

A DRAFT COPY

FOR GEOGRAPHY BOOK 3

SUPPLEMENTRY NOTES

TABLE OF CONTENTS

Chapter 18. Trade within and outside east Africa.

Chapter 19. Further skills in map reading and map use

Chapter 20. Location and size of Africa

Chapter 21. The relief regions and drainage of Africa

Chapter 22.the climate and vegetation of Africa

Chapter 23. Forests, forest resources and forestry in Africa

Chapter 24. Irrigation farming in Africa.

TRADE WITHIN AND OUTSIDE EAST AFRICA.

Trade is defined as the buying and selling of goods.

Trade refers to exchange of goods and services. Internal or domestic trade is done within a country, external or foreign trade is done between different countries.

Types of traders

- *Retail traders,*
- *wholesalers,*
- *importers,*
- *multinational companies,*
- *exporters,*
- *Hawkers*
- *Visible and invisible trade.*

Activity 18.1

- a) Using ICT or Library resource, identify and explain the advantages and disadvantages of visible and invisible trade.*
- b) In pairs, carry out a textbook or internet research on terms used in trade and do the following tasks that follow.*

What do you understand by the following terms?

- a) Terms of trade*
- b) Balance of trade*
- c) Balance of payment*
- d) Favorable and unfavorable balance of payment*
- e) Favorable and unfavorable balance of trade.*

A. what benefits is a country likely to get when it exports more goods than it imports

B. Discuss the dangers a country is likely to face when it imports more goods and services than it exports.

Characteristics of trade within East Africa

- ❖ There has always been a considerable amount of trade between the East African countries.
- ❖ They have supplied each other with goods, which they cannot themselves produce.
- ❖ Until recently, Kenya was the largest supplier since it had developed many industries in Nairobi, Nakuru and Mombasa.
- ❖ Kenya supplied Uganda and Tanzania a lot of manufactured goods and chemicals.
- ❖ In return, she imported food especially maize and Tobacco from Uganda and food, oils and manufactured goods from Tanzania.
- ❖ Kenya also imports electricity from the Nalubale power station formerly Owen falls dam power station but this is likely to decrease once Kenya expands her own power station at Seven forks dam on river Tana.
- ❖ The quantity of goods Kenya imports from Uganda and Tanzania are less than what it exports to the two countries.
- ❖ This has forced Uganda and Tanzania to put in place tariff barriers on many imported goods from Kenya, so that their own young industries can develop.
- ❖ Today these countries can export manufactured goods to Kenya as well.

The main export commodities of the East African countries

KENYA:

The main export Commodities from Kenya are coffee, tea, pyrethrum, maize, hides and skins ,wattle, soda ash, sisal, cement, vegetables, cotton and fuel. Most of the agricultural produce of the country are exported. The fuels exported are the refined petroleum products like petrol, diesel, paraffin which are re-exported from the refinery at Mombasa.

TANZANIA:

Tanzania's exports include: Coffee, cotton, diamond, sisal, cloves, Cashew nuts, Tea, Tobacco, Pyrethrum, Copper, hides and skins, meat and fuel from the refinery at Dares-salaam.

UGANDA:

Uganda's exports include: coffee, Cotton, Cobalt, Gold, Tobacco, Sugar, Hides and skins, vegetables and animal feeds. **N.B:**

Agricultural produce constitutes a big percentage of total exports while manufactured goods, machinery, fuels, chemicals, crude materials like oil for processing constitute the biggest percentage of the imports into the region.

Such a trend implies a low level of industrialization and agricultural dependence.

Characteristics of trade in LDCs (case study Uganda) Structure of

Uganda's exports.

- Wood products like timber, plywood, wood pulp.
- Fish products like fish fillet, frozen fish, fresh fish.
- Agriculture products like coffee, vanilla, tea, coca, tobacco.
- Livestock products like hides, skins, goats, and sheep.
- Industrial products like textile products, iron and steel, cement.
- Alcoholic drinks like Uganda Waragi, Bell, and Nile.
- Art and craft materials.
- Services through tourism, immigrants to other countries.

Characteristics of Uganda's exports

- Mainly from the primary sector
- Mainly Agricultural products
- Few and limited
- Poor quality and not processed
- They earn low income

Structure of Uganda's imports

- Textile products
- Ammunition (guns, grenade, tear gas)

- Vehicles from Japan, Auto parts or spare parts, electronics (China), alcoholic drinks like spirits, wine
- Cosmetics (perfumes, lotions)
- Stationary and printing materials like books.
- Iron and steel
- Computers and their accessories
- Leather products (bags, shoes, belts)

Characteristics of Uganda's imports

They are many i.e. more than exports

Mainly manufactured or processed from the secondary sector

- High value
- Take a lot of foreign exchange

Factors for development of trade

Task

a) Using ICT or library resources, identify and explain the factors that led to the development of trade in east Africa.

There are physical and human factors influencing the development of trade;

- Improved transport and communication like the construction of roads, railway lines, water ports, Airports, telephone services.
- Adequate capital provided by the government, private investors for financing trading activities.
- Good international relations, Regional Corporation leading to development of import and export trade e.g. the E. African community, African Union, PTA, COMESA.
- Positive and supportive government policies such as reduced taxes, attracting investors, giving loans, gazetting land.
- Political stability and security leading to a favorable investment climate and diverting resources to trading activities.
- High population density helping in providing cheap labor and market e.g. in urban areas.
- Good management helping in planning, organization for the development of trade.

- Wide market both internal and external because of people and high incomes i.e. employed people.
- Presence of natural resources leading to economic activities and providing items for trade like forest for timber, water bodies for fish, mineral, strategic location like border towns, water ports, Airports.
- Comparative and absolute advantages leading to specialization at low costs.
- Presence of entrepreneurs helping in planning, providing capital, good management e.g. Mehta, Mukwano, Madhvan, Wavamunno, Katatumba
- It depends on personality helping in marketing and hospitality.

N.B: these countries are trying their best to develop both visible trade and invisible trade.

☒ Visible trade is the trade in imports and exports of tangible products like agricultural and manufactured goods.

☒ Invisible trade refers to the trade in services such as tourism, health, labour and education.

Benefits of trade in East Africa

In pairs, carry out a textbook or internet research and do the tasks.

1. *What is the percentage of foreign exchanges that east Africa earn from?*

- a) *Agricultural products*
- b) *Manufactured goods*
- c) *Tourism*

2. *How has east Africa benefited from international trade?*

- Trade has stimulated the growth of industries which lead to economic diversification.
- It leads to development of transport facilities, financial institutions like banks and insurance companies which lead to urbanization.
- Agriculture has been largely modernized which has ensured increased supply of food.
- Trade has led to regional co-operation which has boosted peace in the region.
- Government earns revenue through taxes and tariffs across borders which it uses for national development.
- Trade has encouraged full resource utilization which has ensured constant capital inflow.

- Ideas have been exchanged through trade relationships which has boosted national development.
- Government is able to earn foreign exchange through export trade which is used for developing infrastructures e.g. roads.
- It has encouraged exploitation of natural resources even in remote areas which also leads to regional balance.
- Through international trade, East Africa is able to acquire commodities that it doesn't produce e.g. drugs, cars and computers.
- Expatriates are hired from developed who trained local people hence leading to skill acquisition by the locals.
- Employment opportunities have been created through trade leading to improved standards of living.

Factors that encourage inter-state trade/international trade in East Africa

- Differences in natural endowments especially raw materials e.g. Uganda has more agricultural raw materials but less high value minerals.
- Specialization also leads to inter-state trade e.g. Uganda has specialized in agricultural exports while Kenya produces more manufactured goods.
- Differences in levels of development e.g. Kenya has a highly developed industrial sector than Uganda and Tanzania.
- Presence of developed means of transport e.g. roads and railways which help to promote cross-border trade.
- Outbreak of political unrest in one country reduces her level of production hence leading to international trade e.g. Uganda.
- Formation of the East African Community which encourages peaceful trade relationships among the member countries.
- Outbreak of natural disasters in one country can also lead to international trade to get essential goods like basins, mattresses and blankets e.g. Bududa landslides.
- Differences in climate also lead to inter-state to get food e.g. Uganda provides a lot of maize to Kenya.

- The need to earn government revenue through customs duty and trade licenses also leads to inter-state trade.
- The need to dispose of surplus produce also leads to inter-state trade in a bid to create market for the produced items.

Problems affecting the development of trade

Activity 18.10. Understanding problems affecting trade in east Africa.

In groups, carry out a textbook or internet research on the problems affecting trade in east Africa.

- 1. What are the problems affecting the development of trade within east Africa.*
- 2. Suggest ways through which problems affecting trade in east Africa can be overcome.*
 - Marketing problems because of price fluctuations affecting planning.
 - Political instability and insecurity diversion of resources to defense destroying property.
 - Competition between different traders leading to low prices.
 - Inadequate capital leading to small scale business enterprises like hawkers.
 - Underdeveloped transport and communication in rural and remote areas.
 - Unfavorable government policies like high taxes, not giving loans.
 - Poor economic integration affecting joint investment causing competition.
 - Conflicts and tensions of traders because of mismanagement.
 - Presence of physical obstacles / barriers like water bodies, drainage features, forests.
 - Corruption and embezzlement leading to poor services, mismanagement and diversion of public fund.
 - Poor storage facilities causing wastage like food crops, perishable products.
 - Profit repatriation by foreign investors causing capital outflow.
 - Limited resources leading to limited economic activities.
 - Poor marketing and advertisement by using the local media.
 - Low levels of education leading to limited skilled labour and causing poor planning and management.
 - Dumping of foreign goods affecting local infant industries.

- Hostile tribes and backward cultures scaring investors.
- Limited market because of low incomes, sparse population.

Solution to problems of trade in low developed countries or steps / measure and policies.

- Acquisition of loans from financial institutions and development agencies for expanding businesses.
- Gazetting areas for markets, shopping centres, privatization and economic liberalization attracting foreign investors.
- Diversification of trading activities reducing on dependency burden.
- Opening more areas for more trade opportunities.
- Government support by giving loans attracting investors, gazetting areas, tax holiday.
- Fighting corruption using government agencies, procurement companies, commissions of inquiry.

Steps taken to encourage export trade and reduce import trade

- The three countries are building manufacturing industries (export promotion industries) to enable them stop importing manufactured goods.
- Heavy duties (taxes) are levied on imported manufactured goods to discourage their demand on the local market as well as protect the local infant industries.
- Foreign investors are attracted to set up big industries in the region by giving them tax holidays.
- Tax holidays are also given to infant industries to enable them to start producing goods locally.
- Formation of regional blocks e.g. East African Community (E.A.C) to encourage cross-border trade without many restrictions.
- Carrying out extensive market research to diversify the markets and create more demand abroad for locally made items.
- Increased advertisements through international media to create awareness about East Africa's products which increases demand.
- Ensuring political stability which has attracted more foreign investors to set up industries in East Africa.
- Encouraging economic diversification by government to reduce dependence on agriculture and encourage industrial development.

THE DEVELOPMENT OF IMPORT SUBSTITUTION INDUSTRIES IN EAST AFRICA.

Individually carry out a test book or internet research, on import substitution industries and do the following tasks.

- 1. What do you understand by import substitution industries?*
- 2. Why should east Africa develop import substitution industries?*
- 3. What are the problems hindering the development of import substitution industries in east Africa.*

THE TRADE AGREEMENTS.

Tasks

- 1. Why is it easier for countries to sign trade agreements with groups of countries that have joined together?*
- 2. What are the likely challenges faced by countries which trade with each other without signing trade agreements into a block.*

Chapter 19.

FURTHER SKILLS IN MAP READING AND MAP USE.

Meaning of contour

Contour are imaginary lines which cannot be seen on the earth's surface with a human eye. Contours are numbered depending on the vertical interval of a particular map. Contours are numbered in an increasing order.

Nature of the slope	Shape of contour.
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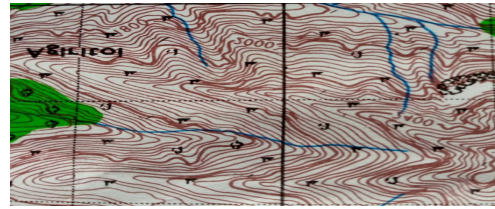
Gentle slope

Contours are relatively far away from each other.

3500 3400 3300

**Steep slopes**

Contours are packed or are close to each other.



3400 3400 3400

**Flat areas**

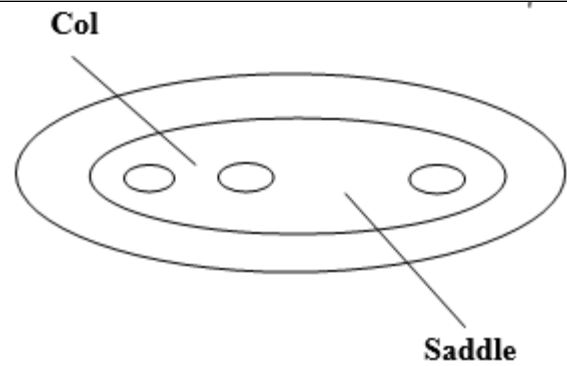
Contours are far from each other

**Conical hill.**

Contour are in a circular shape.

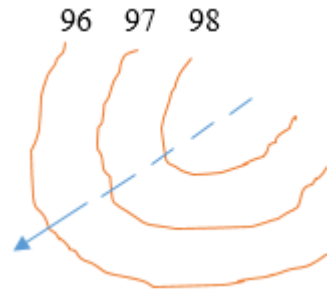
Saddle and col.

These are depressions found between two hills, a narrow depression is a col and wide depression is a saddle



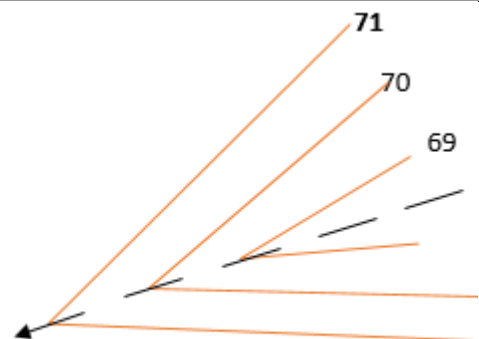
U shape valley.

Contours are in u shape.



V shaped valley.

Contour are in v shape valley.



Describing an area from a survey map.

Activity 19.2 discovering feature found in an area shown on a map.

In groups, study an area around your school and do the following tasks.

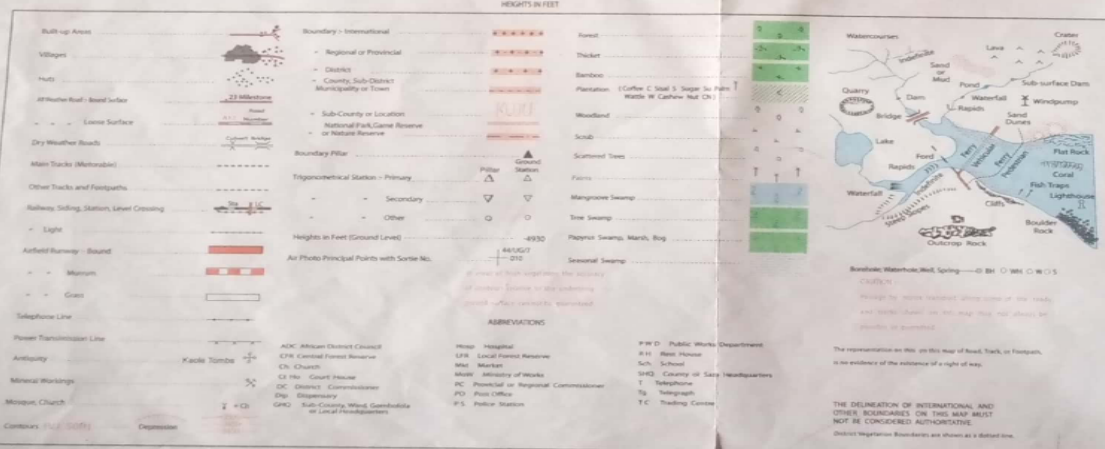
- 1. Find out the physical features found in the area*
- 2. Draw a sketch map of the area around your school and on it mark and name the physical features you have observed in 1 above.*

Activity 19.3 identifying features on the survey map.

In groups, study the map of Bulisa in figure 19.1 and the do tasks that follow.



SCALE 1:50,000



1. Identify the following features shown on the map in figures 19.1

- a) Relief features
- b) Drainage features
- c) Vegetation types
- d) Transport routes
- e) Types of settlement.

2. Giving evidence from the map in fig.19.1

- a) Identify the economic activities carried out by the people of bulisa
- b) Identify the problems faced by people living in the area shown on the map
- c) Giving evidence from the survey map, why do you think people living in this area are experiencing these problems
- d) As ageography a student, what kind of advice can you give to these people to overcome the problems

ii) Identify the prospects for development of the area need to develop it

Identifying and describing economic activities on a map extract

Economic activity is the making, providing, purchasing or selling goods or services. An economic activity should be bigger and income generating. The economic activities/land use types. Human activities are identified according to the existing features that act as evidence on a map extract

Crop growing/crop cultivation	Plantations/estates /crop store/crop/market crop factory for example ginnery / sugar factory/ tea factory/ hullery for coffee
Animal rearing/livestock farming	Animal farm/Ranch/agricultural department/ animal market/abattoir/Bore holes/ water holes/water tanks/water reservoirs/valley dams, cattle dips/veterinary offices/kraal etc.
Transport	All roads railways/ ferry routes across lakes/landing sites/

	air runways/ airfields/telephone line/communication masts etc.
Lumbering	Saw mill/timber factory/carpentry workshop/transport route ending in forest or at forest, lumbering pit etc. <i>N.B: Forest alone does not indicate Lumbering</i>
Forestry	Forest reserve(F.R) forest department/forest plantation/forest guard posts/ tree stations/ named forest etc.
Fishing	fish landing site/ fishing village/ piers/jetties/ fish traps/ fish ponds
Tourism	Rest house (R.H)/National parks/ Game reserves/forest reserves/ museums / monuments/ antiquity/ hotels /camping sites/game departments.
Trade and commerce	Trading Centre/ market/transport junction/transport station towns/linear settlement along transport route etc.
Mining	Quarry/mine/rock outcrops)/ mineral factory/mineral deposit, mineral pit etc.
Industrialization/processing	Factory/saw mills/ ginnery
Urbanization	Towns/cities/ports/hotels etc.
Hunting	Hunting area/hunting tools/hunting posts, Ranger post etc.
Art and craft	Papyrus swamp
Settlement (land use)	Built up areas/villages/huts/rest houses/hotels/lodges etc.
Power generation/production	Power station/power dam/power transmission line etc.
Recreation	Recreational centres and posts
Wild life conservation	Gazetted area/forest reserve/game reserve/national parks/zoos/sanctuary/conservation areas.

Relationship between different features on survey map.

Activity 19.5 describe relationship between different features on the survey maps.

In groups, study the map extract of bulisa in fig 19.1 and do the following tasks

1 describe the relationship between:

- a) Relief and drainage*
- b) Relief and settlement*
- c) Drainage and vegetation*
- d) Drainage and settlement*
- e) Transport and trade*
- f) Relief and vegetation*
- g) Relief and transport*
- h) Drainage and transport*
- i) Settlement and transport.*

j) Relief and drainage

- ❖ Rivers like ... flow from highlands/uplands to lowlands
- ❖ Lakes occupy basins, depressions/ and craters for example...
- ❖ Rivers like...flow through narrow valleys.
- ❖ Swamps occupy broad valleys, lowlands/craters for example.
- ❖ Gently sloping areas at... are well drained
- ❖ Low lying areas for example... Are poorly drained.
- ❖ Steep slopes, uplands, ridges at...are well drained
- ❖ Rivers have relatively straight courses in highland areas for example...
- ❖ River.... meanders in lowlands.
- ❖ Rivers form radial pattern on steep slopes/highland/hilly areas for example

Relationship between relief and vegetation

Vegetation include forests, thicket, bamboo, scrub, woodland, scattered trees, palms, mangrove swamp, tree swamp, papyrus swamps.

- ❖ The gentle slopes in the ... have got forests.

- ❖ The gently sloping area in the ...has favored the growth of plantation vegetation
- ❖ Hill tops in the... have favored the growth of forests.
- ❖ Forests are found along ridges in the....
- ❖ Scrub vegetation in the...is found on gentle slopes/flatland/steep slopes
- ❖ Saddles/cols in the Are occupied by forests.
- ❖ The broad valleys in the...have favored the growth of papyrus vegetation
- ❖ Papyrus vegetation grows in broad valleys, craters, lowlands and at the coast/shorelines.
- ❖ Mangrove swamp/forest is found in lowlands in the...

Relationship between drainage and vegetation.

- ❖ Forests are found along the margins of swamps for example....
- ❖ Papyrus vegetation in the... grows in swamps/waterlogged areas.
- ❖ Forests grow along rivers and lake shores for example in the....
- ❖ Permanent swamps in the ...have promoted the growth of papyrus/tree swamp vegetation.
- ❖ The well drained areas in thehave favored the growth of forests/woodland vegetation

Relationship between relief and settlement.

- ❖ Gentle slopes in the...have attracted are dense settlements due to easy construction.
- ❖ Settlement is carried out on flat topped hills/gentle slopes in the....
- ❖ Lowlands in the...are sparsely populated due to poor drainage.
- ❖ The relatively flat areas in the...have encouraged settlements due to easy construction.
- ❖ Settlement is carried out along saddles/ ridges/foot hills in the....
- ❖ Steep slopes in the.... have discouraged/limited settlement due high costs of construction.

Relationship between relief and transport/communication

This is the mode/way through which goods and passengers are moved from one place to another by land, air or water. These include; Roads, Railways, Airfields, Water Routes.

Check on the key of the map extracts for the symbols of these routes.

- ❖ Roads like the loose surface road/bound surface in the... is constructed on gentle slopes due to low coast.
- ❖ Main tracks like... follow gentle slopes and lowlands.
- ❖ Footpaths follow/are concentrated on foot hills and steep slopes in the...
- ❖ Footpaths are concentrated on gentle/flat areas for example in the...
- ❖ Roads like... is constructed through ridges, saddles and valleys.
- ❖ Airfields/ have been established/constructed on relatively flat areas/lowlands.
- ❖ The dry weather road in the Wind/meanders on steep slopes.
- ❖ Roads are relatively straight on gentle slopes and lowlands for example....

Relationship between drainage and communication.

- The dry weather/bound surface/loose surface road in the ...is constructed in well drained areas on gentle slopes.
- Railways are constructed in well drained areas in the....
- Roads cross streams and swamps by use of culverts for example....
- Roads cross rivers by use of bridges for example....
- Lakes are crossed by ferries/boats/canoes or ships for example....

Relationship between drainage and settlement.

- Settlements are concentrated along rivers and lake shores for fishing activities for example....
- Waterlogged areas like swamps are avoided for settlement due to water logging for example....
- Settlements are confined to well drained areas on gentle slopes, hilltops for example.

Relationship between relief and land use

- Roads are constructed on gentle slopes or foothills due to low cost of construction for example
- Crop cultivation is carried out/practiced on gentle slopes in the.... due to fertile soil
- The gentle slopes in the.... are used for settlement due to low cost of construction.

- Forestry is practiced in the uplands and some steeply sloping areas/gentle slopes/lowlands in the....
- Mining and quarrying is carried out in hilly/gently sloping areas for example...
- Tourism is carried out on gentle slopes evidenced at....
- Trading is carried out on gentle slopes evidenced by a trading Centre at...

Drawing sketch maps from survey maps.

Activity 19.6. Drawing a sketch map from a survey map.

In groups, study the map of bulisa in figure 1 and the do the following tasks

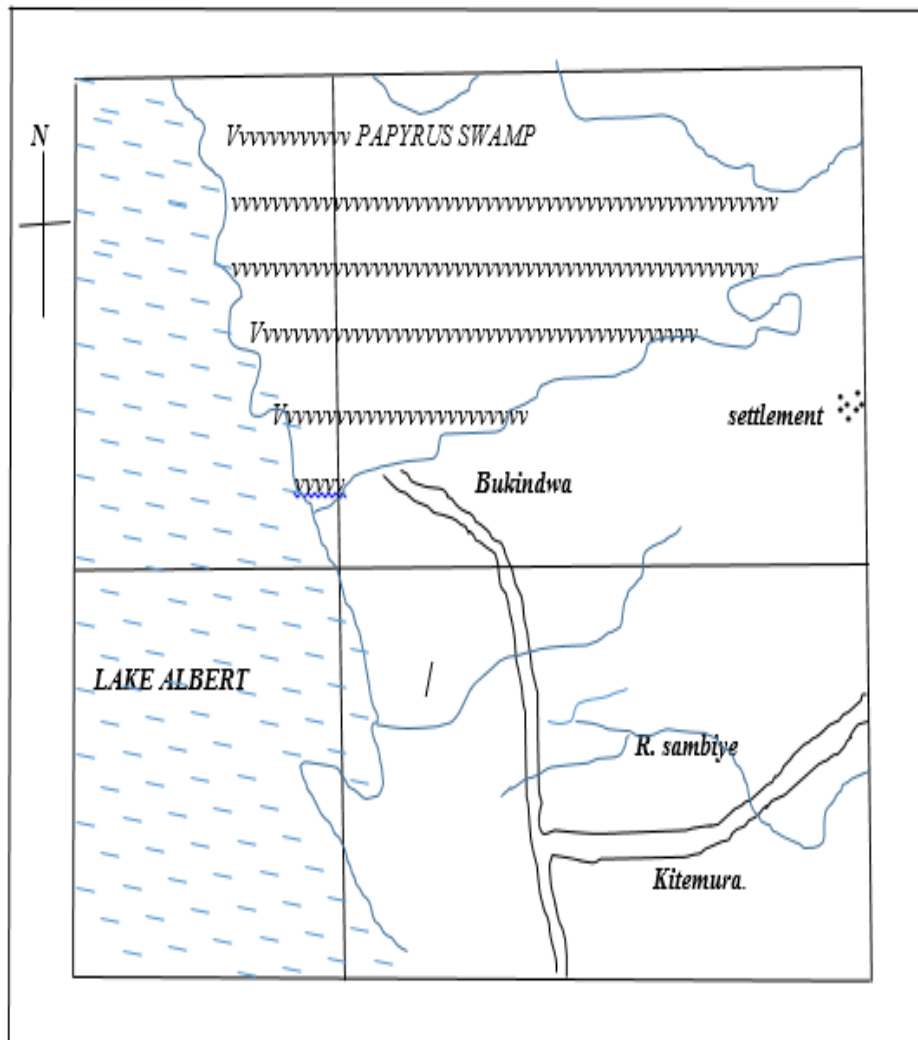
1. *Draw a sketch map of the area shown on the map extract and on it mark and name the following*
 - a) *All weather surface road*
 - b) *Lake albert*
 - c) *Any two Rivers*
 - d) *Papyrus swamps.*
 - e) *Settlement.*

When drawing a sketch map, following steps

- a) *Study the survey map given. This will help you determine the shape of the map to be drawn*
- b) *Count the boxes of the map both horizontally and vertically to determine the shape of the sketch to be drawn*
- c) *Draw an outline with a similar shape on a piece of paper.*
- d) *Plot on it the major grids; these are the thick lines on the survey map and name them. These guide you on where features will be marked*
- e) *Using a pencil draw out the features in the outline trying as much as possible to follow their shapes and location.*

NB. *The sketch maps are the original survey map. This is because a sketch map contains a few features. All the element of a good map should be included on the sketch drawn.*

A SKETCH MAP OF BULISA SHOWING ALL WEATHER SURFACE ROAD, LAKE ALBERT,
TWO RIVERS ,PAPYRUS SWAMPS. SETTLEMENT.



KEY

	Lake Albert.
	River /
	Road
	Permanent swamp
	Settlement

Drawing a cross section from a contour map.

A cross section is a diagram that represents the nature of relief of a particular areas as viewed along a given line. It clearly shows changes in relief, such as the ascending and descending sections, the rugged and smooth areas as well as the steep and flat areas. It presents the outline of the land as it would be seen from sideways.

This should be by taking the followings steps:

Step 1: locate the points between which you are going to draw the cross section

Step 2: Takes a pencil and a ruler and draw a line joining two points, A and B on the map extract between which you want to draw across section.

Step 3: take a piece of paper that has a straight edge and place the straight edge between the two points.

Step 4: put a mark on the paper whatever a contour line touches the edge of the paper, and write the height of the contour at each mark.

Step 5: On a graph paper, draw a horizontal line representing the distance between the two points and write down the value of each contour.

Step 6: draw a vertical line that represents the contour heights found between the two points

Step 7: calculate the amplitude of the area drawn. This helps you to obtain the vertical scale to be used in cross section drawing.

Step 8: mark out the heights on the vertical axis using the vertical scale.

Step 9: place the paper edge along the horizontal axis and starting from the left to right, plot the contour heights that you have marked on the paper using faint dots.

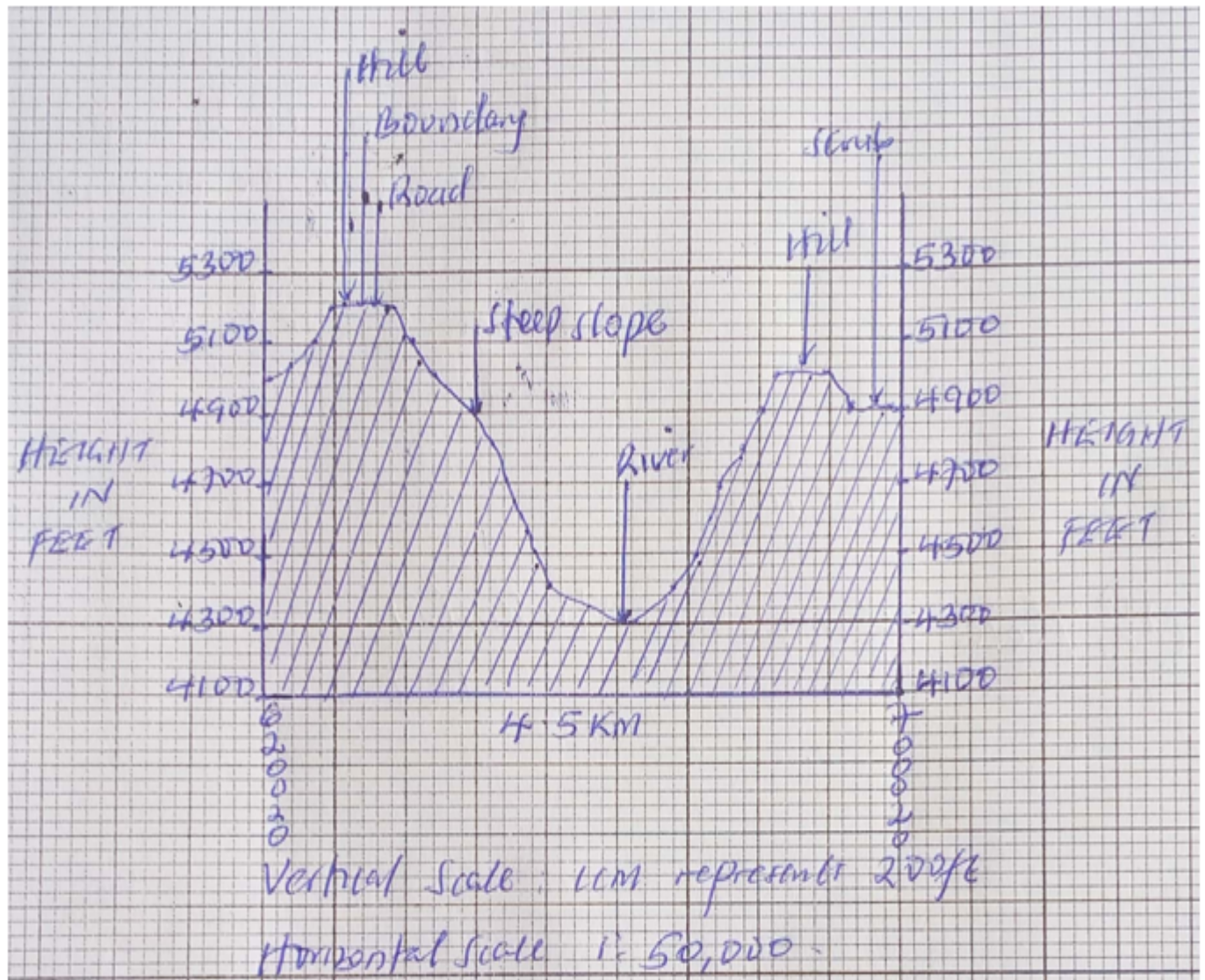
Step 10: transfer the contour heights information on to the vertical line.

- District Vegetation Boundaries are shown in a dotted line.

- a) Draw a cross section between grid references 620020 to 700020 and on it mark and name.
 - i. Dry weather road
 - ii. River
 - iii. Boundary
 - iv. Settlement

- b). Describe the relief of the area
- c). Calculate the
 - a) Amplitude of the cross section
 - b) Horizontal distance along the cross section

A CROSS SECTION OF LAKE NAKIVALE BETWEEN GRID REFERENCES 620020 TO 700020
SHOWING DRY WEATHER ROAD, RIVERS, BOUNDARY, SETTLEMENT, MOTORABLE TRACK.



Amplitude of the cross section.

Amplitude = highest point – lowest point.

Amplitude = 5200ft - 4300ft.

Amplitude = 900 ft.

Horizontal distance along the cross section.

Cm × 50,000

100,000

9cm × 50,000.

100,000

450000

100000

4.5 km.

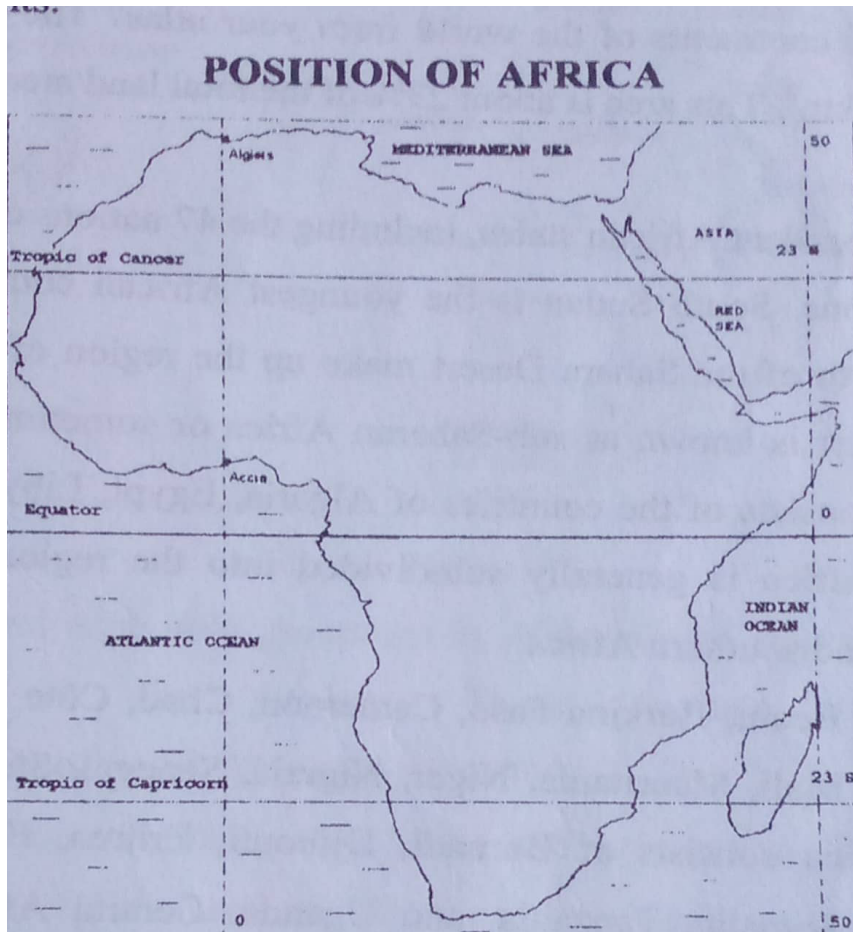
Importance of survey maps in studying geography

- *They help to show relationships between features*
- *They can also help to identify the economic development of the area.*
- *They also help to describe the relief, drainage, vegetation, farming and other human activities in an area.*

LOCATION & SIZE OF AFRICA.

Africa lies between latitudes 37° N and 35°S, and longitudes 25° W AND 58° E. Africa is bordered by the Indian Ocean to the east. It separates Africa from Asia and Australia.

Atlantic Ocean borders Africa to the west.it separates Africa from South America and North America. The Mediterranean Sea borders Africa to the north.



The continent is strategically located astride the equator crossed by the three latitudes i.e.

- Tropic of Cancer in the north
- Equator in the central and
- Tropic of Capricorn in the south

N.B: About 77% of the total land area in Africa lies within the Tropics i.e. between the Tropic of Cancer 23 ½ degrees in the north and Tropic of Capricorn 23½ degrees in the south.

It is also crossed by the major longitude called Greenwich Meridian.

THE SIZE OF AFRICA.

Africa is one of the six continents in the visible world and the second largest continent after Euro-Asia

Covering an area of about 30,065,000 km², which is 20% of the world's land mass, comprising 64 political territories including adjacent islands.

It has a population of 1.311.000.000 billion people having a population density of 32/km accounting for 15% of the world's population with a growth rate of 92.293 million pa.

The shape of Africa is not uniform. It is bulky in the north and thin in the south. Africa's farthest point in the north is Cape Ras Ben in Tunisia at 37° N. The farthest point in the south is Cape Agulhas at 35° S.

The farthest point in the west as Almadi, Cape Verde islands at 25°W. The farthest point in the east is in Mauritius, Rodrigues islands at 58° E.

Continents are usually large landmasses separated from each other by large water bodies usually seas and oceans.

ACTIVITY 20.2 exploring the size of Africa.

Study the table below and answer the questions that follows.

Table 20.1: continents of the world and their sizes

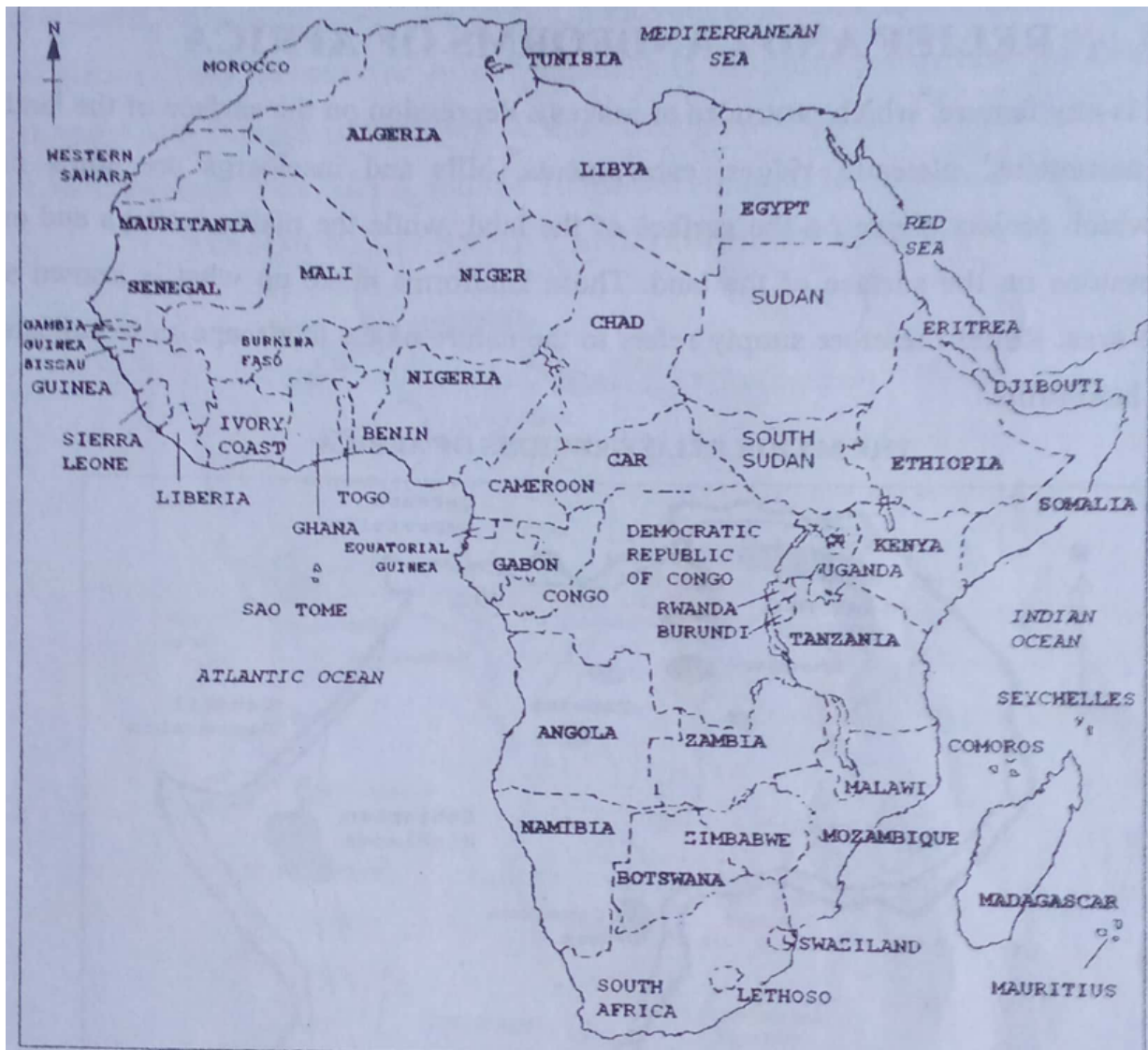
<i>Continents</i>	<i>Area (km²)</i>
<i>Asia</i>	<i>44,579,000</i>
<i>Africa</i>	
<i>North America</i>	<i>24,256,000</i>
<i>South America</i>	<i>17,819,000</i>
<i>Antarctica</i>	<i>13,209,000</i>
<i>Europe</i>	<i>9,938,000</i>
<i>Australia</i>	<i>7,687,000</i>
<i>Total</i>	<i>125,753,000</i>

Tasks

a) Calculate the size of Africa.

b) Using the information in the table 20.1, to draw a graph to represent the information.

The states of Africa



THE POSITION OF EAST AFRICA WITHIN AFRICA.

In pairs, carry out a textbook or internet research and do the tasks that follow.

- a. Find out the sizes of East Africa.*
- b. Describe the position of East Africa in Africa*

Chapter 21.

THE RELIEF REGIONS & DRAINAGE OF AFRICA.

Relief refers to the physical or natural appearance of the general landscape. Africa is endowed with a spectacular landscape ranging from plateau/plains, basins, highlands/mountains, rift valleys, etc.

There origin is attributed to a number of geological processes e.g. Vulcanicity, faulting, folding etc.

ACTIVITY 21.1 exploring the relief regions of Africa.

In groups, carry out a textbook or internet research and do the following tasks.

- a. Draw a map of Africa and on it mark and label the major relief regions.*
- b. Describe the relief regions labelled on the map including its position and characteristics.*
- c. Study table 21.1. Showing the approximate sizes of Africa's major religions and do the following tasks.*

Table 21.1 approximate sizes of Africa's major relief regions.

<i>Relief region</i>	<i>Elevation in metre</i>
<i>Depressions</i>	<i>Below 0</i>
<i>Coastal plains</i>	<i>0-240</i>
<i>Rift valley</i>	<i>250-900</i>
<i>sBasin</i>	<i>150-200</i>
<i>Plateau</i>	<i>900-2000</i>
<i>Highlands and mountains.</i>	<i>Over 2000</i>

Tasks.

- a. *Describe the position, characteristics and mode of formation of these relief regions of Africa.*

Plateau

It refers to a generally flat raised landscape that covers a wide area (a plateau has no peak like a hill) Africa has many plateau that are higher in the east and lower in the west ranging between 600m - 2000m above sea level. E.g.

- *Central plateau in east Africa,*
- *Bie plateau in southwest in Botswana,*
- *Jos plateau in west in Nigeria,*
- *Kalahari stretch in Namibia,*
- *Great Karoo in South Africa, etc.*

The plateau covers the largest area, it is divided into the low plateau and the high plateau. The low plateau has an average height of 900 m above sea level but can rise to a height of 1200m above sea level.

NB. Plateaus are extensive and relatively flat upland areas. It has a flat top and steep sides. Plateau occur on every continent.

IMPORTANCE OF PLATEAU.

- Conducive for grazing and cultivation due to the flat nature that ease movement and mechanization.
- Mineral mining e.g. oil in the Kalahari stretch
- Tourism due to abundant fauna and flora e.g. the Kalahari stretch in western Botswana, Eastern Namibia.
- Wild life conservation due to existing fauna and flora e.g. the Kalahari stretch in Namibia.

- Areas of recreation through motor rallying, bird watching, desert walks due to its flat nature.
- Human settlement e.g. the Karoo in South Africa and the Jos plateau in Nigeria.
- Stone quarrying due to rock outcrops which are blasted for construction.

Plain

This refers to a generally flat low land and covers many miles.

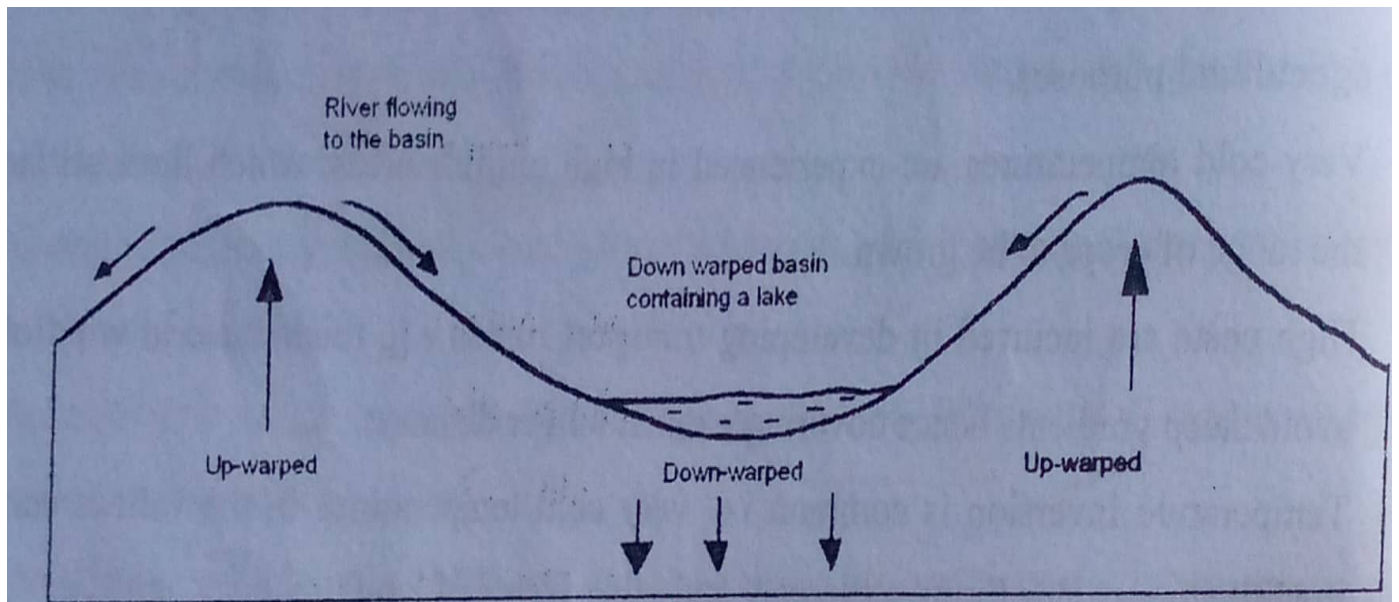
It was formed due to perennial erosion for a long time that removed large amounts of soil from the earth's crust between the east and west coast highlands. E.g. the Veld in South Africa, Sahel region in North Africa, etc. The plain can also be formed due to the flowing of basic lava that is fluid in nature and takes long to solidify on the earth's surface.

Basin

This refers to a saucer shaped depression that is found mainly between a plateau and mountain. It is formed by faulting or down warping when two adjacent land masses are raised leaving the central block to sink forming a saucer feature.

Basins become water bodies when filled with water e.g. Nile basin, Orange Zambezi basin, Niger basin, Congo basin, etc. while those that are empty are called depressions e.g. Qattara basin, Chad basin, Okavango basin, etc.

Illustration showing the basin.



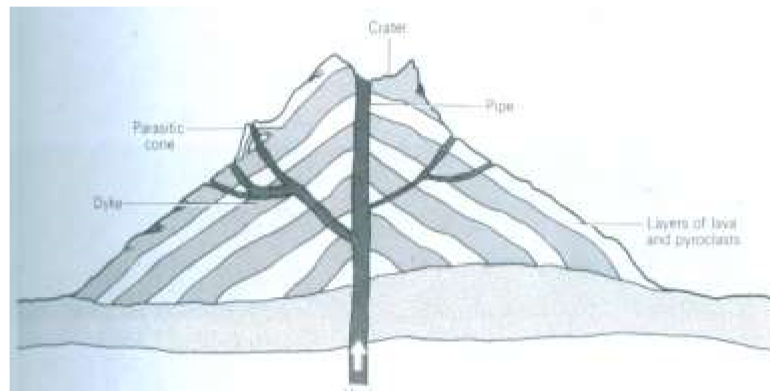
Mountain

This refers to a cone shaped landform that is many meters above the sea level formed by faulting, folding and vulcanicity giving rise to block mountains, Fold Mountains and volcanic mountains.

Volcanic mountains.

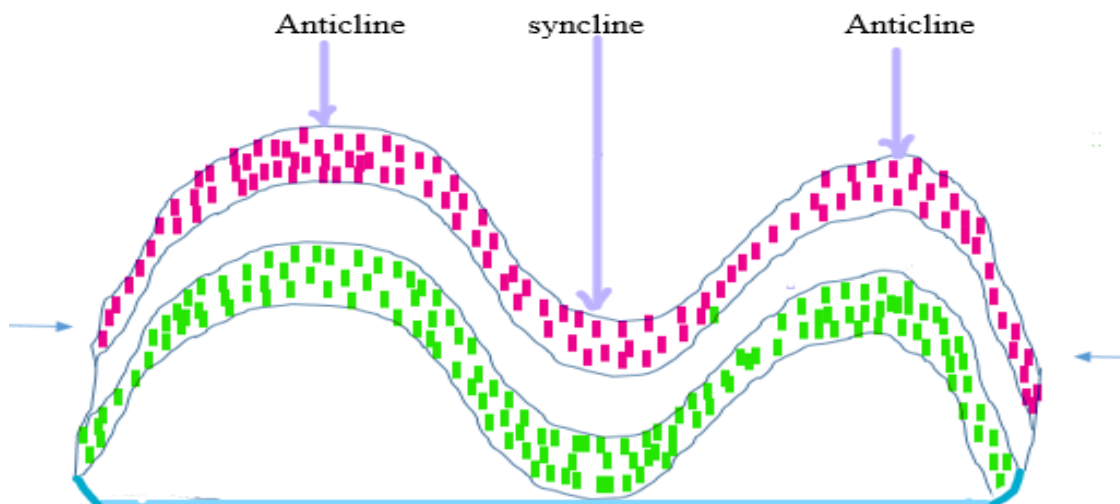
These are formed when molten magma from the earth's interior is exposed to the surface of the earth through a vent exploding into the air thus cooling to form a cone shape. E.g. Ethiopian highlands, Cameroon highlands, Futa Djalon Mountains, etc.

Illustration



Fold mountains- these are formed when compressional forces act against the earth's crust with extreme pressure leading to synclines (valleys) and anticlines (hills). The many anticlines form the Fold Mountains in form of ranges. E.g. the Atlas and cape ranges.

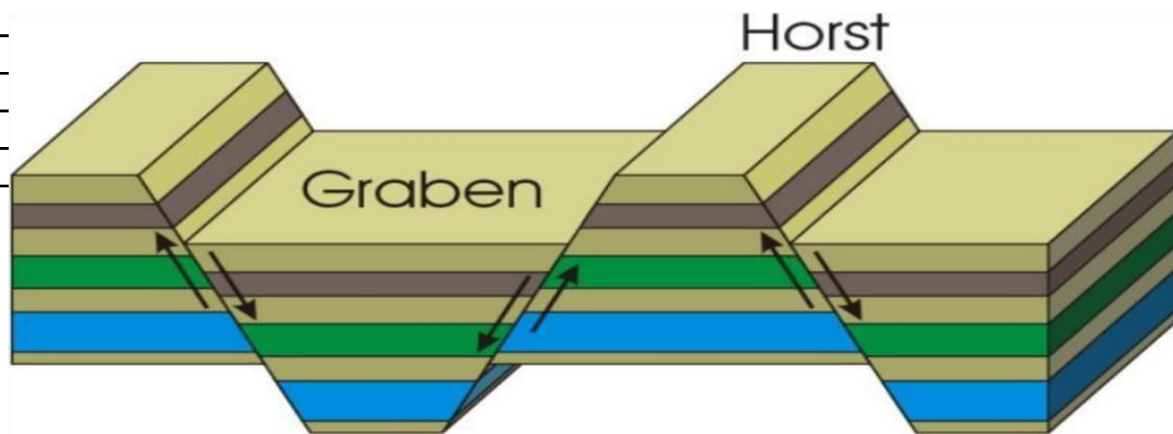
Illustration



Block mountain.

These are formed by faulting when compressional forces act upon the earth's crust leading to lines of weakness/fault lines forcing the central block to rise higher than the other blocks making the central block project as a horst or the adjacent blocks sink lower than the central block leaving the central block projected out as a horst. . For examples include Rwenzori, usambara.

Illustration of the block mountain.



- They are tourist attractions hence promoting tourism which brings in foreign exchange hence leading to infrastructural development.
- Block Mtns are sources of rivers which provide water for irrigation e.g. River Mobuku which originates from Mt. Rwenzori to supply water to the Mobuku irrigation scheme.
- Rivers along the mountainous areas are used for generation of H.E.P e.g. Mobuku Power Project in Kasese along river Mobuku.
- Block Mtns help in the formation of relief rainfall on the windward side hence boosting agriculture.
- Mining is carried out on the lower slopes of block Mtns e.g. copper and cobalt from Kasese.
- Block Mtns have got forests along the slopes hence promoting lumbering.
- Block Mtns contain rocks which provide building and construction materials e.g. gravel. They therefore aid quarrying activities.
- Some act as sources of rivers which provide water for domestic and industrial use. E.g. Mt. Rwenzori is a source of rivers like Nyamwamba, Lubiriha, Rukooki, Mobuku, Sebwe, and Rwimi etc.

Problems faced by people living near the Block Mountains
• The leeward side is in the rain shadow hence having dry conditions e.g. Kasese and Ankole Masaka Corridor and therefore leading to climate demodification.

- Block Mountains are barriers to construction of transport and communication lines hence rendering the places remote.
- Block Mountains accelerate soil erosion which leads to loss of soil fertility hence affecting agricultural output.
- Landslides are common along Mountain slopes which are destructive to human life and property.
- Mountain tops are not suitable for human settlement due to extremely low temperatures.
- Block Mountains are associated with earth quakes which are destructive to human life and property.
- Block Mountains limit the use of machines (Mechanization) in agriculture due to steep slopes.
- Mountains are good hiding places for rebels who cause insecurity in surrounding areas as well as straining the defence budgets.
- Forests along the mountains harbor dangerous wild animals which scares away human settlements.
- The dense population near mountains leads to land fragmentation on the lower slopes leading to low output.

Rift valley

This refers to a long narrow depression that is bordered by fault scarps on either sides formed by faulting of the earth's crust leaving behind a trough.

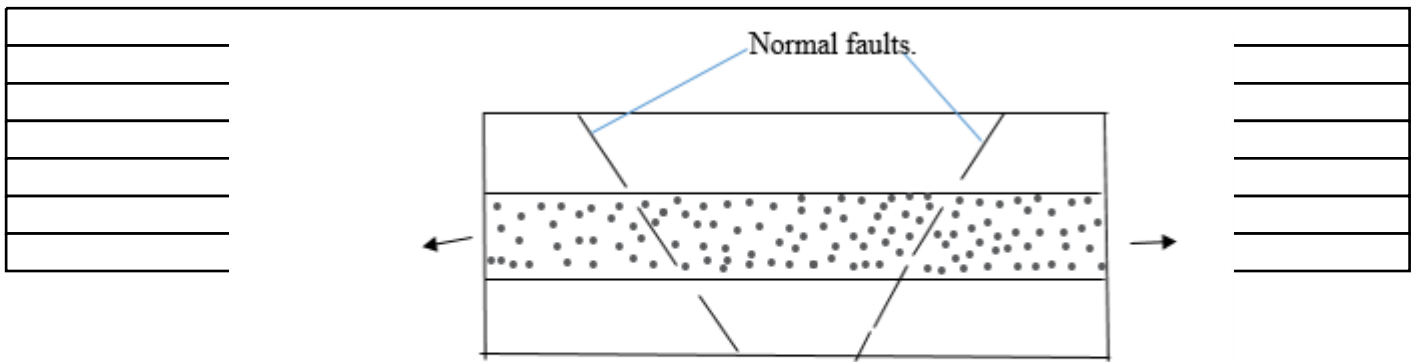
The great African rift valley is about 7200 km and 5600 km is in East Africa with a varying width of 30 to 60 km stretching from the Red sea in the northeast to river

Zambezi in Mozambique.
The African Rift valley was formed by tectonic forces particularly faulting which can
be explained in three basic theories;
• Tensional force by Gregory

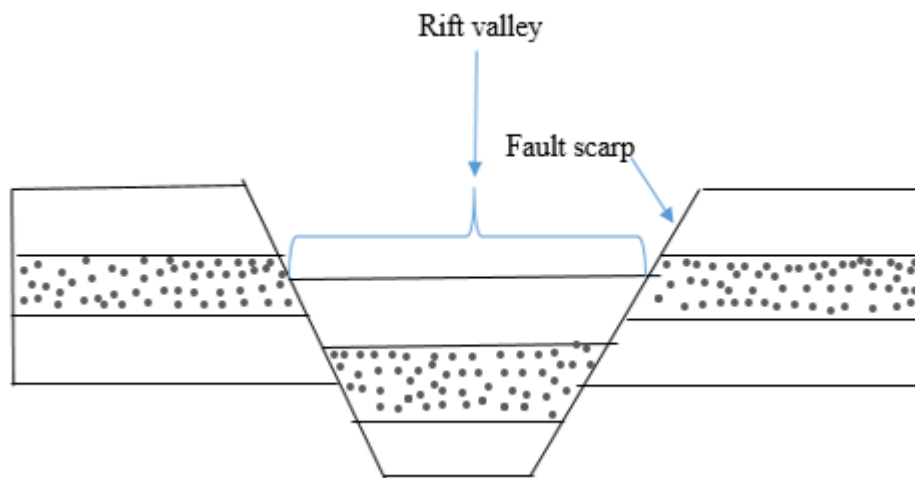
- Compressional force by Wayland

- Differential uplift theory (Dixey and Troup).

Tensional force theory. The earth's crust is acted upon by tensional forces that pull away the earth's core forming normal lines of weakness. The crust is sub-divided into blocks where the adjacent blocks are forced to rise while the central block forms a trough called a rift valley. This is more in the eastern arm of the rift valley in Kenya.



Tension forces acted on the landmass hence leading to normal faults.



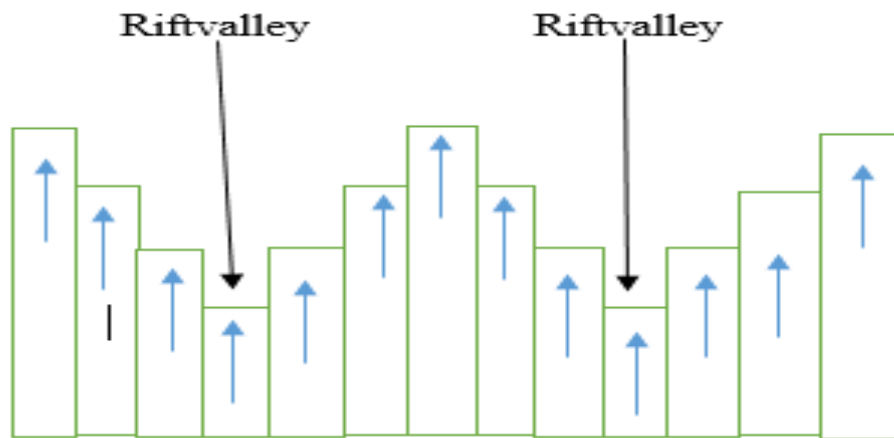
Compressional force theory (Waylland)

The earth's crust is acted upon by compressional forces that pushed landmasses towards each other forming reverse fault lines. This sub-divides the earth's crust into blocks where the adjacent blocks rise with projected scarps which are acted upon by

denudation forming a well-structured rift valley. This is visible in the western arm in the Albertine area.

Differential uplift theory (Dixey and Troup)

The earth's crust is acted upon by tensional forces forming various lines of weakness which are also supplemented by up-warping and down-warping raising the adjacent blocks to different heights. This leaves the central block at a lower elevation forming the rift valley. This explains the rift valley stretch of East Africa near Nairobi.



Economic activities carried out in the Great East African rift valley.

Tourism due to the national parks in the rift valley e.g. Queen Elizabeth and Lake Nakuru for flamingos which brings in foreign exchange used to build infrastructure.

Fishing especially in the rift valley lakes e.g. Albert, George and Tanganyika which provides food to the people.

Mining e.g. oil from Lake Albert, soda ash from Lake Magadi and salt from Lake Katwe hence providing employment opportunities to improve people's standards of living.

The Rift valley is also used for animal rearing e.g. Masai pastoralists and the Turkana of Northern Kenya.

Transport especially water transport on Rift valley lakes e.g. Kazinga channel connects Lake George to Lake Edward and then Lake Edward is used to link Uganda to DRC.

Hunting especially in the National parks found within the Rift valley.

Crop growing (Arable farming) e.g. Maize and cotton in the Mobuku irrigation scheme in Kasese.
Rift valleys are also used for wildlife conservation.
<u>Problems faced by people living in the rift valley areas.</u>

Steep escarpments (Rift valley shoulders) hinder development of transport and communication lines e.g. near Lake Albert hence rendering the places remote.

Low rainfall is received in the rain shadow areas of the rift valley e.g. in Kasese.

Rift valley lakes are very deep hence they are poor fishing grounds e.g. Lake Tanganyika. ☒

Rift valley regions contain soils which are sandy hence not favouring farming.

Rift valley areas are prone to earthquakes and volcanicity which are destructive to human survival e.g. in Bundibugyo and Kabarole.

Steep slopes in rift valley areas hinder mechanization on farms.

The escarpments are associated with soil erosion which leads to loss of soil fertility e.g. in Bundibugyo.

Landslides are common in rift valley areas which lead to destruction of crops and settlements.

Rift valley areas are infested with pests e.g. tsetse flies which spread Nagana.

Some areas of the rift valley have got dangerous wild animals which scare away human settlements e.g. lions and monkeys within the Queen Elizabeth National Park.

Solutions to the above problems

Resettling people away from the rift valley to reduce effects of landslides and earthquakes. Irrigation can be used in the rain shadow areas to provide water for crops.

Soil erosion can be controlled through terracing and contour ploughing.

Re-afforestation and afforestation can be used to control landslides.

Spraying with pesticides to control pests and diseases within the rift valley.

Fencing National parks to ensure security of people from wild animals in the surrounding areas.

Sketch map showing extent of the rift valley.
<i>Using ICT or Library research, draw a map of Africa showing the extent of the rift valley.</i>
DRAINAGE OF AFRICA

Drainage refers to the hydrological system comprising of rivers, lakes and seasonal or permanent swamps.

Africa is endowed with many rivers e.g. The great Nile (Uganda, Sudan, Egypt), the Niger (Nigeria, Niger, Burkina Faso, Liberia), the Congo (DRC), the Zambezi (Zambia, Zimbabwe, Mozambique), the Orange/Vaal (South Africa), Limpopo (Botswana, South Africa, Swaziland, Mozambique, Shibili (Ethiopia, Somalia), etc.

Major lakes include Victoria (Uganda, Kenya, and Tanzania), Nyasa/Malwa (Tanzania, Malawi, and Mozambique), Nasser (Sudan, Egypt), Chad (Chad republic), Tana (Ethiopia), etc. with seasonal and permanent swamps like Lake Kyoga in Uganda.

Factors influencing drainage

Africa's drainage is determined by four major factors which influence its nature of flow on the earth's surface i.e. relief, nature of rocks, gradient/slope and volume of water.

Relief- this refers to the general appearance of the landscape e.g. Mountains, valleys, plains, etc. rivers flowing in mountainous areas tend to diverge in the course when trying to avoid raised landforms.

However rivers flowing on plateau and plains tend to develop a regular course due to less interruption in the flow pattern.

Nature of rock- rock composition of the earth's crust influences the flow of a given river. Rivers flowing in areas of hard rocks tend to meander towards areas of soft rocks developing new flow channels or river course.

However rivers that flow in areas of soft rocks develop a regular course though others create meanders with ox- bow lakes, flood plains and levees/ braided channels.

Gradient/slope – this refers to the proportionate elevation of a river’s course from the
source to the mouth. Rivers flowing in areas of high gradient tend to develop a straight
course which is supported by gravitational pull and acceleration/ velocity of flow.

However, rivers flowing in areas of gentle or very low gradient easily spread on the earth’s surface developing meanders and ox-bow lakes and levees/braided channels.

Volume of water- the amount of water carried by a river at any time in its valley along the course from the source to the mouth affects its flow relating to rejuvenation and river capture. When rivers obtain more water from heavy rainfall they are rejuvenated/strengthened with more erosive power.

This may lead to capturing of a neighboring weak river terminating its flow course. As for the rivers flowing with low volume of water, thus they have low flow speed and erosive power leading to deposition of sediments in the river bed or valley flow.

A) RIVERS:

A river is a water body flowing over the surface of the land flowing through a definite natural channel in a linear direction down a slope due to gravity.

Africa has a number of rivers both big and small, all of which rise somewhere in the huge plateau and mountain areas. In these areas plenty of rain falls and supplies the rivers, keeping them full for their journeys to the seas and oceans which surround Africa.

A point where the river starts to flow is known as a **source** like lakes, mountains.

Swamps and pours into a **mouth** such as lakes, swamps, ocean, and sea for example

THE WORKS OF A RIVER

As the river flows, it performs three functions/activities: It erodes, it transports and it deposits [erosion, transformation and Deposition].

River erosion is done though the following processes: Attrition, Abrasion/Corrasion, Solution/Corrosion and Hydraulic Action.

River transportation
After erosion, the eroded materials known as the load is transported through the following ways: Traction, Siltation, Suspension and Solution.
RIVER DEPOSITION

A river transports its load until it has insufficient energy to transport it any further. When this happens, the load is deposited. Boulders and pebbles are deposited first because they are heavy, and silt and other fine sediments are deposited last. Rivers can be divided along their course into three fairly distinct parts as the Upper course, Middle course and Lower course.

Some rivers have all three of these stages, while a few have two or only one.

For instance, some small rivers flowing off the plateau edge in South Africa or West Africa, too small, have only upper stage and brief middle stages. Some small rivers flowing in high mountains end their life in a mountain lake and only experience an upper stage.

RIVER'S LONG PROFILE AND ITS CHARACTERISTICS

River profile is the outline of the shape of a river from the source to the mouth as illustrated below.

THE UPPER VALLEY (YOUTHFUL STAGE)

In its youthful stage,

- The river flows against a very steep gradient
- The river flows very fast with turbulent flow.
- It has a V- shape valley
- There are interlocking spurs
- There is vertical erosion
- The river has a very narrow deep valley
- Potholes are common in this stage
- The river has waterfall and rapids

- Erosion is mainly directed to its bed

- There is no deposition

A river in this torrent stage follows a winding course, flowing round obstacles formed by more resistant rocks and led to the formation of the following:

A **gorge** is elongated steep sided narrow and deep valley. It forms when water fall retreat up stream.

Formation of a gorge

Process of formation involves the vertical erosion of the river and by fast flowing water over the soft under laying rock between hard rocks.

Waterfall and rapids

Though mainly associated with upper course of rivers, waterfalls and rapids can also be found in the lower courses as well.

Describe the processes responsible for formation of water fall

Plunge pool is a hollow depression formed at the base of a waterfall due to progressive drilling and grinding of the valley floor. Plunge pools are found on rivers with waters in the youth's stages of rivers in rejuvenated section of the profile.

Draw the Illustration of the waterfall and plunge pool refer to Africa by Minns page 16

Conditions for the formation of a plunge pool

- Large volume of water
- Steep gradient
- Great erosive energy due to velocity
- hard rock overlying soft rock

Processes of formation a plunge pool

- Erosion of the underlying soft rock produces a waterfall.

• Potholes will be produced at the base on soft rocks.
• Undercutting scouring action, eddying and cavitation, swirling and erosion collectively enlarge potholes producing a plunge pool.
THE MIDDLE STAGE

In the middle stage of the river,

- There is a reduction in gradient and because of this; the river's velocity is slowed down
- Lateral erosion is dominant in this stage.
- This has a wide valley which is deep
- There is reduced energy because of the reduced gradient
- Meanders develops in this stage
 - The river has more water in this stage because of many tributaries.

THE SENILE LOWER VALLEY/OLD/FLOOD PLAIN STAGE

The senile stage that is when the river is nearing its destination is characterized by

- A much-reduced gradient.
- In this stage, the river's speed is greatly reduced and the river flows very sluggishly.
- Deposition is far more important than erosion and the load transported mainly include sand, very tiny and light particles and materials carried in suspension & solution.

Draw the diagram showing the characteristics of the third stage refer to Africa by Minns page 15

- The main landforms in this stage include

Meanders are curved bends in the river channel. Meanders usually start from the youthful stage as swings in the river but are more developed in the senile stage.

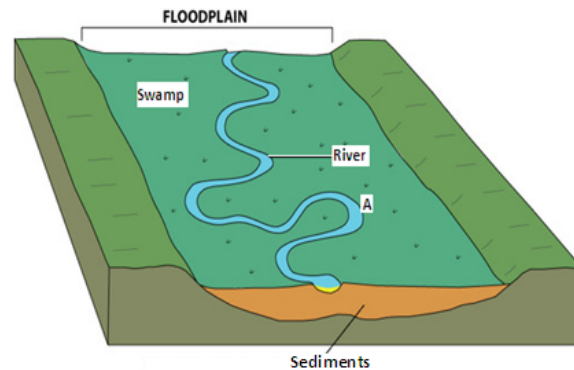
Oxbow lakes and meander scars

An Oxbow lake is a horse shoe shaped lake formed when pronounced meander is cut off from the main river.

When the water that was trapped in the oxbow lake dries up, a meander scar is formed.

Flood plain is wide flat plain of alluvium found in the old stage of a river as illustrated below:

Draw the diagram of the flood plain



Processes for the formation of a flood plain

Downstream migration of meanders causes the widening of the river valley where the spurs are eroded off and low bluffs formed on either side of the plain.

In this stage the valley filled with alluvium, the river swings freely without touching the valley sides the wide valley filled with sediments at this stage (old) is said to be in its flood plain.

Other features found in the old stage are Levees and Braided channel

Deltas is a large flat low-lying plain of silt, boulders, pebbles and gravel deposits at the river mouth where it flows into the sea or lake.

The deposited material forces the river to divide into channels called distributaries.

These are flanked by swamps, lagoons, spits and bars.

The delta is built on the sea and in the senile stage where the river loses competence to carry load.

As the river loses energy, it deposits, heaviest first. This goes on through the long
profile of the river. However, whenever there is an increase in energy, the river will pick
up the deposited material again sweeping it into the sea which is the goal of any river.
As sediments formulate at the mouth, a delta is formed.

Types of Deltas

Arcuate is a type of delta which is triangular in shape, with a convex out margin which is rounded and composed of coarse sediments like gravel, sand and slit The Arcuate delta has many distributaries and is the most common on River Nile in Egypt and River Niger in Nigeria.

It is formed where offshore currents are strong to round the river mouth, sea ward edge with fine and course materials

Lacustrine Delta is an inland delta formed in the lake for example River Omo in Lake Turkana.

Illustration: Draw the diagram of lacustrine delta

Bird's food delta/Digitate resembles the bird's foot formed as a result of the river carrying a lot of load composed mainly of the fine material or silt and having low wave energy.

Here a river deposits its load in the submerged river mouth leading to formation of sand banks and Islands. Around these sand banks and islands, numerous distributaries and currents remove the sediment load as it deposited. Rufigi has an estuarine delta as it has submerged river mouth and River Zambezi

Associates with delta formation are coastal features like spits and lagoons. Illustration

Conditions necessary for the formation of a Delta

- The river should have a mountainous upper course where erosion is rapid. The delta building power of a river is greatly increased if it has a number of tributaries which also gather a considerable load of sediments
- There should be no strong tidal currents to remove the accumulation of silt from the mouth of the river. If tidal currents exist, they should be minimal.

- | |
|--|
| • Low of flat gradient for accumulation of material |
| • Presence of sheltered bay |
| • Absence of artificial barriers like walls or dykes at the mouth |
| • The river should have a long plain or lower course so that its current will have |

slackened before it reaches the sea. Where the gradient of the lower course of the river is shift the strength of the current may be sufficient to carry the sediments well out to the sea beyond the mouth of the river.

- There should be no big lakes along the course of the river because the lakes remove sediments from the river channel before reaching the sea.

(Processes for the formation of a delta)

When the fresh rivers meet the saline water of the ocean, the meeting produces an electric charge the causes the clay particles to coagulate/precipitate and settle on the sea bed (a process known as flocculation).

The fines particles are carried fastest and deposited as bottom set. These are covered by slightly course materials which are deposited to form a slope making up the fore set bed.

The upper part is nearest the; and composed of more coarse sediments form the top set.

Increased deposition causes splitting of the river into distributaries.

Levees extend to the sea via distributaries. Spit, bar and lagoons are formed. Lagoons are later filled with sediments becoming swampy places. Plants colonize older parts of the delta. As the delta takes a sound appearance, swamps disappear forming or leaving dry land.

The range which the delta grows varies according to the rate at which silt is deposited.

Importance or benefits of deltas in Africa

- Deltas contain fertile soils so provide man with agricultural land.
- Deltas attract settlement due to the presence of well drained fertile soils. The delta of the Nile has for a long time been a home to a large population.

- | |
|--|
| • Mining (pottery and petroleum deposits) takes place in delta areas like in Niger delta. |
| • Delta are tourist attractions hence tourism |
| • Fishing takes place in the delta, lagoons. The silt that is brought by the river is good food for these planktons. |

- In deltas where the mangrove forests are found the trees are harvested for poles which are good building materials.
- They have promoted art and craft industry due to the presence papyrus vegetation.

Problems associated with deltas in Africa

- Due to many distributaries a delta has, this impedes communication.
- Delta's harbour diseases carry vectors like mosquitoes and snails. • Flooding occur especially after exceptionally heavy rains
- Salinity of the water.

Alluvial fans

Alluvial fans are similar to deltas (usually referred to as dry deltas) except that they are built on land and not at sea as the delta.

An alluvial fan is fan shaped mass of materials (sand and gravel) deposited by a stream with large load as it emerges from a steep narrow valley onto a wide gentle plain.

Benefits of Rivers to the people of Africa

- Using ICT or library resources, describe how rivers and lakes benefit the people of Africa.*
 - Identify the problems faced while using lakes and rivers in Africa.*
- Generation of hydro-electrical power in the African countries for domestic, industrial and agricultural purposes such as: Kossou hydro power station on Bandama in Cote D' Ivoire. And Kainji dam on River Niger in Nigeria.
 - It has led to the development of the tourism sector. This is because rivers are tourists' attractions and have facilitated tourism activities like White water rafting at Victoria water falls, spot fishing on River Orange in South Africa.

• They have promoted water transport hence promoting internal trade among different parts of Africa
• Rivers provision of water for irrigation farming for example River Senegal provides water to Sir Richard Toll Rice irrigation Scheme in Senegal and River Nile provides water to Gezira irrigation Scheme in Sudan.

- Rivers provision of water for domestic and industrial uses in different part of Africa.
- Rivers acts as internal political administrative boundaries.
- Rivers are sources of food in form of fish like Tilapia to the people of Africa.
- Rivers contribute to the modification of the microclimate through rainfall formation.
- Source of raw materials for art and craft and construction industry, due to the presence of clay soils, sand, and swamp vegetation.
- Rivers are wild life habitats and centers of biological diversity like crocodiles.
- Promotion of agricultural activities due to the presence of fertile soils (alluvial soils) along the river banks
- Study and research purposes

THE PROBLEMS ASSOCIATED WITH RIVER IN AFRICA

- Seasonal rivers in Botswana and Namibia hinder water transport during the dry season, and the generation of hydro electric-power.
- The seasonal flooding of rivers leads to destruction of farmland and transport and communication networks and loss of life.
- Rivers are habitat for harmful vectors like snails, which spread Bilharzia; Simullium flies which transmit river blindness, breeding areas for mosquitoes.
- Presence of water falls and rapids, narrowness of the African rivers hinders navigation in many African countries.

Drainage patterns

This refers to the general lay out plan made by a river and its tributaries on the

surface of the earth.

Africa has got a variety of drainage patterns which include trellis, dendritic, parallel, braided, antecedent, radial, centripetal and fault-guided.

Trellis pattern- this is where the tributaries join the main river at nearly 90 forming rectangular shapes e.g. river Tana and Mara in Kenya, River Charl in Chad and river Orange in South Africa.

Radial Pattern- this is where rivers flow from the same source mainly a mountain top radiating to different directions. Thus the summit or mountain top is made up of a water shed or water catchment area e.g. river Siti, Koitobos.

Centripetal pattern- this is where rivers and their tributaries discharge water into the same basin originating from different directions common in areas surrounded by raised plateau and highlands.

Parallel pattern- this is where rivers flow adjacent to one another with neither the same origin (water shed/water catchment area) nor sharing tributaries but may discharge water into a bigger river or ocean/sea. This pattern is common in areas of hard rock structure or gentle flat lands e.g. river Lagh-tula, Chiraman, Galole into main Tana; Lagh-kifulu, Lagh-bar, Lagh-dera towards Somalia and Indian Ocean.

LAKES

A Lake is a body of water occupying a hollow/depression on the earth's surface. Most of the lakes found in Africa are fresh water bodies with few salty lakes.

There several Lakes found in Africa and classified according to their mode of formation.

These include-

CRUSTAL DOWN WARPED LAKES

These lakes occupy basin- like depressions/Saucer like depressions and were formed by down warping and drainage reversal like Lake Victoria

FAULT LAKES (TECTONIC LAKES)
Rift Valley Lakes/Graben Lakes are found in the rift valley floor.
They were formed due to earth movements that culminated into faulting by tensional or compressional forces leading to the formation of the rift valley.

The minor Grabens/depressions were formed on the rift valley floor after secondary faulting.

The Grabens were later filled with water and accumulated to form rift valley lakes/Graben lakes like Malawi. They are elongated, deep, narrow and regular shape.

Lakes due to vulcanicity:

These are formed as a result of volcanic activities.

These are divided into mountain crater Lakes, Lava dammed Lakes/Lava blocked lake, Explosive/Explosion cater lakes and Caldera Lakes

Lakes formed due to erosion:

Glacial Erosional lakes formed due to alternating freeze- thaw (frost action). They are known as the cirque Lakes/Tarns.

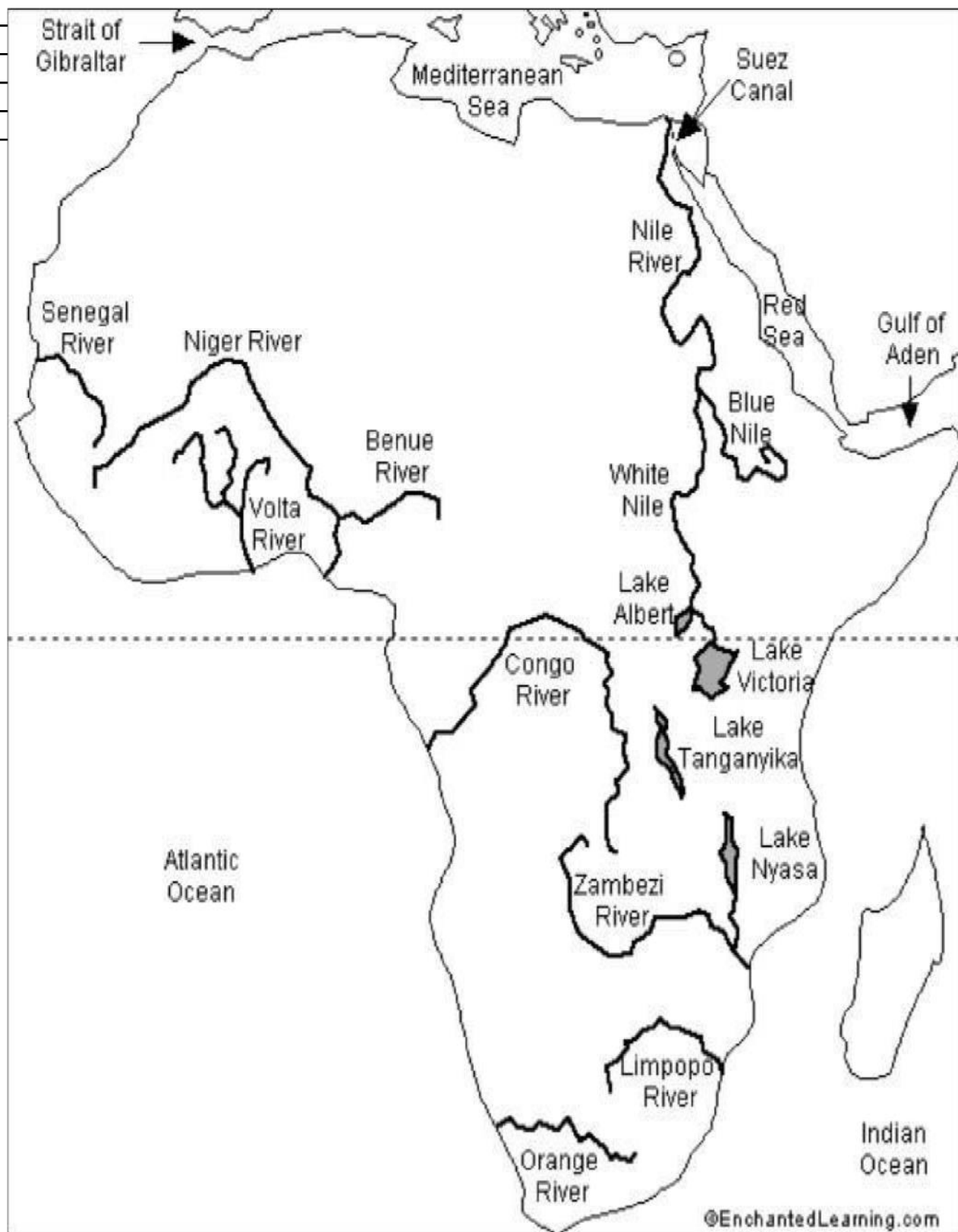
Deposition lakes:

These are lakes formed by deposition of weathered material by either water, ice/glaciers, wind or waves.

They include River depositional lakes, Wave depositional lakes and glacial deposition lakes.

Man-made lakes: These are formed due to man's activities like through the extraction of minerals using open cast method, construction of dams across the rivers; channel development of the agricultural irrigation scheme.

Sketch map showing major rivers and lakes



Task
1. Copy the map in figure 21.7 in your notebook and on it mark and label the;
a) <i>Rivers</i>
b) <i>Lakes</i>

c) *Seas and oceans.*

2. Using the gained in senior one explain how lakes were formed.

a. *Rift valley lakes or Graben lakes.*

b. *Tilt block lakes*

c. *Caldera lakes*

d. *Crater lakes*

e. *Lava dammed lakes*

f. *Downwaped lakes*

g. *Kettle lakes*

h. *Moraine dammed lakes*

Etc.

IMPORTANCE OF RIVERS AND LAKES TO THE DEVELOPMENT OF AFRICA.

How water resources are used and controlled.

Activity 21.13. Understanding how water resources are used and controlled.

In pair, carry out a textbook or internet research and do the following tasks

1. *Make a list of the major water resources in Africa*

2. *Describe how each resource you have listed is used.*

3. *How is each water resource controlled?*

THE CLIMATE AND VEGETATION OF AFRICA.

Climate refers to average weather conditions of a place which is measured and recorded for a very long time usually between 35 and 40 years.

Climate is determined when weather elements are measured and recorded. Such elements include;

- *Rainfall measured by a rain gauge.*
- *Temperature by the sixth thermometer*
- *Humidity by hygrometer*
- *Atmospheric pressure by a barometer*
- *Sun shine by a Campbell stock*
- *Cloud cover by hydrogen filled balloons.*
- *Wind strength by anemometer*
- *Wind direction by wind vane.*

Africa is blessed with a variety of climates and vegetation, their distribution and the effects of these climates and vegetation depends on the human development (activities) and nature.

THE EARTH-SUN RELATIONSHIP

Sunlight is the primary source of energy which is made up of heat and light. The earth's surface has the ability to absorb heat, transmit it, scatter, and reflect the light ray back to the atmosphere.

The sun's movement is apparently caused entirely by the movement of the earth.

The earth both spins on its axis and orbits around the sun. This brings about the change in seasons, causes day and night, changes in temperature. All these affects the climate of African continent.

<i>Activity 22.1. <u>Understanding the relationship between earth and sun.</u></i>
<i>In groups, carry out the research on the relationship and do the following tasks.</i>
<i>1. Draw a diagrams to show the relationship between the earth and the sun's rays.</i>
<i>2. Describe how the earth- sun relationship affects.</i>

a. Changes in temperature

b. Changes in seasons.

3. What happens when the northern and southern hemisphere are tilted towards the sun?

TROPICAL, TEMPERATE AND POLAR REGIONS OF THE EARTH.

The sun heats the earth's surface at different angles. This brings about difference in temperature leading to the division of the earth into tropical, temperate and Polar Regions.

Tropical zone

This is a zone where the temperate are hot throughout year due to high solar insolation from the sun at almost right angle striking the earth's surface.

Temperate zones.

The temperate zones are zones where the temperature are warm. These are located mainly in mild latitude north and south of the equator.

The sun rays strikes these places at almost acute angle hence leading to warm temperatures.

Polar Regions.

These are area where temperature are cold throughout the year. They experience summers and summer.

The sun's rays strikes the surface at almost 180° hence leading to low temperatures.

Task

Activity 22.2. Understanding the tropical, temperate and Polar Regions of the earth.

1. <i>Why is the earth divided into the tropical, temperate and Polar Regions?</i>
2. <i>Find out whether Africa is also divided into the tropical, temperate and Polar Regions.</i>
3. <i>What causes the variation in the temperature of the earth?</i>

Causes of variation in the temperature.

These include the following.

- *Latitude.*
- *Vegetation*
- *Trade winds*
- *Ocean currents*
- *Continentiality*
- *Relief*
- *Cloud cover*
- *Etc.*

NB. The average temperature of coldest month in the temperature zones is lower than that of the tropical zones while the average temperature of the warmest month in the temperate zones is higher than that of polar zones.

THE OVER HEAD SUN AND THE RISING AIR.

The apparent movement of the sun influences rising air, the rainfall pattern and the temperature. Rainfall received in an area also varies with the position of the sun

The sun is overhead at the equator twice a year i.e. 21 March and 23 September. During this period, areas around the equator such as Gabon, DRC, Kenya, etc. receive heavy rainfall.

When the sun is the northern hemisphere, the areas receive heavy rainfall while the southern hemisphere remains dry and vice versa

<i>Activity 22.3. Understanding the overhead sun and the rising air.</i>
<i>1. Describe what happens to air when the sun is overhead</i>
<i>THE INTER-TROPICAL CONVERGENCE ZONES.</i>
This is a zone consisting of high temperatures and low pressure especially along the equatorial regions.

Air masses from different areas of high pressure converge at this zone. I.e. south east trade winds and north east trade winds.

The inter- tropical convergence zone shifts position throughout the year in relations to apparent movement of the sun.

In Africa, it is dominant in sub Saharan African countries excluding the east African coast. ITCZ migrates northward and is positioned over the tropics of cancer.

Migration of the sun

The sun is the main source of heat for a given place on the earth's surface. The amount of heat received in any place on the surface of the earth depends on the great extent to the angle of inclination.

Effects of migration of the sun on weather.

The migration of the overhead sun between the tropics of Capricorn through the equator and tropic of cancer results into ITCZ (Inter Tropical Convergence Zone) conditions that include:

- Winter conditions include; Cool temperatures and dry / unreliable rainfall from the area where the sun migrated from.
- When the sun over heads at the Tropic of cancer in the northern hemisphere the land becomes hotter (warm) than it is in the southern hemisphere (Tropic of Capricorn) i.e. temperatures are hot at the Northern hemisphere and cool at the southern hemisphere.
- Heavy rainfall conditions are experienced in Northern Hemisphere where the sun is overhead and dry conditions in the southern hemisphere where the sun has migrated.

ITCZ also exists when the sun is overhead the Equator and the following conditions are experienced in the region;
▪ Hot temperatures,
▪ High evaporation rates.

- Dense cloud covers in the sky.
- Heavy rainfall.
- Low pressure (doldrums).
- The condition attracts the wind systems to blow towards the equator.
(Winds move from high concentration to low concentrated area).
- Heavy rainfall is received here compared to areas far away from the Equator

Activity 22.3. Exploring the inter-tropical convergence zone.

- a) What do you understand by the term inter tropical convergence zone
- b) Describe how the rising air causes winds to blow from north to south
- c) Find out.
 - i. The position of the inter tropical convergence zone
 - ii. The seasonal movements of inter tropical convergence zone
 - iii. The relationship between the overhead sun, ITCZ, Wind movement and rainfall pattern in Africa.
 - iv. The effect of inter- tropical convergence zone on climate.
 - v. Why places outside the tropics have different kinds of climate not affected by the inter- tropical convergence zone.

CLIMATE OF AFRICA

Africa has arrange of climate zones such as Equatorial, tropical, desert, Mediterranean climate

Temperate climate is rare across the continent of Africa except at a very high elevation is caused by inter- tropical convergence.

Factors influencing climate of Africa.
<i>Activity 22.6. Understanding the factors influencing the climate of Africa.</i>
<i>1. In groups, discuss the factors influencing climate of Africa.</i>

Latitude

Africa is crossed by three major latitudes, i.e. the Tropical of Cancer, Capricorn and the Equator.

Over 3¼ of landmass are within the tropics which means, hot temperatures are experienced all the year around.

However, areas near the Equator do experience hot temperatures and receive rainfall throughout the year than the other in the same areas; where temperature has been modified by the altitude.

This means that areas along the Equator have different climate in terms of temperature and Rainfall.

Relief

Relief is the general description of the landscape. Relief of an area is measured in meters above sea level.

The general landscape is either low, a slope, flat or high i.e. it has valleys, flat lowlands, plateaus, steep slopes, mountains or highlands, etc.

Influence of Relief on climate.

When moist winds blow across water bodies, forests and are in contact with mountain areas or highland, these winds are forced to rise up, and reach a condensations level and form clouds which fall as relief rainfall on the windward side. As the winds cross through above the mountains (highlands) to the other side (Leeward side) they become dry leading to drought.

When winds reach higher elevation up the mountains they condense because of the
effect of altitude (<i>the Higher you go the cooler it becomes</i>) the winds have lost much of
its temperatures into the atmosphere. They condense and become heavy clouds that
eventually fall as rains.

As it falls winds are warmed from the ground surface. Warm air holds moisture such that it loses at higher levels, when it reaches the leeward sides it is dry and absorbs moisture and leaves the place in a dry condition.

Lowland areas do not provide barriers to moving winds since they are flat landscapes, winds just pass and carry along it any moisture present. They are drier lands in most cases e.g. Sahara Desert

Water bodies

The position of the land and sea on earth presents unequal relationship between the land and sea. Land experiences Temperature changes much faster than the sea (Water bodies).

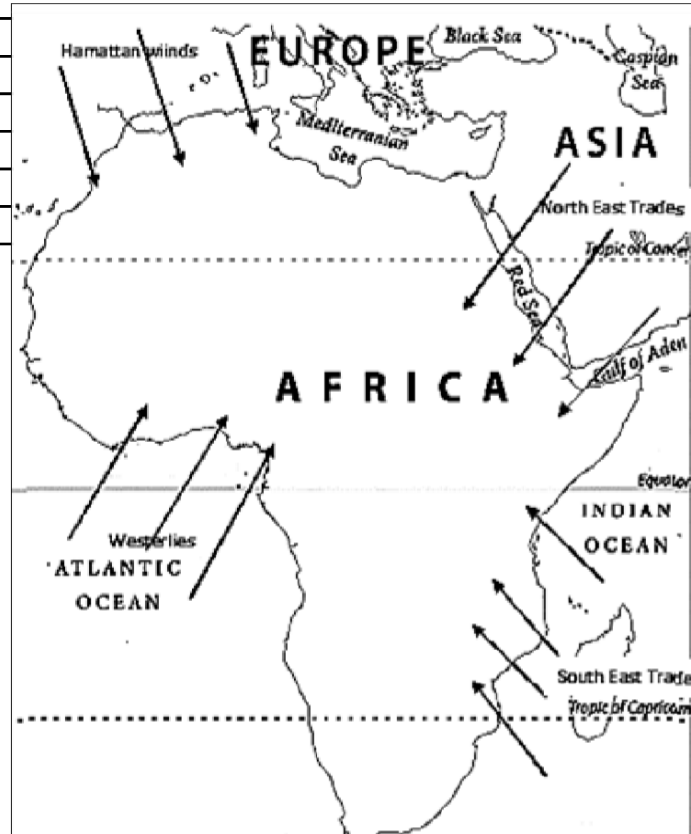
During the day landmass do get heated faster than the sea and evaporation takes place on the land, while a high pressure zone is experienced on the sea with air masses moving towards the land surface.

Wind systems

Prevailing winds are named according to areas they originate from basing on the compass direction.

Africa is influenced by four main wind systems these include

Africa: position of prevailing winds.



The **South West Trade winds** originate from the South West parts of Africa all the way from the Atlantic Ocean onto the Interior West Africa countries and masses. They carry moisture to that cause heavy rainfall to the coastal areas.

Harmattan winds originate from the Alps region of West Europe. They are only dry and cold winds. They cause little or no rain fall on the landmass of North Africa. Its effects may lead to the afternoon and the early morning's rains on the areas near to the Mediterranean Sea.

The South East Trade winds carry the moisture from the Indian Ocean where they
come from and drop it on the Interior of Africa. These winds bring in Rainfall. They are
responsible for heavy rain fall received along Natal province and other parts of the East
African Coast.

The North East Trade winds originate from the North East Africa parts of the continent coming from Asia Continent through Arabian Desert to the Red Sea and they proceed to the whole of Africa.

These winds are forced to rise over the Ethiopian Highlands and form Relief rainfall on the wind ward side. Winds that proceed to the leeward side of the highland lead to desert conditions in the Northern parts of

Kenya, Somalia, North Eastern Uganda and Sudan because they carry no moisture to the Northern parts of Africa.

These winds are partly responsible for the dry conditions and low temperatures during night on the Sahara deserts.

Vegetation: Areas with tropical rainforests receive heavy rainfall due to abundant moisture release through evapo-transpiration e.g. near Congo basin forest in DRC while areas without vegetation cover receive hot temperatures and low rainfall e.g. Sahara region, Namibi and Sahel.

Distance from the sea (continentality)

Cloud cover

Coastal alignment

Ocean currents.

Influence of ocean currents.

An ocean current is the movement of the mass of water within the ocean. Ocean currents are normally warm or cool. Therefore, are named according to the conditions of the temperature.

Ocean currents are set in motion by wind system and reduce force.

Ocean currents are cold /cool or warm.

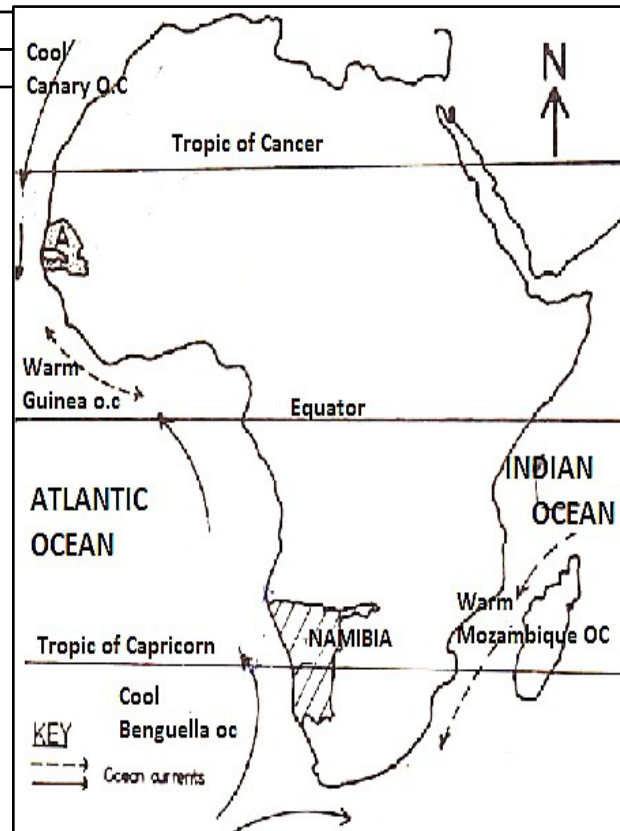
Cold ocean currents originate from the cold parts of the world. (Polar region).

Characteristics of ocean currents.

- a) They have a specific direction of flow. Cold ocean currents move from Polar Regions towards the Equator while Warm ocean currents move from Equator towards the polar region.
- b) Ocean currents carry specific temperatures with them. Warm ocean currents carry warm temperatures towards the polar region. While the cold ocean currents carry the cold temperatures towards the Equator.
- c) Ocean currents move in the clockwise direction in the Northern Hemisphere except the warm guinea currents which are anti-clockwise in the Southern Hemisphere due to earth movements.
- d) Warm ocean currents are always located on the Eastern side of the continent except the guinea warm currents. While cold currents are found on the western side of the continent.
- e) Cold ocean currents induce condensation on the ground surface forming fog. (Lower clouds) and dry winds desert condition.

f) Warm ocean currents are moist and induce evaporation, cloud formation and rainfall.

COOL AND WARM OCEAN CURRENTS



Causes of ocean currents.

Effect of prevailing winds; tend to drift water in the ocean from one place to another e.g. the south west trade winds influence the flow of the cool Benguela ocean currents towards Equator.

Temperature differences; causes the oceanic currents, the winds consequently cause convection currents to set up that drive the warm water of the equatorial climate towards the polar. Warm equatorial waters are less dense than polar.

Rotation of the earth

Causes defective falls over the ocean currents known as the Coriolis force that causes the ocean currents to flow clockwise in the southern hemisphere.

<u>Salinity</u> refers how much salt content is in water. Water with high salinity flows to areas
of low salinity and vice versa leading to ocean currents.

<u>Nature of coasts</u>

Coastal configuration and presence of sub marine ridges can also cause currents in
ocean both north and south equatorial currents are reflected in north and south
respectively to the shape of the coast.

Tides;

The sun and the moon exert gravitation and attraction on the earth's surface this refers to rolling and following motions to develop on water of large oceans result into movement of ocean currents.

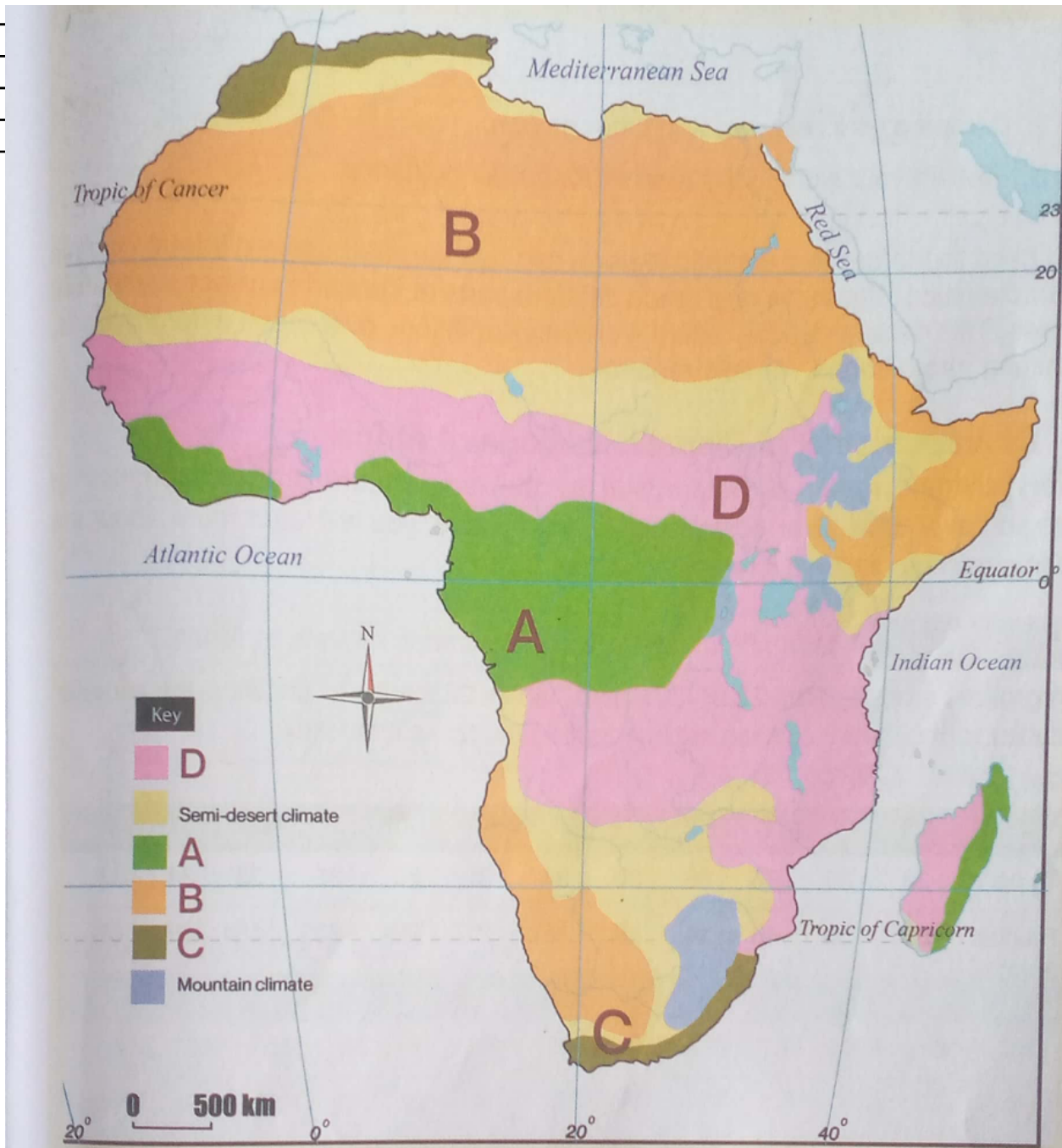
Effects of ocean currents on the Climate of Africa.

- Warm ocean currents, raises temperatures of adjacent areas e.g. Warm Mozambique currents at Natal coast of South East Africa.
- Warm Ocean currents bring in high humidity to the adjacent coastal areas.
- Warm ocean currents cause heavy rainfall to the adjacent coasts of West Africa and the Natal province of Republic of South Africa.
- Cold ocean current to cool temperatures of adjacent areas because they act as heat traps and warmth of crossing over winds.
- Cold Ocean currents are associated with cold and dry climatic conditions e.g. aridity in an area.
- Cold ocean currents result into lower ground clouds because moisture is reduced to condense the surface of earth.
- Cold ocean currents limit the amount of humidity in the atmosphere of the adjacent coast.
- There is low cloud cover /clear blue sky at areas near cold ocean currents.
- Cold ocean currents are associated with desert conditions on the adjacent coast and dry winds.

MAJOR CLIMATE REGIONS OF AFRICA.

Climate regions in Africa have been classified in categories each with sub climatic

types. This is done depending on the distance of the region from the equator.



EQUATORIAL CLIMATE:

This is experienced between 0° to 5° south and north of the equator particularly in the western part of Africa

Equatorial climate extends to the following countries in Africa; Countries covered by the Congo basin, central Africa republic, the guinea coast, Equatorial Guinea, Gabon, Southern Nigeria, Benin, Ghana, Togo, Cameroon Ivory coast, and Southern Sudan etc.

Activity: 22.7 understanding the factors and characteristics of equatorial climate in Africa.

Study the table below showing climatic statistics Of Libreville – Gabon:

Months	J	F	M	A	M	J	J	A	S	O	N	D
Temp °c	30	31	31	30	29	28	27	27	28	29	30	30
Rain (mm)	250	250	325	300	213	25	25	25	100	275	380	200

Source: Minns W.J. A Geography of Africa, New Edition Pg. 37.

a) Draw a suitable graph to represent the information on the table above.

b) Calculate the;

i. Mean Annual Rainfall.

ii. Mean Monthly Rainfall

iii. Mean Annual Temperature.

iv. Annual Temperature Range.

d) Describe the characteristics of the climate at the station.

e) Using ICT or Library resources, describe the factors that led to the existence of equatorial climatic regions in Africa.

Possible response

(i) Mean Annual Rainfall

M.A.R = Total Rainfall for 12 months

1 year	
MAR	$= \frac{250+250+325+300+213+25+25+125+100+275+380+200}{1}$
1	
M.A.R	$= \underline{2368\text{mm}}$

ii) **Mean Monthly Rainfall (MMR)**

= Total rainfall for 12 months.

12

$$= \frac{250+250+325+300+213+25+25+125+100+275+380+200}{12}$$

12

$$\text{MMR} = \frac{2368}{12} = 197.33\text{mm}$$

12

Mean Annual Temperature

MAT = Total Temperature for 12 months

12

$$\text{MAT} = \frac{30+31+31+30+29+28+27+27+28+29+30+30}{12}$$

12

$$\text{MAT.} = \frac{350}{12} = 29.17^{\circ}\text{c}$$

(iv) **Annual Temperature Range**

ATR. = (Hottest – coolest)

$$\text{ATR} = 31 - 27 = 4^{\circ}\text{c}$$

COMBINED BAR AND LINE GRAPH SHOWING CLIMATE OF LIBREVILLE, GABON.

c) Characteristics of the climate at the station:

- Experience hot temperatures about 27°C to 31°C throughout the year.
- The annual range of temperature for the station is small of 4°C.
- Temperature is almost uniformly distributed throughout the year.
- The mean annual temperature received in the station is 29.17°C.

- | |
|--|
| ▪ The station is hot and wet in most months of the year. |
| ▪ Experience double maxima of rainfall in March and April, the October and November. |
| ▪ Receives a high mean annual rainfall of 2368mm a year which is heavy. |
| ▪ The station receives rainfall throughout the year. |

The hottest months in the year is December to April with temperatures from 30°C to 31°C

Factors that have influenced the characteristics of equatorial climate.

Using ICT or Library resources, describe the factors that led to the existence of equatorial climatic regions in Africa.

- Movement of the overhead sun along the tropics of Cancer, Capricorn and equator, during this period these areas do experience; warm temperature, heavy rainfall, thick cloud cover in the skies and high humidity.
- Presence of dense vegetation cover, which encourages evapo-transpiration in a way recharge the winds and atmosphere with water vapor that rise to form convectional rainfall.
- Location along the latitude Equator, an area of doldrums, hot temperatures and rainfall.
- Relief, equatorial areas are located on lowland areas which are associated to hot temperatures.
- Adjacent to the warm Guinea ocean currents that raise the temperature and moisture content to the areas of the adjacent coastal lands of West Africa and Central African countries.
- Existence of numerous water bodies which help to recharge the moving winds on landmass adjacent to lakes, oceans or rivers through Lake Breeze and land breeze. Eventually these winds shall fall as convectional rains.
- Presence of a low pressure belt and hot temperatures in the Equatorial areas contribute to the Equatorial climate.
- Prevailing winds attracted to Low pressure belt e.g. NETS, SETS, and SWETS etc.

are forced to rise to form Convictional Rains.

Characteristics equatorial climate.

Describe the characteristics of the climate at the station.

- Experience heavy rainfall above 1800mm per year for areas adjacent to Equator and 1000 mm to areas far from Equator.
- Equatorial areas receive rainfall throughout the year / wet throughout the year.
- The region experiences double maxima (two rainfall peaks twice a year) whenever the sun is overhead equator on 21st, March and 21st, September each year.
- Experience convectional type of rainfall caused by convergence of NETS, SETS & SWETS or effects of ITCZ.
- Rain is experienced in afternoons and Morning hours with lightening.
- Receive a high mean annual temperature is 27°C.
- Receive hot and evenly distributed Temperatures throughout the year.
- Experience a small temperature range of less than 3°C and diurnal temperature.
- The equatorial areas are hot and wet throughout the year.
- Experience equinox i.e. equal days and equal nights.
- Areas experience a dense cloud cover in the sky

Economic activities carried out in the Equatorial lands.

Tasks.

Using of ICT or library resources, Giving reasons for your answer, suggest at least five economic activities practiced in the equatorial regions of Africa.

- Lumbering in the Rainforests in the countries like; Gabon, Congo, CAR, Ghana and Benin.
- Plantation farming is practiced mainly the growing of Cocoa, Rubber, Palm Oil, etc.
- Hunting and gathering of fruits from the forest.
- Fishing from rivers e.g. R. Congo, R. Volta, Niger delta, R. Ogooue, etc.
- Industrialization, mainly, sawmills for wood products, boat building, agro-processing industries, manufacturing of household products, etc.

- | |
|---|
| <ul style="list-style-type: none"> ▪ Tourism in the rainforests and harvesting of raw materials for art and craft industry promoted by the tourist sector. |
| <ul style="list-style-type: none"> ▪ Mining of minerals oil mining in Nigeria, iron ore and manganese in Gabon, aluminum in Ghana, Copper and Gold in copper Belt of Zaire, etc. |

Problems faced by people living in the equatorial lands.

- Boggy conditions have led to transport difficulty on underdeveloped muddy road transport network.
- High inconvenience for air transport as a result of invisibility over equatorial rainforests sometimes causing plane crash.
- Severe soil erosion due to heavy rains throughout the year.
- Soils are heavily leached due to heavy rains; this causes much soil exhaustion and on bare soils.
- Dangerous wild animals in the rain forests and rivers are a threat to farmer's crops and human lives.
- Political instability or insecurity due to constant rebel activities carried out by rebels who turned rainforests as their hideouts e.g. LRA in CAR.
- Shortage of land for agriculture and settlement because much of the land is under rainforests which is restricted for forest conservation.
- People are infected with diseases from vectors like poisonous insects, snake bites, mosquitoes, tsetse flies etc.

Outline the steps being taken to solve the problems faced by people living in equatorial lands.

- Construction of all-weather roads and railways resistant to heavy rains and improve the radar system to air transport.
- Construction of hospitals and health centers as treatment for people infected with diseases from poisonous insects, snake bites, mosquitoes, tsetse flies, etc.
- Employing game rangers to gazette dangerous animals in the forests to

conservation units.
▪ Deployment of peace keeping forces by UN to push out rebels from the forests, e.g. the UN forces in D.R. Congo.
TROPICAL CLIMATE.

This is experienced between 5° to 15° north of the equator extending to 23° south of the equator.

This climate falls within the transition zone between equatorial climate and the semi desert climate.

It covers the parts of West Africa, the North East Africa, the Central Africa, that is to say countries like Zambia, Mozambique, Zimbabwe, Karoo in South Africa, Northern parts of Nigeria, Burkina Faso, parts of Niger, parts of Chad.

Activity 22. 8. Understanding the tropical climate

In groups, Study the table below showing climatic statistics and answer the questions that follow.

Harare – Zimbabwe.

Months	J	F	M	A	M	J	J	A	S	O	N	D
Temp °c	24	23	22	21	20	18	17	18	20	23	24	24
Rainfall(mm)	200	175	100	25	20					50	100	175

Source: Africa by Minns Pg. 36

Task.

a) Draw a suitable graph to represent the information on the table above.

b) Calculate the;

i Mean Annual

Rainfall

ii Mean Monthly Rainfall

iii Mean Annual Temperature

iv Annual Temperature Range.

d) *Describe the characteristics of the climate at the station.*

e) *Using ICT or Library resources, describe the factors that led to the existence of tropical climatic regions in Africa.*

Soln.

b) (i) The Mean Annual Rainfall;

$$= \frac{\text{Total Rainfall in a year}}{1 \text{ year}}$$

$$= \frac{200+175+100+25+20+50+100+175}{1}$$

$$= 845\text{mm.}$$

(ii) **Mean Monthly Rainfall.**

$$= \frac{\text{Total Rainfall in 12 months}}{12}$$

$$= \frac{200+175+100+25+20+50+100+175}{12}$$

$$= \frac{845}{12} = 70.41\text{mm}$$

(iii) **Mean Annual Temperature;**

$$= \frac{\text{Total Temperature for 12 Months}}{12}$$

$$= \frac{24+23+22+21+20+18+17+18+20+23+24+24}{12}$$

$$= \frac{219}{12}$$

$$= 18.25^{\circ}\text{c}$$

Characteristics of savanna climate/ Tropical climate

- Summers experience hot temperatures throughout the year well over 20°C to 30°C.

▪ High mean annual rainfall is experienced in summers and the amount varies with
its nearness to the equator where it is up to 1270 to 1500mm p.a. and up to
380mm p.a. towards the desert margins.
▪ Winters are warm with temperature up to 15°C.
▪ Little or no rainfall is received in winters.

- Experience convectional type of rainfall because heated air rise and is cooled adiabatically in summers.
- There is low relative humidity during winter (dry season) and it gets higher during summer (wet) season.
- There is one dry season and one wet season received in a year.
- The diurnal temperature range is high about 8 °C.
- The annual temperature range is low of between 6°C to 8°C.
- Rainfall has a mono model or single peak- single maxima i.e. falling between June to August in the northern hemisphere and between November to February in the Southern Hemisphere.
- Rainfall received is accompanied in thunder storms and lightening.
- Rain fall is unreliable in some cases due to amount received and it falls.
- Experience strong prevailing winds that cross flat lands of savanna zones.
- Mild humidity is experienced during winter and high of about 80% in summer.
 - Experience plenty of sun shine throughout the year.

Factors / conditions that influence the characteristics of tropical climate.

- Influence of the ITCZ as the sun over heads the latitudes of tropic of cancer and tropic of Capricorn which increase temperatures, high evaporation rates, a low pressure zone on land surface and eventually heavy rainfall.
- Influence of the prevailing winds that are attracted by a low pressure zone located in the tropics e.g. the South East prevailing winds from Indian Ocean or the South West winds from the Atlantic Ocean do lead to hot temperatures and heavy rainfall formation.
- Latitudinal location. Location between the tropic of cancer and tropic of Capricorn

which experience the effects of ITCZ, hot temperatures throughout and low pressure.

- Savanna lands are partly near large water bodies like the Atlantic Ocean and Indian Ocean; these areas experience the effects of Lake Breeze and land breeze that modify climate.

- Proximity to deserts like Sahara and Namib, areas that have scanty vegetation cover, dry winds and extremely hot sunshine lead to dry savanna lands.
- The effect of dense vegetation covers to areas nearer the equatorial climate, lead to evapo-transpiration to modify the climate by recharging moving winds with moisture.
- Human activities which involve; clearing of vegetation and accelerating soil erosion through traditional farming methods; Pastoralism, over grazing, deforestation etc. lead to the growth of secondary vegetation and affect the original climate.
 - Effect of relief: High Mountains influence dry conditions on the lee ward side and also low land areas experience hot temperatures and have no effect on moving moist winds to cause rain fall in the savanna.

Economic activities carried by people living in savanna climate.

- a) Encourage arable farming e.g. cultivation of crops (subsistence farming) like maize, sorghum, millet, etc.
- b) Commercial farming mainly growing of crops like cotton, tobacco, coffee, sisal, fruits, etc. purposely for income.
- c) Pastoralism i.e. rearing of animals like cattle, goats, donkeys by the Fulani groups of West Africa, who grazes on the extensive savanna grasslands (practice Nomadism).
- d) Bee keeping is practiced in the range lands for income, with the help of existing flowering plants for nectar.
- e) Lumbering of large tree trunks from the woodlands mainly trees near equatorial lands.
- f) Tourism in the game Parks, game reserves and sanctuaries mainly found in the tropical climate / savanna range lands.

g) Mining of minerals e.g. copper in the Zambia – Zaire copper belt, gold and Diamonds in South Africa, coal in Zimbabwe, etc.
h) Charcoal burning in the savanna range lands for sale to urban areas to earn income.
i) Hunting of wild animals e.g. Antelopes, Buffalo, rats, etc. for bush meat in the woodlands.

Problems faced by people living in savannah lands.

In pairs, use ICT or Library resources, identify and explain the problems faced by people living in savannah lands in Africa

- Bush burning during the dry season by the pastoralists and tourists lead to growth secondary vegetation.
- Prevalence of pests like tsetse flies etc. and diseases do affect man and his animals.
- Poaching in the game parks by hunters and pastoralists.
- Soil erosion during dry and wet seasons due to primitive methods of farming and other human practices on the environment e.g. clearing of vegetation for farming.
- Soil exhaustion due to monoculture practice by commercial farmers, etc.
- Land conflicts over struggle for land.
- Cattle rustling by pastoral communities.
- Attacks from wild animals which go past the game parks and reserves.

EXERCISE.

Kano – Nigeria.

<i>Months</i>	<i>J</i>	<i>F</i>	<i>M</i>	<i>A</i>	<i>M</i>	<i>J</i>	<i>J</i>	<i>A</i>	<i>S</i>	<i>O</i>	<i>N</i>	<i>D</i>
<i>Temp °c</i>	22	24	27	32	31	27	26	25	26	26	25	23
<i>Rainfall(mm)</i>				25	75	125	200	150	50	25		

Source: Africa by Minns

a) Draw a suitable graph to represent the information on the table above.

b) Calculate the;

i) Mean Annual Rainfall (MAR)

<i>ii) Mean Monthly Rainfall (MMR)</i>
<i>iii) Mean Annual Temperature (MAT).</i>
<i>iv) Annual Temperature Range. (ATR)</i>
<i>c) Describe the characteristics of the climate at the station</i>

HOT DESERT AND SEMI DESERT CLIMATE

This is experienced in the tropical belt of North Africa i.e. Sahara desert, and the Mediterranean coastal lands i.e. Kalahari and Namib deserts of southwest Africa

There are two types of deserts in Africa:

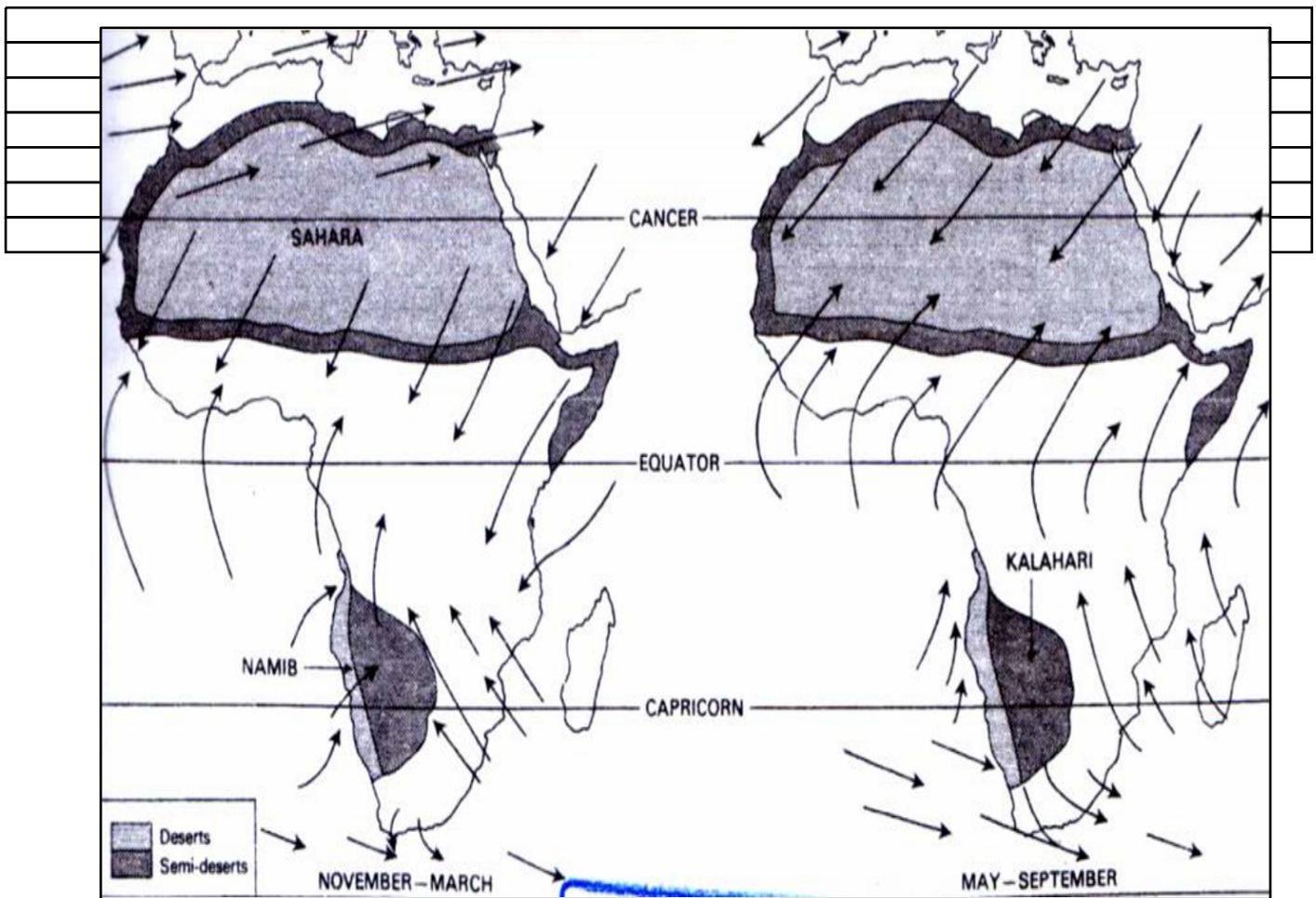
a) *Hot Continental interior deserts - Sahara Desert.*

Continental deserts- those found in the interior of the continental mass like the Sahara desert in the north and Kalahari Desert in the southern section.

b) *The coastal deserts of western margins or Marine deserts: Namib Desert in Namibia.*

Marine deserts- those next to large water bodies influenced by cold ocean currents like the Namib Desert in southwest Africa

A sketch map showing the location of deserts and semi desert climate.



Characteristics of Desert Climate;

Use library resource to describe the characteristics of a semi – arid or arid climate.

- Experience high evaporation rates due to hot temperatures from excessive

sunshine during day.
b) Experience little rainfall of less than 250mm per annum / no rainfall at all for many months a year.
c) Experience hot and dry conditions throughout the year.

- d) Experience strong winds blowing or wind storms which are generally dry.
- e) High diurnal temperature range of over 25°C.
- f) High annual temperature range between 13°C at the desert margins up to 30°C to 58°C in the interior of the desert.
- g) Low humidity throughout the year.
- h) Very cold nights and Very hot days.
- i) Experience little / cloudless skies.

Factors that led to existence desert climate.

In pairs, carry out resource to identify and explain the conditions that have led to the existence of desert type of climate.

- a) Location along the horse latitudes i.e. Tropic of cancer for Sahara Desert and Tropic of Capricorn for Namib Desert are regions of High Pressure belt where winds blow away causing arid conditions.
- b) Continentally i.e. absence of large water bodies within the interior of the continent e.g. the Sahara Desert.
- c) Location on the western sides of continents where the winds are off-shore leading to aridity.
- d) Rain shadow effects due to presence of the Ethiopian highlands and Drakensburg Mountains in South Africa.
- e) Presence of scanty vegetation that limits evapo-transpiration process that would lead to rainfall formation.
- f) On shore winds crossing the cool canary and cool Benguela ocean currents bring dry conditions and cool temperatures to the adjacent areas.

- | |
|---|
| g) Human activities e.g. bush burning; mining can cause greenhouse effects, deforestation, overgrazing etc. Lead dry conditions and hot temperatures. |
|---|

Economic activities in the desert lands.

- | |
|---|
| <ul style="list-style-type: none"> ▪ Nomadic Pastoralism; animal herding in scanty pasture for milk, blood and meat. |
|---|
- Cultivation of drought resistant crops and fast maturing crops for food e.g. date palms.
 - Tourism due to the spectacular landscape and desert landforms to generate foreign exchange
 - Mining of petroleum in Algeria and Libya, Sudan, Tungsten and diamonds in Namib Desert as well as salt in pans of Egypt; for export to earn foreign exchange and revenue to country.
 - Irrigation farming e.g. in the Nile valley and around oases.
 - Bee keeping in the semi-desert lands due to existing scanty flowering plants.
 - Caravan trade and transport with help of camel and donkey across the sandy landscape.

Problems faced by people living on desert margins:

- a) Limited supply of surface water for livestock and human consumption.
- b) Shortage of pasture for livestock rearing leading to nomadic way of life.
- c) Infertile sandy soils which do not support agriculture or cultivation of crops lead to shortage of food.
- d) Low and unreliable rainfall limits the growth of crops and dense vegetation cover.
- e) Excessively hot temperatures during that day do not support human settlement and his animals.
- f) Very cold nights due to absence of cloud cover at night is not favorable for human life.
- g) Remoteness of some desert areas because of uneconomically viable production to encourage infrastructure development in these areas.
- h) Sparse population makes it difficult to provide social economic services to the people by government.

- | |
|---|
| i) Limited supply of food due to crop failure leading to severe famine, starvation, diseases and death. |
| j) Sandstorms are very common lead to loss of lives and bronchial disease, eye problems, etc. |

Desertification.

This is a process by which land becomes increasingly dry until almost no vegetation grows on it, turning into a desert.

Desertification may mean a decline in the biological or economic productivity of the soil in arid and semiarid areas resulting from various factors, including human activities and variations in climate.

Desertification refers to the formation and expansion of degraded soil, not to the advancing movement of the current deserts.

Desertification occurs in cropland (both irrigated and non-irrigated), pasture, and woodlands. Loss of soil, deterioration of soil, and loss of natural vegetation all lead to desertification.

How human activities have led to Desertification.

- (i) **Industrialization** has led to discharge of carbon monoxide into the atmosphere causing the greenhouse gasses that latter increase the temperatures in the atmosphere and eventually drying of vegetation.
- (ii) **Burning of vegetation** as a traditional practice of the pastoralists to get new pasture germinates deprive moisture in soil.
- (iii) **Overgrazing** by the pastoralists reduce vegetation cover that would cause rain formation.
- (iv) **Deforestation**, trees are cut down for preparation of gardens to cultivate, firewood, building shelters, etc. leave land without vegetation to protect soil.
- (v) **Traditional farming practices** which lead to soil erosion, loss of soil fertility and eventually extensive loss of vegetation.

(vi) ~~Swamp reclamation~~ will lead to loss of water bodies that would modify the climate by recharging the atmosphere with moisture.

(vii) ~~Mining~~ in which much vegetation cover is lost in the process of excavating minerals and eventually loss of water vapor in the atmosphere.

(viii) ~~Construction of infrastructure~~ to lay down roads, building, recreational facilities, etc. degrade the soil structures and accelerate loss of vegetation cover and moisture

Tasks

How government is solving the problems affecting arid and semi-arid areas in Africa.

- a) Practice a forestation and re-a forestation or planting of trees to restore formation of rainfall.
- b) Government has legalized cutting down of trees and gazette forests to conserve trees.
- c) Construction of dams to introduce irrigation farming and water reservoirs for human consumption.
- d) Construction of boreholes and valley dams to provide water for animals and domestic uses in away reduce nomadic pastoralist movements and losses.
- e) Open up demonstration farms to teach natives, economically viable farming practices, e.g. ranching and horticulture.
- f) Introduce drought resistant and fast maturing crop species as a means to improve on food production.
- g) Donation of food to starving communities or food aid by World Food Program.
- h) Donations in form of medicine and building hospitals to treat people suffering from malnutrition.
- i) Public sensitization extended to the nomads on the need to reduce the size of herds and teach them effects of over stocking e.g. land degradation, etc.
- j) Alternative energy sources be introduced and intensified like solar energy, natural gas, for urban users in order to save trees.

Activity.22.29. Understanding the Desert and semi desert climate.

Study the table showing the climatic statistics of stations under desert climate and answer questions that follow.

(i) Walvis Bay – Namibian Coast - Desert

Months	J	F	M	A	M	J	J	A	S	O	N	D
Temp °c	18	19	19	18	17	16	16	14	15	17	18	17
Rain (mm)	3	3	7	3	-	-	-	-	-	-	-	3

Source: Africa by Minns Pg 32

ii) Cape Jury – Moroccan coast - Desert

Months	J	F	M	A	M	J	J	A	S	O	N	D
Temp °c	16	16	17	18	18	20	20	20	21	20	18	16
Rain(mm)	13	13	13	-	-	-	-	13	13	13	13	25

Source: Africa by Minns Pg 34

iii) Timbuktu – Mali – Semi-desert.

Months	J	F	M	A	M	J	J	A	S	O	N	D
Temp °c	12	15	20	25	30	35	37	36	33	26	20	16
Rain(mm)	-	-	3	10	10	35	85	50	13	12	-	-

Source: Africa by Minns Pg 35.

Solution

(a) Draw a suitable graph to represent the climate of Timbuktu.

(b) Calculate:

(i) Total rainfall;

$$= 3+10+10+35+85+50+13+12.$$

$$= 218\text{mm}.$$

(ii) Mean Annual temperature;

$$= \frac{12+15+20+25+30+35+37+36+33+26+20+16}{12}$$

12

-	<u>305</u>
	12
=	25.45°C
(iii) Annual Temperature range of Timbuktu.	

$$= 37 - 12 = 25^{\circ}\text{C}$$

Describe the characteristics of climate of Timbuktu.

- The station experience warm to mild temperatures of 12 °C to 16°C in the months of December to February.
- The station experience hot to very hot temperature of 20°C to 37°C from March to November.
- The station receives heavy rainfall in July and August of 85mm and 50mm respectively.
- The station receives little rainfall and dry in most parts of the year from September to June.
- The mean annual rainfall received in the station is very low of 218mm.
- The hottest month of the station is June, July and August at 35°C, 37°C and 36°C respectively.
- The station has a large temperature range of 25°C.
- The station is hot and dry generally.

(c) Using ICT or library resources, Explain the:

(i) Factors which affect the climate of Timbuktu.

- Location near the horse latitudes i.e. Tropic of cancer for Sahara Desert is regions of High Pressure belt where winds blow away causing arid conditions.
- Continentality i.e. absence of large water bodies within the interior of the continent e.g. the Sahara Desert.
- Location on the western sides of continents where the winds are off-shore leading to aridity.
- Presence of scanty vegetation that limits evapo-transpiration process that would

lead to rainfall formation.
• On shore winds crossing the cool canary ocean currents bring dry conditions and
cool temperatures to the adjacent areas.
• Human activities e.g. bush burning; mining can cause greenhouse effects,
deforestation, overgrazing etc. lead dry conditions and hot temperatures.

(ii) Effects of climate in Timbuktu on human activities.

- Nomadic Pastoralism is practiced due to little rainfall and absence of large water bodies.
- Irrigation farming is practiced in areas of dry and unreliable rainfall in the area.
- Caravan trade is practiced, dealing in animal products and general merchandise.
- Industrialization due to provision of raw materials from animal rearing e.g. skins and hides, meat packing, milk cooling plants.
- Tourism due to the interesting landscape and desert landforms to generate foreign exchange.
- Cultivation of drought resistant crops and fast maturing crops for food e.g. date palms.

MEDITERRANEAN CLIMATE.

- Also is called Warm Temperate western margins.
- It is located around the Cape Town region of South Africa and in the northern parts of Morocco, Algeria and Tunisia.

Characteristics of Mediterranean climate.

- Moderate annual Rainfall ranging between 250mm – 1000mm per annum.
- Experience hot sunny and dry summers from June to October and summers are relatively short lasting 4 months.
- Winters are cool and wet between October and May, the cool wet season is relatively long.
- Heavy rainfall is received in winter between Octobers to March.
- Receives a mono modal (single maxima, rainfall regime).
- Rainfall totals during the wet season are relatively uniform with heaviest rainfall

received in December.
• Winters are cool and cloudy with dump air and rain.
• High relative humidity is received in winter and low in summer & summers are generally sunny.
• Has large annual temperature range of 14°C

Economic activities in the Mediterranean Climate.

- Lumbering industry due to presence of Mediterranean vegetation.
- Arable farming mainly growing of annual crops like cereals like wheat, fruits, potatoes, vegetables, etc.
- Animal rearing like cattle, sheep, goats due to presence of pasture.
- Game hunting in the range lands.
- Food gathering like roots, fruits, etc.
- Mining industry.
- Wildlife conservation to promote tourism.
- Trade due to crop growing and animal rearing.
 - Transport industry.

Problems faced by the people in the Mediterranean lands.

- Unreliable rainfall mainly in summers up to relatively long to 4 months.
- Costly irrigation farming.
- High evaporation rates due to hot temperatures in hot sunny summers.
- Shortage of water and pasture during the long dry hot sunny summers.
- Shortage of food during the droughts.
- Transport difficulties during the wet months in mountainous areas.
- Pests and diseases during the dump humid and rainy winters.

Activity 22.30. Understanding the Mediterranean climatic condition of Africa,

Study the table below showing the climate of station A and answer the questions below;

Table I: Climate statistics of station A.

Months	J	F	M	A	M	J	J	A	S	O	N	D
Temp °c	12	13	14	16	19	22	25	26	24	21	17	13
R/F(mm)	110	90	90	60	35	15	3	10	30	80	115	135

a) Draw a suitable graph to represent the information on the table above.

b) Calculate the;

i Mean Annual Rainfall (MAR)

ii Mean Monthly Rainfall (MMR)

iii Mean Annual Temperature (MAT).

iv Annual Temperature Range. (ATR)

c. Describe the characteristics of the climate at the station.

d) State the:

i Economic activities that can be carried out.

ii Problems faced by People living in areas where station A is the found.

iii Hemisphere in which the station A is located.

Possible Solutions.

b) (i) Mean Annual Temperature.

=Add all the temperature for 12 months in a year

12

=12+13+14+16+19+22+25+26+24+21+17+13

12

= 222 = 18.5°C = 19°C

12

(ii) Annual Range of

Temperature; =

Highest temp -

Lowest temp.

= (26 - 12) °C = 14°C

(iii) Mean Annual Rainfall;
= <u>Add rainfall for 12 months</u>
1 year
<u>110+90+90+60+35+15+3+10+30+80+115+135</u>

1 year

= 773 mm p.a.

D (iii) the station is in the Northern hemisphere in Mediterranean climate.

MONTANE CLIMATE.

There are many high mountains and plateaus regions in Africa. This include; the Ethiopian highlands, the Drakensburg, etc.

Their altitude changes with effects on temperatures.

The size and altitude of mountains affects the distribution of rainfall over large areas.

Temperatures decrease with increasing altitude and thus we find permanent snow and ice on Africa's highest peaks.

Temperatures increase with decreasing altitude; thus we find some of the hottest temperatures on (lowlands) in Africa in the Danakil desert in Ethiopia where large areas are below sea level.

Temperatures changes by about 2°C for every 300 Meters rise or decrease in altitude.

Mountain ranges and high plateaus cause much of relief rainfall.

The slopes that face rain bearing moist winds are very well watered indeed, but on the far side (leeward side), away from these winds, there is often much less rainfall.

By the time rain bearing winds reach the peaks of a high mountain, there is little moisture left in the air. Thus the very tops of these mountains do not receive as much rain / snow as the lower slopes.

As the air falls down other side of the mountain becomes warmer and warm air does not loss its moisture. Thus the windward slopes are often wet and leeward slopes are often dry. These areas are known as **Rain shadows**.

<u>Characteristics of Montane climate.</u>
❖ The temperature decreases with an increase in height or altitude.
❖ They receive relief or orographic rainfall mainly on the windward side of highlands.
❖ The upper slopes of the mountains do not receive as heavy rainfall compared to the lower slopes.
❖ Where altitude exceeds 4500m above sea level, the areas are covered by permanent snow (glaciers) e.g. Atlas Mountains, Ethiopian highlands, etc.
❖ The leeward slopes are often dry due to the rain shadow effect.
❖ Lower slopes are warmer than higher slopes.

Economic activities carried out in montane climate.

❖ Tourism encouraged by existence of permanent snow and glacial features that attract tourists that brings in foreign exchange.

❖ Lumbering encouraged by Montane forest on slopes of that receive heavy rainfall.

❖ Agriculture for food production on the windward slopes that have fertile soil and receive heavy rainfall.

❖ Nomadic pastoralism on the leeward sides of the highlands with dry weather conditions.

❖ Mineral exploitation encouraged by occurrence of some mineral deposits in mountain rocks e.g. copper at Kasese.

VEGETATION OF AFRICA

Definition of vegetation:

- Vegetation refers to all forms of plant life growing in an area.
- As a community of plants like trees, scrubs, herbs, woodland and grasses that cover an area and give it a distinct character.
- Vegetation is the living mantle of plants (flora) which covers much of the land surface forming an important aspect of the physical environment.

Natural vegetation is that of type of plant life that grows particularly in a particular physical environment. It can be a forest, grassland or scrub.
Vegetation is very important because the natural vegetation provides a good base for rational use of land for economic benefit.

The natural vegetation of Africa has been adversely affected by human activities that today; Africa has a very small percentage of her original vegetation cover left.

Vegetation types found in Africa

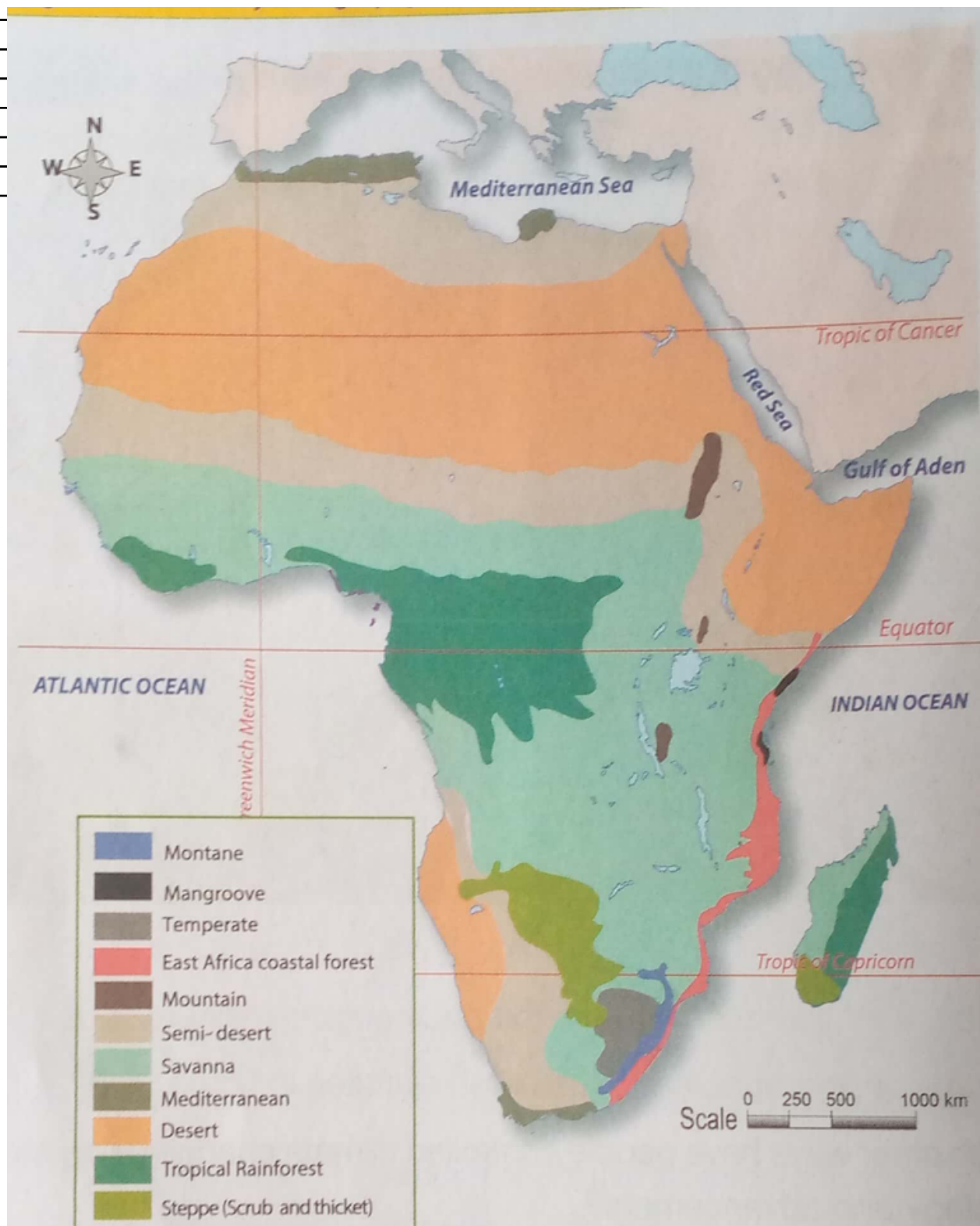
These include the:

- Tropical rain forests or equatorial vegetation
- Savannah vegetation (woodland, grassland and scrub)
- Semi- desert and desert vegetation
- Montane or mountain vegetation
- Mangrove vegetation
- Swamp vegetation
- High veld grassland

Activity 22.31. Describing the different types of vegetation in Africa

- a. Describe characteristics of the different types of vegetation in Africa.*
- b. Explain how climate has contributed to the existence of each of the vegetation types.*
- c. Suggest at least five economic activities that can take place in each of the types of vegetation in Africa.*

Activity: Draw a sketch map of Africa showing the distribution of the natural vegetation



<u>Tropical Rain Forests or Equatorial Forests</u>
Tropical rain forests are also known as Equatorial or selva forests.
They occur only in regions close to the equator. Equatorial regions support a luxuriant type of dense vegetation the tropical rain forest because of the very heavy rainfall and the uniformly hot temperatures.

The great extent of hardwood forests is between the latitudes of 20⁰N and 20⁰S of the equator.

In tropical Africa, the rain forest covers much of the Congo basin and along the western coastline of the continent, another belt of rain forest vegetation occurs along the eastern coast of Madagascar, lowlands bordering the Gulf of Guinea from Sierra Leone in the west to Cameroon and Gabon in the east.

The Congo forest covers the whole basin drained by river Congo and its tributaries like rivers Ubangi and Kasai. It occupies the lowlands of Congo-Kinshasa (Democratic Republic of Congo) and Congo Republic.

Nigeria, Gabon, Cameroon, Democratic Republic of Congo, Cote D'voire and Ethiopia are the leading commercial timber producing countries.

Equatorial forest (vegetation) is characterized by:

- It comprises of a multitude of evergreen trees that yield tropical hard woods like Mahogany, Ebony, green heart, rose wood, Cabinet wood, ironwood, Dyewoods and Elgon olive due to enough water and nutrients.
- There are smaller palm trees, climbing plants like the lianas or rattan, epiphytic and parasitic plant that live on other plants. Under the trees grow a wide variety of creepers, ferns, orchids, and herbaceous plants.
- Trees grow in three distinctive layers or canopies. The first layer known as the under canopy grows up to about 10m high, the second layer known as the main canopy grows up to about 30m high while the third layer of the tallest trees called the "emergent" rises up to about 50m high due to the growth of trees at different intervals or age and sprawl to form canopies.

- | |
|---|
| • The trees are heterogeneous in nature or trees grow in mixed stands or have a |
| variety of plants growing due to ample water supply like palms and mahogany |
| • The trees are tall that grow to height of 60 meters due to competition for light. |
| • Trees are straight and have big trunks due to ample water supply. |

- The trees have evergreen broad leaves throughout the year that allows evaporation and get rid of excess water.
- There is little or no under growth because of the thick canopy of foliage preventing light from reaching the ground.
- The trees have huge buttress roots. Buttress roots are thin triangular slabs of hard wood that spread out from the bases of their trunks to provide extra support.
- Trees have a long gestation period to mature of about 30 years+.
- The trees are umbrella shaped

Economic Value/Benefits

- It has to the Development of the tourism industry due to the presence of fauna and flora which are tourists' attractions.
- The growing of perennial and annual crops (tropical and temperate crops) like coffee Banana, Sugarcane, tea, cocoa which cultivated extensively in West Africa – Ivory coast and Ghana; palm oil in Nigeria, Congo Republic, bananas, pineapples due to the presence of well drained fertile soils
- It has encouraged Lumbering activities or harvesting or exploitation of forest resources on a large scale, charcoal burning and gathering of firewood.
- It has promoted the Collection of fruits, nuts and roots from the forests

Outline the problems facing the people living in the equatorial areas

Savannah vegetation

Savannah refers to wide range of plant communities ranging from unbroken treeless grassland to woodlands in which trees and shrubs form an almost continuous cover. It is found in the north and south of the tropical rain forests; north and southern Congo Basin, Sudan, some parts of Western Africa and East Africa.

Savanna Vegetation is categorized into:

• Savannah grassland,
• Savannah woodland and
• Dry bush and thicket or steppe savannah.
<i>Savanna vegetation is characterized by;</i>

- The savanna vegetation varies with the amount of rainfall from wood land with long grass, through acacia woodland which has short grass and scattered trees, to open, short grasslands with thorny bushes in the semi- desert areas.
- Trees and plants have adapted themselves to the savanna climate rhythm of long winter drought and short summer rain both trees and plants are therefore, deciduous in nature, shedding their leaves in the cool dry season to prevent excessive loss of water through transpiration and lying dominant during the long drought.
- They have long roots or deep roots (like the acacia trees) to search for ground water or broad trunks (like bottle and baobabs trees) to store up excessive water for use during the dry season.
- Trees are mostly hard gnarled, thorny and may exude gum.
- Many trees are umbrella- shaped to shield their roots from the scorching heat and to expose only a narrow edge to strong trade winds that blow all the year round.
- The grass is tall and coarse, growing 2 to 4 metres (6-12 feet) high. The elephant grass may attain a height of 15 metres.
- The grass which grows in compact tufts has long roots which reach deep down in search of water.
- The appearance of the savannah vegetation changes with the season. It appears green and fresh in the rainy season but turns yellowish-brown and parched with the ensuring dry season.

Economic Value/Benefits

- It has led to development of the tourism industry. Savannah grassland in particular is the home of wild animals like Lions, Giraffes and Zebra.
- Livestock farming like Nomadic pastoralism and Beef cattle ranching ▪ The Growing

of annual crops mainly Sorghum, Millet, Maize, cassava, sweet	▪ It has led to the
development of Api- culture (Bee-keeping).	
□ Charcoal burning and gathering of firewood from savanna woodlands	
Outline the problems facing the people living in the savanna areas	

Semi – desert vegetation or deciduous bushland and thicket or scrub vegetation and desert vegetation

Semi – desert vegetation is found the Sahel region.

The desert vegetation is found in the Sahara Desert, Kalahari and Namib deserts. **Semi-desert and desert vegetation are characterized by;**

- Most of the scrubs have long roots and are well spaced out to gather moisture and search for ground water.
- Plants have a few or no leaves and the foliage is waxy, leathery, and hairy or needle shaped to reduce the loss of water through transpiration.
- Other plants like cacti have thick succulent stems to store up water for long droughts.
- The seeds of many species of grasses and herbs have thick, tough skins to protect them while they lie dormant. They germinate at once when their seeds are moistened by the next rain.
- Plants are fast maturing and complete their life cycle in a short time like shrubs ▪ Some of the plants are entirely leafless, with pricks or thorns.
- The predominant vegetation in semi-desert area is Xerophytes' or drought-resistant scrub. This includes the bulbous cacti, thorny bushes, long-rooted wiry grasses and scattered dwarf acacia.
- The leaves are spiny and thorny which reduce transpiration or loss of water
- Plants that exist in the deserts have highly specialized means of adapting themselves to the arid environment.

Economic Value/benefits

- It has led to the development of the Tourism Industry.
- Nomadic Pastoralism for example Bedouin, Tuaregs, Matheniko, Masai and Galla

□ The growing of drought resistant crops like millet, Sorghum in Sudan.
□ The primitive hunters and collectors like the Bushmen of Kalahari Desert.

MOUNTAIN or MONTANE VEGETATION

This type of vegetation is found on the slopes of Adamawa highlands, Drakensberg Mountain, Ethiopia highlands, Atlas Mountains, Cameroon highlands, Blue Mountains and Mufumbira ranges.

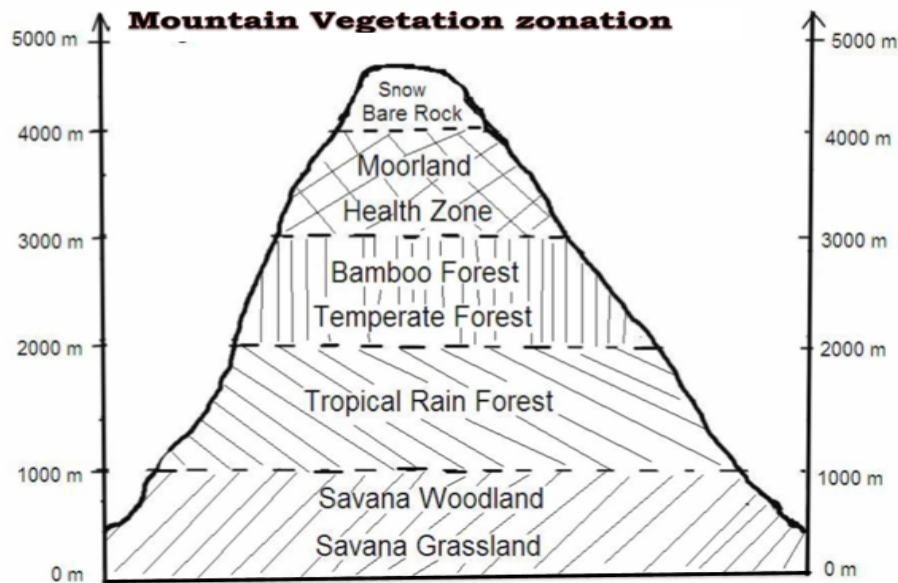
The vegetation is not uniform all over the mountain due to the effect of altitude, temperature, moistures availability and slope steepness.

The vegetation zonation starts at the base of the mountain

- At the **base** there is savanna vegetation (at the lower levels, dry bush or scrubs, grading upward into Savanna grassland and then into woodland, which finally merges into true forest).
- On the **lower slopes** of the mountain where the rainfall totals are high, there is thick forest (rain forests –at the lower levels grading upward into temperate forests) at 1800metres above sea level.
- Temperate forest is not as large as those in the equatorial forests, and with altitude they become smaller. Ferns and Epiphytes are abundant. The leading species of trees in these forests include pod carp, Cedar and Camphor.

Near its upper limit, these trees dwindle to low forests that are densely populated with mosses.

- Above **3000 metres**, this forest usually merges into a very dense thicket of Bamboo.
- Above **3,500metres**, the vegetation is limited to treeless vegetation. The plants found at this level are adapted to cold and bleak conditions, and the vegetation is alpine, scrub, grassland and heath.
- Other plants in this zone include giant lobelia, giant groundsel, and bromeliad (Heath and moorland. The upper limits of plant growth in Africa are between **4400 - 4500 metres**.
- Above **4500 metres** there is snow and bare rocks because the temperatures are too



- Altitudinal zonation of forest vegetation for example tropical forests at the lower altitudes/slope replaced by temperate forests at mid slopes, coniferous and bamboo forests on the upper most slopes.
- The tropical forests at low altitude are of mixed stand and have two layer canopy
- Tropical forests are hard wood
- Temperate, coniferous and bamboo forests are in pure stand and single canopy
- Temperate and conifers are soft wood, have thick bark or waxy barks, needle shaped leaves, straight trunk, cone shaped trees and some species have hollow stems.

• Thick cover of moss/cabbage leaf growth and tress ferns
Economic value/Benefits
• There is the growing of tropical and temperate crops like wheat, barley, pyrethrum, Arabica coffee, grape vine, Oranges, on the lower and upper slopes of mountains.

- It has led to the development of Dairy farming because of the cool temperature on the gentle slopes of mountain Atlas and Ethiopian highlands.
- Lumbering activities due to the presence of Equatorial and temperature forests leading to the development of pulp and paper industry.
- It has led to the development of Tourism due to the presence of flora and fauna.

SWAMP VEGETATION:

This type of vegetation is found in areas that either seasonally/periodically or permanently flooded.

There are two types of swamp vegetation. These include;

Swamp forests: There are swamp forest dominated by trees and other woody vegetation.

Swamp vegetation dominated by tall herbaceous vegetation.

This type of vegetation occurs at the edges of Lakes like Victoria and along the river valleys like river Nile, Niger, Kafue and Congo.

Economic Value/benefits

- It has led to the development of Art and Craft Industry
- Papyrus for the production of Bio-gas
- The growing of crops through irrigation. Example Sir Richard Toll in Senegal and Gezira irrigation scheme in Sudan.
- It has encouraged Fishing and fish farming
- Grazing of animals in the swampy environment because there is water and natural grassland for the animals to feed on.

Mangrove vegetation

Mangrove vegetation is found in the water logged areas and along the coastal areas of

West Africa and the East Africa.
<i>Mangrove vegetation is characterized by:</i>
• They have medium height trees.
• They have hard wood species.

- They have short stumpy trunks

- They have evergreen broad leaves.

- They are dense with bushy stands.

- They have twisted trunks.

- They have stilt roots.

Mediterranean vegetation

It is found the Mediterranean basin and Western Cape Province of south Africa.

Mediterranean vegetation is characterized by the following

- Mediterranean forests are composed of broad leaf evergreen trees like oak, eucalyptus, cork oak, red wood due to wetter winter resist dry summer conditions.

- Much of the woody vegetation in Mediterranean is hard leaved. Vegetation generally has small, dark leaves covered with a waxy outer layer to retain moisture in the dry summer months

- Plants like grape vines have deep tap roots to reach the moist rocks underneath.

- Some plants have large fleshy bulbous roots which stores water

- Some trees have thick rough barks to store water during the summer •

Mediterranean oak form open woodland with evergreen trees.

- There are sweet smelling herbs and shrubs like lavender, rosemary, thyme and oleander

- Some trees are Cone shaped trees like pine

- Short and flat-topped trees like cork oak in the dry areas

- Mixed type of vegetation with deciduous trees coniferous tough grasses and dwarf trees.

Factors affecting the distribution of natural vegetation in Africa
<i>Physical factors</i>
<i>Climate</i>
The natural vegetation is a direct response to the type of climate experienced in area.

It mainly influences vegetation through the aspects of rainfall and temperature. Areas with heavy well distributed rainfall over 1500mm with double maxima and experience warm-hot temperatures throughout the year are covered with equatorial vegetation.

Areas receiving moderate and seasonal ranging between 600mm – 800mm, savanna vegetation are common.

Areas with unreliable and low rainfall less than 550mm with very hot temperature are covered with thicket, scrub and dry bushes.

Relief or topography

It affects vegetation distribution and growth by influencing the rate at which water moves to the surface.

Steep slopes experience rapid water movement/flow hence little water is left for plants and as a result there is stunted vegetation.

On the gentle slopes, the speed of water is slow and this allows deep penetration of water into the ground and as a result the gentle slopes have well developed soils and dense vegetation

Relief also influences vegetation in as much as it determines rainfall distribution and formation. The wind ward side receives high amount of rainfall hence thick vegetation compared to the leeward side which has poor vegetation.

Soil

The mineral composition, depth, maturity, acidity and alkalinity of soil directly influence the type of soils directly influence the type of vegetation.

Soils factors influencing vegetation type according to their moisture content for example peat soils give rise to riverine forests and swampy vegetation. Soils devoid of

moisture like sandy soils give rise to scanty or scrub vegetation.

Highland soils which are rich in organic matter give rise to dense vegetation on the slopes of Mountains of Africa.

Drainage

Well drained areas influence vegetation leading to growth of different types of vegetation like equatorial vegetation and grassland

In flat areas and valleys, the drainage is likely to be impended and characterized by swampy conditions leading to the growth of Water loving plants like papyrus and mangrove vegetation.

Altitude

It is the height above sea level. Altitudinal differences lead to vegetation zonation due to changes in soils and climatic conditions.

The lower altitude areas have savannah grasslands and mid slopes support deciduous forests and bamboo.

High altitude areas allow the growth of heath and moorland.

Organisms like wild animals' influence vegetation distribution through overgrazing, the vegetation changes to secondary type for example in some parts of Queen Elizabeth national park. Insects like locusts in Senegal and termites are common in the savannah woodland areas destroy the vegetation in those areas.

Latitude:

Latitude has influenced the natural vegetation in the following ways:

- In the range of 0° - 5° north and south of the equator are areas of low latitude which support the growth of tropical rain forests due to heavy rainfall and warm – hot temperatures throughout the year.
- In range of 06° – 15° north and south of the equator, savannah grasslands occur due to alternative dry and wet season
- In the range of 15° – 35° north and south of the equator, there is semi-arid or scrub vegetation dominated by poor grass and thorny trees.

- | |
|---|
| <ul style="list-style-type: none"> • The Mediterranean type is found on north western tip of North Africa in the range of 30°-35° north and south of the equator, western tip of South Africa due to wet winters and warm dry summers. |
| <ul style="list-style-type: none"> • The effect of dry winds has led to the growth of scanty vegetation in some parts of Africa. Areas adjacent to the cold current like canary and Benguela lead to scanty vegetation. |

Human activities

Man's activities which include cultivation, industrialization, overgrazing, bush burning and forestry activities lead to the growth of the secondary vegetation or have reduced vegetation cover to scanty vegetation or modification of the vegetation

Agro-forestry, Reafforestation and afforestation programs to replace original forests with new plant species or quick growing trees.

Government policy to determine the location of vegetation for example through
Gazetting some areas of natural vegetation for conservation

Reasons for reduction in natural cover in Africa

- Human activities like clearance land for settlement, agriculture, road construction, and industrialization.
- Destruction of forests by wild fires or natural fires
- Destruction of vegetation by wild animals like elephants
- Prolonged drought resulting into desertification
- Loss of vegetation by pests like desert and red locusts and termites and diseases
- Occurrence of landslides and mass wasting in the mountainous areas due to heavy rainfall
- Flooding
- Pollution

Influence of vegetation on people's lives.

In pairs, use ICT or library resource and do the following tasks.

- in what ways does vegetation affect the peoples way of life*

<i>b. discuss the ways how people have destroyed the vegetation</i>
<i>c. what activities do people do to conserve the natural environment</i>
<i>d. Discuss why it is important to conserve the natural environment.</i>

Chapter 23.

FORESTS, FOREST RESOURCES AND FORESTRY IN AFRICA.

Definition of a forest.

A forest is a large area of land covered with trees. A forest is a conservation of trees of vegetation like natural forests growing according to physical conditions and artificial forests planted by man.

FORESTS OF AFRICA.

Africa has large areas of forests ranging from tropical rainforests to savanna woodland and forests planted by man.

Africa's timber production is still mainly hard wood, soft wood is of commercial importance in Swaziland, South Africa, and Zimbabwe.
<i>Forest are mainly of two types i.e. Natural and planted forest.</i>
Natural forests are those that grow in a particular environment because of its natural climatic conditions while artificial forests are those which have been planted by people.

Activity 23.1. Understanding the main type of forests in Africa and their characteristics

- a) Identity the types of natural forests in Africa.*
- b) Describe characteristic of the different types of natural vegetation in Africa*
- c) Identify and explain the conditions that have favored the existence of natural forests Africa*
- d) Use atlas and draw the map showing the distribution of natural vegetation in Africa.*

Natural forests in Africa

These include the following.

- Tropical rainforest
- Mangrove forests
- Mediterranean forest
- Temperate forest
- Riverine forest.

Equatorial / Tropical Rain forests.

These are found in the tropics, equatorial regions like in the Congo Basin, DRC, Gabon, etc.

Characteristics of these forest include the following.

- Trees have big trunks
- They are ever green through-out the year because of high rainfall.

• They have little or no undergrowth.
• Trees are very tall above 30-40 meters.
• Trees form canopies of about 3 different layers due to varying tree heights.
• Trees have many climbing plants (lianas) because of search for sunlight e.g.

passion fruits.

- The trees mainly provide hard wood e.g. Mvule, Mahogany and Ebony.
- Trees have broad leaves.
- The trees have buttress roots to hold the huge tree trunks.
- Trees appear in impure stands.
- Forests are always thick i.e. impenetrable e.g. Bwindi impenetrable forest.
- Trees have a long gestation period of over 60 years.

Mangrove forest:

In Africa, mangrove forest are found around water bodies e.g. Indian and Atlantic Ocean shore such as the East African and West African coast.

Characteristics of mangrove forest.

- Mangroves forests are found in water logged areas.
- Trees are evergreen throughout the year.
- Trees are medium height usually less than 10m due to high temperatures.
- Trees grow close to each other making forests thick.
- Trees have fibrous roots and straight stems.
- Trees have broad leaves and are characterized by hard wood.
- Some trees have twisted stems/trunks

Montane forests:

This occurs in mountain ranges and highland regions e.g. along Ethiopian highland, atlas and cape ranges.

Due to varying altitude, the vegetation changes as one moves up the mountain as shown below.

Tropical rain forests: these are above savannah at an altitude between 1500 to 2500 meters. It consists of thick luxuriant and evergreen vegetation.

Temperate and bamboo forests: as altitude increases, the rainfall amount reduces and this gives rise to the temperate and bamboo forest which thrive well under cold conditions.

Characteristics of montane forests

- Altitudinal zonation of forest vegetation i.e. tropical forests at lower slopes, temperate slopes at mid-slopes, coniferous and bamboo slopes at higher slopes.
- Tropical forests (low altitude) are of mixed stand and have two layers of canopy.
- Tropical forests are of hard wood.
- Temperate, coniferous and bamboo forests are in pure stands and have single canopy.
- Temperate and coniferous forests are soft wood, have thick barks, cone shaped trees, needle shaped leaves, straight trunks and some species have hollow stems.

Mediterranean forests

- The forests consists of many species of pine, oak and cedar
- Contain both thick shrubs and long grasses
- Trees are fully grown with the broad leaves

Conditions favoring the natural growth of forests

Activity 23.2 discovering the factors responsible for the growth and distribution of forests in Africa.

In groups, Discuss the:

- a) *Factors that influence the growth and distribution of forests in Africa.*

<i>b) Benefits of the forests to the:</i>
<i>i. Environment</i>
<i>ii. People</i>
<i>iii. Economy</i>

Possible soln. A

- Availability of extensive land with sparse population where forests grow with limited interference.
- Heavy rainfall of over 1500mm per annum for proper tree growth.
- Reliable and well distributed rainfall throughout the year for proper maturity of the trees.
- Hot temperatures of about 20⁰C- 30⁰C for the proper growth of trees.
- High humidity level which is responsible for heavy rainfall that supports tree growth.
- Altitude especially at higher altitude where the population is small and temperatures do not favor human settlement hence leaving aside the land for forest growth.
- Supportive government policy of emphasizing afforestation and reafforestation programs.
- Deep, fertile and well drained soils which support the growing of trees.
- Control of growing population to reduce on human interference with forests through settlement and agriculture.
- Abundant sunshine for the growth of natural forests.

FORESTRY IN AFRICA.

Forestry is the science of managing of forests including the creation of new forest lands for regular supply of timber and associated products and for the well-being of the environment.

Forestry is the scientific management of forests involving exploitation conservation.

Therefore forestry involves the management, exploitation and utilization of forests for

human and economic development. This involves a number of methods.

These include the following.

- Taking a survey of the area to be exploited
- Creating or establishing possible routes of transportation
- Preparing roads and tracks to ease the movement of logger and the logs
- Trees are cut using powered saws
- Branches are removed and the trunks cut into suitable lengths as logs
- The logs are moved to collection point
- Tractors or trucks take the logs to the riverside for floating down stream

Forestry in Gabon

Gabon in western is a good example of an African tropical hardwood producing nation.

Gabon's forest land lies in the basin of R. Ogooue. Most of the country is covered by dense tropical rain forest except in the south and south west. The forests cover 77% of its land surface. They contain over 400 species of trees, with about 100 species suitable for industrial use.

Gabon's forests contain valuable hardwood e.g. ebony mahogany, sapele, African walnut, Movingui (Nigerian Satinwood), Zingana (African Zebrawood), teak, Kolanut, African redwood, Ironwood, Ozige, ilomba, azobe, padouk but the most valuable is the Okoume tree which grows nowhere else but Gabon and produces valuable soft wood.

Gabon is the largest exporter of raw wood in the region and its sales represent 20% of Africa's raw wood exports. Forestry is only second to the petroleum sector in export.

Activity 23.3 Finding out the factors responsible for the development of forestry in Gabon

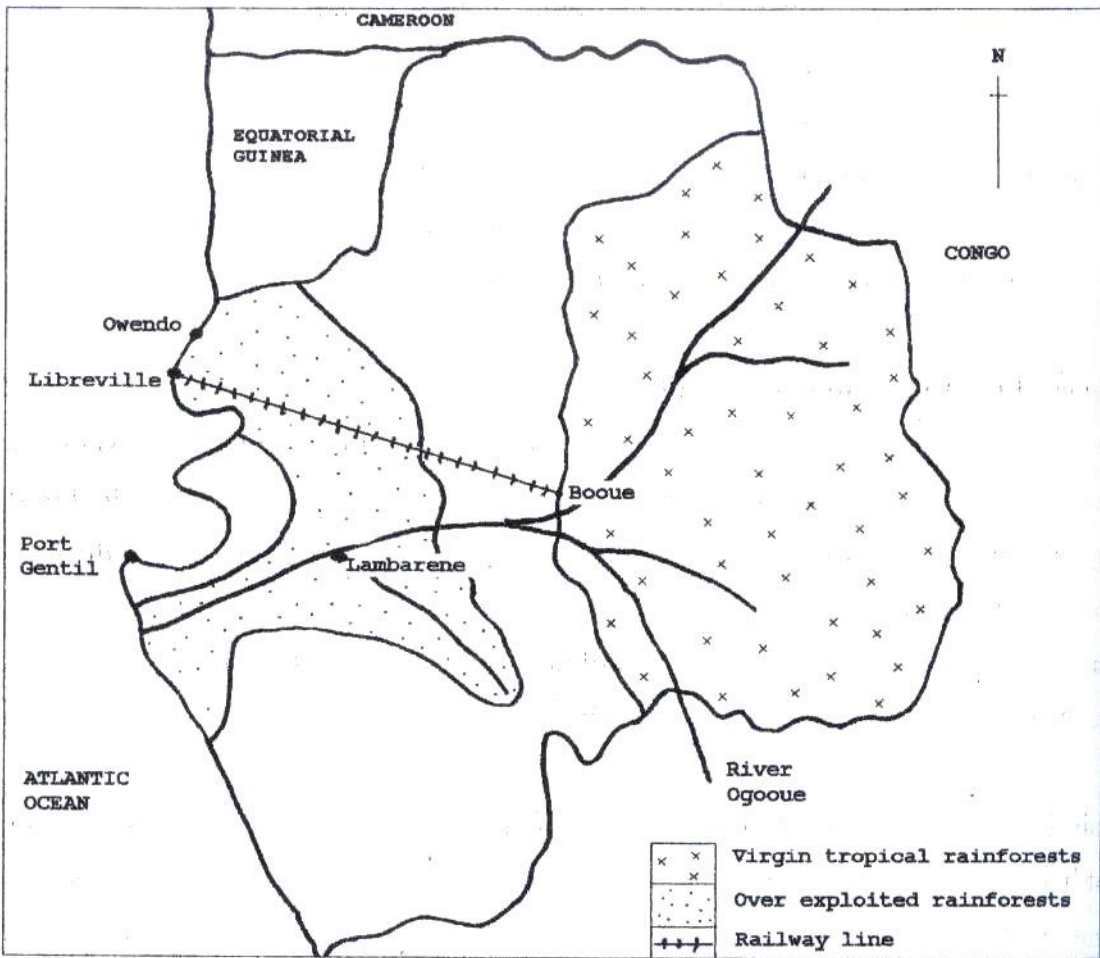
In groups, carry out the textbook or internet research and do the following tasks.

a. Draw a sketch map of Gabon to show the location of the forests

<i>b. What are the factors that have led to the development of the hardwood industry in</i>
<i>Gabon</i>
<i>c. Identify and explain the benefits of the forestry industry to development of Gabon</i>

Possible soln

- a. A SKETCH MAP OF GABON SHOWING THE LOCATION OF THE FORESTS.



Factors favoring the development of forestry in Gabon.

- Presence of heavy rainfall of over 15000mm pa and high humidity all year around has encouraged the growth of luxuriant forests.

- | |
|---|
| <ul style="list-style-type: none"> • Presence of commercially valuable species of trees e.g. mahogany, ebony, okoume, ozige, Sapele, Red heart etc. |
| <ul style="list-style-type: none"> • Existence of navigable rivers eg R. Ogooue which transport the logs to the saw mills at the coast, besides the rivers are used to generate power for the saw mills/ presence of power/energy. |

- Availability of vast land due to the sparse population for planting forests.
- Proximity of Gabon to the coast, as well as availability of numerous ports for timber export e.g. Port Gentil, Owendo, Libreville, Mekambo, increases accessibility to external market.
- Existence of well- developed port facilities that facilitates timber exports e.g. port Gentil.
- Availability of adequate capital provided by both the government and foreign companies to invest in forest related activities.
- Availability of efficient transport esp. on railway transport that facilitates the transportation of logs to the processing centers.
- Favorable government policy on forest exploitation and conservation.
- Availability of cheap labour provided by the local population and skilled labour from outside Gabon (foreigners).
- Existence of extensive forest reserves esp. in the North Eastern part of Gabon.
- Availability of advanced technology based on mechanical methods of exploitation e.g. use of chain saws that make work much easier.
- Presence of low altitude that supports the growth of equatorial forests.
- Availability of stable supply of power e.g. H.E.P to operate machines in the saw mills. Availability of a wide market for the forestry products in Gabon, African region and the rest of the world.
- Existence of extensive forest reserves esp. in Gabon in the Eastern part of Gabon that ensures regular supply of tropical wood for processing.

Using ICT or library resources, discuss the Benefits of the forestry industry in Gabon

- Production of timber and other forest products which are exported to earn Gabon foreign exchange that is used in international trade.
- Generation employment opportunities for the local population in lumbering and forest related industries leading to better standards of living.
- Growth of infrastructure e.g. roads, railways etc. hence increasing accessibility in Gabon.
- Development of industries, saw mills at port Gentil, Owendo, Libreville, which provide alternative employment for the people of Gabon.
- Promotion of tourism hence generation of foreign exchange.
- Promotion of international relations between Gabon and the timber importing countries, hence opening up Gabon to more trading opportunities.
- Modification of climate thru formation of convectional rainfall that supports arable farming.
- Forests act as water catchment areas for numerous rivers and streams that are sources of water for domestic and other uses.
- Generation of income leading to improved standards of living.
- Promotion of education and research.
- Generation of revenue for government from taxing the forestry sector that is used to develop infrastructure.
- Diversification of the economy hence creating the alternative source of foreign exchange, revenue.
- Forests are sources of fuel for domestic and industrial use.
- Forestry has promoted the development of towns/urban centers with associated advantages like employment, trade and commerce.
- Forests are a habitat for animals e.g. monkeys, chimpanzees that attract tourists.

- | |
|---|
| <ul style="list-style-type: none"> • Source of raw materials leading to the development of timber processing industries, e.g. the ply wood factory at port Gentil, saw mills at Kango and cellulose factories. |
| <p style="text-align: center;"><i>Negative effects</i></p> |

- They hinder the development of transport and communication routes. The roads and railway lines are difficult to construct in the thick impenetrable forests in the interior.
- The forests harbor dangerous pests and diseases which affect people living near them as well as their animals and plants. Mosquitoes causing malaria and tsetse flies causing sleeping sickness in humans and Nagana in livestock are common diseases in forested regions of Gabon.
- Forests harbor wild animals which attack man and destroy his crops when they go beyond the forest boundaries e.g. elephants, buffalos, chimpanzees, hippopotamuses, crocodiles and large snakes.
- In Gabon, logging is mainly carried out by large foreign firms which repatriate their profits to their mother countries such as France and Portugal.
 - Timber processing industry leads to the pollution of the environment through the emission of dust, smoke and other toxic gases to the atmosphere e.g. the large plywood factory and a cellulose factory based on forest resources found at port Gentil.
- Forest exploitation is difficult and risky as it is associated with loss of lives during felling.
- Forest exploitation and the processing of forest products has led to the growth of urban centres and their associated problems such as unemployment, high crime rates and slum development e.g. port Gentil, port Owendo and Liberaville.
- Environmental degradation especially where forests have been depleted like the coastal areas.
 - Tropical rain forests are seen as an obstacle in the expansion of agricultural land.

• Some forests have few valuable trees species and therefore the low commercial value and uneconomical to exploit.
• Logs are often floated down river Ogoove to the processing centre at the coast. This interferes with fishing as well as fish breeding.
• The forested landscape hinders the exploitation of mineral deposits.

In pairs, discuss the Problems resulting from forestry activities in Gabon

- Over exploitation/ deforestation has led to loss of vegetation cover e.g. Okoume trees esp. western part of Gabon.
- Soil degradation/Soil erosion due to loss of vegetation cover.
- Loss of bio-diversity (valuable species which take long to mature have been depleted).
- Destruction of habitat for wild life.
- Desertification as a result of deforestation.
- Reduction in soil fertility due to reduction in supply of humus.
- Lowering of the water table due to loss of vegetation cover.
- Increased global warming resulting from the destruction of trees.
- Reduced rainfall totals.
- Over dependence on timber exports which are subject to price fluctuations.
- The concentration on forestry activities led to the neglect of agricultural sector.

Individually suggest the Steps taken to improve on the forestry sector in Gabon

- Reforestation and afforestation programs.
- Education and awareness seminars for the local population.
- Opening up new areas for forestry/afforestation.
- Planting quick maturing tree species e.g. eucalyptus.
- Diversification of the economy i.e. planted areas be used for agriculture.

• Strengthen government policy on deforestation/legislation against deforestation.
• Gazzetting of forested areas to reduce rate of encroachment.
• Soil conservation measures have been put in place e.g. application of organic manure.

- Extension of feeder roads and railways further inland to formerly inaccessible areas e.g. the trans-Gabon railway and the Ndjole-Bitam highway.
- Development of research to produce new and fast maturing trees.
- Use of energy saving technology reduce pressure on forests/ use of alternative fuels.
- Carrying out selective thinning to protect valuable species like okoume.
- Provision of loans from international financial institutions to invest in forestry.
- Use of modern technology/ mechanization of forestry activities.

DESTRUCTION OF FOREST IN AFRICA.

Forest destruction involves the removal of trees at a greater than the growing. Trees are being destroyed in your area, why are they being cut down and are they being replaced.

There are physical and human factors causing deforestation or environmental degradation.

- Population increase causing deforestation for settlement and agriculture in densely populated areas e.g. Nigeria,
- Excessive lumbering for timber and other building materials in densely populated areas.
- Development of industries destroying forests for raw materials and causing pollution which leads to destruction of vegetation e.g., Egypt, Sudan.
- Construction of transport routs like roads, railway lines, expansion of ports leading to destruction of forests and wetlands e.g. Trans African Highway, Tanzam railway line.
- Fire outbreak caused by natural and human factors like by shifting cultivators,

nomadic pastoralists, smokers like in the Conga Fulani in Chad, Mali and Senegal.

- Climatic change causing drought desertification and aridity leading to global warming and discouraging the growth of vegetation e.g. Sahara desert.

- Presence of pests and diseases destroying vegetation e.g. locusts, termites, ants, caterpillars like in Sahara desert, Karamoja and they discourage the planting of trees.

- Getting fuel like firewood and charcoal used for domestic and industrial purposes like rural areas in developing countries.
- Mining and quarrying using open cast method leading to the destruction of the landscape and vegetation e.g. South Africa, Zambia copper belt,
- Use of poor methods of farming causing soil exhaustion and discouraging the growth of vegetation e.g. nomadic pastoralism like in the Fulani region, monoculture maize growing at Gezira, shifting cultivation in Zambia,
- Weakness of the government in implementing laws and regulations leading to illegal activities e.g. forest encroachment, bush burning, and illegal lumbering.
- Political instabilities and insecurity leading to use of ammunition destroying the landscape and vegetation causing bush burning e.g. Somalia, S. Sudan.
- Ignorance and backwardness about environmental matters causing bush burning, illegal lumbering, forest encroachment like peasants in rural areas, shift cultivators.

Effects of destruction of forests in Africa

- It leads to soil erosion e.g. sheet, rill causing soil exhaustion
- It leads to reduction in rainfall, humidity causing climatic change, global warming, destruction of the ozone layer. Aridity and desertification Sahara, Namibia.
- Decline in tourism industry reducing on foreign exchange.
- It leads to pollution due to accumulation of carbon dioxide and reduction of oxygen, destruction of dumping sits, destruction of the ozone layer e.g. in developed countries and urban centres.

- | |
|--|
| • Destruction of habitats for disease vectors reducing on the effects of pests and diseases like mosquitoes, tsetse flies. |
| • Occurrence of floods in lowlands and valleys causing destruction of people, property, transport routes, causing breeding grounds, drainage channels, Mozambique, Japan, Australia. |

- Spread of pests and diseases like water born and air borne diseases e.g. Bilharzia, Dysentery, cholera, flue, TB, cough.

Ways of environmental conservation (Solutions, steps, measures, policies)

- Encouraging tree planting through afforestation and re-afforestation programs with soft wood species proving habits, controlling soil erosion, landslides.
- Promotion of mass education and mobilization on environmental matters like using opinion leaders, mass media.
- Using modern methods of farming helping in soil conservation like ranching, Agroforestry, intercropping or intensive farming, irrigation.
- Strengthening laws and fines reducing on illegal activities like laws against bush burning, forestry encroachment.
- Privatization helping in attracting investors into the forestry industry leading to good management, availability of capital and high production.
- Using alternative resources of energy and power like HEP, solar energy, biomass, biogas reducing forest destruction for firewood and charcoal.
- Using alternative building materials e.g. plastic and metallic, tiles, and furniture reducing on deforestation.
- Improvement in transport and communication leading to easy movement of workers helping in marketing and reducing on fuel consumption.
- Economic diversification by exploiting other resources reducing on dependency burden and land pressure.
- Using soil conservation measures helping in maintaining soil fertility like terracing, mulching, mixed cropping.

- | | |
|---|--|
| • | Gazetting areas as national parks, game reserves, forest reserves reducing on human activities. |
| • | Using government agencies and nongovernmental organizations which help in environmental matter like UNEP, NEMA, IGAD, LVMP, NFA, CARE, UWA, and UTB. |
- Population control by using modern methods of family planning by using condom, pills, setting population policy.
 - Promotion of research on resource exploitation, land use management and on tree planting leading to environmental sustainability.
 - Training skilled labor like forest officers, environmental officers helping in supervision, monitoring education.

DESTRUCTION OF FORESTS IN UGANDA.

Uganda has a wide range of forests and these include; tropical 49%, savannah woodland 50% planted forests 1% major forests include amber, ,kalinzu, maramagambo, MT Eglon forest, Budongo, Bugoma, Kibale, Malabigambo , Mt Ruwenzori forests, Zoka, Lendu, Wiceri, Katata, Echuya, Muko, Bwindi. However human activities have reduced this forest cover

Activity 23.11. Exploring forest destruction in Uganda.

In groups,

- 1. Have you heard of illegal destruction or cutting down of forests in Uganda. Why is it happening?*
- 2. What are the trees cut down used for?*
- 3. Discuss the dangers of cutting trees in your area*

Chapter 24.

IRRIGATION FARMING IN AFRICA.

Irrigation farming is the artificial application of water to crops in semi-arid and arid areas to supplement to the natural rain water.

This is the agricultural practice which involves addition of water for plant growth either permanently or temporarily. Irrigation farming is carried out where rainfall is insufficient to meet the plant growth, where flooding is common and where the crops need abundant water for proper growth.

There are different types of irrigation and these include;

- Basin irrigation /overhead irrigation
- Track irrigation
- Etc.

Activity 24.1. Understanding irrigation in Africa.

In groups, carry out textbook or internet research and do the tasks that follow.

- a) *Identify examples of irrigation schemes in Africa.*
- b) *Classify them into large and small scale irrigation scheme.*
- c) *Identify countries of Africa with large irrigation schemes*
- d) *Why were the irrigation schemes established in those countries?*

It is divided into small scale and large scale and these include.

Large scale irrigation schemes.

• Gezira irrigation scheme in Sudan
• Richard toll scheme in Senegal
• Aswan high dam irrigation scheme in Egypt etc.
Small scale irrigation schemes.

- Kilombero valley irrigation scheme
- Mwea Tebere irrigation scheme
- Galana- kulalu irrigation

The countries that practiced irrigation in Africa include the following.

- Egypt
- Morocco
- Sudan
- Madagascar
- South Africa
- Senegal.

Gezira irrigation scheme in Sudan

This scheme is located with the Blue Nile and White Nile on river Nile. This scheme was established or constructed by the British community and later the government of Sudan nationalized it in 1956 and set up on a Sudan boarder to manage the scheme.

Major crops grown include;

- Sugarcane
- Rice
- Cotton.

Aims for the establishment of Gezira irrigation scheme.

- It was established to control seasonally floods on the blue and white Nile.
- Established to increase on food production so as to reduce famine problems.

•	Established to expand on the agricultural land this was by then limited due to low and unreliable rainfall received in the country.
•	It was established to transform the traditional agricultural practices to modern farming practices like ranching.

- It was established to promote forestry (afforestation) that could help in modifying the climate of the country.

Factors favoring the development of irrigation farming on Gezira scheme.

- Presence of constant supply of water from Blue and white Nile has promoted the irrigation scheme in Sudan since river Nile acts as the source of the water supply on Gezira scheme.
- Presence of the gentle slopes around Gezira has favoured mechanization e.g. lifting device and encouraged gravity flow of water to the farms.
- The arid conditions around Gezira scheme has limited bush growing and this has eased the clearing of land to establish Gezira scheme.
- Presence of sparse population around Gezira due to arid conditions has availed more land for the establishment of Gezira scheme.
- Availability of adequate capital that was initially provided by the British company and later by the government of Sudan
- Limited pests and diseases due to the arid condition around Gezira has favoured the irrigation farming in Sudan
- The favorable government policy of Sudan by giving free land to the farmers and loans for their farming activities has promoted irrigation farming in Sudan
- Presence of skilled and semi-skilled labour informs of the farm management, researchers, transporters are increasing productivities on the farms in Gezira scheme.
- Presence of advanced technology inform of lifting devices , tractors has increased production on Gezira irrigation scheme
- Availability of ready market for the agricultural products like cotton, rice and sugar cane internally and externally from neighboring countries like Uganda, Ethiopia

has encouraged farming on Gezira scheme.

Benefits of Gezira irrigation scheme to the people of Sudan.

Positive benefits

- Promotion of production of crops like rice and cotton on large scale which are valuable for export.
- This is earning the government of Sudan foreign exchange which is used to development of schools and loans.
- It has promoted the development of industries such as ginneries that use cotton grown on the scheme as their raw material. These industries have generated more employment opportunities to the people of Sudan (Khartoum) hence improving their standard of living.
- Gezira is providing employment opportunity to the local people around the scheme and the entire country such as farm managers, drivers and researchers. These are earning income to the people hence promoting on their standard of living.
- The Sennar dam that has been established on Gezira scheme as a water reservoirs or help in controlling floods from blue and white Nile which usually occur during rainy seasons.
- Gezira irrigation scheme is promoting fishing which is being done on fish ponds found on the scheme. This is supplementing on the diet of people living in Sudan especially around Gezira scheme.
- It is encouraging livestock industry e.g. dairy farming has been introduced on Gezira scheme and this providing dairy products like milk to the people in Sudan.
- Gezira irrigation scheme is promoting the growing of forests that are being planted to provide building and fire materials to the people living around the scheme in addition to modifying the climate around Gezira scheme.
- It has led to the development of social service like education, hospitals, and schools etc. that do not only benefit only people around but entire community.
- It has also led to the development of urban centers like Khartoum which is

attracting many people in search for jobs on the irrigation farms hence these towns are
providing social services like HEP and clean water to people in Sudan.
• Gezira irrigation scheme is generating local revenue to the government of Sudan
through the taxes obtained from the employees like farm managers on the scheme.

This local revenue is used to develop schools and roads in Sudan.

- It has encouraged the development of transport network like railway lines that have been constructed to connect the irrigation farms to cotton ginneries in Khartoum and later distribute the cotton products to the market hence the transport routes constructed are promoting trade and commerce in Sudan

Negative roles

- Gezira irrigation scheme has led to the displacement of people due to the construction of sennar dam and establishment of the scheme. This has broken the social lives among the displaced people.
- It has led to soil exhaustion due to monoculture. This has made it costly because of land require the use of fertilizers so as to increase on crop productivity.
- Gezira irrigation scheme has encouraged on rural urban migration since many people are attracted to the scheme in search for new jobs. This is promoting high crime rates like thief in towns like sennar and Khartoum.
- It has led to loss of soil fertility due to over use of scientific methods which destroy the natural fertility of the soils.
- There is increased silting on Gezira irrigation scheme which requires regular dredging of the canals to remove the deposited materials. This has made it expensive to maintain the scheme.

Irrigation farming in Senegal (Richard toll scheme)

Senegal is found in a dry zone (Sahel region) which receives low and reliable rainfall totals of less than 600 mm per annum hence there was need to set up the irrigation scheme so as to increase on crop productivity in the country.

Richard Toll scheme was established on Senegal and other small schemes include
Delta scheme. Crops grown on the scheme include rice and cotton.

<u>Factors favoring the irrigation farming in Richard toll scheme.</u>
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Physical factors

- Presence of R. Senegal provides constant water supply for irrigation.
- Senegal River is located in an arid zone ex-perennially low and unreliable rainfall hence there was need to set up Richard Toll scheme to enable the growth of crops throughout the year.
- Presence of alluvial fertile soils along the R. Senegal valley has favoured irrigation farming in Senegal.
- Availability of extensive land to set up the scheme around R. Senegal has favoured irrigation farming in R. Senegal.
- Gentle slopping land scape around R. Senegal has enabled easy mechanization and natural gravity flow of water.

Human factors

- Availability of strong capital base from the government of Senegal is used to expand and maintain the scheme, pay workers and improve on infrastructures.
- The desire by the government of Senegal to create more employment opportunity to the local people living around R. Senegal has encouraged the establishment of Richard Toll scheme so as to generate more employment opportunities for the people.
- Availability of adequate skilled labour and semi-skilled labour.
- Availability of appropriate technology such as combine harvesters, tractors trucks etc.
- Availability of intensive research on technology, quality of crops grown and market
- Availability of ready market locally and internationally for the agricultural products.

• Availability of accessible transport routes in forms of roads.
• Relative political stability in Senegal.
Economic importance of Richard toll scheme
There are both positive and negative

Positive importance.

- There are generation of employment opportunity -
- It has increased on crop productivity in the country. -
- It has aided in controlling floods on R. Senegal.
- It has increased government revenue through taxing the farmers and managers on the scheme.
- It has generated foreign exchange to the government to countries like Ghana.
- It has promoted Agricultural base industry such as rice factories and ginneries since crops grown on the scheme act as raw material
- The scheme has promoted infrastructures development such as roads connecting the scheme.
- It has promoted international relationship
- The scheme has promoted acquisition of skills among the employees.
- It has encouraged the out growers.
 - It has utilized natural resources (land)
 - It has promoted industrialization e.g. Dark town - It has diversified the economy.

Negative roles

- It has led to displacement of people
- Stagnant water act as habitants for mosquitoes and snails
- It has promoted rural urban migration
- It has led to soil exhaustion due to monoculture and over use of artificial

<i>Government cooperation with small scale farmer.</i>
Government are the primary actors in the physical, social and economic aspects of a nations food security, so any attempts to improve agriculture and food security outcomes must also consider the role of governance

It is a two way relationship, stable agriculture and food security systems can help to establish stable and transparent government, which contribute to more inclusive and effective agriculture and food security systems.

This is why the government of Sudan is laying heavy emphasis on the importance of developing cooperation with small scale farmers.

POSITION OF CHINA.

China is world's third largest country after Russia and Canada.

Activity 24.11 understanding the location of china.

- Find out the continent in which china is found
- Identify the countries that share boundaries within china.
- Find out the water bodies found on the eastern part of china.

Location of china.

China is located in Southeast Asia along the coastline of the Pacific Ocean. It has an area 9.6 million square kilometres making it the third largest country in the world after Russia and Canada. But with approximately 1,357,380,000 people. China is the world's most populous country.

Due to its massive size, china is bordered by fourteen countries. China has more different political units as immediate neighbor than any other country except Russia.

On land china, shares borders with fourteen states. The most important of these are Russia, North Korea, Vietnam, Myanmar (Burma), India, Pakistan, Afghanistan, and four states of central Asia.

At sea, Chinese territorial claims about or overlap with those of some of the same

states plus six others, including South Korea, Japan, the Philippines, Brunei, Malaysia
and Indonesia. Some of the water bodies include Yellow Sea, Lake Balkhash and
Yangtze.

Climate of China

The climate of China is characterized by the large size of the country. In the north, the climate is temperate with summer temperatures and very cold winters.

In the south, it is sub-tropical with very hot summers and mild winters.

Activity 24. 12. Understanding the climate of China.

In groups, study maps below, and do the following tasks.

- a. Describe the climate of China.*
- b. Which climate of East Africa is similar to the monsoon climate of China.*

NB. China generally follows the same pattern as temperature that is to say decreasing from the south-east to Northwest. China's southern cities experience monsoon rainfall during summer.

In some areas especially in the dry northwest changes in precipitation every year are greater in the coastal area.

Weather forecasting is therefore the application of science and technology to predict the state of the atmosphere for a given location.

Weather forecasts are issued for example to save lives. There are a variety of the forecasting techniques but the easiest one is called Persistence, tomorrow's weather is same as today's weather.

Irrigation farming in China

Irrigation farming refers to a practice of crop cultivation where water is artificially provided to the crop yields to boost crop growth during periods of low and unreliable rainfall.

This type of farming is very essential in China and the country is known to have major

irrigation systems with architectural designs. And some of the major irrigation schemes
in the country include Dujiangyan, Quepi irrigation project, Zhengzhou irrigation canal.
<u>Characteristic of irrigation farming</u>

Activity 24.13. Describe the characteristics of irrigation farming.

In groups, discuss the characteristics of irrigation farming in china.

- Artificial watering of the crops
- It is practiced in areas of low and unreliable rainfall which is unevenly distributed in a year.
- It is practiced in arid areas of hot temperatures and high evaporation rates.
- It is used mainly in extensive farming.
- It is highly mechanized
- It involves gravitational flow of water in canals
- It involves construction of canals aqueducts and aerial pipes

Methods of irrigation in china.

Activity 24.14. Discovering methods of irrigation in china.

a. In groups, discuss the different methods of irrigation farming in china.

A. Drip irrigation.

Drip irrigation. Under this method of irrigation a variety of distribution pipelines that are evenly spread in the farmland are attached to the main supply pipe that drops water at slow rate. The method is common in green houses

B. Center pivot irrigation

Archimedean screw. Under this method, a metal pipe is fastened on a motor like stand with a perforated coil on top. The spreading of water in the cultivable land is determined by the acceleration pressure of the land

C. Sprinkler irrigation
Overhead lining: a perforated pipe is elevated higher than the basic crop height and well
distribution irrigation land.
When the water is released, it finds its way into the farmland through the outlets on the
raised pipe.

D. Pipeline irrigation

E. Surface irrigation

Perennial/gravity method. This method of irrigation involves digging of canals, ditches and channels linking farmland to the water flows naturally into the irrigation area.

Factors that have favored irrigation farming in china.

Activity 24.15. Understanding the factor influencing irrigation farming in china.

In groups, carry out a textbook or internet research on the factor influencing irrigation farming in china and do the following tasks.

a. Explain the factors influencing irrigation farming in china.

b. Discuss the importance of irrigation farming in china.

- Presence of extensive land that has enabled large scale farming with extension of farms especially in the west.
- Abundant water supply from rivers such as pearl, Yangtze and Huang supplementing on the unreliable rainfall.
- The existing desert climate in the north central and western parts with hot temperatures and unreliable rainfall that limit proper crop growth necessitating irrigation.
- Presence of relatively fertile soils of the losses type that are abundant in arid areas of china promoting irrigation to ensure production.
- The supportive government policy that aimed at putting to proper use the marginalized desert land in order to improve food productivity.

• The growing population of china that required more food for survival yet government expenses on imported food were rising hence resorting to irrigation farming
• A large population which offers cheap abundant labor to work on the irrigated farms.
• Presence of large sums of capital to build canals, ditches and aqueducts to facilitate irrigation.

- The growing levels of industrialization that require raw materials for massive production especially the agro-based industries necessitated irrigation farming.
- Appropriate technology used in farming e.g. the use of canals and drip irrigation which encouraged smooth running of the irrigated crop field.
- Introduction of the green revolution by the government of china.

This enhanced modern agricultural practices such as the growing of vegetable fruits and arable crops at specific temperatures with maximum supervision which encourages irrigation farming.

Importance of irrigation farming in china

Activity 24.15. Understanding the importance of irrigation farming in china.

In groups, carry out a textbook or internet research on the importance of irrigation farming in china and do the following tasks.

c. Discuss the importance of irrigation farming in china.

- ❖ Farmers earn income through working on irrigation farms which helps them to improve their living standards.
- ❖ The government earns a lot revenue through taxing farmers and irrigation machinery which is used to develop the country.
- ❖ China earns a lot of foreign exchange through exportation of irrigated crops to Britain and USA which is used for development.
- ❖ Infrastructural development ranging from canals roads and railways, linking farmlands to market centers.
- ❖ Through irrigation, there is increase in cultivable land hence ensuring all year –round production.

❖	Promotion of international relations between china and the countries importing
	her irrigation crops hence widening market for china's products and allowing inflow of
	foreign aid.
❖	It has promoted industrial development especially agro-based industries that use
	farm produce hence creating more jobs to the people of china.

❖ There has been a reduction in the destruction effect of flood waters which is now used for irrigation.

❖ Irrigation farming has promoted urbanization along major canals and such towns include Beijing, Hangzhou, and Soochow etc. with their advantages such as improved medical care and health.

❖ Irrigation farming has encouraged economic diversification of china hence reducing over dependence on mining and industrialization.

Negative effects.

- It attracts growth of weeds which compete with crops for soils nutrients leading to low crop yields.
- It causes leaching which results into low soil fertility.
- It brings about soil exhaustion due to perennial cultivation where one crop is grown on the same piece of land year after year.
- It brings about pollution of the environment through over use of fertilizers, pesticides and fungicides.
- It has led to development of towns and urban centers with their related problems such as slum development high crime rate and prostitution.
- Flood irrigation leads to growth of pests and disease vectors which spread malaria and river blindness to farmers.

Problems facing irrigation farming in china.

In groups, carry out a textbook or internet research on the problems facing irrigation

farming in china.

- Siltation of the canals by deposited alluvium which limits flow of water to the crop fields.
- Very hot temperatures which lead to high evaporation rates that drain the soils making them unsuitable for crop growth.
- Salination of the soils near the irrigated zones through capillarity making them less fertile and unproductive.
- Over use of fertilizers to ensure all-year –round production which end up polluting the soils through affecting the oil PH.
- Occasional flooding of the river banks during the heavy rainy seasons leading to destruction of some crop fields.
- High costs of production involved in dredging of silted canals, maintaining and repairing of cracked canals making irrigation farming very expensive.
- Outbreak of pests and diseases which affect the quality and quantity of crops.
- Limited land for agricultural expansion due to the ever increasing population which requires more land for settlement and infrastructural development.
- Pollution of irrigation water by industrial wastes and fertilizers leading to the wilting of crops.
- Over flooding which washes away the weak canal culverts hence distorting water transfer the crop yields.

Solution to the above problems.

- ✓ Dredging is carried out to reduce siltation.
- ✓ Use of pesticides and insecticides to control pests and diseases.
- ✓ Treatment of industrial wastes before emission to reduce pollution.
- ✓ Hiring migrant workers during the busy periods to avoid labor shortage.
- ✓ Acquiring loans from the government construct and maintain. Irrigation canals.

- ✓ Land reclamation of swamps and wastelands to create more land for irrigation farming.

Case study.

The dujiangyan irrigation system.

This is an irrigation structure that was started in 256BC. During the worrying states period of china by the kingdom of jin.

It is located on R.Minjiang, west of Dujiangyan city in the Sichuan province. Today, the DIS irrigation over 5300km of crop land and it is the world's oldest surviving grand scale irrigation infrastructure comprising the Yuzuwater shade dyke, the Feishayan spill way and the Baopingkou water inlet.

Objectives of the dis

- ❖ To control flooding of the Sichuan province.
- ❖ To promote food security for the growing population of china.
- ❖ To put to use the spring melt water from Quingcheng Mountains and Mt.Yule.
- ❖ To ensure all year –round crop production.
- ❖ To effectively use the fertile soils of the Sichuan basin and the dry Chengdu region.
- ❖ To divert water to shipping people and agricultural production.
- ❖ To expand cultivable land in china

Rice growing in china.

China is the world's largest producer of the rice and accounts for 30% of all world rice production. Rice growing conditions in china vary because of topography and weather but the crop is because of topography and weather but the crop is basically irrigated.

Activity 24.16. Understanding the stages of rice production in china.

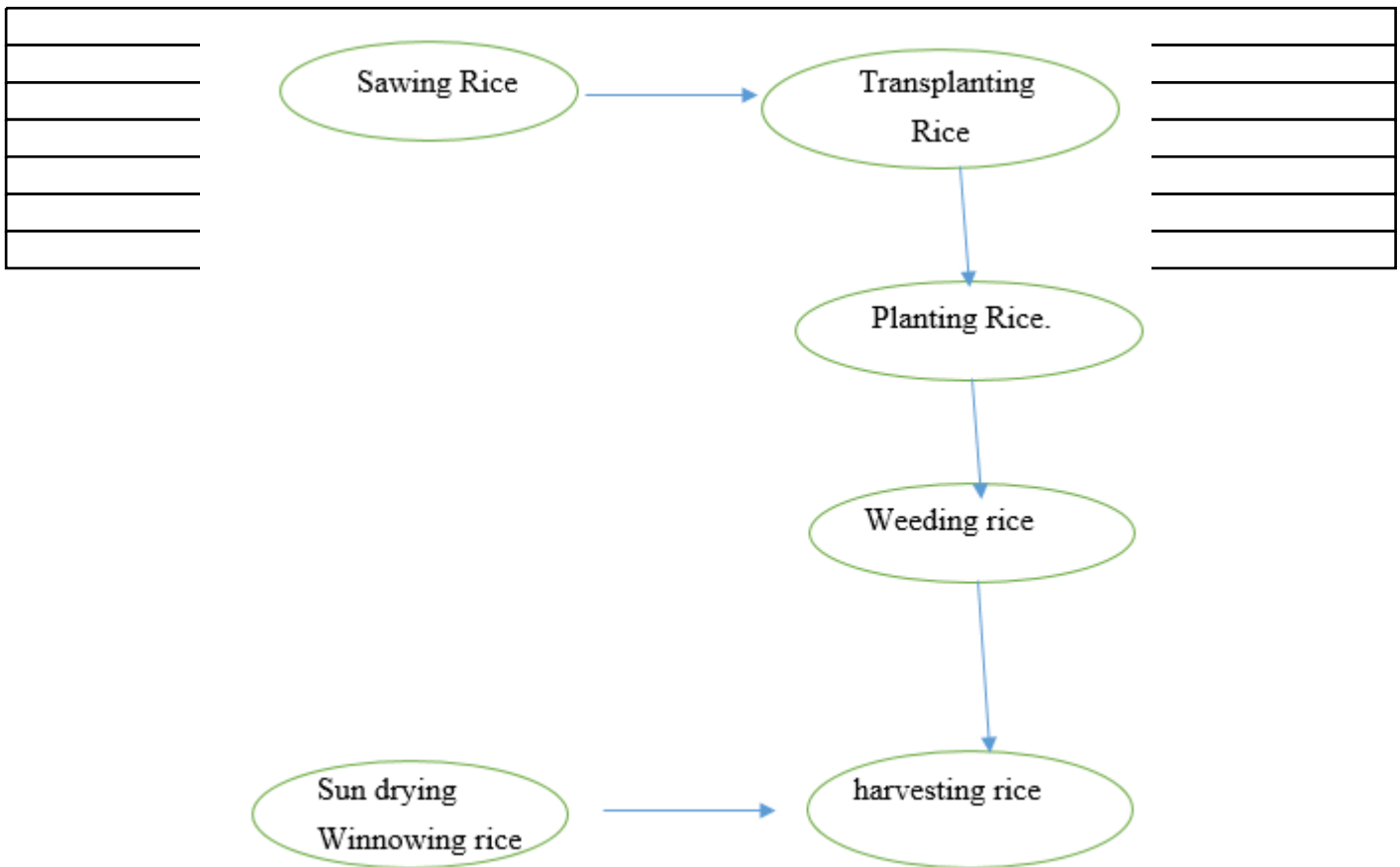
- Describe the stages of rice production*

<i>b. Draw a flow diagram to represent the stages described in a above</i>
<i>c. Suggest reasons why irrigation is important in rice growing in china</i>
<i>d. What lessons can Uganda learn from rice growing in china?</i>
Soln.

Many steps are involved in the production of rice. All steps are vital and affect the overall quality of the yields hence knowledge in each step is crucial. The stages include

- a. Preparing land for planting
- b. Seed selection
- c. Sowing the rice seeds
- d. Transplanting
- e. Planting
- f. Weeding
- g. Harvesting
- h. Sun drying, winnowing

Flow chart.



Areas of rice growing in china.

In china rice is grown in specific areas in various provinces. Rice cultivation is highly labor intensive. Rice is grown as wetland crop in fields flooded to supply water during the growing season

Rice is the most important food crops of the developing world and the staple food of more than half of the world's population. Rich in nutrients, vitamins and minerals. It's an excellent source of complex carbohydrates.

Nine out of every ten people in the world who eat rice are Asian. The major problems
confronting rice production in china are narrow genetic background, overuse of the
fertilizers and pesticides, breakdown of irrigation infrastructure, oversimplified crop
management and a weak extension system.

Activity 24.16. Understanding the areas of rice growing in china

Carry out a textbook or internet research on the areas of rice growing in china and do the following tasks.

- a. Draw a sketch map of china and on it mark and label areas of rice growing in china.*
- b. Besides rice, which other crops are growing irrigated farms in china*
- c. Discuss the importance of growing rice in china*
- d. Describe the problems associated with rice growing in china.*

Hydroponic farming.

Hydroponics is an ideal concept for today's agriculture sector which struggles to find new fertile lands for crop productions and will enable crops to be grown in green houses or in multilevel buildings.

People have developed many method of growing crops especially vegetables in water where plant nutrients have been dissolved. This method of growing crops in water rich in mineral nutrients is called hydroponics.

Crops grown in hydroponic system will require less growing time since they get all the nutrients they need.

The word hydroponic comes from the roots "**hydro**" meaning water and "**ponos**" meaning labor. This method of gardening does not use soil.

Hydroponics is a good method for growing plants, vegetables and herbs. Compared to the cultivation in soil. The plants also get everything they need to grow through the nutrients solution delivered directly to the roots.

The various types of hydroponics growing systems include, aeroponic systems, these

requires only air and some nutrients. The crops are suspended in a tray which contains
water and nutrients at the bottom, with the roots hanging in the air.
Drip system is the most widely used type of hydroponic system. Nutrient-rich water is
pumped via small tubes and drips on to the top of the plants, with a timer controlling the
submersed pump. In a nutrient film technique system; plants are supported in small
plastic baskets in a tray with their roots hanging into a nutrient solution.

Activity 24.18. Principles and use of hydroponics.

In a group, use of textbook or ICT research, do the following tasks.

- a. Explain how hydroponic farming systems work*
- b. Describe the basic principle of hydroponics*
- c. Discuss the benefits of hydroponic farming.*

Soln.

Hydroponic systems work by allowing minute control over environmental conditions like temperature and PH balance and maximized exposure to nutrients and water.

Hydroponics operates under a very simple principle.

- Provide plants exactly what they need when they need it.
- Hydroponics administers nutrient solutions tailored to the particular plant being grown
- They allow you to control exactly how much light the plant receives and for how long.
- PH levels can be monitored and adjusted.
- In a highly customized and controlled environment, plant growth accelerates.

.....END.....