GEOGRAPHY DEPARTMENTAL NOTES
O' level

Chapter one: **Introduction To Geography**

What is Geography?

This is the study of man and his environment and how man interacts with the environment.

In simpler terms, it is the study of man and how the environment influences his activities like farming, construction, settlement, etc.

Branches of Geography

1. Physical Geography
2. Human Geography

1. Physical Geography

This is the study of different natural aspects found on the Earth e.g. landforms, climate, vegetation.

2. Human Geography

This is the study of human activities such as agriculture, forestry, trade, mining, fishing, tourism and others.

ATABLE SHOWING PHYSICAL AND HUMAN GEOGRAPHICAL FEATURES

PHYSICAL GEOGRAPHY	HUMAN GEOGRAPHY

Environment

Environment is all the things around us, both natural and human.

Natural things makeup our physical environment.

All things made up people make up the human environment (the built environment)

NATURAL ENVIRONMENT (Natural things)	HUMAN ENVIRONMENT (Things made by man)
Trees Grass Hills	Buildings Roads

The Natural Environment

The natural environment, at times referred to as the physical environment involves four parts, also called spheres i.e.

- Atmosphere
- Hydrosphere
- Lithosphere
- Biosphere

The Atmosphere

This is that part of the earth covered with air. It is made of the different gases including oxygen, carbon dioxide, rare gases and substances like dust, water vapor and clouds.

Hydrosphere

This is that part of the earth covered with water. Hydro means water. We find water in lakes, rivers, streams, wells, oceans, hot springs and seas. The hydrosphere covers the biggest part of the earth.

Lithosphere

This is that part of the earth covered with land. It is made up of rocks, soils and minerals like gold, diamond, coal and many others.

Biosphere

This is the part of the earth involving living organisms. Biosphere is subdivided into flora and fauna.
Flora is the living environment made up of different plants such as grass, trees, shrubs, thickets
Fauna is the living environment made up of animals, birds, and insects. For example lions, dogs, worms, bacteria, cats, birds, grasshoppers, etc.

How Man Interacts With the Environment

Man directly interacts with the environment, for example

- He breathes the air so he depends on the atmosphere for oxygen.
- He uses water for drinking, washing, irrigation, fishing, transport so he depends on the hydrosphere for water
- He feeds on animals and plants, so he depends on the biosphere for food
- Man cultivates the land, uses it for construction of houses and roads and mines the minerals from rocks, hence depending on the lithosphere for incomes.

Air, water, land, animals, and plants put together are resources from which man earns a living

Natural Resources

Natural resources are materials/things from the earth that are used to support life and meet people's needs. All natural things that humans use to survive or earn a living are called natural resources.

These are three (3) types of natural resources;

- Continuing resources
- Renewable resources
- Nonrenewable resources.

Continuing Resources

These are features or gifts of nature which are ever present. For example water, and oxygen which are very essential for life.

Renewable Resources

These are resources whose productivity can be made to regenerate after being used or can be used and replaced. But can disappear if not replaced for example, vegetation and soil fertility.

Non-Renewable Resources

These are features or gifts of nature which are used and cannot be replaced by people for example minerals like coal, oil, gold etc.

How Do We Use Our Environment

Activities we do in the places where we live depend mainly on the environment we live in.

Human activities can include,

- fishing,
- lumbering,
- cultivation,
- animal rearing,
- industrialization,
- HEP generation,
- transport, etc.

Ways of Conserving the Environment

- Afforestation, this is the planting of trees where they have never existed before. This helps in controlling erosion, act as wind breaks and are a source of timber and fuel.
- Re-afforestation, this is the planting of trees in areas where have been cut down
- Fish farming, rearing fish in ponds which increases the number of fish and fish varieties in the environment
- Mulching, covering the soil by remains of dry vegetation for example banana leaves, remains of cereal crops like maize, sorghum, sunflower, etc. mulching preserves moisture in the soils, which is important to plant growth
- Controlling pollution, controlling emission of poisonous gases or materials into water, air and land. This is done by industries through recycling their waste products.

How Man Destroys the Environment

- Deforestation that is, cutting down trees without planting others. This leads to massive soil erosion.
- Bush burning this leads to loss of bacteria and loss of soil fertility.
- Overfishing here young fish caught using undersize nets and the use of poison. It leads to extinction of some fish species because even the young ones are caught before they reproduce.
- Overmining of non-renewable minerals like gold, zinc, diamond,coal,tin,etc.

- Pollution by industries, poisonous gases from industries are released into the air, land and water sources like rivers and lakes.
- Poaching, this involves hunting of wild animals illegally.
- Over cultivation leading to soil erosion and exhaustion

The Value/Benefits of Studying Geography

- Geography helps us to know our environment and how to conserve it.
- Introduces us to different parts of the world, including places we have never been to.
- Helps us to understand local weather and climate so that we can plan our activities accordingly
- Gives practical skills needed in our day to day life e.g. sketching, reading, drawing, collecting, analysis and present information.
- Enables us to understand the resources in our environment and how we can use these for development.
- Creates a foundation for future career e.g. meteorologists, cartographers, surveyors, urban planners, pilots, environmentalists, etc.
- It is a multidisciplinary subject from which other subjects like History, Biology borrow knowledge.

Chapter 2; **Showing the Local Area on a Map**

What is a map?

A map is a representation of part or all the surface of the earth on a sheet of paper.
The features on the ground are drawn in plan, as if the observer is seeing them directly from the air.
On a map, real features and places are represented using symbols. They may include signs, colors, shades, and abbreviations.
The place on the map where all symbols are explained is called a key.
Maps that exist in our minds are called mental maps.

Mapping a Local area

Every time you move to different places, there are certain important features which you see along the way. These assist you in tracing the place you are going to. These features are called landmarks.

Activity: Drawing a map of a small area

Note, When drawing a map of an area such as a village, town or a school, we put only the most important features in the area. These enable us to follow routes in the area and to find where certain things are located.

Activity 2.3
2.4

Qualities of a good map
When we draw maps, we take great care to ensure that other people con read, interpret, and use our maps. Such maps are called good maps.
The qualities include:
The Title: This is a heading given to a map. It is an arrangement of words summarizing what is on the map.
The Scale: It shows the relationship between distance on a map and its corresponding distance on ground.
The Key: Is an interpretation of symbols and what they mean on a map.
The frame: Also referred to as the boundary of a map. It is an enclosure to the map. It makes a map appear in one piece hence creating visual impression.
Compass direction: This shows direction of different areas on the map.

Chapter 3: Maps and Their Uses

Map Scale:
A scale is the relationship between the distance on the map and that on the actual ground.
It tells us the relationship between the distance measured on the map and what it represents on the real ground.
In order to represent features and places on a map, we reduce their actual size by a certain amount.

Types of scales
There are 3 ways in which a scale can be written. These include:

- Statement scale

- Representative scale
- Linear scale/ bar scale

Statement scale.
This is the scale written inform of words or statement. Such a scale is written as a sentence or simple statement. For example:

- One centimeter represents one kilometer
- One centimeter to five hundred meters.

This first part of the statement represents the distance on the map while the second part of the statement represents distance on the ground
Note: Avoid giving statements like one centimeter is "equal" to one thousand meters.

Representative Scale
This type of scale is written in a ratio form or fraction form. It is also known as ratio scale or fraction scale
E.g. 1:50,000 (ratio form)
Or
1/50,000 (fraction form)
In a ratio scale, the figure on the left represents distance on the map while the figure on the right represents distance on the ground
In a fraction scale, the numerator represents distance on the map while the denominator represents distance on the ground.

Linear scale/ Bar scale
The linear scale is the type of scale where a line is drawn and divided into segments/sections each of which represents certain distance on the ground.

The linear scale has two parts i.e., the primary part and the secondary part.
The primary part shows whole numbers from 0 upwards on the right and it is in Km.
The secondary parts from 0 to the left, It is just one unit subdivided into fractions i.e. a kilometer divided into meters.

Measuring distance on the map.
Distance is how far one point is from another. It refers to the length between two points.

On a map, distance is measured either in straight line or following a winding route.
One can measure distance between two points by using a pair of dividers, straight edge of paper or using a thin thread/ string.

Using a pair of dividers to measure distance on a map.

1. From where the road begins, identify a portion which is almost straight.
2. Mark it off, using a pencil and give it a numbers
3. Repeat this until you have divided the whole road into fairly straight portions.
4. Using a pair of dividers, measure the length of the first portion
5. Transfer the pair of dividers onto the linear scale (or foot ruler)
6. Place the left hand pointer of the divider at zero and read off the length indicated by the right hand pointer.
7. Record the length in your note book
8. Repeat steps 4.5 and 6, above until you have measured all portions of the road.
9. Add up all distances measured in order to get the total length of the road.

Using a straight edge of paper to measure distance on a map

1. Towards the end of the left hand side of the edge of paper, put a mark to show the starting point of the road, and place it along the road with the marked point against the starting point of the road.
2. Hold the paper firmly against the starting point and turn it along the road until part of the road disappears underneath the edge of paper.
3. Put a mark on both the paper and map, at a point where the road leaves the edges of the paper. When you do this, then you have measured off a fairly straight portion of the road.
4. Starting at the point you have marked, repeat steps 2 and 3 until you reach the end point of the road and mark it on the edge of paper.
5. Transfer the edge of paper onto the linear scale (or foot ruler) and read off the length of the road.

Measuring distance with a thread/string on a map.

1. Get a string or thread and if possible wet it so that it can be aligned to the winding feature.
2. Identify the two points between which distance is to be measured, and mark them using a pencil.

3. Align the string or thread with the winding feature between the 2 points following all the bends.
4. Mark the two end points on the string or thread
5. Transfer the string/ thread on to the linear scale and read the distance.

Calculating area on a map

When using the map, we may be interested in knowing how big certain features are e.g. a farm, forest, swamp, township or an airfield.

- Some of these features have shapes which are similar to those of polygons, which you have learnt in math. These are called **regular shapes**.
- Other features have shapes which do not resemble any polygon. These are called **irregular shapes**.

Area of regular shapes

Regular figures are objects which have well defined shape for example triangles, kites, rectangles. In order to calculate areas of these objects it is always important to apply their mathematical formulae. For example the area of a square is calculated using the formula

A=Length x width

Area of irregular shapes

These have no defined shapes. On a map these could be represented by an area of a lake, a natural forest, river, a swamp, urban or rural area. Grid squares are used to calculate area of irregular shapes.

Using the grid method to calculate area of irregular shapes/objects (e.g. lake, forest)

Note that the grid lines represent a distance of 1km. the area of a grid square is $1km^{2.}$

1. Identify the area covered by the lake
2. Count all grid squares which are fully covered by the lake
3. count all squares which are touched but not fully covered by the Lake and divide their number by 2.
4. Add up the values you have got in steps 2 and 3 above.
5. multiply the value got in step 4 by the area covered by a full square i.e. 1Km
6. The area of the object is given in square kilometers

How to Find Places and Features on a map

On the surface of the earth, and on maps, different features are found in different places.

To be able to use the map, you need to describe where features are found.

Grid and Grid References

Topographic maps have a network of lines drawn all over them. These are called Gridlines. They cross one another at right angles and form a grid of squared. These lines can also help you to find features anywhere on the map.
The vertical lines are called 'Easting's' as they increase in value as you move East on the map.
The horizontal lines are called 'Northings' as they increase in value as you move North on the map.

Four-figure grid reference

The four figure grid reference enables a map user estimate the position of the feature.
State the four figure grid reference of;
A, B, C and D from the figure above

Six figure grid reference

The six figure grid reference enables the map user to accurately locate a feature on the map.

Compass Directions

A compass is an instrument/tool used to find the direction of something.
A compass rose/direction finder
To be able to use the campus to find directions more accurately, we further subdivided the cardinal directions i.e. East, West, North and South, into four other directions. These are called intermediate directions/intercardinal points. They are Northeast (NE), Southeast (SE), Southwest (SW) and Northwest (NW).
An eight point compass rose

Note; Intercardinal points combine two directions e.g. North East, meaning that you move east, then North at the same time. In other words, Northeast lies North of the East.

A sixteen point compass rose

The new directions got combine three directions. These enable a map reader to find and describe directions of all places and features accurately.

How to determine the directions of a feature on a map
Draw a compass rose at the point from which you want to describe direction
Then draw a straight pencil/line connecting the two points.
Read off the direction corresponding/ closest to the point whose direction you want to find.

BEARING
You can also describe the position of a feature or place from another using their distance apart in the form of an angle.
The angle is measured clockwise from the North line
This angular distance is called a bearing.
It is stated with three figures
For angles less than 100^0 , we write a zero before the measured angle, for example, for 045^0 instead of 45^0

Procedure of finding bearing of a place

- To determine the bearing of one point form another, draw a compass rose at the Centre of the point from which you want to determine the bearing
- Then draw a line joining the two points
- Using a protractor, measure clockwise the angle between the North and the line you have joining the two points, e.g.

State the bearing of
(a) A from B
(b) B from A

Latitudes and Longitudes
When we want to describe the exact positions of features or places on small scale maps, we use latitude and longitude.

Lines of latitude
Latitude lines are parallel lines drawn on the map running from West to East.

Latitude measures how far north or south of the tor a place is located. The equator is the starting point for measuring latitude. For this reason, it is marked as the 0 (Zero) degree latitude. It divides the world into two equal parts i.e. North and South.

How lines of Latitude are determined and marked on maps.

- First by measuring the distance of places using angles from the Centre to the surface of the Earth
- Then places lying at equal distance round the world are joined using a line of Latitude

Lines of longitude

Longitudes are parallel lines drawn on the map running from North Pole to South Pole

They are imaginary lines drawn on maps showing how far places are from the prime meridian/Greenwich line (0^0)

Longitude measures how far a place is East or West of the major vertical line called the Prime Meridian. The Prime Meridian runs through Greenwich in England. Because of this, it is also called Greenwich Meridian.

How longitudes are determined and marked on maps.

First, by measuring the distance of places using angles from the Centre to the surface of the earth.

Then places lying at equal distance round the world are joined using a line of longitude.

Using Latitude and Longitude

Lines of latitude and longitude also form a grid system on the map. To find a location on the grid system;

- Simply read the latitude along which a place or feature is in degrees
- Then read the longitude
- At the point where the two lines meet, state the two numbers
- These give the co-ordinates of the feature

Using latitude and longitude, find the position of;

i. Arua- 3.0N, 30.9^0 E
ii. Lira- 2.2^0 N, 32.9^0E
iii. Mbarara- 0.6^0S, 31^0E
iv. Soroti- 1.7^0N, 33.6^0E

v. Moroto- 2.5^0N, 34.7^0E
vi. Jinja- 0.3^0N, 32.6^0 E

Note; the responses given are not very accurate because they are just estimates.

Chapter 4; **Ways of Studying Geography: Fieldwork, Photographs, Statistics, Charts and Graphs**

(Discuss the different sources of geographical information)

Learning Geography through Fieldwork

What is Fieldwork?

Is the study of geography carried out in the field /real environment?

How do we study geography through fieldwork?

In order to use fieldwork to get information about a given area, there are certain steps which you have to follow.

Step 1

Preparation stage, this stage involves activities carried out before going to the field and these include;

-Identification of the topic of study (depending on the area)
-Setting the objectives of the study (reasons for going to the field)
-Choosing the methods of getting information.
-Identifying the instruments to be used for the study

Step 2

Collecting information in the field, in collecting information from the field, different methods are used and these include;

- Observation, this method involves use of your eyes to see features and activities carried out in the area.
- Interviewing, this involves asking people oral questions about the activities they carry out.
- Field sketching, this involves drawing sketch maps of the area, panorama, and cross section of the area studied to show physical and human features.
- Sampling, this involves studying samples (small size to represent the whole) of say soils, vegetation.
- Measurement, this involves finding out distance or size of some features in the field.
- Recording, this involves using study tools like a pen, pencil, ruler, book, and paper, clipboard to write or draw information from the field.

Step 3

Writing a fieldwork report; when we collect information about an area, we use it to write the geography of the area. This is called writing afield work report. Afield work report must be organized in a logical order,

- State the topic of the study
- State the objectives of the study
- Write down the information you got about every objective (that is the findings)
- Include photographs and maps, statistics, charts and tables.
- Make conclusions, including the relationships between the people of the area and their physical and human environment. `

Learning Geography through Photographs

If you cannot reach a place very easily we can learn about it by looking at its photographs. These can tell us a lot about the geography of even those areas we have never been to.

Types of Photographs.

Photographs differ depending on the angle at which the photographer was looking at the ground.

Ground photograph.

This is a photograph taken when the camera is directly facing the features and usually shows the features as they appear in reality.

Ground photographs are divided into two types,

- **Ground horizontal.** These photos are taken when the cameraman is connected to the ground. The camera is pointing directly at the features without any tilt.

Ground horizontal photos are characterized by;

- they are more detailed
- mainly show front part of the objects
- they cover a small area
- the objects in the photo appear in their right shapes and sizes
- the objects near the camera appear bigger than those far from the camera.

- **Ground oblique photographs**. These are taken when the camera is tilted at an angle less than 90º. They are taken from a hill slope, top of a tree, top of a building or hill top.

Characteristics of ground oblique photographs

- they show the tops of the objects
- the horizon\skyline is clearly seen
- the sizes and heights of objects are greatly reduced.

Aerial Photographs.

These are taken when the photographer is seeing the features from the air. An aerial photograph can be taken from an aircraft, freight balloon or very tall building. Aerial photographs are divided into two,

- **Aerial vertical photographs**. These are taken when the photographer is looking at the features directly from above perpendicularly (at 90^{o} angle)

Characteristics of vertical aerial photographs.
-they cover Avery wide area
-the features/objects are greatly reduced in size (very small)
-they only show the tops of features
-they do not show the skyline/horizon.

- **Aerial oblique photographs**. These are taken with the camera tilted at an angle

Characteristics of aerial oblique photographs
-covers a very wide area
-the horizon/skyline is visible
-the objects are more detailed

Describing Where Things Are On The Photograph

To describe where things are on the photograph, we divide it into regions depending on how far away from the observer the features are. These are, foreground, middle ground and back ground.
The part of the photograph which shows the sky is called the horizon

BACK GROUND
MIDDLE GROUND
FORE GROUND

To get the exact positions of features you subdivide the above three grounds into other regions. These are left foreground, right foreground, left middle ground, right middle ground, left back ground and right back ground

Left back ground	Centre back ground	Right back ground
Left middle ground	Centre middle ground	Right middle ground
Left foreground	Centre foreground	Right foreground

Vertical aerial photographs do not have any fore ground, middle ground or back ground. So, when interpreting such a photograph, you use terms like bottom, top, left, Centre, and right to describe where things are.

Drawing a sketch from a photograph

Sketching a photograph does not include drawing the photograph itself. It focuses on the identification, marking using symbols and labeling the marked features in their relative positions.

Sketching takes into account only physical and manmade features in question

Procedure for sketching

- Measure the dimensions of the photograph and the measurements to draw a frame. (In instances where the photograph is too large, one is expected to reduce it proportionally and produce an outline whose shape is similar to that of the photograph.
- Study the features in question and identify their locations in relation to the regions (divisions) of the photograph
- After sketching the photograph, mark and label the features in question. Marking should be done on the photograph much as the key can also be used where labeling would over crowd
- The sketch must have a title (heading) in relation to the question. The title outlines what the sketch represents

N.B;

- Avoid unnecessary shading and including details that are not required by the question
- Avoid congesting the sketch with too many labels and features

Finding Out Information From Statistics

You can learn about the activities people do by looking at and interpreting mathematical figures. These figures are collected about the activities.

You can also collect similar figures about say, amount of crops produced in year, number of people in each parish in your sub county, sizes of houses in your home area, amount of rainfall received in your home area in six months and others. Such figures are called statistics.
You can use these statistics to draw graphs, pie-charts, flow diagrams and other drawings. Such drawings are called statistical drawings.
E.g. study the table below showing tea production in Uganda for different years and do the tasks that follow.

YEAR	TEA PRODUCTION IN TONNES
1986	3300
1987	3500
1988	3500
1989	4200
1990	6600
1991	8300

a) Identify the year when Uganda's tea production was

I) Highest
ii) Lowest
iii) Increased most
iv) Did not change

b) Draw a bar graph to show the information in the table above
c) Draw the table and the graph you have drawn and decide which of the two is easier to understand. Give reasons for your answer.

Chapter 5: **The Earth And Its Movements**

What shape is the earth?

The earth is the planet on which we live. All other living things live on earth. It is the only planet with life. This is because it has enough supply of oxygen and water which are needed for life.

Also since the earth is not very far from the sun, it has moderate temperature i.e. it is neither too cold nor too hot.

(Discuss the position of earth in relation to other planets in solar system)

- The earth is spherical/ oblate/oblate spheroid
- It is flattered at both ends. These ends are called poles.
- The poles are at the extreme ends, the North Pole at the upper end, the South Pole at the lower end.
- The middle part at the equator is enlarged. The enlargement at the equator is caused by the earth's rotation.

There, the middle part of the earth is enlarged at the equator and as you move towards the poles, it becomes smaller and it is flat at the poles.

The movements of the earth

All planets in the solar system move around the sun. Each planet follows path called an orbit. No planet enters the orbit of the other.

The earth makes two types of movement's i.e.

1. Rotation, which is the daily movement of the earth on its axis
2. Revolution, which is the yearly movement of the earth around the sun

ROTATION OF THE EARTH.

This is the daily movement of the earth on its axis. It takes 24 hours for the earth to complete this movement along its axis. This movement is from west to east (eastwards)

Earth's axis is permanently tilted at an angle of 66^{0} to the earth's orbit

CONSQUENCES OF THE EARTHS ROTATION

1. It creates/ results into day and night. As the earth rotates, one half of it faces the sun while the other half is hidden from the sun. The part of the earth facing the sun is experiencing day time. The part of the earth which is hidden from the sun experiences night time.
2. It results into changes in temperature. The temperature is not the same all the time. The earth receives heat from the sun. This change in the temperatures is caused by the daily rotation of the earth on its axis. The nights are usually cool and this is because the sun which is the source of heat for the earth, is hidden away from the side of the earth on which you live.
3. Time difference. Time is not the same for all places on earth. This is caused by the earth's rotation. The world time zones are based on the prime meridian. As you move 15º from the prime meridian eastwards you gain one hour. You lose one hour for 15º of longitude you move westwards. All 12:00 midday or noon, the sun reaches its highest position in the sky. At this time the prime meridian is under the sun. This is called 12noon local time along the prime meridian. The local time at Greenwich is called Greenwich is Greenwich Mean Time (GMT)

All meridians to the east of the Greenwich meridian have sunrise before the prime meridian. Local time along these meridians is ahead of GMT. Meridians to the west have sunrise after the Greenwich, and the local time is behind GMT.

REVOLUTION OF THE EARTH

The earth takes one year or 365¼ days to complete its journey around the sun. This journey is called a revolution. After four years, the earth takes 366 days to complete this same journey. The fourth year is called a leap year. All other years have 365 days

The movement of the earth around the sun leads to change in the position of the latitudes in relation to the sun.
On 21st march and 23rd September, the sun is overhead at the equator. This is called equinox.
On 21st June the sun is overhead at midday at the tropic of cancer. This is called summer solstice
On 22nd December the sun is overhead at midday along the tropic of Capricorn. This is called the winter solstice.

Impacts of the revolution
Hottest months in places along the equator
March and September

When is summer in the northern hemisphere?
June-September

Spring in southern hemisphere
April –may

Summer in the southern hemisphere
December – march

MAJOR CLIMATIC REGIONS OF THE WORLD
Why is the Earth divided into zones with different temperatures?
The earth is divided into zones i.e. tropical zone, temperature zone and polar zone with different climatic conditions.

Tropical climate zone. This lies close to the equator between the tropic of cancer and tropic of Capricorn i.e. 23.5ºN and 23.5ºS of the equator
This region receives direct sunlight all year round so the average temperature stays greater than 20º
This region is hot throughout the year
Mornings are usually cool but quickly become warm and hot in early afternoon up to around 3:00pm.
Experiences high evaporation especially in places close to large lakes and seas.
Rainfall is heavy in most areas and this leads to the growth of dense forests and savannah grasses
Temperate climate zone. It lies between the tropics and Polar Regions (35º and 50º north and south of the equator)
The temperatures are moderate, they are neither too hot nor too cold.
The zone has four clear seasons namely; summer (warmest) autumn (the season between summer and winter) winter (the coldest) and spring (the transiting zone between summer and winter)
Temperature ranges throughout the year are large i.e. the difference between the hottest and coldest months is big.

Polar climate zone. It is found around the north and South Pole.
It is very cold and dry throughout the year
The summers are cool while winters are very cold.
Precipitation comes in form of snow i.e. small ice crystals. This brings about permanent ice sheets.
Experiences strong winds
These conditions are not favorable for permanent human settlement. So there are no people living permanently in the polar region.

FACTORS WHICH CAUSE DIFFERENCE IN TEMPERATURES OF AN AREA.

Altitude. This is the height of a place. Places which lie at or near sea level are hotter than those at great height above sea level. This is because heat from the sun heats the air around the earth from the ground surface upwards. This makes temperature to decrease with increasing height above sea level. For example on a mountain the lower slopes are hotter than the peak.

Distance from the sea or large water body. The sun heats the earth, water and land absorb the heat differently. Because of this, places near large water bodies tend to cooler than those far inland. When the sea is cooler than land, it lowers the temperature of the coastal areas.

Humidity. This is the amount of water vapor present in air. Water vapor absorbs heat escaping from the earth back into the atmosphere. Therefore, the

higher the humidity, the higher the amount of heat absorbed and kept in the air and hence the hotter the atmosphere becomes

Aspect. The side of a mountain or the hill directly facing the sun gets heated up before the opposite sides.

Vegetation cover. Areas with dense vegetation such as forests always have lower temperature than areas with open ground. This is because the crowns of trees in the forest prevent heat from the sun from reaching the ground directly so the ground remains cool.

Nature of the soil. Light soil absorb less heat than darker soils. This may bring about a small difference in temperature even within the same region. Again, dry soils like sand heat up faster when struck by the sun's rays than wet soils such as clay, which keep much moisture and warm up more slowly.

Ocean currents. These are large streams of water flowing in the oceans. They influence temperature in the nearby coastal areas. Currents flowing from the Polar Regions towards tropical areas bring cold temperature conditions which lower temperature. Those flowing from tropical areas towards Polar Regions carry warm conditions even during winter.

ACTIVITY OF INTERGRATION

If the earth stops rotating on its axis;

There will be no day and night in all parts of the world. Places exposed to the sun will have only day time while those on the opposite side will remain in the darkness all the time.

There will be no time difference between places lying at different lines of longitude.

Winds will be able to move straight from one pole to the other.

If the earth stops moving around the sun;

There will be no seasons i.e. winter and summer

There will be no rainfall, humidity, and wind movement on the side of the earth which will not be exposed to the sun.

Only the side of the earth exposed to the sun shall be receiving rainfall. The opposite side will remain dry, it will always be a high pressure zone.

How people's ways of life might change

Depends on the changes in climate and weather suggested above.

CHAPTER 6: WEATHER AND CLIMATE

What is weather?

Weather refers to the conditions of the air or atmosphere at a certain time. Or the conditions of the atmosphere at any one time.

The weather maybe sunny or cloudy. It may be hot or cold, windy or calm. It may be rainy. Our country has many different kinds of weather at any one time.

ELEMENTS OF WEATHER

These are things used to describe the weather of a place. The elements of weather include

Rainfall
Sunshine
Temperature (hotness and coldness)
Air pressure
Air humidity (moisture in the air)
Clouds

Weather of a place can be described by combining two or more elements for example weather can be

-sunny and calm
-cloudy, hot and calm
-rainy and windy
-humid and cool, etc.

HOW IS WEATHER DIFFERENT FROM CLIMATE?

The description of the weather pattern will vary depending on the region and local area in which you live. It should point out the times of the year when the area receives low, moderate and heavy rainfall; Cool, warm or hot temperature; calm, light or strong winds

The name given to the weather pattern described is the climate/ local climate.

Unlike weather which changes from time to time even in the same area, climate takes Avery long period of time to change.

The two elements of the weather that is precipitation especially rainfall and temperature are the most important elements used to describe climates in the world.

What is precipitation?

The earth receives moisture from the atmosphere in different forms. These different forms of moisture received on the earth's surface are called precipitation.

-rain
-snow
-sleet
-hail
-mist
-fog
-drizzle

All forms of precipitation start in the same way of evaporation and condensation.

Rainfall and drizzle are the only types of precipitation that reach the ground in the liquid form.

Snow and hail is water in solid form. Water from the atmosphere falls as snow when the atmosphere is not hot enough to melt the ice crystals in the sky

Sleet is partially melted snow; it's a combination of rain and small pieces of snow. It occurs when the snow melts in warm air and freezes again as it falls through the cold layers of the atmosphere.

WHAT IS TEMPERATURE

Temperature is the amount of heat in the air. The atmosphere usually has different amounts of heat. It can be hot, warm, or cold.

Study the table below and answer the questions that follow

Study the table below showing the climate statistics for Entebbe and answer the questions that follows

Month	J	F	M	A	M	J	J	A	S	O	N	D
Temp (c^0)	27	27	27	26	25	25	25	26	27	27	26	26
Rainfall (mm)	65	85	150	250	225	125	75	75	75	112	125	125

(a) Write down
  (I) The highest rainfall
  (II) Lowest rainfall

(b) Find out the
  (i) Annual total rainfall
  (ii) Mean monthly rainfall
  (iii) Annual range of temperature

(c) Draw a suitable graph to show the climate of Entebbe.

MEASURING AND RECORDING ELEMENTS

The measuring and recording of weather elements is carried out from a weather station.

At the weather station, there are a number of instruments used in measuring the different elements of weather

Such instruments are included in the table below;

Wind vane	Wind direction
Sunshine recorder	sunshine
Wind sock	Wind strength
Rain gauge	Rainfall amount
Mercury barometer	Air pressure/ atmospheric pressure
Anemometer	Wind speed
Hygrometer	Humidity

How these instruments are used

WIND VANE

The wind vane records wind direction

- The wind vane records wind direction
- As wind blows the arm of the wind vane rotates until its pointer faces the direction from which the wind is coming while the tail points in the direction the wind is going
- The person observing weather reads the pointer and records the directions

SUNSHINE RECORDER

- This instrument records the number of hours and minutes of sunshine a place receives a day.
- When the sun shines, the glass ball (sphere) on the recorder collects and directs the sun's rays to a heat-sensitive card found on one side of the metal frame surrounding the glass ball.
- The heat sensitive card has a scale marked in hours and minutes. As the position of the sun changes, its rays burn a line
- At the end of the day, the card is taken out and the length of the burnt line is interpreted in hours and minutes to get the total amount of sunshine received on that day

WIND SOCK

- It measures and records the strength of the wind blowing in an area. The sock itself is a bag made from light cloth. It is kept with both ends open to allow wind to pass through
- When the weather is calm i.e. with no wind blowing, the sock falls against the post/ pole and points to the ground. When wind blows through the sock, it stretches out.
- The amount of the stretching will depend on the strength of the wind. When wind is very strong, the sock becomes horizontal and parallel to the ground.

RAIN GAUGE

- This instruments records the amount of rainfall received in a day
- Inside the cylindrical container is a can containing a glass or transparent plastic jar for collecting rain water. At the top of the can there is a funnel which directs rain water into the jar.
- Every 24 hours the rain gauge is opened and the water that has collected in the jar is poured into a measuring cylinder. The amount received is read off the scale marked on the measuring cylinder, usually in millimeters and recorded.

MERCURY BAROMETER

- This instrument is used to measure atmospheric pressure or the weight of air over a given part of the earth's surface.
- When the glass tube containing mercury is placed in the bowl or trough of mercury, the mercury inside the tube fall and creates a vacuum at the top until its pressure balances with the pressure of air outside the tube. At the sea level the column of mercury inside the tube rises to about 760mm
- When the pressure of air outside the tube is high, it presses down the surface of the mercury in the bowl and forces it to rise into the glass tube. This is causes a rise in the pressure.
- When the air pressure is low, the mercury in the glass tube flows down into the bowl causing a fall in pressure reading.

ANEMOMETER

- This instrument is used to measure and record the speed of wind in a given area.
- The cups on it are semi-circular in shape so that they can trap wind. All cups are fixed on metal rods which is connected to a spindle. The spindle is in turn connected to a meter which records the number of revolutions made by the cups as wind blows
- The faster the wind blows, the faster the cups move. The movements are used to interpret the speed of wind

HYGROMETER
(To be discussed in class)

CLOUDS

Cloud cover depends on the locality, season of the year, relief and distribution of sources of water vapour.

Types Of Clouds

NAME	HEIGHT	APPEARANCE
Cirrus	High in the atmosphere	• White in color • They look wispy or feathery • They are thin with lots of blue sky visible • They look as if someone took a cloud, stretched it, pulling pieces off
Nimbus	High level clouds	• They are dark and seen during a thunderstorm along with thunder and lightning • They have great vertical height
Stratus	Low clouds	• They are gray or white in color

		• They look like a very large thick blanket covering all or most of the sky
Cumulonimbus	Low clouds	• They are pale to dark grey in color • They appear to be dense and usually form towers which make them to appear like a mountain

The amount of cloud cover is estimated in oktas. One okta represents approximately one eighth of the sky covered with clouds.

IMPORTANCES OF CLOUDS TO HUMAN BEINGS

- They influence the formation of rainfall and other types of precipitation which control most of the human activities
- They influence temperature conditions which in turn determine what we dress and how we dress
- They provide a guide to weather forecasting and preparation for expected weather events, e.g. when we see stratus clouds, they are a sure sign of rain especially if it is warm

Weather elements are presented on maps using lines. These lines join area with equal measure of a given element of weather.

Elements of weather	Lines presenting it on a map
Temperature	Isotherms
Rainfall	Isohyets
Atmospheric pressure	Isobars
Cloud cover	Isonephs
Sunshine	Isohels

EFFECTS OF WEATHER ON LIFE AND THAT OF THE COMMUNITY

A number of activities people do in the community depend mainly on sunshine, temperature, and rainfall. Weather changes can affect you and your community positively

WEATHER CONDITION	BENEFITS	NEGATIVE EFFECTS
Rainfall	• Supports growth of crops • Lowers air temperature thereby creating cool conditions which are good for us • Supports the growth of pasture on which people feed their animals	• Leads to flooding of roads and homes causing death and loss of property • Rain storms destroy farmland • Too much rain leads to poor crop harvests
Sunshine	• Creates warm conditions which are conducive for life • Enables farmers to preserve their crop harvest through drying • Provides light which makes our movement easy	• Too much sunshine leads to drying of pasture and loss of animals • Strong sunshine spoils crops leading to poor harvest.
Temperature	• Cool and warm temperature enables human beings to carryout activities like games, sports and farming	• Very cold temperature makes people uncomfortable and to stay indoors

CHAPTER 7; LOCATION, SIZE, AND RELIEF REGIONS OF EAST AFRICA.

East Africa is composed of the countries of Uganda, Kenya, and Tanzania. East Africa is found on the eastern half of the African continent. This explains why it is called East Africa.

LOCATION OF EAST AFRICA

East Africa is crossed by the equator. Parts of it lies in the northern hemisphere and the other part lies in the southern hemisphere. This is why East Africa is said to lie a stride the equator.

THE SIZE OF EAST AFRICA

A table showing the size of East African countries

COUNTRY	AREA/SIZE IN SQUARE KILOMETRES

Uganda	241037
Kenya	580367
Tanzania	945087
Total	1766481

Activity; 7.3 (to draw pie-chart)

POPULATION OF EAST AFRICA

The population of East African countries varies

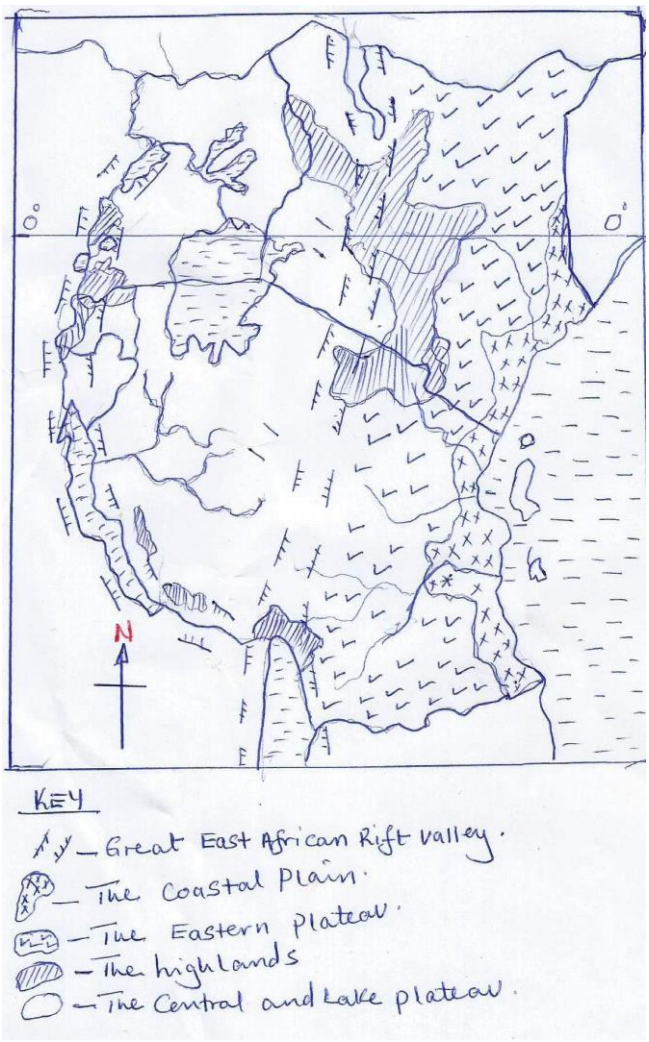
COUNTRY	POPULATION	AREA(km2)	POPULATION DENSITY
Uganda	45740000	241037	
Kenya	53770000	580367	
Tanzania	59730000	945087	
Total	159240000	1766481	

Draw a well labelled pie-chart showing the population of East African countries

THE RELIEF REGIONS OF EAST AFRICA

East Africa is divided into five major relief regions. Each region has certain characteristics which make it different from other regions.

These regions have an influence on the local weather and climate. This, in turn, determines the economic activities people in each region do and their way of life in general.



The Coastal Plains

This relief region starts from 0 to 250 metres above the sea level.
It's bordered by the Indian Ocean in the East
This is along the coast of Kenya and Tanzania

Characteristics of the Coastal Plains

- It is made up of deposited sand and silt deposited by sea waves
- It has coral reefs built by polyps
- It is made up mainly sedimentary rocks including sand and silt
- It is crossed by different rivers pouring into the Indian ocean
- It has fertile plains of alluvial soils
- It has mainly mangrove type of vegetation, marshes and swamps
- It experiences hot and humid climate with temperatures ranging between 28ºc to 30ºc and rainfall of 1000-1500mm per year

- It has dense population

Economic Activities

- Fishing due to the presence of the ocean and different rivers
- Farming e.g. growing crops like sugarcanes, coconut, cloves, etc.
- Tourism due to beautiful features like coral reefs
- Trade and shipping at Mombasa, Dar-es-salaam
- Mining e.g. limestone at Mombasa
- Industrialization

The Eastern Plateau

This region is also called the **Nyika dry plateau**. It is a flat topped plain next to the coastal plains from the east. It occupies Eastern Kenya and Tanzania.

Characteristics Of The Eastern Plateau

- It is formed of very old rocks
- It is generally flat with scattered/ isolated/ residual hills also called inselbergs
- It is crossed by rivers like tana, athi, galena in Kenya, rufigi, pangani, Ruvuma in Tanzania.
- It's generally dry with poor soils
- It experiences low rainfall between 250-500mm per year and temperatures of 27ºc- 30ºc
- The vegetation is mainly shrub, scattered trees and short grass
- The area has a very sparse population.

Economic Activities

- Pastoralism especially by the masai
- Fishing in the different rivers
- Tourism e.g. in tsavo national park, meru in Kenya, selous in Tanzania.

The East African Rift Valley

A rift valley is along depression on the earth's surface bordered by steep slopes and escarpments. The rift valley has two arms i.e. the **eastern and western arm**

The western arm stretches from Lake Malawi in Tanzania and runs through western Tanzania, Rwanda, Burundi, and Uganda. In there are lakes like Malawi, Tanganyika, Rukwa in Tanzania, Albert, George and Edward in Uganda.

The Eastern arm stretches from Lake Malawi in south Tanzania and runs through central Kenya up to Lake Turkana and continues upwards. It has lakes like Turkana, Naivasha, Nakuru, Magadi, Eyasi, Natron, Elementeita.

Characteristics of the Rift Valley Region

- Its floor is covered by alluvial soils
- The rift valley is dry, very hot with poor sols
- The vegetation there is made up of grasslands and shrubs

Economic Activities

- Fishing in the lakes like George, albert, turkana
- Tourism e.g. in queen Elizabeth national park
- There is mining e.g. salt mining around Lake Katwe and soda ash around Lake Magadi.
- There is animal rearing
- Cultivation in some areas with alluvial soils

Lake And Central Plateau

It ranges from 900-1500 metres above sea level. It lies between the Eastern and Western arms of the rift valley hence the central plateau.

Characteristics Of Lake Plateau

- It is generally flat with isolated hills
- It is composed of metamorphic and sedimentary rocks
- It has flat topped lateritic capped hills and flat bottomed valleys
- The central part of the plateau is made up of depression lakes hence the lake plateau e.g. lakes kyoga and Victoria
- It experiences a hot and wet climate hence the name wet plateau
- It has fertile soils that support agriculture
- It is densely settled

Activities That Can Take Place In The Lake Plateau

- There is farming due to fertile soils
- There is fishing in lakes, rivers, swamps
- There is animal rearing
- Lumbering due to existence of thick forests
- Industrialization
- Tourism

THE HIGHLANDS

This region is the highest point in East Africa. It's made up of mountains e.g. block mountains like rwenzori, usambara, mbeya, nyiru, Mathew, ndoto, etc. volcanic mountains like elgon, Kilimanjaro,napak, Kenya, etc.

CHARACTERISTICS OF HIGHLANDS

- Receives heavy and reliable rainfall of over 1500mm per year except in the rain shadow areas
- Experiences relatively cool temperatures
- Has fertile soils
- It is densely settled

ACTIVITIES THAT CAN TAKE PLACE ON THE HIGHLANDS

- Farming at the mountain slopes especially large scale farming
- Tourism around mountains Rwenzori, Kilimanjaro and the rest
- Animal rearing
- Mining e.g. in kasese

CHAPTER 8: FORMATION OF MAJOR LANDFORMS AND DRAINAGE IN EAST AFRICA

Rocks and land forms

A rock is an aggregate of mineral particles. All landforms of the earths are made up of rocks.

Rocks are of different types and sizes. In terms of size, they may range from very tiny particles Such as sand grains, through small stones to very large boulders.

Every rock is made up several mineral and if you break it up and examine it scientifically, you can identify each mineral. Some of the minerals are found in the rocks are useful to people

Examples of minerals include

Mineral	Uses
Gold	Used for making jewellery like bangles, necklaces, earrings and pins Making decorations such as flower vases, statues and winning medals In glass making , it is used as a pigment or coating to give glass a beautiful colour In dentistry and medicine, gold is for filling tooth cavities and damaged crowns

Copper	Making electric wires, decorations and metallic plates Making shutters like house doors and windows
Aluminium	Making cooking utensils like saucepans Making aluminium sheets used to manufacture air crafts In building and construction, it is used for making shutters e.g doors and windows It is used on power lines for transporting energy across long distance. This is because is light and durable In medicine, aluminium hydroxide is used to treat heartburn, upset stomach and acid in digestion
Silver	Plating metals to prevent rusting Making coin money in many countries including Uganda Making jewellery and decorations Used for making mirrors because it is the best reflector of visible light In medicine it is used as silver nitrate for treating wounds like bone ulcers and burns
Calcium	Manufacturing tooth paste, animal feeds and construction cement Calcium carbonate is used in construction as binding material

Types of rocks

Rocks are different in colour, hardness, texture and ability to hold water. This is because they were formed by different processes and under different conditions

Rocks are divided into three main types depending on how they were formed i.e.

- Igneous rocks
- Sedimentary rocks
- Metamorphic rocks

IGNEOUS ROCKS

Igneous rocks are rocks formed from the solidification of molten rock material. Some form below the earth's surface, some form on or above the earth's surface. We describe these two types as:

- Intrusive igneous rocks
- Extrusive igneous rocks

Intrusive igneous rocks

Intrusive igneous rocks are formed from magma that cools and solidifies within the earth's crust. The slow cooling that occurs there allows large crystals to form.

Examples of intrusive igneous rocks include; granite, gabbro, diorite, peridotite, syenite

Illustration

Extrusive igneous rocks

Extrusive igneous rocks are formed when magma cools and solidifies on the earth's surface. They cool quickly to form small crystals.

Examples of extrusive igneous rocks include; pumice, basalt, dolerite, obsidian, andesite and rhyolite.

Illustration

Ways in which igneous rocks benefit people living in areas where they are formed

1. Provision of fertile soils which support cultivation of crops
2. Provision of valuable minerals
3. Provision construction materials such as gravel and hard core
4. Attracting tourists and fetching income for the local people and country
5. Provision of grinding stones for local food processing

SEDIMENTARY ROCKS

Sedimentary rocks are types of rocks that are formed by the accumulation or deposition of mineral or organic particles at the earth's surface, followed by cementation

Sedimentary rocks are divided into three i.e

- Mechanically formed sedimentary rocks
- Chemically formed sediment ally rocks
- Organically formed sedimentary rocks

Mechanically formed sedimentary rocks
These are formed when small particles of igneous, metamorphic or old sedimentary rocks are removed by running water.
The water transports them from one place and drops (deposits) them in a low lying depression or valley. As more materials are deposited, the layers at the bottom get compressed under pressure from the new material, become hard and eventually form rock layers
NB. Material carried by running water is called alluvium, that deposited by glaciers is called moraine while those deposited by wind is called loess.
Illustration

Chemically formed rocks
These are formed in areas with hot temperatures which experience high evaporation. Naturally, when water comes into contact with rocks
It dissolves some of the rock minerals. In hot areas when water evaporates, the minerals dissolves in it does not change to gas; instead it forms small crystals. When these crystals accumulate they harden and form rock layers.
An example of this rock type is rock-salt. Sodium carbonate solution evaporates to form salt deposits like lake katwe. Carbonate solution evaporate to form stalagmite and stalactites like Nyakasura
Illustration

Organically formed sedimentary rocks
These are formed from the remains of dead plants and animals. Some animals live in communities or colonies. When such animals die in large numbers their remains decay, harden and form a rock. Some rocks such as coral limestone along the east African coast were formed from the skeletons of snail-like animals called polyps.
Coal, peat, lignite form from plant remains
Illustration

Areas in east Africa where each type of sedimentary rocks are likely to be found
Mechanically formed sedimentary rocks; valleys between hills, foothills of mountains, depressions, river valleys, along lake shores.

This is due to the fact that these are areas where rock sediments and silt are deposited and accumulate.

Chemically formed sedimentary rocks; these are found in areas of hot conditions or hot temperatures and high rates of evaporation like chalubi desert in Kenya, Turkana land in Kenya, karamoja in Uganda and albert rift valley.

Organically formed sedimentary rocks; are found in areas where the remains of dead plants and animals have collected over a long period of time to form rock e.g rift valley regions, Indian Ocean coastline, southern Tanzania

How each type of sedimentary rock affects human activities in areas where it occurs

Mechanically formed sedimentary rocks

- Used as construction materials e.g. lake sand
- Source of minerals such as gold (mining sites)

Chemically formed sedimentary rocks

- Source of chemicals used in industries eg salts like gypsum and common salts and calcium.

Organically formed sedimentary rocks

- Source of fossil fuels such as mineral oil and coal
- Industrial raw materials

Metamorphic rocks

Metamorphic rocks are formed when pre-existing rocks are exposed to great temperatures and pressure. Original igneous or sedimentary rocks when subjected to high temperatures and pressure they change physically and chemically.

Examples of metamorphic rocks

Original rocks	Metamorphic rocks
Granite	Gneiss
Shale	Schist
Coal	Graphite
Clay and mudstone	Slate
Sandstone	Quartzite
Limestone	Marble

A sketch map of east Africa showing the distribution of major types of rocks

Uses/ significance/ importance of rocks

- Rocks weather to form soil rich in nutrients for agriculture
- Rocks like sand and granite are used as building materials
- Some rocks have beautiful scenery which attract tourists e,g coral reefs
- Some rocks like coal are used as fuel in industries and homes
- Rocks like limestone are used in industry as a raw material for manufacturing of cement
- Some rocks contain valuable mineral like diamond extracted hence promote mining
- Some rocks provide natural habitats for wild animals like lizards and snakes
- Some rocks like salts are suitable for human consumption

How land forms in each region have been influenced by the type of rock present

The presence of soft young sedimentary rocks on the coastal plains leads the existence of generally flat landscape. These sediments cannot form high lands if they are not modified by another process

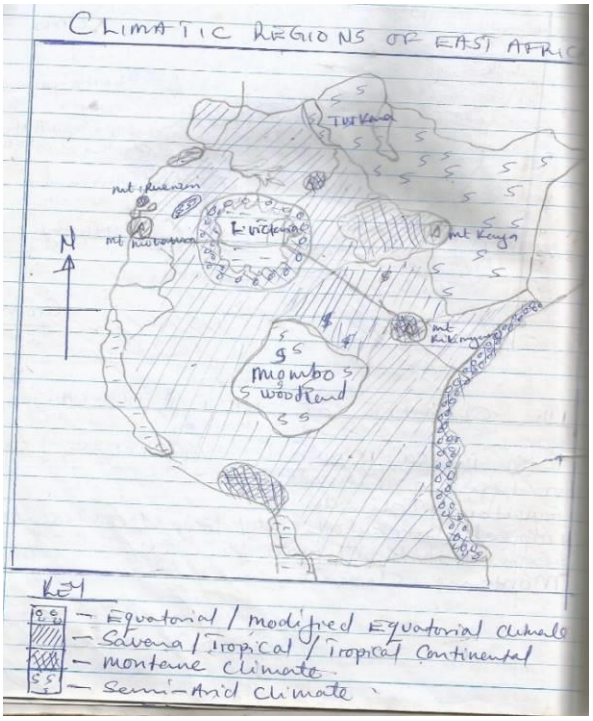
The metamorphic rocks on the interior plateau have led to the existence of relatively flat plains with residual hills made up of hard rocks which are not easily eroded

The presence of extrusive igneous rocks in the high land region has led to the formation of volcanic highlands or mountains. Most of the mountains have weak rocks which are easily eroded to form deep gullies on mountain slopes

Formation of landforms in east Africa

Chapter 9: **Climate and Natural Vegetation of East Africa**

East Africa mainly experience four types of climate i.e
(a) Equatorial climate
(b) Tropical/savanna climate/tropical continental
(c) Semi-desert climate
(d) Montane climate



Characteristics of Equatorial Climate (Modified Equatorial Climate)
- Hot temperature (over 20^{o}C) all the year.
- High humidity of over 80%
- Heavy rainfall totals of over 1000mm/annum.
- Rainfall received is bimodal/double maxima/two rainfall peaks.
- Rainfall is received throughout the year/absence of distinct dry season.
- Thick cloud cover.
- Small diurnal temperature range (1-8^{o}C)
- Convection rainfall is received.

- Small annual temperature range (1-30^{o}C)
- Low pressure is experienced throughout the year.

Tropical climate/savanna climate
- There is moderate rainfall of 500-1000mm.
- Rainfall is seasonal with one wet season (mono modal)
- There is a distinct dry season.
- Hot temperatures throughout the year (21^{0}-30^{0}C)
- High humidity during the wet season and low humidity during the dry season.
- There is a thick/dense cloud cover during wet season and clear skies during dry season.
- It experiences convectional rainfall.
- There is a moderate annual temperature range (4-15^{0}C)
- There is a distinct wet and dry season.

Semi-desert climate
- Low humidity of less than 25%.
- Limited cloud cover/clear skies/cloudless skies.
- Little rainfall of less than 500mm.
- Large diurnal temperature range.
- Prolonged dry winds.
- Hot day time temperatures and cold night temperature.
- High temperatures over 35^{o}C.
- High average annual temperature range of over 15^{o}C.

N.B Then Semi-Arid areas of East Africa include;
- North East Uganda or Karamoja.
- Ankole – Masaka dry corridor.
- North West Kenya/Turkana land.
- North East Kenya
- Cental Tanzania (Miombo woodland)

Montane Climate /Mountain Climate
Characteristics:
- Receives heavy relief rainfall.
- Cool and very cold temperatures at high altitude.
- Small diurnal range of temperature.
- Wind ward slopes are wetter than leeward slopes.
- Atmosphere pressure decrease with increase in altitude.

- Anabatic winds blow up the slopes during the day and Katabatic winds blow down the slopes at night.
- Temperature increase with increase in altitude.

In East Africa, montane climate is experienced in areas around;
- Kilimanjaro slopes (Tanzania)
- Muhavura mountain slope (South West Uganda)
- Elgon slopes (Eastern Uganda)
- Mt. Kenya slopes (Central Uganda)
- Rwenzori slopes (South West Uganda)

Factors That Influenced the Climate Of East Africa

(a) Latitude: East Africa lies a stride the Equator hence hot temperature because of the overhead sun.
- The areas close to the Equator experience rain fall throughout the year due to the hot temperatures.
- The areas far away from the Equator receive seasonal rainfall due to the apparent movement of the sun north and south of the Equator.
- Areas close to the Equator experience of double rainfall maxima due to the overhead position of the sun at the Equator twice a year or at the Equator.

(b) Altitude (height of land): Areas at higher altitude experience cooler temperatures because temperatures decrease with increase in height.
- The low lying area experience hot temperatures because temperature increase with decrease in altitude.

(c) Relief: Highland areas experience temperature inversion due to upward displacement of warm air from the valleys by cool air.
- The wind ward slopes in highlands areas receive heavy rainfall.
- The leeward slopes receive little or no rainfall due to the descending dry winds.

(d) Distance from the water body (continentality).
- Areas along the shores of water bodies received heavy rainfall because of the influence of the warm dry winds which have lost moisture along the coast.
- Water bodies lower the temperatures of the adjacent areas because of the influence of sea/lake breeze during the day.

(e) Winds and air masses

The South East trade winds cause dry conditions in Central Tanzania, North Western Tanzania, Ankole-Masaka Corridor and Nyika plateau in South East Kenya because they have lost moisture.

- The warm moist South East Trade winds cause heavy rainfall along the coast of East Africa and Western shores of L. Victoria because they are warm and moist.
- The North East Trade winds cause dry conditions in North East Uganda and Northern Kenya due to having lost moisture from dry lands.
- Westerly winds bring heavy rainfall to pars of western Uganda and West Nile because they pick moisture from the Atlantic Ocean and Congo basin.

(f) Ocean currents: The warm Mozambique current rises the temperature of the adjacent coastal.

(g) Human activities like deforestation, swamp reclamation, bush burning and industrialization results into global warming, which change the climate.

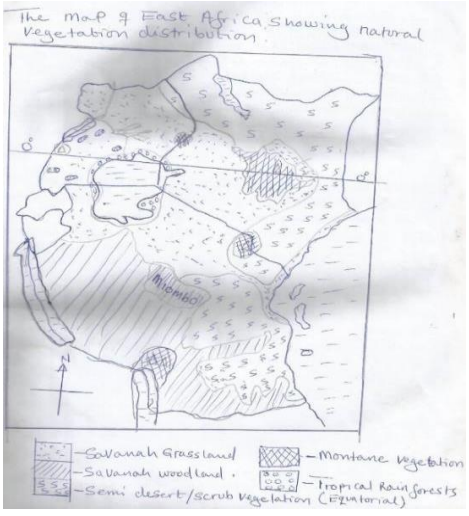
- Afforestation and re-afforestation create micro-climate in surrounding areas which is cooler.

(h) Influence of (ITCZ) inter tropical convergence zone.

- This is a zone of low pressure along the Equator. The South East Trade winds and North East convergence meet convectional rainfall is formed where there is the overhead son.
- As the areas south of the Equator experience a wet season, on the Northern areas are in a dry season, other prevailing factors remaining consent.

Vegetation

Vegetation refers to the community of plants which cover the surface of the earth either natural or artificial. Biologically, it is called Flora



Factors that influence vegetation distribution in east Africa

The influence of climate for example amount of rainfall, temperature and light

- Areas with well distributed rainfall (over 1500mm) support the growth of dense forests for example Mabira and Budongo.
- Areas that receive moderate rainfall (about 750mm – 1000mm) support the growth of woodlands and (500-700mm) favour the growth of grasslands.
- Areas that receive little amount of rainfall (250-500mm) result into growth of semi – arid stunted vegetation(shrubs)
- Areas with hot temperatures (20-30^{0}C) favour the growth of semi desert thorny bushes
- Areas that experience cool temperature (0-10^{0}C) result into growth of heath vegetation
- Areas with abundant light result into growth of dense vegetation.

The influence of soil types (adaphic factors) in terms of fertility, moisture and texture.

- Areas with fertile well drained deep soils favor the growth of dense vegetation
- Areas with thin infertile sandy soils encourage the growth of stunted and scattered vegetation.

The influence of drainage

- Swampy/wetlands attract luxuriant papyrus vegetation
- River courses favor t5he growth of luxuriant forest vegetation
- Coastal marshes favor the growth of mangrove forests

The influence of relief (altitude)

- Lowly areas favor the growth of lowland forests
- Highland/ mountain areas are covered by montane vegetation where;
    - Lower slopes with less rainfall (500-700mm) favour the growth of savannah grasslands(below 1000m above sea level)
    - Mid altitude slopes (1000-2000m) receive heavy rainfall which support the growth of rain forests.
    - High slopes (2000m and above with low temperatures, low rainfall, snow bare or thin soils support bamboo, and temperate vegetation. Heath and moorland vegetation follows at 3500 – 4500m.
    - Wind ward slopes of mountains encourage the growth of dense vegetation while above 4500m plant growth is limited due to low temperatures.
    - Lee ward slopes encourage the growth of poor and dry savannah vegetation.

The influence of latitude. Areas near the equator receive heavy rainfall (1000-1500mm) and hot temperatures 20^0C – 30^0C leading to growth of forests.
Areas which are far from the equator receive moderate rainfall (500-1000mm) and hot temperatures leading to growth of Savannah.
The influence of government policy in terms of gazzeting land for forests and degazzeting forest reserves into other land use for example gazzeting areas for frorests, conserve them while degazzeting forest lands leads to loss of forests.
The influence of human activities like;

- Lumbering and cultivation leads to loss of vegetation (forests)
- Bush burning and overgrazing have changed forests into Savannah and semi-desert vegetation.
- Swamp reclamation and industrialization lead to loss of vegetation.

The influence of ocean currents. Areas bordering warm ocean currents favour the growth of dense forest vegetation.

Tropical Rain Forests
Characteristics of tropical rain forests

- Trees have buttress roots to give extra support
- Trees are ever green because they shed off leaves at different intervals
- Trees have broad leaves
- Trees grow in mixed stands/impure stands
- Trees produce hard wood
- Trees have climbing plants
- Trees for three distinctive canopies
- Trees are closely packed
- Some tree species can grow as tall as 70m high

Factors which have favored the growth of forests in east Africa .

- Presence of heavy and reliable rainfall above 1500mm distributed throughout the year faor the growth of trees
- Constant hot temperature (20^0C- 30^0C) which favor the growth of tall trees.
- The existence of well drained deep fertile soils favors the growth of big trees.
- The presence of low altitude with deep soils and favorable temperatures favor the growth of big trees
- The existence of high humidity over 50% prevents excessive evapo-transpiration leading to growth of big forests.
- The favorable government policy towards forestry by gazetting forest reserves and formation of NEMA and NFA protect forests.

- The nature of some forests being thick and impenetrable discourages human exploitation.

Land use practices in forests

- Lumbering for timber
- Subsistence crop growing in same patches of cleared areas. Crops like bananas, pine apples, yams, cassava, beans and maize.
- Forests are used for wild life conservation and promote tourism.
- Forests provide medical herbs.
- Forests are reserved for water catchment areas to protect water resources
- Forests are used for recreation for example natural walks, outings and picnics
- Forests are used for study purposes
- Hunting of wild animals for meat like antelopes

Savannah Vegetation

Savannah means grasslands. It covers the biggest part of East Africa. It is divided into;

i) Savannah grassland
ii) Savannah woodland

Characteristics of Savannah grassland

- Grass is tall close to the equator and short towards the arid region
- It is dominated by elephant and spear grass towards the equator margins
- Savannah grassland have isolated or scattered trees
- The tree species are hard wood
- Trees are umbrella shaped
- Trees have tiny leaves in the drier margins
- Trees are deciduous
- Trees are stunted with twisted trunks
- The grass wither/turn yellow/brown during the dry season and green in the wet season
- Trees are fire resistant for example Acacia and Baobab
- Most trees develop branches at low heights
- Most trees like baobab have swollen trunks to store water during dry season
- Most trees are drought resistant
- Trees are short and scattered/medium height

Examples of areas covered by Savanah grasslands are;

- The Nyika plateau of Kenya and Tanzania

- The rift valley floor of Western Uganda

Savannah woodlands

These are grasslands with continuous cover of trees. Trees are between 8-16 meters tall

Characteristics of Savannah woodlands

- There is a close cover of trees
- The tree are of mode height (8-16m)
- The trees are umbrella shaped
- The trees are deciduous
- There is dense undergrowth due to sunlight penetration (these are grass and shrubs)
- Trees are drought resistant
- Acacia are the dominant tree species
- Trees are hard wood

These woodland savannah are commonly found in central and south western Tanzania (the Miombo woodland)

The land use type of the savannah vegetation

- Animal keeping for example nomadic pastoralism
- Subsistence crop cultivation especially maize, millet and sorghum
- Wild life conservation in the national parks and game reserves
- Population settlement although the density is highly sparse
- Hunting for meat
- Afforestation programs in the margins of the forests

Semi desert vegetation

This type of vegetation is a characteristic of areas with very hot temperatures (over 30^0C) and very light rainfall of below 250mm

The semi-desert vegetation is in places like;

- Northern Kenya
- North eastern Uganda

Characteristics of semi-arid vegetation

- The shrubs are very short (1-3 meters)
- The trees are thorny
- The trees are scattered
- Trees have small waxy leaves
- Trees have deep tap roots

- Trees are stunted due to very little rainfall totals received.
- The main tree species are cactus and xerophytes
- Trees are fire resistant and drought resistant
- Trees are deciduous.

Land use types (practices) in desert vegetation areas

- Nomadic pastoralism
- Mining for example Gold,
- Hunting
- Bee keeping

Problems of land use types in desert areas

- Very little/light rainfall of less than 250mm
- Very hot temperatures of more than 30^{0C}
- Limited water, inadequate water due to limited surface water resources
- Remoteness due to limited transport

Factors for the growth of semi-Arid

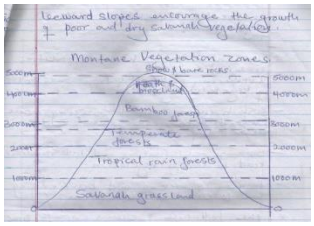
- Presence of very light rainfall lead stunted growth of trees ad shrubs
- Very hot temperatures over 30^{0}c causing high evaporation hence small level
- Infertile sandy soils leading to short trees and poor grass
- Relatively flat landscape hence hot temperatures accounting for the growth of short and stunted trees
- Poorly drained areas due to limited moisture hence growth of drought resistant trees
- Low humidity content of less that 30% due to small leaves. This leads to little rainfall hence poor and stunted growth of trees.
- Man's interference through overgrazing, bush burning, open cast mining and bore hole drilling have cleared savannah

Montane vegetation

Montane vegetation occurs in high land/mountain regions

a) Montane vegetation is influenced by changes in temperature
b) vegetation varies from bottom to the top of the mountain
c) vegetation zones gradually merge into each other with increase in altitude
d) the lower slopes are dominant with grass
e) savannah grassland merges into tropical rain forests between 1500 – 2500mtres
f) temperate and bamboo forests occur at 2500 and 3500 m above sea level

g) temperate and bamboo forests are replaced by heath and moorland between 3500-4500mm



Swampy Vegetation

Swamps are found in wetlands which are water logged. They are found along river valleys, on shores of lakes, at the coast of east Africa/marshes and low lands/valleys

In east Africa they are divided into two types:

- mangrove swamps
- wetlands/marshes

Characteristics of swamp vegetation

- mangrove swamps grow aerial roots
- the trees and papyrus are ever green due to constant water supply by water from rivers, lakes, coastal lakes and high rainfall
- wetlands/swamps have papyrus vegetation
- the mangroves have broad leaves to trap sunlight for photosynthesis
- the trees are umbrella shaped and develop branches near the ground
- trees are short about 10metres or less

Land use practices of the swamps

- farming especially growing of yams, wetland rice and grazing animals
- brickmaking along the swamps
- swamps act as water reservoirs
- afforestation especially pine and eucalyptus
- wild life conservation for example of rare animals and birds for example crocodiles, hippopotamuses and birds
- fish farming in ponds

Dangers of swamps and wetlands today

- Removal of soil especially clay and sand for brick making hence leaving behind open holes.
- Pollution by chemical substances from industries
- Sewage and plastic wastes in areas around urban centers.

Chapter 10: **Climate Change in East Africa and the World**

What is climate change?

Climate change refers to a change in global or regional climate patterns.
Climate change is a long term change in the expected patterns of weather of a region over a significant period of time

Over the years, there has been a change in the elements of weather and climate over the world. Scientists have confirmed that climatic conditions are no longer the same as they used to be.

Indicators of climate change

These are things that show climate has changed over the years;

- Rainfall seasons started in the months that were known while in the present, the rainy seasons come late, too early or unpredictable.
- Prolonged droughts in some areas
- Heavy rainfall in some areas
- Very hot temperatures that have led to melting of glaciers such as those of Rwenzori mountains
- Air temperatures are increasing
- Glaciers are melting/snow is decreasing
- Sea levels are rising
- Ocean heat content is increasing

Causes of climate change

Climate change is caused by both natural factors and human activities.

Natural causes of climate change

- Volcanic eruptions
- Earth's revolution changes/orbital changes
- Reflectivity or absorption of the sun's energy
- Solar effect/solar variations
- Ocean currents

Human activities that cause climate change

- Industrialization releases greenhouse gases (smoke) to the atmosphere
- Exhaust fumes from motor vehicles
- Deforestation leads to destruction of trees which act as "carbon sinks"
- Bush burning by pastoralists
- Swamp reclamation

- Poor waste management such as burning, burying in landfills produces carbon dioxide and methane
- Rapid population growth increases demand for food and leading to deforestation for fuel and space for settlement.
- Open-cast mining destroys natural vegetation which would otherwise absorb carbon dioxide
- Road construction
- Pollution by cars

Global Warming

Global warming refers to the increase in global temperatures.

Or

Global warming refers to a general rise in the temperatures of the earth's atmosphere. This rise in temperatures has been a major aspect of climate change.

Causes of Global Warming

- Solar effect i.e. an increase in sun's heat energy received on earth
- Volcanic eruptions which releases gases and dust particles into the atmosphere
- Bush burning by pastoralists which increases carbon dioxide levels in the atmosphere
- Swamp reclamation because swampy areas release methane gas in the atmosphere
- Poor waste management such as burning, burying in landfills, produces carbon dioxide and methane
- Rapid population growth increases demand for food and land, leading to deforestation to provide fuel and space for settlement, as a result more greenhouse gasses are produced
- Open cast mining destroys natural vegetation which would otherwise absorb carbon dioxide in the atmosphere.

Effects of Global Warming

- Famine due to decline in agriculture
- Drought causing limited water for animals and plant growth
- Wild fires due to an increase in temperatures that generates a lot of heat, which destroys forests.
- Changing patterns of rainfall causing crop failure
- Hot temperatures due to increase in solar radiation
- Rising sea level causing flooding

- Changes in plant life i.e. loss of plant species as they dry or wither, they become less productive due to stress caused by heat waves
- Changes in animal migrations and animal life cycle

Greenhouse Effect

The warming of the earth's atmosphere by the sun's rays can be compared to what happens in a greenhouse. A greenhouse is a structure with walls and the roof made of transparent materials such as glass in which plants requiring regulated climate conditions are grown for example vegetables and tomatoes.

How a Greenhouse Works

A greenhouse stays warm inside, even during winter. In the day time, sun shines into the greenhouse and warms the plants and air inside. At night-time, it is colder outside but the greenhouse stays pretty warm inside. That is because the glass walls of the greenhouse trap the sun's heat.

Similarity between a Greenhouse and the Atmosphere

The greenhouse effect works much on earth. Gases in the atmosphere, such as carbon dioxide, trap heat just like the glass of a greenhouse. These heat-trapping gases are called **greenhouse gases**. [Others include: **Chloral-ferrous-carbons, carbon monoxide and methane]**

During the day, the sun shines through the atmosphere. Earth's surface warms up in the sunlight. At night, earth's surface cools, releasing heat back into the air. But some of the heat is trapped by the greenhouse gases in the atmosphere.

Greenhouse Effect on Global Warming

When the sun rays reach the earth, they are turned into heat energy. The earth is warmed up and it in turn releases this heat into the atmosphere. The gases which include carbon dioxide, methane, nitrous oxide, water vapour among others do not allow this heat to freely escape to the outer atmosphere. This is what is known as the **Greenhouse effect**.

The greenhouse effect is an important part of the earth's climate, without which the planet would be much cooler. This effect is natural and not new.

However, when the greenhouse gases increase in the atmosphere, naturally or through human activities, the temperature will increase beyond what is supposed to be normal. This is referred to as **enhanced global warming**.

Difference between Natural Global Warming and Enhanced Global Warming

Global warming exists naturally to maintain temperatures on planet earth by gases that exist in natural concentrations. **Enhanced global warming** is as a result of increased greenhouse gases in the atmosphere leading to less heat escaping into space, more heat re-radiated to the earth.

Similarities between Enhanced and Natural Global Warming

- Solar radiation from the sun reaches the earth normally
- The earth re-radiates the heat in both

Causes of Enhanced Global Warming

- Increased burning of fossil fuels like coal, oil, and natural gas
- Increased clearing of land for agriculture use
- Increased urban development
- Increased use of automobiles
- Increased levels of industrialization
- Increased swamp reclamation
- Increased bush burning by pastoralists

Effects of enhanced global warming

- Increased temperatures
- Shortage of water
- Shortage of food
- Foods
- Wildfires
- Death of livestock due to prolonged drought
- Crop failures
- Landslides

Benefits of global warming

Global warming is generally regarded as totally dangerous. However, several scientists think that the increasing temperatures could actually be an advantage to mankind, particularly farmers;

In some high latitude areas;

- Increase in temperature , a variety of n crops grow because the growth period for crops increases
- Increase in temperature in high altitudes mean more warmer days for crop growth
- The growing seasons become longer which results into increased agricultural production.

Activity – 10.5 table 10.1

Effects of climate change in east Africa and other parts of the world

- Shortage of water in some parts of the world
- Shortage of food due to prolonged droughts
- Flooding due to increasing water levels
- Death of livestock due to prolonged droughts
- It has led to increase in temperatures which makes many pests and diseases to thrive
- Waterborne diseases due to floods
- Displacement of people/migrations
- Loss of vegetation cover
- Wildfires which destroy property and cropland
- Landslides leading to loss of lives
- High increase in temperatures and heat waves
- Stronger storms
- Changes in plant life cycle
- Migrations of animals and extinction [birds and whales]
- Thawing permafrost/melting of glaciers
- Rainfall unreliability leading to crop failures
- Drying of crops during prolonged drought

Case studies; - Somalia, Australia, Uganda

Ways of controlling climate change in east Africa

- **Planting trees** to modify the climate and creating carbon sinks to clean the atmosphere [Afforestation and Re-afforestation]
- **Population control** through family planning methods [like celibacy]
- Proper waste management such as the **recycling /treatment of waste**
- **Sensitizing people** about the benefits of conserving the environment
- **Establishing and enforcing strong laws** to safeguard the environment
- Use of **energy saving technologies** in order to conserve forests e.g. cooking using energy saving stoves
- Use of friendly environmental **alternative sources of fuel**s such as solar, bio-gas, and wind power so as to conserve forests
- **Research into disease resistant**, high yielding and drought resistant crop varieties
- **Rainwater harvesting** so as to have water supply throughout the year

- Construction of water reservoirs/ dams and ponds for use during the dry seasons
- **Practicing irrigation** farming for food security
- Adopting use of **environmentally-friendly means of transport** such as bicycles
- **Conservation of available resources such as forests, swamps**, by gazetting them into national parks, sanctuaries, etc.
-

Global agreements on controlling climate change (learners' book … act 10.13)

Difficulties faced in trying to control climate change

- Inadequate funds for adoption most especially in developing countries
- Limited support from government
- Incapable leaders
- Inadequate information on climate change

Chapter 11: **Climate Zones of the World**

Climate is an area's long term weather patterns. The simplest way to describe climate is to look at the average temperature and precipitation over time.

Whereas it is easy to do this by looking at weather data, it is important to consider all the factors that work together to determine climate.

Factors that influence/ factors affecting climate.

Latitudes; places located at high latitudes (far from the equator) receive less sunlight than places at low latitudes (close to the equator)

Relief; mountains receive more rainfall than lowlying areas because as air is forced over the higher ground, it cools, causing moist air to condense and fall out as rainfall.

When the place is higher above sea level the colder it will be. This happens because as altitude increases, air becomes thinner and is less able to absorb and retain heat. That is why you may see snow on the top of mountains all year round.

Distance from water bodies; the water body affects the climate of a place. Coastal areas are cooler and wetter than inland areas.

The centre of continents are subject to a large range of temperatures. In summer, temperatures can be very hot and dry as moisture from the sea evaporates before it reaches the centre of the landmass.

Direction of prevailing winds; winds that blow from the waterbodies often bring rain to the coast and dry weather to inland areas. Winds that blow from warm inland areas tend to be warm and dry.

Distance from the equator; areas near the equator are hotter than areas far from the equator.
Ocean currents; ocean currents can increase or reduce temperatures

Major world climatic zones

World climatic zones have been classified in categories each with sub-climatic types and this is done depending on the distance from the equator.

Location of world climatic types and regions
(provide learners with an atlas and guide them to locate climate zones)

Climatic zones	**Region of location**
Polar zones	They are found near the southern and northern poles
Temperate zones	Between the tropics and the polar regions of the earth
Savannah zones	Found between the equator and the tropics
Tropical zones	This zone is found near the equator
Deserts	This zone lies between 15^{o} and 35^{o} north and south of the equator
Mediterranean zones	Located along the western sides of continents, between roughly 30^{o} and 45^{o} north and south of the equator

Polar region/zone

Polar zones are found north of the arcticcircle and south of the Antarctic circle. Cold climates describe this climate type perfectly.
These climates are part of areas where permanent ice and tundra are always present, and only about four months of the year have above freezing temperatures.
Polar climate zones, Alaska in the USA, Norway, Finland, Iceland, Denmark.

Characteristics of polar climate zone/region

- It is very cold and dry throught the year
- The summers are cool while winters are very cold
- Every month has an average temperatures of less than 10^{o}c
- Precipitation comes in form of snow

- Winters are long while summers are short

Temperate Zones

Temperate zones lies roughly between 25^{o} and 60^{o} North and south latitudes. It lies between the tropics and the polar zones. These climates have warm dry summers and cool wet winters.

Temperate climatic zones;, Austria, Belgium, Canada, France, Italy, USA.

Characteristics of temperate climate zone/region

- Moderate temperatures and rainfall throughout the year
- Cold snowy winters
- Hot humid summers

Tropical zone

This zone is located near the equator. It lies between 23$^{1}/_{2}$N and 23$^{1}/_{2}$ S of the Equator. Most tropical climates are known for high temperatures all year round and for their large amount of annual rainfall.

Tropical climate zones;, DRC, Uganda, Tanzania, Liberia Kenya, Ecuador, Peru, Brazil, Venezuela, Colombia, India, Sri Lanka.

Characteristics of Tropical climate zone/region

- Hot temperatures of between 25^{o}C and 27^{o}C
- Heavy rainfall of about 1500 mm annually
- Some areas experience double maxima of rainfall
- High relative humidity

Desert climate zone

Most deserts lie between 15^{o} and 35^{o} North and South of the Equator. All over the world many deserts lies in these regions e.g. Sahara, Kalahari, Arabian desert, Atacama desert.

Desert zones include Iraq, Jordan, Kuwait, Oman, Saudi Arabia, Botswana, Namibia, Egypt, Libya.

Characteristics of Desert climate zone

- Hot temperatures of about 35^{o} C
- Low and unreliable rainfall
- Very low humidity
-

Chapter 12: **Mining in East Africa**

Mining is the extraction of underground minerals.

Minerals are naturally occurring elements on planet earth with unique chemical and physical properties, exploited by man for several uses.

Classification of minerals

Minerals are categorized into 3 major classes' i.e. Metallic minerals, Nonmetallic and mineral fuels

Metallic minerals	Non-metallic minerals	Mineral fuels
- iron ore, - gold, - cobalt, - copper, - lead, - zinc, - wolfram, - manganese, - silver, - uranium, - nickel, - tungsten - Aluminum.	- Salt - Potash - Limestone - Marble - Sulphur - Soda ash - Diamonds - Gypsum - Mica - Granite	- Coal - Oil/petroleum - Natural gas - Peat - Tar sand

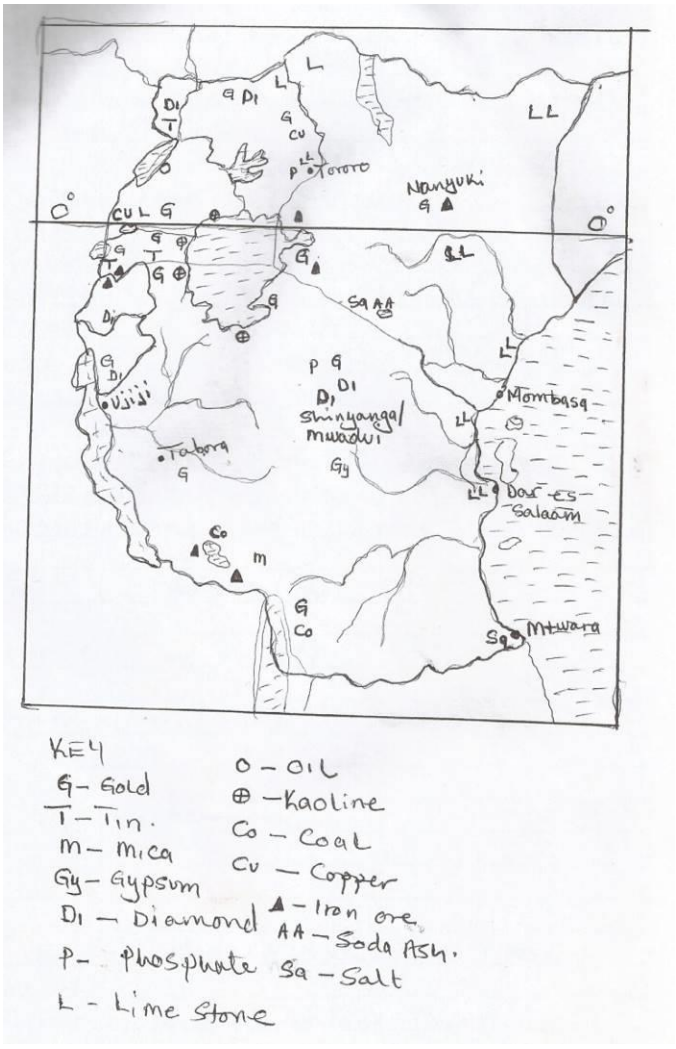
Differences between metallic and non-metallic minerals

Metallic minerals	Non-metallic minerals
- They are generally hard - They are mostly found in igneous and metamorphic rocks - They are a good conductor of heat and electricity - They are ductile and malleable, can be turned into sheets and stretched to produce wires	- They are soft - They are mostly found in sedimentary - They are a poor conductor of heat and electricity - They are not ductile and malleable, so they break into pieces when hit hard.

Distribution of Minerals I n East Africa

Minerals are found in different parts of east Africa in varying amounts

Sketch Map Of East Africa Showing The Mineral Resources



Major minerals and mining centers in each country

Country	Major minerals	Location/mining centre	Exported/ used locally
Uganda	- Copper - Limestone and phosphates in - Gold	- Kasese/Kilembe mines. - Tororo,Karamoja and Kasese. - Karamoja, Kitgum, Mubende, Kabaale and Bushenyi. - Mbarara, Kigezi - Albertine region, Semuliki basin,	

	- Tin - Petroleum/oil - Salt - Cobalt - - Iron ore, tin, - Kaoline, sand and clay - Tungsten	Hoima-Masindi, Lake George-Edward basin, Butiaba, Wanseko, Paraa, and Pakwach. - L. Katwe(Kasese) - Kilembe mines/ Kasese - Kigezi(Kabale) S.W Uganda. - lake Victoria shores - Kabale	
Kenya	- Gold - Tin - Limestone - Soda Ash (Trona) and Salt - Gypsum	- Kisumu - Eldoret - Mombasa - Lake Magadi - Garissa, and Malindi	Locally used
Tanzania	- Diamond - Coal - Sand and clay	- Shinyang/ Mwadui - Mbeya - Mwanza	

			Locally used

Uses of copper

- Copper is used in making electric wires.
- Copper is used in making coins.
- For making copper ornaments.
- It is used in making tins.

Uses of Diamond

- Diamond is used for making precious jewellery.
- Diamond is used in polishing.
- Diamond is used to make cutting instruments for glass.
- It is sold for foreign exchange.

Uses of coal

- Coal is used in making plastics.
- Coal is used as fuel
- Coal is used in making paints.
- Coal is used making tar.
- Coal is a source of revenue when sold.
- Coal is used in making alloys.
- Coal is used in making pharmaceuticals.

Uses of Lime stone

- Limestone is used in the manufacture of lime.
- Limestone is used in manufacturing cement.
- Limestone is used in processing iron ore.
- Limestone is a source of revenue.
- Lime is used in making fertilizers.

Uses of soda ash

- Soda ash is used in glass making industries.
- Soda ash is used in soap making industry.
- Soda ash is used for making chemicals like bicarbonate, caustic soda, drugs and other chemicals.
- It is used in manufacturing disinfectants/detergents.
- It is used for softening water in oil refineries.

Uses of gold

- Gold is used for making beautiful ornaments and jewellery.
- Gold is used as a medium of exchange.
- Gold is sold to obtain income.

Uses of Asbestos

- Asbestos is used for making fire proof materials.
- Asbestos is used in making roofing materials.
- It is mixed with cement to make asbestos cement, roofing sheets and pipes.

However some products of Asbestos like roofing sheets are associated with health problems like cancer.

Uses of Mica

- Mica is used in making electrical insulators.
- Powdered mica is used in coasting and roofing.
- Mica is used in radio components.

SALT MINING

Salt mining is mined from lake Katwe in Queen Elizabeth National Park.

MINING PROCESS

Salt mining in Lake Katwe is mined by dredging method.

- Brine is got from the main lake through the trenches into the pans.
- Brine in the pans is heated by the sun and evaporation takes place.
- During evaporation, scum forms on top of the brine.
- Scum is then sediment for about 8-10 days.
- After 8-10days, slat crystals are dredged out of the pans and washed by brine.
- Salt crystals are them pilled on heaps ready for sale/consumption.

Methods of mining

There mainly three (3) methods of mining i.e.,

- Opencast/Quarrying method
- Underground/tunnel method
- Alluvial/Placer method

Open cast method

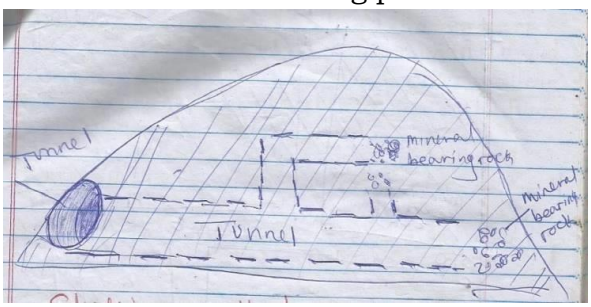
This method is also known as pit method or quarrying method.

- Open cast method is used to extract the minerals which appear near the earth's surface like limestone, lead, sand, clay, murram, granite rocks, exposed coal and diamonds.
- It involves the removal of the unwanted top layer of soil by excavators, hoes and spades.
- After exposing the mineral, the mineral bearing rock is broken into pieces by explosives.
- When it is sand, clay or marrum it is scooped out by excavators or spades.
- The mineral ores are then loaded onto trucks to be taken for sale or for refinery.

The underground method
Adit method/Tunnel method

This method is used to extract mineral which appear deep in the ground for example copper, cobalt, uranium, gold, coal etc.

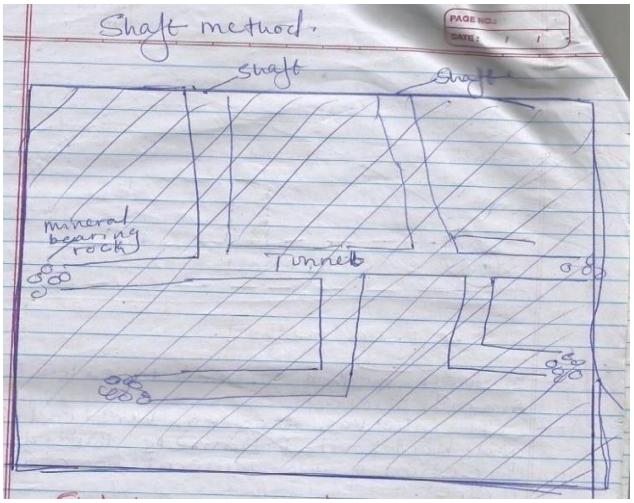
- Horizontal or gently inclined tunnels are driven into the hill side.
- When the mineral bearing rock is reached it is blasted loose using explosives.
- The mineral ores are then transported out of the tunnels by light railway or convey or belt to the smelting plant.



Shaft method

A shaft method is used to extract underground minerals.

- It involves digging vertical shafts and horizontal tunnels towards the direction of the mineral bearing rocks (ore)
- After reaching the mineral ore/rocks are blasted by explosives (dynamites) into small pieces.
- The pieces are lifted up by conveyor or trains to be processed.



Shaft method

Solution method

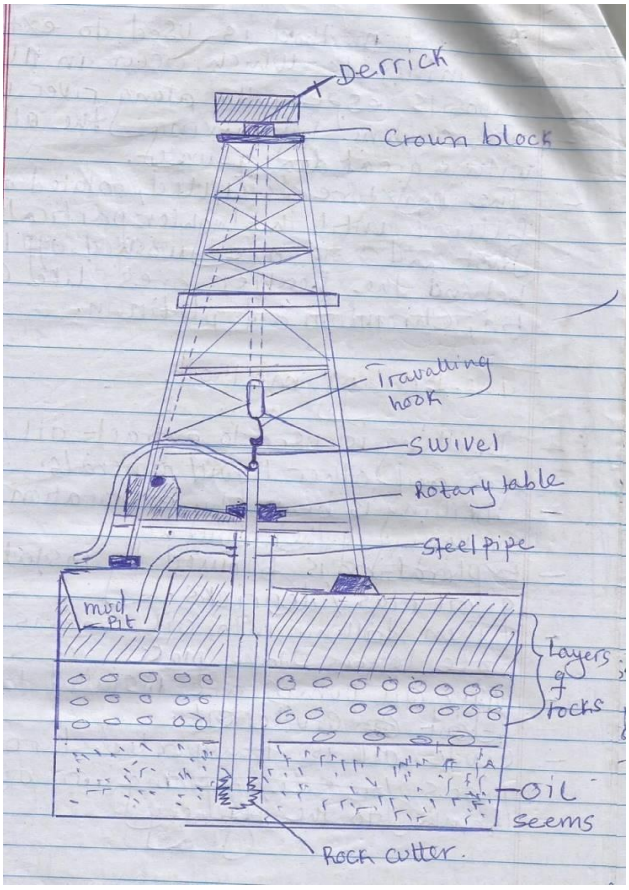
- Solution method is used to extract minerals that can dissolve in water. These minerals include; salt, potash, sulphur.
- Pipes are drilled down where there are deposits.
- Suer heated steam/water is injected inside to dissolve the mineral into solution.
- The solution is then pumped to the surface.
- At the surface, the water is evaporated to leave the mineral.

Alluvial/Placer method

- Alluvial method is used to extract the minerals which occur in alluvial deposit especially along river valleys.
- It is done by mixing the alluvial with a great deal of water.
- The mixture is tittled, rotated and filtered until the lighter particles (mud, dust and sand are washed off leaving behind the heavier ores like gold, tin, chromium and platinum.

The Drilling method

- Drilling is used to extract oil, natural gas and other liquid minerals.
- Drilling is begun by exploitation or surveying of the mineral.
- Exploitation is followed by installation of oil rigs/derricks.
- Then drilling into oil seems of layers take place.
- After oil; pumps are installed to pump out crude oil.
- Crude oil is transported through pipes or oil tanks to the refinery.



Factors that influence the development of the mining industry in East Africa

- Presence of a variety of mineral for diversification of the mining activities.
- The presence of high quality minerals for commercial exploitation.

- The existence of minerals near the surface for cheap extraction by open cast method.
- The presence of gently sloping relief making the minerals accessible.
- The existence of large mineral reserves hence enabling commercial exploitation for a long period.
- The existence of limited vegetation covers like forests and swamps making exploitation easy.
- Presence of soft rocks overlying the mineral ore/oil and natural gas in sedimentary rocks which are easily broken by explosives and hard rocks for adit mining.
- The availability of improved transport systems in form of railway and roads for cheap transportation of minerals.
- The availability of relative political stability around mining centres for safety of miners and confidence to foreign mining investors.
- The availability of skilled and semi-skilled labour to work in the mines e.g. to carry out exploitation, surveying, processing mining and transport.
- Application of modern technology brought by mining companies for example drilling, rigs, conveyors, head vision gadgets, use of cables and adit methods.
- The availability of adequate capital to invest in buying mining equipment, mineral exploitation and processing.
- The availability of reliable forms of energy like thermal energy, and HEP energy for processing, refining and smelting minerals.
- The supportive government policies towards mining by giving mining contracts to potential mining companies, maintaining security and fair compensation to landowners in mining areas.
- The availability of good international relations to provide market for the minerals and processed goods.
- The availability of research into different uses of all minerals.

Problems facing the mining sector in East Africa

- Political instabilities and insecurity scarce potential investors and diverting resources to defense
- Underdeveloped mining infrastructure like railway lines, roads in the mining areas affect marketing of minerals.
- Limited government support towards mining through failing to give soft loans to small scale miners causing low production.
- The availability of other resources like agriculture, forestry and finishing leading to diverting of scarce capital and skilled labour.
- Limited power supply like HEP with a lot of load shedding and absence of other sources of power like coal and nuclear energy for exploiting, smelting and processing minerals.
- Limited skilled labour to work in the mining sector in form of mineral surveyors, geologists and processors result into overdependence on foreign expatriates who are expensive.
- Exportation of crude oil reduces foreign income due to low prices.

- Inadequate internal market due to low levels of the manufacturing sector to buy the mineral for raw materials.
- Exhaustion of minerals like copper and gold due to over exploitation hence affecting the mining activities
- Price fluctuation for minerals like oil, copper and iron ore because of completion from other producers like USA, china, and Russia result into imbalance of trade and imbalance of payments.
- High costs of mining operation due to use of outdated technology, use of foreign expatriates who are expensive and the increasing depth of minerals like Gold and diamonds.
- Constant strikes by labour in the mind of gold, iron ore and lead. This is cause by poor working conditions and little salaries which result into expensive destruction of equipment.
- Frequent civil wars in most countries for example of Congo lebels, civil war in South Sudan and in Somalia scare away potential mining investors due to fear of losing life, smuggling of minerals by lebels and halting production.
- The declining market for some minerals like copper and cobalt.
- Appearance of some minerals like Gold, uranium and iron ore in small quantities discourage commercial exploitation in Uganda and Kenya.
- Appearance of some minerals in deeper layers with hard rocks which are expensive to exploit for example copper and tin in Uganda, and oil in the Albertine region.
- Presence of backward culture in some areas who are hostile, and ignorant. They attack workers and investors
- Presence of thick and dense vegetation makes transport and exploitation difficult and expensive.
- Existence of minerals in rugged, and steep slopes with escarpment and mountains make transport difficult and constant loss of property and lives due to landslide.
- Occurrence of accidents in the mine due to collapsing mine walls, flooding of mine pits result into loss of lives and destruction of property.
- The poor drainage near rivers, lakes and swamps with floods affect transport, exploitation, surveying and mechanization.
- The presence of disease vectors and diseases near forested mining centres like mosquitoes, tsetse flies and snails scare worker and investors.
- The presence of a lot of poor quality minerals scattered, small quantities, which are not good for commercial exploitation like Gold in Uganda, Kenya, and Tanzania.
- Presence of physical obstacles like relief vegetation, landforms, lakes, swamps, rivers and hard rocks make mining very expensive.
- Appearance of mineral in deeper layers which are expensive to exploit and transport.

Effects of mining on the environment

- Mining leads to destruction of vegetation cover when opening up mines which affect the ecosystem.

- Mining leads to noise, air and water pollution by huge explosives, dust while processing minerals, oil spills in water sources and acids from industries which affect all living organisms in the mining areas.
- Mining leads into destruction and denaturing of the landscape due to excavation.
- Mining especially of limestone and lead exposes infertile soils which are difficult for plant growth.
- Mining pits collects water forming breeding grounds for mosquitoes which spread malaria.
- Mining leads in reduction f rainfall totals due to deforestation.
- Mining leads to displacement of people due to expansion of mines and the unbearable explosions and noise.
- Mining leads to loss of lives due to mine accidents because of collapsing walls, and mining related diseases like sileasis a long disease cause by inhaling too much dust and poisonous gases trapped into the rocks.
- Mining has led into profit repatriation due to foreign mining companies dealing in mining, smelting ad refining of minerals which affect national development.
- Mining leads into development of towns which come with their associated shot comings like congestion, crime, gambling and prostitution, thefty, counterfeits and forgery.
- Mining leads into regional imbalance in terms of infrastructure compared to other areas without minerals. This leads into rural urbanization.
- Mining affects/reduces agricultural land especially where open cast method is used and where broken debris are left which are infertile.
- Weakening of rock structures and lead to land slides which may lead to loss of lives.
- Mining leads to political insecurity caused by the unfairly displace local people who feel unfairly compensated.

Benefits of Mining

- Mining provides employment opportunities to thousand of workers working in the mines, and processing/refineries. This results into improved standard of living.
- Mining is a source of government revenue through licences, fees and taxes imposed on mining companied and refineries which is used to develop the economy.
- Mining is a source of foreign exchange after exporting minerals. This is water for foreign transactions.
- Mining is a source of raw materials for industries for example refineries, smelters and processing industries for example limestone to cement industries.
- Mining stimulates the development of transport infrastructure such as pipe line, roads and railways that link the mining centres to processing, smelting and refinery centre.
- Minining stimulated the development of towns near mining centres, refineries and processing centres. These, refineries and processing centres. These provide social and economy facilities such as trade health and education to people.

- Mining attracts foreign capital in flow through foreign investment in mining, processing and refining of minerals.
- Mining leads to development of skills to workers like mining engineers, geologists minerals surveyors and mapping.
- Mining promotes agriculture trough creating a great demand for agricultural products like milk, beef, fruits and other food stuffs to miners.
- Mining promotes international relationships through giving mining contracts and promotes trade between countries.
- Mining stimulates tourism. Mining centres attract foreign and local tourists interested in geological study and research.
- Mining promotes economic diversification hence reducing the reliance on a few sectors like fishing, forestry and agriculture for employment and government revenue.
- Mining earns a country international respect through the exportation of minerals.
- Mining is a source of power and energy used in homes and industries for example oil, coal, natural gas and uranium for nuclear energy stations.
- Mining reduces the government expenditure on imported minerals such as oil, natural gas and limestone/salt hence helping to improve the balance of payment.

Chapter 13: Development of Manufacturing Industries in East Africa

An Industry is an establishment which is set to process raw materials to manufactured goods of greater value using capital and labour.

Types of industries
There are 3 types of industries ie;
Primary industries.
Secondary industries.
Tertially industries.

Primary industries are the ones which deal in extracting raw materials from their natural form.
For example
Agriculture. Minning.
Fishing . Forestry.

Secondary industries. These process raw materials produced by primary industries into final manufactured / consumable goods.
Examples
Fish canning (for fish) Paper and pulp industries
Textiles (process cotton)
Food processing / Refineries.

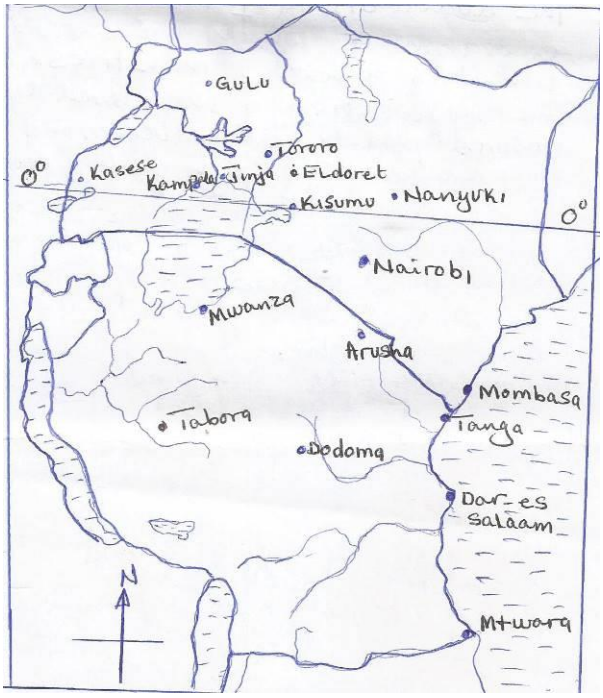
Tertiary industries: These deal in the provision of services to the people.

Examples.
Banking ,tourism ,Insurance, Transport, Hotel industry.

N.B: The East African Countries are dominated by the primary or extractive industry (Agriculture).

N.B: Petroleum, plastic and iron and steel industries depend on imported raw materials.
Industrialization in East Africa is mainly hindered by low income levels and the size of domestic market.

THE MAJOR INDUSTRIAL TOWNS OF EAST AFRICA



The major industries found in the major industrial towns of East Africa.

Kampala
- Food processing (Grain milling companies)
- Textile industries.
- Fish processing industries.
- Furniture making industries.
- Cigarette making
- Chemical making industries.
- Soft dinks industries
- Brewing industries
- Corrugated roofing sheets
- Foam manufacturing
- Car batteries
- Moto vehicle assembly
- Printing and papermaking
- Pharmaceuticals

- Steel rolling
- Engineering

Jinja
- Food processing / grain milling industries.
- Steel rolling
- Leather tanning and shoe- making.
- Iron and steel industries
- Brewing of beer at Njeru
- Textiles.
- Vehicle repairing
- Tororo
- Cement making Chemical making industries
- Steel works industries Confectioneries
- Grain milling factories
- Foam matress manufacturing

Kasese
- Cement processing
- Cobalt processing
- Food processing
- Cotton ginning
- Grain milling factories
- Hotel and accommodation

Mbale
- Textiles industries
- Cosmetics industries
- Confectioneries Edible oil industries
- Soap making
- Mineral processing (cement processing).

Nairobi is the leading industrial town in East Africa.
- Industries located in Nairobi.
- Vehicle assembling
- Brewing
- Wood furniture and printing
- Food processing
- Distilling
- Edible oil making and drinks
- Textiles and clothing
- Steel rolling industries
- Foot wear
- Cigarettes making
- Rubber processing
- Pharmaceuticals
- Beverages

Mombasa
- Petroleum refineries
- Brewing

- Ship repairing
- Food processing
- Vehicle assembling
- Cement manufacturing
- Coffee milling
- Corrugated iron sheet
- Plastics
- sack making
- Soap making

Dar-es-salam
- Petroleum refinery
- Cement making at Wazo hills
- Ship repairing
- Food processing
- Motor vehicle engineering
- Textiles
- Brewing
- Grain milling
- Meat packing
- Printing
- Corrugated iron sheet

Industries in Tanga
- General engineering
- Beverages
- Breweries
- Cement making
- Food processing
- Textiles
- Wood and paper making

Industries in Mwanza
- Textiles
- Food processing
- Leather
- Wood and paper products
- General engineering
- Soft drink making
- Chemical making industries
- Vehicle repairing
- Ship repairing

Factors which have led to the development of industries in East Africa
- Presence of large / cheap land for industrial establishment / flat land for industrial set up.
- The presence of cheap raw materials to be used in industries for example agricultural products, fish and minerals like lime stone.
- Presence of reliable fresh water supply used in cooling of machines and in the making of soft drinks like sodas.

- The influence of conducive climate which support setting up of agro-based industries.
- The availability of adequate capital to invest in buying raw materials, machines and pay workers.
- The availability of cheap skilled and semi-skilled labour to work in the various activities in the industries.
- The availability of ready market for the finished products for example confectioneries and soft drinks.
- The availability of supportive government policy of leasing land to industrialists, tax holidays to investors and protection of local industries from foreign competition.
- The availability of fairly improved transport net work especially roads and water for easy transportation of raw materials and distribution of the finished products.
- The availability of Hydro-Electric power which is used in running of machines.
- The availability of relatively stable political environment which has encouraged industrial investors to set up industries and security of industries.
- The application of high level of technology that ensures quality in production and efficiency in manufacturing high quality products.

Challenges of industrial development in East Africa
- Limited capital to invest in industries.
- Limited local market due to low income levels of the average people in East Africa.
- High interest rates charged in commercial banks. This discourages possible industrial investors.
- Unreliable power supply which is sometimes very expensive.
- Limited cheap, reliable and well maintained transport net work especially railway for cheap transportation of bulky raw materials and finished products.
- Application of low/ out dated technology leading to production of sub-standard goods and producing at high costs.
- Low supply of skilled labour hence relying on imported expensive skilled labour from China, India, Japan, USA and Britain.
- Limited important industrial minerals like iron ore, coal and petroleum to boost industrial development.
- The stiff competition with dumped goods which affect the growth of infant industries.
- Absence of political stability which scare away the potential industrial investors.
- Stiff competition from already heavily industrialized nations like China, USA and India lower the market for locally produced goods.
- High taxes imposed by the government affect the small scale local investors.
- Expensive raw materials reduce the profit margin of industrial investors.
- Smuggling of goods from out side leads to flooding of the market for local products.
- Profit repatriation by foreign industrial owners affect the development of East Africa.

The importance of industries
- Industries provide consumer goods to people like sugar, bread, tea, clothes, tinned, fish, cooking oil and beverages.
- Industries provide employment opportunities to people who work as transporters of goods, technicians hence earning income and improve their living standards.

- Industries are sources of government revenue in form of taxes which is used to construct roads.
- Industries are used for study purpose because they are training grounds for future industrial workers, engineers and entrepreneurs.
- Industries lead to the development of infrastructure like roads, railway lines, health centres, electricity and schools.
- Industries lead to improved standard of living of people who work in industries and earn income.
- Industrial development leads to full exploitation of the local resources for example minerals, land, water resource, forestry and fishing.
- It leads to improved international relations between a producing country and those consuming her industrial products.
- Industries lead to attraction of foreign investors who can bring in more capital and skilled resources.
- Industrialization lead to diversification of the economy by creating more alternative sources of income, government revenue and foreign exchange.
- Industries lead to development of towns which towns later provide commercial and accommodation facilities to people.
- Industries lead to agricultural modernization because industries provide agricultural inputs like fertilizers and market for the produce from agriculture sector.
- Industries lead to acquisition of skills like mechanics and machine repairing through industrial training.
-

Effects of manufacturing industries to the local environment

- Industries lead to environmental pollution in form of air, water and land pollution which affect human health causing lung cancer.
- Industries lead to environmental degradation when such industries get the raw materials from the surrounding for example tiles and bricks due to over extraction of clay.
- Industries lead to rural- urban migration hence straining the social services in towns such as schools, health services, water and roads.
- Industrial unrest in form of strikes due to low pay and poor working conditions.
- Industrialization leads to regional economic imbalance in terms of infrastructure development like roads, electricity and schools.
- Depletion of local raw materials leading to importation of high cost raw materials from abroad.
- Industrialization lead to nu balanced population distribution where industrial areas become heavily populated and villages abandoned. This causes slum development, urban violence and decline in agriculture.
- Industries lead to urbanization and associated problems like prostitution and high crime rates.
- Industries lead to loss of vegetation cover in a bid to create land for industrial development.
- Industries lead to loss of scenic beauty during construction of industrial infrastructure.
- Industries lead to loss of agricultural land leading to low food production in the region.
- Industries lead to increasing competition for land with agriculture and settlement.

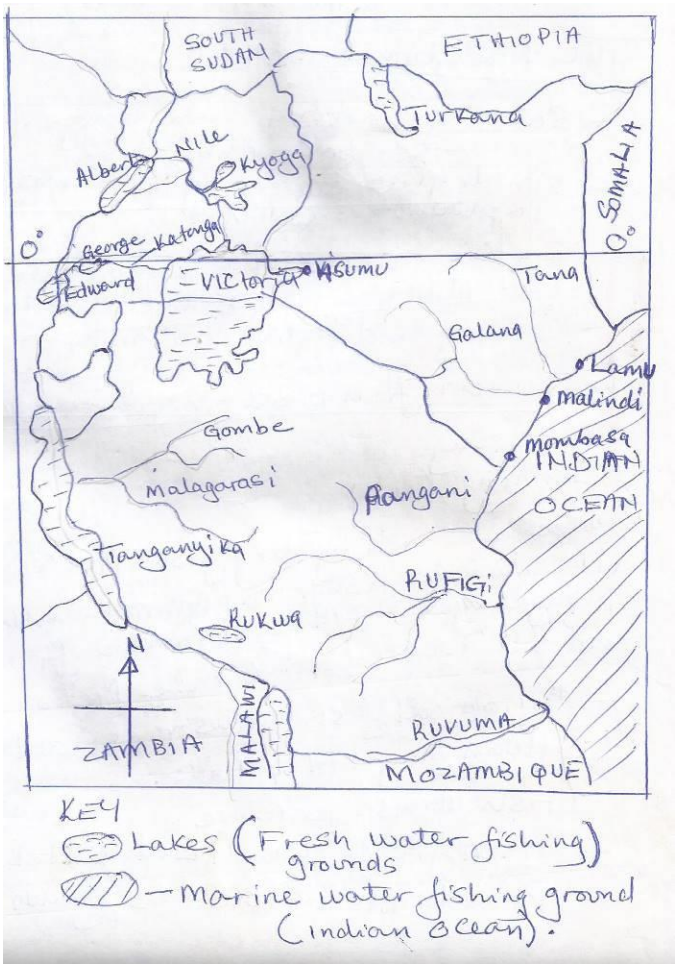
- Industries lead to overcrowding in industrial towns hence causing delays.
- Industries lead to displacement of people due to industrial expansion.

Chapter 14: Sustainable Use of Fisheries Resources in East Africa

Fishing refers to the extraction of valuable resources such as fish from water bodies

There are different species of fish that are caught from different water bodies in east Africa.

A SKETCH MAP OF EAST AFRICA SHOWING FRESH WATER FISHING GROUNDS AND MARINE FISHIG GROUNDS



Methods Of Fishing

In East Africa there is a combination of traditional and modern methods used in fishing. The method used depends on the level of technology and the skills needed. This is the

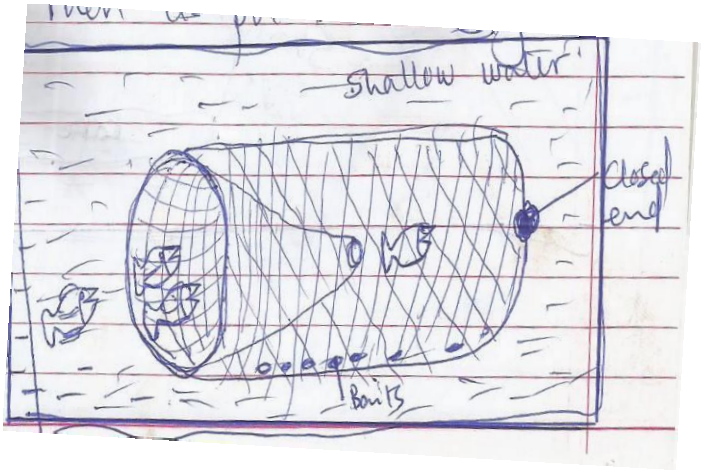
reason why subsistence fishing involves the use of traditional methods and commercial fishing involves the use of modern methods.

Traditional methods of fishing

The basket trap method

- The basket trap method is usually used in shallow waters of the swamps and rivers which flow fast.
- It is used to catch small sized tilapia mudfish, lungfish, haplochromis and other small fish.
- A woven basket with the front side which protrude inside is made.
- A small hole on the protruding side is left through which the fish can only enter.
- Baits are dropped inside the basket to attract fish.
- The basket with its baits is placed at the bottom of a shallow river/swamp.
- Unsuspecting fish is attracted into the basket by the baits and its trapped.
- Once the fish is inside the basket is lifted from the water and the fish is removed. Then it put in water again.

A basket trap method



Hand hooking methods

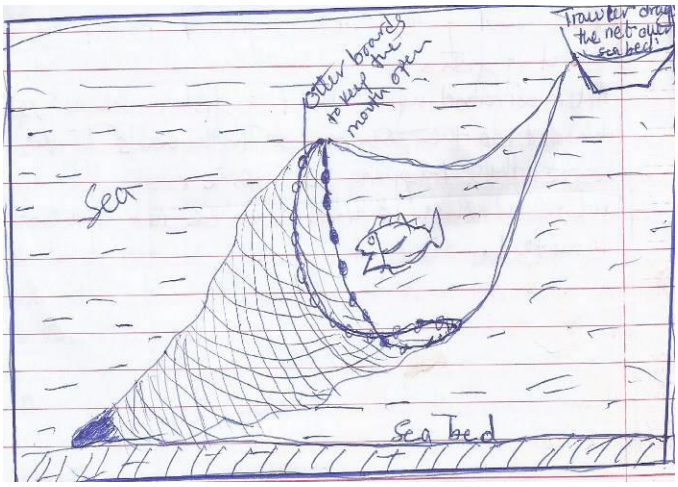
- Hand hooking is used for sport fishing or catching small fish which swim near the water surface.
- It involves use of a baited hook tied on a rope/string and connected to a long stick.
- A single floater is tied on a string to help the fisherman monitoring the hook.
- When the fish eats the bait, it gets hooked and the floater moves down into the water.
- The fisherman scoops out the fish from the water.

Beach seining,
Basket trap methods,
Hand hooking and
Spearing.

Modern fishing methods

(a) Trawling

- A trawl net is used to catch demersal big fish species like Cod, Tuna, Haddock, Plaice, hake, sole and Pollack which swim in deep waters near the bottom of the sea.
- The trawl net is a bag-shaped net whose mouth is kept open by otter boards.
- Its mouth is fitted with floats on it's to and weights at the bottom.
- At the end there is cod to support the large fish caught.
- The trawl net is pulled along the sea bed by a boat/trawler and trap all fish on its ways.

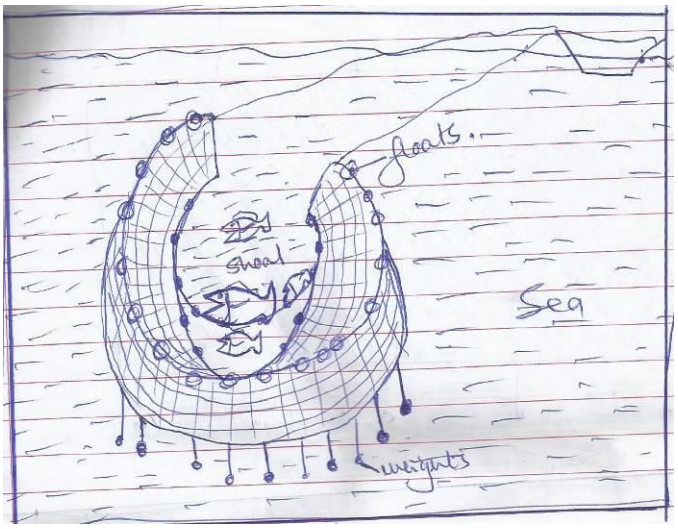


Purse seining

A purse seine net is used to catch pelagic fish species such as salmon, mackerel ad sardines.

- It uses a sounder or detector to detect fish.
- It contains a net supported by floats at the top and weights at the bottom.
- On top of the net there are rings through which a strong rope passes.
- The net is cast into the water with one end of the rope attached to one wing of the net held on the shore and the other on the boat.
- Floats keep the net near the water surface while the weights stretch the net in water.
- One end of the net is pulled round the shoal of fish.
- After surrounding a shoal of fish, the net is dragged to the shore at both ends by the ropes thus trapping fish inside.
- The fish which s trapped in the net is them removed.

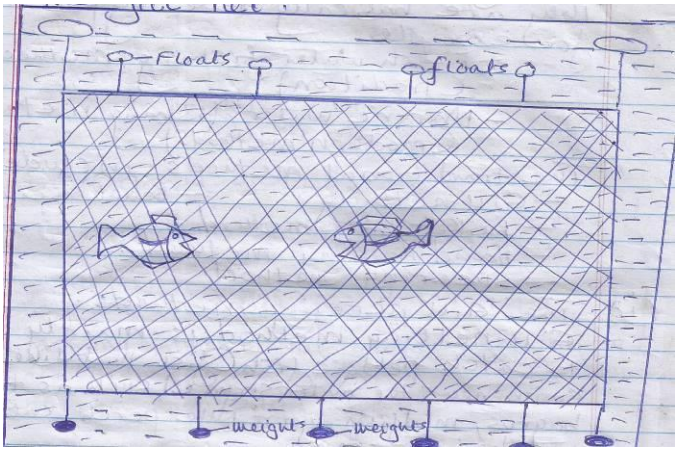
Tepurse Seine method



1. The gill netting methods.

- Gill netting methods is mainly used to catch fish from lakes, rivers and ponds.
- A gill net is used to catch pelagic fish such as tilapia, bagrus, mudfish, young Nile perch, Cat fish and haprochromis which swim near the water surface.
- Anylon mesh net is laid vertically in water. It is supported by weights at the bottom and floats on top.
- The net is left in water for some time to obstruct fish movement.
- One fish swim into the net it tries to escape backwards.
- Then the fisherman removes them from the net into the boat and the processes continues after drying the nets.

The gill net

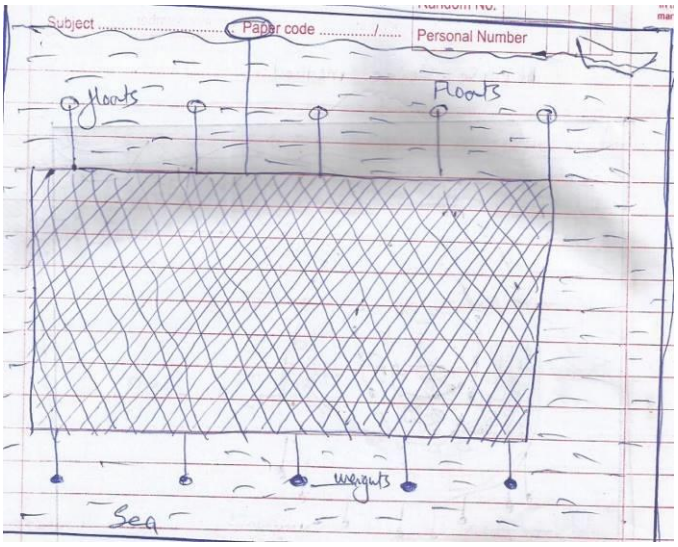


The drifting method

- A drift net appears like a tennis net/large gill net. It is used to catch pelagic fish which swim near the water surface like mackerel and Sardines.

- A drift net is fitted with floats on top and weights at the bottom to keep the net vertically in water.
- It is placed below the surface of water.
- A motor boat slowly moves the net and when the fish swim into the net its trapped by the gills

The long lining method
- A long tinning method is suitable for catching large demersal fish species like cod and Tuna that swim in deep waters and rough sea bed which can destroy the trawl nets.
- A lot of baited hooks are attached on strings which are thrown into water.
- Fish is hooked as tries to eat the baits.
- The rope is pulled back into the boa or ship from where fish is removed.



PRESERVATION OF FISH

Fishing Preservation Method
They are two types;
- Tradition methods
- Modern methods

Traditional methods
- Salting around Lake George, Edward and Lake Albert.
- Sun drying especially of silver fish and haplochromis (Nkejje)
- Smoking especially along Lake Kyoga, Lake Albert, Lake Edward and Lake George.
- Cooking and flying in cooking oil.

The **modern fish preservation methods**
- Freezing

- Canning/tinning.

These are used by big fish processing plants like Masese fisheries, Samaki fisheries, Ngege Uganda ltd, and Gomba fisheries all located near Lake Victoria.

- Tropical fish industries (Old Kampala)
- Huan sung Ltd - Ntida
- Fish ways – Entebbe
- Green Fields Uganda Ltd – Entebbe
- Pearl Fish Processors Uganda Ltd - Entebbe

Factors favouring fishing in East Africa

- Presence of large water bodies like Oceans, lakes and rivers where fish is caught.
- Presence of shallow continental shelf that permits penetration of light necessary for plankton growth.
- Abundant planktons on which fish feeds hence rapid multiplication of fish.
- Presence of a long indented coastline with sheltered waters which provided ideal grounds for fish breeding.
- Presence of Alkaline water which facilitate the growth of planktons which is food for fish.
- Existence of rivers which facilitate upstream migration of fish for breeding and provide nutrients to the main water bodies and worms for fish.
- Existence of ice free conditions along the main fishing ports hence supporting fishing throughout the year.
- Presence of a variety of delicious and valuable fish species with high local and foreign demand which is caught at different periods of the year.
- Presence of forests along the coast which provide wood for boat making, fish smoking and making fish packaging boxes.
- Existence of a smooth sea floor which enable use of trawler nets to catch demersal fish species like Cod, Tuna and Haddock.
- Presence of infertile soils and rugged terrain along the coast hence driving the people to the sea for fishing as the major economic activity.
- Cool climate with temperatures less than $20^{o}C$ favour growth of different species, and provide natural freezing conditions at fishing villages.
- Occurrences of Ocean currents warm and cold that mix up the waters hence providing ideal conditions for fishing activities.
- Off-shores Island that provides sheltered habours and temporary landing sites for fishermen in the open seas.
- Existence of a lot of sea birds like geese, swans, water ducks and pelicans whose droppings fertilize the sea floor leading to growth of planktons on which fish feeds.
- Limited other natural resources like infertile soils near landing sites, and limited minerals making fishing the major alternative source of employment.

Human factors

- High population in cities and around ports which provide market for fish.

- Adequate capital provided by the government and fishing companies and local fishermen which is used to buy fishing equipment.
- Extensive research in the fishing activities in terms of fish species, modern fishing, fish farming and re-stocking of depleted water bodies.
- Efficient and well developed transport and communication net work systems linking fishing villages to marketing centres and fish sellers to fish buyers.
- Well trained and educated labour force in the fishing industry engaged in fishing, processing and marketing fish leading to qualitative and quantitave output.
- Relative political stability around fishing villages which gives confidence and security to fishermen and investors in the fishing industry.
- Nature of people around fishing villages who are hard working with a long history on the sea. Hence having much experience the sea and fishing.
- Positive government policy towards fishing through controlling fishing activities to avoid over fishing, avoiding illegal fishing, investing in infrastructure like roads and educating fishermen.
- The availability of efficient fishing cooperatives at fishing ports which assist fishermen in acquiring easy loans and market their fish.
- The availability of modern processing and storage facilities at the landing sites which handle fish in a standard and more hygienic way and ensure no wastage of fish resources.
- Application of modern technology like use of gill nets, trawl nets, purse seines, under water cameras modern fishing ships, use of fish detectors, and automatic fishing.
- Concentration of big population at the coast ensures large supply of labour equipped with adequate fishing knowledge.
- Good international relations with other countries increase market for fish.
- Presence of industries for making boats and nets therefore fishermen get them at lower coasts.
- The use of modern preservation methods at eh landing sites like refrigeration, using tinning and packing for easy transportation.

Benefits of fishing in East Africa

- Fishing is a source of good (fish) after eating fish like salmon and tuna rich is proteins which help to improve the diet of people around ports and cities.
- Fishing is a source of foreign exchange through exporting fish. This is used to develop the economy.
- Fishing is a source of employment opportunities to fishermen at landing sites, boat makers, fish mongers and fish processors at landing sites.
- Fishing is a source of income to fishermen after selling fish leading to improved standards of living at landing sites.
- Fishing provides raw materials to industries dealing in manufacture of animal and chicken feeds.
- Fishing provides market to industries dealing in manufacture of fishing nets, motor engines, boats and ships leading to a diversified economy.

- Fishing encourages development of fish processing industries dealing in fish tinning near ports hence creating more employment opportunities.
- Fishing facilitates development and improvement of feeder roads which link fishing landing sites to marketing centre.
- Fishing leads to economic diversification there by reducing over reliance on a few sectors like agriculture and mining. This widens the market base, creates alternative sources of employment and taxes to the government.
- Fishing stimulates the growth of fish landing sites into towns. These help to bring services like banking, insurance, accommodation and recreation closer to people at those ports.
- Fishing grounds like lakes and rivers are used for education and research purposes for example marine Engineers, fisheries institutes and fisheries research institutes.
- Fishing promotes international relationship between visiting and hosting countries. This promotes international trade.
- Fishing provides market to agricultural products like food staffs sold to fishermen on landing sites.

Negatively fishing leads to;
- Pollution of air, land and water due to establishment of fish processing industries a long lake and oceans which dispose off the wastes in water.
- Fishing promotes urbanization with its related evils like congestion, crime, prostitution and slum development.
- Congestion and crowding on landing sites leads into poor sanitation which cause water born diseases such as cholera and dysentery.
- Fishing leads to deforestation due to much timber needed to make fishing boats, and wood for fuel used for fish preservation and processing.
- Fishing leads to stiff competition for territorial waters and shared waters lead to conflicts.
- Fishing leads to loss of lives due to water accidents case by strong waves and storms and attack by dangerous animals like crocodiles, hippopotamus, and sharks.
- Fishing leads to decline in other sectors such as agriculture due to the withdrawal of labour in areas around landing sites.
- Fishing increases the rate of school dropouts to carry out fishing around fishing grounds.
- Over fishing due to unregulated fishing activities and use of modern fishing methods like trawling, and drifting leads to reduction of fish species.
- Profit repatriation by foreign fishing companies.

Problems facing the fishing industry in East Africa.
- Presence of fish predators like crocodiles, birds, Nile perch and sharks eat/feed on other small fish and reduce their number.
- Limited capital for buying the modern fishing gear like trawl nets and purse seines result into small quantities of fish caught.

- Strong storms and waves on lakes and oceans lead to capsizing of boats hence loss of fishermen.
- Presence of marine animals like crocodiles and sharks attack and kill the fishing.
- Presence of water falls and rapids on rivers hinder fishing and lead to small amount of fish caught.
- The use of poor storage facilities like putting fish in baskets, sacs and stores lead to a lot of post harvest losses.
- Presence of rapids water falls and rocks along rivers affect movement of fishing boats.
- Warm ocean currents like Mozambique current bring hot temperatures along the coast which affect the growths of planktons.
- Limited number of commercial fish species like cod, tuna and salmon due to warm waters.
- A lot of insecurity and thefty caused by lake/sea pirates who attack, kill and steal boats, engines and boats of fishermen.
- The remoteness of some landing sites from the market centres due to poor roads affects marketing.
- The stiff competition for market from the developed fishing countries result into price fluctuations hence losses to fishermen.
- The use of illegal fishing nets of small size result into depletion of fish in rivers and lakes.
- Existence of water weeds/hyacinths on rivers and lakes suffocate and kill fish on L. Victoria, Kyoga and Taganyika.
- Pollution of water bodies by industries located near water bodies result into migration of fish and stoned growth.
- Rampant use of inefficient methods of fishing such as use of spears, baskets, hand hooking which are time wasting and lead into low amount of fish caught.
- Presence of rock outcrops/submerged rocks in lakes and oceans lead to capsizing of boats resulting into death of fishermen.
- The use of sub-standard preservation methods like salting, sun drying and smoking which cannot keep fish for a long period of time.
- Limited continental shelf along the Indian and Atlantic Ocean.
- Limited market for fish due to traditional beliefs and poverty of people around some fishing grounds. Some fish species like long fish among Baganda are taken as taboo.
- Limited and ineffective fishing cooperatives to provide loans, fishing assistance and market research on behalf of fishermen.
- Existence of saline water bodies which limit growth of a variety of fish species.
- The stiff competition with other sectors which divert labour and capital allocation because of fertile soils.
- Limited research affecting fish conservation.
- Existence of unparatable and poor fish and aquatic species like crabs, bonny fish and lobsters which are not used for commercial purposes.
- The existence of warm tropical climate affecting breeding, plankton growth and lead to migration of fish.

- Limited skilled labour in fish metabolism fish behavior and in processing plants.
- Profit repatriation by foreign companies from China, India, Pakistan, USA and Japan that affect the GNP and retard the economy.
- Substandard and very small fishing boats on lakes which cannot be used in deeper waters to catch big quantities of fish.
- Rampant smuggling and enchrochment by neighbouring countries affect the development of the fishing industry.
- Limited government support through failing to control corruption among the fisheries officials, failing to control and regulate fishing activities and modernizing the feeder roads which link landing sites to marketing centre.
- Indiscriminate fishing of immature fish. This has reduced the population of fish in most water bodies.
- Overfishing is a result of greed by fishermen.
- Prolonged drought along L. Turkana, Kyoga, and Albert has threatened fish growth due to reduced water levels.

Ways to improve the fishing sector in East Africa

- Arresting fishermen who use illegal nets and destroying them and the boats.
- Controlling the levels of pollution of waters through treating industrial discharge.
- Ensuring security on water bodies by regular patrol of security forces to control piracy.
- Giving loans to the fishermen and fishing gear at subsidized prices to solve the problem of inadequate capital.
- Studying the periods/season of strong winds and storms and use of life jackets to avoid loss of lives on water bodies.
- Establishment of cold roams refrigerated trucks and boats on landing sites to minimize the post harvest loss of fish.
- Constant removal of water weeds to clear the landing sites and water bodies.
- Encouraging fishermen to form cooperatives to help them in marketing, secure loans, and train fishermen in the modern fishing methods.
- Improvement on the feeder roads which connect landing sites to market centre to make delivery and distribution of fish.
- Restocking of the overfished lakes and other water bodies with valuable fish species from the well populated water bodies.
- Emphasizing fish farming by increasing the number of fish ponds and artificial fertilization of fish eggs.
- Improving on the quality of fish through proper handling and production of high quality fish to increase market outside and competitiveness.
- Controlling corruption by government fisheries officials in order to control illegal fishing and overfishing.

Fish farming

This is the artificial rearing of fish in a controlled environment like a pond, cage or tank for food or sale.

Importance of fish farming

1. It is good source of proteins and minerals.
2. It is a good source of employment.
3. It is a source of foreign exchange after exporting the fish.
4. Source of income to fish farmers.
5. It makes fish available nearby when reared in ponds.
6. It helps the farmer to diversify his or her income.
7. It is a source of animal feeds e.g. fish meal.

Ways in which fish is reared

- Use of ponds
- Cage system
- PVC fish farming

Fish Species commonly reared in East Africa

- Tilapia
- Nile perch
- Mud fish
- Cat fish

Steps taken to start a fish farm

- Secure land at any location
- Construct fish ponds
- Create a permanent water source/reservoir either by digging a borehole or an overhead tank
- Get juvenile fish of fingerlings from another farm
- Get attached to a fish farm for training and continued advisory services
- Get capital depending on the size of cage or pond

Features of a good fish pond

- Permanent/reliable water Source flowing throughout the year to ensure oxygen supply.
- The site should be free of gravel or stones and sand to prevent drainage of pond water.
- Should have a clay basement and walls to hold water.
- Gently sloping that allows free water flow in and out of the pond.
- Close to the homestead for security and supervision.
- Close to the market center since fish is perishable
- Water must be free from any pollutants such as chemicals and other wastes

Advantages of fish farming

- It can be practiced on limited land.
- It is a cheap and good source of proteins, vitamins and minerals.
- lt makes proper use of land which is not Suitable for crop or livestock production.
- it reduces dangers associated with fishing in rivers, lakes etc.
- It provides an easy and cheap source of fish instead of going to rivers or lakes.
- Farmers can economically control the type and number of fish in a pond.
- The market for fish and fish products is widely available.
- The fish fetch high incomes for the farmers.

Chapter 15: **Wildlife Conservation And Tourism In East Africa**

Wildlife Conservation

Wildlife is the major tourist attraction in east africa because east africa is one of the few areas in the world where wildlife is conserved in their natural habitats.

Conservation Areas

A national Park is a large piece of land which is kept in its natural state by the act of parliament for public benefit and future generation.

The act of parliament restricts population encroachment in the gazetted land. In National Parks both Flora and fauna are conserved.

The major national Parks in East Africa include;

- Mt. Rwenzori National Park.
- Kabalega (Murchison falls National Park.
- Kidepo valley National Park.
- Lake Mburo National Park.
- Bwindi impenetrable National Park.
- Kibaale National Park.
- Queen Elizabeth National Park.
- Semuliki National Park.
- Mgahinga National Park.
- Mt. Elgon National Park.

In Kenya

- Isavo National Park.
- Nairobi National Park.
- Marsabit National Park.
- Samburu National park.
- -Aberdares National Park. -Simba Hills.

In Tanzani

- Serengeti National Park.
- Ngorongoro Crater National Park.
- Mikumui National Park.
- Great Ruaha National Park.
- Mt. meru National Park.
- Lake manyara National Park.
- Katavi National Park.
- Kilimanjaro National Park.

A game reserve is a piece of land put aside by an act of parliament for any future use. A game reserve can be used for any possible meaning for economic use. It can be formed into a Game Park or temporally population settlement.

Examples of Game Reserves in East Africa.

In Uganda.

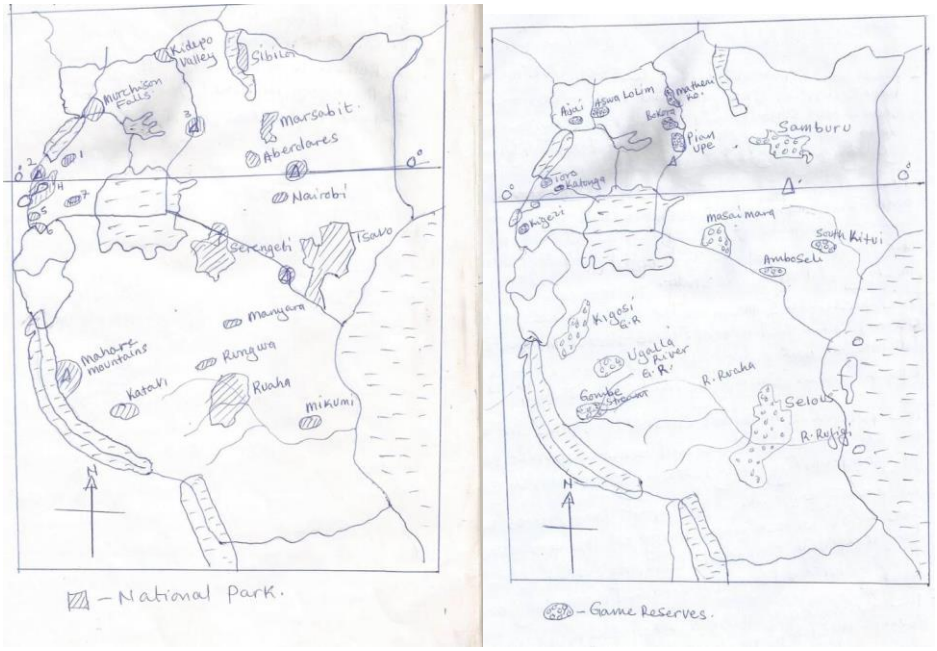
- Aswa-Lolim G.R.
- Ajai G.R (in west Nile)
- Toro Game Reserve.
- Kyambora Game Reserve.
- Katonga Game Reserve.
- Pian Upe Game Reserve .
- Bokora Game Reserve.
- Matheniko Game Reserve.

In Kenya

- Masai mara Game Reserve.
- Samburu Game Reserve.
- South Kitui Game Reserve.
- Marsabit Game Reserve.
- Ambosebi Game Reserve.

In Tanzania

- Selous Game Reserve.
- Rungwa Game Reserve.
- Ugalla Game Reserve.
- Kigosi Game Reserve.
- Maswa Game Reserve.
- Arusha Game Reserve.
- Ngorongoro Game Reserve.
- Tarangire Game Reserve.



KEY

1- Kibaale National Park
2- Mt. Rwenzori National park.
3- Mt. Elgon N.P
4- 4- Queen Elizabeth National park
5- Bwindi impenetrable National park
6- Mgahinga National park
7- Lake Mburo National park

SANCTUARIES

A sanctuary is a piece of land gazzeted to preserve and protect rare and endangered animals, birds, reptiles and other Flora plants which are threatened by extinction.

Examples include.

- The Zziwa sanctuary in Nakasongora for Rhinos.
- Mt Keliend Otze forest for the white Rhinos.
- Bwindi Impenetrable forest for Gorillas and Chimpanzees.
- Lake Nakuru for flamingos and pelican birds.
- Gombe stream in Tanzania for birds. e.t.c

ZOOS

A zoo is a place where various birds, animals, reptiles and rare plant species are collected and protected in cages and provided with similar conditions like those in their natural habitat for the future generation.

Zoos are created to provide alternative attraction for out side visitors. That is why they are always near urban centres and Air ports.

In Uganda it is at Entebbe (UWEC) Uganda Wild life Education Centre.

Tourism

Tourism is the act of travelling for pleasure, site seeing, curiosity, study purposes, exploration and leisure involving payments for the services.

THE TOURISM POTENTIALS IN EAST AFRICA

(a) Relief sceneries (features / physical features.
These include;
The East African rift valley, volcanic mountains, explosive craters, volcanic plugs, hot springs and geysers, Lakes, block mountain, glacial mountains, and their features, Rivers and their associated features, coasted features like beaches, cliffs, coral reefs, lagoons and spits.

(b) The varied faun a (animal life). These are found in National parks, Game reserves, sanctuaries and zoos. These animals and birds attract a lot of tourists from temperate regions where such animals do not exist.

(c) Flora (plant life) East Africa contains various species of vegetation for example swamp vegetation, desert vegetation, savannah vegetation, montane vegetation, tropical and rain forests.These attract a lot of tourists for filming, nature walk, pick nicks and research.

(d) Cultural and historical attractions for example; Burial grounds of traditional kings, (tombs), palaces, temples for example walumbe tombs of Ttanda, art galleries, museums, Archeo logical sites like olduvai Gorge in Tanzania, Nyero rock paintings in kumi Uganda, Fort Jesus in mombasa, Olorgesailie in Kenya.

(e) Constant Hot temperatures through out the year attract a lot of tourists especially from temperate regions of the world. These come to the beaches for sun bathing, swimming, boat cruising and sport fishing.

Factors that have led to the development of the Tourism industry in East Africa

- Presence of various relief features like mountains with sceneries like Pyramidal peaks, Aretes, tans, snow capped summits and the Great East African Rift valley attract tourists for mountain climbing, filming and geological study.
- The existanceof diverse wild life in National Parks and Game reserves, sancturies zoos with various species of animals watching, bird watching, animal tracking, filming and study.

- The presence of many water bodies like the Indian Ocean, lakes and Rivers. These attract thousands of tourists for boat riding, boat cruising, surfing, beach games, swimming, and sport fishing.
- The existence of various coastal landforms for example the cliffs, deltas, cave and beaches attract tourists for geomorphology study, filming and research.
- The presence of constant warm / hot temperatures between 20ºc - 30ºc attract people through out the year especially from temperate regions for camping, picnics, sun bathing, filming, horse and camel riding, photocopy and holidays.
- The existence of various vegetation types like savannah vegetation, montane forests, tropical forests, semi-arid vegetation and the mangrove swamps. These attract a lot of tourists for wilderness travels, nature or forest walks, camping, picnics and research.
- The availability of relative political stability near tourist centres enforces safety of tourists and investment in the tourist section.
- The availability of fairy improved transport net work in form of roads and air transport which connect to the tourist centres for easy and quick transport of tourists.
- The availability of fairly improved accommodation facilities like hotels, Resort centres, lodges, inns and camping sites for comfortable stay of tourists.
- The presence of supportive government policy towards the tourism industry through investing in tourism infrastructure, promote and protect tourist attractions and gazetting new National parks and Game reserves.
- The availability of adequate capital to invest in the tourism industry for example to set up tourist facilities like hotels and camping sites, construct roads and financing tourist activities.
- The availability of skilled labour to look after tourist attractions and attend to tourists for example linguists, game wardens and rangers, tour guides, waiters and waitresses.
- Intensive advertisement to the locals and out side world to increase awareness about the existing tourist potentials.
- The availability of the hospitable people around the tourist centres who are friendly and welcoming to foreign tourists.
- The availability of many historical sites like Fort Jesus, Back paintings, Ttanda caves, museums, olduvai Gorge and Olorgesailie attract many people for archeological study and research.
- The availability of many international languages like English and Kiswahili for easy communication with foreign tourists.
- The availability of diverse cultural activities like traditional dances, ways of life, dressing and food stuffs.

Challenges facing tourism in East Africa.

- Rampant poaching of animals, birds and reptiles for skins, hides, tasks, shells and features for example elephants, rhinos, tortoises, ostriches, pangolins, snakes and monitor lizards.

- Prolonged drought in some parts of East Africa lead to reduction of pasture and water. This causes death and mass migration of wild animals to distant areas difficult to reach.
- Population encroachment on the national parks and game reserves leading into competition for water and pasture and wood.
- Inadequate advertisement of the available tourist attractions to local and international world. This has affected their awareness of the available tourist potentials.
- Inadequate well trained personnel in most tourist sites like linguistics tour guides, international chefs and hotelian.
- The stiff competition from other sectors like agriculture, mining and fishing leading to diversion of the limited capital and labour.
- The stiff competition with other tourist destinations countries like Egypt, South Africa and USA. This results into small numbers of international tourists coming to East Africa.
- Under developed transport networks especially roads which are in most cases slippery in wet seasons hence affecting the movement of tourists.
- Tropical diseases like Anthrax, malaria, AIDS and Chorea scare some tourists to come to East.
- Political instabilities especially by Al shabab militants and other suicide bombers scare tourists from coming to East Africa.
- -Location of East Africa far from rich countries who can afford making long holidays and vacations out of their home countries.
- Under developed accommodation facilities near most tourist attractions affect tourism.
- Low technology for developing artificial attractions like bridges, high rising buildings, fly over and Amusement parks.
- Shortage of capital to modernize hotels, lodges, transport and employing more skilled personnel.
- Low culture of holiday making in East Africa because of poverty by the majority.
- The hostility of some tribes in some parts of East Africa especially in Masai land, Karamoja and Turkanas who scare away tourists
- Limited Linguists who can speak international languages like English, French, Japanese, Chinese and Italians, this hinder effective communication between foreign tourists and local people.
- Competition with other countries out side East Africa leading to low tourist arrivals.
- -Redundancy of the sector during low peak seasons due to seasonality of the activities.
- -Massive cancellation of tourist travels due to tourism threats.
- -Similarity of tourist attractions in other African countries limits tourist travels.
- -Competition for funds with other economic sectors leads to low levels of investment in tourism.

- **Solutions for the above problem**s.
- Employing more game rangers and anti- poaching personel to fight poaching.
- Ensuring political stability and security by disarming some hostile tribes like the Turkans, Karamojongs and fighting the Alshababs fighters.
- Support private agencies like the tours and travel agencies to improve on the provision of transport facilities to the tourists.
- Reinforcement of laws to prevent encroachment on game parks and reserves.
- Continuous advertisement through international media and the internet, CNN and BBC to attract more tourists.
- Rehabilitation of transport and communication facilities to make transport easy to and from the tourist centres.
- Renovation of hotels, restaurants, lodges and camping sites for comfortable accommodation of tourists.
- Liberalization of the tourism industry to increase competitiveness and efficiency.
- Training of more tourism staff and personel to boost the sector.
- Sensitizing the masses over the Radios, News papers and TVs against encroaching on game parks and reserves.
- Encouraging private and foreign investors into the sector to provide capital.
- Providing insensitiveness to East African nationals by lowering entrance fees to tourists sites to promote domestic tourism.
- Sensitization of the masses about the importance of tourism to control poaching and encroachment.

Contribution of tourism to the development of east African countries

- Tourism is a souce of foreign exchange from tourists who pay for services. This is used in foreign trade.
- Tourism is a source of food through game hunting, game fishing and fruit gathering.
- Tourism stimulates urban development through provision of accommodation, entertainment in stations, and amusement parks.
- Tourism provides market for locally produced items like food stuffs, art and craft items sold to tourists.
- Tourism is a source of employment opportunities to hoteliers, transporters, and game rangers who earn income and improve their living conditions.
- Tourism promotes international co-operation between a host and a visiting countries which later promote bilateral and international trade.
- Tourism is a source of government revenue from taxes charged on private tour agencies like hotels, resort centres lodges and tours and travel agencies.
- Tourism stimulates infrastructural development like hotels, stadiums, roads, and amusement parks which also are used for other economic purposes.
- Tourism attracts foreign investment in the hotel and resort business hence allowing capital inflow.
- Tourism helps to preserve the wild life cultural heritage, traditional dances and dressing for the future generation.

- Tourism helps to keep the natural beauty of the region through conservation of wild life.
- Tourism helps to diversify the economy through creating alternative sources of jobs, market and foreign exchange.
- Tourism helps to put areas that would have been wasted into use for example mountain peaks, valleys, waterfalls and desert regions.

Problems brought by the tourists to East Africa

- Tourism leads into spread of diseases like AIDS through sexual tourism.
- Tourism leads into cultural erosion through copying foreign cultures like the ways of dressing and Eastern music.
- Tourism encourages poaching and smuggling of animals and animal products like skins, hides, shells, tasks, and feathers.
- Tourism encourages growth of towns with their associated short comings like prostitution, gambling and congestion.
- Game parks and Game reserve occupy large areas instead of using it for agriculture industry and settlement.

Chapter 16: **Population Urbanisation In East Africa**

Population refers to the number of people living in a given area at a given period of time.

Terms used in studying population.

Over population: Over population is a situation where the number of people living in a given country / area is more than the natural resources to support them.

Under population: Under population is a phenomenon where the available resources in a given country are far more than the number of people to exploit them.

Countries which are under populated in the world include; Democratic Republic of Congo, Canada, Russia, Brazil, Peru and Colombia.

Optimum population: Optimum is a situation where a country's natural resources are in balance / equal to the population for maximum population.

Population Census: Population census is the general counting of people in a country in a specified period of time usually after every 10 years.

Population density: Population density is the average number of people living per square unit / kilometer.

$$\text{Population Density (P.D)} = \frac{\text{Total population}}{\text{Total land area}}$$

P.D = P/A = X Person / km^2

Population Growth Rate: Population growth rate refers to the natural change in the population. It describes the difference between the Birth rate and Death rate.

:. Growth rate $= \frac{\text{Birth Rate} - \text{Death rate}}{1000} \times 100$

Birth Rate: The birth rate refers to the annual number of live birth (children) born per 1000 people of the population.

Birth Rate = $\frac{\text{Total Number of live Birth}}{\text{Total Population}} \times 1000$

Death Rate: The death Rate refers to the annual number of people who die per 1000 0f the total population.

Death rate = $\frac{\text{Total Number of Death}}{\text{Total Population}} \times 1000$

Mortality Rate: Mortality rate is the number of people who die per 1000of the total population per year.

Infant mortality Rate: Infant mortality rate refers to the number of children under one year per 1000 of the population.

Population structure: Is the quantitative and qualitative characteristics of the population in terms of age and sex.

Life expectancy: Life expectancy is the number of years that the average person born in a given country expect to live.
The life expectancy in East Africa stands at;

Fertility Rate: Fertility rate refers to the number of children a woman is expected to have during her life time / productive stages.

Population distribution: Population distribution refers to the way how people are spread over an area in a given period of time.

Rapid Population Growth

Causes of population increase in East Africa.
•High fertility ratio among the women.
•Limited family planning services especially in rural areas to control birth.
•Early marriages leading to production of many children.
•The traditional beliefs and culture that allow polygamy.
•Wide spread ignorance and low levels of education about family planning.
•Polygamous practices for example among the non-christians and muslems leading to production of many children.
•The religious factors for example among the catholic who discoourage the use of family planning methods.
•The decrease in the death rate due to improved medical services, improved nutrition and health education.
•There is a decrease in infant mortality rate due to massive immunisation campaigns.

•Improvement in health services where health centres have been put almost in all places.
•uction of enough food stuffs which has improved people's nutrition.
•An increase in the number of immigrants and refugees for example from south Sudan, Congo, Somalia and Rwanda.
•Relative political stability / Reduction of wars which has made people to stay and others come from other countries.
•The decrease in the number of emigrants due to absence of internal wars in East Africa.
•Larger number of women compared to men lead to high chances of polygamy and concubinism.
•Low status of women in most African socities.
•High life expectancy due to improved socio- economic conditions.
•Reliable rainfall that support agriculture for production of food.

Advantages of a high population.

-A big population provides cheap labour needed to exploit resources like fishing, forestry through lumbering and mining.
-A high population provides market for agricultural and industrial goods.
-It creates a wide tax base for the government from businesses done by many people in agriculture, fishing and forestry.
-It stimulates the development of infrastructure like schools, roads and hospitals.
-A high population stimultes innovation and creativity by the government and individuals in order to sustain and meet the demands of population for example food.
-A high population stimulates the provision of social services by the government for example, electricity, water and security.
-A big population stimulates the development of urban centres due to many people who provide labour and market in towns.

Disadvantages of a big population or population growth.

-A big population leads tohigh levels of un employment and under employment because the big number of people don't match with newly created economic activities leading to poverty.
-A large population increases pressure on available resources like forests, land and minerals leading to their exhaustion.
-A big population increases pressure on the government to provide basic social services hence increasing its expenditure.
-It increases the dependence burden since a bigger proportion of the population are children who don't work.
-A big population strains the social facilities like schools, hospitals and roads which reduces the quality and increase the rate of tear and wear.
-It increases the coast of living especially food and accomodation.
-It results into land shortage which limits economic activities especially agriculture.
-A big populaion leads to increase in crime rate especially jorgery, counterfeiting, robbery and theft.
-It leads into development of slums with their associated problems like prostitution and poor sanitation.
-It leads into converting of economically productive land to settlement.
-It leads to rural urban migration in search of jobs.
-A large population slows down investment due to need to provide basic services.

-A big population lead to increased dependency on foreign aid in order to provide health and education services.
-A large population leads to moral decay insanity and cultural degeneration.
-It results into pollution of air, water and land due to careless dumping of wastes.
-It increases the spread of diseases due to congestion and poor sanitation in towns.
-It leads into encroachment on marginal lands such as forests and swamps for settlement, agriculture and industry.
-Reduced savings and investment leading to increased poverty.

Solutions for the problem of a increasing population.
-Discouraging polygamy and encouraging monogamy.
-Rising the girl's age at marriage through educating them.
-Encouraging vertical expansion through constructing storeyed buildings.
-Educating the masses against having large famiies.
-Practicing agricultural mechanisation to increase food production.
-Diversificationof economy to absorb the abundant labour force.
-Practicing family planning methods in order to control birth rate.
-By restricting immigration levels.
-Discouraging early marriages for example through setting strict laws against child marriages.
-Providing free education to girls at high institution to increase on their age at first birth hence reducing their fertility.
-Setting up resettlement schemes where people are transferred from densely populated regions to areas of low population.

Population Distribution and Population Density
Population distribution refers to spread of people over a particular area.

Population density refers to the number of people living in each unit are, for example a square kilometer.

In East Africa, population is un evenly distributed where some areas are densely populated, others are moderately populated and others are sparsely populated.

The areas with dense population include;
- Areas around Lake Victoria for example in Kampala, Jinja, Masaka, Wakiso, Entebbe, Bukoba, Mwanza, Kisumu and the Nyanza province.

- Highland areas in Kenya, Kigezi, the slopes of mountain Elgon and Kilimanjaro, Kipengere slopes, the slopes of Usambara and around Lake Malawi in Tanzania.

- The Islands of Zanzibar and Pemba.

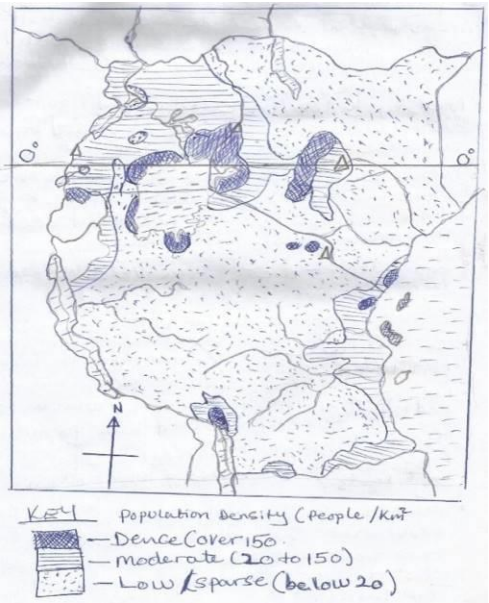
- Major towns and cities for example Kampala, Nairobi, Dodoma, Thika, Nakuru, Kakamega, Kisumu, Dar-es-Salaam, Jinja and Entebbe, Tabora, Rukwa, Songea, Lindi, and Morogoro.

- Coastal ports of Mombasa, Lamu, Malindi, Mtwara, Tanga.

Areas with moderate population;
- Areas between Kenya highlands and Nairobi.
- Areas between the coast and Nairobi.
- The northern and central parts of Ugandafor example in Gulu and Lira and the West Nile.
- Western Uganda in areas of Mbarara, Masindi and Hoima.

Areas with sparse population
•North Eastern Uganda in areas of Kotido, Kitgum, Moroto and Napak, Kaabong.
•Areas of Ankole – Masaka corridor up to Lake Kyoga, Nakasongola, Kaabong.
•Areas with National Parks and Forest reserves.
•Northern Kenya in areas of Turkana, Pokot and Wajir.
•Central Tanzania e t c.

POPULATION DENSITY MAP OF EAST AFRICA.



Factors that influence population distribution in East Africa.
•The influence of climate in form of rainfall and its distribution, temperature and Humidity.
•Areas with heavy reliable and well distributed rainfall (1000-1500mm) are densely populated because they encourage agriculture and settlement.
•Areas with low/ unreliable and light rainfall (250-500mm) distribution are sparsely populated because they encourage agriculture and settlement.
•Areas experiencing cool temperature (0-10ºc) in the highland and mountainslopes of Kigezi, Kenya and Elgon are densely populated because of limited incidences of pests and diseases.
•Semi- desert areas with very hot temperatures over 30ºc are sparsely populated beause theyn are uncomfortable for human settlement.
•The influence of soil type in form of fertility.

•The areas with fertile soils which is volcanic and laterite have attracted high population densities because they favour agriculture for example the Kigezi highlnds, Slopes of montain Elgon and Kenya highlands.
•The areas with infertile soils have low population concetration because they make crop growing difficult. Forexample Northern and Eastern Kenya, Karamoja region and cebtral Tanzania.
•The influence of relief inform of steep sope, valleys and plateaus.
•Areas with plateaus, gentle slopes and wide valleys have high population densities because of convenience in transport and communication cultivation and settlement.
•Areas which are mountainous with steep slopes for example Kilimanjaro, Mt. Kenya Mt.Elgon and Mt. Rwenzori are sparsely populated due to hardships in agriculture, settlement and transport and communication.
•Areas which are flat and extensively open have low/ medium population because it is always dry and hot for example the rift valley floor, the Ankole – Masaka corridor, the pastral areas and Masai land.
•The influence of drainage where well drained with limited risks of vector breeding and with good supply of water for domestic use are densely populated.
•The areas which are poorly drained with swamps and bogs/ Marses are poorly settled and have low population densities because they harbour disease vectors like mosquitoes and snails for example the mangrove coastal areas and swampy areas along Lake Kyoga.
•The influence of vegetation cover, where areas with dense and thick vegetation cover are sparsely populated because of hardships to clear to establish settlements and agriculture for example the wood lands of central Tanzania and forested parts of western Uganda.
•Savanah areas have medium and dense population concetration because they are easy to clear for settlement and agriculture.
•The influence of biotic factors in form of pests, vectors, diseases and wild animals .
•The areas with pests and disease vectors like tsetse flies, mosquitoes and snails which spread diseases like malaria, sleeping sickness and bilharzia have sparse population for example rifty valley areas, Kiguba, panyimur in masindi and mangrove swampy areas.
•The influence of minerals and their exploitation where areas endowered with minerals which are exploited have medium population densities because of related employment opportunities for example areas around Mwadui, Magadi, and Kilember.
•The influence of natural calamities like floods, famine, landslides, earth quakes.
•The areas which are prone to famine, floods and land slides have low population densities because of high risks of death. These include; Turkana land, Karamoja and Bududa.
Human factors/ social and economic.
•The influence of urbanisation where urbanised areas have attracted high population densities because of trade and commerce and improved social services for example Kampala, Nairobi, Dar es Salaam and Kisumu.
•The influence of industrialization where industralized areas are densely populated because of employment opportunities in industries for example in Jinja, Kampala, Nairobi, Arusha, Dar-es Salaam, Eldoret.
•The influence of transport and communication. For example areas with improved transport and communication have attracted high and medium population densities because of easy and convinient transportation of goods and serfices. For example in Kampala, Entebbe, Nairobi and Dar-es –Salaam.

•The government policies over land gazzeting for National parks, forest reserves, and restrictions in swamps have led to low or no opulation densiies for example around Murchison falls, Isavo National park and Masai mara game reserves.
•Areas with plantations and estates like sugar estates of kakira, kinyara and kericho tea estates of Kenya have attracted dense settlements for employment opportunities.
•Areas with relative political stability are moderately and densily populated because of safety of life.
•Areas with unstable political climate are sparsely populated for example North eastern Kenya and North Eastern Uganda.
•Areas which once affected by slave trade have low population densities for example Bagamoyo in Tanzania.
•Areas occupied by traditional kings and palaces have high population densities as people search for security for example Kampala (mengo) for Kabaka of Buganda, Toro and Bunyoro in Uganda.

Causes of high population densities.
•Presence of reliable rainfall and hot temperatures 20º-27ºc which support the growth of crops to sustain the population in terms of food.
•Presence of fertile volcanic soils support agriculture for food to feed the population.
•Existence of conducive temperature between 10º-27ºc for comfortable human settlement.
•Availability of various economic activities like industrialisation, mining, trade and commerce that attract large number of people for employment opportunities.
•The availability of well-developed transport and communication network that ease transportation of goods and services.
•The availability of relative peace and stability which favour establishment of permanent settlement and migration into these areas.
•The availability of improved social services like schools, universities, good hospitals, clean water, electricity and recreation centres which attract a lot of people.

Problems caused by high population density.
•Shortage of land for both farming and settlement.
•Land fragmentation and land disputes due to shortage of land.
•Over exploitation of resources leading to their depletion.
•Unemployment and under employment which result into high crime rates in order for people to earn a living.
•Over crowding results into easy spread of diseases.
•Straining of available social services like health services, education and transport utilities.
•Pollution of land and water resources through dumping of wastes generated from the dense population.
•High government expenditure to provide social services like health, education, security, clean water and transport utilities.

Causes of low population density.
•Presence of thin and infertile soils that discourage agriculture for food to feed the population.
•Low and unreliable rainfall received for example less than 500mm discourage crop growing for food.

•Remoteness due to under developed transport routes like reads which have discouraged trade and commerce.
•The presence of dense vegetation cover and swamps because they are difficult to clear for settlement and agriculture for example in central Tanzania.
•The presense of pests and diseases such as tsetse flies in Miombo woodlands and rift valley areas cause Nagana and sleeping and sleeping sickness to live stock and humans.
•Gazzeting of some areas for National parks and game reserves for example marsabit National park, Isavo and Murchison falls National park.
•Internal conflicts and mis understandings for example cattle rustling among pastoral tribes has prevented other people to migrate into those areas.

Problems caused by low population density.
•Shortage of labour supply to work in sectors like agriculture and mining.
•Limited market for goods and services available.
•Under utilization of the available resources such as land, vegetation and water.
•Low revenue collection due to limited economic activities done to be taxed.
•Slow growth of infrastructure such as schools, health centres and roads because they become uneconomical to build.
•Low agricultural production due to limited labour supply.
•It promotes remoteness and under development.
•It leads to socio- economic dependency on other areas for market, labour and other utilities.
•It encourages low levels of investment in all sectors due to limited labour and market.
•It may lead to importation of foreigners to work on estates, factories and other sectors.

Rural-urban drift and urbanization

Rural-urban drift also known as rural-urban migration.
This refers to the movement of people from villages to towns.

Factors responsible for Rural-urban drift

The factors are divided into two categories. The factors which force people to move from rural areas are called push factors. The push factors include;

- Poverty which forces people to move to urban areas to look for opportunities
- Natural disasters like drought, floods
- Unfair land distribution where the landless people move to towns
- Conflicts which force people to move in search of peaceful areas
- Shortage of land for agriculture
- Outbreak of diseases
- Escaping traditional practices like circumcision
- Criminal acts whereby people run to cities after committing crimes

The factors that attract people to migrate to urban areas are called Pull factors. Pull factors include;

- Employment opportunities in industries and factories
- Search for better education opportunities
- Search for better entertainment services such as bars, clubs,
- Search for improved amenities like water and electricity.

When more people move and settle in towns, urbanization occurs.

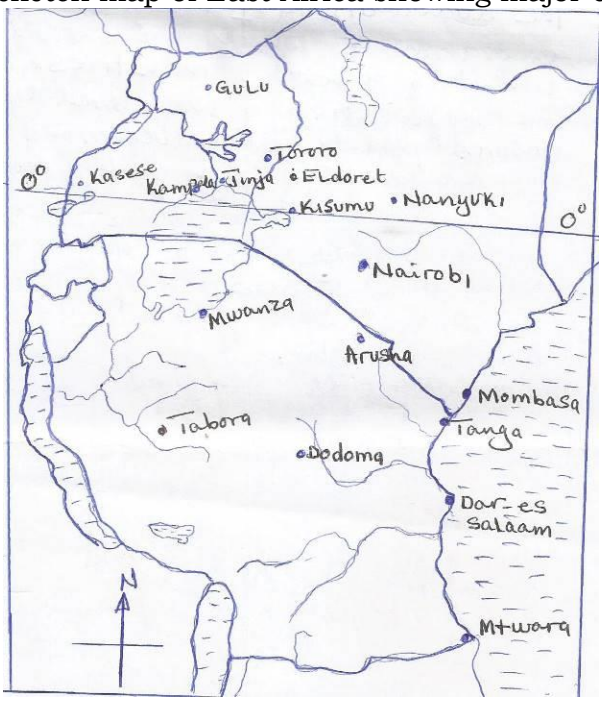
Urbanisation

Urbanization refers to the growth of towns and cities.
Urban areas are categorized on the basis of population size, population density and the activities that take place there. Towns and cities act as the major urban centres in East Africa.
East africa is experiencing urbanization because there is a large number of people migrating from villages to towns.

Rural-urban migration has led to the development of main cities in east africa e.g. Mombasa, Kampala, Nairobi, Arusha, Dodoma, Dar-es-salam, and Jinja.

The leading cities in East Africa are;
- Arusha, Dar-es-salaam, Mbeya, Dodoma, Kigoma, in Tanzania
- Kisumu, Mombasa, Nairobi, Eldoret, and Nakuru in Kenya
- Kampala, Mbale, Arua, Jinja, Mbarara, Gulu, Masaka, and Lira in Uganda

Asketch map of East Africa showing major cities



Kampala City
Kampala is the capital city of Uganda. It had an estimated population of 1,650,800 people in 2019. It is important to note that the population of Kampala is high during day and low during night. This is because most of the people who work in Kampala stay in the neighboring cities and villages.

Structure of Urban Areas In Uganda
Urban structure is the arrangement in which land is used in towns and cities. It shows how the land use of a town or city is set out.
It categorizes land use in commercial, residential, industrial and administrative areas.
Commercial centres consist of shopping malls, markets and service stations.
Residential areas divided according to the people's income, high income earners live in better developed areas than low income earners.

Functions of Urban Centres

- Administrative centres with administrative units and offices e.g. the parliament
- Residential centres with many housing facilities
- Entertainment centres with sporting stadiums, clubs, discotheques,
- Tourist centres with many tourist attractions like museums
- Industrial centres with manufacturing industries
- Commercial centres with shopping malls, markets, and service stations
- Transport centres with roads, car parks, air transport facilities, railway stations
- Employment centres with many jobs in industry of service
- Education centre with many schools, colleges and universities.

Problems related to rapid growth of urban centres

Although urbanization is good for development, it has a number of problems. These include;

- High levels of unemployment resulting into poverty and low standards of living
- Traffic jam and congestion leading to delays and stress
- Overcrowding leading to easy spread of diseases
- Growth of slums with very poor living conditions
- Pollution of land, water and air due to poor disposal of domestic waste
- Increased crime rates because most people are unemployed
- Shortage of food due to increased population leading to hunger and starvation
- Water shortage for domestic and industrial use
- Poor sanitation leading to easy spread of diseases

Solutions to the Problems Of Big Cities

- Strict laws on waste disposal to solve the problem of water and land pollution
- Tightening security to solve the problem of high crime rates
- Providing efficient services to all parts of the country to solve the problem of rural-urban migration
- Sensitizing masses on urban agriculture to solve the problem of food shortage
- Increased investment in industry and service sector to provide employment opportunities
- Upgrading slums to improve people's living standards

Chapter 17: Transport and Communication in East Africa

Transport is the movement of people, animals and goods from one area to another.

Transport is the processes whereby passengers and goods are moved from one point to another.

Transport is an important factor that facilitates rapid economic development of a region.

Types of transport

They are **three types** of transport which are commonly used in E. Africa

- Land transport
- Water transport
- Air transport

Land Transport

Types of land transport

- Human transport/portage

- Animal transport
- Road transport
- Railways transport
- Pipeline transport

Human Portage

Human transport is the oldest and most common form of transport men have used for a long period of time.

Advantages of Human Portage

It can be used in very remote and inaccessible areas where other forms of transport are not possible e.g in very steep mountain relief, swamps and in shallow rivers.

- It does into require any initial capital and skill resources to establish it. It can be used anywhere and any time.

Disadvantages of Human Porterage

- The amount of goods involved is too small at a single moment.
- It's too slow to match modern standards in terms efficiency.
- It is very tiresome to those who use it. It can't be recommended for modern uses.

ANIMAL TRANSPORT

It is not well developed in E. Africa. It's only Kenya, which has improved and emphasized animal transport in the Central and North Eastern parts, in the semi-desert areas. Here donkeys and Camels are used for transport.

It is commonly used in remote and harsh environments such as in deserts and semi-desert areas, in mountainous and swamps areas.

In Uganda animal transport is used, although on a small scale in Kapchorwa and Kumi in N. Eastern parts.

Advantages of Animals

- It relatively quicker compared to human porterage.
- The amount of goods transported at a single time is larger than that of human porterage.
- It is suitable for use in remote and inaccessible environments where modern means are not easy to reach.
- It doe not require capital bass for its initial establishment.

Disadvantages

- The amount of goods transported in a single route is very small.
- It is relatively slow compared to modern farms of transport like railway and water.
- It is tiresome to those who use it daily.

ROAD TRANSPORT

Road transport involves the movement of goods and passengers by vehicle, bicycles, motorcycles and buses on the road. Road transport is the most common form of transport used in East Africa.

There are two types of road commonly used in E. Africa i.e,

- Highway road network
- Feeder road network

Advantages

- It can be constructed in remote areas which re inaccessible to other forms of transport like railway and air transport.
- It is cheaper to establish compared to air and railway transport.
- It is suitable to use over short distances.
- It is flexible during its use and goods can be sold on route and delivered any time.
- It can be used to deliver perishable goods over a short distance.
- Road transport can be used for advertisement placed on vehicles.
- Road transport is cheaper to establish. [RPT]
- Vehicles don't run on a scheduled time like air so operate at any time.
- Insurance charges on road transport are lower than other means.

DISADVANTAGES

- Heavy loaded vehicles such as Lorries are too slow to cover their intended distance in time compared to air.
- Since trucks on roads don't use time schedule, the return journeys tend to be of less value as most tend to return empty.
- It is likely to be attacked high way robbers which may result into great loses.
- It can be affected by congestion and traffic jam especially during the rush hours resulting into delays or time wasting and inconvenience.
- It can be affected by weather changes especially severe rainfall which may make roads impossible.
- Prone to a high rate of accidents unlike other means of transport

NB. ***In E. Africa Kenya has the best road network followed of a reign.***

Roles of Road Transport to the economic development of a region [values or benefits]

- It provide employment opportunities as drivers.
- It helps in delivering goods to final consumers.
- It boasts the tourism industry in the remote parts of E. Africa where other forms don't reach.
- It promotes international understanding /relationships across boarders' i.e. between Uganda – Kenya and Tanzania.

- It is a source of government revenue through taxing truck owners and fuel pump owners.
- They encourage industrial development by linking industries to markets or industries to raw materials

The factors hindering construction of road network in E. Africa
- Inadequate capital resources to invest in the transport sector.
- Limited technological know-how resulting into dependence foreign exports which are very expensive.
- Physical barriers like extensive swamp, valleys and high altitudes which interfere with easy establishment of roads.
- Limited government of allocating scarce resources leading to construction of roads which get spoilt easily.
- Petroleum products are very expensive and their prices are ever increasing. This affects road transport.
- Many heavy trucks overburden the existing roads leading fast depreciation and increased maintenance costs.
- Roads normally are destroyed by natural hazards like erosion, weathering, earthquakes and flooding which increase maintenance costs.

NB. Much of Western Tanzania and Southern parts between Mahenge and Songea and some Northern Eastern parts between Tabora and Arusha are very remote due to inadequate road network. This is responsible for the law levels of economic development and backwardness in the rural Tanzania.

RAILWAY TRANSPORT IN E.AFRICA

Railway transport involves the carrying of goods and passengers by train. It is the least means of transport used in E. Africa because it is very expensive to establish and maintain.

Advantages of Railway transport
- It is relatively cheaper for carrying of bulky commodities over long distances.
- It is less affected by extremes of weather compared to other forms of transport.
- It works on time schedule and follows strict routes. This saves time.
- It is suitable for carrying a large number of passengers at a single route.

Short comings of Railway transport
- It is expensive to install railway lines for trains.
- It is very expensive for short distances.
- It is suitable for perishable goods and goods which are urgently needed e.g Newspapers and drugs.
- It is slow leading to delay in delivery of goods and services.
- Not flexible since it has fixed routes.
- It has specialized coaches/wagons for goods/liquids/passengers.

- It has limited distribution. Not everywhere.
- It causes inconveniences and delays due to working on a strict schedule and timetable.
- It is not as flexible as road transport.
- It is affected by relief features in its course e.g hills and mountains/difficult to use highlands
-

PIPE LINE TRANSPORT

It involves the transportation of liquids and gases through pipes from one point to another.

Advantages of Pipeline Transport

- It is cheap and easy to maintain.
- It is not affected by weather changes and congestion.
- It is more convenient
- It can be used to transport large volumes of liquids and gases.
- It is very reliable.
- It involves little chances of theft.

Short comings of pipeline transportation

- The initial costs of constructing a pipeline is high and can result into environmental disaster (degradation) in form of pollution where there is a leakage along the pipe.
- It is used for transport liquids and gases only.
- It's hard to lay down pipes in unfavourable relief like steep mountains and extensive swamps.
- Sometimes it's expensive to maintain where there has been a leakage along the pipe.

WATER TRANPORT

Water transport is the cheapest means of transport of the three types. It is the single types of transport where the largest amounts of goods are transported at a single round. It is sub-divides into three branches: i.e

- Lake or ocean transport
- Water canal transport
- Ferry transport

Advantages of water transport

- It is the cheapest means of transport for transporting bulky goods.
- Little tine us wasted in such incidents like traffic jams and checks, like load transport.
- It is suitable for transportation of fragile or breakable goods. For example, glass. This is because there is very little shaking during the time when the goods are being transported.
- There is limited chance for the attack from robbers as it's the case on high ways and along the rail line.

Disadvantages of water transport

- It is affected by prolonged drought.
- Double cots of loading at terminals makes it costly.
- The process of loading and off loading of ships takes long leading to delays in delivery of goods.
- Perishable or urgently required good such as newspapers, can not be transported using this form of transport.
- Water transport is only developed in areas with water bodies.
- It is affected by infavourbale weather conditions along the water transport routes e.g accurance of strong winds and storm.
- Port facilities are very expensive especially to Uganda which is landlocked

AIR TRANSPORT

This involves the movement of good and passengers by aeroplanes. It is not well developed and commonly used compared to other forms of transport. This is because;

Factors for the limited use of Air transport in E. Africa.

- Shortage of capital yet it required large capital base.
- Limited skilled labour and technological know how yet it needs a highly killed labour force.
- It has a low carrying capacity compared to other forms of transport especially water and railway.
- It is very expensive yet majority of people in E. Africa are low income earners.
- Political instabilities in some parts hindered the development of air strips and air ports.

Advantages of Air Transport

- It is the quickest means of transport compared to other forms of transport.
- It is suitable for transport perishable goods and urgently needed goods e.g flowers, drugs and relief products.
- There is greater security for passengers and goods while in transit.
- There is no time wastage since it operates on time schedule.
- It is comfortable and less tiresome especially over great distances.
- If well managed it is highly profitable.
- Inadequate storage space therefore transportation of bulk and poorly packed goods is difficult.

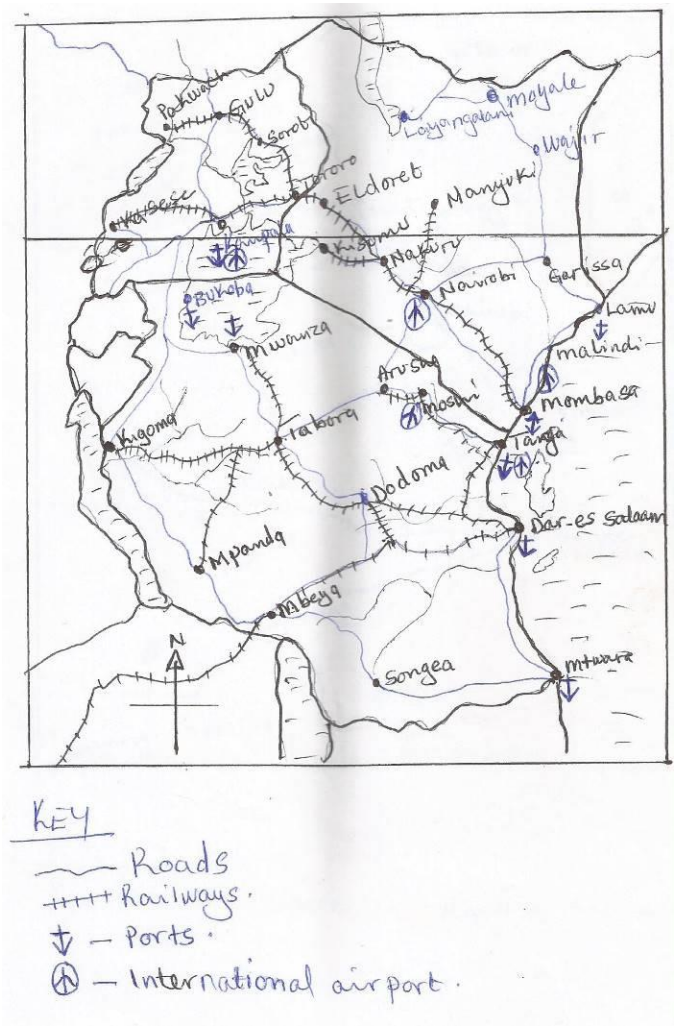
Disadvantages of Air Transport

- Dangerous and inflammable commodities such as petrol, paraffin and so on cannot be allowed on the plane.
- Weather conditions like fog and mist interfere greatly with air transport schedules compared to other forms.

- Construction of an airport is very expensive and air transport fare is very high for most people.
- Time is wasted in air traffic control such as checking in and booking.

Locating major transport routes of east Africa

THE DISTRIBUTION OF TRANSPORT ROUTES IN EAST AFRICA



Factors which influence the distribution of transport routes in East Africa.

- Areas with valuable minerals resources/deposits have attracted transport routes for example Kasese, Tororo and Shinyanga to transport minerals.
- Areas with agricultural raw materials attract transport routes to exploit the raw materials and areas with low agricultural production have few transport routes.
- Areas with fisheries resource have encouraged the development of ports and landing sites to transport/promote fishing.

- The presence of forestry resources have encouraged the development of transport routes to link the tourist centres to the towns/areas where tourists come from.
- The influence of industrial development where industries attract transport and communication networks to market industrial goods and deliver raw materials.
- The influence of relief where gentle slopes favour the construction of transport routes because they are cheap to construct/excavate.
- Steep slopes discourage development of transport routes because they are difficult and expensive to excavate.
- The influence of urbanization where by towns encourage the development of transport routes for easy mobility of people.
- The influence of water bodies where by the existence of navigable water bodies have encouraged the development of ports and habours for water vessels to anchor.
- Areas which area densely populated attract transport routes for easy movement of people.
- The influence of drainage where well trained areas favour the construction of transport routed because it is cheap and easy to construct roads and railways.
- Water logged areas discourage the development of transport routes of seasonal flooding.
- The influence of government policy towards the transport sector. Favourable government policy encourages the development of transport routed because it provides funds for construction.

Challenges facing transport in East Africa.

- Inadequate capital to invest in the construction and maintenance of transport routes which are better and durable.
- Limited skilled labour such as civil engineers to design and work in the transport sector.
- Low levels of technology to construct and maintain the transport infrastructure especially water transport.
- Existence of strong winds/waves on water bodies which lead to capsizing of boats, vessels and ferries.
- The presence of water weeds/floating vegetation affect easy movement of boats on lakes and rivers.
- Political instability which affect transport in some ports of East Africa.
- The use of outdated/very old/poor vessels limit navigation of deep waters.
- The existence of rugged/mountain terrain limit the construction of roads and railways.
- The neglect of existing transport infrastructure like roads and railways leading to its wearing out/collapse.
- The existence of shallow water, rapids and waterfalls limit navigation along some sections of rivers for example river Nile.
- The heavy rainfall in some area/seasonal flooding make some roads impassable.

- The existence of rock out crops across river beds and lakes lead to breakage of water vessels.
- The existence of sea pirates /insecurity /highway robbers along transport routes attack and disrupt transport especially near Somali waters.
- Congestation/jam at ports and along roads lead to delays in delivering of goods and services.
- Petroleum products are very expensive and ever increasing in prices which affect easy and cheap use of road transport.
- Heavy trucks over burden the existing road network leading to quick depreciation and increase the maintenance costs.
- Weather conditions such as fog and mist in some areas greatly interfere with air transport.
- Limited economic activities like industrialization to stimulate the construction and upgrading of transport routed especially water.
- Corruption amongst transport officers has hindered development of the transport sector resulting in construction of substandard transport routes like roads.
- Occurrences of accidents on roads due to reckless usage of roads.
- Shoddy construction of transport infrastructure especially roads has led to losses due to reconstruction.
- Poor government policy in relation to allocation of the available resources.

Communication

Communication is the sending and receiving of messages from one place to another.

or

Communication involves sending and receiving knowledge, information, and ideas from one place to another.

It involves **the person sending the information**, the **information itself**, the **medium** through which the information is transferred, and the **receiver of the information.**

Traditional forms of communication

- Drums/ drumming
- Horns/ horn blowing
- Whistles
- Clapping
- Use of signals like: smoke and gestures

Advantages of traditional of using traditional means of communication

- Promote culture
- Cheap to acquire and maintain
- Can easily alert people in case of danger
- They are easy to use

Disadvantages of traditional forms

- Make a lot of noise for example horns
- Show disrespect in some societies

- Takes a lot of time to get feedback
- Can easily be misinterpreted

Modern forms of communication

A) Before digitalization

- Letters
- Radio
- Telephone
- Telex machine
- Fax machine
- Analogue television
- Newspapers
- Telegram

B) As technology improved more digitalized efficient forms were developed

- Internet
- Smartphones
- Digital television
- Computer
- Radio
- Magazines
- Letters
- Electronic mail/e-mail

Advantages of digital communication

- They are faster
- Information and ideas are transferred easily
- They carry more information than those that were used before
- Instant feedback is provided
- Connects people in all parts of the world
- Brings cooperation between different countries
- Reduces distance used to convey information

Disadvantages

- Expensive to acquire and to maintain
- They cannot be used by illiterate people
- It cannot be used by people in rural areas because it requires electricity to be used

Chapter 18: Trade within and outside East Africa

What is trade?

Trade refers to the buying and selling of goods and services.

Trade is one of the main economic activities that people do in East Africa. Evidence of trade in an area is the;

- Presence of shops
- Trading centers
- Markets
- Road networks

Goods sold and bought in your local area

- Foodstuffs like maize flour, rice, beans, potatoes, cassava, bananas, meat
- Livestock like: chicken, goats, cows
- Clothes (new and second hand)
- Fresh foods like fruits, beans, peas

Why do people engage in trade in the local area?

- Need to earn money
- Need to avail some areas goods that are scarce there
- Lack of alternative activities e.g. in areas where there is land shortage, people aren't able to be involved in agriculture
- Need to supplement their normal income sources

How people in the local area benefit from trade?

- Traders make profit and improve their standards of living
- Traders gain fame from their work thru specialization [deal in specific trade of goods] as they produce goods of high value or quality.
- Buyers are able to easily access what they need or don't have in their areas from traders [make scares goods available]
- Trade enables inter regional relationships since goods that are made from other areas can reach the local area through traders.
- Local people are able to get cheap food supplies from the traders that improve their diet and standards of living
- Local government earns revenue thru paying tax and its injected in infras development e.g. roads
- Led to development of roads and railways and communication structures to linkup the people to goods or services
- Trade to the local people has enabled exploitation of idle existing natural resources [especially those that have market]

Problems traders face in the local area

- Poor transport during the rainy season (in rural areas)
- Sunshine during the dry season in open air markets
- Rain during rainy seasons for traders in open air markets
- Low sales for traders of some goods
- High taxes (licence, market dues)
- High transport costs for traders who travel from far to such markets

Types of trade

There are various ways of buying and selling of goods and services. What we trade in and the way we sell and buy our things, give rise to different types of trade like:

Examples:

1) Barter trade
2) Monetary trade
3) Invisible trade
4) Visible trade
5) Internal trade

6) External trade

ACTIVITY

*R*ead the following examples of different types of trade and name which form of trade corresponds to which example from A to D.

A) Charles owns a banana plantation and wants to eat some eggs yet he has no money. So he visited his friend Nancy who has got poultry birds and asked whether she would take a bunch of banana in exchange for a tray of eggs. They agreed and made the exchange.

B) Apio's family lives in Uganda. Her father often crosses over to Kenya and works as a labourer on the farms there in the Kenya highlands

C) At Malaba Border, in Uganda, Masaba often sees many big trailers/ trucks loaded with goods entering Uganda from Kenya and others from Uganda entering Kenya

D) Pauline's Geography book got filled during the last class. She used the money that her mother had given her to purchase another book from the shop on her way to school.

Trade is mainly classified under **Barter trade** which is a form of exchange of goods and services for other goods and services. Or

Monetary trade which is the exchange of goods or services for currency/ liquid cash.

Trade can be classified according to level of operation i.e.

- ✓ Internal
- ✓ Regional or
- ✓ International trade

Internal trade is the exchange of goods and services within the country's borders. [It's also called **local or domestic trade**]

Regional trade refers to the exchange of goods and services between countries located in the same geographical region/ part e.g. SADC (Southern African Development Community), COMESA (Common Market for East and Southern Africa.)

International trade (Foreign trade) is a form of exchange of goods and services done between 2 or more countries and it involves **export** and **import trade.**

NB: [Export trade involves **selling of goods and services** to other countries while import trade involves the **buying of goods and services** from other countries.]
Trade can also be visible were tangible goods like beans, coffee, textile are got in exchange for money or invisible trade where there is a sale of services like: insurance, banking, labour and tourism that are not seen/ tangible.

ACTIVITY
Researching from the Library or internet, find out the following:

a) What are Uganda's main exports?
b) What are Uganda's main imports?
c) Of what value are Uganda's exports and imports to the people?

ACTIVITY OF INTERGRATION

The following table shows Uganda's exports and imports in **2023**. Study the table below and use it to answer the questions that follow:

Export item	***Value (million USD)***	***Import item***	***Value (million USD)***
Gold	1650	Refined petrol	1,100
Coffee beans	487	Gold	205
Dried legumes	104	Hot rolled iron	970
Fish fillet	99.7	Packaged medicine	400
Maize	92.5	Cars	140
Raw tobacco	84.5	Wheat	87.3
Raw sugar	75.9	Electricals	87.2
Vanilla beans	72.4	Pesticides	80.5
TOTAL	***2,666***	***TOTAL***	***3,070***

a) (i) Distinguish between import trade and export trade **[02 mark]**
(ii) Calculate the balance of trade between Uganda's exports and imports. **[02 marks]**
(iii) What is the nature of Balance of trade Uganda enjoys as seen from
(a) (ii) above. **[01 mark]**
(iv) Why is the Balance of trade of Uganda like that? **[01 mark]**
b) Draw a pie chart to show Uganda's import contribution for the year 2023. **[09 marks]**
c) Explain the benefits of trade to Uganda's people. **[05 marks]**
d) Suggest any 5 obstacles limiting Uganda from engaging in wide spread Trading with other countries. **[05 marks]**

Chapter 19: Further skills in map reading and map use

Using contours

Contours are used to show relief of an area on a survey map
Contours are drawn on a map to join places of the same height

- Contours are measured from sea level
- Contours form different pattern to show different relief features
- Contours forming a circular pattern represent a hill
- Contours are very close where the slope is steep and widely spaced where the slope is gentle

Describing an area from a survey map
Describing an area involves identifying the characteristics of relief, drainage, vegetation, as well as human made features and human activities of that area.
Identifying physical features and human activities on a survey map
Physical and human features as well as human activities are shown on a map by means of symbols. These symbols are listed on the key. The map key is also called a legend.
Describing relief
Use contours to identify relief features on a survey map

- Vertical interval
- Hills
- Areas with steep slopes
- Areas of gentle slopes
- Flat areas
- Basins

Describing Drainage
To identify drainage features on a survey map you study the key to acquaint yourself with the symbols used to show drainage on the same map.
Drainage features on a map include;

- Swamps
- Rivers
- Lake

Identifying vegetation on a survey map
It is important to study the key with the symbols to show vegetation. The types of vegetation shown on the map include;

- Forests
- Thickets
- Papyrus Swamps
- Woodland
- Scrub

Describing settlement
Settlement on a map are shown by huts, buildings and built-up areas
Settlement patterns
This is the way people settle and construct their huts/houses in a place. The common settlement patterns are;

- Scattered settlement where the huts are distributed anyhow in a place
- Clustered settlement where huts are concentrated in small areas,

- Nucleated settlement huts are concentrated around a given feature becomes the nucleus,
- Linear settlement where huts are arranged in lines along an elongated feature such as a road, railway, etc.
- Planned settlement pattern where huts/houses are arranged in columns and rows

Describing human activities

The features which show that certain human activities take place in a given area

Cultivation – crop gardens, agro-processing industry/factory, plantations

Fishing – lake, river, wetland, landing sites, fish trps

Animal rearing – ranch, paddock, cattle dip tanks

Lumbering – sawpit, forest, sawmill

Manufacturing – sawmill, ginnery, factory

Transport – road, railway, railway station, bus/taxi park, bus stop

Identifying economic development on a survey map

Indicators of economic development in a given area include; roads, railways, ecectricity supply, health centres, trading centres, factories, etc

Drawing a sketch map from a survey map

Procedure

- Measure the from left to right, and write down the length
- Measure the map from top to bottom and write down the length. Which of them is longer?
- In your exercise books, draw a rectangle similar in shape as the area occupiued by the map
- In the rectangle that you have drawn, carefully and neatly draw the physical and human features as seen from the map
- Use different colours to show the features
- Draw another rectangle outside the one you drew in 4 above and indicate the title, key and compass

Using a cross section

A cross section is also known as a relief section. It shows the shape of the earth's surface of a given place along a straight line. It is constructed basing on the contours between two specific points on the map.

Constructing a cross section

- Locate the points between which the cross section is to be constructed
- Get the plain straight-edged sheet of clean paper and lay it over the map to connect the two points
- Clearly mark the two points with lines on the sheet of paper
- Mark all points where the contours cross the straight edge of the paper indicating the height of each
- Mark all features (physical and human) crossed by the paper edge
- Mark the two points (ends of the section) on the paper

- Remove the paper from the map
- Place the paper horizontally over a graph paper with its edge along one of the thick lines of the graph paper. Mark, on the graph paper, the two points.
- Draw a horizontal line joining the two points on the graph paper
- Draw a vertical line of between 3cm-6cm from each of the two points
- Check the contour values you have indicated on the paper and identify the highest and lowest ones
- Subtract the lowest figure from the highest
- Determine a convenient vertical scale for your section
- Use the scale to graduate the vertical axis
- Place the marked paper back over the graph paper as you did in step 8
- Plot/mark the contours on the graph
- Join the points on the graph with a line
- Neatly shade the region between the line and the horizontal axis

  What you have drawn is a cross section, also known as a relief section. It shows what the relief shown on the map is like.

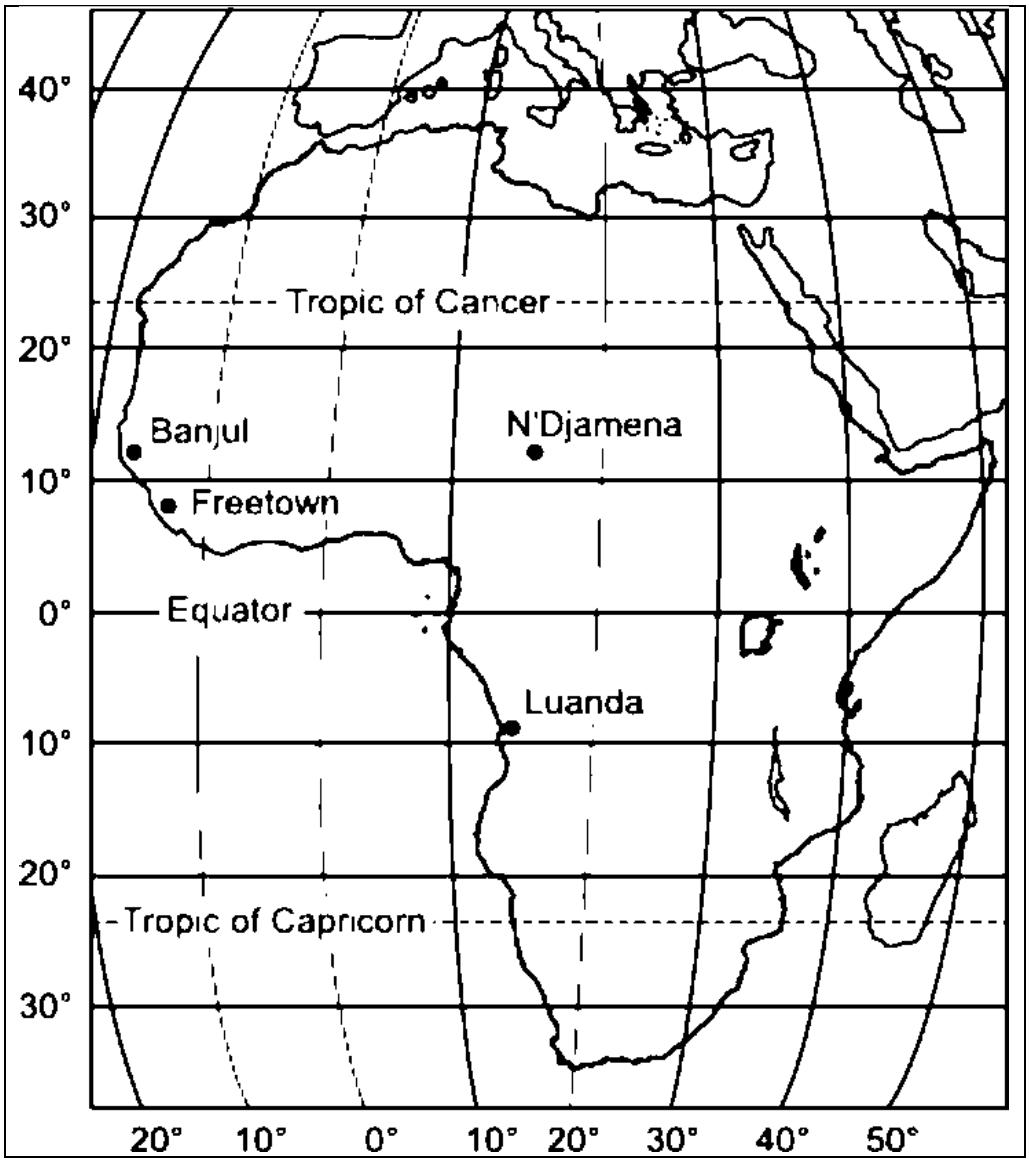
  The value that you got by subtracting the lowest contour figure from the highest one is referred to as "amplitude"

  Constructing a digital cross section

Chapter 20: Location and Size of Africa

Africa is one of the continents of the world and the second biggest after Asia.
Africa straddles the equator (Africa is crossed by the equator).
The Equator divides Africa in two hemispheres; the Southern hemisphere and the Northern hemisphere.
The largest part of Africa lies within the tropics. Between the two major latitudes tropic of cancer marked at 23.5^0N in the north and the tropic of Capricorn marked at 23.5^0S in the south.
Africa is also crossed by the major longitude called the prime meridian (Greenwich) in the West through Accra in Ghana.

LONGTUDS, LATITUDES



COUNTRIES OF AFRICA

Africa as a continent is surrounded by four major water bodies;
Atlantic Ocean in the west.
Indian Ocean in the East
Red sea in the North East
Mediterranean Sea in the North.

Chapter 21: the relief regions and drainage of Africa
RELIEF REGIONS OF AFRICA
Relief is the general appearance of the land surface. The relief of an area is shaped up by the land forms.

Land forms are features that protrude or make depressions on the earth's surface.

Examples of protruding land forms include;

Highlands and mountains
Escarpments
Hills
Ridges
Plateaus

Examples of land forms that make depressions include;

Basins	- Explosion crates	- Gulfs
Rift valley	- River valleys	- Calderas, etc.

NB: The relief of Africa is mainly made up of large plateaus, highlands, basins, coastal land forms and plains.

PLATEAUX

A plateau is a raised land with a (uniform) monotonous relief on top. (It's a raised land with a flat top)
The plateau of Africa consists of old basement rocks.
It is higher in the East but gradually sinking towards the west.
The Northern part of East Africa is on a lower altitude than the southern part of the continent.
The plateau of Africa is raised between 200 – 8000 feet above sea level.
Generally the relief of Africa lies at a height of 900m and above comparing from the sea level.

BASINS AND DIVIDES

A basin is a broad shallow saucer shaped depression on the earth's surface which is separating plateaus, frontlines or mountains on both sides.

A divide is a hill /ridge separating two or more basins.

Basins therefore, form one of the major relief features of Africa. Basins in Africa are areas of deposition because all water from the divides drain into the basins, where they deposit sediments of eroded materials.

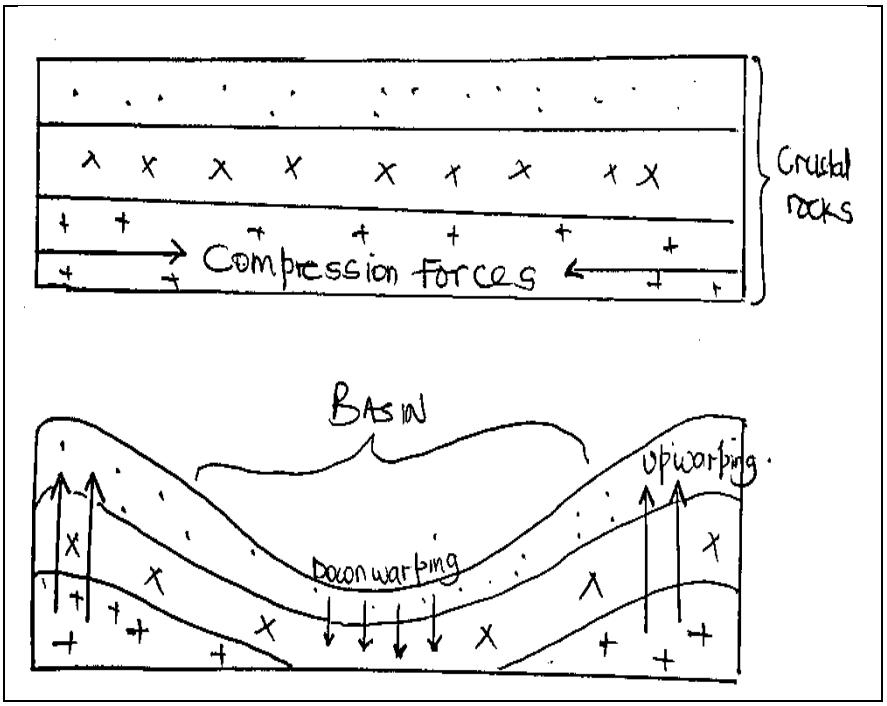
Formation of Basins

Basins are formed when tectonic forces act upon the landscape from either side.
These compress the land by pushing the crust rocks from both sides towards each other, and the sides are forced upwards through up warping, while the central block is pulled down wards through down warping. The central block therefore subsides to form a basin.

Examples of basins in Africa include;

Victoria basin, Chad basin, Congo basin, Kalahari basin and many others

Illustration for formation of a basin.



BENEFITS OF BASINS TO THE PEOPLE OF AFRICA

Basins are occupied by forests which encourage lumbering, for example the Congo basin is occupied by tropical rain forests.

Basins contain lakes which are used for fishing. Fish a form of food and used to obtain proteins in the human diet, for example the Chad basin.

Basins have got fertile alluvial soil which encourages crop growing, for example Banana and Robusta coffee around the Victoria and Kyoga basins.

Basins have got rivers which are used for navigation and generating Hydro Electric Power, for example River Congo in the Congo basin.

Some basins are used for wild life conservation which encourages tourism.

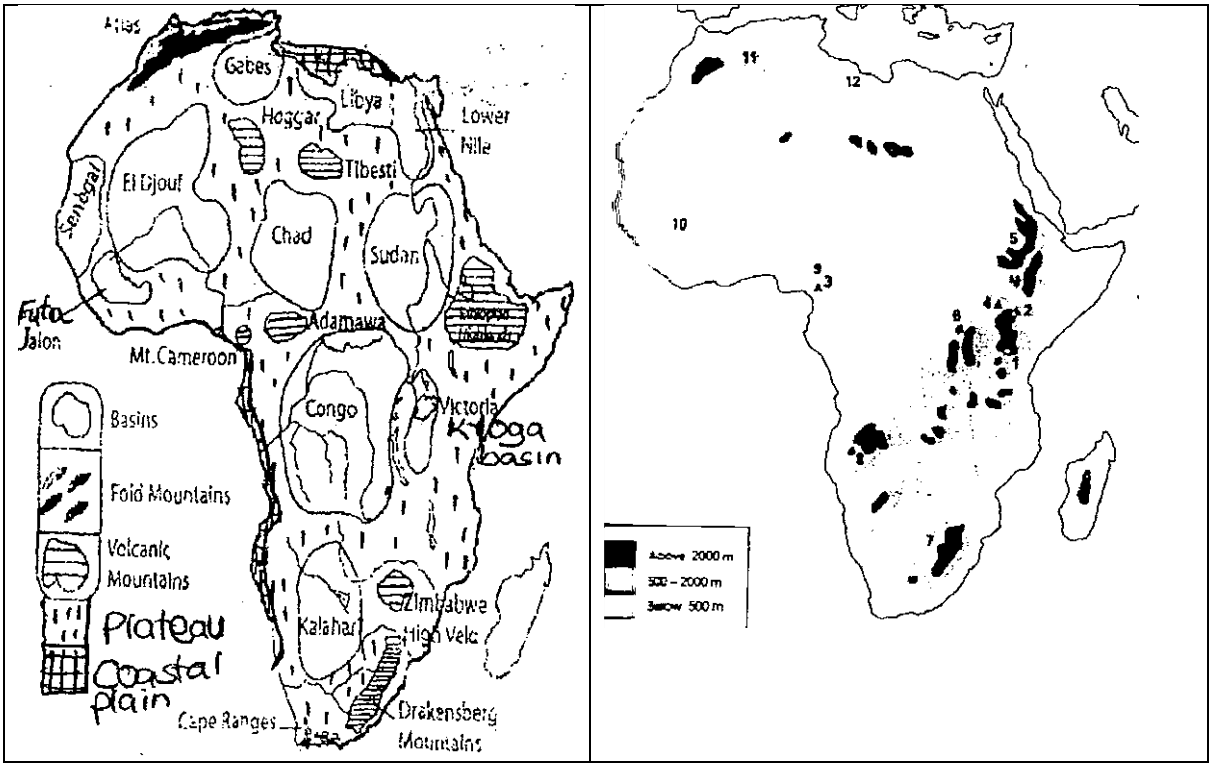
However, Basins have got some problems associated with them, these include;

Basins encourage flooding leading to destruction of life and property. This is due to over flow of the rivers and lakes within the basins.

Basins have forests which habour disease causing vectors for example Ebola in the Congo basin that is claimed to be spread by monkeys and bats, Malaria spread by Mosquitos and these largely claim lives.

Basins have forests which are used as hiding places by antigovernment groups such as rebels and other criminals causing insecurity for example ADF, Ntarahamwe, M23 and other rebel in Congo basin.

A SKETCH MAP OF AFRICA SHOWING RELIEF REGIONS OF AFRICA (PLATEAU, HIGHLANDS AND BASINS).



THE GREAT RIFT VALLEY

A **rift valley** is an elongated depression boarded by escarpments.

The African rift valley is found in the Eastern part of Africa;

It was formed by the process of faulting.

Faulting is the fracturing of rocks of the crust due to strains and stress and eventual displacement of the rocks of the crust.

The African Rift valley is believed to have been formed by number of forces, such as tension forces, compression forces and uplift forces.

Formation of the rift valley by tension forces

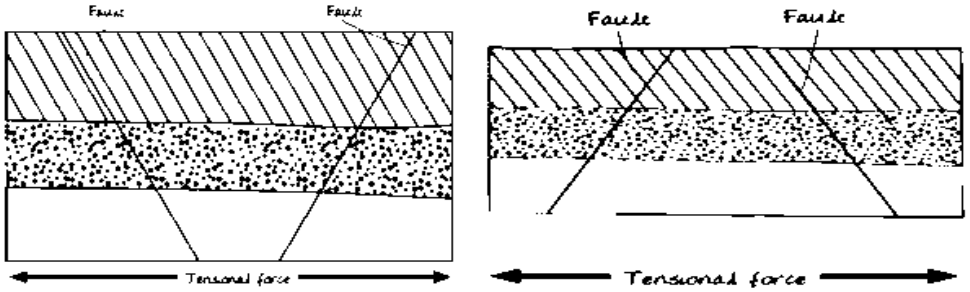
Tension forces are those that pull the rocks of the crust to opposite direction away from each other.

The Eastern part of Africa was subjected to tension forces which pulled the rocks of the crust to different directions. These tension forces led to formation normal faults which divided the land scape into three faulted blocks. Tension pulled apart the side blocks and the central block was forced to sink under its own weight and formed a rift valley. Examples include the Western arm of the East African Rift valley.

Illustration of rift valley formation by tension forces.

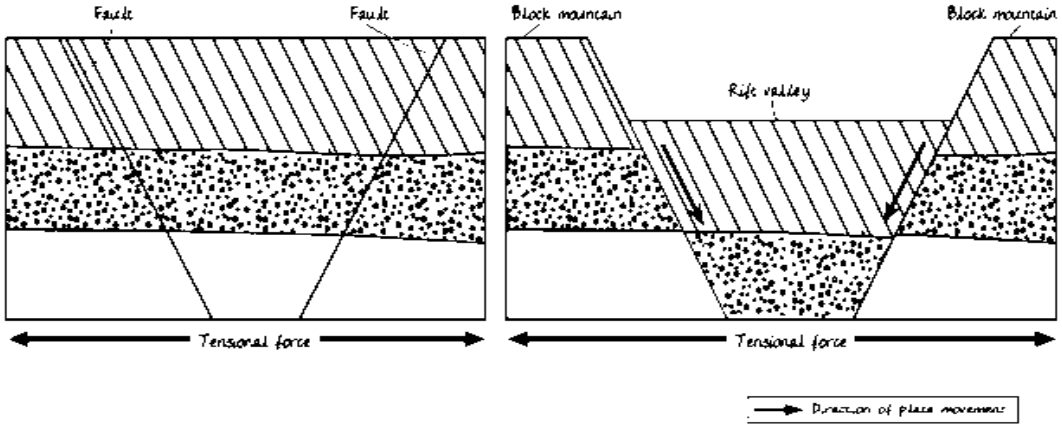
FAULTING

- A fault is a fracture in the rocks along which the rocks are displaced.
- The **tensional forces result in parts of the crust** being fractured.
- This process is called faulting.



Formation of Rift Valley

- A **rift valley** is a valley with steep sides formed along **fault lines.** E.g. East African Rift Valley

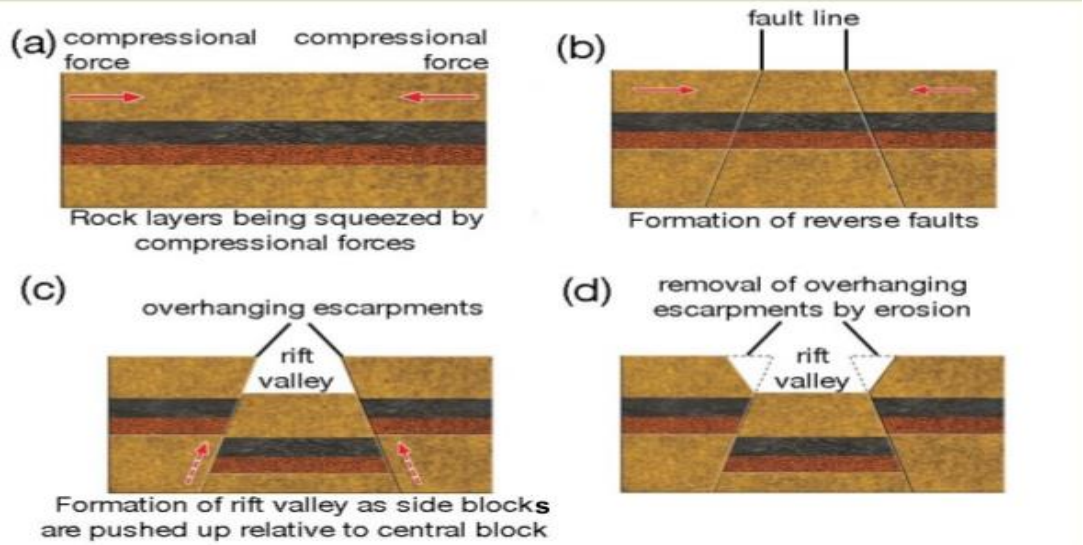


Formation of the rift valley by compression forces

Compression forces are those that push the rocks of the crust towards each other in the same direction.

Part of Africa was subjected to compression forces. These pushed the rocks of the crust towards each other which led to formation of reverse faults in the rocks, along which the land scape was divided into faulted blocks. Continued compression forced the side blocks to over-ride the central block which remained stable and formed a depression known as the rift valley, for example the Eastern arm of the African great rift valley.

Illustration of the formation of the Rift valley by compression forces.



Formation of rift valley by compression

Economic importance of the Rift valley to the people of Africa.

The rift valley forms a beautiful scenery which attracts tourists from within Africa and abroad. These tourists pay fees in form of foreign exchange which is used to develop infrastructures in Africa.

The rift valley has got lakes which are used for fishing to obtain food inform of fish. These lakes include Lake Tanganyika, Lake Albert, Lake Malawi, Lake Magadi and many others especially in the stretches within East Africa.

The rift valley has got grasslands which are used for wildlife conservation. Large game parks have been gazette in Africa within the rift valley due to the presence of grasslands and the limited human population, this helps in Bio-diversity, ecological balance and has turned out to be the basis of African tourism. Examples include Queen Elizabeth National park.

Some lakes found in the rift valley are used for mineral extraction for industrial processing for example soda ash from Lake Magadi. Soda ash is used to make glass ware.

The rift valley has got grasslands which are used for animal rearing especially cattle rearing.

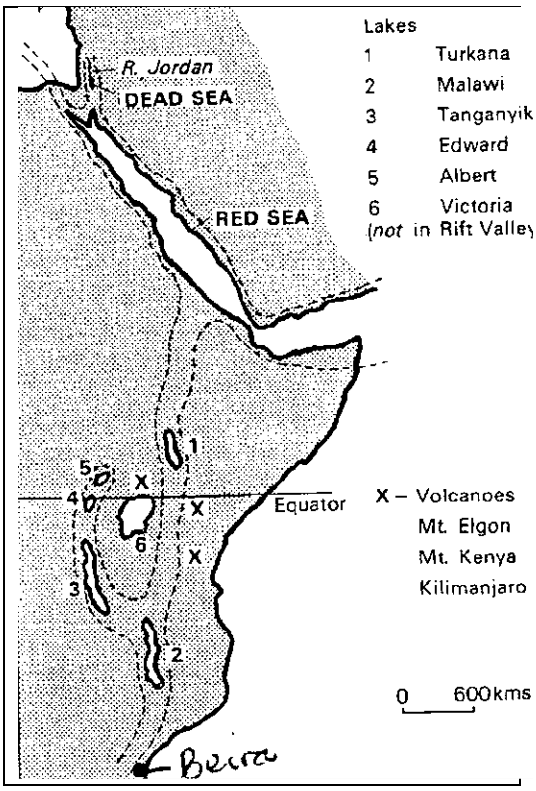
Some parts of the rift valley are associated with fertile soils that support crop farming especially growing of cereals.

Some parts of the rift valley are used in the generation of Geo-thermal electricity for example in the Nairobi rift where geo-thermal plants have been established as sources of energy.

PROBLEMS RESULTING FROM EXISTANCE OF RIFT VALLEY

The steep escarpment of the rift valley hinders construction of transport routes making transport difficult and expensive.

Much of the rift valley floor in Africa lies in a rain shadow of mountains, so receives unreliable rainfall which discourage crop farming.
The rift valley areas are associated with earth quakes which destroy property and claim lives.
Some parts of the rift valley are infested with vectors, vermins and pests like tsetse flies, mosquitoes and rodents which spread diseases to humans and livestock such as nagana to livestock and sleeping sickness to people.
Escarpments of the rift valley are associated with landslides which claim lives and destroy property for example in Swaziland along the Lubombo escarpment, and in Ethiopia.
Soil within the rift valley is largely infertile which makes crop growing difficult, hence pausing the land as idle and wasted.



HIGHLANDS OF AFRICA

Africa has a number of highlands. These have been formed majorly by three major process;

- ✓ Volcanicity
- ✓ Faulting and
- ✓ Folding

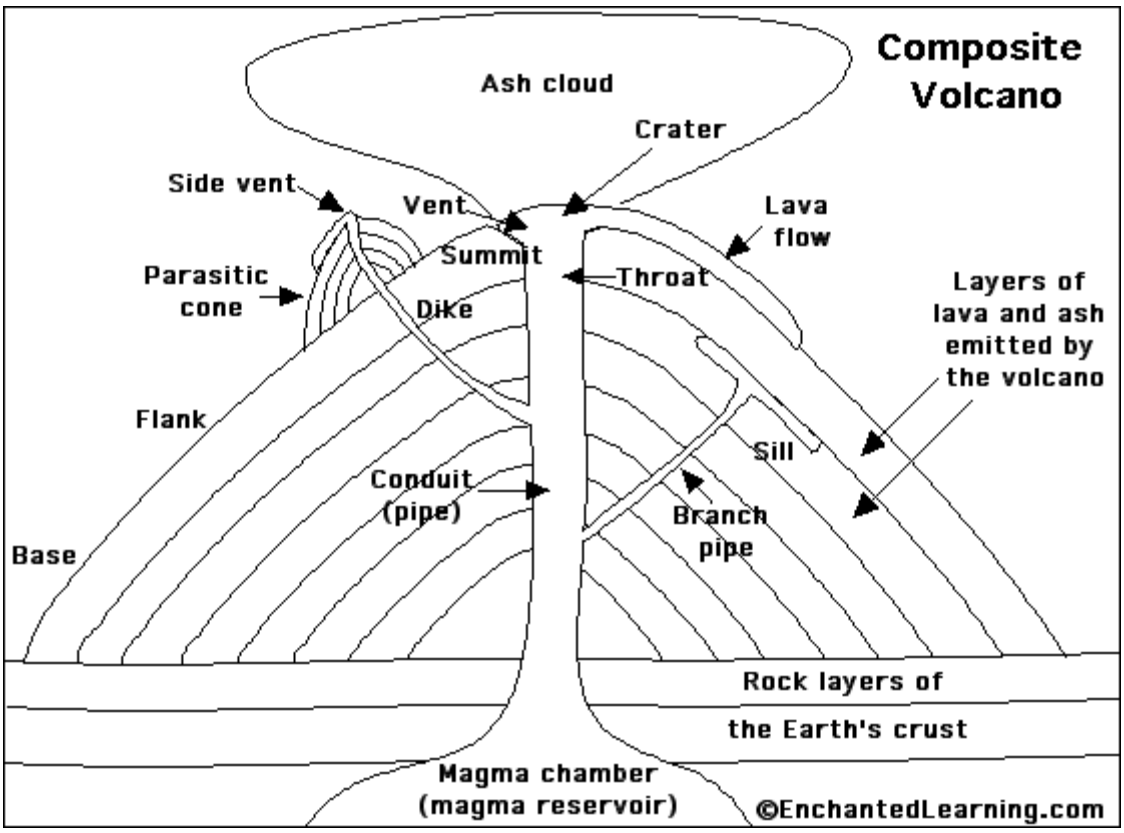
VOLCANIC HIGHLANDS

A large area of the African plateau was and still affected by volcanic activity.

Volcanic activity is also common near the rift valley and in areas affected by faulting in Africa.
Volcanicity involves molten rocks known as magma originating from the earth's interior in the mantle and are ejected to the surface where they solidity to form land scapes including volcanoes. These are of different shapes and types, depending on the type of lava from which they were formed. For instance;
Fluid Larva (basic lava) which can spread for miles before solidifying on the earth's surface because of its being less viscous with a low silica content.
Acidic larva which flows for a short distance and solidifies because of its being viscous with a high silica content.

FORMATION OF VOLCANIC MOUNTAINS.

Volcanic mountains are formed by the process of Volcanicity.
Volcanicity is the process by which molten rock material (magma) is ejected to the surface of the earth where it solidifies to form volcanoes.
Magma flows through the vent and accumulate in layers to form an upland with a crater on top.
Parasitic cones may be formed on the sides of the volcano as magma forces it's way in the sides through subsidiary vents.
Illustration of formation of a volcano.



Examples of volcanic mountains in Africa

Drakensberg in South Africa
Ethiopian highlands
Cameroon Highlands [Adanawa highlands]
Hagger Mountains
Kilimanjaro Mountains
Tibest mount

FOLD MOUNTAINS

Formation of Fold Mountains

Folding is the bending of rocks of the earth crust. Folding occurs on the young sedimentary rocks of the crust.

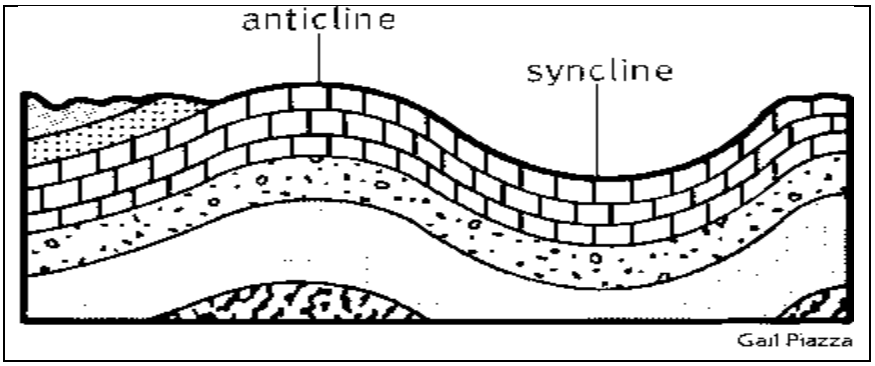
Folding occurs on these rocks for them being semi plastic and elastic.

Fold Mountains are formed as a result of tectonic forces for instance the compression forces which push young sedimentary rocks from both sides, leading to formation of upward bends known as anticlines and down ward bends known as synclines.

The upward bends termed as anticlines form Fold Mountains while the down ward bends termed as synclines form Broad valleys.

Examples of folded mountains in Africa are; The Atlas Mountain and the cape ranges.

Illustration of formation of Fold Mountains.



Economic importance of highland areas to the people of Africa.

Highlands have an influence on formation of relief rainfall which encourages agriculture for example growing of coffee on the Ethiopian highlands.

Highlands are associated with minerals which are extracted for industrial use.

Highlands are tourist attractions and the tourists pay foreign exchange to governments of Africa which is used to develop social and economic infrastructure.

Mountains are water catchment area (watersheds) with sources of rivers; the rivers provide water for generating Hydro-electric power and for domestic use.

Negatively

Highlands are affected by landsides which claim lives and destroy property.

Highlands are prone to serve soil erosion which discourages crop farming.

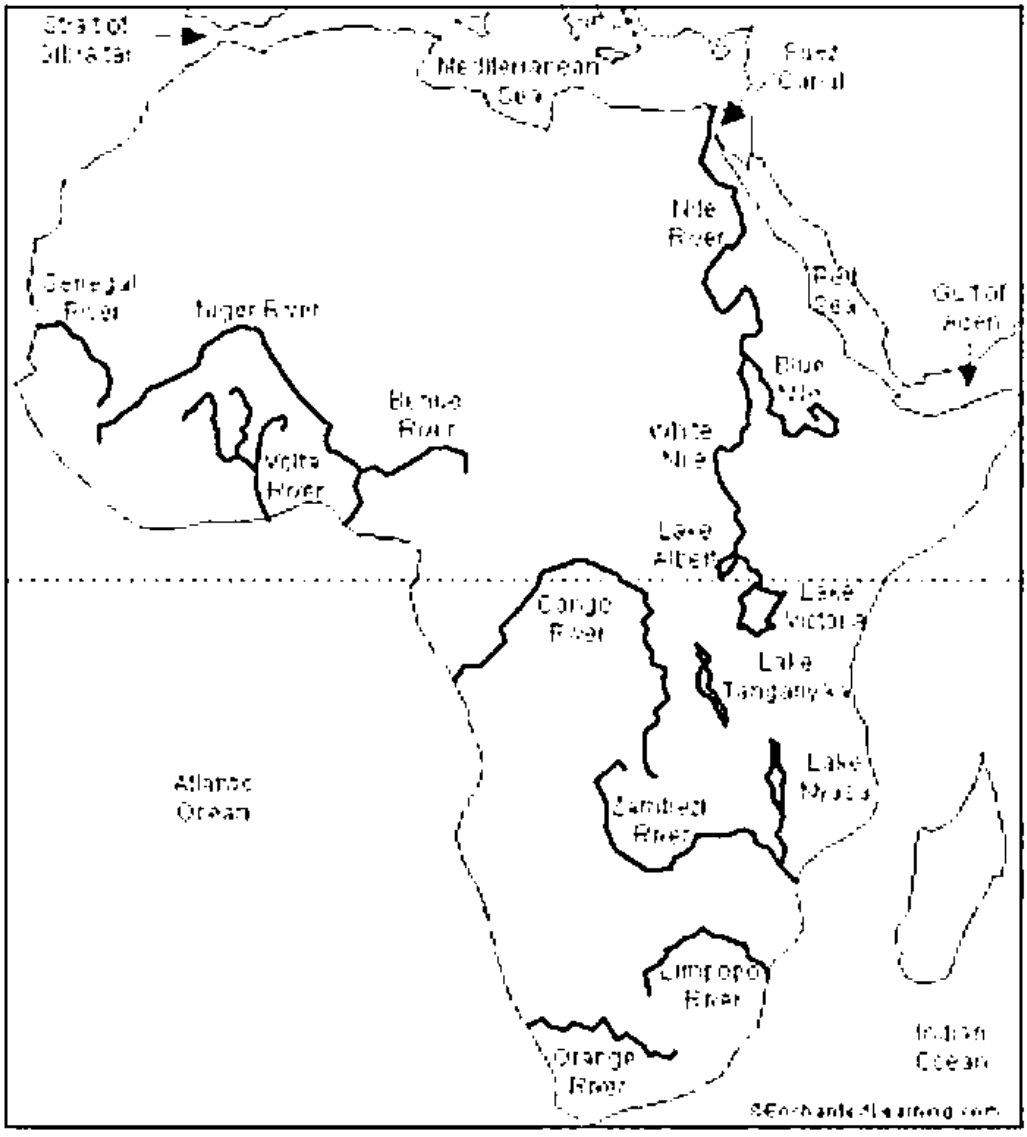
The lee ward sides of highlands are affected by dry conditions which discourages crop farming due to unreliable rainfall.

Highlands with forests act as hiding places for animals and labels who are a threat to humans national security respectively.
Highlands hinder the construction of transport routes due to the very steep relief, this keeps places remote and inaccessible.

DRAINAGE FEATURES OF AFRICA

AssignmentDraw a sketch map of Africa and on it mark and name.
Major rivers of Africa and the mult-purpose river dam projects known to you.

SKETCHMAP OF AFRICA SHOWING MAJOR RIVERS



RIVERS IN AFRICA

A river is a body of water flowing in a specific channel to a specific direction.
Rivers may be permanent or seasonal.

The major rivers in Africa include River Nile which is the second longest, Orange, Congo, Zambezi, Senegal, River Niger, River Gambia and River Limpopo.

The Okavango River is another unique river in Africa. It has its source in the Bie plateau in Angola. Unlike other Rivers in Africa which flow towards the sea, the Okavango River is mysterious since its mouth is in the Kalahari Desert where it supports a variety of world animals such as elephants, Zebras, Gazelles, and Crocodiles among others.

FORMATION OF FEATURES ALONG AFRICAN RIVERS

The theoretical stages of a river

Africa's river systems develop different characteristic features in different stages of their long profiles. The long profile of a river can be divided into three stages or sections according to various characteristic features. The divisions are based on W. M. Davis theory, "The Erosional cycle". The stages include; the youth's stage (upper stage), the mature stage (middle stage) and the old stage (lower stage).

THE YOUTHFUL/TORRENT/UPPER STAGE

Perhaps the most dynamic of all rivers is a Youthful River.

Characteristically youthful rivers are found at higher elevations, in mountainous areas, where the slope of the land is steeper. Water that flows over such a landscape will flow very fast. Youthful rivers can be a tributary of a larger and older river, hundreds of miles away and, in fact, they may be even close to the headwaters (the beginning) of that larger river.

Characteristics of a youthful stage

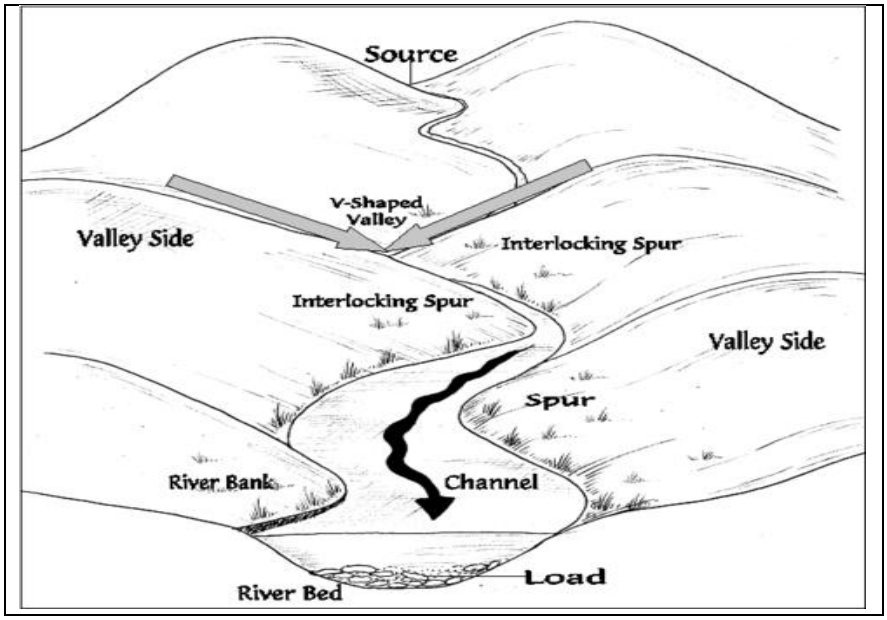
2. The channel is deeper than it is wide and V-shaped due to vertical erosion that causes down cutting rather than lateral (side-to-side) erosion.
3. Its velocity is fast and strong and capable of enabling vertical erosion.
4. Capable of moving all sediment sizes from ions in solution, to silts and clays, also cobbles and boulders.
5. Steep sided cliffs flank the river.
6. A floodplain does not exist. There are no grassy areas beside the river where a person can walk.
7. Rapids may be present due to the water velocity and the presence of boulders in the channel. Waterfalls are also a feature of a young river.
8. Erosion is prominent over deposition.

1. V-shaped Valley; this is a narrow river valley with steep slopes. Because of the steep gradient, there is pre-dominant vertical erosion which deepens the river channel with limited lateral erosion. As a result the valley becomes V-shaped. V-shaped valleys can be identified in the upper course of the Niger River, River Congo.

2. Interlocking Spurs

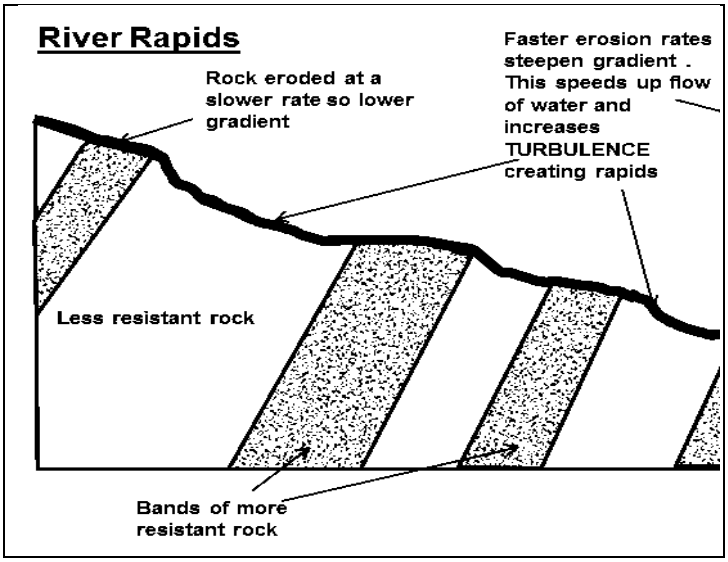
These are a series of protrusions of land lying between bends in the winding course of a youthful river valley. One spur juts into the bends of the valley and overlaps or interlocks with an opposing neighbouring spur forming interlocking spurs. They are formed when

vertical erosion rapidly deepens a river valley, the river turns around obstacles of hard rocks and erosion is pronounced on the concave banks while deposition takes place on the convex banks. This eventually causes projections of highlands called Spurs to Interlock. Examples include river Tana, upper river Athi and in the upper course of the Niger River, River Congo and River Zambezi.



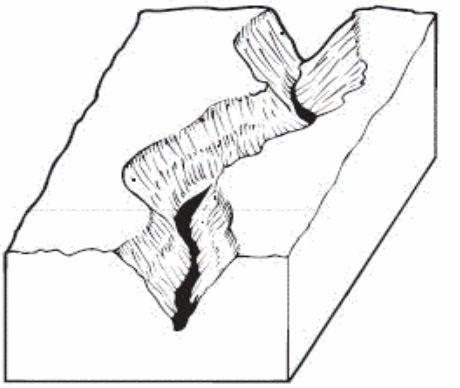
3. Rapids

A rapid is a stretch of broken fast flowing turbulent water along the long profile of a river. Rapids have no definite flow and may extend for distances. They are formed where a river comes across hard resistant rocks and it is unable to erode them vertically. Where a series of rapids occur on a river bed they are known as cataracts.

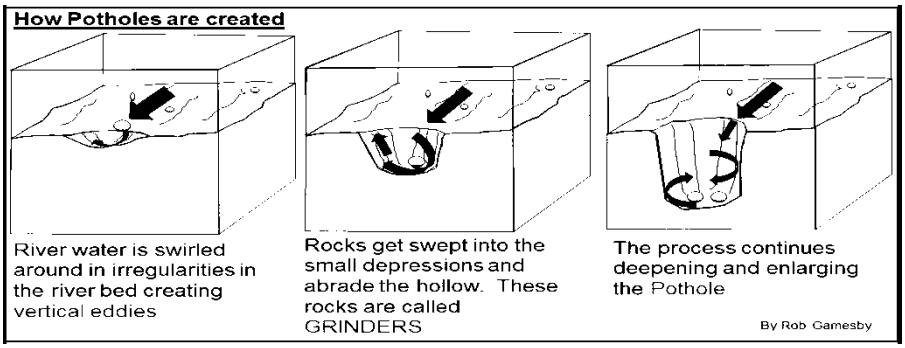


4. A Gorge

A gorge is a narrow, deep, steep sided river valley with vertical walls. Gorges occur in the youthful stage of a river but can also be found in other stages. They are formed by vertical erosion through abrasion and hydraulic action. Gorges result from the following:
A gorge may be formed where a waterfall retreats upstream. Erosion by abrasion and hydraulic action takes place on the rocks of the waterfalls cutting a deep valley resulting in a gorge.
Gorges also form where a river flows through less resistant rocks like limestone. Chemical weathering takes place rapidly in such rocks producing very steep gorges.
Gorges form where a river flows a long a line of weakness like along a fault. The river erodes by vertical erosion cutting a deep valley into the rocks.
Gorges may result where the land is being uplifted as it happens in antecedent drainage. The river is able to erode its valley vertically at a faster rate than the rate at which land is being uplifted eventually forming a deep valley for example on River Congo, River Senegal and river Tana.
When there is a fall in land surface, rejuvenation may occur. The river cuts deep into the rocks leading to the formation of a gorge Kabalega Falls Gorge, the great Ruaha gorge in Tanzania, Mitana gorge through which River Birira flows.



5. Potholes
These are circular holes in the rocky bed of a river. Potholes are cylindrical holes drilled into the rocky bed of a river by turbulent high-velocity water loaded with pebbles. The pebbles become trapped in slight hollows and vertical eddies in the water are strong enough to allow the sediment to grind a hole into the rock by abrasion (corrasion). Attrition rounds and smoothens the pebbles caught in the hole and helps to reduce the size of the bed load.
Potholes can vary in width from a few centimeters to several meters. They are generally found in the upper or early-middle course of a river. This is where the valley lies well above base level, giving more potential for undercutting, and where the river bed is more likely to be rocky in nature.
Formation of a pot hole



5 Water falls

A water fall is sharp break in the channel bed over which a river flows; water falls are common in the upper section of a river.

Causes of water falls

1. The most common cause is where there is an outcrop of horizontal hard rock overlying softer rocks in a river bed. Vertical erosion through abrasion and hydraulic action erodes the softer rocks downstream at a faster rate than the hard rocks. With time the valley deepens and a waterfall forms at the point where the river crosses the hard band of resistant rocks. Examples of water falls include; Victoria Falls on River Zambezi, Bujagali falls on River Nile

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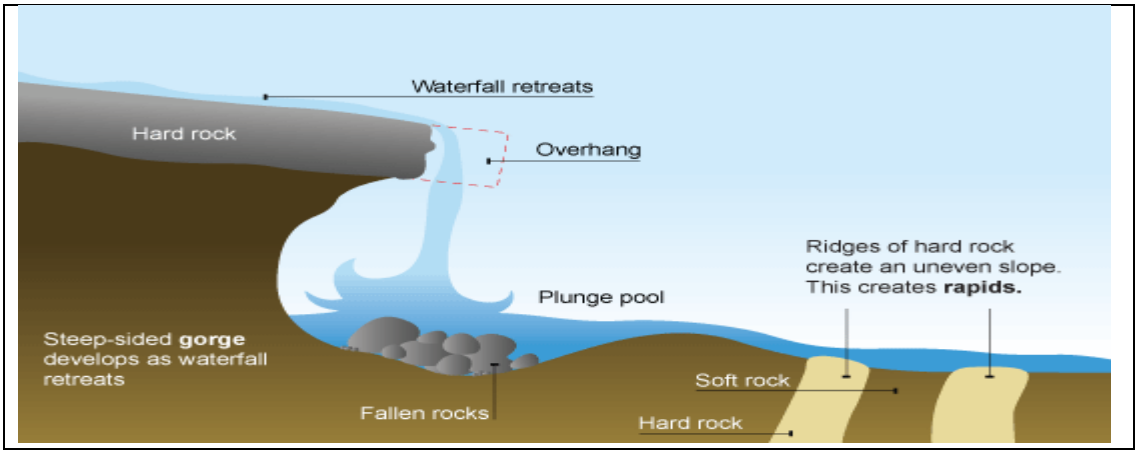


Where there is a vertical hard rock crossing a river channel. Waterfalls are found in the upper course of a river. They usually occur where a band of hard rock lies next to soft rock. They may often start as rapids. As the river passes over the hard rock, the soft rock below is eroded (worn away) more quickly than the hard rock leaving the hard rock elevated above the stream bed below.

The 'step' in the river bed continues to develop as the river flows over the hard rock step (Cap Rock) as a vertical drop. The drop gets steeper as the river erodes the soft rock beneath by processes such as abrasion and hydraulic action.

A plunge pool forms at the base of the waterfall. This erosion gradually undercuts the hard rock and the plunge pool gets bigger due to further hydraulic action and abrasion. Eventually the hard cap rock is unsupported and collapses.
The rocks that fall into the plunge pool will continue to enlarge it by abrasion as they are swirled around. A steep sided valley known as a gorge is left behind and as the process continues the waterfall gradually retreats upstream.
3. Where there is a hard rock dipping upstream a river channel.
4. Where there is uplifting of land or down thrust across a river valley which makes river water fall down over an escarpment e.g. karuma falls.
e) Where a tributary from a hanging valley falls into a major glaciated u-shaped valley for example. Bujuku falls on Mountain Rwenzori.
Where a river enters a sea at a cliff line.
6. A plunge pool is a hollow/broad depression formed at the base of the waterfalls or enlarged pot holes due to prolonged drilling and grinding of the valley floor.
Plunge pools form when pot holes at the base of the waterfall are enlarged by scouring action, undercutting, eddying and cavitation, swirling and erosion. There is renewed river energy which transports the eroded materials or load. Plunge pools from under the following conditions.
i) Large volume of water in a river.
ii) Steep river gradient
iii) High erosion power/energy due to high rate of low.
iv) A hard rock overlying a soft rock.
v) Large amount of boulders carried by the river which acts as grinding instruments on the river floor.

THE MIDDLE STAGE
The major work of a river at this stage is both erosion and deposition. This is because the rate of flow slows more than in the upper course. But however, the rivers bed will still be lowered by the grinding action of stones which a river rolls along. In places where the river is slowest there is deposition of rich alluvial soils and meanders also begin.
The features produced at this stage are; open u-shaped valleys, flood plains and a line of bluffs (spur ends).
The Mature River is an in-between stage. Here the river still undercuts though to a much lesser degree than the Youthful River does mainly erodes laterally.
The channel of a mature stage is U-shaped but deeper than and not as wide as the Old stage of a river's channel.
Characteristics of a mature stage
1. The river flows down a moderate gradient (slope).
2. The channel is U-shaped and wider than a youthful river yet deeper than an old stage channel due to moderate down cutting but also lateral (side-to-side) erosion. In general, the channel is broader with gentler slopes.

4. Capable of moving many sediment sizes from ions in solution, to silts and clays, also cobbles, but normally not boulders unless peak flooding occurs.
5. Cliffs may flank the river at a distance.
6. A floodplain exists with grassy areas beside the river along which a person can walk.
7. Meanders may be present though they will not be as "curvy" as those found in Old stage Rivers.
8. Erosion is present though deposition of sediments also occurs.
9. There is more water in the stream channel, i.e. the river has a greater discharge than the youthful river. This means the river is capable of carrying more a greater volume of sediment.

THE LOWER COURSE (SENILE STAGE)

This is sometimes referred to us the old stage or the plain stage. In this stage a rivers most important work is deposition.

Old Age Rivers actually have more distinguishing features to speak of than the Youthful and Mature Rivers do.

Characteristics of the Old stage

1. The river flows down a very shallow gradient (slope).
2. The channel is wider than it is deep with a very broad and U-shaped channel due to extensive lateral (side-to-side) erosion.
3. Its velocity is quite slow and that means the river is sluggish.
4. Rivers in the old stage have a low ability to transport heavy loads, they are only capable of moving small-sized sediments, i.e. silts and clays. Small sediments are suspended in the slow-moving water giving the river a "muddy" appearance with dissolved salts and ions carried in a solution form.
5. The general landscape surrounding the river is flatter and less steeply sloped. If hilly areas exist, they are further away from the river channel, keep at a distance by the wide floodplain which flanks the river.
6. A wide floodplain characterizes Old stage of the rivers. There are grassy areas besides the river along which a person can walk. However, the floodplain is often marshy and swampy due to flooding of the river valley.
7. Curvy "S-shaped" Meanders are abundant and prominent features of an older river referred to as the swan's neck.
8. Streams run parallel to the main river but do not join it.
9. Oxbow Lakes exist within the floodplain. Meanders were cut off from the main stream due to extensive erosion and deposition. The meander is now its own lake but, with no water entering to replenish its supply, it will eventually dry up and become a Meander Scar
10. Natural Levees, ridges form by successive floods that deposit sediment over time which flank the outside meander curves.
11. Fed by many smaller tributaries which join the main river at various locations, the discharge (volume of water), is quite large. This means that, although the river is capable of moving only the finer sediments, it can move large amounts of sediments.

13. Erosion is present on the concave curves of meanders while deposition of sediments occurs on the convex curves.

FEATURES IN THE OLD STAGE OF A RIVER

1. Flood pain

Floodplains are created as a result of both erosion and deposition, although the accumulation of river deposits suggests that they are predominately depositional features. They are relatively flat areas of land on either side of the river. They are composed of alluvium - river deposited silts and clays.

Over time, a floodplain becomes wider and the depth of sediment layers increases. The width of the floodplain is determined by the amount of meander migration and lateral erosion that has taken place. Lateral erosion is most powerful just downstream of the apex of the meander bend.

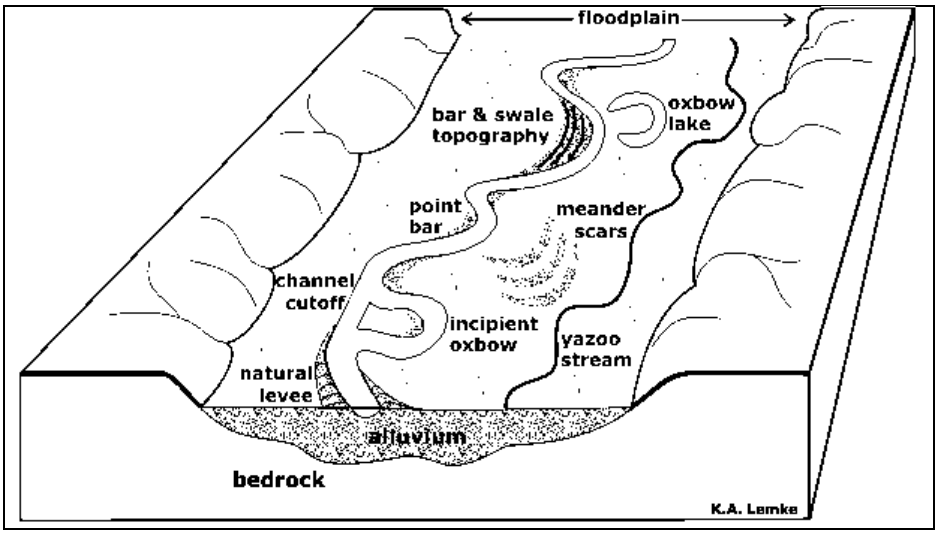
Over time, this results in the migration of meanders, leaving their scars clearly visible on the floodplain. Interlocking spurs are eventually removed by lateral erosion in the middle course, leaving behind a bluff line and widening the valley. The depth of the alluvial deposits depends partly on the amount of flooding in the past, so floodplain creation is linked to extreme events.

Over time, point bars and old meanders scars become incorporated into the floodplain, adding to the alluvial deposits. These become stabalised by vegetation as the meanders migrate and abandon their former courses.

All rivers in Africa have flood plains towards their deltas.

2**. Levees**

These are raised banks built by some rivers alongside their channels rising above the level of the adjacent flood plain. In its middle and lower courses, a river is at risk from flooding during times of high discharge. If it floods, the velocity of the water reduces as it overflows the banks. This results in deposition, because the competence of the river is suddenly reduced. It is usual for the big material to be deposited in a far distance, forming small raised banks (levees) along the sides of the channel. Subsequent floods increase the size of these banks and further deposition on the bed of the river also occurs. This means that the river, with channel sediment build-up, now flows at a higher level than the flood plain.



3. Braided channel

This is an extensively wide shallow channel into which a river divides and subdivides into a series of inter-connecting minor channels separated by sandbanks and islands of alluvium.

Braiding occurs when the river is forced to split into several channels separated by islands. It is a common feature in rivers that are supplied with large loads of sand and gravel.

It is most likely to occur when a river has variable discharges.

The banks formed from sand and gravel are generally unstable and easily eroded. As a consequence, the channel becomes very wide in relation to its depth.

The river can become choked, with several sandbars and channels that are constantly changing their locations. Braiding also occurs in environments in which there are rapidly fluctuating discharges: Semiarid areas of low relief that receive rivers from mountainous area.

Glacial streams with variable annual discharge. In spring, melt water causes river discharge and competence to increase, therefore the river can transport more particles. As the temperature drops and the river level falls, the load is deposited as islands of deposition in the channel.

4. River meanders

These are curved bends of a river channel. **Water flows fastest on the outer bend** of the river where the **channel is deeper** and there is **less friction**. This is due to water being flung towards the outer bend as it flows around the meander, this **causes greater erosion** which deepens the channel, in turn the reduction in friction and increase in energy results in greater erosion.

This lateral erosion results in undercutting of the river bank and the formation of a **steep sided river cliff**. In contrast, **on the inner bend water is slow flowing**, due to it being a **low energy zone**, deposition occurs resulting in a **shallower channel**.

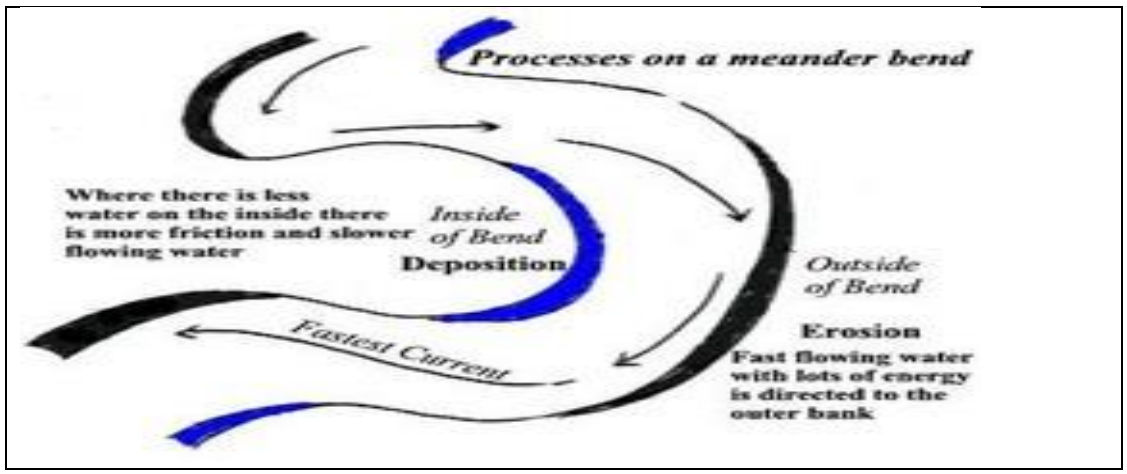
This increased friction further reduces the velocity (thus further reducing energy), encouraging further deposition. Over time a small beach of material builds up on the inner bend; this is called a **slip-off slope or point bar**.

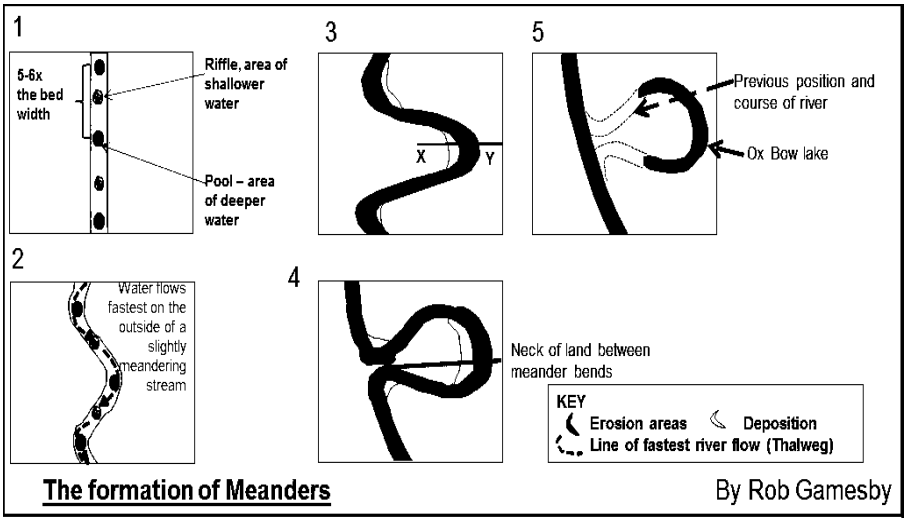
The water in a meander flows in a corkscrew like movement as it moves from the inside of the bend towards the outside of the bend. This is called helicoidally flow.

We should always remember - a meander is asymmetrical in cross-section (see diagram above).

It is deeper on the outer bend (due to greater erosion) and shallower on the inside bend (an area of deposition). For example river Nile, River Congo and river Senegal.

Illustration of a river meander





Effects of a river meandering on human activities

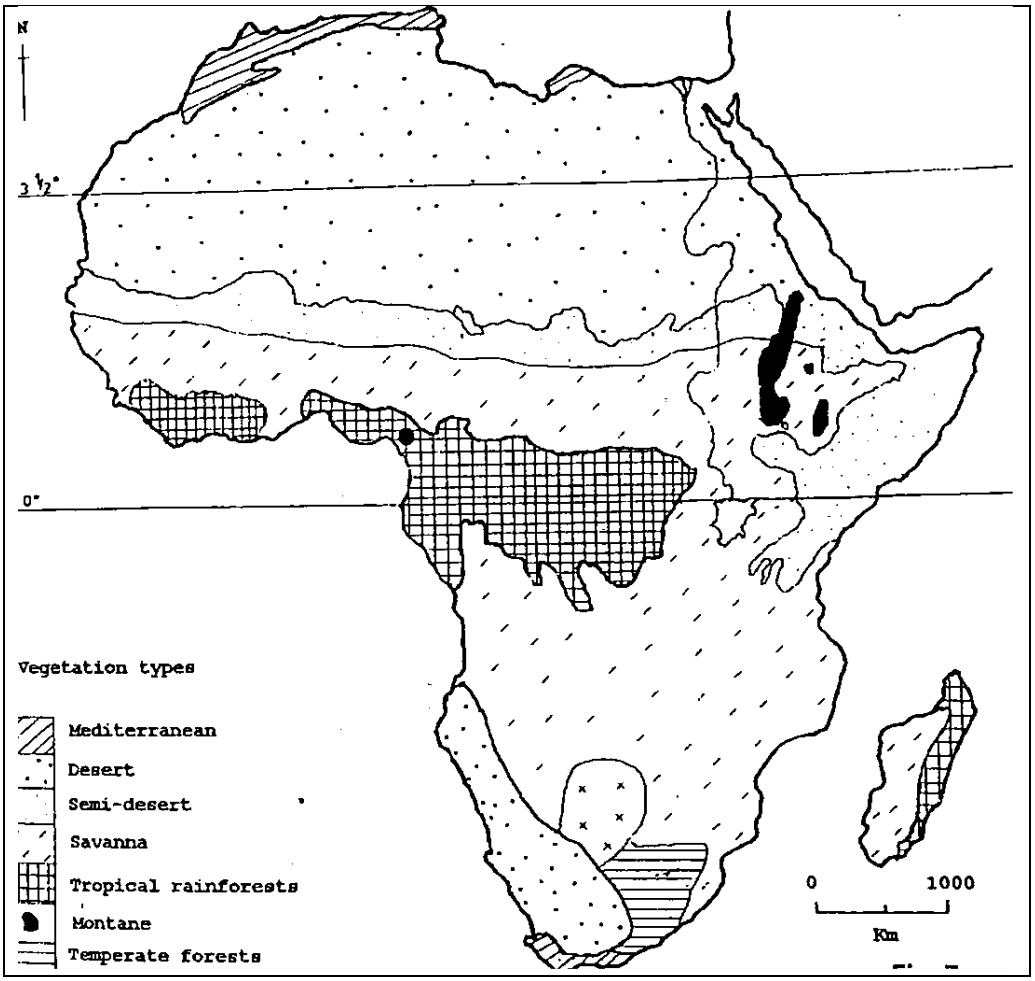
1. It leads to the formation of ox-bow lakes which are useful for fishing, transport, water for industrial and domestic use etc.
2. Features from river meandering act as tourist attractions hence foreign exchange.
3. The floods plains formed due to meandering provide fertile land agriculture eg the Nile

Chapter 22: The climate and vegetation of Africa

NATURAL VEGETATION IN AFRICA

Vegetation is a community of plants that cover an area and give it a distinct character.
Plant communities in Africa include shrubs, tree herbs, scrubs, grasses and woodlands.
Major plant communities in Africa include Savannah woodlands, tropical rain forests, grasslands, Oak wood lands, and dry bush savannah and range lands, semi deserts and Desert vegetations.
Generally in Africa, the vegetation types include savannah vegetation (tropical continental vegetation)
Montane vegetation found in Highland areas.
Equatorial vegetation (tropical rain forests)
Temperate evergreen forest also found on highlands in the high altitudes.
Mediterranean vegetation.
Mangrove swamps and forests.
Temperate grasslands (high veld-vegetation)
It should be noted that the vegetation distribution in Africa largely depends on the climate of the area.

VEGETATION DISTRIBUTION IN AFRICA



Factors influencing the type and distribution of natural vegetation in Africa.

1. Climate

Climatic factors are the most important factors that affect vegetation particularly through its elements.

a) Rainfall

The amount of rainfall, its incidence and distribution affects vegetation distribution in the following ways.

i) Abundant rainfall of over 1500mm gives the rise to forest vegetation.

ii) Moderate rainfall between 750-1000mm gives rise to woodland and rainfall of between 500-700 gives rise to grassland.

iii) Semi-desert vegetation is determines by low rainfall totals of less than 750 mm per annum for example in the Sahel of West Africa.

ii) In areas with low rainfall (less than 250mm) desert vegetation occurs.

b) Temperature

Temperature plays a great part in determining the actual type of vegetation. Where temperatures are low, the area is dominated by boreal forests.

Warm temperatures are responsible for warm temperate and tropical forests.

Warm temperatures tend to encourage luxuriant plant growth as seen in the equatorial forest regions while low temperatures tend to encourage the slow plant growth as seen with the heath vegetation.
Hot and very hot temperatures accompanied by prolonged spans of drought result into semi-desert and desert vegetation such as the Sahara of Northern Africa.

c) Light
It's one of the essential requirements for photosynthesis. The amount of light and the intensity vary from one place to another and from time to time and from season to season depending on the latitude and relief of the area.
The more the light, the more the vegetation cover. The abundant light in the tropics result into dense vegetation while in the high latitudes, the light intensity is weak resulting into poor vegetation cover.

2. Edaphic factors (soils)

Soils play a very big role in plant growth. There is a big relationship between vegetation and soils. The amount of organic matter and inorganic contents in the soil, affects plant growth.
The death of plants or parts of plant followed by accumulation of organic matter in the soil helps to maintain a life cycle of a plant. The moisture or water content in the soil helps to make available the food of organic origin for the new plants.
Equatorial forests grow in areas of fertile soils which support vegetation.
Generally, the nature and type of soil affects type of vegetation that grows in an area. The soil texture can also affect the type of vegetation. Soils of coarse grain texture e.g. sand are easily leached and are permeable hence encouraging only stunted vegetation to grow.
Besides soils with fine grains have little air space therefore impermeable and sticky discouraging vegetation growth.
The fertility of the soil determines the amount of vegetation it can hold. Fertile soils support more plants than infertile soils. Forests grow in an area with fertile soils while scrub vegetation grows in areas with infertile soils.

3. Altitude

Altitude has greatly influenced vegetation distribution in East Africa through its influence on climate, drainage, soil depth, fertility, steepness.
Altitude influences vegetation distribution through changes in temperature and rainfall. Temperature decreases with increase in altitude. This leads to the occurrence of hot condition similar to those of low latitudes at the mountain base hence savannah and rainfall forests, mid altitude conditions between 3000m -4000m are similar to those of high latitude (Polar Regions) hence temperate forests bamboo, heath and moorland.
Precipitation received at different levels of highlands varies in amount and in form. Lower altitude areas receive less rainfall below 100mm hence savannah grassland.

Mid altitude areas receive higher amounts of rainfall over 1000mm that support forest growth and upper slopes receive reduced rainfall and precipitations inform of snow hence temperate trees, heath and moorland vegetation.
Soils vary in character, depth and profile depending on the nature of the slope and position of the slope on the mountain.
Very steep slopes are bare and support thin vegetation cover e.g. heath and moorland vegetation. While gentle slopes support savannah and forest because the soils are deep.

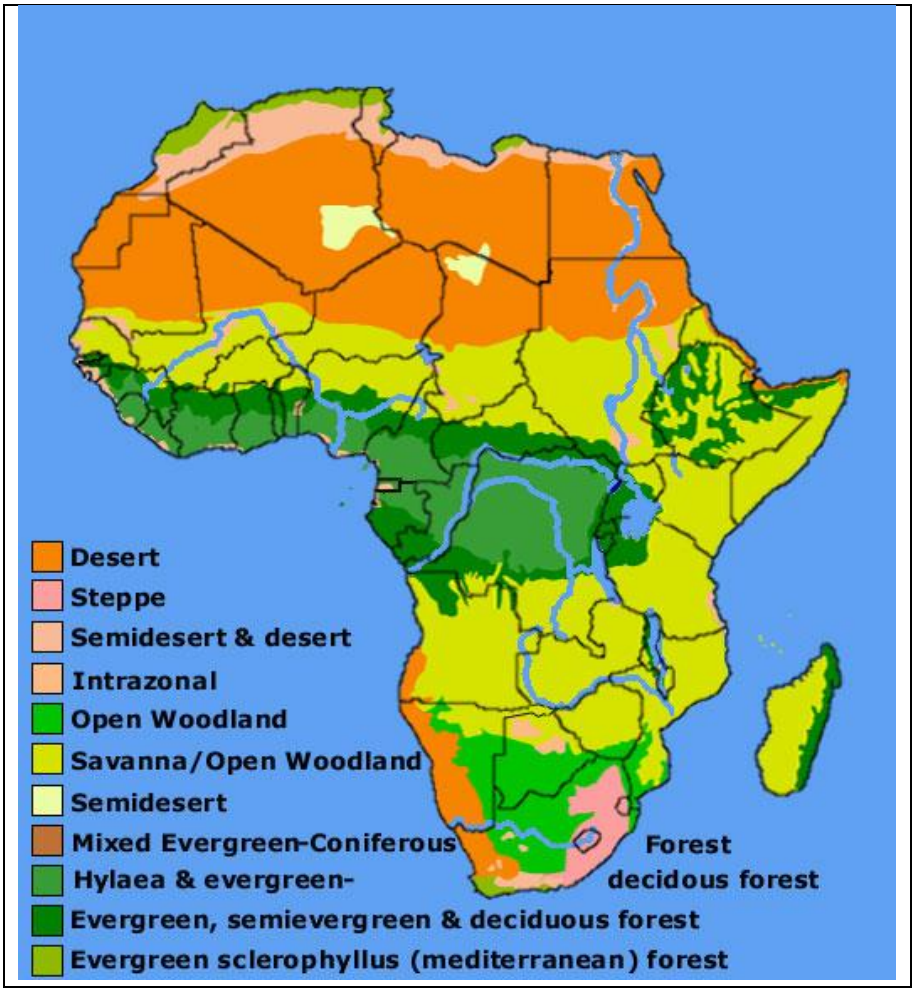
4. Latitude
This influences vegetation in that as the latitudes changes, the vegetation also changes e.g. equatorial region yields tropical rain forests, tropical regions yield savannah grassland, the hoarse latitude yield desert vegetation. Latitude influences vegetation distribution in the following ways;
It influences the temperature which leads to differences in heating encouraging different vegetation types which suit the latitudinal conditions e.g. areas with low latitude have evergreen equatorial forest.
Latitude also influences rainfall distribution which has a direct effect on the distribution of natural vegetation e.g. within the equatorial zone (between 5^0N and south of the equator). Rainfall is heavy leading to the growth of equatorial forests.
Between 5^0- 15^0N and south of the equator, there is a district wet and dry season and rainfall is less than in an equatorial region giving a rise to savannah vegetation.
Between 15^0 – 30^0 North and South of the Equator, there is semi desert vegetation and desert vegetation due to extremely reduced rainfall for example the Kalahari Desert.
Between latitude 30^0-45^0N and south of the equator, rainfall is low but received throughout the year. This gives rise to the moderate vegetation.
Around 65^0N, we get very low rainfall and of less than 250mm giving rise to tundra vegetation.
At the poles, the temperatures are extremely low and plant growth is inhibited. Those areas are covered by ice sheets.

5. Drainage
The effectiveness of natural drainage will affect the vegetation of a given area.
An excess of water leading to water logging will obvious favour plants adapted to insufficient air saturation.
In such areas water living plants which float freely on water logged areas are likely to occur like on coastal lands where mangrove grows, papyrus vegetation and swamp forests.
Plants that live freely under water logged environment are known as hydrophytes and those that grow on marshy environment are hygrophytes, those that live in the regions of dry conditions are known as Xerophytes.
The poorly drained areas of Africa are covered by papyrus vegetation.

6. Man's activities
The activities of man have influenced vegetation either positively or negatively.

The clearing of forests and extensive burning is believed to be responsible for the extensive distribution of savannah vegetation in East Africa.
Natural forests have been cleared and have become savannah woodland. Savannah woodland has been over grazed by the pastoralists and destroyed e.g. in Sahel and has turned to scrub or semi-desert vegetation. Also through swamp reclamation, the swamp vegetation has disappeared.
Positively through environmental conservation and afforestation programmes man has planted trees where they never existed before hence influencing the distribution of forests.
Government has also tried to conserve forests by creating forest reserves for example Kruger National Game Park in South Africa.

VEGETATION DISTRIBUTION IN AFRICA



The landscape of Africa is covered by various vegetation types which include the following.

a) Equatorial vegetation (Tropical rain forests)

This vegetation is found in areas astride the equator about 5^{o} North and 5^{O} south of the equator.

In Africa equatorial rainforests exist in the Congo basins West African coastline and globally, equatorial vegetation is found in Malaysia, Amazon of South America, Coastal areas of Cambodia, Vietnam, Indonesia and South East Asia.

Inn East Africa, equatorial forests are found in the Congo basin in Congo, Gabon, Equatorial Guinea, West coast of Africa, the northern shores of Victoria for example Mabira forest in East Africa.

Characteristics of tropical rainforests.
The trees are broad leaved and are ever green because of the well distributed heavy rainfall of over 1500mm per year and hot temperatures that allow luxuriant growth of forest. The broad leaves trap sufficient sunlight for photosynthesis and also get lead of excess water from the trees.
Trees are very tall of about 50m with straight trunks.
These grow tall as a result of competition for sunlight for example Mahogany, Oakoume, Ozigo, Azobe, Elgon teak, Mvule, Ironwood and others
There is limited or no undergrowth in equatorial forests. This is because trees are very close to each other very tall and form a deep canopy that doesn't allow penetration of sunlight to the ground that would favour the undergrowth.
Trees are composed of canopies, there are three recognized layers that form the canopies, that is to say: a recognized layers that form the canopies i.e. a top layer composed of very tall tress of about 50-60m in height , the middle layer constitutes of trees of medium height about 26m tall and the under canopy composed of term herbaceous plants and saprophytes.
Trees have buttress roots to support the heavy and tall trunks.
The trees have a long gestation period therefore take long to mature; some trees may take between 50 and 70 years to mature.
There are many climbing plants which search for sunlight is some are as long as 100meters like the lianas and epiphytes.
Some trees are host trees to other plants that grow on them search as parasitic trees which at times lead to death of the host trees.

Conditions favouring the growth of tropical rainforests.
Presence of hot temperatures of between (22^{o}-28^{o}) Delicious which is required for the fast growth of luxuriant trees in tropical rainforest.
Presence of well drained fertile soil resulting from the folding branches and leaves which add humus to the soil and enables it to support growth of trees in forest such as those in Kisangani, Ituri in the Congo basin..

Presence of good drainage and this is because tropical rainforests grow in areas which are well drained and these areas although receive heavy rainfall they are not water/logged and aren't water deficient, a condition necessary for the growth of trees.
Presence of a high humidity content of over 80% throughout the year necessary for growth of trees.
Latitudinal location these forests survive due to their location a stride the equator in 5^{o}N and 5^{o}S of the equator where rainfall is heavy and temperature.
Presence of a gently sloping relief which allows retention of sufficient water in the soil needed for the growth of luxuriant forests for example in the West coast of Africa in Gabon, Cameroon and south Ivory coast where there are tropical low land forest.
Presence of an altitudinal range of 1800 – 2500 meters above sea level where rainfall is heavy and well distributed in East Africa and with warm temperatures which favour the growth of tropical highland forests.
Converging of the prevailing winds especially the North East Trade Winds which create a low pressure zone when meeting the South East trade Winds that trigger off heavy rain fall, low pressure and warm temperatures which are necessary for the growth of tropical rain forests/Equatorial vegetation.
Existence of warm ocean currents that favour the growth of thick vegetation through inducing heavy rainfall in the adjacent areas such as the Warm Guinea current on the west coast of Africa favouring the growth of the Congo basin forests.
Favourable government policies and the entire supportive human activities of gazetting, conserving and protecting the natural forests against encroachment , through creating alternative sources of fuel, power and furniture and reduce the risk of depleting the tropical rain forests and also owing to the limited human activities of exploitation.
Aspect of topography given the fact that vegetation grows faster and thicker on the wind ward slopes that face the sun directly in the mountainous areas.

OTHER TYPES OF FORESTS IN AFRICA.

Forests signify a close cover of trees which vary from 8-50m or more and forming dense canopies at times of several layers. Many equatorial forests are evergreen so that the shade is continuous all year round; grass and shrub growth is thus reduced. The forests of Africa occur where the soils are deep and more mature than other vegetation types. The forests areas of East Africa can be categorized as follows.

i) Montane forest

These are normally found at an altitude of 1800mm and consist of trees normally found in sub- tropical or temperate regions. In East Africa, montane forests occur on mountain Kenya, Kilimanjaro, Elgon, Rwenzori, Atlas, Drakensberg, Ethiopian highlands and Cameroon highlands. In most areas trees grow very tall, but in areas of low rainfall the height dwindles into a dense thicket of Bamboo which in turn changes into grass or Moorland at an altitude of 3500m.

ii) The plateau or lowland forests

These are equatorial rain forests, they are very tall, heavy with dense canopies. They are found in the Congo basin, Cameroon, Ivory Coast and in East Africa, they include Mabira, Budongo, Maramagambo Kalinzu and others.

iii) Mangrove forests

These are found along the coastal areas of Africa that are water logged, salty and with hot temperatures. These trees have broad leaves, short trunks.

iv) Bamboo forests (3000-3500 meters above sea level)

Commonly found in high altitudes on highlands of Africa. It is considered trees though their quick growth qualifies it more or less a grass.

These consists of trees which are up to 20m height

The trees have hollow stems inside.

The stems are segmented (like the sugar cane stems) and hallow.

The trees grow in pure stands are ever green with needle shaped leaves.

Trees have sharp pointed elongated leaves

Limited undergrowth.

Reasons for its existence.

Cool temperatures.

Low humidity levels due to cool temperatures.

Thin infertile soil.

Reduced rains.

c) SAVANNAH VEGETATION

Savannah is the most widely spread vegetation in Africa at large.

Savannah covers the largest land area in Africa. It is divided into 3 categories. Savannah Woodland, Savannah grassland and Dry bush savannah.

Savannah wetlands are a form of Savannah vegetation consists of more or less continuous cover of trees and shrubs intertwined in water logged regions.

Characteristics of Savannah woodland

It is also referred to as tropical woodland or the Miombo woodland type of vegetation deriving the name from central Tanzania. It is more or less a continuous cover of trees.

There is a variety of trees ranging between 8 to 16m tall and grow-over a wide area with an umbrella shaped top.

The tress shade off the leaves during the dry season therefore are deciduous in nature in order to reduce water loss during the dry season.

There is a thick undergrowth due to sufficient sunlight penetrating through to the ground.

There are drought resistance trees like Acacia Baobab and some have swollen trunks which stores waters for use during the dry season.

The trees have broad leave and thick bucks due to the relatively heavy rainfall during the wet season.
The trees develop branches close to the ground for example acacia.
The trees are fire resistant for example Acacia and Baobab.
The trees are intermixed with cacti, baobab and shrubs, xerophytes thorny lianas.

Conditions that favour growth of savannah woodland

Presence of moderate and seasonal rainfall ranging between (750 and 1000) mm per annum that's necessary for growth of deciduous trees.
Presence of hot temperatures of over 24^{o}C required for the growth of woodland trees.
Presence of daily soils with a relatively low water retaining capacity enabling the growth of drought resistant trees such as the cactus baobab and acacia.
Existence of a low lying relief that leads to the growth of short trees intermixed with shrub.

Savannah grassland

This is majority tall grass of about 2m in height with some scattered trees.
Savannah grassland grows in areas of moderate rainfall ranging from (500 to 7000_mm per annum
Savannah grassland is well distributed in Uganda, Zimbabwe, Zambia, Some parts of Botswana, Central African Republic among others.

Savannah grassland is characterized by the following features.
The vegetation is dominated by tall grass search as elephant grass spear gas about 2m in height.
The green grass forms brown during the dry season and often patched.
They are scattered grass land with umbrella shaped tips. Branches close to the ground.
The plant in Savannah grassland are characterized by long tap roots for obtaining water from deep underground during the dry season.

Conditions favouring growth of Savannah grassland in African.

Moderate rainfall of about 750mm per annum which is seasonal and is enough to support the growth of tall grasses and short trees of savannah grassland.
Occurrence of alternating seasons between dry hot seasons that force the grass turn brown and patched and the wet rainy season favours flourishing of green grass.
Presence of fairly fertile soil which can support growth of tall grass and short trees.
Presence of hot temperatures above 25^{o}C which cause shedding off leaves during the dry season and causing the grass to turn brown.
Low humidity content in the atmosphere favours the growth of grass and draught resistant trees.
It grows in areas of reduced water content in the soil which forces the plants to have long tap roots to obtain water from deep underground.

Human activities interference but favour game parks limiting human interference but favours growth and survival of grass. On the other hand the wild life discouraged growth of luxuriant trees in grasslands a result of overgrazing.

Dry bush savannah

Dry savannah vegetation is a savannah vegetation found in dry areas.
It is common in the Albert flats, Semiliki zone, North Eastern Uganda, some parts of northern Kenya, Masai Mara region and around Lake Magadi, some parts of Ethiopia, Botswana and Somalia.

Characteristics of dry savannah vegetation.
Dry savannah is characterized by bushy, thorny trees with scrubs growing between them.
Dry savannah is highly patched dues to a low water retaining capacity in the soil.
Dry savannah vegetation is characterized by growth of thickets with thorny trees that have long tap roots to obtain water from underground.
The trees have got small leaves to reduce water loss by reducing the surface for transpiration.
The plants in dry savannah are drought resistant and fire resistant therefore in case of fire, their roots remain dormant in the soil and germinate on the onset of the rainy season.
The stems of some trees such as the baobab are photosynthetic because they have chlorophyll and are highly fibrous.
The leave of plants in dry savannah have waxy surfaces and are shiny therefore reduce water loss by reflection.
The trees tend to develop a very long tap root system to penetrate deep underground searching for water.
The trees are short and umbrella shaped to cover the ground from hitting by the sun and reserve water in the soil for use in the dry season.

Conditions responsible for the growth of dry savannah vegetation.

Dry savannah vegetation grows in areas of hot temperatures of over 20^{o}C. This temperature facilitates growth of trees with small waxy leaves in order to avoid loss of moisture through evapo-transpiration.
Presence of a low humidity content in the atmosphere leads to scarcity of all trees and grass but favours growth of drought resistant vegetation such as thickets short grass and thorny trees.
Low rainfall totals and unreliable rainfall of between (500 to 700) mm per annum which is favourable for the growth of short grass and scrubs.
Low lying relief of below 1250m above sea level where temperatures are very hot and support growth of the short grass for example along the rift valley flow in the Albert flats, Semiliki region.

Existence of a rain shadow on the leeward side of mountains where there is unreliable rainfall which is only suitable for the growth of dry savannah vegetation for example some parts of Turkana land that lie in the rain shadow of Ethiopia highlands.
Existence of infertile dry soils with a low water retaining capacity which can only support scanty patched short grass of the dry savannah regions.
Overgrazing by both wild animals such as elephants in green Kruger national park and livestock I the [pastoral areas like Turkana and leading to depletion of vegetation and emergency of stunted, scattered, and patched of grass.
Outbreak of wild fires started by farmers in pastoral areas, hunters in hunting areas and highlighting which burn and destroy growing vegetation leading too emergency of fire resistant grass.
Deforestation due to need for fire woods or clearing of land for growth of secondary dry bush vegetation.
Sinking of boreholes and digging of valley dams leading to lowering of the water table which results into a low water table which results into a low water content in the soil causing plants to grow long tap roots to obtain water from deep underground that can only support dry savannah vegetation.

Economic importance of tropical savannah

1. Savannah areas have been gazette as national parts e.g. Kruger of South Africa, Tsavo, Serengeti, Queen Elizabeth, this promotes wildlife conservation and tourism.
2. They are also useful for animal rearing as they provide good pasture for pastoral tribes. More so if capital allows, such areas can be put to modern farming easily e.g. in South Sudan ranching scheme.
3. They act as habitant for number of animals which can provide meals to the hunters, hides and skins and even medicines from these animals.
4. In wet zones, they provide many tree types which can be used for fuel (firewood) and building.
5. They are potential for the production of honey which can be sold.

Problems of exploitation of savannah lands

1. These areas are mostly infected by tsetse flies which discourage settlement and establishment of modern farms e.g. Miombo woodlands in Tanzania.
2. There's shortage of water and pasture due to the prolonged drought hence hindering pastoralist and human settlement.
3. There is shortage of food due to poor yields.
4. The thorny bush vegetation is a hindering factor to pastoral development which causes erosion and soil deterioration in attempt to clear thorns.
5. Areas receive low rainfall which is not favourable for agriculture (crop cultivation).
6. They have high rates of erosion accelerated by over grazing by pastoralists and poor vegetation cover.
7. Wild fire affects trees and bee keeping sometimes resulting into the development of fire resistant vegetation.

8. Uncontrolled cutting of trees has led to the depletion of the wood land vegetation.
9. The harsh climate of the savannah vegetation region (hot temperatures) makes human habitation difficult.
10. The regions are remote with limited transport networks. This has discouraged settlement.
11. Poaching of animals in National parks and Game reserves has affected tourism in the savannah region.

SEMI DESERT VEGETATION

Semi desert vegetation is common in the Sahel region of South Africa and many other countries in the sub-Saharan Africa for example in the Albert flats, Semiliki zone of Uganda, Northern Kenya and Namibia.. Some parts of Northern Kenya, Masai- Mara land region and around Lake Magadi.

Characteristics of semi desert vegetation

Semi desert is characterized by bushy and thorny trees with scrub growing between them.
Semi desert vegetation is highly patched due to a low water retaining capacity in the soil.
Semi desert vegetation is characterized by growth of thickets with thorny trees that long tap roots to obtain water from underground.
The trees have got small leaves to reduce water loss by reducing the surface area for transpiration.
The plant roots are more resistant and drought resistant therefore their roots remain dormant in the soil and germinate on set of rainy season.
The stems of some trees for example Baobab are photosynthetic because they have chlorophyll are highly fibrous.
The leaves of the plants have waxy surfaces and are shinning therefore reduce water loss by reflection.
The trees tent to develop a very long taproots system to penetrate deep underground searching for water.
The trees are short and umbrella shaped to cover the ground from direct heating by the sun and conserve the water for use in the soil in dry season.

Conditions responsible for the growth of semi desert vegetation

Semi desert vegetation grows in areas of hot temperature of over 26^0C. These temperature facilities growths of trees with waxy leaves in order to avoid loss of moisture through transpiration.
Presence of a low humidity content in the atmosphere leads to scarcity of tall trees and grass but favours growth of drought resistant trees such as thickets, short grass and thorny trees.

Low rainfall totals and unreliable relief of between 500-700mm per annum which is favourable for the growth of short grass and shrubs.
Low lying relief of below 1250mm above sea level where temperatures are very hot and support growth of short grass along the rift valley flow in the Albert flats and the Sahel region.
Existence of a rain shadow in the lee-ward side of the mountains where there is unreliable relief which is only suitable for the growth of semi desert vegetation e.g. some parts of Turkana highlands that lie in the shadow of Ethiopian highland.
Existence of infertile dry soils with a low water retaining capacity which can only support scanty patched short grass of the semi desert vegetation.
Over grazing by both wild animals such as elephants in the National Game Parks, livestock in the pastoral areas for example Sahel lands leading to depletion of vegetation and emergency of stunted scattered trees and patched grass.
Outbreak of wildfires which is usually started by farmers in pastoral areas, hunters in hunting areas and lightening which burn and destroy growing Vegetation, leading to emergency of fire resistant grass.
Deforestation due to the need of firewood or charcoal or clearing of the land for agricultural use, tsetse flies control leading to the growth of secondary and semi desert vegetation.
Sinking of bore holes and digging of valley dams leading to the lowering of the lowering of the water table which result into a low water content in the soil causing the plants to grow long tap roots to obtain water from deep underground that can only support semi desert vegetation.

DESRT VEGETATION

Is found approximately between 20^0N and 30^0N and south of the equator.
There are hot deserts and cold deserts in the world. Hot deserts include the Sahara of North Africa the Namibian desert and Kalahari in Southern Africa and many others distributed all over the world.
In East Africa desert like conditions are found in Kenya known as the sahib desert, northern Kenya and some parts of north east Uganda. These places have desert vegetation.

CHARACTERISTICS OF DESERT VEGETATION

There is scarce vegetation cover varying from short bushes to bear sandy grounds majority dominated by xerophytes which are highly resistant and tolerant to drought like the cacti
Drought avoiding plants grow characterized by quick sprouting plants with a short life cycle for leafing flowering fruiting and seed dispersal.
These plants require short rains and their seed are kept buried under the sand during the long dry season and germinate immediately when the rains occur.
There is growth of deciduous bushes and grass with every long tap root system to absorb underground water e.g. the plants in the Namibian desert which are hasty and thorny.

There is growth of salt resultant plan basically plants referred to as Halophytes growing in area that experiences high evaporation rates.

Cold deserts of the world.

Cold deserts are mainly found in polar regions and on extremely high mountains like Himalayas and the commonest type of vegetation is tundra existing were temperature are very cold and these places have cold water and they ever frozen.

In the Northern Hemispheres they are faired in Eurasia North America. In high latitudes referred to as the Arctic tundra. E.g. in Canada, Alaska, Greenland and Siberia.

In the Southern hemisphere would desert vegetation is found in the acatalectic about 76^0 South of the equator.

Towards the poles vegetation is almost absent but the region is just covered by bare snow due to very cold temperatures of below 10^0C with precipitation in form of snow and skeletal soils which only favours the growth of acetic and aquatic.

FACTORS FAVOURING DESERT VEGETATION

Very low relief totals of than 250mm annually which makes drought resistant plants grow e.g. acacia cacti, lobelia which survives even during long periods of drought.

Very hot temperatures of 29^0c and above which makes the available plants to develop needle like leaves, waxy leaves, thorny stems and branches to reduce evapo-transpiration.

Constant blasting by sand and winds which makes trees develop thick and hard bucks and leaves for protection against sand blasting.

Trees develop thorns with an adaptation to protection from animals both livestock and wild animals

Low humidity content of less than 30% in the atmosphere leading to high evaporation rate thus growth of poor desert soils.

Presence of dry winds, some areas in Somalia and Northern Kenya have been influenced from Arabian Desert those winds pick some moisture as they blow. However tend to lose their moisture in Ethiopia highlands which they are dry, they don't bring rain. They even absorb the little moisture they find in the region therefore discourages growth of Luxuriant resulting into desert vegetation.

MEDITERRANEAN VEGETATION.

Describe the characteristics of Mediterranean type of vegetation

Explain the factors for the growth of Mediterranean type of vegetation in Africa.

Mediterranean is found in the mid-latitudes especially in the Mediterranean basin north of Africa. (It is also found in California, Central Chile, south west of Australia).

Northern tips of Africa around Algiers, Casablanca, Tunis and some parts of Benghazi and South Western tip of Africa for instance in the cape province of South Africa.

CHARACTERSISTICS OF MEDITERRANEAN VEGETATION INCLUDE;

Mediterranean forests are composed of broad leaves, ever green trees, such as Oak. Eucalyptus, cork oak, and these result of wet winters and resistance to dry summer conditions. Much of the wooden vegetation is broad leaved and vegetation lies has small dark leaves covered with waxy surface layers to retain moisture in the dry summer months.

Plants like grape vines have long tap roots which can reach down the moisture rock to absorb water.

Some plants have large freshly roots which store water and food for use in the dry summer months.

Some trees have rough thick barks to store water for use during summer and reduce evapo-transpiration.

There sweet smelling and scented herbs and shrubs such as lavender, rosemary, thyme, and oleander.

There are cone-shaped trees especially pines to allow easy snow fall.

There are also short flat topped trees especially pines to allow easy snow fall.

There are also short flat topped trees e.g. the cock oak.

There is mixed type of vegetation with acidulous trees, coniferous trees tough grasses etc.

Some trees have compact wooden stems bushy shrubs with dense thickets.

Short grass is common especially in the Mediterranean grassland of Northern Africa.

The shrubs are widely spaced to reduce competition for water in drier margins therefore patches of bare ground are common. These shrubs are sweet smelling like rosemary.

In the driver margins the plants are fast splinting with a short life cycle taking advantage of the short rains.

In the wet margins, the trees grow between 3-5m high e.g. citrus and cedar.

FACTORS THAT HAVE FAVOURED MEDITERRANEAN VEGETATION

Influence of climate. Mediterranean vegetation grows in the Mediterranean climate which is also referred to as western margin climate. This type of climate experiences some desert like conditions and also part of the temperate climate.

During summer, the region is hot with about 24^0C But with humidity rains leading to growth of short trees, shrubs and herbs.

During winter temperatures are cool with about 13^0C and experience some frontal and orographic rainfall of between 500mm-700m due to the influence of the mountains like Atlas and the on-shore highlands. Westerly winds that blow in winter also cause cyclonic rainfall.

These conditions lead to the growth of Mediterranean vegetation with trees like eucalyptus cock Oak etc. influence of the soil. Mediterranean soils are transitional between brown earth soil on the wetter margins and desert soil at the desert edges.

The ashy Mediterranean residue soils support growth of Mediterranean vegetation. These contain a lot of humus in the interior margins leading to growth of pines, oak and chest nuts.

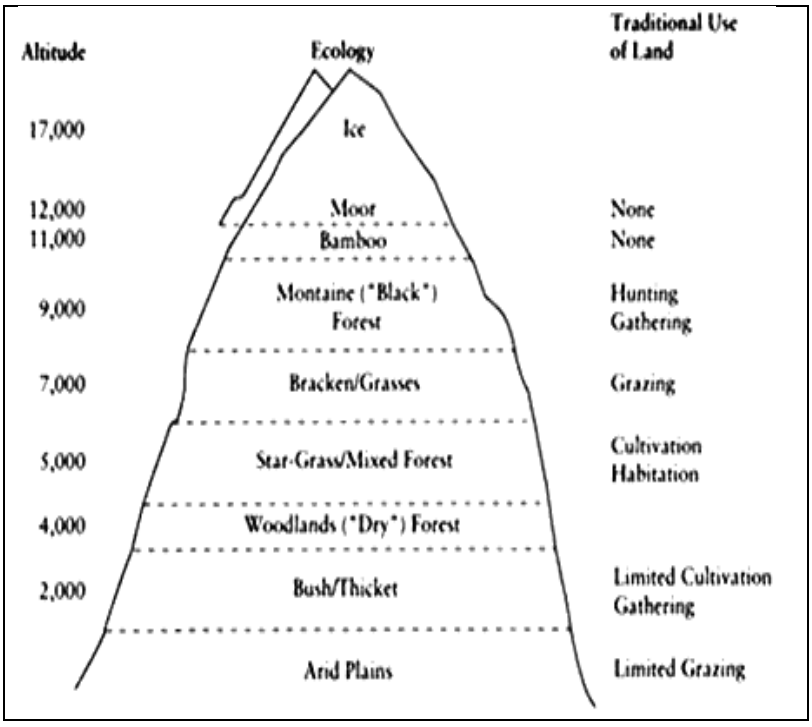
The sandy and rocky thick soils limit growth of luxuries vegetation but encourage growth of widely spaced and patched shrubs.
Many of the Mediterranean plants are hydrophytes (fire loving) trees. They depend on fire for reproduction recycling nutrients and removal of dead vegetation which encourages their survival.
Biotic factors especially the incidence of pests like caterpillars, moths which affect growth of Mediterranean vegetation. It is estimated that a single Oak tree can be a host of over 500 caterpillars at a time which reduces the growth of Mediterranean trees and luxuriant trees.
Altitudinal location; The Mediterranean vegetation is mainly found along the coastal areas with a low altitude except for the Atlas mountains for instance, scrubs near the coast are often adopt to wind and salt conditions of the ocean for example in stranded in south Africa.
Latitude; Mediterranean vegetation can grow in latitude between 30^0N and 45^0N and south of equator and in Africa areas with Mediterranean vegetation are found on the west coast tips of the continent because of the maritime conditions.
Influence of human activities such as logging, overgrazing conservation, agriculture, urbanization, and introduction of exotic tree species lead to extensive loss of forests and many active plants have become extinct.
Drainage factors including poorly drained soils due to excessive evaporation especially during the summer seasons which makes it difficult for the plants to grow luxuriantly. Trees have to adapt long tap roots to penetrate deep underground searching for water. On the other hand open forests comprising of pines, cider, and cactus grow in areas of relatively significant water content and moisture in the soil.

Economic Activities carried out in areas with Mediterranean
Wild life conservation
Harvesting of fruits (citrus)
Lumbering
Mining
Livestock farming.

MONTANE VEGETATION
Africa, mountain vegetation, vegetation belts, Mt. Kenya, Aberdares, Kilimanjaro, Mt. Meru, Mt. Elgon, Mt. Cameroon, Mt. Ruwenzori, Virunga, Simien Mts., Bale Mts., Ethiopian highlands, Drakensberg, FutaDjalon and Tibest mountains, Imatong, Atlas, Jebel Marra
These environments are found, with several ranges reaching well above 4000 meters above sea level. These are almost exclusively located in the tropical parts, with Mt. Kilimanjaro (5985 m), Mt. Kenya (5198 m) and Rwenzori (5109 m) being the highest sites.

Several other mountains reach above the tree line, with the most extensive areas being in Ethiopia. However, the High Atlas in Morocco is also high enough to support truly alpine vegetation (4165 m).
The vegetation in mountainous regions tends to be different from the vegetation of neighbouring plains. This very keeps changing with variation in height above sea level.

Therefore montane vegetation is not uniform it keeps changing on successive cones according to the altitude which influences the climate, nature of slope nature of boil and the rate of human interference and finally combine together to influence the vegetation covers. With increase in altitude and relief as well as temperature.
However with further increase in latitude there is a reduction both in temperate and relief. Therefore for every 1000m ascend of descent, there is a drop in temperate of approximately of 6^0C and this give rise to lower slopes between 1000 to 1800m above sea level there is savannah vegetation.
Between 1800-2500 there is rain forests
2500-3000 there is temperate forest
3000-3500 there is bamboo forest.
3500- 4000 there is health and moorland
4000 above there is bore rock / snow.
A simple illustration along mountain Kenya below.



Altitude is in feet above sea level
At the very bottom bellow 1000-1800 meters is savanna vegetation which has the following characteristics:

Has scattered trees such as acacia, baobab and tall grasses such as Elephant grass and spear grass.
There is a thick under growth due to adequate sunlight reaching the ground, moderate rains and hot temperatures.
Trees have long tap roots to obtain water from deep underground during the dry season.
Trees shed off leaves during the dry season to reduce water loss.
The grass turn brown during the dry season.

Conditions for its existence are mainly;

Moderate rainfall of 750mm-1000mm and may increase towards higher altitudes or reduce towards lower slopes.
Hot temperatures ranging between 20^0C – 25^0C.
Average humidity of 40 – 60 %.
Fairly fertile soil.
Human activities like grazing.

Tropical high land rain forest (1800-2500 meters above sea level)

Trees are found in the highlands or mountain areas such as on the slopes of mountain like Kilimanjaro, Kenya, Elgon, Rwenzori Meru and others.
The trees are ever green due to the heavy relief which is distributed throughout the year in the forests.
The trees tend to be fall, the tallest being over 60m.
The trees have straight smooth bucked trunks and a few branches before they crown.
The canopies shut off out the light reaching the lower levels resulting into little or no under growth.
Many trees develop buttressed roots from the lowers few meters of the trunks to support their great weight and height.
There may climbing plants which twine from tree to tree e.eg. Lianas.
The trees consists mainly hard wood.

They are mainly favoured by:

Deep fertile soil usually with a high humus content.
Heavy and well distributed rain fall usually of relief type which is over 1500 mm per annum and received throughout the year.
Good drainage
Limited interference from human activities
High humidity content of over 80%
Warm temperatures of over 22^0C.

Temperate forests (2500-3000 meters above sea level)

Trees are soft wood such as cedar, pod carp, and septum.
Trees are tall and slender but become shorter with increase in altitude.
Trees are cone shaped on top.
The trees are ever green.
They are evergreen (trees)

Trees occur in pure stands, confined to only a few species such as pine, pod carpus, canephors and cedar.
A single species may occur over a large area therefore exist in pure stands.
The trees grow straight, tall and slender although their height decreases with increase in altitude.
The tree leaves are tiny and needle-shaped with small surfaces which prevent excessive loss of water by transpiration.
The trees yield cones instead of fruits. These have scales close together and seeds which are thick coated to survive in a region deficient in heat and moisture.
The trees have shallow roots to survive the thin podzolsols.
Trees grow close to each other and moderate density (temperate forest are replaced by bamboo forest)

Factors favouring its existence include;

Cool temperatures
Moderate humidity levels of about 40%
Limited human interference
Reduced soil depth
Well pretty moderate rain fall.

Bamboo forests (3000-3500 meters above sea level)

These consists of trees which are up to 20m height
The trees have hollow stems inside.
The stems are segmented (like the sugar cane stems) and hallow.
The trees grow in pure stands are ever green with needle shaped leaves.
Trees have sharp pointed elongated leaves
Limited undergrowth.

Reasons for its existence.

Cool temperatures.
Low humidity levels due to cool temperatures.
Thin infertile soil.
Reduced rains.

Heath and moorland (3500-4000 meters above sea level)

Characterized by;

Grasses shrubs and flowers with fleshy stemed plants such as the great lobelia and ground sel on mountain Kilimanjaro and Rwenzori.
Absence of trees because the vegetation exists beyond the tree line where temperatures are below 6^0C.
Plants have fleshy stems and are scented.

Favoured by:

Cold temperatures below 6^0C
Reduced rain fall

Rocky skeletal and moraine soils.

MANGROOVE VEGETATION.

These are areas which are either permanently/ seasonally covered by water and colonized by vegetation with animal life in coasts of Africa. Swamps are classified according to the area where they are found. For example mangrove swamps are found along the east coast of Africa.

Characteristics of mangrove vegetation

They are found along the E. African coast in areas of Malindi, Kilwa, Dares-salaam, and Tanga.

Mangrove vegetation are dominated by water living plants that survive under water logged conditions.

The trees develop aerial roots; these roots develop from branches and grow towards the ground to hold them firm in the muddy grounds.

The plants are evergreen due to existence of plenty of water.

The trees are broad leaved to trap adequate sunlight for photosynthesis and to increase the surface area for getting rid of excess water through leaves.

The trees grow short trunks to enable them grow firm in the muddy grounds.

It has got salt tolerant plants which get adapted to salty conditions in the coastal soils.

The trees are mainly softwood for example palms.

Conditions favouring existence of mangrove swamps.

Presence of Saline soils leading to growth of salt tolerant vegetation.

Water logging especially in the coastal areas leading to growth of water living plants.

Low attitude that allow water logging.

Coastal location near the Indian Ocean.

Human activities of either conservation or destruction.

Climate; Heavy rainfall that provides water.

Coastal configuration.

Coastal configuration

CAUSES OF DISAPPEARANCE AND DECREASE IN NATURAL VEGETATION OF AFRICA.

Various human activities have altered the distribution of natural vegetation in Africa.

Over the years, man has cleared natural forests to create room for agriculture for example in the Cong basin, in Kumasi of Ghana, and the forests in Kigezi highlands in Uganda, forests covering large areas of the Ethiopian highlands. The original forest cover has thus been replaced by planted crops such as coffee, tea, pyrethrum and bananas.

The increase in population over the years leads to more and more land being demanded for settlement. Rural settlements have encroached on forests too.

Government policies of de-gazetting forests have also contributed to the disappearance and decrease of natural vegetation in Africa.

Tropical rain forests are rapidly being exploited to supply the increasing demand for logs and timber for building and construction as well as furniture making industries.

Firewood and charcoal form the main source of energy used by the majority of the people in East Africa. For example Miombo woodlands in Western Tanzania are being progressively replaced by secondary forests.

Repeated burning of grasslands especially by pastoral communities in Sahel of west Africa, Turkana, Masai-land and in Botswana at the end of dry season is widely burnt in anticipation of fresh pasture growth on the on-set of the wet season.

Some minerals occur in areas occupied by forests, in order to mine them, forests have been cleared for example gold mining in the Wit waters rand of South Africa.

Pastoral communities such as Turkana in North Western, Kenya, Masai in Southern Kenya and Northern Tanzania, Fulani of West Africa keep large numbers of livestock beyond the carrying capacity of the land. The grasses are overgrazed leaving behind bare land and grasslands being replaced by the growth of dry bush savannah.

The improvement in technology has come with its negative effects for example the use of power driven chain saws leads to rapid exploitation of forests and their depletion as opposed to previously used hand saws.

Increases accessibility to forested areas has increased their exploitation and depletion.

Some forests have been cleared for purposes of flashing out anti-government elements or rebels for example in Kisangani of Congo and Galamba in Central African Republic.

Climate changes have manifested itself in reduced rainfall and its unreliability as well as frequent occurrences of drought and floods. Draught which is an abnormal insufficiency of water below the usual requirements.

The outbreak of natural fires such as those started by lightning lead to the destruction of areas of forest land.

Pests such as locusts and grasshoppers which periodically invade large areas.

The population of wild animals in some national parts and game reserves has become so dense and therefore destructive to the environment.

Deforestation

Mining

Lightening

Steps being done

Controlled grazing in areas where livestock rearing is practiced is being introduced. The number of animals is being regulated in order to avoid overgrazing of the grasslands and soil erosion and this is through mainly the establishment of ranching schemes for example Kongwa cattle ranch in Tanzania and among others.

Afforestation and re-afforestation programmes are being implemented to control soil erosion.

Other forms of energy are being developed for example Hydro Electric power, solar energy, Bro-mass, bio-gas and others to reduce on the rapid exploitation of forests in search of firewood as a source of energy.

Forest encroachers are being evicted for example from forests such as mountain Elgon and Kibale forests in Uganda as well as Mau forest range in Kenya.

Laws are being enacted in parliament to protect the environment which include the natural forest for example it is by law that no one is supposed to destroy or exploit forest reserves without the prior permission of the relevant authorities.
Environment education is being done in order to create awareness on the dangers of vegetation degradation and how to combat it. This is being channelled through the public media such as radios and television station.
Recycling rather than disposing of wood products such as papers are being done to reduce the exploitation of forests, most of the recycled materials are being used for packaging and newsprint in East Africa.
Settlement and re-settlement schemes are being set up to transfer people from densely populated areas and near forests.

THE CLIMATE OF AFRICA

FACTORS AFFECTING CLIMATE OF A PLACE IN AFRICA
Climate is the average weather of a place based on data recorded over a 30-year period.

LATITUDE is how far north or south a place is from the equator – a major influence on temperature and precipitation.
ALTITUDE is the height above sea level – the higher a place is the colder and wetter it will be.
DISTANCE FROM SEA Places that are influenced by sea temperatures have a maritime climate – wet with a small temperature range. Places inland that are not influenced by sea temperatures have a continental climate – dry with a large temperature range.
PREVAILING WIND are the most frequent winds affecting an area – they influence temperature and precipitation. Sea Winds bring precipitation Land Winds bring dry weather Polar Winds bring cold weather Tropical Winds bring warm/wet weather and precipitation
OCEAN CURRENTS Warm Ocean Currents flowing from the tropics towards the poles warm the surrounding area, especially in winter (see below) Cold Ocean Currents usually have less effect, but may lower temperatures and cause fog.
ASPECT is the direction a place faces. On a local scale aspect is very important. In the British Isles south facing places are warmer than north and east facing places.

AFRICA'S CLIMATE REGIONS

Africa's position is relatively unique in the sense that it almost has a mirror image of climate zones to the north and South of the Equator with regard to latitude. The six

main climate zones of Africa are found to the north and south of the equator, namely, Equatorial, Humid Tropical, Tropical, Semidesert (Sahalian), Mediterranean and Desert.

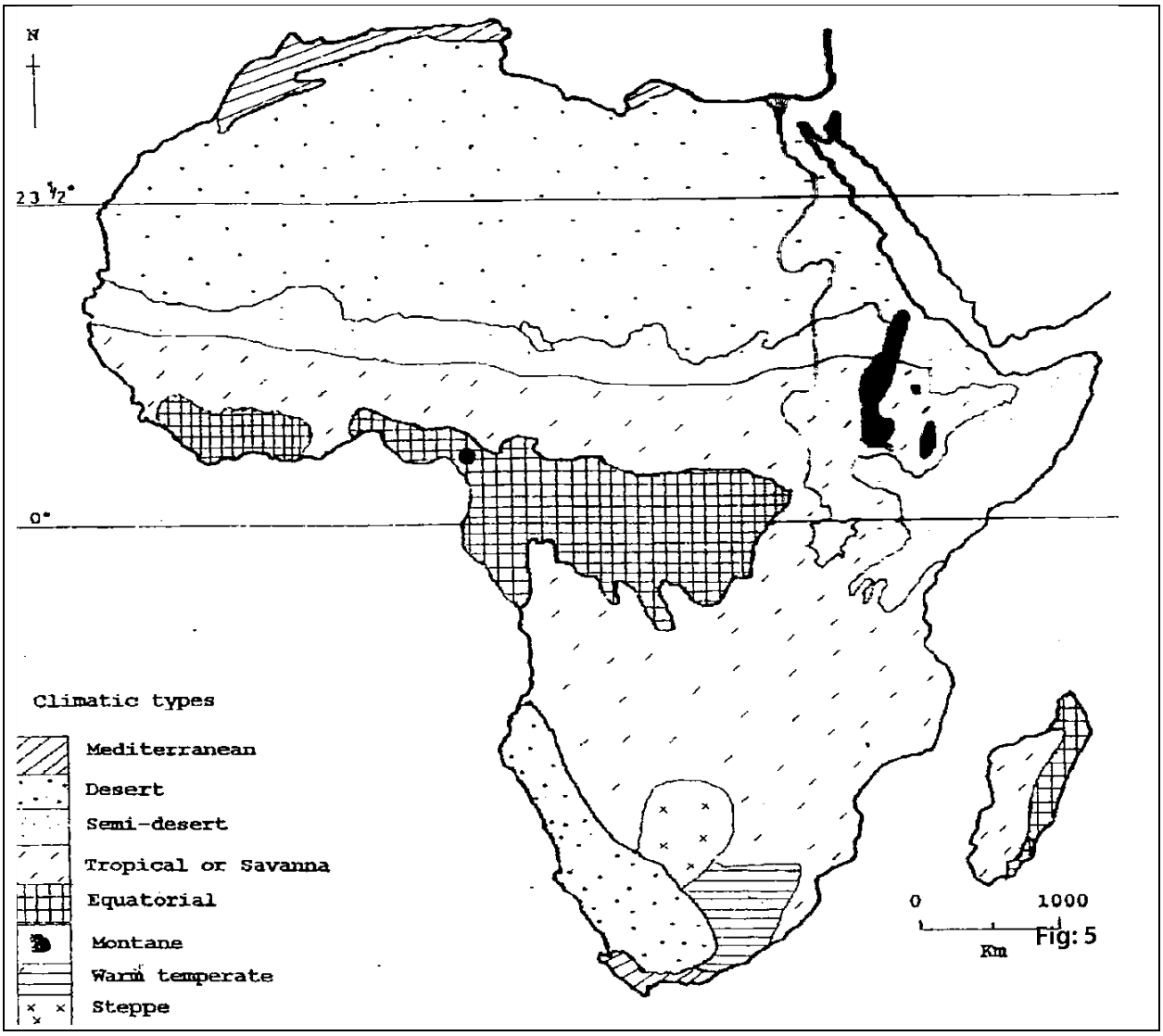
Climate regions of Africa

Climatic type	Common characteristics
Desert climate	18° - 36° N & S of the Equator Sub-tropical HP zone West coast and Continental effect Very little rainfall of below 250 mm per annum. Temperatures are very hot throughout the year Day time is very hot yet nights are very cold There is a very large diurnal temperature range Commonly in Sahara, Namib and Kalahari deserts they are associated with the Cold Canary Current and Cold Banguella Current
Equatorial climate	5° N & S of the Equator Associated with the ITCZ Very heavy rainfall is received throughout the year of above 1000 mm per annum There is a high humidity content of over 80% There is a thick cloud cover Temperatures are warm throughout the years Days are equal to nights There is no cut dry season There is a double maxima of rain received. Commonly receives convectional rainfall associated with thunder and lightning. Continental mainly with west coast warm current
Semi-desert climate	20º N of Equator Transition between Savannah and desert zones ITCZ moves N -summer rainfall Mainly Continental effect

Climatic type	Common characteristics
Tropical savannah climate	15° to 20° N & S of the Equator Sub-tropical HP over region in winter Winters are dry yet summers are wet Clear cut alternating wet and dry season Moderate rainfall received in the rainy season of 750mm-1000mm per annum Moderate annual temperature range Temperatures are hot throughout the year Moderate humidity content of below 80%

	Summer rainfall region prone to droughts and tornadoes relatively Large diurnal temperature ranges
Mediterranean climate	30° - 40° N & S of the Equator Situated on the furthest north and south west margins of the African continent Winter rainfall brought on by temperate cyclones (cold fronts) Maritime
Humid Tropical continental climate	Transition between Equatorial and Tropical (Savannah) Rainfall throughout the year – more in summer Small variations in temperature 20º - 25º C High temperatures due to tropical location

MAP OF AFRICA'S CLIMATE REGIONS



Africa straddles the Equator from 37º N to 34º S. Africa has two Sub-tropical belts with the ITCZ somewhat equidistant from the two high pressure zones.

The ITCZ (also known as the heat Equator) moves between the Tropics of Cancer and Capricorn depending on the season. This is the area of massive uplift over Africa and very high rainfall figures are measured.

The sub-tropical High Pressure Belt also migrates with the seasonal movement of the overhead sun. Areas in Africa have their rainfall season when the heat Equator moves into its respective hemisphere. Figure 2 is more simplified. It shows conditions for an Equinox with the overhead sun over the Equator

ARIDITY AND DESERTIFICATION IN EAST AFRICA

Aridity refers to conditions of low and unreliable rainfall. It also implies low humidity and cloud cover. In Africa, arid regions receive less than 250mm of rainfall per annum and semi-arid regions receive less than 750mm of rainfall per year.

In Africa the arid and semi –arid regions are found in Sahara desert, Kalahari Desert and Namib Desert. Semi-desert areas are widely spread in the Sahel region and in sub Saharan Africa.

Factors responsible for desertification in Africa

1. Coastal configuration. The East African coast is aligned in a north-eastern to south-western direction. Therefore some winds like the North Eastern winds just blow parallel to the coast in a North-Eastern to South-Western direction especially along the Kenyan coast, where winds blow parallel to the coast instead of blowing inland. A greater part of Kenya's interior is left without moisture-laden winds and therefore remains dry (arid).

2. Corriolis force. According to Ferrel's law any loose object flowing in the Northern Hemisphere is deflected to the right of its path due to the rotation of the earth thus when South East trade winds cross and the equator they are deflected to the right towards the Indian Ocean and therefore become off-shore winds which will not bring rainfall. Somalia and some parts of Ethiopia are dry.

2. Continentality (Distance from the coast). Coastal areas experience rainfall as a result of land and sea breezes and also as a result of prevailing winds blowing over the area. Coastal areas tend to be wetter than areas in the interior because by the time the prevailing winds reach the continental interior they are dry winds.

4. Perturbation. The high temperatures over the Indian Ocean have resulted into the existence of low pressure cells over the ocean. This low pressure region attracts winds thus winds which would have brought rainfall into the mainland are diverted by the low pressure cells towards the ocean resulting into heavy rainfall in the open water surface of ocean and aridity on the main land of East Africa.

5. Dry winds

a) North East trade winds. The northern parts of Kenya are dry because the area is traversed by a dry Northern East trade wind. The north eastern trade winds originate from Arabian Desert it passes over a small water surface (Red sea) and eventually to Ethiopian highlands where rain falls on the windward side. The wind descends on the leeward side of the Ethiopian Highlands which extends into northern Kenya as dry winds leaving the area dry and devoid of rainfall.

b) South East trade winds. The south east trade winds have origins in the Indian Ocean which make them warm and moist. This character keeps on changing as they blow over the main land areas. The south east trade winds are responsible for the aridity of the north western shores of Lake Victoria (Ankole –Masaka corridor) where they are deflected by the rotation of the earth.

c) The Westerlies. These blow from the Congo basin and affect most of Western Uganda; they cause arid conditions over the leeward slopes of the Rwenzori Mountains, Rift valley and Lake Albert Flats where they descend bringing hot, dry rainless conditions.

6. Morphology. This means the general appearance of the landscape. Monotonously flat areas such as the Karamoja Plains, Ankole –Masaka corridor, Central Tanzania and

Northern Kenya lack highlands which would trap rain-bearing winds and cause orographic rainfall so such flat areas have remained dry because the winds just pass these areas without any obstacle.

7. Lack of water bodies. There is marked absence of large water bodies in Northern Uganda, North Eastern Kenya and Masai land. The water bodies would help in recharging the dry winds which would result into heavy rainfall therefore absence of large water bodies has led to aridity of these places.

8. Relief. Presence of high hills or mountains may lead to the formation of orographic rainfall on the windward side but the leeward side remains without any rainfall because of being in a rain shadow such as lake Albert flats, parts of Kasese, North Eastern Uganda and north Western Kenya have remained dry.

b) Human factors

9. Deforestation. This is the removal of the forest cover which reduces evapo-transpiration and ultimately the formation of convectional rainfall. It also encourages soil erosion which leads to loss of soil fertility thus the soil can support fewer plants which leads to low amount of moisture in the atmosphere.

10. Over stocking. The keeping of a large number of animals than what land can accommodate has led to over grazing and consequently soil erosion. Soil erosion leads to a decline in soil fertility which makes the soil to support limited vegetation cover leading to low rates of evapo- transpiration resulting into arid conditions.

11. Grass burning. During the dry season in areas of nomadic pastoralism, grass burning has resulted into degeneration of the natural vegetation. This leads to reduced rates of evapo-transpiration. This leads to low humidity and low amounts of rainfall.

12. Swamp reclamation. In heavily populated areas, swamp reclamation has led to the lowering of the water table and reduction of evapo-transpiration rates. The result is low humidity, low rainfall hence aridity.

13. Sinking of boreholes. This has led to the fall in the water table which makes the shallow-rooted plants to die off leading to reduced evapo-transpiration and eventually arid conditions.

14. Industrialisation. Exhaust fumes from industry and vehicles have led to increased carbon monoxide in the atmosphere. The carbon monoxide attracts a lot of insolation and therefore contributes to a steady increase in temperature leading to arid conditions.

Measures against aridity and desertification

1. Laws should be established so that forests reserves should not be encroached on also planting of trees should be made compulsory.
2. Alternative sources of energy apart from wood e.g. paraffin, solar energy, electricity; bio gas should be made available at affordable costs in order to reduce the rate of forests depletion.

3. Public education about the role and importance of forests should be encouraged. This can be done through mass media, local councils and wildlife clubs.
4. Use of energy saving stoves. This means that less fuel per unit of time is used. This reduces the rate at which trees will be felled which helps in forests conservation.
5. Encouraging a forestation and re-a forestation programmes in order to reduce forest depletion by deforestation and also to reduce the demand for fuel and wood products.
6. Establishment of a body, committee or authority to monitor and supervise issues of environmental management.
7. Use of good methods of agriculture.

OCEAN CURRENTS

Ocean currents are general movements or drifts of the surface water of the ocean in a fairly defined direction. They are continuous general movement of masses of surface ocean waters horizontally and in a fairly defined direction.
They tend to be persistent. Most ocean currents drift very slowly and that is why they are commonly referred to as drifts.
Ocean currents may be either warm or cold i.e. there are warm ocean currents and cold ocean currents.

Causes of ocean currents

1. **The prevailing winds**; winds influence oceanic circulation, this is because as winds blow friction is generated between the wind and water surface causing the water to move in the general direction of the wind. Some winds such as trade winds which almost continuously blow in the same direction cause surface waters over which they blow to move in the direction to which they blow e.g. across the Atlantic ocean westerlies produce the North Atlantic drift and Kuroshio currents (in the Pacific).

2. **Rotation of the earth**; the earth's rotation influences the direction of movement of ocean currents. It causes the currents to be deflected to the right in the direction to which they flow in the northern hemisphere and in the southern hemisphere the currents tend to be deflected towards the left.

It is generally because of the Coriolis force that the ocean currents are deflected.
3. **Differences in temperature**; ocean currents may be caused by differences in temperature. Such currents are generally referred to as convection currents.

Heating by the sun in the low altitudes makes the waters less dense and the waters therefore drift pole wards.
In the equatorial belt, temperatures are high and therefore waters are warm and tend to be less dense, unlike the polar region or high latitude region waters. As a result, the warm waters of the equatorial region drift towards the higher latitudes.
4. **Salinity of the waters**; salinity may increase the density of the waters. Saline waters (these of high PH/basic waters) tend to be denser than waters of low salinity. It is generally noted that waters of high salinity tend to flow to areas of low salinity e.g. the

surface water current from the Mediterranean Sea which enters the Atlantic Ocean is due to difference in salinity. The high rate of evaporation and limited rainfall may result into high salinity.

This means that the Mediterranean Sea is made up of waters of high salinity and therefore flows into relatively less saline waters of the Atlantic Ocean while the under current flows in the opposite direction.

5. **Coastal configuration**; the alignment the coast and the existence of sub marine ridges is partly responsible for the direction of flow of ocean currents. The shape of the land helps in the direction of moving currents e.g. the North equatorial current tends to be deflected north wards because of the shape of the horn of Africa.

Ocean currents may be characterized by under currents. These are return or compensating currents that normally flow within the equatorial latitudes. They flow in the opposite direction from which the opposite currents are flowing. They are normally known as counter currents that replace the surface waters that may have moved to another region.

WARM OCEAN CURRENTS

These are ocean currents with warm waters and may include, the warm
Mozambique current or the warm Agulhas current or South equatorial current in Africa. Other warm currents include; the warm gulf stream, the North Atlantic drift, the North pacific current, the Kuroshio current, the East Australia current, the Brazilian current and the North east monsoon drift.

Characteristics of warm ocean currents

1. They have higher temperatures i.e. tend to be warm.
2. They generally tend to flow on the eastern side of the continental landmasses in the low latitudes (except for Guinea current).
3. They generally tend to flow on the western side of the continental landmasses in the mid and high latitudes e.g. the Pacific current and the North Atlantic drift.
4. They tend to flow from the lower latitudes to the higher latitudes i.e. flow pole ward away from the equator.
5. In the northern hemisphere, their circulation tends to be clockwise while in the southern, their circulation tends to be anti-clockwise.
6. They generally tend to be of lower density/high salinity.
7. They flow on the surface but later lose temperatures and become under water currents.

COLD OCEAN CURRENTS

These are ocean currents with waters of low temperature, i.e. the waters are cold. In Africa the main cold ocean currents include; the cold Banguella current and the cold canary current. Elsewhere examples include the Californian current, cold Peruvian

current, the North equatorial current, East Greenland current and the West Australian current.

Characteristics of cold ocean currents

1. They are characterized by low temperatures, i.e. they have low waters.
2. They tend to flow from high latitude regions to regions of low latitude, i.e. they flow equator wards from regions of cold conditions.
3. They generally flow on the western side of the continental landmasses. This is true in the lower latitude regions.
4. In the mid and high latitude regions, they tend to flow on the eastern sides of the continents e.g. the Labrador Current, the Oyashiwo current.
5. They tend to characterized by high density/low salinity.
6. In the northern hemisphere their circulation tends to be anti-clockwise while in the southern hemisphere their circulation tends to be clockwise.
7. They are also characterized by up-welling of waters at the coasts

Ocean currents influence the climate and environmental conditions of adjacent lands.

Effects of warm ocean currents

Warm ocean currents have influenced the climate or environmental conditions of the areas adjacent to them in the following ways;

1) They lead to warm conditions, i.e. they tend to warm or raise the temperature of the adjacent area, this is because the winds which blow over them are warmed up and as they blow onshore they bring in warm conditions e.g. the North Atlantic drift raises the temperatures of the coasts of Portugal, France, Britain, the Netherlands etc. and the ocean ports remain ice free in winter.

Durban on the eastern coast of South Africa is affected by the warm Mozambique current and has temperatures of 24.40C compared to Port Noloth on the west coast along the same latitude which has temperatures of 15.50C because of the cold Benguela current.

2) Warm ocean currents lead to heavy rainfall conditions on the adjacent coastal lands. This is because over warm ocean currents there is high rate of evaporation and the winds that blow over them pick the moisture which winds later rise, cool down and condense to form rainfall e.g. along the East Africa coast and along the west African coast there is heavy rainfall because of the warm Mozambique and warm Guinea currents respectively. For instance Beira receives 1,521 mm and Durban receives 1,008 mm of rainfall per annum.

3) They results into humid conditions, i.e. high humidity. This is because warm ocean currents are associated with high humidity due to the relatively high temperatures. All

these tend to increase the humidity of the surrounding areas e.g. the Natal Province of South Africa and the coasts of Western Europe.

4) Warm ocean currents influence the temperatures of winds and result into warm winds. Winds that tend to originate from areas with warm currents are generally regarded as warm maritime winds.

5) They lead to increased cloud cover over the adjacent coastal lands. This is because of the high rate of evaporation. The water vapour rises, cools and condenses to form dense clouds (cumulonimbus clouds) which later result into heavy rainfall.

Effects of cold Ocean Currents

Cold ocean currents influence the climate and environmental conditions of the adjacent land masses in the following ways;

1. Cold ocean currents tend to control the temperatures of the surrounding land masses due to the influence of the land and sea breezes. E.g. the Benguela lowers the temperatures of surrounding areas in Namibia e.g. Walvis Bay has temperatures of 160C as compared to Durban's 250C and yet they lie at almost the same latitude.

2. Cold ocean currents lead to arid conditions or the formation of marine deserts on the adjacent coastal lands. This is because of limited evaporation and winds that blow over them hardly pick any moisture.

The winds also generally tend to be off shore winds meaning that the level of condensation that will result into rainfall is low.

Examples of marine deserts include the Namib Desert which is due to the cold Benguela current. The Californian desert is due to the cold Californian current and the Atacama Desert due to the cold Peruvian current.

3. They tend to result into low humidity; this is because of the low rate of evaporation. This consequently leads to limited cloud cover because of the limited atmospheric moisture.

4. Cold ocean currents lead to the formation of cold offshore fog or misty conditions as a result of rapid radiation cooling.

It may also be due to when slightly warm air blows over the cold ocean currents resulting into steam fog e.g. there are frequent foggy conditions in San Francisco in southern California and in the Labrador region in eastern Canada.

Effects of ocean currents on human activities along the coastal areas

The nature of ocean currents has influenced human activities in the coastal regions.

Effects of warm ocean currents

1. The resultant high rainfall experienced has encouraged crop cultivation or rain fed-agriculture.

This is common along the east African coast and West African coast where a number of crops are grown, e.g. cloves, sisal, and sugarcane along the East African coast. Along the West African coast crops like cocoa are grown in Ghana
2. The high rainfall experienced encourages the growth of forests and people may be involved in forestry activities, e.g. in Gabon, forestry activities such as lumbering are practiced. On the east African coast lumbering is also carried out in the mangrove forests.

3. The high temperatures or warm conditions along the East African coast are conducive for the growth of coral polyps and the resultant rocks and land forms like coral reefs.

These coral rocks have been a potential for the manufacture of cement from the coral limestone e.g. the Bamburi cement.
In addition the coral reefs have been a tourist attraction and have promoted tourist activities along the coast of east Africa. Furthermore, the fringing reefs have tended to be a hindrance to deep sea fishing along the east African coast.
4. The heavy rainfall that may result may be associated with thunderstorms which tend to be destructive to the crops and property and also disrupts the economic activities.

Effects of cold ocean currents
a) The arid conditions lead to the growth of pastures of short grass which has encouraged pastoralism. It is important to note that pastoralism is common in semi-arid areas such as the Namib Desert and Kalahari Desert.

b) The arid or desert conditions have promoted tourism. Such areas have been gazetted as wildlife conservation sites e.g. Namib Desert.

c) The arid or desert conditions have also provided a conducive environment for the film industry. Film making has been carried out in the arid areas such as the Namib Desert.

d) The ocean currents cause upwelling of ocean waters creating conducive conditions for the growth of planktons and this has encouraged fishing in these areas. The upwelling may be rich in phosphates and nitrates that promote plankton growth e.g. fishing has been an important activity in the coastal waters of Morocco, South Africa, Angola and Mauritania

Chapter 23: Forests, forest resources and forestry in Africa
A forest is a large area covered by growing trees.

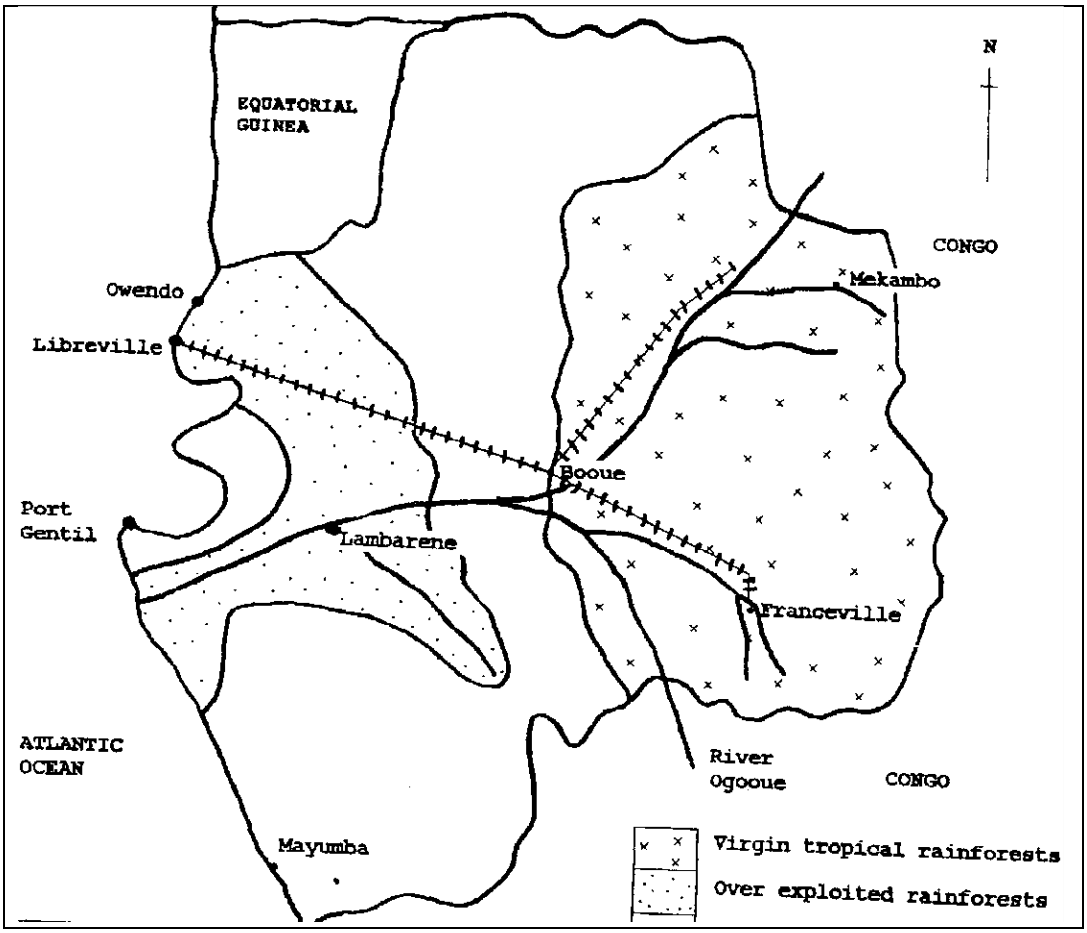
There are various types of trees in Africa, these include, tropical rain forests/Equatorial forest, planted forest, montane forest/mountain forests like bamboo forest and temperate mountain forest.
Africa's forestry sector is mainly dependent on tropical rain forests and planted forest.

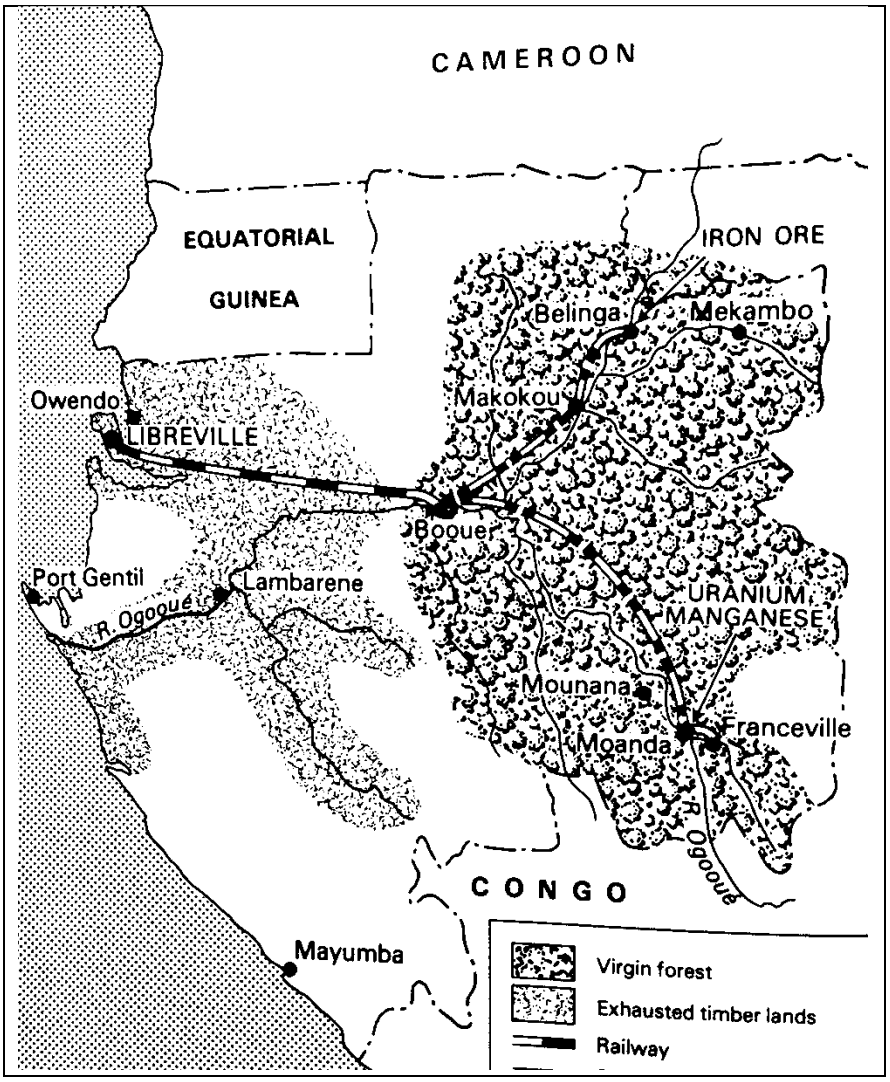
TROPICAL RAIN FORESTS (Equatorial Forests)
These are found astride the equator in 5^0 North and South of the Equator. They are commonly found in the equatorial regions of Africa.
The trees are very tall up to about 50meters in height.
There are hard wood trees species for example mvule, mahogany, Oakaume, Ozigo, musizi, ebony, iron wood, rose wood etc.
The trees form a canopy on top and are umbrella shaped.
The trees have got broad leaves to get rid of excessive water, and trap sufficient sunlight for photosynthesis.
The trees have got buttress roots to support the huge large trunk.
The trees are very huge and bulky because they have a long gestation period.
There is no under growth due to the thick canopy which does not allow sunlight to penetrate to the ground.
The forests have got climbing plants like Lianas.
Some trees are host trees to others.

Tropical rain forests are found in countries such as Democratic Republic of Congo, Gabon, Equatorial Guinea, Congo Brazzaville, Ghana Cameroon, Southern Nigeria, Ivory Coast, and Central Africa Republic.

FORESTRY IN GABON
Forest cover the largest part of Gabon. The forested land is over 29% of the total land area of the country. The forests are mainly of hard wood tree species and these grow in impure stands.
Tree species include ebony, Mahagony, Ozigo, Azaobe, Iron wood,
Major rivers in Gabon include Rivr Orgove which is used for floating logs.
Major sawmills and processing plants are found in ports like Gentile, Owendo, Libreville, Mayumba, Bouve and Mekambo.

A SKETCH MAP SHOWING FORESTRY IN GABON


N
EQUATORIAL
GUINEA
CONGO
Owendo
Mekambo
Libreville
Booue
Port
Gentil
Lambarene
Franceville
ATLANTIC
OCEAN
River
Ogooue
CONGO
Mayumba
Virgin tropical rainforests
Over exploited rainforests



FORESTRY IN GHANA

Ghana ranks 2nd among the leading Western African exporters of Timber.
Timber exports are the 2nd largest leading foreign exchange earner after cocoa.
The most important tree species in Ghana include ebony, sapere, otile, kawa, iron wood, Oakoume.
The major saw mill centres include Tema, Accra and Axim.
The major export port for Ghan's timber is Takoradi.

FORESTRY IN CAMEROON

Cameroon is located in West Africa. Cameroon has tropical rainfalls which are a continuation of the Congo basin forests. Tree species include, ebony, Maphogany, Olive, Bongongi.
Rivers as long which logs are floated include Rier Sanaga River Jdja.
Ports handling timber exports include, Dasala, Buela.

FORESTRY IN IVOARY COAST

Ivory Coast is located in North West Africa; Timber is one of the country's major exports. These forests are an extension of the Congo basin forest. Trees specious include, Maphogany, Iroko, Idigbo, Okere, Aprokona, Iron wood, Olive.

FACTORS RESPONSIBLE FOR DEVELOPMENT OF FORESTRY INDUSTRY IN GARBON, GHANA, CAMEROON, DRC, IVORY COAST.

Presence of heavy and well distributed rainfall of over 1000m per annum which encourage growth of forests.

Presence of numerous navigable rivers used to float logs.

Presence of a variety of valuable hard wood tree species which are demanded on the market.

Presence of a reliable soils that support the growth of forests.

Presence of a relatively flat relief which supports construction of transport route especially railway lines along which forest products are transported.

Presence of extensive land with limited settlements on which forest grow.

Presence of large sums of capital from government and foreign investors from France, Switzerland who invest in forestry exploitation.

Availability of a large ready market for timber and timber products both within and international which buy forest products.

Availability of sufficient cheap labour force with semi-skilled and skilled labour who work in forestry industry like lumber jacks.

Availability of improved technology which eases exploitation of forestry.

Availability of efficient transport systems especially railways and roads which facilitate movement of the forestry product.

CONTRIBUTION OF FOREST TO ECONOMIES IN TROPICAL AFRICAN COUNTRIES SUCH AS GARBON, GHANA, CAMEROON, DRC, IVORY COAST.

Timber and timber products earn foreign exchange as a result of exportation to other countries like Belgium and UK, foreign exchange is used to provide social and economic infrastructure.

Forestry facilitates industrial development through providing wood as a raw material to saw mills.

Forestry provides employment opportunities to people for example lumber jacks who earn incomes to maintain their living standards.

The forestry industry facilitates development of infrastructure especially railway lines connecting forests to processing centres hence improvement of transport.

Source of government revenue through taxes imposed on lumbering companies and workers' income, the tax revenue is used to develop infrastructures.

Development of urban centres and ports for example Ouendo.

Forestry improves international relations with other countries which export timber product this helps to provide market for even other sectors.

CHALLENGES FACING THE FORESTRY INDUSTRY IN AFRICA

Exhaustion of forests due to over exploitation especially the forests at the coastal areas,
Trees are large and bulky therefore they are difficult to cut, float and transport.
Most of the tropical rain forests are thick and impenetrable, therefore are hard to access.
Trees appear impure stands and therefore difficult to hunt for the valuable species for exploitation.
Unfavourable climatic conditions where it almost rains throughout the year which makes it had to access the forests for exploitation.
Price fluctuation caused by stiff completion with the soft wood tree products from the temperature regions which makes it unprofitable.
Effects of wild fires that burn large chunks of forests.
Trees have buttress roots which makes telling of trees difficult and required constructions of plat forms.
Inefficiency in transport systems where there are impossible roots out dated railways systems which make transportation of logs difficult.
Attacks from wild animals that pause a threat to the potential lumber jacks.
Accidents during felling of the trees causing accidents which make the activity unattractive to skilled labour.
Low levels of technology involved in exploitation of forests like use of pangas and axes which leaves the industry to a small scale.
Trees have a long gestation period which makes their generation after exploitation difficult and causing exhaustion of the valuable tree species.
Opposition from the environmentalists who are opposed to the exploitation of trees.
Political instabilities and rebel activities which make forests unsafe to the potential investors because rebels hide there.

MEASURES BEING TAKEN TO IMPROVE THE FORESTRY INDUSTRY IN AFRICA

Re-afforestation in the areas where the forests have been exhausted.
Introduction of fast growing tree species to address the issue of forests exhaustion.
Spraying with chemicals to combat the pest that destroy the trees.
Attracting foreign investors to invest in the forestry industry and increase the capital and machinery.
Establishing fire control centres carryout regular patrols to combat fire outbreak.
Use of strict laws to avoid indiscriminate exploitation of trees.
Using protective gears to reduce accidents exploitation of trees.
Using protective gears to reduce accidents that claim lives.
Market research from within Africa and abroad to reduce after harvest losses and competition and saw mills centres.
Diversification of the economy to reduce over-dependence on forests alone to reduce the threats of exhaustion.

PLANTATIONFORESTS IN AFRICA

FORESTRY IN SWAZILAND

Many years ago, Swaziland had forests which unfortunately were ruthlessly cut down for fuel and with the need to create land for agriculture. This resulted to severe soil erosion especially in the Drakesburg Mountains. However, since 1940's there has been various plantation forests established and currently these exceed 100,000 hectares.

The major tree plantations in Swaziland include;

Mondi peak formerly pigs peak area in the North of the country with pine and Eucalyptus (32,000 hectares)

The Sappi Usutu formerly Great Usuhs forests in the south near Mbabone (40,000) hectares.

Shiselweni formerly Nhlangano forest in the South West which is the most recent.

Characteristics of soft wood tree plantation in Africa (Swaziland)

Trees occur in pure stands.

Trees are fast maturing taking less than 15 years to mature.

Trees are tall, slender and straight.

Trees are ever green.

Trees appear impure stands.

Trees are light in weight.

FORESTRY EXPLOITATION IN SWAZILAND

Forestry cutting is largely done by mechanical saws. Horses and tractors drag the logs to the main roads where they are transported by truck to the saw mill centre.

Products from Swaziland forests are saw timber, ply wood, pit proops, poles pulp.

MANAGEMENT OF FORESTRY

The forests are harvested systemically.

There is a carefully planned rotation system of re-afforestation once the trees have been cut.

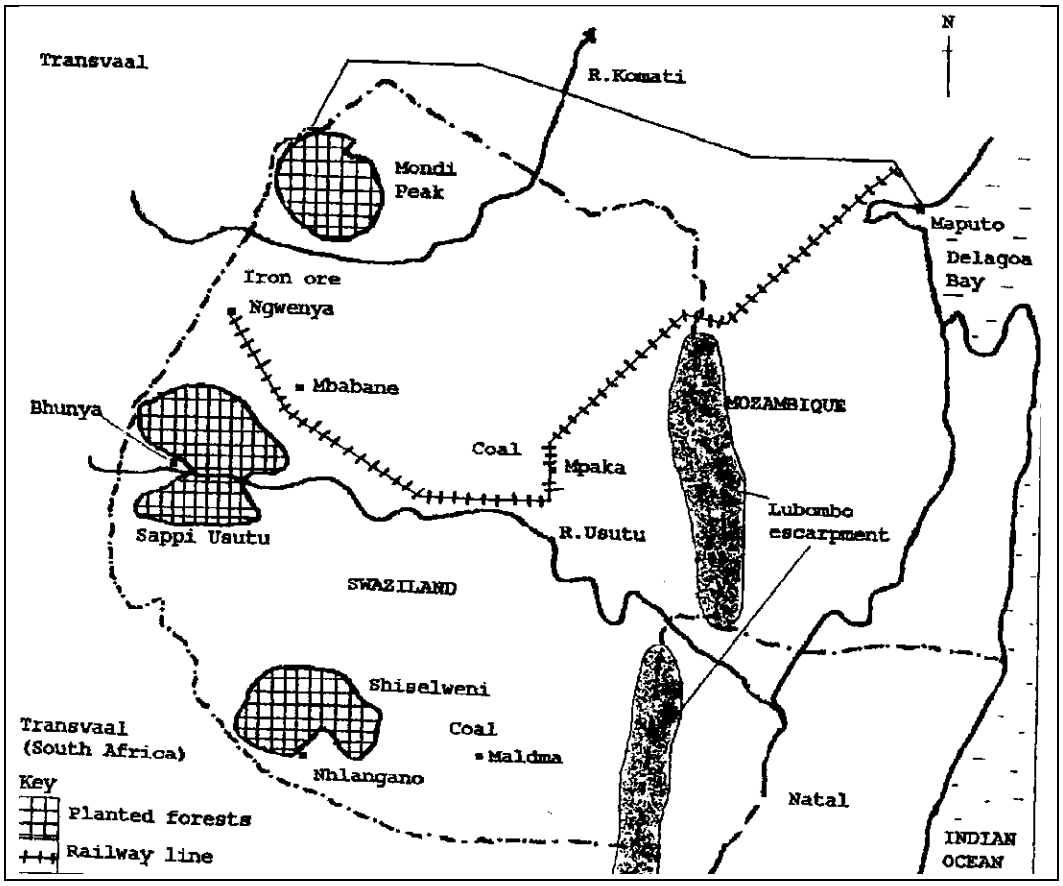
Rotational harvesting is practiced.

Fast growing tree species such as eucalyptus and pines are planted.

The government supports positively the planting of trees.

Financial assistance is provided by common wealth Development Association.

MAP SHOWING PLANTATION FORESTS IN SWAZILAND



FACTORS FAVOURING THE DEVELOPMENT OF THE SOFT WOOD FORESTRY INDUSTRY

Favourable climatic conditions of adequate rainfall for quick growth and maturity of trees.

High attitude of over 100 meters above sea level which favours the growth of soft wood tree species.

Existence of various tree species such as pines and cypress.

Proximity to the coast hence easy to export to foreign market.

The rugged nature of the relief with thin soil which cannot support agriculture and settlement hence put under forests.

Presence of fast growing tree species.

Availability of large sums of capital to invest in forestry to acquire seedlings.

Availability of sufficient skilled labour that work in the forests for example planting, pruning and felling trees.

Availability of high levels of technology.

Conditions that led to deforestation in Swaziland

Excessive lumbering for exportation of timber to South Africa, Japan and China led to depletion of large chunks of forests.

Clearance of forests to acquire land for agriculture especially establishing vine plantation.
High demand for fuel wood and charcoal for energy purposes.
Development of transport routes such as roads and railway lines necessitated cutting down portion routes where the transport routes were constructed.
Fire out break started by farmers (shifting cultivates or lightening led to considerable loss of forests cover.
Population pressure and need for land for settlement caused disappearance of forests
Use of modern technology such as power driven chain saws , diesel ,saws which are highly effective and fast at cutting trees led to rapid deforestation .
High demand for forests products such as fruits, root, mushrooms, and herbs caused rapid disappearance of forests.

Problems facing the forestry section in Swaziland.
Outbreak of tree pests that attack and destroy forest.
Occurrence of prolonged drought which retards the growth rate of trees.
Outbreak of wild fires that burn large change of forestry cover.
Stiff competitions for market with other countries exporting forests product which cause post-harvest loses.
Fluctuation in prices of products which causes postharvest loses.
Under developed transport systems in the stiff slopes of Swaziland when delays transportation of forest products to market centres.
Shortage of skilled labour which affects maintenance and management of forests.
Limited capital due to competition with other government sectors for funding which limit forests expansion.

MEASURES BEING TAKEN TO IMPROVE FORESTRY IN SWAZILAND
Establishing fire control centres and under taking regular patrols to control fire outbreak.
Training of more skilled labour to maintain forests.
Planting drought resistant trees species which are discovered through research
Spraying with pesticides to control pests and diseases.
Developing modern transport system connecting forests and processing centres .
Researching for market.

BENEFITS OF FORESTRY TO THE ECONOMY OF SWAZILAND
Forestry has stimulated growth of industries through providing raw materials to swamps.
Forestry has facilitated rainfall formation that encourages agriculture.
Farming foreign exchange through exportation of timber and other wood products. The foreign exchange is used by the government to provide services to the people.
The forests of Swaziland are tourist attractions that earn revenue to the economy of Swaziland. The revenue is used to provide services to people.
Forests facilities conservation of soils against erosion which encourage agriculture.

Forests provide water catmint areas such as rivers where people harvest water for domestic use.
Forests are used for research and education purposes. The researchers results in first growing trees species.
Creation of employment opportunities to the people engaging in forestry who earn income and a living from forestry.
Forests provide electricity poles for distribution electricity in the country.
Forestry has stimulated development of transport routes with in the country leading to easy mobility.

Assignment

Explain clearly in you books the benefits of forests to the people of Swaziland.
Outline the challenges and solutions towards the forestry industry in Swaziland.

Benefits

Timber and timber products earn foreign exchange as a result of exportation to other countries like Belgium, which is used to provide social and economic infrastructures.
Forests facilitate industrial development through providing wood as raw materials to saw mills.
Forests provide employment opportunities to people of Swaziland for example lumber jack who earn incomes to maintain the living standards.
Forests facilitate the development of infrastructures especially railways lies, connecting forests to processing centres hence important of transport.
Sources of government revenue through taxes imposed on lumbering companies and workers incomes, tax revenue is used to develop infrastructures.

Challenges

Exhaustion of forests due to over exploitation especially the forests at the coastal areas.
Trees are huge and bulky therefore they are difficult to cut, float, and transport.
Trees appear in impure stands and therefore difficult to hunt for the valuable species for exploitation.
Price fluctuation caused by stiff completion which the soft wood tree products from the temperate regions which makes unprofitable.
Affects f wildlife out breaks that burn large chunks of forests.
Attacks from wild animal that pause a threat to the potential lumber jacks.
Low levels of technology involved in exploitation of forests like use of pangas and axes which leaves the industry to a small scale.
Political instabilities and rebel activities which make forests unsafe to the potential investors because rebels hide there.

Solutions

Attracting foreign investors to invest in the forestry industry and increase the capital and machinery.

Market research from with Swaziland and abroad to reduce after harvest losses and competition on market.
Use of strict laws to avoid indiscriminate exploitation of trees.
Using protective gears to reduce accidents that claim lives.
Establishing fire control centres to carryout regular patrols to combative out breaks.

CONDITION THAT HAVE FAVOURED GROWTH OF FORESTS IN SWAZILAND
Presence of adequate moderate rain fall that favours quick growth of trees in the forests
Presence of relatively infertile soil that limit agriculture but favour forestry as an alternative land use.
Presence of a high altitude that favours the growth of soft wood highland tree species lie pines.
Presence of hot sub-tropical temperatures that favour quick growth of trees.
Availability of cheap skilled labour involved in tree planting and forest manager.
Availability of a supportive government policy in the fight against desertification which financed and encouraged afforestation in Swaziland.
Presence of vast land on which large plantation forests were established.
Availability of large sums of capital from the government of Swaziland which was invested in tree planting and management of forests.

Chapter 24: Irrigation farming in Africa
Irrigation refers to the process where water is applied artificially to growing crops.
The greatest need and the great developments in the field of irrigation are found in the tropical semi desert regions of Africa. In these areas the amount of rail keeps on reducing year by year which necessitate irrigation farming.

METHOD OF IRRIGATION
Overhead sprinkle irrigation. Under this method water is channel through a pipe and the pipe is realized above the crops .Water is pumped and left to sprinkle in form of rain by use of high pressure.
Drip method. This involves setting up pipes or bottles with holes and water drops out drop by drop.
Channel method/follow irrigation. This in values construction of water channels to supply growing crops with water and it is mostly done in gently sloping area.
Torrential irrigation. Under this, water is supplied to the cultivate land through the area .It is commonly used in semi – aid areas.
Bavin irrigation. This depends on the annual flowing of the river. During the roping season water is trapped in ditches and then harvested during dry seasons and supplied to crops.

N.B: In channel irrigation formers construct target dams to create a water reserve which can supply water to cultivated water throughout the year e.g. the Aswan high dam, Senna dam etc

THE GEZIRA/IRRIGATION SCHEME IN SUDAN.

Irrigated areas along the White and Blue Niles produce the bulk of the country's commercial crops. These areas are centred on the Gezira Scheme with its Mangil extension—between the Blue and White Niles south of Khartoum.

The main cash crop on irrigation scheme is cotton. Other includes millet, maize, beans, Guinea corn, which is grown to feed livestock.

OBJECTIVES OF THE SCHEME

To open up more land for settlement and farming.

To modernize the economy from pastoralism to a modern economy.

To diversity the agriculture sector.

To control flooding of the Blue Nile.

To diversify the economy so as not to relay on cattle rearing alone but also growing crop like cotton, beans and millet.

ORGANISATION OF THE SCHEME.

The scheme was organized at 3 level involving parttenship.co-operation and control.

The Sudan government provided the land and it was responsible for its construction.

The ten dents had to work on the land.

The Sudan Gezira board has to sell the crops, process them, provide fertilizers, and provide advice to farmers.

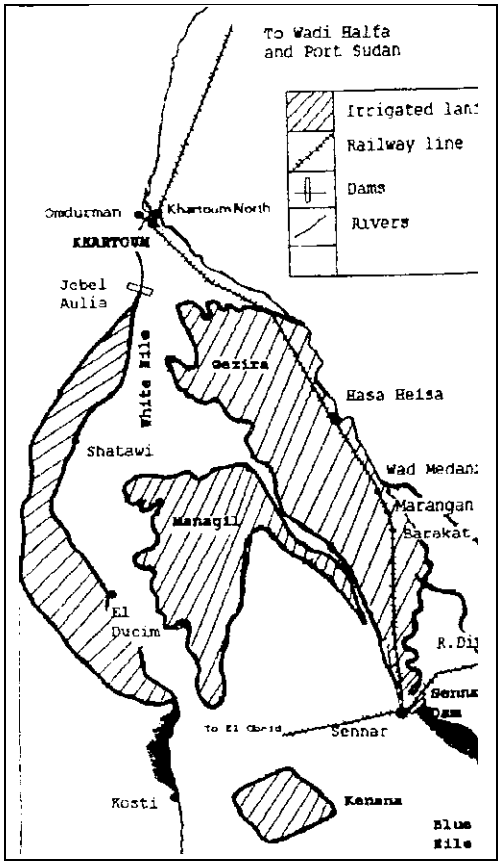
There was sharing of income and profits.

FACTORS THAT FAVOURED THE ESTABILISHMENT OF THE SCHEME

- Presence of gently sloping relief which allow flow of water by gravity and mechanization
- Presence of the Blue Nile which provides a constant supply of water for irrigation
- Presence of a low incidence of pests and diseases due to dry, this allows quick growth of the crops
- Hot temperatures that enable quick ripening and harvesting of crops
- Presence of fertile alluvial soils which favours the growth of crops
- Presence of extensive land for the establishment of the Gezira scheme and managil extension
- Presence of the dry savanna vegetation which was easy to clear to establish the scheme
- availability of abundant skilled labour to plant, weed and harvest crops
- Availability of adequate capital to purchase farm equipment e.g. tractors
- Availability of large/ready market for the crops grown both locally and abroad
- Availability of improved technology used in clearing land, digging canals and harvesting

- The relative political stability that enabled large scale investment in the Gezira scheme

MAP SHOWING EXTENT OF THE GEZIRA SCHEME



BENEFITS OF THE GEZIRA IRRIGATION SCHEME TO THE ECONOMY OF SUDAN

Growth of agro-based industries such as textiles, gineries

Created employment opportunities and generates income to people either directly or indirectly.

Provides land for the land less people and these have used the land for cotton growing on the scheme.

Gezira scheme is used for constant supply of clean water for both irrigation and domestic use.

Modern farming system has been introduced and farmers are using them to ensure food security.

The dam contracted enable fishing activities to take place in manmade lake of semis.

Gezira has promoted industrialization because of cotton growing as a raw material for textile industry.

The economy of Sudan earns foreign exchange as a result of exportation of cotton.

A number of unproductive areas have been made productive as a result of irrigation.

Farmers have learnt and adopted scientific methods of irrigation.

Infrastructural development e.g. there has been construction of the railway, public toilets hence development of transport and other social services.
The Gezira scheme introduced fruit gardening where oranges and mangoes are growing currently there are over 270 fruit gardens.
Women have received adult education in for example home economics which was introduced by the scheme.
Many forests of eucalyptus have been planted and this provides wood fuel.
There are many spurting and leisure activities that improve people standards of living.

PROBLEM FACED BY THE GEZIRA SCHEME

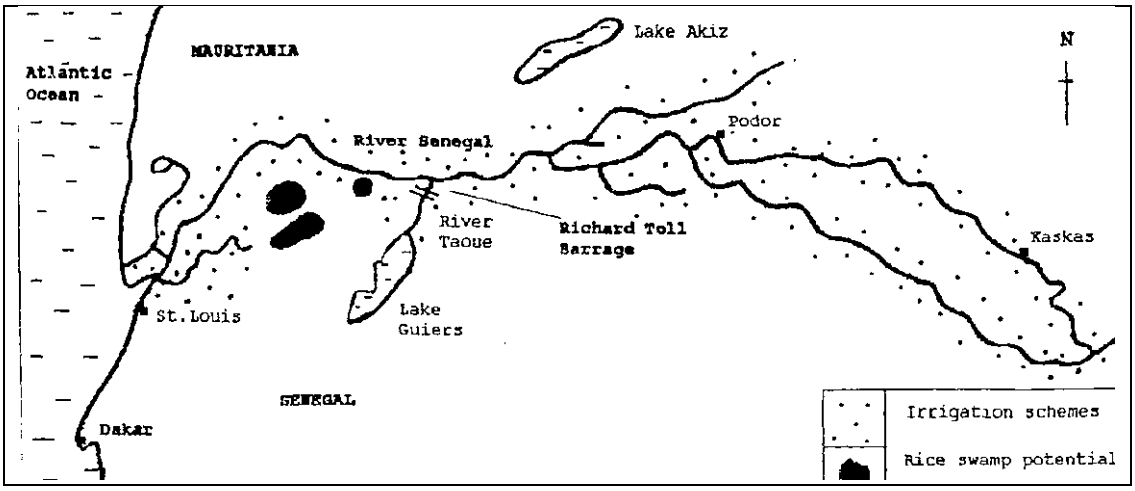
- Outbreak of pests and disease for example cotton ball warm.
- Growth of weeds for example rhizomes which compete with crops for soil nutrients
- Shortage of labour especially during the harvesting period which cause great losses
- Competition from synthetic fibers which reduce the size of production
- Salination of soils due to high rate of evaporation reducing productivity
- Price fluctuation on the world market which causes seasonal losses when price reduce
- Flooding and water logging which have caused severe damage for the crops.

SOLUTION TO THE PROBLEMS ABOVE

- Mixed farming, rotational bush fallowing and to improve soil fertility
- Use of fertilizers to improve soil fertility.
- Monoculture is being solved by growing other crops sorghum.
- Canals have been constructed to draw excess water from land in order to reduce flooding and water logging.
- Dredging the floor of dams to solve the problem of deposited silt to control silting of water channels
- Spraying with pesticides and herbicides in order to reduce effects of pests and disease

RICHARD TOLL SCHEME IN SENEGAL

This is found on river Senegal between the confluences of River Taoue. Before the scheme was put into operation, water would rush up River Taoue to fill Lake Guier when the River Senegal experienced its annual floods.



AIMS AND OBJECTS FOR ESTABLISHMENT OF RECHARD TOLL PROJECT

To control flooding of river Senegal into River Taoue.
To improve on agriculture of rice through irrigation farming.
To provide employment opportunities to people through improving agriculture.
To improve on people's standards of living through improving on their settlement areas.
To reduce salinity, desert conditions and use of fertile soils hence improving on agriculture.

Chapter 25: **Mineral Resources and Mining In Africa**

Mining is the extraction of minerals from underground. Africa is rich in minerals and it is known for both a variety of minerals and qualitative high grade minerals. However, mineral exploitation is not yet commercially carried out in most the African countries.
Examples of minerals mined in Africa

Examples of minerals	**Countries**
Copper	Zambia, D.R.C
Iron ore	Liberia, South Africa, Botswana, Ghana, Swaziland and Namibia
Gold	South Africa, Ghana, D.R.C
Diamonds	South Africa, Namibia, Ghana and Tanzania.
Tin	Nigeria, D.R.C
Oil	Libya, Algeria, Egypt, Nigeria, Angola.
Phosphate	Egypt, Morocco, Cameroon

Although the minerals in Africa are widely spread and existing in a large quantity with a high quality, they are not fully exploited due to a number of limitations and they include.

Low levels of technology.
Political instability
Limited skilled labour.
Unfavourable climate such as very heavy rainfall
Limited capital to invest in the mining sector.
Methods of mining
Open cast mining
This method of mining is used to extract minerals that occur near the earth's surface. The overlying rocks are removed to expose the mineral. Excavators break down the mineral ore, wghich is the loaded onto lorries that take it to the processing plant.
Advantages of open cast mining

- It is cheap
- It is faster because the mineral is near the surface
- It is used to mine low-grade minerals over a wide area
- Larger machinery can be used because of a wide space

Disadvantages

- Natural vegetation is destroyed exposing the soil
- Pits are created and water collects in them encouraging breeding of mosquitoes which spread malaria
- Heaps of waste are created

Underground mining
Underground mining is used to extract ore from deep into the earth's crust

Chapter 26: Industrial development in Africa

Chapter 27: Mining and industrial development in China

Chapter 28: Population and Urbanization in Africa

Africa has experienced a rapid growth of towns and ports in the recent years.
Urbanization refers to as situation involving an increasing population that comes to the concentration of towns and ports in a given area.
But there has been a rapid growth of town population during the last 20 years.

FACTORS LEADING TO GROWTH OF TOWNS IN AN AREA
Strategic factors (strategic reasons) leading to the growth of the towns like Cape town, Free town, which occupy strategic position commanding ocean trade routes and they have grown as important security places.
Industrialization leads to growth of towns because of establishment of industries tend to attract large number of population, modern infrastructures for example Tema, Accra, Khartoum and others.
Administrative factors where some sites have been chosen by the nations as suitable places from which to govern countries for example Khartoum, Lagos and Addis Ababa.

Development of transport and trade routes more so at their meeting points where these settlements tend to develop to handle trade, accommodation and recreation for example Khartoum, where the White Nile meets, Bulawayo at the junction of major rounds.
Existence of mineral resources which attract a large population because many people work in the mining centres leading to the development of Urban centres.

TYPES OF TOWNS

Commercial towns: These provide mainly commercial services for example sea ports, lake ports and towns.
Industrial towns: This is where the manufacturing is mostly done for example Red cliff.
Agricultural owns: These are towns that grow as a result of agricultural development more so around plantation.
Administrative towns: These are towns used for the major function of administration, therefore most of the capital cities are regarded as administrative towns.
Mining towns: These are towns that grown as a result of influence of mining activities for example in the copper belt of Zambia.
Cultural towns: These are towns that grow as a result of cultural attachments for example Khartoum in Sudan, Cairo in Egypt.

IMPORTANCE OF URBANISATION

Urbanization facilitates rapid growth of industries because it provides cheap labour and ready market.
Urbanization facilitates establishment of important infrastructures like roads.
Urbanization facilitates exploitation of resources for example minerals.

DISADVANTAGES OF URBANISATION

Urban centers in Africa are prone to the outbreak of adverse effects such as Pollution, High crime rates, Unemployment, Rural urban migration, Difficulty and strains in sustaining social services like hospitals, Increase government expenditure. These in all require a daily concern from all stake holders and in many towns of Africa, these problems have made the government unpopular.

MAJOR URBAN CENTRES IN AFRICA.

LAGOS IN NIGERIA

The development of Lagos probably is the best example of major towns and ports in Africa.
Lagos used to be the largest and the capital city of Nigeria, but now Abuja is the capital city, Lagos represents how historical, physical, geographical and economic development has contributed to the growth of major cities and ports in West African states.

SKETCHMAP SHOWING LOCATION OF LAGOS TOWN

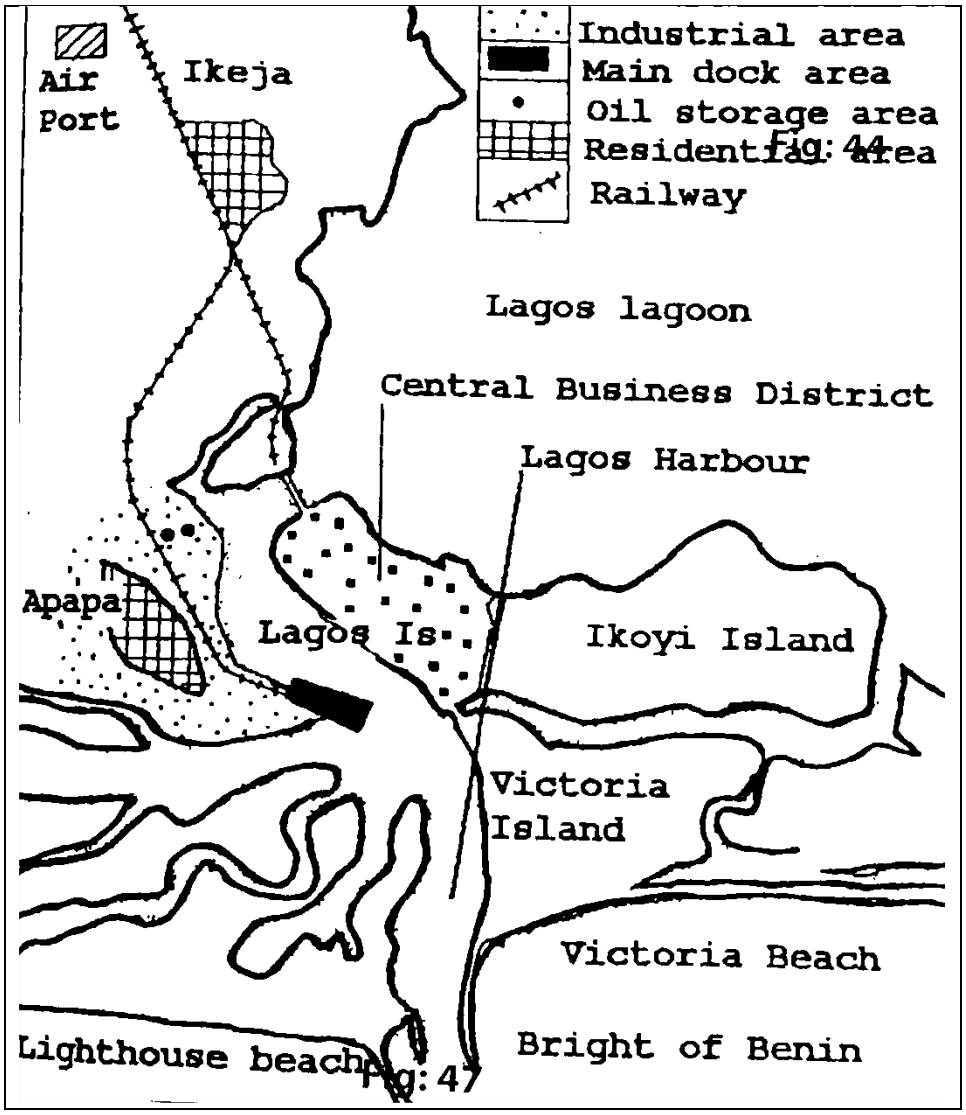


Fig: 44

Fig: 47

FACTORS RESPONSIBLE FOR LAGOS DEVELOPMENT

Lagos was extensively used by slave traders in West Africa.

Its defensive site facilitates its development.

Lagos is found in on area which is densely populated and this has facilitates he rapid growth.

Lagos is an entry port of Nigeria and this mode her attract the greatest concentration of industries with nearer of 600 factories. It handles both imports and exports for Nigeria.

Presence of well sheltered habours.

Easy access to the hinter land.

Ice free conditions hence used all the year around.

Lagos is linked to all major towns in Nigeria and other West African countries as to say air sources, railways and roads. This gave her additional advantage to develop.

The prisoner of Islands of Lagos and Apapa main land for loading and offloading goods.
Low tide ranges.
Lagos attracted British traders to carry out traders and by 1989, there were over 200 British residents contributing to development of Lagos.

FUNCTIONS OF LAGOS TOWN

Lagos is an industrial center with textile industries, printing, plastics, motor vehicles industries etc.
Lagos is the presidential town housing thousands of people working indifferent sectors.
It is a focal point with communication lines linking to the rest of the country with major, air, road and railways routes.
It is on administrative center with many offices leading with public administration.
Lagos is a financial center with many banks, insurance companies, forex bureau and micro finances.
Lagos is a cultural centres with many education institutions for example Art galleries entertainment centres and religions.
Lagos facilitates and it handles over 60% of Nigeria's imports and exports.

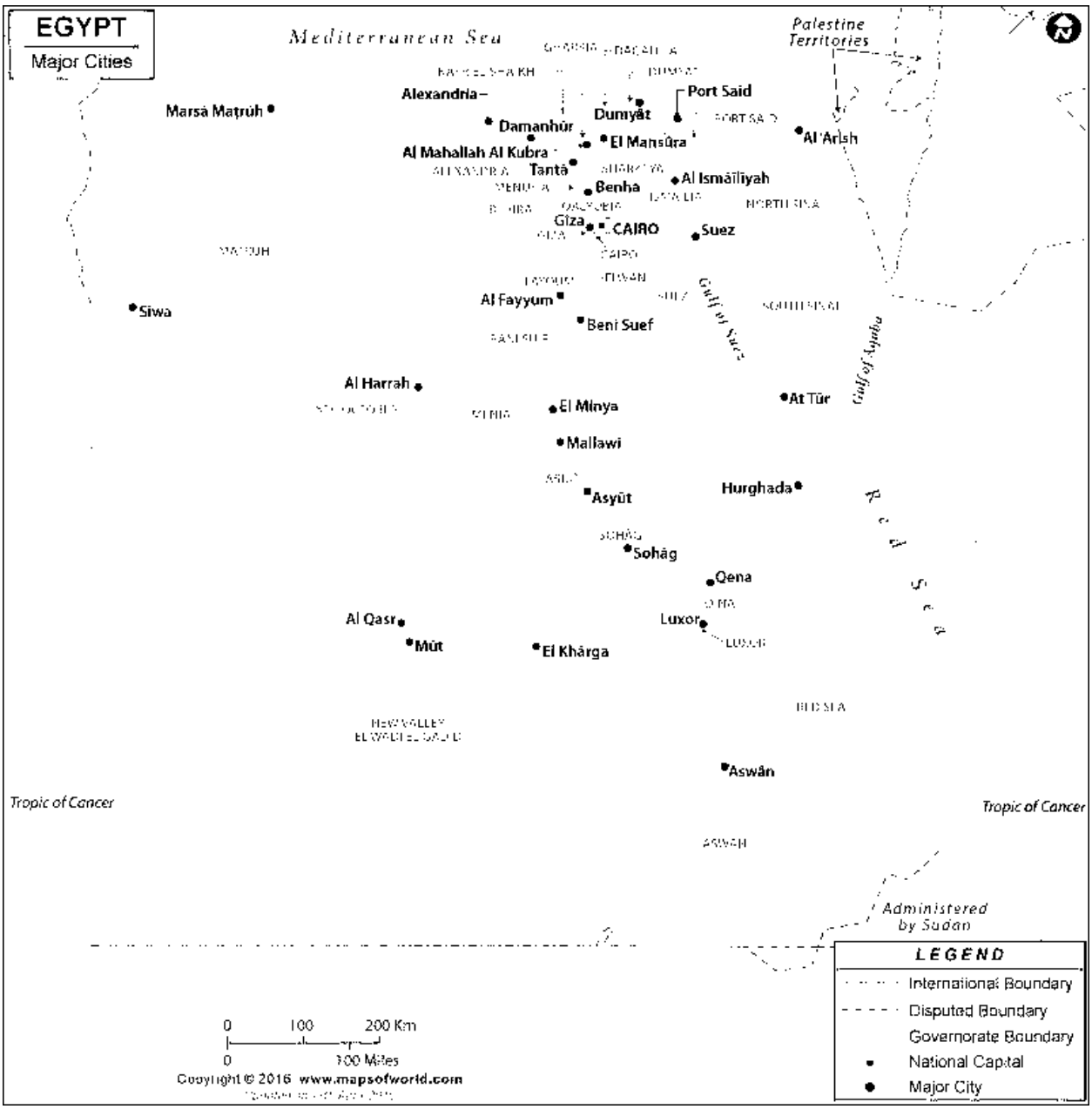
EXPORTS HANDLED BY LAGOS

60% of Nigeria's exports include, groundnuts, cotton, hides and skins and palm oil.
Imports include car, electrical machinery, Lorries, construction equipment, tyres, fuels, oils, salts and sugar.
Overcrowding, Pollution of the surrounding environment, Congestion at the ports and increasing fraud are some of the difficulties faced in Lagos, just like any other African city.

CAIRO

Cairo is the largest city in Africa with a population of more than 10 million people. Cairo was built in 1969 AD at the Roman fortress and earlier great settlement.
The city spread along the Makaton Hills on the right bank of Nile River.
In the middle ages, it was the center of the Moslem culture and in 1903, it became the capital city of Egypt.

A SKETCH MAP SHOWING LOCATION OF CAIRO CITY



FACTORS OF THE DEVELOPMENT OF CAIRO

Cairo developed as a result of construction of dams, bridges, and canals that enabled the expansion of the rural to urban area especially in the lower Nile.

The establishment of modern irrigation scheme in the delta region especially at the start of the 19th Century.

Cairo was strategically located as the focal point of the Nile and the over land routes.

Availability of constant supply of large volumes for fresh water from the Nile River used for domestic purpose.

Availability of s dense population in Egypt providing a large market hence developing into commercial area.

Availability of constant supply of large volumes of fresh water from the Nile River used for domestic purpose.
Existing of gently sloping relief which made the establishment of settlement easy.
Strategic location infertile areas where food is easily produced to feed the growing urban population.

PROBLEMS FACED BY CAIRO

Over population due to rural urban migration.
Rampant open urban unemployment.
Population and contamination of the Nile.
High crime rates.
Traffic congestion.
Limited land liming expansion.

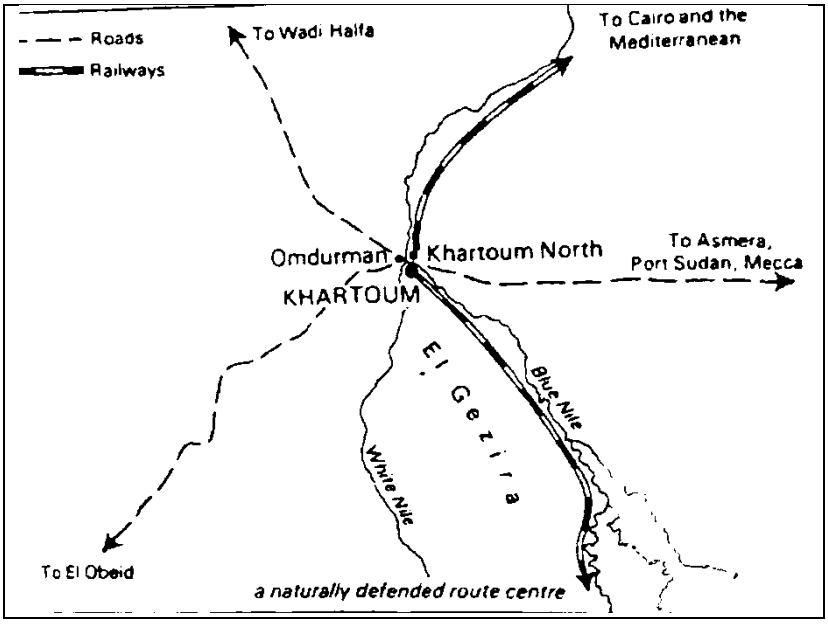
CONDITIONS FOR LOCATION OF IS INDUSTRIE IN CAIRO

Presence of plenty of fresh water from river Nile for cooling machines and also work as an ingredient.
Availability of a constant labour supply from the large population of Cairo that works in the industries.
Availability of a large ready market that buys the manufactured products produced in Cairo.
This result from a large population in the city.
Presence of vast land in Cairo for industrial establishment.
Availability of favourable government policy to words industrialization in Cairo for example offering land to industrial investors.
Presence of a constant power supply especially hydroelectric power from Aswan high dam.
Availability of constant supply of raw materials to industries in Cairo for example minerals.
Availability of a stable political climate in Cairo since tutorial time.

KHARTOUM

Khartoum lies at the confluence of white and Blue Nile. It is the capital city of Sudan.

A SKETCH MAP SHOWING LOCATION OF KHARTOUM



Reasons for the site of Khartoum.

The place is easy to defend due to the natural barriers made by the blue and white Nile.
Availability of large volumes of fresh water from the blue and white Nile since Sudan is a desert area.
Presence of gently sloping relief which made settlement of the area easy.
Presence of River Nile used as transport routes.
It was easy to construct transport and communication lines due to the relatively flat relief of the area.
Presence of fertile alluvial soils deposited by the Blue Nile and White Nile making cultivation similar in the area this attracted a large area leading to establishment of Khartoum.
Strategic location in the heart of Sudan which helped to connect the northern and southern people.

FUNCTIONS OF KHARTOUM

Being the capital city, Khartoum is an administrative center with most of the government offices and headquarters of ministries.
Khartoum is c communication center radiating from it to other places.
Khartoum is residential city housing millions of people especially those who work in industries and other settlement of Agriculture.
Khartoum is a commercial, center she has a big population density providing market for merchandize, livestock agriculture and other products.

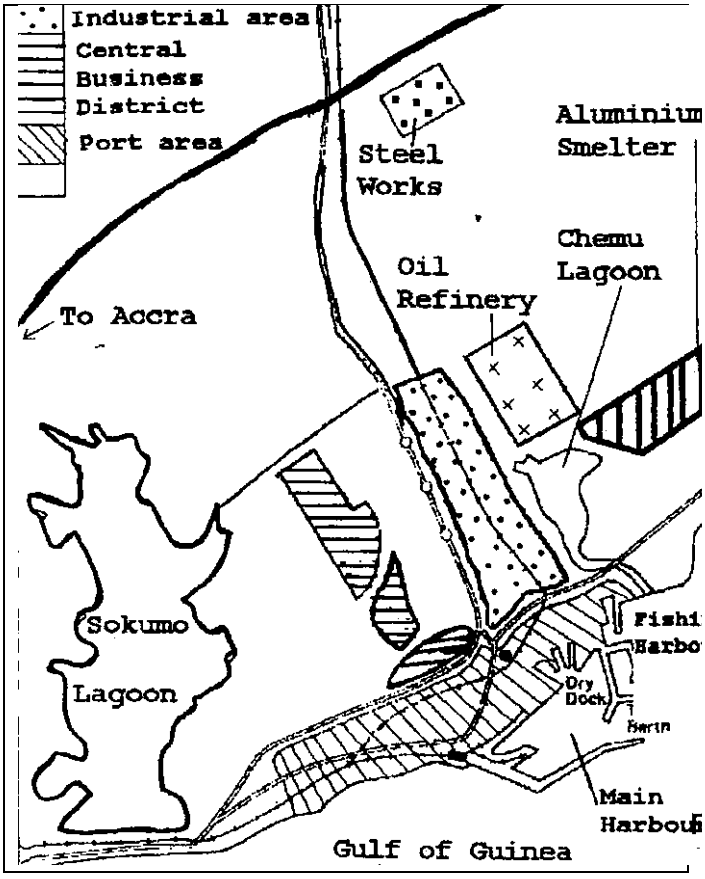
Khartoum is an industrial center producing textile class, wear, grain milling and other products.

PROBLEMS FACED IN KHARTOUM

Congestion resulting into overcrowding.
Environmental position.
Pollution to environment near the port.
Outbreak of diseases resulting from poor circulation.
Shortage of housing facilities leading to slums.
Limited land limiting expansion of the city.
Political armrest and insecurity resulting from internal wars.
Unemployment both voluntary and involuntary.
Traffic congestion.

TEMA PORT IN GHANA

Tema port is 30km East of Accra in Ghana. Tema port has rapidly developed and has reduced pressure which is being put on major ports for example Accra and Takoradi.



FACTORS CONSIDERD IN THE DEVELOPMENT OF TEMA

Presence of seep shore waters allowing large water vessels to anchor.

Presence of a well sheltered harbor protecting the port facility from strong winds.
Presence of low tidal ranges.
Presence of hard basement rocks providing a foundation for establishment of the sky scrappers.
The relief town Tema, which makes construction of the port easy.
Presence of a rich hinterland.
Discovery of a aluminum which necessitated the establishment of smelting plants contributed to her development.
Availability of some transport routes by roads and railways connecting Tema.
Closeness to the Volta project where H.E.P is generated.
Supportive government policies towards development of Tema to handle exports.
Availability of large sums of capital provided by the government of Ghana.
Tema developed because of being an initial collecting centre for gold and slave traders.

Chapter 29: Population and urbanization in China

Chapter 30: Development of transport, communication and trade in Africa

Chapter 31: trade between Europe and Africa; Asia and Africa