama Industrial Zone

-The most important and the leading motor vehicle manufacturing region.
Manufacturing cities in this region include Tokyo, Yokohama, Chiba and Hitachi (electronics products).

Osaka-Kobe Industrial Zone

-2nd most important car manufacturing zone.
It's located on Honshu Island.
Manufacturing cities in the region are Kobe, Osaka, Kyoto, Otsu, Wakayama and Akashi.

Nagoya Industrial Zone

-3rd largest car manufacturing zone.
It's also on Honshu Island.
Manufacturing zones include Nagoya, Honda, Toyota and Okazaki.
Toyota Motor Corporation has its headquarters at the City of Chiru 20km east of Nagoya.

Electronics

Major car manufacturing cities include Tokyo, Kobe and Osaka and others are towns of Hitachi and City of Chiru (Fuji machine).

TRANSPORT AND COMMUNICATION

Transport is the act of moving items and people from one place to another while communication is the process of transferring information between individuals, groups and places.

Factors influencing Transport and Communication

1. Existence of sets of corresponding places with surplus (supply) and deficits (demand) for goods, services and information.
2. Alternative sources may hinder transport and communication e.g. a nearby source of market of a required commodity or source of information or means of communication.
3. Infrastructure depending on how it is can lead to establishment of efficient or inefficient transport and communication network.
4. Politics where by the government may ban use of certain means of communication e.g. as was the case with Google in China or where the government may decide to be the leading provider of transport and communication facilities.

Modes of Transport

There are 3 common modes of transport namely land, water and air transport.

Land Transport

-The type that involves movement of people and goods on land.

Types of Land Transport

1. Human Porterage

-Movement of people from one place to another carrying light goods on their back, hands or shoulders or by using hand carts, trolleys, bicycles or motorcycles.

2. Use of animals

-Use of domesticated animals to carry goods and people on their back or pull loaded carts (drought animals).

Advantages of Human and Animal Transport

(a) It's the cheapest and can be used by all classes of people since no fuel is used. Animals require very low maintenance costs as they feed on vegetation.
(b) Relatively safe because few accidents occur during transportation.
(c) Doesn't pollute the environment as it doesn't use fossil fuels.
(d) They are flexible in that they can be used to transport goods in areas without good road network.
(e) It's convenient in that it's readily available whenever required.

Disadvantages

(a) Goods can be stolen or destroyed by wild animals and extreme weather conditions because they are exposed.
(b) They are a very slow means of transport hence time consuming, tedious and boring.
(c) They can't transport large quantities of goods because human and animal energy get exhausted with time.
(d) They can cause congestion on busy urban roads which may delay other forms of transport.

3. Road Transport

-Means of transportation of people and goods by motor vehicles on roads.

Types of Roads

(a) All weather roads- which are used all year round i.e. tarmac and murrum roads.
(b) Dry weather roads- which are used reliably during dry seasons.
(c) Motorable trucks- which are used by people on foot and by vehicles on dry season. A truck is a path or rough road made by people, vehicles or animals.

Principal Trans-Continental Highways in Africa

- Great North Road connecting Cape Town and Cairo through Tanzania, Kenya, Sudan and Ethiopia.
- Trans-Africa Highway from the Port of Mombasa to Dakar in Senegal through east and Central Africa.
- Dakar-Djamena Highway through Core De Ivoire , Nigeria and Chad.
- Trans-Sahara Highway from Lagos to Tripoli through Algeria.

Advantages of Road Transport

(a) It's a faster means of transport compared to human and animal transport.
(b) It's cheaper compared to railway transport because construction of roads is cheaper than that of railways.
(c) It's available at ones convenient time.
(d) Roads can be constructed in stages improved and even repaired while they are being used.
(e) It's flexible in that road connections are available all over the country.

Disadvantages

(a) Traffic congestion and jams when there are many vehicles on roads which leads to delays and fuel wastage.

(b) Its expensive over long distances and when transporting bulky goods.
(c) Vehicles can carry a limited number of people and amount of goods at a time making them expensive and uneconomical.
(d) It's adversely affected by weather e.g. during heavy rains, roads become impassable and foggy conditions hinder visibility making it easier for accidents to occur.
(e) Vehicles pollute the environment by their exhaust fumes and noise which they produce.

4. Railway Transport

-Means of transporting people and goods using trains or rails.

Advantages of Railway Transport

1. Less expensive compared to road transport because it can carry a large number of people and heavy and bulky goods in one trip.
2. There is no congestion or jam because there is only one train on a given truck at any particular time.
3. Passenger trains are comfortable for passengers travelling over long distances in that they have facilities such as accommodation, dining and toilets accommodation.
4. Safer than motor vehicles because they are less prone to accidents.
5. Have less maintenance costs because they don't require frequent repairs like roads.

Disadvantages

(a) Very slow means of movement especially of perishable and urgently required goods.
(b) Expensive to construct as much iron and steel is used to construct railway lines and trains.
(c) Inflexible in that railway lines aren't available all over the country and their direction cannot be changed.
(d) Are affected adversely by terrain as where there are steep gradients, tunnels and winding tracks have to be used which adds to the cost of setting up railway system.
(e) Specific gauge of railway line can only be used by a specific design of train unlike roads which can be used by many varieties of vehicles.
(f) Trains can't use rails while they are being constructed unlike roads which can be used while they are being constructed, improved or even repaired.

Examples of Railway Links in Africa

- Tazara railway- connects Zambia Copper Belt with the sea port of Dar-es-salaam.
- Benguela Railway- runs from Zambia Copper Belt to Angola.
- Kenya Uganda Railway- runs from Mombasa to Kisumu. It has an extension from Nakuru through Eldoret to Malaba then through Tororo to Kampala.
- Kenya's other railway branches are Voi to Taveta, Konza to Magadi, Nairobi to Nanyuki, Gilgil to Nyahururu, Nakuru to Eldoret and Kisumu to Butere.

Why There Are Few Railway Links among African Countries

- Administration by different colonial governments who constructed railway links only within areas of their jurisdiction.
- Political differences which led to mistrust and hostility which works against effort to construct railway jointly.
- Countries have railways of different gauges making connection to be difficult.
- Little interstate trade which doesn't warrant construction of railways to transport bulky goods.
- Countries lack sufficient capital to establish railways.
- Mountainous landscape and swampy terrain which hinder the development of rails to link the countries.

Problems Which Kenya Experiences In the Rail Transport

- Competition from other modes of transport which are cheaper and flexible.
- Frequent accidents from derailments due to inadequate servicing which has led to high maintenance costs and losses when goods are looted.
- High maintenance and expansion costs causing little expansion of rail lines.
- Mismanagement of rail services leading to deterioration at lower income.
- Vandalism during political unrests and by people dealing in scrap metal.

5. Pipelines

-Means of movement of fluid or gas products such as water, gas and oil through pipes from one place to another. Pumping stations are constructed along the pipelines to keep the product flowing steadily.

In Kenya the main oil pipeline extends from Mombasa through Nairobi to Kisumu and Eldoret where there are main oil depots. The pipeline is managed by Kenya Pipeline Corporation.

Advantages of Pipelines

(a) No delay as there is a constant supply of commodity.

(b) Convenient in that amounts of commodity can be transported within a short period.
(c) There are low operating costs in that minimal labour is required in operating pipelines and also the cost of maintenance of pipelines is lower than for other means.
(d) They aren't affected by bad weather like other means of transport.
(e) It doesn't pollute the environment like other means of transport except in cases of leakages which are rare.

Disadvantages

(a) Selective in that they can be used to transport fluids and gasses and can transport only one type of commodity at a time.
(b) Insecure in that they may be sabotaged if they run across a number of countries when there are political differences or when one country decide to withhold the product.
(c) Pipelines may cause pollution if they burst spilling oil, gas or sewage and the problem would be grave if it occurred under water.
(d) Inflexible in that they remain permanently in one position and rerouting becomes impossible and further distribution of the substance from depots has to be done by roads and railways.

6. Water Transport

It involves movement of goods and people over waterways/ water bodies.
Water transport is classified into two: Sea Waterways/ marine water transport and inland water ways.

Sea Waterways/ Marine Water Transport

-Involves movement of goods and people over seas. There are the following types of vessels used in sea transport:

1. Liners

They are ship with the following characteristics:

- Operate along fixed routes and time schedules.
- They transport both people and goods.
- Fixed rate of freight charges.

There are two types of liners:

Passenger Liners

- Carry people and small valuable items.
- Have luxurious facilities e.g. cinemas, shops, banks, hotels, etc.

Cargo Liners

- For carrying both goods and people.
- Have loading and unloading facilities.
- Slower in speed
- Less prestigious
- Smaller in size compared to passenger liners.
- Some carry different products while other carry specialised goods e.g. petroleum.

2. Tramps

- They are ships meant for transporting cargo.

- No fixed routes or schedules.
- Are slower in speed
- Have lower freight charges compared to liners

Improvements in Ocean Transport

1. Refrigeration facilities to enable transportation of perishable goods.
2. Containerisation (parking of goods in standard sealed metal containers which are unsealed at the destination).

Advantages of Containerisation

(a) Safety and security because containers are sealed which protects goods from destruction by bad weather and from being stolen.
(b) Easy to handle because containers are fitted with special devices like hooks and rings which makes loading and unloading easy.
(c) Time saving because goods are put in one container than being carried in several boxes which makes loading and unloading easy.
(d) It's economical in terms of space because containers have a standard shape which reduces wastage of space by allowing tight packaging of goods.

Ocean/ sea Routes/ Ocean Trade routes

Are well marked routes through which Ocean traffic passes. They are also called ocean trading routes because they have come about as a result of trading activities among various regions.

Major ocean routes are concentrated in the northern hemisphere due to the following:

- High degree of industrialisation
- Intensive trading activities
- High population

- Availability of ocean terminals in developed countries of Europe, N. America and parts of Asia.

World major Sea Routes

1. **Panama Canal Sea Route-** connects Pacific and Atlantic oceans.
2. **Cape of Good Hope Sea Route-** serves eastern and western coasts of Asia, New Zealand and Australia.
3. **North Pacific Sea Route-** serves industrialised countries of Asia e.g. Japan, Singapore, Hong Kong, S. Korea and W.N. America.
4. **N. Atlantic Sea Route-** connects W. Europe to E.N. America.
5. **Mediterranean Asiatic Sea Route**- connects Europe to Africa and the Far East countries.
6. **Trans-Atlantic sea Route**- connects Europe to E.S. America.

Inland Water Ways

-Movement of goods and people over rivers, lakes and canals.

Examples of Navigable Rivers of Africa

- Section of R. Congo
- R. Nile from Uganda to Khartoum
- R. Ogowe in Gabon.
- Sections of R. Niger
- Tana
- Zambezi

Examples of Navigable Rivers in Other Parts of the World

- R. Rhine and its tributaries main, Meuse and Ruhr.
- Mississippi and its tributaries Ohio, Missouri, Arkansas and Tennessee.
- Mackenzie, Yukon, Nelson and Albany in N. America.
- Most important water way in N. America is the St. Lawrence Sea Way .

Examples of Lakes which are inland water ways are such as Victoria (largest inland waterway in E. Africa, Tanganyika, Malawi, Albert and also man-made lakes such as Kariba, Nasser, Volta and Kainji.

Factors Which Have Hindered Development of River Transport in Africa

1. Inadequate capital to develop waterways, ports and for the purchase of vessels.
2. Fluctuation of water levels which makes sailing difficult as a result of rivers passing through dry areas.
3. Presence of rapids and waterfalls which hinders the vessels' movement.

4. Siltation of rivers which makes their channels shallow hence hindering movement of vessels.
5. Presence of floating vegetation which makes it difficult for vessels to sail due to narrowing of the river channel.
6. Most rivers pass through unproductive zones hence it's uneconomical to develop river transport.
7. Rivers flow across political boundaries which may require negotiation in order for the countries involved to use them for transport.
8. Inadequate technology.

Canal Transport

A canal is a water channel that is cut through land for boats or ships to travel along. Some canals join large water bodies like seas and oceans.

Examples of Canals

- **Suez Canal** which joins Mediterranean and Red Sea.
- **Panama Canal** which connects Caribbean Sea with Pacific Ocean.
- **Dortmund-Ems Canal** which joins R. Rhine to the N. Sea.
- **Soo canals** which connects connecting L. Superior to L. Huron.

The Great Lakes and the St. Lawrence Sea Way

- It's the most important sea way in N. America shared by U.S.A. and Canada.
- It's located along the boundary between the two countries.
- It stretches over 3680km from Atlantic Ocean to the interior of N. America up to L. Superior.
- It comprises of St. Lawrence River and the Great Lakes Superior, Michigan, Huron, Erie and Ontario.

Shortcomings of the seaway before development

(a) It had obstacles of rock outcrops, rapids, waterfalls and small islands.
(b) Shallow sections due to silting
(c) Narrow sections (bottle necks).
(d) Freezing of water in winter.
(e) Presence of fog and mist at the mouth of St. Lawrence River.

- St. Lawrence Sea Way Project was started by U.S.A. and Canadian governments in 1954 to construct and improve navigability of St. Lawrence River.

Objectives of the Project

(a) Promote trade and industrialisation between the two countries.
(b) Remove silt between L. Erie and Huron.

(c) Regulate the flow of St. Lawrence River through dam construction.
(d) Smoothen river channel by removing rapids, small islands, rock outcrops etc.
(e) Regulate different water levels along the sea way through dredging to widen and deepen shallow sections within the lakes and the river.

What the Seaway Project Was Involved In

(a) Dredging of the shallow sections to deepen to accommodate large shipping vessels.
(b) Formation of water reservoirs behind dams to drown rapids allowing ocean vessels to move along the routes.
(c) Installation of radar and light on ships to improve the navigation of ships in order to avoid accidents.
(d) Blasting to remove the rocky islands and narrow sections along the sea route.
(e) Construction of canals to join the lakes and bypass obstacles e.g.
- Soo Canals to join L.Superior and Huron.
- Welland Canal joining L. Erie and Ontario to bypass Niagara Falls.
- New York State Barge Canal to connect L. Erie to Hudson River.

Benefits/Role of St. Lawrence Seaway to the Economies of U.S.A. and Canada

(a) Source of foreign exchange for the two countries because many tourists are attracted hereby the scenery e.g. Niagara Falls.
(b) Dams along the seaway are used to produce H.E.P. which stimulated growth of industries.
(c) Fishing is undertaken in dams and lakes along the water way.
(d) Development of agricultural activities along the seaway e.g. villages which practice horticultural farming.
(e) It's a source of employment e.g. tour guides, security, transport, etc.
(f) Source of revenue to U.S.A. and Canada from toll charges paid by ships which go there.
(g) Lakes and the seaway are sources of fresh water for domestic and industrial purposes.
(h) Increased trade between the two countries and other countries of the world.
(i) Reduction of transport costs to and from the interior of the continent.

Advantages of Water Transport

(a) Offers less friction to the movement of vessels as it's the case with roads.
(b) Are natural and free transport routes requiring less artificial infrastructures

(c) Less expensive because large loads can be carried at minimal costs and water routes require minimal maintenance.
(d) It's a reliable mode of transport since there is very little traffic congestion on waterways because the waterway is large.
(e) Goods are protected because they are transported in containers or tankers.
(f) It's a safe mode of transport for delicate goods.

Disadvantages

(a) Many water ways are affected by water fluctuation like low volumes and high volumes which make them to flow swiftly which make them unnavigable.
(b) Water transport is the slowest and unsuitable for perishables, casualties and medicines.
(c) Great loses are incurred during accidents such as fire outbreaks, typhoons, tsunamis and mechanical breakdown due to the large carrying capacity of the vessel.
(d) High capital is required in the purchasing of modern shipping vessels and maintenance of parts.
(e) Ocean transport is available only to people who live near water ways unlike roads which are flexible.
(f) Insecurity in the oceans where pirates steal from and attack sailing ships.
(g) Sea vessels greatly contribute to water pollution as most of the wastes are thrown into the sea.

Types of Communication

1. Verbal communication-communication by word of mouth e.g. telephone, face to face and radio.
2. Written communication-communication by writing e.g. letters. Magazines, newspapers and journals.
3. Audio-visual communication-communication by using a combination of sounds, signs and pictures e.g. gestures, beating drums, smoke, shouting in a special way, television, etc.

Telecommunication Services

-Communication over a distance using cables or wireless communication e.g.

1. Telephone-converts sound into electronic signals and back to sound waves at the receiving end.

2. Facsimile (fax)- send information through telephone lines by converting written information into electronic signals and back to written at the receiving end.
3. Internet-global network of computers linked via telephone and enables individuals to send e-mail. It is the fastest, cheapest and connected all over the world.

Role of Transport and Communication in the Economic Development of Africa

1. development of trade because buyers are able to move to markets, traders are able to move to market centres where products are in high demand and order goods for sale without necessarily going to the suppliers which reduces transport costs and hence increases profits.
2. Development of infrastructure by making tourist attractions accessible.
3. Promotion of industrial development/establishment of more industries since areas with good transport and communication networks are likely to attract investors to set up industries and finished goods are able to reach consumers easily. Communication enables industrialists to know where raw materials are available without having to move a lot.
4. Promotes international understanding because it enables citizens of different countries to be in close contact enabling them to learn about and appreciate each others culture resulting in good relationship.
5. Many people are employed in the transport and communication sectors e.g. drivers, mechanics, engineers, journalists, broadcasters, computer programmers etc.
6. Settlements develop where transport routes converge e.g. Khartoum at the confluence of blue and white Nile and Mombasa.
7. Transport opens up remote areas for exploitation of natural resources such as minerals, fish, tourists' attractions because labour can be easily ferried to such areas and resources can be taken easily to processing sites.
8. transport and communication are sources of revenue to the government e.g. tax levied on air time, license fees charged when one wants to start T.V. or radio station, etc.

Problems Facing transport and Communication in Africa and their Possible Solutions

1. Some countries are landlocked i.e. located far inland away from oceans e.g. Uganda, Rwanda, Burundi, etc. the solution is to develop good relations

among the nations in the continent so that countries which have access to the sea permit their landlocked neighbours to have direct access to the sea routes.

2. Regions having rugged relief due to presence of features like mountains e.g. mountains Kenya and Kilimanjaro which makes construction of roads and railways difficult and expensive. Presence of rapids and waterfalls which causes swift movement of water makes development of river transport difficult. The solution is constructing passes and tunnels through ridges and slopes and building of bridges across rivers and valleys to allow construction of roads and railways.
3. Shortage of navigable rivers because rivers have navigable stretches, presence of obstacles and fluctuations of water volumes, narrowness and shallowness all of which makes navigation difficult. Solution is widening and deepening of river channels through dredging and construction of dams across rivers to improve navigation.
4. Vandalism of communication facilities such as telephones and their cables which hinders communication. The solution would be prosecution of people caught in possession of communication materials.
5. Lack of adequate capital for establishment and maintenance of transport and communication infrastructure e.g. vehicles, locomotives, aircraft, satellites, computers, etc. The solution is joint partnership between African countries with donors in order to finance establishment of communication infrastructure and also.
6. Political instability in countries such as Somalia which have affected transport and communication. The solution would be to set peace mission in the affected countries in order to restore stability.
7. Communication experiences language barriers due to many ethnic groups with majority who only communicates through vernacular making international communication difficult. Solution is adoption of major international languages like French and English to help Africa engage in international communication.
8. High cost of travelling due to high cost of fuel causing the low and middle class persons to travel less which reduces profits realised in the transport sector. The solution is management and conservation of energy to save on the available resources and alternative sources of energy.
9. Deep rooted colonial heritage where colonialists constructed railways of different gauges which makes extension of railways into neighbouring countries difficult. Efforts are being made by several African countries to

change the pattern of roads and railways and joint construction of roads and railways.

TRADE

-Buying and selling or exchange of goods and services.

Types of Trade

A. Domestic/Internal/Home/Local trade

-Buying and selling of goods within a country's borders.

It's classified into:

1. Wholesale Trade-purchasing of goods in bulk from producers and selling them to retailers.
2. Retail Trade-buying goods from wholesalers and selling them to individual consumers.

B. Regional Trade

-Trade between countries found in the same geographical region.

C. International Trade

-Exchange of goods and services at the global level.

It's classified into:

1. Export Trade-selling of goods and services to foreign countries. Examples of major exports from Kenya are coffee, tea, cut flowers, tourism, fluorspar, miraa, vegetables, etc.
2. Import Trade-buying of goods and services from other countries. Examples of imports to Kenya are crude oil, vehicles, electronics, sugar, skilled labour, fertilisers, rice, vehicle parts etc.
3. Bilateral Trade-exchange of goods and services between two countries.
4. Multilateral Trade-exchange of goods and services between many countries.
5. Visible Trade-trading in tangible goods.
6. Invisible trade-trading in services.

Balance of Trade

-Difference in value of countries visible exports and imports.

It's of 2 types:

1. **Adverse Balance of Payments**-in which value of visible imports exceeds that of visible exports.
2. **Favourable Balance of Trade**-in which value of visible exports exceeds that of visible imports.

Balance of Payment

-Difference in value between visible and invisible exports and imports.

Factors Influencing Trade

1. Difference in natural resources which makes it necessary to trade with other countries or areas in order to obtain goods and resources which are not found in their area.
2. population whereby large population or one with high purchasing power provides a large and ready market for goods and services encouraging trade.
3. Trade occurs when there is demand and supply of goods and services.
    - **i.** If the supply is low and the demand is high, prices go up stimulating trade.
    - **ii.** When the supply is more and the demand is low, prices go down discouraging trade.
4. Adequate and efficient means of transport and communication encourage trade because bulky goods can be transported quickly and overlong distances from producers to consumers. Poor transport discourages trade due to the difficulty in getting goods to the market in time. Goods can be supplied faster when traders communicate with suppliers without having to travel a lot which reduces travelling cost and hence increasing profits.
5. Trade restrictions can encourage or discourage trade. They are of two types:
    - Tariffs- taxes or duties levied by a country on a particular type of commodity imported in order to protect its domestic industries.
    - Quotas-specified quantities of goods which must not be exceeded during importation or exportation.
    - Trade Agreements-agreements made between countries regarding which commodities are exported or imported from specific countries.
    - Total Ban-complete restriction of importation of a particular commodity in order for a country to protect its domestic industries or due to political hostility.

6. Trading Blocks or economic Unions/Associations among countries aimed at promoting regional trade among members states can encourage trade between members and discourage trade with non members.
    - Free Trade Associations-liberalise trade among member countries by lowering and abolishing tariffs.
    - Common Market Associations-liberalise trade among members and raise tariffs for non members.
7. Trade can only take place between countries only when they are in good terms. Hostility leads to total ban as was the case with s. Africa during apartheid and Iraq when it attacked Kuwait and failed to destroy weapons of mass destruction.
8. Existence of aids to trade e.g.
    - Banking facilitates storage and transfer of money used in trade transactions
    - Insurance protects businesses against theft and destruction from fire which instils confidence among investors.
    - Warehouses are essential for storage of large quantities of goods for sale.

Significance of Trade to Kenya

1. Many Kenyans are employed in domestic trade such as in wholesale and retail shops and in sectors dealing with foreign trade such as customs and clearing and forwarding firms.
2. It's a source of revenue for the government by charging sales tax such as V.A.T. on manufactured goods sold locally and tariffs at the point of entry into the country.
3. Foreign trade enables a country to earn foreign exchange which is used to import goods that a country needs, setting up of industries, developing transport and communication, providing social services etc.
4. Leads to development of settlements e.g. many towns started as a small market and more people moved there when trading activities increased.
5. International trade ensures availability of a wide range of goods for consumers to select from in order to satisfy their needs.
6. It leads to development and improvement of transport infrastructure such as roads and railways in order to enhance transportation of goods and people.

7. Leads to development of industries because as the goods are bought demand for goods increases hence more industries are set or existing ones increase their activities in order to satisfy the increased demand.

Problems Facing Trade in Kenya

1. Kenya largely depends on agricultural exports which are sometimes affected by climatic variations and diseases and pests leading to low production, and hence low foreign currency.
2. Kenya's exports are of low value as they consist of raw materials or semi processed commodities which fetch low prices because they have to be processed further and also due to being bulky a lot of money is required for their exportation making returns accruing from exportation to be low.
3. Local manufactures suffer unfair competition from foreign firms e.g. from COMESA some of which don't attract tariffs, diversion of goods intended for neighbouring countries to the local market and counterfeit goods which compete with genuine ones.
4. There is ignorance about Kenyan goods where by some Kenyans believe that goods from overseas are of superior quality so they prefer imported goods instead of local ones.
5. Unexpected trade restrictions are sometimes imposed on Kenyan exports e.g. in 2000 E.U. banned fish importation from Kenya.
6. Inadequate transport and communication as most roads are poor and impassable during rainy season meaning goods can't reach the market and hence increased costs for such goods.

The Future of International Trade in Kenya

The future of it is bright because of the following:

1. Kenya has signed trade agreements with various countries of Europe, asia, America and Africa.
2. It's a member of COMESA which has increased the volume of regional trade.
3. There is revival of E.A.C. which has also increased the volume of regional trade.
4. Peace agreement between Sudanese government and S.P.L.A. has also led to increase in regional trade.
5. Kenya is exploring markets in the Far East countries.
6. Kenya has trade attaches abroad who help promote Kenyan goods there.
7. She has trade organisations such as Kenya External Trade Authority (K.E.T.A.) which carries research on factors which have limited access to top

markets in U.S.A. and japan and Kenya Bureau of standards which ensures quality of goods is maintained by the manufacturers.

The Role of Regional Trading Blocks

The Common Market for Eastern and Southern Africa (COMESA)

- It was established in 1994 to replace Preferential Trade Area (P.T.A.).
- It has 22 member states e.g. Kenya, Uganda, Ethiopia, Zambia, Zimbabwe, Namibia, etc.

Objectives of COMESA

(a) To reduce and eliminate trade barriers on selected commodities to be traded with member states.
(b) Abolish restrictions in administration of trade among member countries.
(c) Fostering relations, peace and political stability for member states.
(d) Raise the standard of living within member states.
(e) Promote goods being produced in the member states.
(f) Establish and foster co-operation in all fields of economic activity.

Achievements

(a) Increased volume of trade.
(b) Increased accessibility to markets in member countries.
(c) Free movement of goods among member countries due to elimination of trade barriers.
(d) Increased efficiency in production as each member is allowed to specialise in what she produces.
(e) Improvement of transport and communication facilities.
(f) Increased political and economic cooperation among member states.

The Southern African Development Community (SADC)

- It started as Southern African Development coordination in 1980 in Lusaka Zambia and transformed into SADC after collapse of apartheid.
- It has 14 member states e.g. Tanzania, DRC, S. Africa, Zambia, Zimbabwe, Mozambique, etc.

Objectives

(a) Encourage self reliance among member states in the face of instability posed by apartheid regime of S. Africa.
(b) Promote and defend peace and security.
(c) Promote regional integration.
(d) Eradicate poverty.
(e) Facilitate trade and economic liberalisation.

(f) Promote self sustaining development on the basis of interdependence on member states.
(g) Promote and maximise utilisation of natural resources and effective protection of environment.

Achievements

(a) Promotion of regional industries based on domestic and regional raw materials.
(b) Reliability and development of regional transport and communication infrastructure.

The Economic Community of West African States (ECOWAS)

- Was established in 1976 by the treaty of Lagos.
- It has headquarters in Lagos Nigeria.
- It has 15 member states e.g. Nigeria, Liberia, Ghana, Benin, Guinea, Sierra Leone, etc.

Objectives

(a) Promote mutual trade by eliminating trade restrictions among members.
(b) Create a monetary union.
(c) Impose uniform tariffs for imports from non-member countries.
(d) Give special treatment to goods imported from member states.
(e) Promote free movement of people to and from member countries by eliminating visas.

Achievements

(a) Brought peace to troubled countries like Liberia and Sierra Leone.
(b) Promotion of trade in the region through the peace achieved.
(c) Development of schools to train people on peace keeping e.g. The National War College.
(d) Free movement of goods among member states.

The European Union (EU)

- An organisation of European countries dedicated to increasing economic integration and cooperation among members.
- It was formerly inaugurated in 1993 and has headquarters in Brussels in Belgium.

Objectives

(a) Promote cooperation in economic, trade, social, security and judicial matters.

(b) Implementation of economic and monetary union.

Achievements

(a) Signing of many trade agreements between EC and other countries.
(b) Free trade among members as a result of abolishing trade barriers.
(c) High agricultural production as farmers receive guaranteed prices which have enabled them to increase efficiency.
(d) Free movement of factors of production which include capital and labour.

Problems Facing Regional Trading Blocks

(a) Civil wars taking place in some countries which has caused insecurity in turn affecting trade between countries.
(b) Political differences among leaders of member states may affect cooperation among member states.
(c) Some countries produce similar goods making the volume of trade to be low and less rewarding.
(d) Free trade affects local industries as the imported goods without taxes are usually cheaper than locally produced goods.
(e) Free trade denies countries revenue they would have earned from taxing imported goods.
(f) Poor transport and communication limits inflow of goods and services.
(g) Some member states don't remit their annual subscriptions which affects the operations of the organisations.

POPULATION

- **Population**-total number of people occupying a given area.
- **Population distribution**-the way people are spread out on the land.
- **Population density**-number of persons per unit area= number of people in a given area/total area of the place=XP/km2.
- **Demography**-study of statistical data on human populations.

Sources of Population Data

- **Primary sources**- registration of births and deaths and censuses.
- **Secondary sources**-census reports, textbooks, periodicals, etc.

Population Distribution in E. Africa

- In 2005 was estimated to be 90m people spread out thus:
    1. Kenya-33m
    2. Tanzania-36m
    3. Uganda-21m
- It's spread out over an area of 1,768,267km2 resulting to a population density of 51 persons per km2.
- The population is unevenly distributed whereby some places are densely populated e.g. large towns of Nairobi, Dar-es-Salaam and Kampala while others are sparsely populated e.g. N. and E Kenya, N.E. Uganda etc.

Factors Influencing Population Distribution in East Africa

Distribution of population on the earth's surface isn't uniform due to the following factors:

Climate

- Areas with moderate temperatures and high rainfall have high population per unit area than those with extremely high or low temperatures and low unreliable rainfall because moderate temperatures give comfort to people and abundant rainfall favours growth of crops.

Relief

- High altitude areas have low population because of extremely low temperatures which doesn't support growth of crops to ensure food sufficiency.
- Plains and gently sloping areas have higher population than steep areas due to fertile soils, ease to erect buildings and construction of transport infrastructure.

Vegetation

- Dense forests are sparsely populated because they are habitat to wild animals and it's difficult to develop transport and communication infrastructure and some are tsetse fly infested e.g. Miombo Woodland in Tanzania.
- Grasslands have high population if rainfall is favourable because they are easy to clear and relatively level or gently sloping.

Soils

- Areas with fertile soils and reliable rainfall have high population because they are agriculturally productive while those with poor soils e.g. savannah with leached soils have low population since they are agriculturally unproductive.

Drainage

- Well drained areas have high population than swampy areas because they support settlement and farming.
- Areas which are swampy have less population because it's difficult to construct buildings, carry out agriculture and also mosquito infested.

Pests and Diseases

- Areas infested with mosquito and tsetse flies have low population because those pests transmit malaria and sleeping sickness and Nagana to livestock.
- Disease epidemics cause low population in areas affected as was the case in S.W. Uganda as a result of HIV and Aids which left the area almost deserted.

Historical Factors

- Slave trade left some parts of W. Africa with low population as people were captured and sold as slaves in America, W. Indies and Arab world. While others run away to avoid being captured.

- Colonisation caused people to be driven from their homes in to reserves to create room for white farmers e.g. in parts of Kenyan Highlands which caused low population in indigenous people's farms while the population in reserves kept on increasing.

Tribal Conflicts

- Areas with tribal conflicts are sparsely populated because people move away from there to seek safety e.g. Molo.

Economic Factors

- Towns and areas with mining activities have high population as people go to seek for jobs e.g. Nairobi, L. Magadi due to trona mining.

Political Factors

- Political unrest may cause people to move from their home area leaving it sparsely populated e.g. Uganda during the reign of Iddi Amin and S. Sudan.

Government Policy

- Government programmes such as construction of dams and mining may require removal of people from certain areas causing them to be sparsely populated while the population in areas of destination increases.

Factors Influencing Population Growth

- Population growth is the change that occurs in the number of people in a population over a given period of time.
- Population may grow positively by number of people increasing in a population or negatively by having a decrease in the number of people.
- The main factors influencing population growth are **fertility**, **mortality** and **migration**.

Fertility

- **Fertility**-number of live births a woman has during her reproductive period.
- **Fecundity**-ability of a woman to conceive and give birth to a child regardless whether alive or still born.
- **Infecundity/Sterility**-inability of a woman to conceive and give birth to a child regardless whether alive or still born.
- **Primary Infertility**-involuntary childlessness.
- **Involuntary Secondary Infertility**-involuntary childlessness caused by a second factor e.g. when a woman has had a child/children and is unable to have more due to health factors.

- **Voluntary Secondary Infertility**-voluntary childlessness where a woman who has had a child/children decides not to have any more e.g. by using contraception methods.
- **Fertility Rate-** average number of children that a woman of child bearing age (15-49 years) will have in her lifetime.
- High fertility rate leads to high population growth while low fertility rates lead to slow or negative population growth.
- **Population Growth**-increase or decrease in the number of people.

1. **Natural Population Growth**

Natural increase or decrease in population.

It's calculated using Crude Birth Rate/estimated rate of births in a population (CBR) and Crude Death Rate/estimated rate of deaths in a population (CDR).

CBR=total number of births in a year ×1000/total population estimated at mid year=X births/1000population.

CDR=total number of deaths in a year×1000/total population estimated at mid-year=X deaths/1000population.

N.P.G=CBR-CDR×100/1000=X%.

For instance, in 1999 the CBR in Kenya was 41.3 while CDR was 11.7. Therefore the population growth was (41.3-11.7) ×100/1000=29.6%.

2. **Numerical population Growth**

Actual or absolute increase in the number of people in an area within a given period of time.

=inter-censal increase×100/total population in the former census

For instance pop in 1989 was 2000 and in 1999 was 2500. Inter-censal increase was 500

=500×100/2000=25%.

Causes of High Fertility Rate in Kenya

Cultural Beliefs

1. Early marriage of women which lengthens their fertile duration.
2. Belief in large families as a source of prestige e.g. children are a source of labour and girls are a source of dowry.
3. Polygamy which causes competition between wives leading to large number of births per woman.

4. Sex preference when there is a high regard for a birth of a son/heir to ensure continuity of the family status which causes couples who are bearing girls to continue bearing girls until they get a boy.
5. Naming of relatives whereby couples will continue to get children until they finish naming relatives of both sides e.g. fathers, mothers, uncles, aunts, etc.

Other Factors

1. modernisation which leads to decline in social values leading to free interaction of young girls and men causing girls to become mothers at tender age.
2. Availability of enough and better food ensuring people are healthy and live longer and are able to bear more children as they are able to feed them.
3. Availability of health services for both mother and child which provide prenatal and post natal care.

Factors Which Have Caused Low Fertility Rates in Kenya/Slow population Growth

1. Economic considerations where modern families prefer fewer children because it has become expensive to bring up a child.
2. Increased use of birth control measures.
3. More girls are attending school so they don't get married early.
4. Education making women to opt to remain single as they get employed and no longer look to marriage as a source of financial security.
5. Modern career opportunities which have a limiting influence on the women's fertility rate as most employees don't want women who keep on going on maternity leave.

Mortality

Mortality refers to deaths among members of a population.

- It reduces the population in a given area
- It also affects its structure or composition of the population in terms of age and sex whereby if there is consistent death of a particular age or sex there will be marked change in the population because the other ages or sex will be more than the affected ones.

Causes of Mortality/ More Factors Which Cause Slow Population Growth

1. Low nutritional standards which cause deficiency diseases reducing body's ability to fight diseases which may kill many children below 5 years.
2. Low hygiene standards which may cause diarrhoeal diseases such as cholera which kill young and old members of the population.

3. Prevalence of natural calamities e.g. droughts, floods and earthquakes which also leads to deaths of many.
4. Epidemics and disease outbreaks such as HIV/AIDS which has eliminated large numbers of people in communities where wife inheritance is practised and as was the case in S.W. Uganda.
5. Human made calamities such as outbreaks of war and high crime rates which reduce population.
6. Emigration i.e. movement of people from their country especially the youth to settle else where which reduces population at the area of origin.

Causes of Decline in Death Rates in Countries

1. Immunisation of infants which has reduced infant mortality rate.
2. High nutritional standards which have reduced incidents of deficiency diseases which kill children aged between 1-5 years.
3. Improved hygienic standards which have reduced incidents of diarrhoeal diseases which used to kill many people.
4. Advanced medical facilities which have ensured availability of drugs for some diseases which had no drugs which enables people to live longer.

Migration

-Movement of people from one place of residence to another.

It causes reduction of population in the place of origin and increase of population in the area of destination.

Emigrants-people who move out of a place.

Immigrants-people who move out of a place.

Causes of Migration

Push Factors

-Problems or circumstances which force out a person from his/her area of residence.

1. Pressure on land due to increase in population which cause people to move to other areas where land is available e.g. from C. Kenya to R. Valley.
2. Land becoming too poor to support crops which cause people to move to other areas where fertile land is available.
3. Unemployment and underemployment which cause people to move to other areas to seek jobs or better paying ones.
4. Insecurity such as tribal clashes and terror gangs which cause people to other safer places.

5. Persecution of specific religious groups due to their faith which causes them to move to areas where they can practise their faith freely e.g. Jews from Europe to Israel.
6. Political persecution e.g. many Ugandans moved to neighbouring countries during the reign of Iddi Amin.
7. Occurrence of natural calamities such as diseases, floods and severe droughts forcing people out of their place of residence e.g. in monsoon Asia.
8. Government policy where people are moved from one area to give room for development e.g. H.E.P. projects and mining such as of titanium at Kwale.

Pull Factors

-Positive conditions which attract a person to a new place.

1. Attraction of urban life where there is electricity, piped water, entertainment and social amenities.
2. Availability of employment such as in urban areas where there are many industries and businesses or in rural areas with estates and plantations.
3. Opportunities for better education e.g. in urban areas with many education institutions.
4. Security
5. Plenty of land
6. fertile land
7. Higher standard of living e.g. in urban areas

Types of Migration

2 basic types namely:

Internal migration

-Migration within a country.

Types of Internal Migration

Rural to urban Migration

-Movement of people from rural areas to urban areas.

It involves:

1. Youth who have completed various levels of education moving to urban areas to seek employment in while collar jobs.
2. People moving to urban areas in search of alternative ways of earning a living due to shortage of land in rural areas, unemployment and low prices for agricultural produce.
3. Traders relocating to urban areas where there is a larger market as the people in rural areas have low purchasing power.

4. People moving to urban areas where there is adequate social amenities such as hospitals, entertainment, electricity and generally exciting life.
5. Youth seeking for further education who join universities and colleges many of which are located in urban areas.
6. Transfer of people employed in rural areas to urban areas.

Rural to Rural Migration

-Movement of people from one rural area to another.

It involves:

1. People moving to plantations and other large farms seeking employment e.g. tea pickers in Kericho from Kisii rural parts.
2. Movement of nomadic pastoralists from one place to another in search of water and pasture.
3. People moving to other parts of the country to buy land and settle there.
4. Movement of people into settlement schemes e.g. Mwea, Nyandarua etc. to ease pressure on land.
5. Movement of public and private employees on transfer from one rural area to another.

Urban to Rural Migration

-Movement of people from urban areas to rural areas.

It involves:

1. Transfer of people employed in urban areas to rural areas.
2. Movement of people from urban areas to search for jobs in rural areas.
3. People moving from urban areas to rural areas to settle permanently after retirement.
4. People moving away from stressful urban life to suburbs to be commuting daily to work.

Urban to Urban Migration

-Movement of people from one urban area to another or from one part of urban area to another.

It involves:

1. Employed persons who are transferred from one town to another.
2. people moving from one part of town to another due to:
    - transfer
    - in search of affordable housing
    - in search of better employment
    - in search of better business opportunity

External Migration

-Movement of people from one country to another.

It involves:

1. People who seek employment abroad for a short period who end up settling permanently.
2. Refugees who are forced out of their country by factors such as war.
3. People seeking political asylum due to political persecution in their country.
4. Government employees such as ambassadors who are in assignment abroad.

Effects of Migration

At the Place of Origin

Positive Effects

1. Improved agricultural production in rural areas when people move out creating more room for cultivation.
2. Increase in purchasing power in rural areas when migrants remit money back home.
3. Relief to a country which is faced with unemployment when people get employed outside the country.

Negative Effects

1. Lowering agricultural production when able bodied people go to town leaving the women, elderly and children who are unable to manage farms effectively.
2. Underemployment in rural areas due to lowered agricultural productivity.
3. Break up of families and lowering of social morals since majority of migrants are men which causes imbalance of female-male ratio.
4. Lowering of population density in the area of origin.
5. Lowering or fertility due to long separation between a man and wife.
6. Lower rate of industrialisation due to transfer of skilled man power to other countries (brain drain).

Place of Destination

Positive Effects

1. There is a gain in population.
2. Development if the migrants are involved in gainful employment which results into increased production.
3. Contributes to national peace when people from different parts of the country settle together.

Negative Effects

4. Social evils such as crime, prostitution and drug peddling when people fail to secure employment.
5. Shortage of housing and high house rents leading to growth and expansion of slums.
6. Shortage of social amenities such as schools, hospitals, water and transport.

On the Individual

Positive Effects

1. Improved living standard of the worker resulting from savings made from income gained after employment.
2. Acquisition of skills and change in attitude due to exposure which may cause some town dwellers to change their way of life and become more sophisticated.

Negative Effects

1. Lower fertility rates when some people who have migrated to towns take long time before marrying as they try to achieve various goals in their lives.
2. Immorality may arise may arise when urban migrants lose touch with their cultural values.
3. Marriage breakages may occur when spouses are separated for long periods of time.

Demographic/Population Trends

- Various positive or negative changes (transition) which take place in the population of a given society, country or the world and their impact on social economic environment.
- Demographic transition refers to the historical change in birth and death rates from high to low which causes population increase.

Demographic Transition Theory

-A theory compounded to explain this phenomenon.

There are 4 demographic transition phases namely:

Stage/phase 1

- High birth rate and high death rate due to inadequate food supply, wars, diseases and insufficient medical facilities.
- Little or no increase in population
- Was experienced in Europe before 19th Century.

Stage 2

- High birth rate and a decline in death rate due to improved food supplies and medical facilities.
- High population growth rate

- Was experienced by European countries in the 19th Century during industrial revolution.
- Kenya is in this stage.

Stage 3

Relatively low death rates and declining birth rate due family realisation of the need to have small families due to pressure exerted on economic resources and social facilities, level of education attainment leading to use of birth control measures.

Moderate population growth rate.

Stage 4

- Low birth and death rates.
- Low population growth rate.
- The population becomes static and can only reproduce to replace the dying ones (population replacement level).
- It's experienced in industrialised countries like Germany and Sweden where death rate is falling below death rate.

Population Structure

-Composition of a given population in terms of age and sex.

The information on population structure is obtained in a census and presented using an age sex pyramid.

Characteristics of an Age Sex Pyramid

- Vertical axis represents age ranges
- Horizontal axis represents percentage of total population
- Right hand side represents females proportion
- Left hand side represents males proportion

Population Structure of a Developed Country

- It's broad at the base due to factors contributing to high fertility rates already discussed.
- Hollows for ages 5-9 due to high mortality rate.
- Thins towards the top due to the low life expectancy (average number of years a person is expected to live) as few people survive to 70 years.
- Tapers towards the top due to relatively high death rates throughout age groups.

Population Structure of a Developed Country

- Narrow at the base due to low birth rates causing low population of children and young people.

- Broadens towards the top due to high life expectancy leading to a high population of old people (ageing population).
- Broadens towards the top which is an indication of low mortality rate throughout age groups.

Significance of Population Structure

1. For planning by enabling the government to know the percentage of available funds to allocate for various sectors e.g. if most of the people in the population are youth it will allocate more funds for education and health services and if most are elderly more funds will be allocated for health and social welfare.
2. For calculation of dependency ratio (proportion of population which isn't involved in production activities to the one that is.

   DR=children <15+old people/working population (15-64)

   - High dependency ratio means the population is strained since population will devote most of its resources to consumption instead of investment.
3. For calculation of sex ratio (number of males per 100 females.
   - If greater than 100 it means there are a greater number of males than females which is typical in urban areas.
   - Small sex ratio results in male deficiency which affects fertility which is typical in urban areas.

Consequence of Population Structure

1. Strain on budget due to developing countries having a large population of young people whose health and education cost is high and developing countries having a large proportion of old people whose cost of health and social welfare is high.
2. Low quality of education and health care in developing countries due high population leading to the high cost of those services.
3. Better quality of health and education in developing countries due low population.
4. Strain on working population in developing countries since most of the money is consumed leaving less for investment. Large population of old people does the same in developing countries.
5. Boost in food production when there is a large proportion of males due to the availability of a large labour force.
6. Heavy taxation of the working population when the dependency of young and old is high in order to avail funds for provision of social amenities.
7. Large number of females than males leads to low birth rates and consequently slow growth of population.
8. Increase in promiscuity when there are a large number of females than males.

Consequences of Population Growth

Overpopulation (Positive Population Increase)

Positive Effects

1. A large population provides cheap labour due to a large number of people competing for jobs.
2. Increased exploitation of natural resources and industrial development due to increased demand for goods and services causing those activities to be increased to meet the demand.
3. Technological innovation due to pressing needs associated with a high population (necessity is the mother of invention).

Negative Effects

1. Pressure on land leading to land fragmentation.
2. Environmental degradation when people clear forests to make room for settlement and agriculture.
3. Low investment and slow growth of industry as the government spends a lot of money on education and medical facilities leaving less for investment.
4. Lowering GDP (aggregate value of goods and services that a country can produce) due to inability to save any money for investment.
5. High rate of unemployment due to employment sector growing at a slower rate than population growth.
6. Towns face problems of water shortage, pressure on social amenities and high cost of housing leading to development of informal settlements such as slums which expand covering agricultural land surrounding the towns.

Under population (Negative/Slow Population Growth)

-This is the case in developed countries.

1. High government spending on health and social welfare as the population consists of a high proportion of old people due top low birth rates and low death rates.
2. High cost of production since there is a small work force consisting of skilled people whose wages are high.
3. Underutilisation of resources such as agriculture and mineral resources since there is shortage of labour due to sparse population and most of it being concentrated in urban areas.
4. Inadequate market for goods and services due to a small population.
5. Underdevelopment and low living standards in rural areas since a large percentage of people live in urban areas.

6. Traffic congestion and atmospheric and noise pollution in urban areas due to continuous expansion of towns.
7. Reduced food production as towns expand and engulf surrounding agricultural land.

Related Studies on Population in Kenya and Denmark

Sweden

- One of the Scandinavian countries which also include Norway, Finland and Denmark.
- It's located in the N. Europe.
- It's in the 4th stage of the population transition trend. The birth and death rates are equal i.e. replacement level.
- Natural and numerical population growth is 0.5%.

Factors Which Have Contributed To Slow Population Growth in Sweden

1. Improvement of medical facilities.
2. People have become more affluent and urbanised causing a tendency to have fewer children so as to maintain a high standard of living.
3. Population has embraced birth control measures and as a result contraceptives are widely used.
4. Move towards small families in response to economic realities.
5. High rate of separation leading to low fertility rate and consequently low birth rates.
6. Population is highly literate and understands the need for controlling population growth.
7. Low death rates reducing the need to bear more children.

Factors Influencing Population Distribution in Sweden

1. A large proportion of the country is mountainous whose cultivation isn't easy due to steepness, stony soils and permafrost causing 60% of population to be found in the southern part (Skane) where there is fertile soils and warmth which favours cultivation.
2. Chilly climate with cold winters especially in the northern lands (Norrland) which are not inhabited at all once again causing population to be concentrated in the south.
3. Sweden is a forested country and areas under forests are more settles because they are more ideal for cultivation unlike plains which are permafrost.
4. Lakes and rivers cover almost ½ of the country and the area with water bodies aren't settled which causes the population to be scattered.

5. Mining centres such as Grangesbery and Fennimore form islands of high population while the immediate neighbourhoods have high population.
6. The largest number of people lives in urban areas the major one being Stockholm and villages forming nucleated and clustered type of settlement.

Comparison between Population Trends in Kenya and Sweden

Similarities

Both countries have uneven distribution of population dictated by factors such as relief, climate and presence of economic activities.

Both countries have low mortality due to improved medical care.

In both countries population density in urban areas is high.

In both countries there is use of family planning methods in effort to control population growth.

Both countries have parts which aren't inhabited at all e.g. in the north of Sweden and Chalbi desert in Kenya.

In both countries there is high population in areas with mining activities e.g. Grangesbery in Sweden and Magadi in Kenya.

In both countries population distribution is influenced by drainage where areas with water bodies aren't settled.

Differences

- Kenya has a birth rate of 3.2% leading to high population growth while Sweden has 0.5%leading to slow growth rate.
- Kenya has a population density of 36 persons per square km while Sweden has a population density of 19 P/km2.
- Kenya has a larger population than Sweden.
- Kenya has a large population of young people and a small proportion of old people while Sweden has a large population of old people and a small proportion of young people.
- Kenya has relatively high death rates throughout age groups while Sweden has low.
- Population distribution in Sweden is very uneven compared to Kenya's.
- In Sweden most of the population is found in urban areas while in Kenya most of it is found in rural areas.
- Kenya has a high dependency ratio compared to Kenya.
- Kenya has a low life expectancy (50 years) than Sweden (70 years).
- The main factor contributing to population growth in Kenya is high birth rate while in Sweden it is Migration.

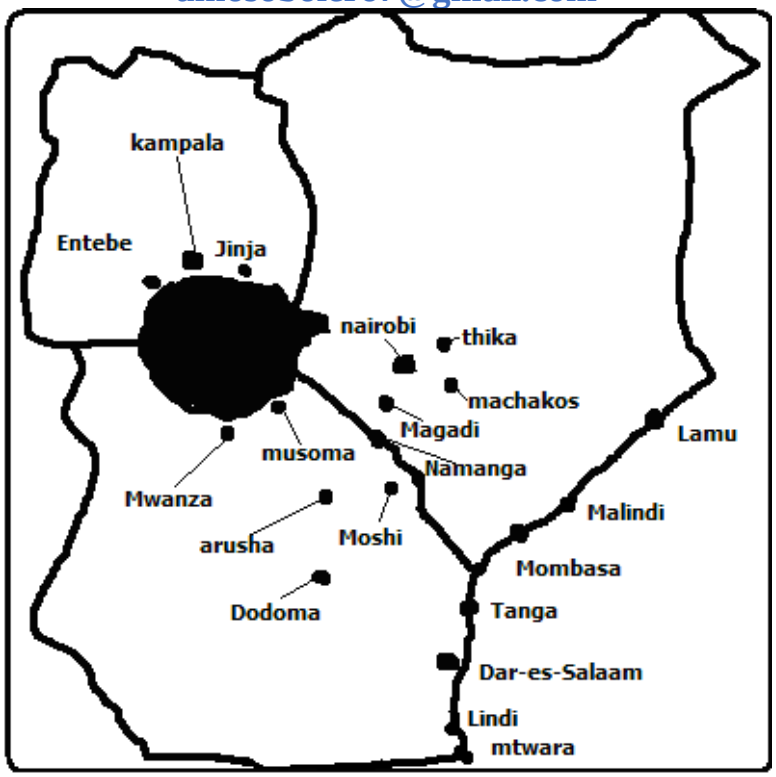
- Kenya has high population density while Sweden has low.

URBANISATION

-Development of towns.

-Process in which a population is transformed from a rural based agricultural lifestyle to an urban based non-agricultural lifestyle

Distribution of Major Urban Centres in E. Africa



Main categories of Urban Centres

1. **Capital towns**-towns which are the main seat of the government or administrative centres of each country. These are Nairobi, Dodoma and Kampala.
2. **Cities**-largest towns in E. Africa with city council status i.e. Nairobi, Dar and Kampala.
3. **Sea ports**- are located in the Indian Ocean Coast and are Mombasa, Malindi, Dar, Tanga, Mtwara and Lindi.
4. **Lake Ports**- are located on lake shores e.g. Kisumu, Mwanza, Kigoma, Bukoba, Jinja, etc.
5. **Mining towns**-evolved due to mining activities e.g. Magadi, Kakamega, Shinyanga, Kilembe, etc.
6. **Industrial towns**-whose main functions are industrial activities e.g. Thika, Athi River, Jinja, Tanga, etc.
7. **Collecting towns**- whose functions are to collect agricultural produce for being located in rich agricultural areas e.g. Karatina, Nakuru, Eldoret, Mbalala and Kabale in Uganda and Mbeya and Songea in Tanzania.
8. **Gap towns**- (Makutano towns) located at points of convergence of transport routes e.g. Voi, Moshi and Tabora in Tanzania and Hoima in Uganda.

9. **Administrative towns-**whose main function is administration e.g. all provincial and district headquarters in Kenya, Dodoma and Morogoro in Tanzania and Gulu and Fort Portal in Uganda.

Factors influencing the Growth of Major urban Centres in E. Africa

1. Rural to urban migration when young people complete formal schooling and migrate to major towns to look foe employment causing population to expand in those towns.
2. Natural growth of urban population through births because most of migrants are young couples who are at their height of their reproductive years.
3. advantages of well develop[ed transport and communication network since most of them are accessible by good roads, railway, air and some by waterways enabling goods to be imported easily and accelerates migration.
4. Industrialisation which attracts people because industries attracts people because they offer employment opportunities.
5. Some have emerged due to mining as it attracts workers who move and settle in the mining area.
6. Tourism whereby influx of tourists to a town can cause demand for high class hotels, curio shops, entertainment etc which make the town to grow e.g. Malindi and Mombasa.
7. Agriculture can make a town to grow by providing market for industrial products from urban centres and by providing raw materials foe industries established in urban areas.
8. administration when there is set district or provincial headquarters and government employees are posted there to provide services to the people and houses, shops and service industries such as banking are established there to serve people.

Growth and Functions of Selected Towns in Kenya

Thika (An Industrial Town)

- its one of the most industrialised towns in Kenya with industries such as flour milling, bread baking, vehicle assembly, fruit canning, etc.
- Located at the edge of Kenyan Highlands.
- Started as a small African village where the Akamba and Agikuyu traders met and exchanged goods.
- A market developed and Asian traders set up shops to cater for the small African and European farmers from the surrounding areas.

Factors Which Have Contributed To Its Development as an Industrial Town

1. It's surrounded by districts which are agriculturally productive e.g. Kiambu, Thika, Maragua and Muranga.
2. It's situated near rivers Chania and Thika which supply water for domestic and industrial use.
3. It's located on Nairobi-Nanyuki railway and tarmac road which makes transport of raw materials to the town and that of finished products to the market easy.
4. It's near Nairobi which is a source of raw materials making many investors to prefer to establish industries there.
5. High population from the surrounding districts which supply labour to the industries as well as market for some manufactured goods.
6. Availability of expansive flat land for industrial growth.
7. Congestion of Nairobi's industrial area which made many investors to prefer Thika as it's outside and at the same time near Nairobi.
8. Availability of power from 7 Forks Power Project on R. Tana which provides electricity for industrial and domestic use.

Kisumu (A Lake Port)

- It's the largest port of E. Africa.
- Located on the E. shores of L. Victoria on the Winam Gulf.
- Third largest city after Nairobi and Mombasa.
- Started as a small fishing settlement called Ugowe Bay.
- Later, the settlement developed into a port called Port Florence after the completion of the railway from Kilindini to Mombasa.
- Port Florence later came to be known as Kisumu

Factors Which Contributed To Its Development into a Leading Lake Port

1. Settlement of Asians after the railway reached there who later built shops to cater for Africans needs (Bombay of Kenya).
2. Location on the shores of L. Victoria which ensures adequate supply of water for domestic and industrial use.
3. Availability of H.E.P. from Uganda which has enabled industries to grow and expand.
4. Being a lake port which handles regional trade across the lake.
5. Development of industries and trade which has attracted many job seekers thus increasing the population.
6. Surrounding areas are highly populated thus acting as a pool of labour for industries and market for products.

7. Fishing activities and processing of fish has contributed to its growth.
8. Being surrounded by areas which are agriculturally productive e.g. Western Kenya which provide a base for potential development in industries in sugar and cotton in Kisumu.

Eldoret (An Agricultural Collecting Centre)

- Located in the highlands on the western part of the R. Valley.
- It started as a small post office from which the town grew.
- It was started as an agricultural collecting and marketing centre for White farmers who were commercial wheat farmers and practised dairy farming.
- It has acted as a collecting centre for agricultural produce from Uasin Gishu District.

Factors Which Made It to Be a Leading Agricultural Collecting Centre

1. It's easily accessible by the railway line from Mombasa to Kampala and the highway from Mombasa to Kampala.
2. Location at the heart of one of the richest agricultural hinterlands for which it has acted as a collecting, processing and marketing centre.
3. Availability of social amenities which has led to rapid increase from the surrounding areas.
4. Availability of H.E.P. which has led to establishment of industries such as plywood making, manufacture of soft drinks, textile, milk processing, etc.
5. High population in the surrounding regions which provides labour for industries and a ready market for manufactured products.
6. Plenty of land for expansion of the town and industries.
7. Establishment of service industries such as banking and insurance which has contributed significantly to its growth.

Related Studies on Selected Cities in the World

Nairobi and New York

Nairobi

- Came into existence when Uganda Railway reached it in 1899.
- It started as a railway camp before embarking on the rugged highlands and the steep descent into the R. Valley.
- It's located on Athi-Kapiti Plains.
- The plains were unoccupied due to the tribal clashes between Kikuyu and Maasai.
- The camp was temporarily relocated to Kiambu due to mosquitoes and wild animals which posed a danger.

- Settlers later moved back to the present city centre.
- Nairobi became the provincial headquarters of Ukamba Province.
- It was in 1907 elevated to the administrative capital of British East Africa Protectorate.

New York

- Located on the E. coast of U.S.A. at the mouth of R. Hudson.
- A section of the city is situated on the mainland while part of it is made up of a group of islands-Long Island, Staten Island, Manhattan and Jersey.
- Established after the Dutch bought the Manhattan Island from the Red Indians and renamed it New York.
- Its growth is associated with the construction of New York State Barge Canal which links Hudson to L. Erie one of the great lakes of N. America which passes through regions which are highly industrialised and agriculturally productive.

Functions of Nairobi and New York/Similarities

1. **Both are industrial centres** with Nairobi being the leading industrial town in E. Africa with industries such as brewing, steel rolling, motor vehicle assembly, etc. and New York has ship building, chemical industries, pharmaceutical industries and the largest industry being clothing followed by printing.
2. **Both are international centres** with Nairobi having KICC and high class hotels where international meetings are held and New York is the Headquarters of U.N. World Bank, I.M.F. and other international organisations.
3. **Both are residential centres** with Nairobi providing shelter to over 2m people in estates and slum areas and New York is also a residential centre for people of various races of European origin, West Indians, Jews, Chinese, Indians and Jews and the famous ghetto for blacks known as Harlem.
4. **Both are educational centres** with Nairobi having educational institutions such as Kenyatta and Nairobi Universities and Kenya Polytechnic and various other colleges and New York has several junior schools, high schools, colleges and universities for people of all races.
5. **Both are transport and communication centres** with Nairobi having JKIA and Wilson Airports and several highways leading to other major urban centres and Telcom Kenya and Mobile phone services which have headquarters there and New York is the largest sea port in the world, has J.F. Kennedy, New York and La Guardia airports and The New York State Barge Canal.
6. **Both are religious centres** with religious centres including cathedrals, temples, mosques and Jewish synagogues.

7. **Both are financial and trade centres** with C.B.K., commercial banks and N.S.E. and shops and New York is the world's financial centre and the headquarters for I.M.F. and also has shops.
8. **Both are recreational and cultural centres** with Nairobi having Kasarani and Nyayo stadiums, Gong Race Course etc. and N. York has Night clubs, cinema halls, Central Park, Madison Square Garden and it's also the fashion and art centre.

Differences

1. New York developed as a sea port while Nairobi developed as a town following construction of Uganda Railway.
2. New York is a coastal city while Nairobi is an inland city.
3. New York comprises of mainland and several islands while Nairobi is in the mainland.
4. New York has an approximately 12 times larger population than Nairobi.
5. New York is located in a developed country while Nairobi is located in a developing country.
6. New York is an international city while Nairobi is a national city.
7. New York is a sea port while Nairobi has an inland dry port at Embakasi.
8. New York is the capital of the state of New York while Nairobi is a national capital.
9. New York experiences the problem of racism while Nairobi experiences the problem of tribalism.

Mombasa and Rotterdam

Mombasa

- It's located at the coast of east Africa in a Ria at the mouth of R. Mwachi.
- Started as a resting and calling port during the era of slave trade.
- It was once a Portuguese town who built Fort Jesus in 1593.
- Originally the town was located on the island surrounded by the creeks namely Tudor and Port Reitz.
- Later the town expanded farther north, south and west to the mainland.

Factors Which Influenced Its Location

1. Was a strategic calling port for early traders to and from the Far East.
2. Provided a good defensive site against external aggression (Fort Jesus).
3. Has flat land which is ideal for construction of buildings (coastal plains).
4. Coral limestone rocks found in the sea were used as building stones for houses.

5. River Mwachi and Kimbeni provided early settlers with fresh water for domestic use later Mzima Springs in Tsavo W. N. Park became the main source of water.
6. The deep waters of Kilindini creek provide a good well sheltered natural harbour.
7. Has a large and rich agricultural hinterland i.e. the whole of Kenya, N. Tanzania, Uganda, S. Sudan, Rwanda and DRC.

Rotterdam

- Located in the province of s. Holland in Netherlands.
- Located at the mouths of rivers Rhine and Meuse on the N. Sea.
- Originated as a small port sandwiched between 2 other ports Antwerp in Belgium and Amsterdam.
- Silting of the N. Sea led to the dwindling of the development of Rotterdam.
- After the harbour was deepened it witnessed rapid growth at the 1st half of 19th Century.
- The growth was halted by the devastations during the 2nd World War.
- It has since grown into the leading world port in terms of tonnage.
- It's the enterport to Europe.

Factors Which Have Led To Its Development as an Enterport

1. Deepening of the harbour creating a new port known as Europoort which is deep enough to handle large vessels.
2. Has an extensive hinterland for which it handles transit goods through the navigable R. Rhine comprising of Belgium, Netherlands, Germany, Austria, etc.
3. Located at a strategic central point in Europe where sea routes converge from America, Africa and other parts of Europe giving it an advantage over the other ports of Europe.
4. The port doesn't freeze due to the warm Atlantic Drift Current which raises the temperature enabling it to operate throughout the year.
5. Provision of modern port facilities.
6. Its industrial function of its being the major industrial area in the Netherlands with industries such as engineering, food processing, oil refining etc.

Functions of Mombasa and Rotterdam/Similarities

1. **Both are sea ports** with Mombasa being the gateway to E and C Africa and Rotterdam being the enterport to Europe.
2. **Both are transport and communication centres** with Mombasa being well served by transportation routes such as Nairobi-Mombasa Highway, has Moi International Airport etc and Rotterdam is linked to other urban centres by modern roads, railway lines and waterways.

3. **Both are industrial centres** with Mombasa having Changamwe oil refinery, Bamburi cement Factory, motor vehicle assembly, etc. and Rotterdam having being the major industrial centre in Netherlands having industries such as ship building, engineering, petrol chemical ,etc.
4. **Both are commercial centres** with both having shops and businesses selling goods to citizens.
5. Both are located at the mouths of rivers, Mombasa on the mouth of R. Mwachi and Rotterdam on the mouths of rivers Rhine and Meuse on the N. Sea.
6. Both are in the coastal region.
7. Both are open for use throughout the year due to favourable weather conditions.
8. Both are the second largest towns in their respective countries.

Differences

1. Mombasa handles much less volume of trade.
2. Mombasa is frost free throughout the year while Rotterdam is sometimes affected by frost.
3. Netherlands has more sophisticated port facilities than those of Mombasa.
4. Mombasa is in a developing country while Rotterdam is in a developed country.
5. Mombasa depends on roads, railways, air and pipeline transport while Netherlands has canal transport in addition to those means of transport.
6. Mombasa mainly exports agricultural raw materials while Rotterdam exports manufactured goods.

Effects of Urbanisation

Positive effects

1. Urbanisation encourages national unity as people of different ethnic backgrounds come together and interact.
2. It creates employment opportunities through establishment of commercial and industrial activities through which peoples living standards are raised.
3. Leads to development of infrastructure within urban centres and the surrounding areas.
4. Provides a market for agricultural goods produced in the country.
5. Encourages development of industrial and agricultural sector by providing market for manufactured goods and produce.

Negative Effects (Problems)

1. Environmental degradation e.g. air pollution when the industries and motor vehicles emit smoke and other gases to the atmosphere which accelerates global warming, pollution of rivers through discharge of harmful effluents from

industries into them and people throwing all types of wastes there and noise pollution from industrial machines, aircrafts and motor vehicles which causes loss of sleep and permanent loss of hearing.

2. Unemployment because of the population growing at a higher rate than the employment sector.
3. Crime and other social evils like prostitution which people engage into to earn a living due to high levels of unemployment.
4. Strain on social amenities i.e. there is shortage of housing, health centres, sanitation, schools, transport etc due to increase in population.
5. Traffic congestion especially in developing countries due to poorly planned roads which are unable to accommodate the ever increasing motor vehicles which causes wastage of time and fuel.
6. Breakdown of family units as many men leave members of the extended family, their wives, children and get concubines leading to marriage breakages.
7. Causes mental disorder to people due to stress and depression resulting from the high cost of living causing some people to abuse drugs in the process of stress management causing them to end up getting mad.
8. Juvenile delinquency or tendency by the youth to break the law due to idleness resulting from lack of activities to keep them busy.
9. Urban sprawl or expansion of towns into the surrounding agricultural land which lowers agricultural production.

MANAGEMENT AND CONSERVATION OF THE ENVIRONMENT

Environmental conservation is protection and preservation of natural resources from destruction, wastage or loss while environmental management is effective planning and control of the processes and activities that could cause deterioration of environment.

Need For Environmental Conservation and Management/Why its Essential

1. To sustain human life because it depends or resources from the environment e.g. soil, water, air, forests, wildlife, etc.
2. So as to protect endangered species of plants and animals from becoming extinct e.g. Meru oak, white rhino and Sokoke Scops owl.
3. So that the natural resources in the environment can continue sustaining the present and future generations.
4. Because a lot of natural resources in the environment are of economic value by being consumed directly or by giving us an income.

5. Because the features in the environment e.g. plants and animals are of aesthetic value i.e. they are beautiful to look at.
6. For posterity i.e. to ensure a better life for future generations.
7. To curb global warming by reducing the green house effect which is causing a lot of heat to be trapped in the earth's atmosphere.

Environmental Hazards

-Dangers or disasters within the environment due to natural causes or human activities.

1) Floods

-An overflow of a large amount of water over dry land.

Causes

a) Spilling of excess water of a river over its banks into the surrounding areas.
b) Rising of the level of the sea or lake due to increased rainfall.
c) Exceptionally heavy rainfall like El Nino resulting in excess water on land collecting in shallow basins and flat areas causing flooding.
d) Breaking of a dam making the water in the reservoir to drown the land on the downstream side of the valley.
e) When an earthquake occurs in the ocean causing huge sea waves called Tsunami which travels to the land flooding it.

Control of Floods

a) Construction of dams to reduce the speed and amount of water flowing down stream by excess water flowing into the reservoir.
b) Construction of dykes or high walls some distance from the river bank, lake shoe or sea shore to protect low lying land from being flooded by water from the water body.
c) Making piles of earth along the riverbanks to form a raised platform to keep flood waters within the river channel.
d) Reforestation of land to reduce to increase infiltration by vegetation giving rain water ample time to percolate and thus reduce runoff meaning there will be less water in rivers and hence less incidents of flooding.
e) Dredging of shallow river channels to increase their depth and hence the channels capacity.
f) Straitening of rivers with meanders to enable the water to flow more swiftly.
g) Diverting of some river tributaries to reduce the volume of water getting into the main river.

2) Lightning

-Flash of brilliant light in the sky produced by natural electricity passing between clouds or from the clouds to ground.
-Common where convectional rainfall occurs.
-Associated with cumulonimbus clouds.
-Common Kakamega, Kisii and Nyamira and around L. Victoria which experiences in the highest frequency.
-It starts forest fires e.g. in U.S.A and damages houses and electrical installations leading to loss of life and property.

Control

a) Installing lightning arresters on buildings which are copper rod conductors which direct lightning electrical current into the ground.
b) Educating the people on the dangers of lightning and precautions to take.
c) Not taking shelters under trees or on verandas when it's raining.
d) Avoiding walking on open fields during thunderstorms.
e) If possible people should remain indoors when it's raining.

3) Windstorms

-Very strong winds that develop as a result of great differences in atmospheric pressure on the ground e.g. hurricanes, tornadoes and typhoons. Kenya experiences thermals.

Effects

- In the deserts they transport sand which may burry houses and oasis.
- Rip off roofs of buildings
- Uproot trees and
- Cause flooding and
- Felling of crops e.g. cocoa pods.
- Spreading bush fires

Control Measures

a) Predicting and monitoring windstorms using satellites to know their development and advancement speed.
b) Warning people through electronic media of advancing windstorms so that they can move away.
c) Taking shelter in bankers.
d) Planting of trees in open ground to break the speed of wind thus reduce its destructive effects.

4) Earthquakes

5) Droughts

-Condition whereby an area experiences a rainfall deficient season followe4d by a long dry period.

Causes

a) Insufficient rainfall
b) Global warming leading to high rates of evaporation which exceed precipitation.
c) Encroachment of desert like conditions due to destruction of vegetation by deforestation and overgrazing.

Effects

a) Crop failure leading to famines
b) Deaths due to famines
c) Shortage of water
d) Closing of HEP stations
e) Death of livestock and other herbivores due to shortage of water and pasture
f) Migration of people to unaffected areas which may lead to conflict due to competition for resources (environmental refugees.
g) Destruction of vegetation and animal life causes loss of biodiversity.
h) Poverty as those who depend on agriculture lose their livelihoods.

6) Fires

Causes

a) Kerosene stoves
b) Candles electric faults
c) Explosion of oil pipelines
d) Explosion of oil tankers when people drawing fuel set the on fire accidentally e.g. when attempting to smoke e.g. Sachangwan.
e) Lightning

7) Volcanic Eruptions

Effects

a) Lava flows spread to nearby settlements burying and burning people.
b) Set vegetation on fire.
c) Heated water cause death of aquatic life.
d) Emit poisonous gases which kill people when they inhale them.
e) Damage and disrupt infrastructure.

8) Pests and Diseases

Pests- animals, insects and birds which are harmful to other animals and plants.

Effects

- Locusts and army warms destroy vegetation resulting in shortage of pasture for herbivores.
- Ticks, river flukes, tapeworms and fleas affect animals by transmitting their diseases and weakening them.
- Jiggers cause woods in human feet through which infections may enter the body.
- Parasitic plants feed on the host plant leading to its eventual death.
- Cause problems in the provision of food and maintenance of human health.

Most diseases which affect plants and animals are viral, bacterial or fungal.

Control

a) Use of chemicals e.g. fungicides, herbicides and pesticides.
b) Developing plant species which are resistant to pests and diseases.
c) Biological control e.g. control of tsetse flies by breeding sterile males which are released to mate with females which occurs once in a lifetime thus reducing their population.
d) Educate people on the proper use of chemicals to prevent resistance and environmental degradation.

9) Pollution

-Contamination of environment with harmful or poisonous substances.

Types

A. **Water Pollution**

- Addition of harmful substances in water causing deterioration in the quality of water so that it no longer serves the purpose for which it is intended.

a) Addition of materials like dust and salts to water through erosion and wind deposition.
b) Disposal of wastes from houses e.g. sewage into rivers or lakes.
c) Effluents from industries and factories.
d) Oil spills from e.g. off shore oil drilling, tankers and burst oil pipes.
e) Testing of nuclear weapons under the sea.
f) Agricultural fertilisers and chemicals washed in to the river by rain water.

Effects

a) Causes diseases such as cholera when drinking water is contaminated.
b) Causes poisoning e.g. when mercury from industries is consumed by fish and is eventually consumed by human beings.
c) Causes death of aquatic life like fish due to poisoning and suffocation.
d) Makes introduction of fish into aquatic systems difficult.

Soil/Land pollution

-Addition of harmful substances in the soil land leading to deterioration of their state.

a) Chemical fertilisers added to improve fertility.
b) Pesticides, fungicides and herbicides to control pests and diseases.
c) Chemicals and explosives which are used during mining.
d) Nuclear testing and careless testing of nuclear wastes.
e) Presence of garbage heaps which stinks, become breeding ground for disease vectors and make the land to look ugly.
f) Open cast mining and quarrying of rocks which leaves open pets which people may fall into, water may collect in to them and become breeding ground for mosquitoes which transmit malaria.
g) Heaping of the overburden on the land during mining.

Effects

a) Causes poisoning and cancers when toxic chemicals are absorbed by crops then people consume them.
b) Contaminates ground water as rain water aids the toxic chemicals to seep underground.
c) Kills soil organisms.
d) Affects the growth of crops by altering soil PH.
e) Makes land derelict i.e. useless for other activities like agriculture.

Air pollution

-Addition of toxic and harmful substances in to the air which destroy its purity.

Causes

a) Eruption of volcanoes which releases poisonous gases, dust and ash particles to the atmosphere.
b) Natural fires started by lava flows and lightning which add a lot of smoke into the air.
c) Industrial emissions e.g. sulphur dioxide, carbon dioxide, hydrocarbons etc.
d) Dust and carbon particles added by quarrying and factories,
e) Tanneries which release large quantities of hydrogen sulphide and ammonia into the atmosphere.
f) Smoke and poisonous gases from motor vehicle emissions.

Effects

a) Sulphur dioxide and nitrogen dioxide combine with water vapour forming acidic water which corrodes buildings.

b) Sulphur dioxide also combines with oxygen forming a dilute mixture of sulphuric acid which damages forests, ancient buildings and sculptures.
c) Lead released into the air from leaded fuels is absorbed by vegetables which are eaten by human beings and animals causing sickness resulting from poisoning.
d) Large quantities of smoke contribute to formation of smog in industrial cities such as Beijing.
e) Hydrocarbons cause depletion of ozone layer leading to excess UVR reaching the surface which accelerates global warming and causes problems such as skin cancers, deterioration of plastics etc.
f) Air pollution also causes respiratory problems and also aggravates respiratory diseases such as asthma. respiratory

Noise Pollution

-Discordant sound which is excessive, unwanted and of a disturbing nature.

Causes

a) Booming music in night clubs, shops or motor vehicles.
b) Repeated hooting of motor vehicles.
c) Revving of motor vehicles' engines continuously.
d) Defective exhausts of vehicles or without silencers.
e) Sound from large aeroplanes and military aircraft.
f) Loud noises from machines in factories.

Effects

a) Headaches
b) Stress leading to physical or mental illnesses such as neurosis.
c) Cause people to become irritable.
d) Raising blood pressure.
e) Damaging of eardrums leading to impaired hearing or total deafness

Measures undertaken to Curb Pollution

a) Not to cultivate on river banks to prevent silting of rivers, lakes and reservoirs.
b) Sewage treatment before releasing it to the environment.
c) Regular inspection of factories to ensure they don't release toxic fumes to the atmosphere.
d) Using unleaded fuels.
e) Sorting garbage before disposing it into vegetative and non-biodegradable e.g. plastics and glass.

f) Recycling wastes such as plastics, paper, glass and polythene bags and turning vegetative wastes into manure.
g) Banning use of chemicals with residual effects in the soil e.g. DDT.
h) Use of ear guards.
i) Use of efficient energy saving stoves.
j) Prohibiting playing of loud music in public service vehicles, clubs and etc.
k) Use of pit latrines
l) Use of alternative environmentally friendly sources of energy such as solar energy, hydropower, etc.

Environments Management and Conservation Measures

a) Setting organisations and institutions to coordinate matters related to environmental conservation and management e.g. UNEP. Green Belt Movement, Environmental and wildlife clubs.
b) The government has made laws governing environment conservation and management e.g. Wildlife Conservation and Management Act, The Water Act, Forest Act etc.
c) Setting up of ministries to deal with various aspects of environment e.g. Ministry of Tourism and Wildlife, Ministry of Water, Ministry of Environment and Natural Resources, etc.
d) Presidential decrees and directives e.g. declaration of "Kayas", Protecting the aloe plant, etc.
e) Educating people to create awareness on environmental issues through the mass media and seminars.
f) Participating in environmental activities such as tree planting and construction of gabions during the environmental day.
g) Research on development of crops that are resistant to certain pests and diseases and environmentally friendly methods of controlling pests (ICIPE).
h) Setting up recycling factories to recycle scrub metal, paper, glass, plastics and make manure out of vegetative wastes.
i) Rehabilitating land rendered derelict by mining by filling pits with waste rock and soil and planting vegetation.

Global efforts towards environmental Conservation and Management

a) Signing of Kyoto Accord where countries agreed to reduce the amount of green house gases they emit.
b) International law which binds the countries to protect the sea against pollution and overexploitation of its resources.

c) Guidelines on the use of hazardous chemicals have been issued.
d) Countries have greed to notify others when they restrict the use of a chemical.
e) FAO collaborates on matters involving food additives and pesticide residue.
f) Governments are required to notify others of chemical accidents.
g) Governments are required to provide assistance when hazardous chemicals cross national frontiers by accident.