MSCE PHYSICAL GEOGRAPHY

GGK PRODUCTION 2018, whatsapp: 0992437115

LAND USE

Success criteria:

- Interpreting map symbols in relation to land use
- Explain factors that affect land use patterns

Types of land use on a map

a. Vegetation e.g forestry
   The forest area is normally shaded green
b. Cultivation e.g farming
c. Settlement area
   The area is represented by black dots (huts) which may be nucleated, linear or scattered pattern form
d. Communication
   This is shown by railway lines, roads, air ways or aerodrome (air ports) and sea-ways
e. Mining or quarry
f. Tourist resorts
g. Industrial area
h. Parks and game reserves
i. Historical sites

(see below)

Coloring on Map work

- Green color shows swamps and other low laying places on the map
- Brown and greyish color indicates highlands and mountains
- White color show snow and cold regions on the map
- Blue shows water features
- Red color may indicated political boundary or main roads

Factors affecting land use include:

- Relief such as mountains, high lands may discourage agriculture activities
- Soil type eg fertile soils encourage settlements and agriculture activities
- Water source may encourage settlement eg close to a river or lake
- Natural disaster such as flooding, earthquake may discourage settlements
- Climatic conditions such as very high temperature and very low temperature may discourage settlements
- Availability of minerals may encourage mining settlements

LAND FORMS

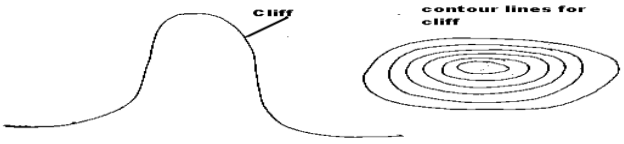
Success criteria

- Identify various landforms on topographic maps
- Draw a cross section of selected landforms from topographic map
- Interpret map symbols in relation to land use

This indicates the relief of the land as caused by denudation forces and earth movements

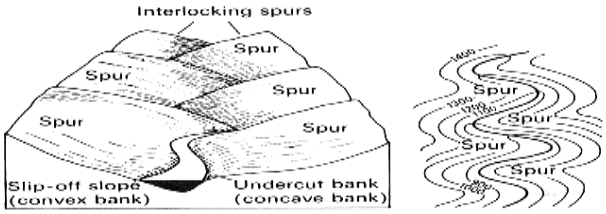
i. Cliff

It's a high ground rising abruptly across coastal plains e.g Mulanje Mountain over Phalombe plains
Contour lines are drawn close to each other but not crossing each other



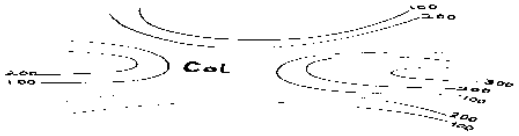
ii. Spur

It's an area of high ground extending outwards from a large mass of high ground



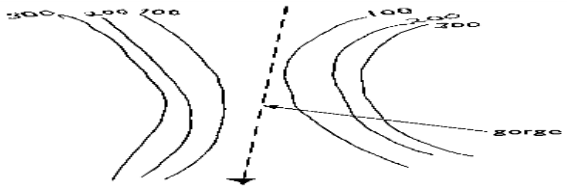
iii. Col

It's a slight depression in the ridge of hills
It is similar to a gap or pass

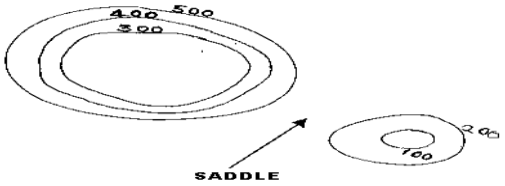


iv. Gorge

It's a steep sided river valley
The valley floor is very narrow and almost flat e.g Mpatamanga gorge and kafue gorge



v. Saddle

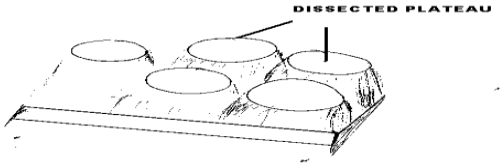


It's a depression in a range of mountain or hills usually providing a pass through the range

The landform is not as deep as a pass

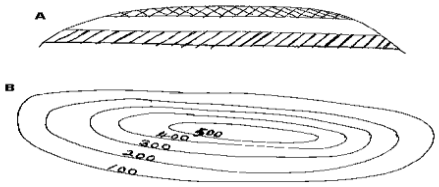
vi. Dissected plateau

Its when the surface and sides of a plateau have been deeply cut by a stream/streams



vii. Ridge

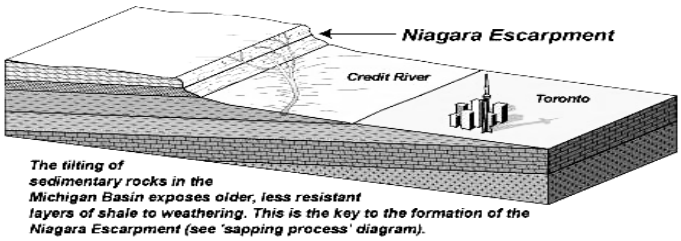
It is a long up land area or a chain of mountains



viii. Escarpment

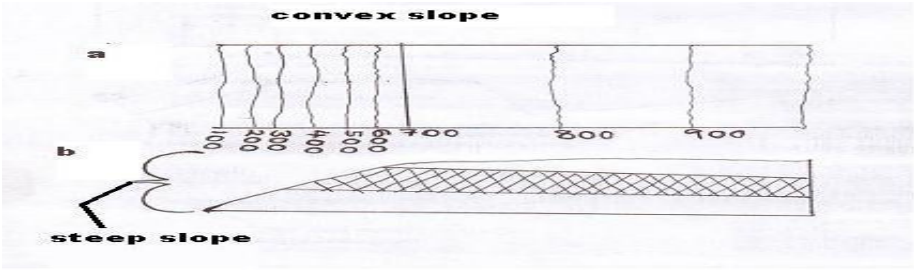
It's a ridge which has a gentle or deep slope on one side and a steep slope or scarp slope on the other side

On the gentle slope the contours are widely spaced and on the steep scarp slope they are closely spaced together



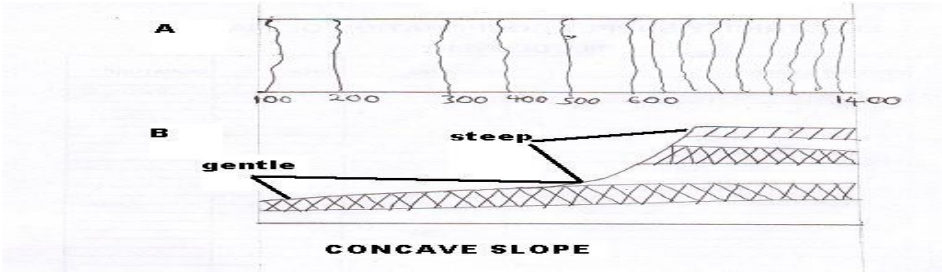
ix. Convex slope

Contours are closer together at the bottom than at the top of the slope



x. Concave slope

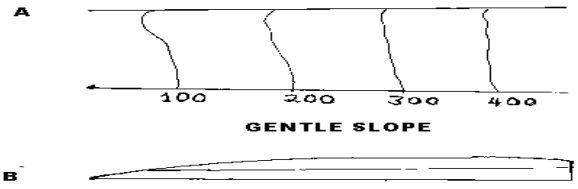
The contours are close together at the top and wider at the bottom



xi. Plains

Its an area of land that has generally level land

On a topographic map contour lines are widely spaced



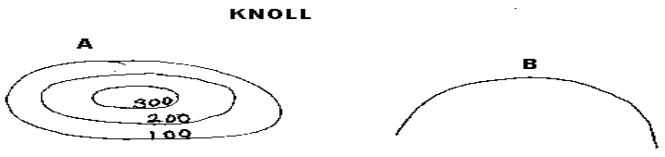
xii. Conical hill

Its shown on a topographic map with a series of concentric rings

A volcanic peak is normally shaped in that manner e.g Hora hills in Mzimba, Nangadwe hill in Zambia where also formed from volcanic activity

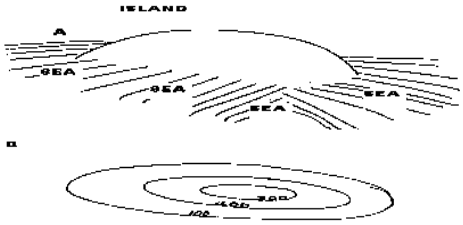
xiii. Knoll

It's a low isolated hill e.g Midima hills in Blantyre



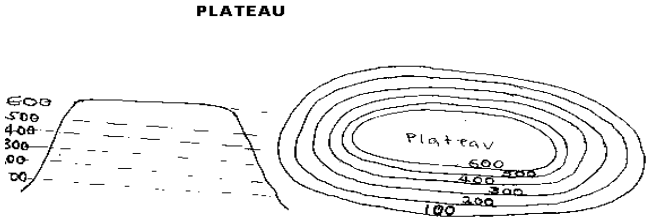
xiv. Island

It's a piece of land surrounded by water in an ocean, lake or sea e.g Likoma island



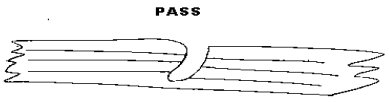
xv. Plateau

It's a widely elevated area with a more or less flat surface on top. Most of the plateaus are formed from volcanic activity eg Zomba plateau, Kirk Range, Nyika plateau, Mulanje plateau etc



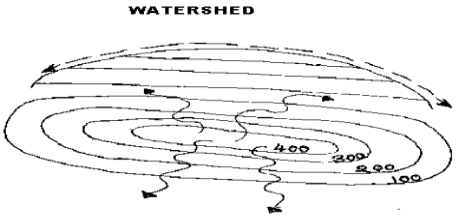
xvi. Pass

It's a generally narrower space of mountains
It is narrower than a gap and is usually found at higher altitudes e.g Munali pass in Zambia



xvii. Watershed

It's a highland that divides streams of rivers where some flow on one side while the other flow on the other side e.g Viphya plateau



RIVERINE FEATURES

Success criteria:

- Identify riverine features on a topographic map

Drainage pattern

There are four types

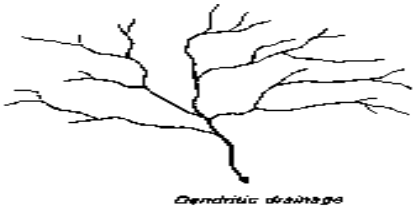
a. Dendritic
b. Radial
c. Trellis
d. Disappearing/intermittent

i. Dendritic drainage pattern

The tributaries appear like the veins of a leaf and connects to the main stream at an acute angle

Such a pattern normally develops on a landform that has uniform resistance to erosion

See below



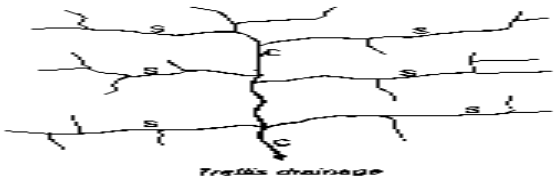
ii. radial pattern

the tributaries emerge from one central place and run down a highland like spokes of a bicycle wheel, the high ground may appear like a water-shade

iii. Trellis (rectangular)

Tributaries meet the main stream at almost right angles

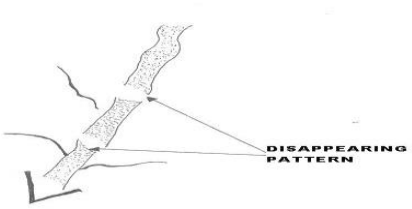
It normally develop on an area that has alternate resistance to erosion and the streams are formed along the soft rocks



iv. Disappearing patterns

The tributaries or streams appear and disappear underground

The pattern normally develops in swampy areas



COASTAL FEATURES

Success criteria:

- Identifying coastal features on a topographic map

Coastal Features

These are features that are found along the coast or water bodies (sea, oceans or lakes) caused by water movements such as:-

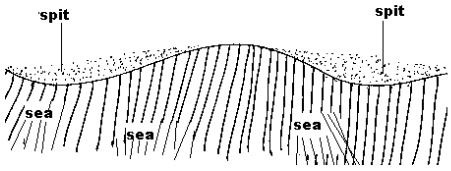
- Lagoons, Estuary, Delta, Peninsula, Spit, Bay, Headland, Cape, Strait, Isthmus

- **Bay**

Its' an indentation in the coastline e.g Nkhata bay, Monkey bay

- **Spit**

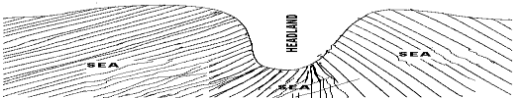
Its an area of the coastal water where gravel, sand, mud and other materials are deposited from the sea



- **Headlands**

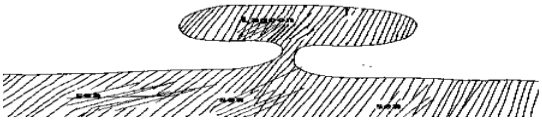
It's an area of high land that is extending out into a sea or lake

It is caused by hard bedrock that is not eroded by actions of water waves



- **Lagoon**

It's a shallow stretch of water which is partly or completely separated from the



Sea or lake by a narrow strip of land e.g Chia lagoon in Nkhotakota
Lagoons are normally formed due to the action of spit across part of a lake or water Body

- **Isthmus**

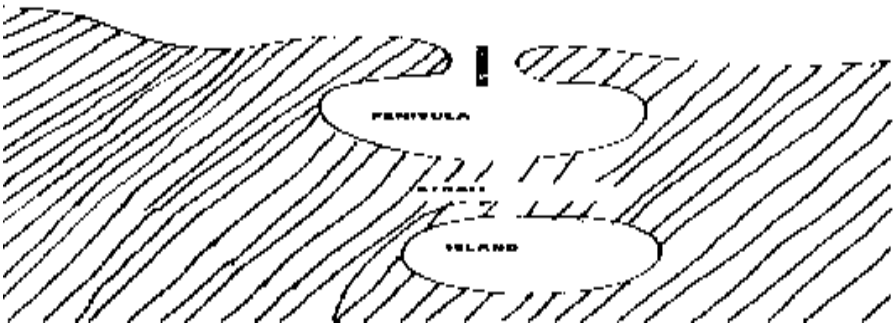
It's a narrow neck or strip of land areas e.g Isthmus of Suez connects Africa and Asia

- **Strait**

It is a narrow stretch of water which connects two larger bodies of water e.g the Strait of Gibraltar Connects Atlantic Ocean and Mediterranean Sea

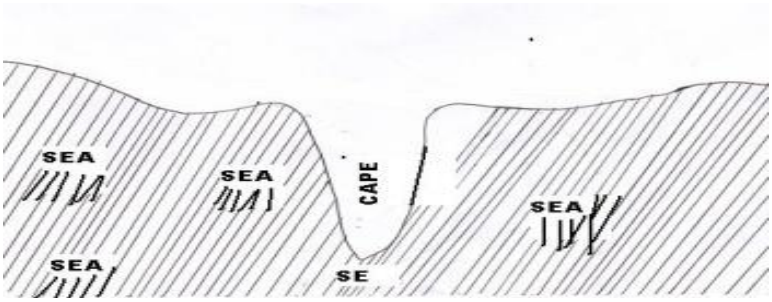
- **Peninsula**

It's a piece of land that is almost surrounded by water



Cape:

It's a smaller headland extending into the sea or lake e.g Cape Maclear, Cape town



MAP WORK

Success criteria:-

- Measuring distance between points
- Calculating area on a map
- Draw cross-sections and river profiles
- Reduce and enlarge maps
- Calculate gradient

a) Measuring distance

Measuring of distance on a map can be done using the following instruments

- String
- Ruler
- Straight edged paper
- Pairs of divider
- Pairs of campus

The distance is measured following a road or river in all meanders

The measured distance is then transferred to a scale where it is translated into kilometers (Km)

b) Reducing and enlarging map and scale

When drawing a reduced map from a topographic map one may need to maintain the number of boxes or half boxes covered by the original map itself, but however the map may be draw on a reduced scale than before

If the map was drawn on a topographic map say of 2cm x 2cm then the reduced scale would be 1 cm x 1 cm on a graph paper

Reducing scale of map is done by multiplying half by the given scale

See below

$$^{1}/_{2} \times {}^{1}/_{25,000}$$

Reduced scale would be

$$\frac{1}{50,000}$$

Enlarging scale of map is obtained by dividing scale of map by half

Example:

1:50,000

$$\frac{1}{50{,}000} \div \frac{1}{2} = \frac{1}{50{,}000} \times \frac{2}{1}$$

Therefore enlarged scale= $\frac{1}{25000}$

Map enlarged

(See below)

Map reduced

(See below)

c) Gradient of slope

Gradient is calculated using the horizontal equivalent and the vertical interval (VI)
The Horizontal Equivalent (HE) is the difference in distance between two points while the vertical interval is the difference between the highest contour line on a given point and the lowest contour line or the other end
The formula for gradient is

Gradient= $\frac{VI}{HE}$

Both the vertical interval (VI) and Horizontal Equivalent are supposed to be in the same units thus meters (See below)

Gradient= $\frac{VI}{HE} = \frac{250}{2.5}$

15 meters represent 50 ft

Therefore, = $\frac{250}{50}$ x15

VI = 75m
HE= 2.5Km
But 1000m=1Km
Therefore 2.5 Km=2.5 x 1000
=2500m

Gradient= $\frac{75}{2500}$

=1:33

Areas of focus

1. Finding grid reference of places on a map
2. Measuring distance between places on a map
3. Finding the direction of places on a map
4. Finding bearing of places on a map
5. Identifying the drainage pattern on a map
6. Calculating area of a map
7. Calculating gradient of places on a map
8. Reducing and enlarging scale of a map
9. Reducing and enlarging a map
10. Finding the visibility of places on a map
11. Identifying land-forms on a map
12. Identifying the settlement pattern
13. Drawing of cross-section of places on a map

STATISTICAL METHODS IN GEOGRAPHY

Success criteria:-

- Identifying various ways of collecting geographical data
- Design data collecting instruments
- Collecting data using appropriate tools or instruments
- Analyzing the data using appropriate procedures

Methods of data collection include:-

- ✓ Questionnaires
- ✓ Interviews
- ✓ Observation
- ✓ Measurements

Designing data collection tools

- Questionnaires
- Observation tools
- Interviewing tools
- Measuring instruments

Collecting data using appropriate tools

- Such as interviewing people
- Observing things from the environment

- Measuring things
- Giving out questionnaires to people in order to respond to them

Analyzing data using appropriate tools

- ✓ Histograms
- ✓ Bar graphs
- ✓ Pie chart
- ✓ Line graphs
- ✓ Pictograms

Continental drift theory

Success criteria

- Explain the theory of continental drift
- Explain evidence supporting the theory of Continental drift
- Examine the weakness of the theory of continental drift

The theory states that the earth had one super continent (the pangea) and all the six continents today came from it.

This was suggested by a scientist known as Wegener

The Gondwanaland and Laurasia were the first divisions of the continents and later came the six continents that exists today

Evidence for continental drift theory

a. New rocks appear to be formed at the mid oceanic ridge as the older rocks are drawn at the zone of subduction where plates collide
b. The type of fossils both plants and animals and also rock type and structure are identical to those in south America and west-Africa
c. The shape of the continents that suggest that they can be fitted together especially Americas, Europe and Africa
d. Glacial deposits found in Congo basin which is an equatorial zone
e. The magnetism of ancient rocks indicates that the continents came from a single continent. Rocks are magnetized in the direction of magnetic north when solidifying
f. There is an almost identical geological sequence of rock layers in south Africa, Deccan plateau (India),plateau of south America and Antarctic

g. Folded ranges of Argentina are similar in structure and age, to the folded cape ranges of south Africa
h. Similarity in vegetation found in west Africa and that found in brazil of south America

Weakness of the theory

1. It does not clearly explain the forces behind the drifting of the continents
2. The gig-saw shape of continents lack scientific evidence to show that they once existed together
3. The type of vegetation in west Africa and that of Brazil is not enough to suggest that the two places existed together
4. All the evidence given are based on assumptions hence lack scientific evidence of the drift

Plate tectonic theory

Success criteria:

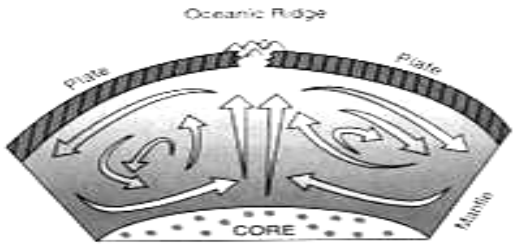
- Explain the theory of plate tectonic
- Examine the cause of plate tectonic
- Explain the different types of plate and boundaries
- Explain the formation of geographical features
- Explain the effects of geographical features on the environment and human activities

The theory suggest that the earth is made up of crusted plates that are always converging, diverging or shearing due to convectional current within the mantle

Plate

It's a solid rigid block of rocks that make up the earth's crust

See below



Convectional Currents responsible for plate spreading or divergence

Figure showing spreading or diverging movement

Cause of the plate tectonic

It is caused by convection current from the mantle that allows plates resting on the asthenosphere to swing or move

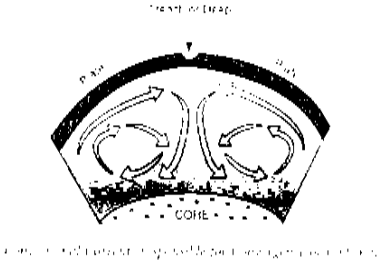


Figure showing convergence movement

Plates rest on a soft layer between the crust and the mantle called asthenosphere

The **asthenosphere** carries the plates and moves them horizontally with the help of **convectional currents** in the mantle

Examples of world plates and direction of movements

Name a plate	**Direction of movement**
Nazca plate	Eastwards
Pacific plate	Westwards
Australian	North eastwards
Eurasia plate	Eastwards
South America plate	Westwards
North America plate	Westwards
Philippine plate	Eastwards
African plate	North eastwards

Plate boundaries

These are areas where active earth movements are observed or experienced

Some of these active earth movement are observed on the western side of the America, the Himalaya mountains and around the mid-oceanic ridges

These places are common or active places for volcanic activity, earthquake

Results of plate tectonic (Earth movement)

Plate tectonic results in formation of features such as; the

1. Nazcan trench on west of south America following the convergence of Nazcan and south America plate
2. The Indies fold mountains on western south America
3. The mid Atlantic ridge in the Atlantic ocean following divergence of African plate and south American plate
4. The Himalaya fold mountain following convergence of Eurasian plate and Australia plate
5. The Philippine trench following convergence of Eurasia plate and Philippine plate
6. The great Africa rift valley is also as a result of plate tectonic
7. Oceanic island are also common feature due to plate tectonic

Note: Plate tectonic also results in volcanic activity and earthquake

Beneficial effects of plate boundaries to people

- There is an opportunity to generate electricity through Geo-therm.
- Some fishing grounds have developed following trenches formed through tectonic plates eg Nazcan leading to upwelling of water
- They are sources of precious stones such as Diamond in Kimberley-Australia
- Some have formed beautiful scenic for tourism development
- They have created an opportunity for agriculture activities eg Deccan plateau in India
- They have formed good habitat for wildlife
- Fold mountains assist in the formation of orographic rainfall
- Mountains help in modifying climatic conditions between regions

9. Mountains and valleys assist in the flow of rivers or drainage system

Mountain building process

Success criteria:

- Explain the main process of mountain building in relation to plates
- Explain different features formed from mountain building process
- Analyze the effects of mountain building on the life and human activities

Mountain building involves the folding and uplifting of rock masses a process known as orogenesis

A mountain is a large landform that stretches above the surrounding land in a limited area.

Examples of mountains includes:

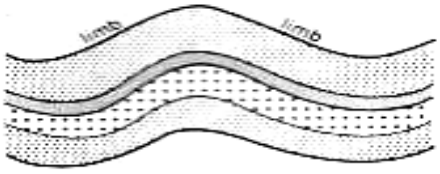
- Fold mountains
- Block mountains
- Volcanic mountains
- Residual mountains

Fold mountains

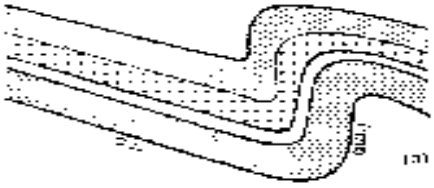
Its due to compressional force acting on rock layer

The compressional force may result in the formation of a number of folds as follows:-

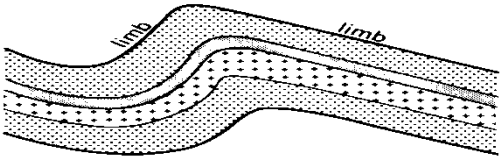
a. Simple fold
Both limbs that form a fold are the same



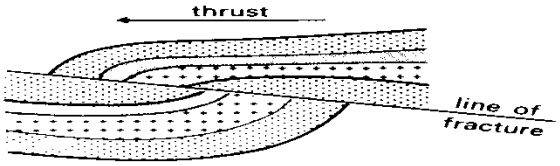
b. Over fold
One limb is pushed over the other



c. Recumbent fold
One limb is steeper than the other



d. Over-thrust fold (Nape)
A fracture occurs across rock layers



During this process of mountain building the Anticline becomes the mountain while the syncline becomes the valley

Causes of fold mountain

- The compressional forces exerted on the earth's surface
- Increasing load of overlaying rocks
- Flow or movement within the mantle
- Magnetic intrusion into the lithosphere
- Expansion and contraction of some parts of the earth

Characteristics of fold Mountain

a. They are often long and high
b. They are associated with volcanic activities
c. They contain rich minerals such as tin, copper gold and petroleum
d. They are generally found on the western continental margins
e. They have a number of volcanic intrusions

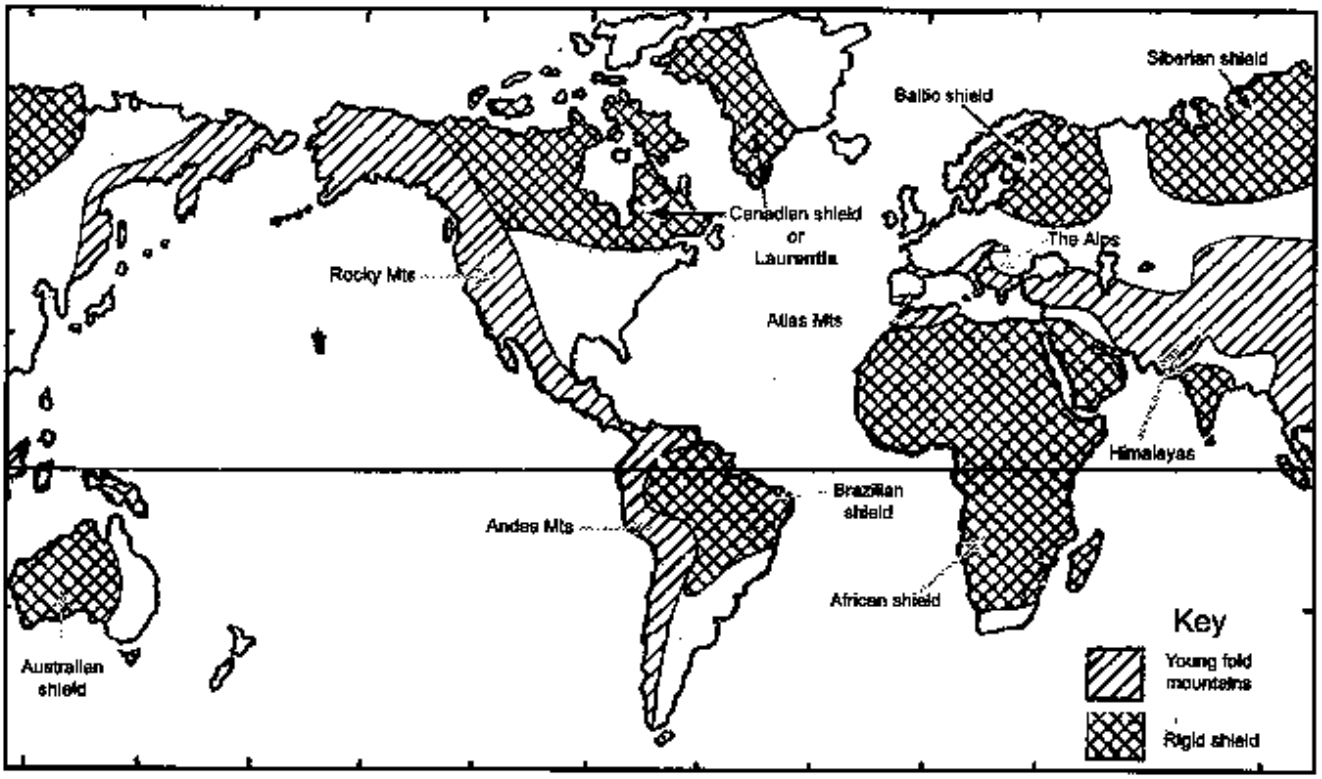


*Fig 3.5: **World distribution of young fold mountains and ancient shields***

Characteristics

1. They lie along margins of plates or concentric boundary
2. They contain stratified rocks

3. They are characterized by linear ranges and valley
4. They are unstable because of occurrence of volcanoes and earthquakes which show that they are still building up

   Examples
   a. Atlas of north Africa
   b. Alps of Europe
   c. Rockies of north America
   d. Andes of south America
   e. Himalayan of Asia

a. Old fold mountains

They have round tops

Some parts of are reduced to peneplains i.e low lying, fairly level surface e.g plateau

Examples are

Mountains in central Europe

Mountains in north west Europe (Scotland)

Influence of Fold Mountains on human activities

a. They act as climatic barriers e.g Rockies
b. They give rise to important rivers due to their heavy rains and snowy summits
c. They provide minerals
d. They act as communication barriers e.g Alps mountain
e. Some fold mountain ranges provide valuable forest resources

Block Mountains

When the earth crust bends folding occurs, but when it cracks faulting takes place

A fault is a crack or fracture in the earth's surface

Causes of faulting

(i) Tensional forces
(ii) Compressional forces

Tensional force:

It tend to pull the crust apart leading to the formation of faults

This may increase the size of the earth's crust.

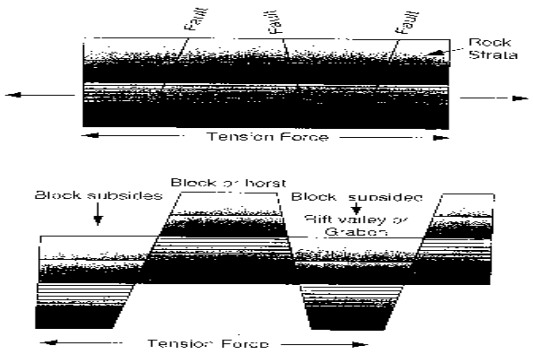


Figure showing formation of Block Mountain or horsts

It may cause the central block to sink and becomes a Rift valley or rise and becomes a block mountain

(see below)

Compressional force:

This force too may result in the formation of faults in the earth's crust.

If force continues, it forces the outer block to rise above the central block and become a rift valley while the standing blocks may later become Block Mountains

(See below)

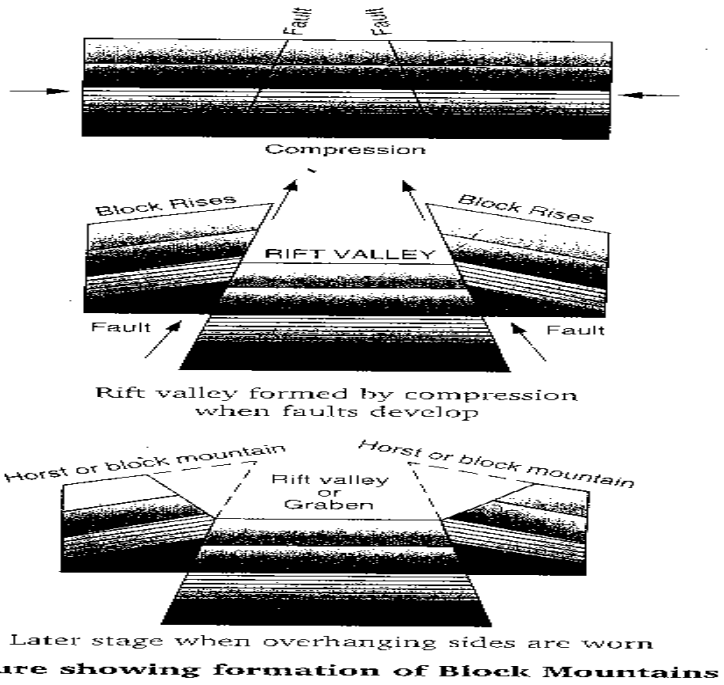
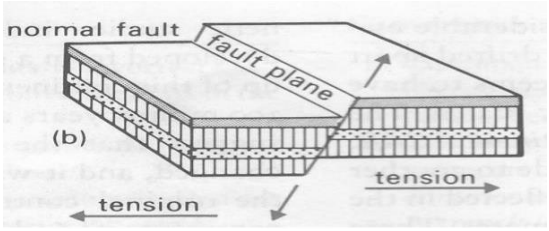


Figure showing formation of Block Mountains

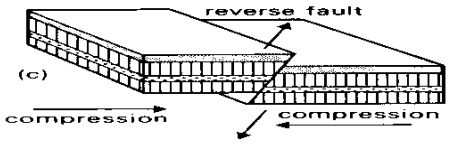
Types of faults:

Normal faults caused by tensional force



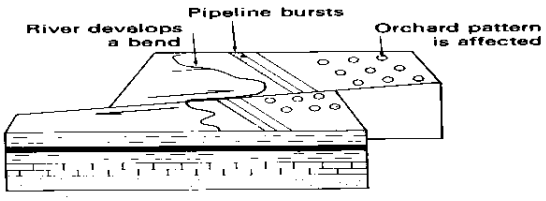
Reverse faults caused by compressional force

(see below)



Transform faults or tear faulting

(see below)



Examples of Block Mountains:

- Ruwenzori mountains (Uganda)
- Khana mountains (Namibia)
- Ethiopian Highlands (Ethiopia)
- Congo Horst (DRC)
- Shire Highlands (Malawi)

Characteristics of Block Mountains

- The faulted side is very steep
- They are long
- The side facing away from the fault has a gentle slope
- There is easy rise of ground water from the fault
- Ore deposits lies in the fault
- Springs of hot or cold water arise from the fault

Environmental resource influence of faults and Block mountains

- Fault side are source of hot or cold water
- Faults permits ore forming chemical solution to rise along the fault plane
- Fault may hinder contraction of roads and railways

Volcanic mountains

These are formed through viscous or thick lava ejected from a fissure in the earth's crust which pile-up into a mountain.

Volcanic mountains result into a steep sided cone

Examples of volcanic Mountains include:

- Mt. Fujiyama (Japan), Mt. Merapi (Sumatra), Mt. Cartopax (Ecuador), Mt. Mayon (Philippines)
  Mt. Agang (Bali), Hood (USA), Mt. Aconcagua (Chile)

Characteristics Volcanic Mt.

- They are steep sided
- They are symmetrical or conical shaped
- They are normally of great height
- They result in isolated peaks

Importance of volcanic Mt.

- Volcanic valleys are often fertile and are good for agriculture
- They are a source of minerals eg Diamond
- They produce good scenic view for tourism attraction

Residual Mountains

These are mountains formed through denudation process in which the land got lowered through agents of erosion

Residual means remains from an original mountain

Hence residual mountains are formed from the remains of al already existing mountain such as Volcanic, Block or Fold Mountain

Examples of residual mountains:-

- Mt. Monadnock (Asia)
- Mt. Mulanje (Malawi)
- Scottish and Scandinavian Highlands (Britain)
- Aravalli and Parasnath (Bihar)

Characteristics of Residual Mt.

- The layers of the rock have more faults
- They may exist as mountain ranges
- They have irregular summits
- Those from volcanic Mt. have sculptured domes

Economic value of Mt.

- They promote tourism through good scenic views
- They are a source of important rivers
- Mountains provide valuable timbers
- They are often rich in minerals eg Gold, Copper etc

- They may form natural political boundaries

Volcanism

Success criteria:

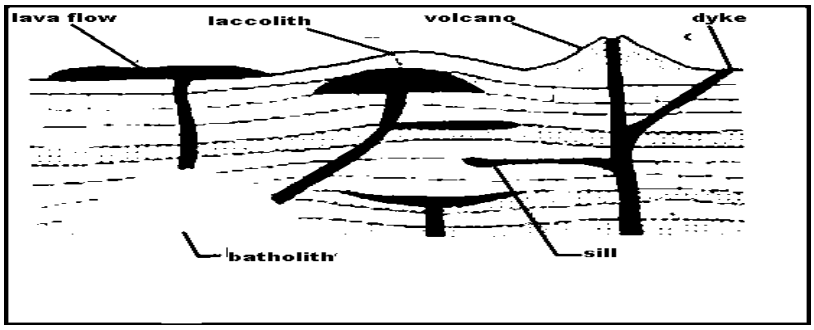
- Explain the term volcanism
- Explain the formation of a volcano
- Explain extrusive and intrusive features formed from a volcano
- Assess the effects of volcanic activity

It's the movement of magma (molten material) from the earth's interior towards the earth' external areas or surface

Features produced

Two types

a. **External (extrusive) features of volcanism**
    1. Lava plateau/plains e.g Decacn plateau
    2. Volcanic mountain e.g Kilimanjaro mountain, Kenya mountain
    3. Caldera-larger crater
b. **Internal (intrusive) features of volcanism**
    1. Batholiths
    2. Laccolith
    3. Sill
    4. Dyke



Batholiths

It's a large mass of magma which forms the root of a mountain

It is made of granite material

Sill

It's a sheet of magma that lie along rock bedding

They may become rapids or waterfalls when exposed by erosion

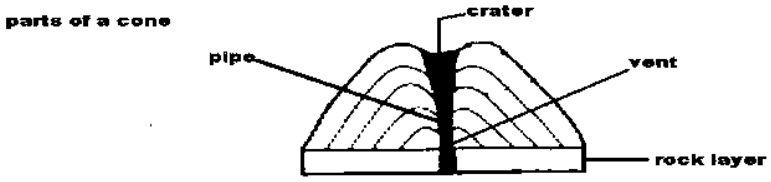
Dyke

It's a mass of magma that run across rock beddings

It may stand-out like a ridge or escarpment when exposed

Volcanic cone

Parts of a cone



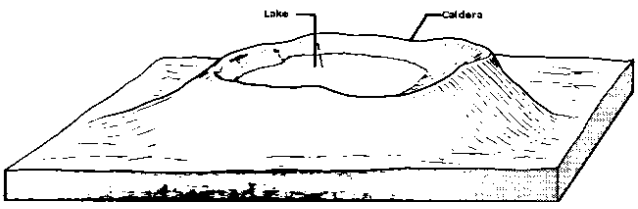
Types of volcanic cone

a. Ash and cinder cone
   Its when lava has been blown out violently to great heights during an eruption e.g Paracutin (Mexico)
b. Lava cone
   Its when the lava is viscous and flows out slowly building up to form steep slopes
c. Composite cone
   Its when a cone has a mixture of lava and ash built-up in layers of a cone e.g Vesuvius cone in Italy

Caldera

This is usually formed when a volcano erupts violently in an already existing cone whereby blowing away the crater to its vent and creating a hallow area

However, when a caldera is filled with water it becomes a lake referred to as a Caldera lake.
Lake Toba



Volcanic activity

These can be divided into three stages

a. Active (erupts frequently)
b. Dormant (erupts infrequently)
c. Extinct (never erupted)

Other forms of volcanoes

a. Hot springs
   Common along rift valley
   Its super heated water where ground water came in contact with magma
b. Geysers
   Its super-heated water that is ejected in form of a steam explosively

Effects of volcanoes

Negative

a. They may cause great loss of life and property
b. They may result in flooding if magma blocks a stream
c. They may hinder communication if it builds into a mountain
d. They may result in unnecessary bush fire and destroy forests

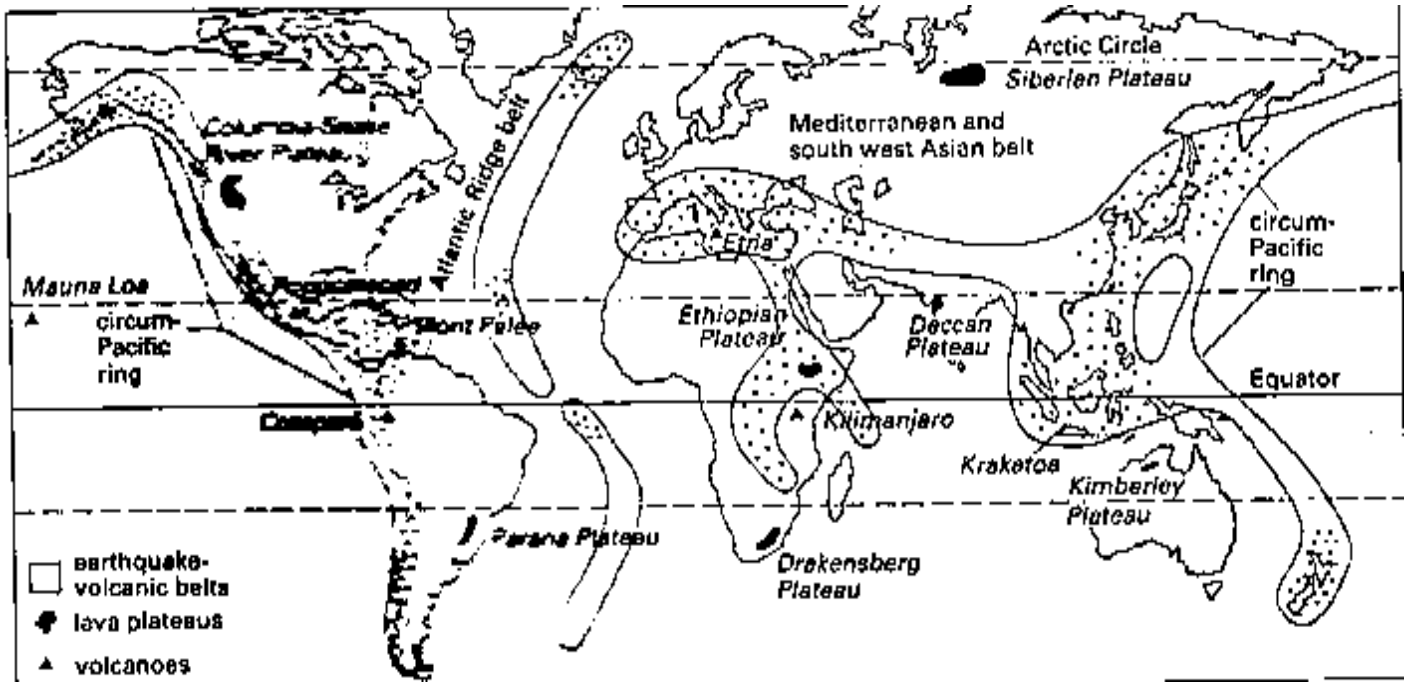
Positive

a. Some lava outpouring have resulted into fertile soil e.g Deccan plateau
b. Some volcanic activities have resulted in formation of precious minerals e.g diamond (Kimberly) copper deposit in (USA) and Nickel in Canada
c. Some hot springs and geysers are used for generation of electricity in japan, Zealand, Iceland

Types of lavas

a. Basic lava
   These are very hot and highly fluid and flow quietly affecting extensive areas
   They give rise to lava plains and plateau
b. Acid lava
   These are very viscous and therefore flow slowly
   They are explosive, often throwing out volcanic bombs or pyroclastic materials

They give rise to steep-sided cones



EARTHQUAKE

Success criteria:

- Explain the term earthquake
- Explain the causes of earthquake
- Explain the effects of earthquake
- Explain the relationship among Fold Mountains volcanoes and earthquakes

These are sudden earth movements or vibrations in the earth's crust

Causes

a. The development of faults or circles in the earth's crust due to collision of plates
b. Movement of molten rocks below or within the earth's crust i.e volcanism
c. Plate subduction as plates collide and get bent
d. Volcanic explosion as magma finds its way out

Location of earthquakes

They are usually located along plate boundaries, occurring alongside volcanic regions

Effects of earthquake

a. They can cause vertical or lateral displacement of parts of the crust
b. They may result in the rising and lowering of parts of sea floor e.g Sagani Bay in Japan
c. They can cause raising or lowering of coastal regions e.g Alaska in Canada in 1899
d. They may result in landslide e.g North China in 1920
e. They may result in destruction of property and lives

There is a relationship between fold mountains, earthquake and volcanic zone in the sense that

- They all occur along plate boundaries
- They are all caused by plates movements
- They mostly occur on the Western side of the continents

Measurement of an earthquake

It is measured using an instrument called a Seismograph

The magnitude of an earthquake is recorded on an instrument called a **Richter Scale**

A Richter Scale of 9.5 is the maximum strength of an earthquake and result in maximum destruction

A Richter Scale of 1.o is the minimum strength of an earthquake and cause minimum destruction

The **FOCUS** is the point in the earth's crust where the earthquake waves originate

The **epicenter** is an area above the focus where the effect of an earthquake wave is felt

ROCKS

Success criteria:

- Describe main types of rocks
- Explain the formation of rocks
- Identify characteristics and samples of each types of rock
- Examine the importance of rocks to life and human activities

What is a rock?

It is an aggregate of minerals or an accumulation of minerals or an accumulation of minerals

Rocks are made up of minerals

Some mineral are elements while some exists on compounds

Examples of elements

Carbon, Gold, Sulphur, Copper, Diamond

Examples of compounds

1. Silica (SiO)
2. Felspur and silicates of aluminium, potassium, sodium and calcium
3. Aligite, hornblende and olivine are silicates of iron (Fe), magnesium (Mg), calcium (Ca) and aluminium (Al)
4. Clay minerals are a complex of silicate felspurs

Classification of rock

This is based on

a. Texture of rocks
b. Origin of rock

Main types of rocks

There are three main classes of rocks namely

1. Igneous rocks
2. Sedimentary rocks
3. Metamorphic rocks

Igneous rocks

Formation

They are formed through solidification of molten material coming from the interior of the earth

When the molten material comes out it is called lava

When the molten material does not come outside of the earth it is called magma

Types of igneous rocks

There are two main types

a. **Intrusive/platonic igneous rock**
   These are igneous rocks formed through the solidification of magma within the earth's crust

They are also known as Abyssal rocks

Such kind f rocks cools very slowly that result in the following characteristics

1. They have large sized crystals
2. They are course

Examples of plutonic igneous rocks include

i) Granite
ii) Gabro
iii) Diorite

b. Extrusive/volcanic igneous rock

These are the igneous rocks formed through the solidification of lava-outside the earth's crust

They are also known as Hypabyssal

The cooling of such rocks is very rapid resulting into the following characteristics

i) The rocks have very fine crystals(no crystals)
ii) They are very smooth

Examples of such rocks include

Basalts, scoria, andesite, rhyolite, pumice, obsidian

Characteristics of igneous rocks include

i) They are crystalline
ii) They do not occur in strata (not stratified)
iii) They do not contain fossils since they are formed from magma coming from the mantle

Sedimentary rocks

Formation

They are found by compaction or cementation of deposited sediments

Sedimentary rocks are derived from weathering and erosion of rocks

The deposited materials are compressed together by pressure and heat through the process known as lithification

Characteristics

1. They occur in layers
2. Some sedimentary rocks contain fossils

Note:

- Mud can change to clay through compaction
- Mud can change to mudstone through compaction/ cementation
- Mud can change to shale through compaction
- Silt can change to siltstone through cementation
- Sand can change to sandstone through cementation

Sedimentary rocks include

- Sandstone
- Siltstone
- Shale
- Mudstone

Other examples of sedimentary rocks

a. **Mechanically formed (physically)**
   These are sedimentary rocks formed by weathered material which are deposited or compacted or cemented together
   Examples:
   i) Sandstone
   ii) Conglomerate
   iii) Shale
b. **Chemically formed**
   These are formed by cementation and compaction of minerals with rock particles
   Examples:
   i) Limestone
   ii) Chalk
c. **Biologically formed (organically formed)**
   These are formed from plants and animal remains
   Examples:
   i) Coal
   ii) Oil shale

Metamorphic rock

Formation

These are rocks which are formed from already existing rocks after being exposed to great pressure and heat

The already existing rocks change their form into a new form (chemically)

The rocks may change their chemical composition after being exposed to intense

a. Heat
b. Pressure
c. Hydro-thermal, liquids and gasses

Examples:

1. Limestone (sedimentary) → Mable (metamorphic)
2. Clay (sedimentary) → slate (metamorphic)
3. shale (sedimentary) → schist (metamorphic)
4. coal (sedimentary) → graphite (metamorphic)

Note: metamorphic rocks are common in volcanic region

After rocks have changed their form they become resistant and compact

Metamorphic means ***changed form***

Importance of rocks

1. Rocks can be used for construction of buildings and roads
2. Some rocks provide energy e.g coal
3. Rocks if weathered they provide fertile soil for agriculture
4. Some rocks when processed may provide fertilizer
5. They can also be used for roofing e.g slate
6. Some rocks help in storage of water e.g aquifer rocks
7. Rocks contain important minerals such as gold

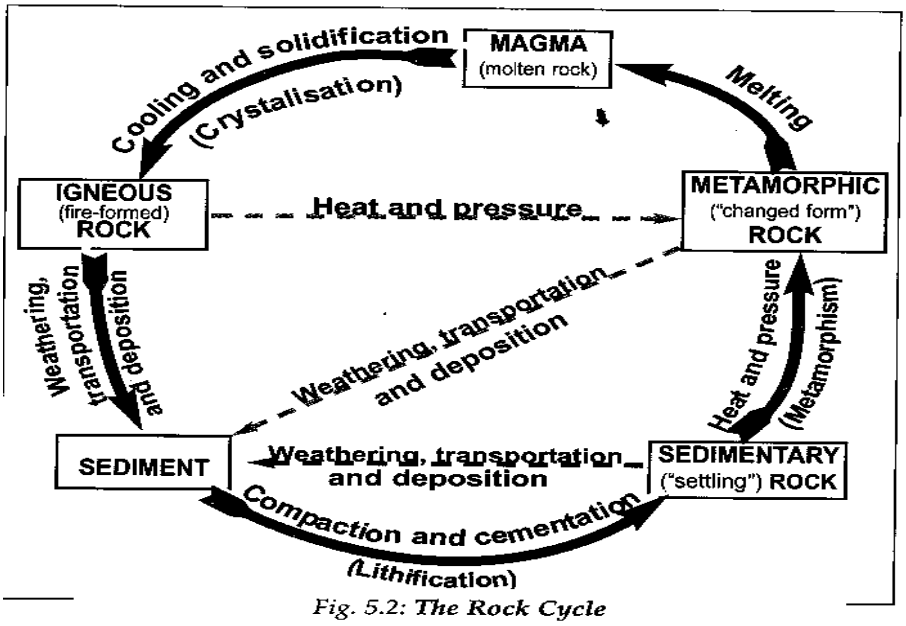


Fig. 5.2: The Rock Cycle

Rock cycle

The rock cycle is also known as lithological cycle or geological cycle

What is involved in the cycle?

All rocks are subject to change to other types of rocks e.g starting from igneous rocks this can be weathered to form sediments

Sediments are lithified or stratified and compacted to form sedimentary rocks

The sediments can also be metamorphosed to form metamorphic rock

The metamorphic rock may melt to magma as a result of great pressure and heat

The magma crystallize through a process of crystallization to form igneous

Note

Rocks can be transformed to any class of rock

Sometimes short cuts can occur within the rock cycle e.g sedimentary rocks may not be buried deeply enough to be metamorphosed and may be exposed to denudation and erosion soon after they are formed

Another example is that igneous rocks underground (platonic) may not be exposed into the surface to be converted into sedimentary but may change directly to metamorphic rocks and may change directly to metamorphic rocks and may be transformed to magma.

RIVERINE LANDFORMS

Success criteria:

- Identify riverine features on a topographic map
- Identify coastal features on a topographical map

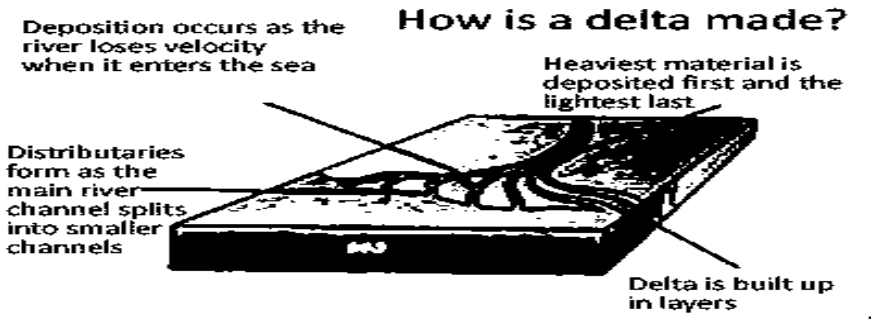
Riverine landforms :

These are features that are formed due to the movement of a river eg Delta, gorge, ox-box lakes, meanders, floodplains, waterfall, cataracts and rapids, tributary and distributary , leeves etc

Formation of riverine landforms

Delta:

Formed when a river load is deposited faster than it can be washed away by a water wave from a water body eg Nile delta

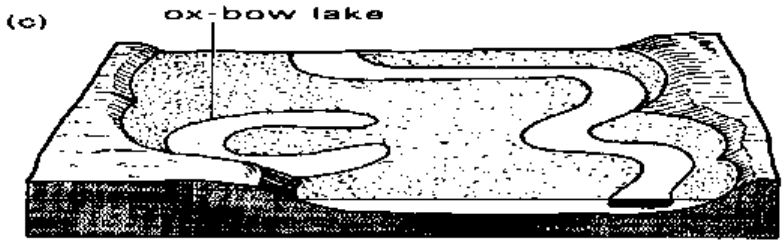


Gorge:

Formed due to an undercutting of a stream or river across a land mass eg Mpatamanja gorge

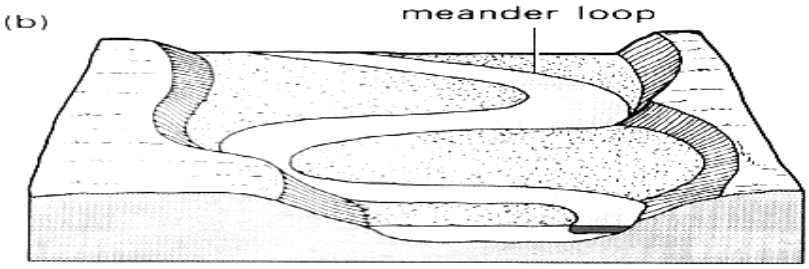
Ox-bow Lake:

Formed from a cut-off loop of a river meander as the river struggles to flow on a very low gradient



River meander:

It's the bending of a river as it passes across a low gradient in its maturity stage

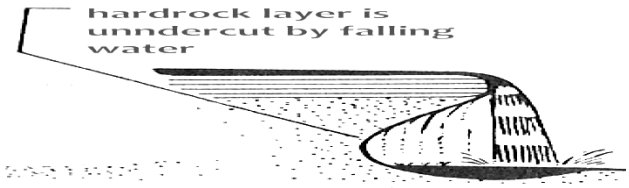


Flood plain:

Its' an area of land that often experiences an over flow of water especially during heavy rainfall eg the Lower Shire

Waterfalls

These are sudden vertical falls of water cascading over the edge of a hard rock layer, plateau or high level side valley



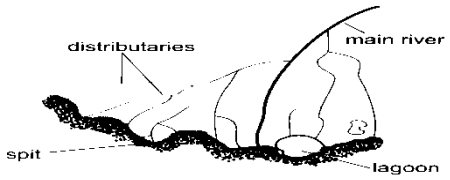
Rapids and cataracts

These are sudden roughing up of a river flow as water flow across rock outcrops

Rapids are common on the upper part of a river (upper course) where the land is steep

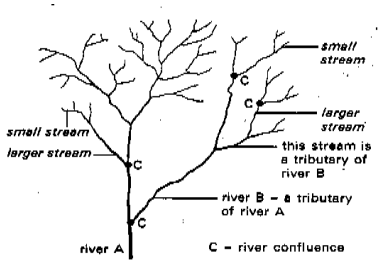
Distributary:

These are smaller channels of river emerging from a bigger river after the mother river-flow is blocked due by sediments or spit from the sea



Tributary: It's a small river that flows into a larger river

Tributaries are commonly observed in the middle or upper course of a river



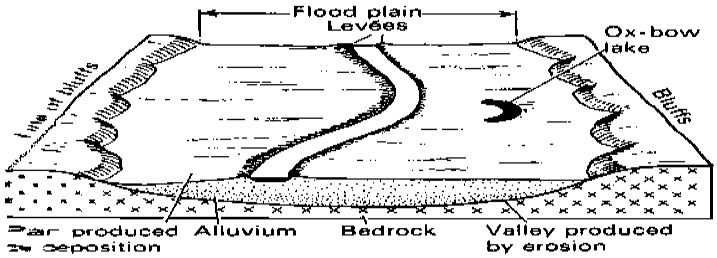
It has levees

It has levees

It’s a raised land of mud added to it by a river-every-time it over flows

It is a bank of alluvial deposits bouldering a river in its lower course and it is built up by deposition laying above the level of the flood plain

See below



WAYS IN WHICH RIVERINE LANDFORMS ARE IMPORTANT

- Water storage for livestock eg oxbow lakes
- Reservoir of water for irrigation eg ox-bow lakes
- Used for recreation purposes eg ox-bow lakes
- Used for fishing eg ox-bow lakes
- For development of HEP eg water falls
- For farming eg flood plains
- For tourism attraction eg waterfalls
- For construction of a bridge eg a gorge
- Controls water outflow from a river eg leeves
- Tributaries helps big rivers to continue flowing throughout the year without running dry
- Distributaries help in distributing water across the land surface that can be used for irrigation

COASTAL LANDFORMS

Success criteria:

- Explain how coastal landforms are formed
- Explain the importance of coastal landform

These are landforms formed due to the action a lake or sea waves as well as ocean current

Examples include:

- Spit, Headland, Isthmus, Cape, Bay, Peninsula, Lagoon, Delta, strait

Importance of coastal Landforms

- Used for the construction of ports eg Bay
- They are important fishing grounds eg lagoon
- Breeding places for fish eg lagoon
- They are conducive places for canal construction eg Suez canal
- They create a passage between two land masses eg Strait of Abrogate

RELIEF FEATURES OF THE OCEAN BASIN

Success criteria:-

- Explain relief features of the ocean basin
- Explain the terms ocean current, drift and streams
- Identify world ocean currents of the world
- Explain causes of ocean currents
- Explain factors that influence the direction of ocean currents
- Suggest the effects of ocean currents

Relief features of the ocean basin include:-

- Continental shelf

Its' an area of land that connects continents and ocean basin

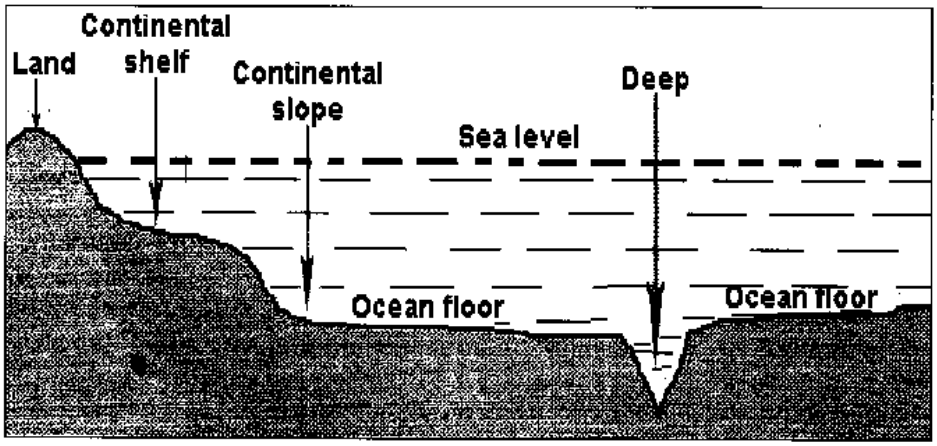


Fig. 10.1: *A cross section of an ocean basin*

It is usually a shallow part of the oceans due to deposition of sediments by rivers from land masses

- Continental slope
- Ocean floor
- Deep points eg Philippian deep
- Oceanic ridge eg the Mid-Atlantic ridge
- Trenches eg Peruvian trench
- Oceanic islands

Ocean currents

Its faster flow/moving of water in an ocean/sea due to different temperature variations

Drifts

These are slower-moving or flow of oceanic water as a result of friction from the prevailing winds e.g West wind drifts and the North Atlantic drift

Types of ocean currents

They are two

a. Warm ocean currents
b. Cold ocean currents

Warm ocean currents

It's a large body of warm water laden with moist air flowing from low latitudes to high latitudes

Examples include:

- North Pacific, Gulf Stream, North Atlantic drift, Kurosiwo, Brazilian, Mozambique, East Australia

Cold ocean currents

It's a large body of cold water that moves from high latitude (polar) to tropical

Cold ocean currents are located on the Western side of the continents

These currents have less effects on temperature because they lie under off-shore winds

Examples include

- California, Labradors, East Greenland (Irminger), Canaries, Kamchatka, Peruvian (Humboldt), Banguela, West Australian, West wind drift

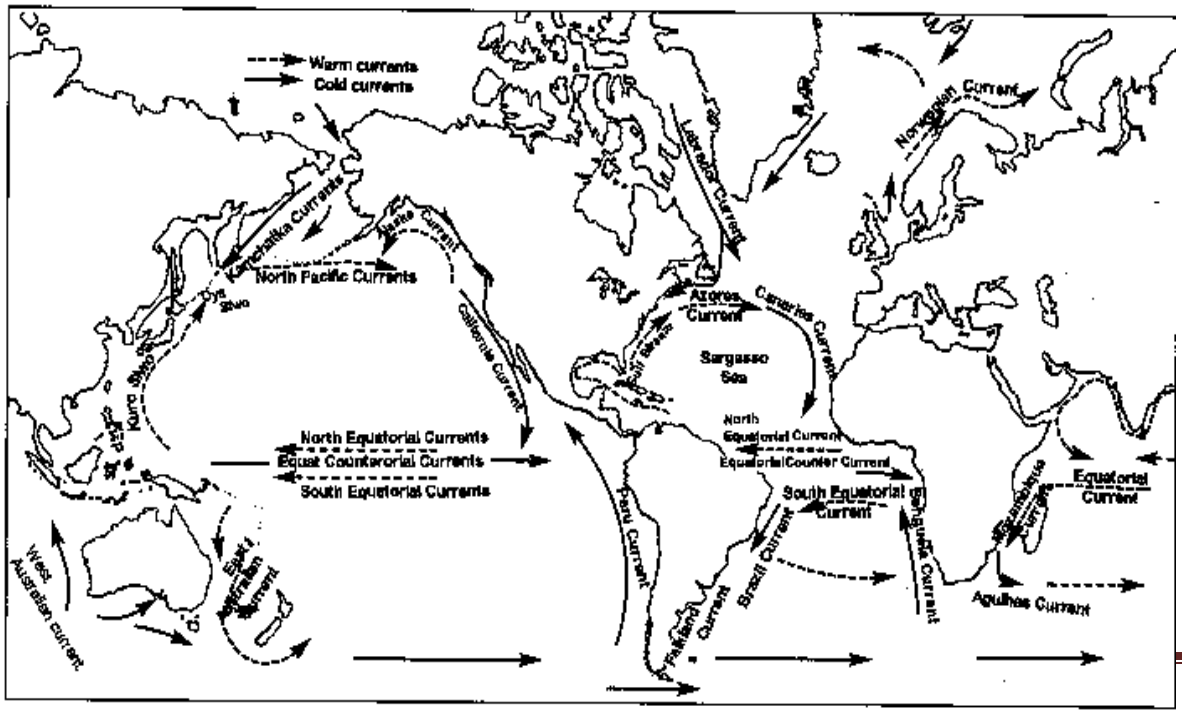


Fig. 10.2: *Distribution of ocean currents*

Causes of ocean currents

a. Temperature variation

The difference in temperature between the polar region and tropical region. Warm water from tropical region easily flow polar-wards

b. Difference in salinity and density

The tropical region has highly saline water that easily sink down due to its high density
However, water also flows side wards from tropical to polar where there is less saline through the process of diffusion

c. **Prevailing winds**
Blowing/moving air above water normally force a water body to move from one point to the other
Water bodies/ocean normally follow the direction of the prevailing winds

d. **Rotation of the earth**
Rotation of the earth causes the deflection of ocean currents
Water bodies in the northern hemisphere are deflected to the right while those in the south are deflected to the left

Direction of ocean currents

Causes of direction taken by ocean currents

a. **Land masses shape**
A land mass may cause a change in the direction of an ocean current
An ocean current that has come across a land mass is forced to change its course of direction

b. **Prevailing winds**
The prevailing winds blowing across water bodies causes water body to take the direction of its flow
Ocean currents caused by prevailing winds are known as drift e.g the North Atlantic drift

c. **Rotation of the earth**
The rotation of the earth often creates coliolis force that forces ocean to be deflected to the right in the North and left in the Southern Hemisphere
This deflection is described by a law known as Ferrow's Law of deflection

Effects of ocean currents

a. **Temperature**
Cold ocean currents often lowers the temperature f the coastal land along its path. Such ocean currents include Banguela, Peruvian, California and Oyasiwo
On-shore winds blowing across the cold ocean current are often cooled to form fog
The cold ocean current often result in dryness of coastal land and form desert such as the Atacama and Namib deserts
The warm ocean currents often raise the temperature of the New Foundland and Western part of Britain
The Mozambique warm ocean current often raise temperature of the Eastern coast of Africa

b. **Climate**
Ocean current modify climatic conditions of some areas such as the Kurosiwo current that often carry much heat from the tropic to the North
The North Atlantic drift that often cause mild winters in Western Europe
The circulation of cold and warm ocean current often contribute to global warming through the reliance of the C.F.C gas from deep oceans

c. **Fishing**
   The meeting of the warm and cold ocean currents often cause rapid growth of plankton that are food for fertile e.g the meeting of the Kamchatka and Kurosiwo has led to the development of the Western Pacific fishing ground
   The Cold Labrador meets with the Warm North Atlantic drift that led to the development of North Western Atlantic Fishing ground
d. **Shipping industry**
   Ocean current often assists in the movement of ship across oceans
   Ships that sail along with an ocean current often move swiftly
   However those ship moving against an ocean current may end-up crushing
   Furthermore, ship moving in the direction of an ocean current saves fuel

WORLD PRESSURE BELTS

Success criteria:

- Explain the term air pressure
- Explain factors that influence air pressure
- Locate the main air pressure belts on world maps
- Account for the distribution of pressure belts in the world

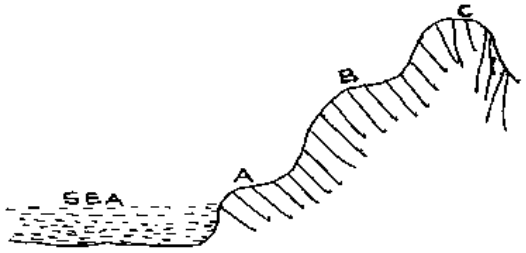
Air pressure:-

It's the weight exerted by air from the atmosphere

Air pressure is measured using instruments known as Barometer and expressed in units called mill bars

Factors affecting air pressure

a. **Temperature**
   The higher the temperature, the lower the atmospheric air pressure since molecules of air expand and lose weight with increasing temperature
b. **Altitude**
   The higher the altitude the lower the atmospheric air pressure
   When the altitude is decreasing air pressure increases



c. **Distribution of land and sea**
   Differences in the heating rates of both the land and sea result in earth low or high air pressure
d. **Amount of water vapour**

Air with high amount of water vapour has low air pressure since water vapour rising is associated with an increasing temperature that negatively affect air pressure

e. The speed of wind

If the speed of wind is high air pressure is likely to be lowered since wind speed tend to clear air molecules away from a specific place

f. Rotation of the earth

This cause air around the equator to be thrown away and pile-up along the 30° North/South of the equator where it leads to a high pressure belt, while the equator experiences low air pressure

g. The size of space air is force to occupy

If air is forced to occupy a small space its air pressure rises up while if it occupies a larger space its air pressure rises up while if it occupies a larger space its air pressure goes down. For instance, there is low air pressure at low latitude (0° equator) than the high latitude (90° polar) due to space air occupies

Distribution of air pressure on the globe:

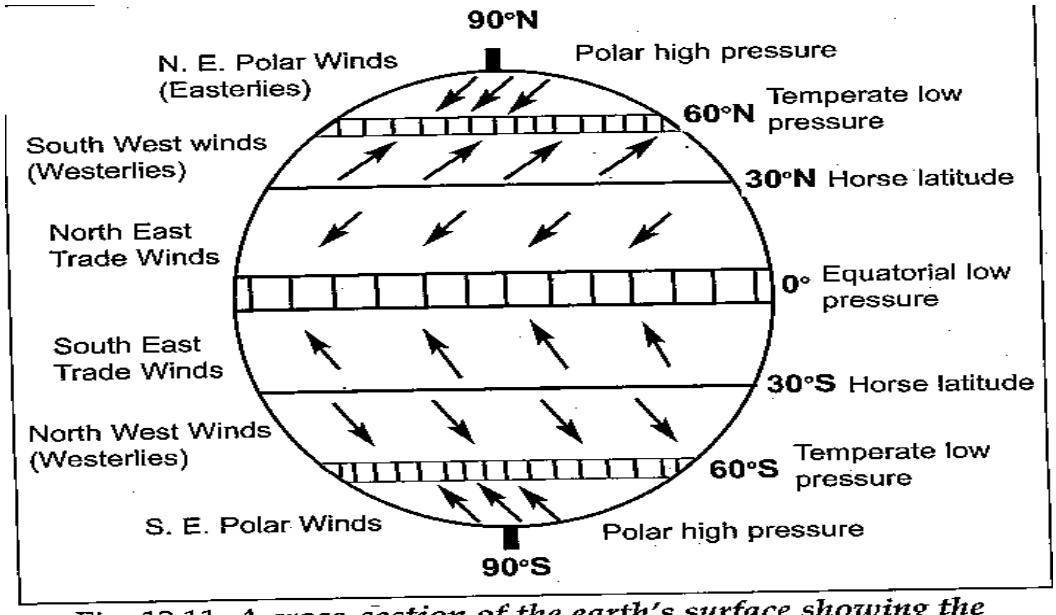


Fig. 13.11: *A cross-section of the earth's surface showing the relationship between pressure belts and winds*

Reasons for the distribution of pressure belts:

(a) Equatorial low pressure belts

The high temperature due to over head sun account for low pressure belt

(b) Horse latitude

The reduction on the size of the earth or narrowing of the earth account for the rising pressure

The pilling of atmospheric air from the equator account for the rising air pressure

(c) Temperate low pressure belt:
The increasing in the size of the earth with air moving from the polar region account for the reduction in the pressure

(d) The polar region:
The low temperature in the region account for the high pressure
The pilling of air from the equatorial region also causes the rising air pressure

Effects of low air pressure

- Preparing food in low pressure areas like mountain takes a long time than places with high air pressure
- Low pressure may cause breathing problems in mountainous areas due to reduced oxygen with thin air

PREVAILING WIND

Wind:

- Its air in motion (It is the moving air)
- The movement of air is caused by differences in heating system of the earth surface by the sun

Types of wind

There are three types

1. Prevailing wind
2. Monsoon winds
3. Local winds

A. Prevailing winds

-These are winds that blow for a long period of time over a specific place or area
-They normally develops in regions of high pressure belts and moves faster into the regions of low pressure belts
They include:-

a. Westeries winds
b. Polar winds
c. Trade winds

Characteristics of prevailing winds

a. Westeries

- They blow from the subtropical (horse latitude) to the temperate low pressure belt

- They are deflected to the right and named **south westerly** in northern hemisphere and to the left in south hemisphere to be **north westerly**
- They have a number of depression (cyclones)
- The depression in westerly brings in **cyclonic rainfall** to affected areas
- They change in direction and strength of wind

b. Trades

- They blow from horse latitude (subtropical to doldrums equatorial belt)
- They are constant in strength and direction
- They follow a regular path
- They bring in a cooling effect to areas over which they pass
- -They bring prolonged rain to coastal areas after passing over an ocean
- -They are deflected to the right in the North to become North East trade and left in south hemisphere to become South East trades

c. Polar winds

- -They blow from the polar high pressure belt to low temperate pressure belt
- In the north it is deflected to the right to become North East polar and in south to the left to be south east polar wind

Influence of prevailing winds by pressure belts

- The **trade winds** mainly develop from the subtropical high pressure belts (Horse latitudes)
- The **polar winds** mainly develops from the high pressure belt of the polar region
- The **westeries** mainly develops from the horse latitude and moves in a north easterly direction from the south west (northern hemisphere)

Importance of prevailing wind

a. Trade winds belts are good for ship or marine vessels sailing westward
b. Westerly wind belts are good for long distance flying
c. Transcontinental flying in the easterly direction requires less fuel and shorter time

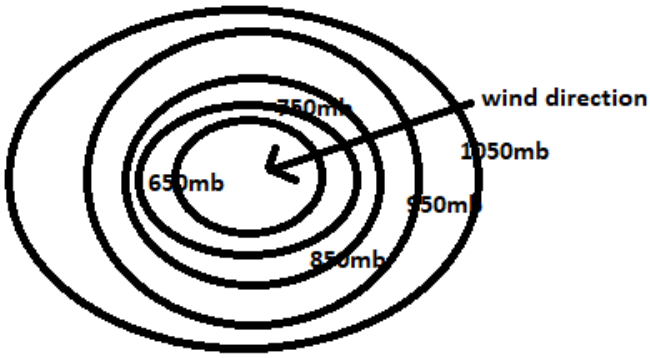
Ferrel's Law of deflection (coriolis force)

- ✓ Ferrel's law of deflection states that any freely moving body in the northern hemisphere is deflected to the right-hand side of its' flow in the northern hemisphere and to the left in the Southern hemisphere
- ✓ In this case, Westeries (prevailing wind) destined for the north is deflected to its' right and therefore take a North East direction in the northern hemisphere
- ✓ The polar wind destined for the south would take the South West direction in the northern hemisphere
- ✓ A trade wind destined for the north would take a north west direction

- ✓ The Coriolis force: is the act of deflection of a freely moving body to the left or right hand side of its 'movement depending on the hemisphere it has developed

Isobars on an air pressure map

- Isobars are lines drawn on a map joining all places of the same air pressure
- Isobars helps gives direction of the movement of wind on a particular place



AIR MASSES

Success criteria:

- Explain the term air masses
- Explain the main types of air masses
- Explain the weather associated with air mass

AN AIR MASS:

It's a large volume of air whose temperature and humidity are fairly uniform

An air mass develops over an area which is extensive and also uniform in-built shape e.g over deserts, oceans e.t.c

Types of air masses:

- Cold
- Dry
- Moist
- warm

Description of an Air Mass

(i) Temperature

An air mass can be referred as

- Cold or warm

Cold air masses are heavy while warm air masses are light

(ii) Humidity

An air mass may be described as :-

- moist or dry

Air masses that crosses an ocean are normally moist while hose that passes over land are dry

Note:

- A cold air mass is formed or develops when an air mass comes into contact with a cold surface for a long period of time such as in polar regions
- A warm air mass develops when an air mass comes in contact with a warm surface for a long period such as in tropical and temperate regions

Source of an air mass

This is the origin of air masses which could be over land or over oceans

Air masses that has land as its source are called continental air mass while those that has oceans as their source are called maritime air masses

Classification of air masses

They are classified according to

a. **Latitude**
   Air masses are classified according to the region they develop:-
   - Tropical region air mass
   - Temperate region air mass
   - Polar region air mass
   - Equatorial regional air mass

b. **Nature**
   Air masses may develop over land or over oceans
   Air masses developing over land are called **continental air mass** while those developing over land are called continental air mass while those developing over ocean are called **maritime air mass**
c. **Latitude and nature**
   Air masses that develops over land in polar region are called **polar continental air mass** while those developing over oceans in polar are called **polar maritime air mass**
   Air mass that develops over land in temperate regions are called **temperate continental air mass** while if it develops over oceans it is known as **temperate maritime air mass**
   Air mass developing in tropical region over land are known as **tropical continental air mass** while that developing over oceans is called **tropical maritime air mass**

Air mass developing in equatorial region over land are called **equatorial continental air mass** while if an air mass develop over ocean it is called **equatorial maritime air mass**

Note: an air mass becomes stable if its temperature and that of the surrounding environment is the same, such air mass does not rise high

An air mass whose temperature is slightly higher than its surrounding environment is referred to as being **unstable** as it continue rising as it is being cooled in the atmosphere, such air mass result in development of heavy storm and rainfall

Weather associated with Air Masses

- Air masses developing over the continents in tropical region may bring in dry hot air
- It may result in cool air if the air mass develops over a cold such as polar region
- It may result in high rainfall if the air mass develops in a high humid area

FRONTS

Success criteria:

- Explain the term front
- Explain the formation of fronts
- Identify characteristics of different types of fronts
- Describe the type of weather associated with each type of front
- Explain the ITCZ and its impact on weather

A Front

It's a line of boundary that separate a cold air mass and a warm air mass in low temperate air pressure belt

It separates the polar cold air mass from the warm westeries air mass

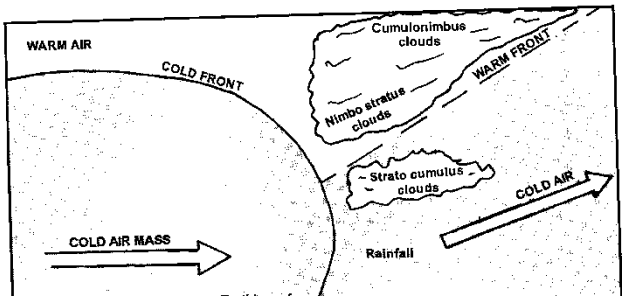
Types of fronts

They are two main types

a. Warm front
b. Cold front

A. Cold front

It occurs when a cold mass of air overtakes a warm air mass



The cold parcel of air displaces a warm air and force it to rise up
The formation of clouds and precipitation at the frontal zone is caused by frontal uplifting

Characteristics of cold front

- Brings in cold air and lower temperature
- Atmospheric pressure decreases steadily with rising warm air mass
- Causes wind to change direction
- It leads to the formation of cumulus and cumulonimbus and cirrus clouds

B. Warm front

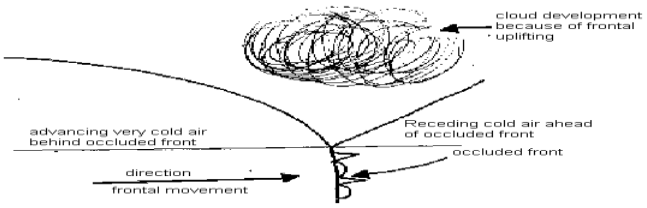
A warm parcel of air displaces a cold parcel of air
A warm front is the transition zone in the atmosphere where an advancing warm subtropical moist air mass replace a retreating cold dry polar air mass

Characteristics of a warm front

- Brings in warm air
- Atmospheric pressure steadily decreases
- Changes the direction of wind
- Shower, snow and drizzle follow
- Cirrus, cirrostratus, altostratus and nimbostratus brings in precipitation

Occlusions

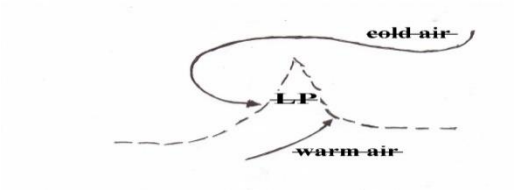
- It occurs in mid-latitude depression when the cold front catches up with the warm front
- If the air behind the warm sector is colder than the air in front of it, a cold occlusion occurs
  See below



How a depression develops

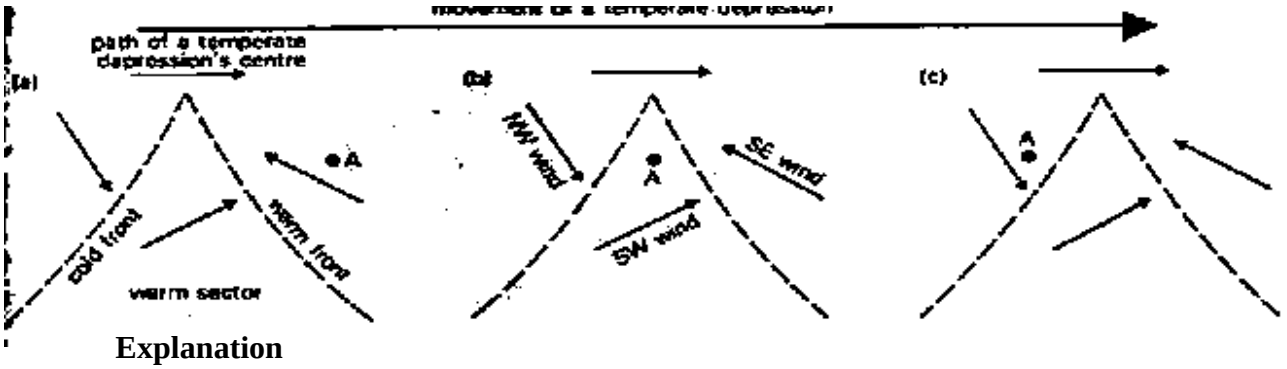
- Cold polar air generally moves in a westerly direction while the warm westerly winds moves in an easterly direction
- However, friction between the two air masses cause a wave to develop
  See below

- The wave bulges into the cold air and becomes bigger and pressure falls at the tip f the bulge(wave)
- An anticlockwise circulation of wind blows around the low pressure point



- As the bulge develops, the warm air rises up over the cold air at the front of the bulge
- The front where warm air rises is called the warm front
- If the rear of the bulge, the cold air forces its way under the warm air
- The rear fronts is called the cold front
- The warm air between the two fronts is called the warm sector
- The warm front is normally more gently sloping than the cold

Weather associated with a depression (cyclone)



Explanation

- The passage of temperature depression across a Centre 'A'
- The sky will be clear except for a little high cirrus cloud
- The wind will blow from the South East
- After a while, a definite cloud over develops and light showers of rain occurs which gets heavier
- The warm front passes 'A'
- The rain stops and the wind changes from south east to south west at 'A'
- Temperature rise and the air is humid because the warm sector lies over 'A'
- As the cold front passes, the weather changes vary rapidly
- The wind now blows from the North West and the temperature falls
- With the passage of the depression at 'A' the sky clears and remains cool

The inter-tropical convergence zone (ITCZ)

The climate of Africa is greatly influenced by the movement of air masses (maritime and continental) which differ in moisture content and stability

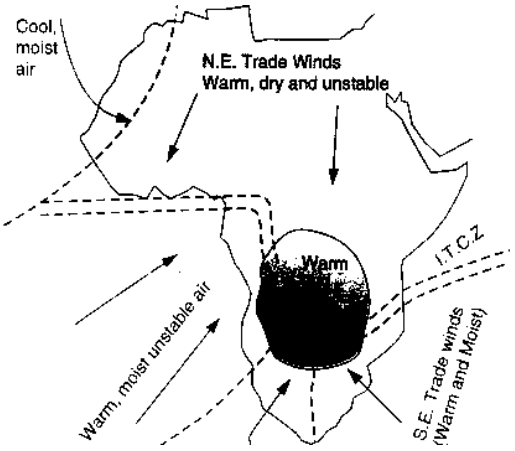
Unstable air mass will easily rise as compared to stable air mass

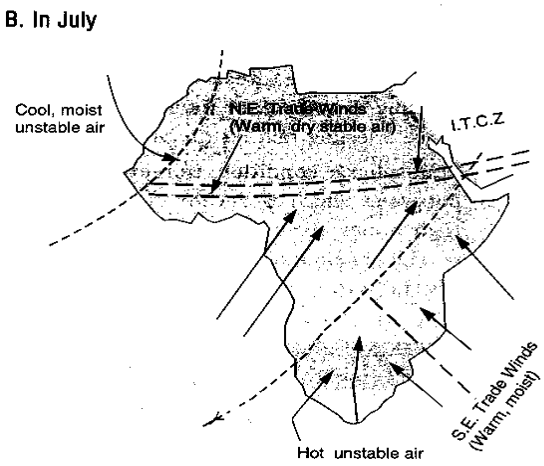
The zone where continental and maritime air mass meet is called the inter-tropical convergence zone (ITCZ)

The ITCZ is not stable but keeps moving between the southern Africa and northern part of Africa and northern part of Africa depending on the position of the sun

In summer the ITCZ stretches in the southern Africa in January as seen below

In January





The ITCZ is normally the meeting of zone of air masses of different characteristics, air masses that are moist and light are forced to rise above others that are cool and dry and result into frontal rainfall

However, the ITCZ is not the only factor that causes rainfall in Africa but same factors include

- Highlands facing warm moist air mass
- Convection currents in hot tropical air

- ✓ The ITCZ is not a front because air masses meeting in the zone have little difference in temperature and pressure
- ✓ The ITCZ is normally associated with rains coming from the cumulonimbus clouds accompanied by lightening, thunder and heavy rains
- ✓ Some gusty winds which bring rain showers
- ✓ The cumulus clouds brought in by the ITCZ slightly reduces the temperature

LOCAL WINDS

Success criteria:

- Explain the term local winds
- Explain the characteristics of local winds

- Explain the occurance of local winds
- Explain the occurance of land and sea breeses
- Explain the influence of land and sea breeze on local and human activities

Local winds

- They affect a smaller local area
- They are influenced by the immediate surrounding environment such as relief or temperature

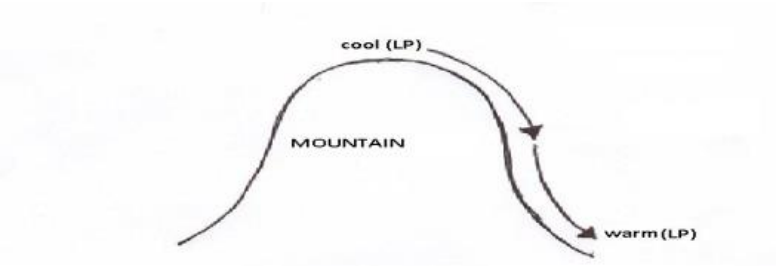
i) Land and sea breeze winds

Sea breeze

It's the movement of cool air from the sea to the land

Sea breeze normally takes place during the day

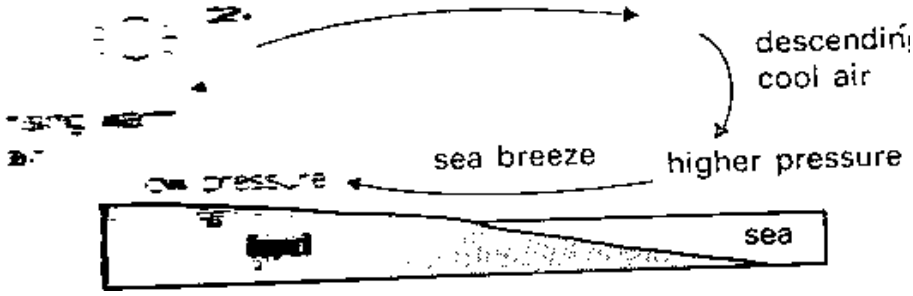
High temperature of the sun creates low air pressure over the land and wind blows from the sea to the land



This normally happen due to difference in the cooling and heating system of land and water body

Land gets heated up faster than a water body therefore emit heat as it loses its air pressure

See below



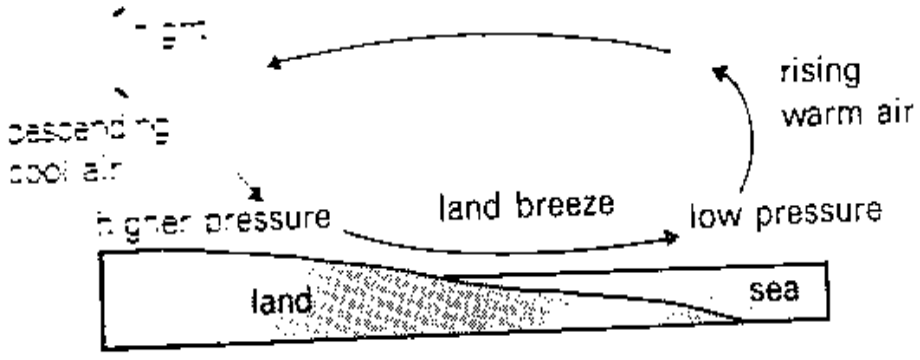
Land breeze

It's the movement of cool air from the land surface to the sea

Land breeze normally takes place during the night

The low temperature of the night makes the land to lose its warmth abruptly and create a high pressure over land while the sea (water body) emits its heat slowly and thus creates an area of low air pressure

See below



Note: in tropic sea, at night land breeze can be strong making fish sail out with them from the coast, however, during the morning fish may return with the sea breeze
Sailing ships leave at night when land breezes drive them seaward

ii) Regional winds

These include winds such as the Fohn of Alpine, the Chinook of Rocky Mountain, the Chiperoni of Africa, Hamattan of North Africa

Local winds can be divided into three main types

a. Depression winds

These are local winds created or caused by low air pressure
Such winds can further be divided into two parts

i) Warm winds
ii) Cold winds

i) Warm depression winds

These are hot and dusty
If such winds cross a water body, they become very humid and may cause rainfall
Examples include:-

- Sirocco in North Africa
- Leveche in Spain
- Khamsin in Egypt
- Hamattan in West Africa
- Santa Ana in California
- Zonder in South America
- Brick fielder in Australia
- Chili in Tunisia

ii) Cold depression winds

These are often very strong gusty and bitterly cold depression winds especially if they pass through a narrow valley eg. Mistral of France
Example of cold winds

- Mistral of France (Central Europe)

- Bora of Yugoslavia
- Pampero of South America (Argentina)
- Southerly Buster of Australia
- Buran

b. Descending winds (mountain winds)

They descend mountains into low laying lands (valleys)

When descending winds are going down a slope on the leeward side, their temperature drops at the rate of 6.5°c every 1000m

Examples of descending winds:-

i) Chinook of the Rockies Mountain in North America

The Chinook raise the temperature of the prairies and make wheat cultivation in winter possible

ii) The Fohn of Switzerland across the Alps mountain

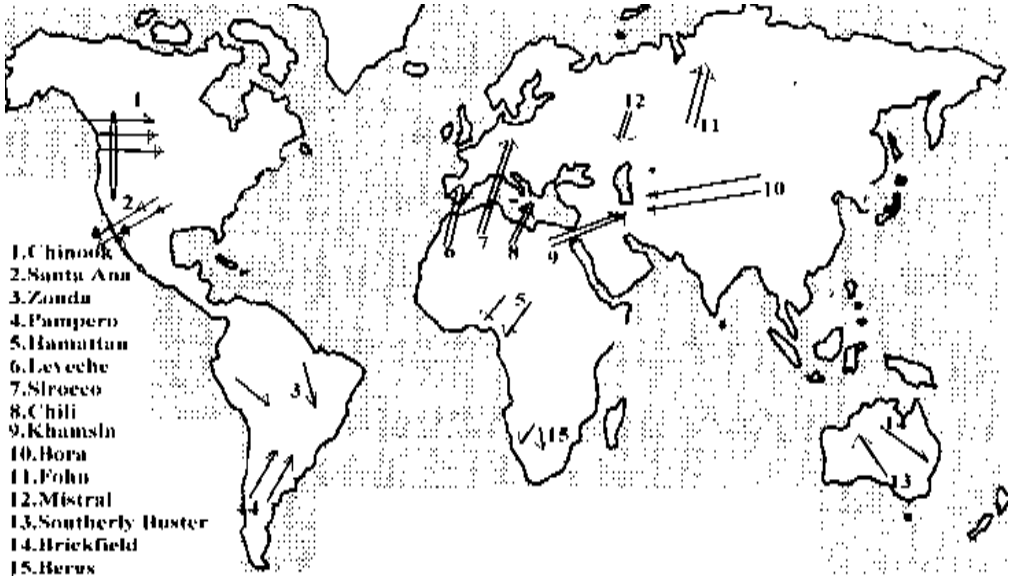
It melts snow in winter and cause avalanches and also help in ripening of fruits like grapes

iii) The Berg of south Africa veldt descending the Drakensberg plateau of south Africa

It helps raise the temperature of the south coast of South Africa during winter (May-August)

Others include:-

- Samun of Iran in Asia
- Nevada's if USA
- Ecuador of South America



c. Convection winds

These are winds that are caused by intense heating of air and the heated air produce convection winds which give rise to dust and sand storm

They normally occur in some deserts

Examples include

i) Dust devil of Sahara (North Africa)

ii) Simoon of Sahara desert too.

Note:

1. The Hamattan of North Africa from Sahara desert are common in west Africa

   They are hot, dry and dusty and causes great damage to crops

   It splits trunks of trees

In Guinea Coast such local winds encourages evaporation and cooling effect that leads to heavy rainfall

2. The Chiperoni wind of southern Africa originates from Indian ocean
   It is caused by the movement of Inter tropical Convergence Zone (I.C.T.Z) to the northern hemisphere and is common from May to August
   The Chiperon winds are loaded with moisture as it originates from an oceanic body
   It brings persistent stratus clouds and drizzles in the Shire highlands
3. The Chinook (Snow eater) melts and dries up winter snow
   It also moves pollutants such fumes away from their sources and raise the temperature by 19°c definitely reducing snow falling in the region

CHARACTERISTICS OF EACH TYPE OF LOCAL WIND

General characteristics:

- They affect animal and plant temperature
- They affect the distribution pollutants
- They influence pollination of plants
- They also influence agriculture activities for instance wheat cultivation in the prairies
- They influence tourism industry especially the cool breeze from the sea

Chiperoni

Characteristics

- ✓ It is an ascending wind
- ✓ It is cool
- ✓ It is moist

Effects

- ✓ It brings in persistent low clouds that may last for some days
- ✓ The wind in some cases brings in drizzles and wet conditions
- ✓ The winds may lower the temperature of an area

Harmattan

Characteristics

- ✓ It is a descending wind
- ✓ It is hot and dry
- ✓ It is dusty

Effects

- ✓ It damages plants and crops on its way from the Sahara desert
- ✓ The dust that comes along side the wind sometimes blurs vision and interfere with aircraft operation
- ✓ The dust from the wind may be carried over to ships sailing in oceans hence cause dirty
- ✓ It brings hot air to the region it blows and hence may result in rapid evaporation and heavy rainfall
- ✓ The rains that are associated with the rains may result in cleaning of the dust
- ✓ The wind has been nicknamed the doctor because of the rains it brings to places such as Mali, Niger and Guinea

Chinook (snow eater)

Arise from the Pacific ocean and descends the Rockies mountains where it blows away the snow

Characteristics

- ✓ Descending winds
- ✓ Warm and dry

Effects

- ✓ raises the winter temperatures
- ✓ melts and dries up the winter snow
- ✓ it leads to loss of moisture and humidity
- ✓ allows free growth of pasture and wheat during winter period
- ✓ summer Chinook brings damage to small crops
- ✓ it may contribute to pneumonia and shipping fever in cattle

Fohn

Descends the slopes of Northern Alps mountains in switzerland

Characteristics

- ✓ It is a descending wind
- ✓ It is warm and dry

Effects

- ✓ It raises temperature and melts snow in winter
- ✓ It may lead to avalanches due to the flow of melting ice and snow in winter on land surface
- ✓ It leads to ripening of fruits such as grapes in winter
- ✓ Trees and houses becomes completely dry
- ✓ It helps in the growth of pasture during winter

Sirocco

It is a descending southerly wind that blows northwards from North Africa towards the Mediterranean sea in spring from February to July

Characteristics

- ✓ It is a descending wind
- ✓ It is hot and dry
- ✓ It is dusty

Effects

- ✓ The meeting of the Sirocco and the cooler air above the Mediterranean Sea leads to the development of fronts which results into heavy rains and thunderstorms
- ✓ Sirocco also brings sand from the Sahara which spread over to the European continent
- ✓ The sudden change of temperature and humidity often cause health problems

Leveche

It's a descending wind that originates from North Africa and blows northwards across the Mediterranean Sea towards Spain in spring

Characteristics

- ✓ It is hot and dry
- ✓ It is dusty and stormy

Effects

- ✓ It may bring in stormy conditions that may be destructive
- ✓ The dust which it brings pollutes the air and blurs vision
- ✓ It brings sudden temperatures rises over the Mediterranean Sea which increases evapoartions
- ✓ Khamsin
- ✓ Blows across the Mediterranean sea from Egypt

Characteristics

- ✓ It is descending wind
- ✓ It is hot and very dry
- ✓ It is dusty

Effects

- ✓ The meeting of the Khamsin and cooler air over the Mediterranean Sea leads to the development of fronts which result into heavy and stormy rains
- ✓ The sudden change of temperature and humidity causes health problems as it causes headache and sleeping problems

Bora

Blows across the Italy, Croatia Slovenia northwards at speed of more than 100km/hour, and may even overturn moving vehicles or knockdown people in the streets

Characteristics

- ✓ Bora is descending wind
- ✓ It is cold and dry
- ✓ It is also dusty

Effects

- ✓ It helps in the nutrient balancing and transportation in the Adriatic Sea
- ✓ It also helps in the creation of water current in the Northern Adriatic Sea
- ✓ It is used in energy production in order to produce wind energy
- ✓ It is very destructive to people building and animals

Mistral

Blows towards the Adriatic sea from South Europe (South France) into the Gulf of Lions in the Mediterranean Sea. It develops when cold air masses from the North Pole move far south into Europe

Characteristics

- ✓ It is a descending wind
- ✓ It is cold and dry
- ✓ It is dusty

Effects

- ✓ It reaches hurricane force and brings in disaster to people, plants and buildings
- ✓ In winter it can bring in freezing of water in the French Riviera
- ✓ When the cold mistral meets the warm Mediterranean air masses heavy rains and thunderstorms can develop
- ✓ The wind sometimes roars heavily and brings a lot of dust

Brick fielder

It is a descending wind that blows southwards from the heart of Australia in summer. It mostly affects the southeastern Australia states of Victoria and South Wales

Characteristics

- ✓ It is descending wind
- ✓ It is very hot and dry

Effects

- ✓ It brings in dry spells that raises the temperature up to 15-20$^{0}_{c}$ within a few hours
- ✓ The frequent sudden rises in temperature may lead to healthy problems in people

Southerly Buster

It blows from the South to the North in Australia at a very fierce force of over 60km/hour raising temperature with over 10-15^{0}c within one hour

Characteristics

- ✓ It is cold and dry
- ✓ It is strong and gusty

Effects

- ✓ Sudden temperature fall often cause health problems
- ✓ It is destructive in nature

Pampero

It is an ascending wind that blows from the Atacama desert of the South America

Characteristics

- ✓ It descends over the Andes Mountains
- ✓ It is cold and dry
- ✓ It is gusty (strong)

Effects

- ✓ It creates violent gales that are more destructive in the Pampas
- ✓ Brings in cool light breeze that lowers the temperature of the Amazon Basin
- ✓ It may create dusty storms

Santa Ana (Devil wind)

Descends the mountains of Rockies across California

Characteristics

- ✓ Descends down the Rockies mountains
- ✓ It is warm and dry
- ✓ Sometimes it becomes gusty and dusty

Effects

- ✓ It leads to air pollution due to the dust
- ✓ It leads to low humidity as the sand sack moisture from the air
- ✓ It brings discomfort in people such as nausea, headache and strange behavior

Berg wind

It's a descending wind from the plateau of South Africa and blows southwards in winter.

Characteristics

- ✓ It descends from the plateau of South Africa
- ✓ It is warm and dry wind

Effects

- ✓ It brings in warm conditions to the South coasts of South Africa
- ✓ It brings dry and dusty conditions in some parts of the country

Zonda

It a warm descending wind blowing down from the Eastern slopes of Atacama desert in Argentina in Summer

Characteristics

- ✓ It descends from the Andes mountains
- ✓ It is a warm and very dry
- ✓ It is dusty

Effects

- Carries dust across the Bolivia and Argentina
- May cause damage to buildings and electric poles
- It is hot and dry over low laying areas but results into rainfall in highland
- It may result into snow formation due to low temperatures in highlands
- It cause damage to crops due to gusts and sudden dryness
- It may cause continuous avalanches

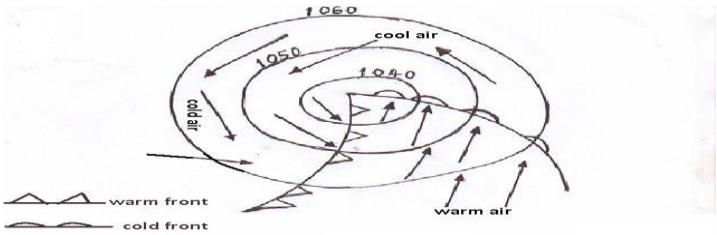
CYCLONE, DEPRESSION AND ANTICYCLONES

Success criteria:

- Explain the development of cyclones and anticyclones
- Explain the weather associated with tropical and temperate cyclones

Depression/cyclones

- Its an air mass which has low air pressure at the Centre and high outside
- A depression is normally associated with oval shaped isobars
- A depression is associated with instability or unsettled weather and rainfall
- Depression normally develops along the temperature low pressure belt of 60° North/South
- They consists of whirling masses of air (clockwise) in the southern hemisphere
- They usually bring prolonged rainfall to the coastal area and often very windy weather
- A cyclone is a system of wind rotating around a Centre of low-air pressure clockwise in the southern hemisphere and anticlockwise in the nation hemisphere



- It has low air pressure at the Centre with cyclonic (inward) air flow and normally air ascends at the Centre of a cyclone

i) Temperate cyclones

They arise from westerly winds caused by the mixing of cold air from the tropical regions
They swell /whirl anti-clockwise in the southern hemisphere
They are associated with prolonged windy rains to coastal regions
See below

Explanation

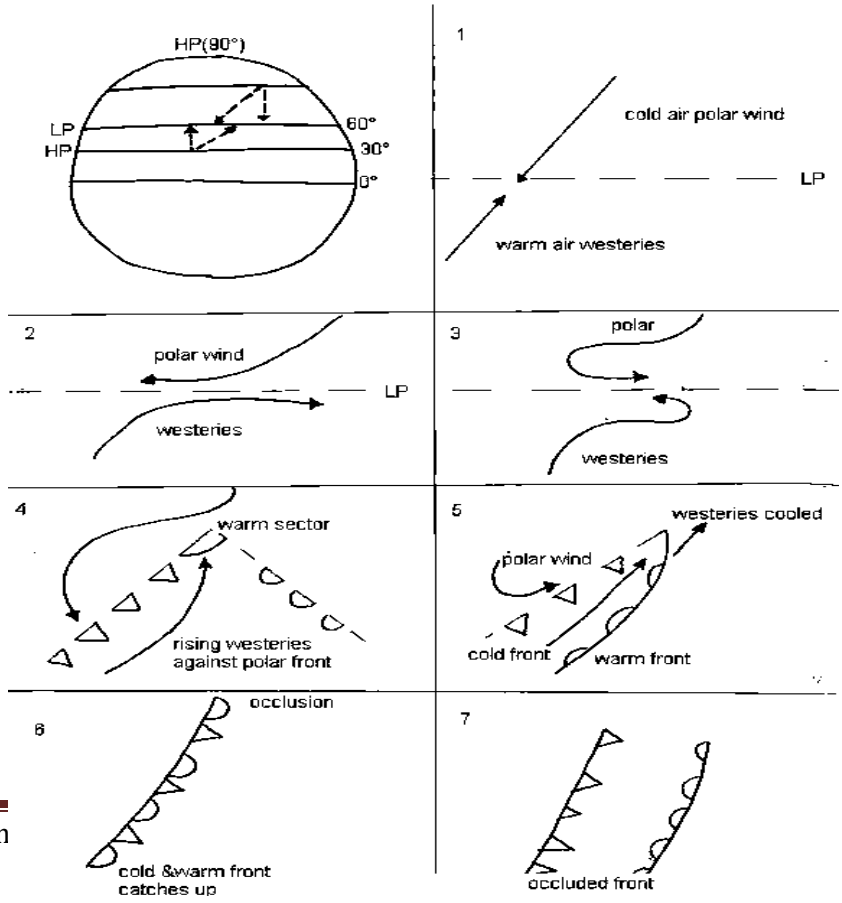
In the **1st stage, the polar winds** (cold air) meets with warm air westerly in the temperate low pressure belt

In the **2nd stage the polar wind** is forced to take a westerly direction while the westerly takes an easterly direction

In **3rd stage, friction** occurs that creates low air pressure and the two winds swing and face each other

In **4th stage, the warm westerly pushes** against the polar front and start rising against the cold front where it creates a warm sector

The **5th stage, the warm westerly** rises up into the atmosphere where it gets cooled, condensed and form clouds



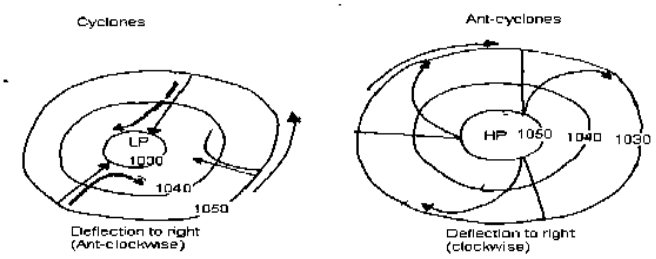
The **6th stage, the cold front catches** up with the warm front and the process of occlusion is reached

The **7th stage, the cold front pushes** the warm front into the atmosphere and take up its position on the ground at this stage, a cyclone dies as the two fronts gets separated and the fronts are referred to as occluded fronts.

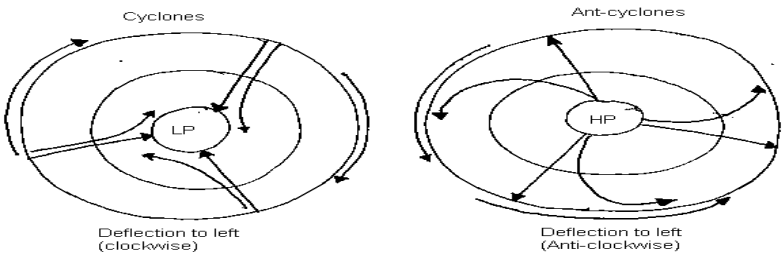
Direction of wind in cyclone and anticyclone

See below

a. Northern hemisphere



b. Southern hemisphere



Tropical cyclones

They occur mainly in the tropical region arising from trade winds belts

They are characterized by strong destructive winds

They are smaller in size as compared to temperate depression (Cyclones)

They are called hurricanes in the West Indies or Willy Willies in Queensland of Australia or Typhoons in India and China or Tornados in south USA and Guinea

Characteristics of tropical cyclones

- ✓ There is sudden drop in air pressure
- ✓ The temperature and humidity of the surrounding area rises up
- ✓ The skill looks dull with heavy clouds
- ✓ When the vortex arise the wind becomes violent
- ✓ They move clockwise in southern hemisphere
- ✓ It is normally accompanied by heavy rain and showers
- ✓ Large amount of latent heat is produced during the condensation of moist tropical air

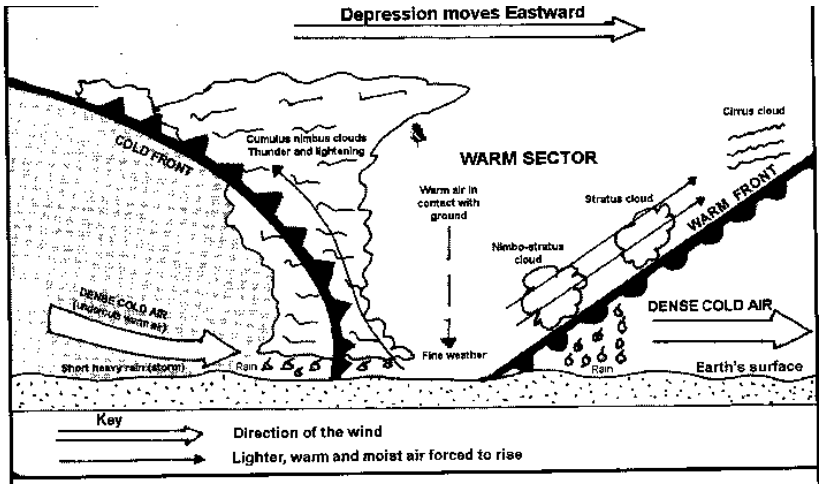


Fig. 13.17A: *Cross-section of a depression*

Rotation in cyclones

Energy for the storm is supplied from latent heat of condensation of rising air as it cools

The difference in air pressure between the inner part of a cyclone and the out put make warm-light air to rise while cool heavy air sinks

As heavier air flows inwards the rotation of the earth makes it swirl or rotate

Stages in development of a tropical cyclone

a. **Formative stage**
   Meeting of two air masses and uplifting of lighter air mass
   Condensation occurs resulting in heavy rainfall and during this process of condensation latent heat is produced that makes the cyclone to rotate
b. **Mature stage**
   Air pressure drops and the cyclone increases
c. **Degenerative stage**
   The cyclone reaches the land and air pressure in the centre rises and the cyclone gradually dies out

Necessary conditions for tropical cyclones development

Warm moist air with a temperature above 27°c

Inward blowing of air toward the centre

An inward flow of air in the upper layer of the atmosphere

effects of tropical cyclone

The high winds destroy building bridges and trees in coastal area

They may cause sparkles of fire or electric poles collide

They reduce moisture content over the land surface and destroy crops

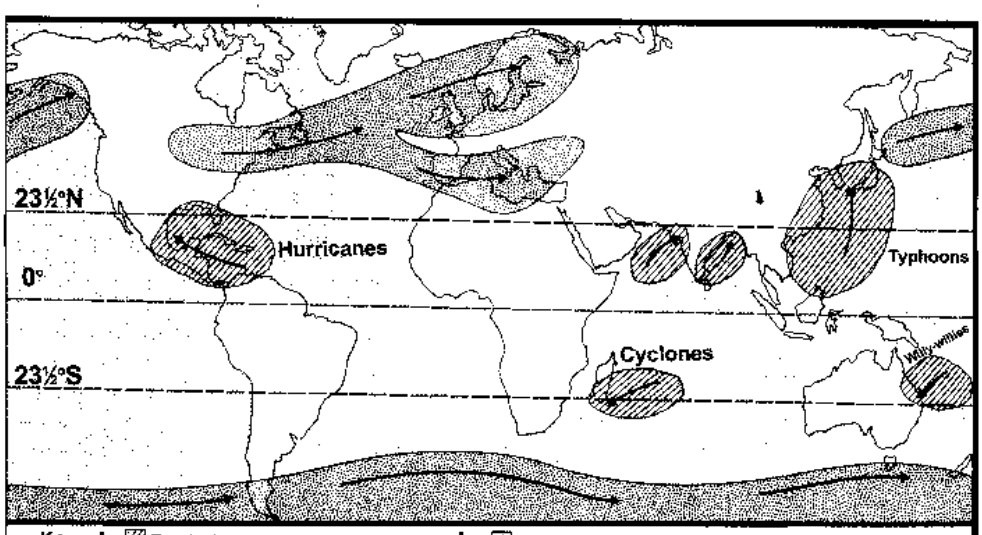


Fig. 13.19: *Tropical cyclone tracks and types*

ANTI CYCLONES

It is an air mass that has high pressure at the Centre and low-outside

Characteristics of anti-cyclones

- They are slow moving or stationary
- Produce a warming and a decrease in relative humidity
- They bring hot, sunny conditions in summer with little cloud and coastal fogs
- The skies are clear at night and temperatures are low in winter

Examples of anti-cyclones

- South pacific high pressure
- Indian ocean high pressure

CLOUDS

Success criteria:

- Explain how clouds are formed
- Identify the main types of clouds

Clouds

They are made up of tiny water droplets or ice crystals depending upon how cold the surrounding air is and are also too light to fall onto the earth's surface

Clouds remain in the atmosphere until they are heavy enough to fall down in form of precipitation

Clouds are formed through condensation of water vapor

They are classified according to appearance and height above sea level

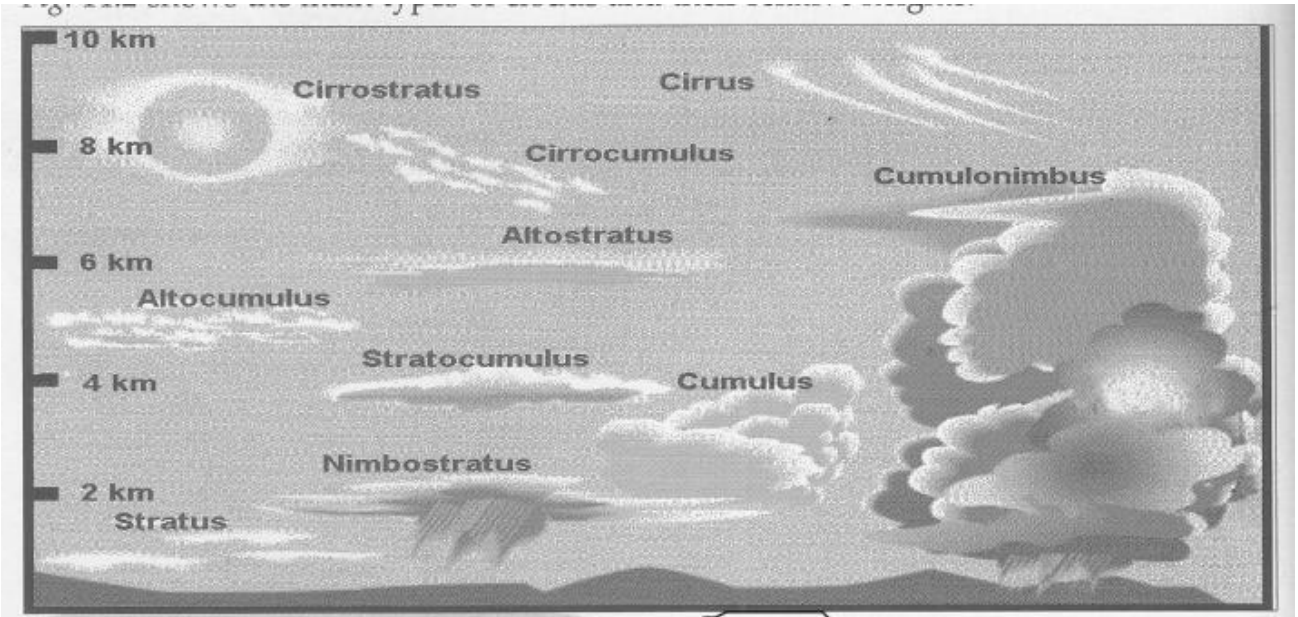


Fig 14.2: *Types of clouds according to height*

Types of clouds

1. High clouds (6-12 Km)
   These include cirrus, cirrocumulus and cirrostratus (associated with cold temperature)
2. Medium clouds (2-6 Km)
   These include Altocumulus and Altostratus (Associated with fair weather)
3. Low clouds (less than 2 Km)
   These include stratocumulus, Nimbostratus and stratus (brings drizzles)
4. Clouds of great vertical extent
   These include cumulus, cumulonimbus. They may extent from 1.5 Km to 9 Km
   They form an anvil shape at the top and are associated with convectional rainfall, lightning and thunder

PRECIPITATION

Success criteria:

- Explain forms of precipitation
- Explain how precipitation is formed

It is formed when water vapor reaches its dew point falls down in form of liquid water

Forms of precipitation

- Rainfall
- Dew
- Snow

- Hailstones
- fog

Rainfall

Success criteria:

- Explain the formation of different types of rainfall
- Identify areas in the world receiving different types of rainfall
- Interpret rainfall data from different sources

It is measured using an instrument called a Rain gauge

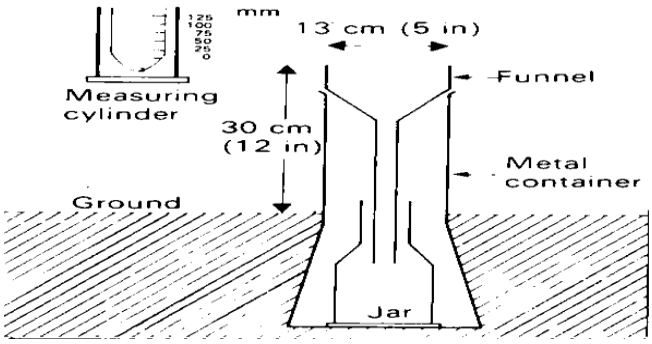
See below

Position of rain gauge

It stands 30cm from the ground level to avoid splashes of water

It is supposed to be sunk into the ground to reduce evaporation

The funnel helps direct water into the jar



Note

- The measuring cylinder is used t measure the amount of water that fell in an area
- The tapped shape of a cylinder help improve accuracy

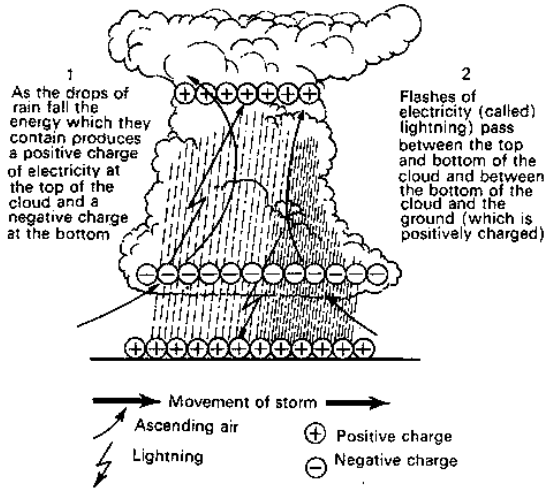
World distribution of rainfall

Types of rainfall

They are three

a. Convection rainfall
b. Cyclonic/ depression rainfall
c. Orthographic/ relief rainfall

A. Convection rainfall



It is caused by intense heat that leads to the rising of warm moist light air
It is common in **tropical regions**
The rainfall is associated with **lightning and thunderstorm**
The thunder storm is caused by rapid expansion and contraction of air

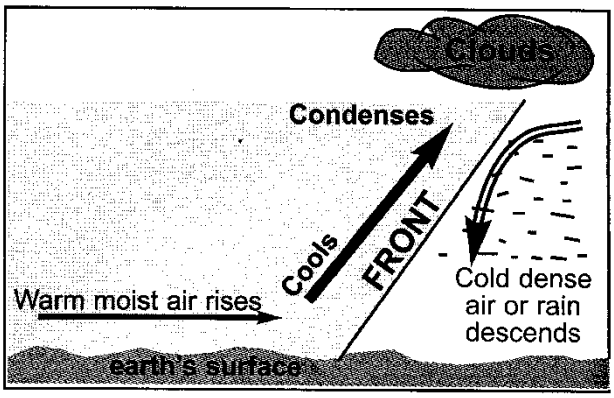


Fig. 14.4: *Frontal (cyclonic) rainfall*

B. Cyclonic/depression rainfall

It is a type of rainfall that occurs when air masses of different characteristics meet
Warm light air mass is forced to rise above the cold dry air which is heavy
The rainfall normally lasts for long period of time even days
Cyclonic rainfall is common throughout the doldrums where the trade winds meet
They are common in the **temperate region**
See below

C. Relief/orographic rainfall

It is caused by the rising of warm moist air mass above highlands/ hills that are at right angle to an incoming air mass
Warm moist air is forced to rise high altitude where it gets cooled and condenses to form clouds
Common in high relief regions facing the direction of warm moist air from the sea

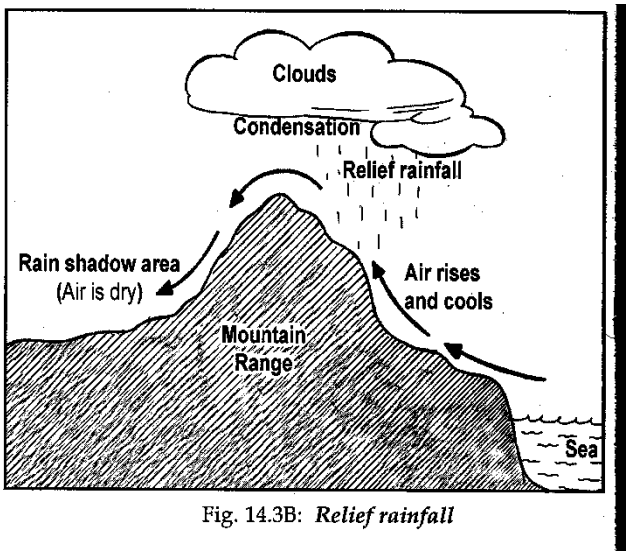


Fig. 14.3B: *Relief rainfall*

AREAS OF THE WORLD RECEIVING DIFFERENT TYPES OF RAINFALL

(See world map)

World climate

Success criteria:

- Explain climatic regions
- Identify world climatic regions
- Explain characteristics of climate and associated vegetation
- Explain the influence of climate and vegetation on economic activities

CLIMATE: Its' refers to the daily average weather conditions of the atmosphere for a long period of time

It is an aggregate of day to day weather over a prolonged period of time

Factors influencing climate

- Latitude, Altitude, Ocean current, Prevailing winds, Air masses, Distance from the sea (Continentally)

i) Latitude

It refers to the location of a place from the equator

Temperature decreases with increasing distance away from the equator

ii) Altitude

Temperature decreases with increasing height above sea level. Higher places normally experience higher rainfall than low lands

iii) Ocean currents

Warm or cold ocean currents have an influence over the coastal land adjustment to their flow.

Warm ocean currents will often raise temperature and on-shore winds normally brings rainfall

Cold ocean currents will often reduce temperature and an on-shore wind is normally cool and dry and discourages rainfall

iv) Prevailing winds

In temperate latitude prevailing winds from the land lower the winter temperature but raise the summer temperature. Prevailing winds from the sea raise the winter temperature but lower the summer temperature

In tropical latitude on-shore winds modify the temperature of coastal region because they have blown over cooler ocean surface

v) Air masses

Air masses blowing from low latitude to higher latitudes warm the ocean over which they blow

Cool or dry air masses cause little or no rainfall while moist air masses bring warm and wet conditions

vi) Distance from the sea (Continentally)

This occurs due to the difference in the heating and cooling effect of the land and water body

This is very common in temperate region when oceanic bodies are warmer and influence the temperature of the coastal regions (refer to land sea breeze)

Climate whose temperature are influenced by sea are called maritime/ oceanic/ insular climate

Climates whose temperature are influenced by remoteness (away from sea) are called continental climate and they occur central-continents

World climate regions

There are described according to the latitude from which they are located

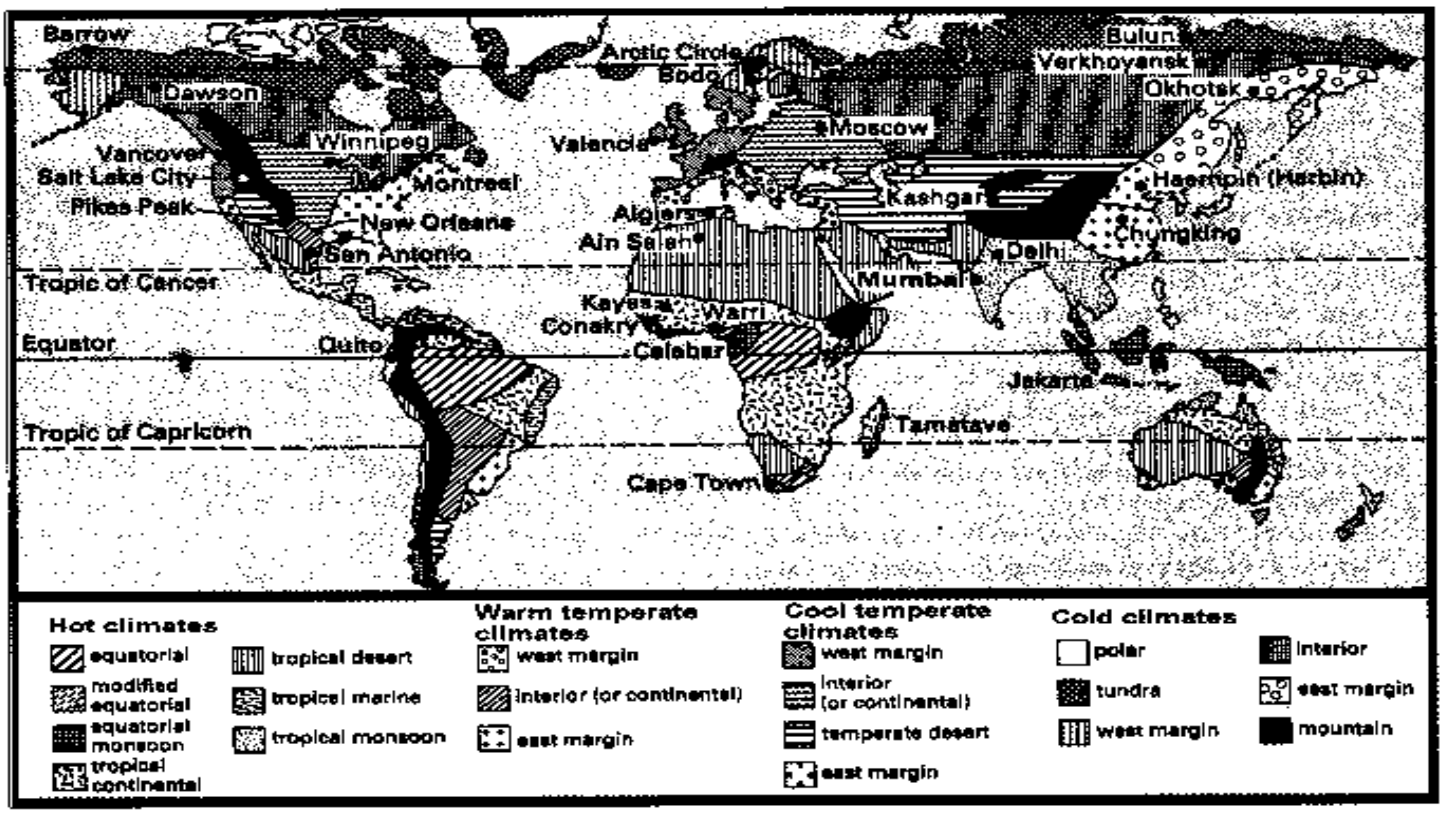


Fig. 15.16: *Mediterranean, Cool temperate continental, cold continental and Tundra climates*

Hot zones (0°-30° North/South of Equator)

Climate include

a. Hot wet equatorial climate
b. Tropical monsoon climate
c. Tropical continental climate also known as Sudan type or Savanna climate
d. Hot deserts

Warm temperate zone (30°-40° North/South of Equator)

Climates include:

a. Western margin climate or Mediterranean type
b. Central continental climate or Steppe type
c. Eastern margin climate or china type

Cool temperate zone (45°-65° North/South equator)

Climate include

a. Western margin climate or British type
b. Central continental climate or Siberian type
c. Eastern margin climate or Laurentian type

Cold Zone (65 climate-90 climate North/South Equator)

Climate include

a. Arctic polar climates or Tundra
b. Alpine zone climate or mountain Range type
c. Mountain climate

Tropical climates

1. **Equatorial climate (5° North or 5° South)**
   Located:
   Ghana, Nigeria, Cote d'evoire, Gabon, Malaysia, Singapore, Indonesia, Amazon basin, Zaire basin, Philippine and guinea coast

   Climate characteristics
   Lies under Doldrum low pressure belt throughout the year
   Experience high temperature all year round
   It has small temperature range of not more than 3°c
   It has high convectional rainfall of between 1,500mm to 2,500mm per annum
   There is high humidity all year round
   There is no distinct season

   Vegetation
   There is evergreen type of vegetation
   Trees have broad leaves and thick canopy
   Tall trees, lianas and epiphytes are common
   Common trees include; mahogany, ebony, green heart and chengal

   Economic activities
   - Shifting cultivation is common
   - Rubber cultivation is common in Malaysia and Indonesia
   - Palm oil in Malaysia, Nigeria and Zaire
   - Sugarcane grown in Cuba
   - Cocoa grown in Ghana
   - Most of the trees are processed for timber production

Temperature and rainfall of equatorial

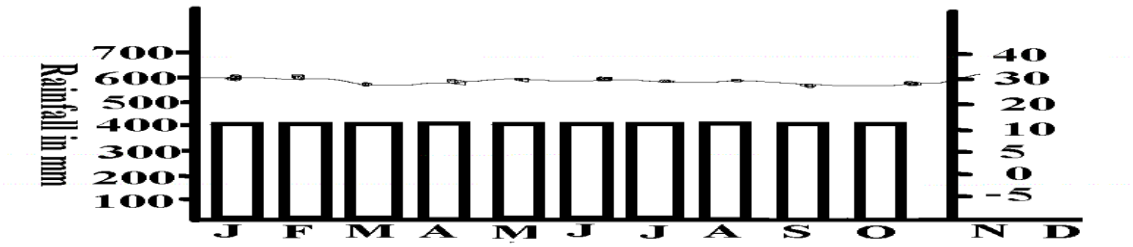
see below

Annual Rainfall: 1,582 mm
Temperature range: 25-23°c=2°c

MONTH	JAN	FEB	MAR	APRI	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
TEMP (°c)	25	25	25	25	24	23	25	25	25	25	25	25
RAIN	138	144	194	190	83	24	13	58	117	173	225	223

Factors hindering development in equatorial zone

Excessive heat and humidity that favour multiplication of bacteria
Abundant insects and pests such as tsetse flies that affect animal farming
Thick vegetation that is difficult to clear
High rainfall that causes leaching of mineral salts



2. Tropical continental climate (Savanna/Sudan type, 5° North-15° North and 5° South-15° South)

Common location
Best developed in East, central Southern and Western Africa
The Illanos of Colombia and Venezuela
Campos of Brazil
Northern Australia
Llanos of Orinoco Basin

Climatic characteristic of Savanna
It is influenced by the trade winds in summer and doldrums in winter
Hot temperature in summer are 32°c and cool winter are 21°c
The annual temperature range is 11°c
Heavy convectional rains are common in summer
Winters are normally dry
The annual rainfall is around 762mm

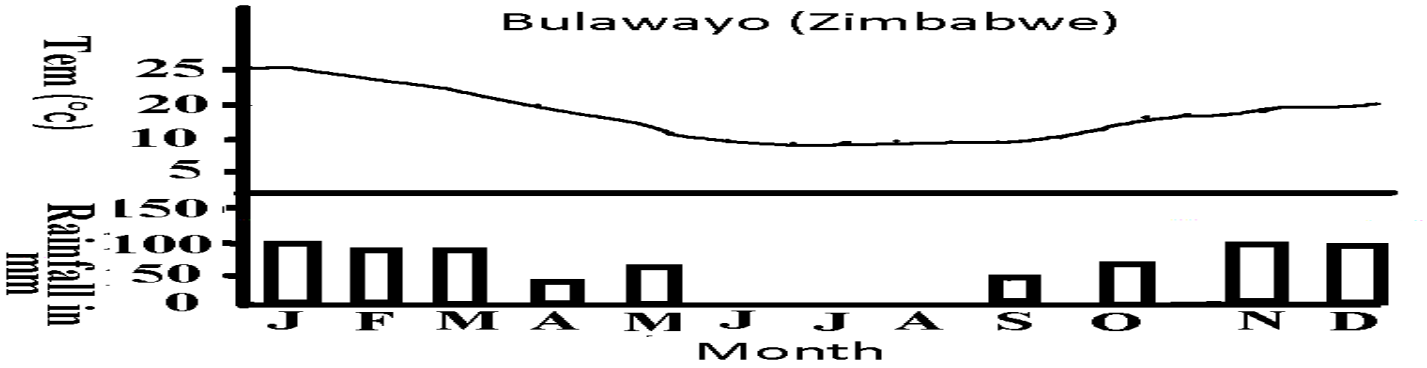
Vegetation
Baobab trees, palms
Acacias trees, gum trees

Deciduous trees/vegetation are common
There is scattered trees and tall grass (elephant grass)
Economic activities
Cattle keeping among Masai people of Kenya, Tanzania and Uganda
Corn, millet, maize, bananas, ground nuts and beans are grown among Hausa and Kikuyu people
Sugar-cane, tobacco, sisal and cotton are grown in east Africa, Kenya, Tanzania, Malawi and Zimbabwe

Temperature and rainfall of savanna

See below

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
TEMP (°c)	22	21	21	19	16	14	15	16	20	22	23	22
RAINFALL (mm)	205	220	154	36	8	0	0	4	5	9	85	131



Factors that hinder economic development in Savanna

- Rainfall is seasonal and hence cultivation is not done year round
- Tsestse flies often hinder animal farming
- Heavy rainfall often cause leaching
- Convectional rainfall is associated with lightening which often affect people or farmers

3. Tropical desert climate (10°-20° North/South)

Location

Sahara desert, Namib desert, Kalahari desert, Jordan, Syria, Iran, Iraq, Israel, Arabia, Colorado, Mexico, Central America, Great Australia desert, Atacama desert, Thai desert (India), Mohave Cold desert

Climatic characteristics

On-shore winds are dry and cool

- Precipitation Rainfall) is scarce and unreliable
- Day temperature goes up to 49°c
- Nights are cool and temperature may go down to 15°c
- The daily (diurnal) temperature range is very high

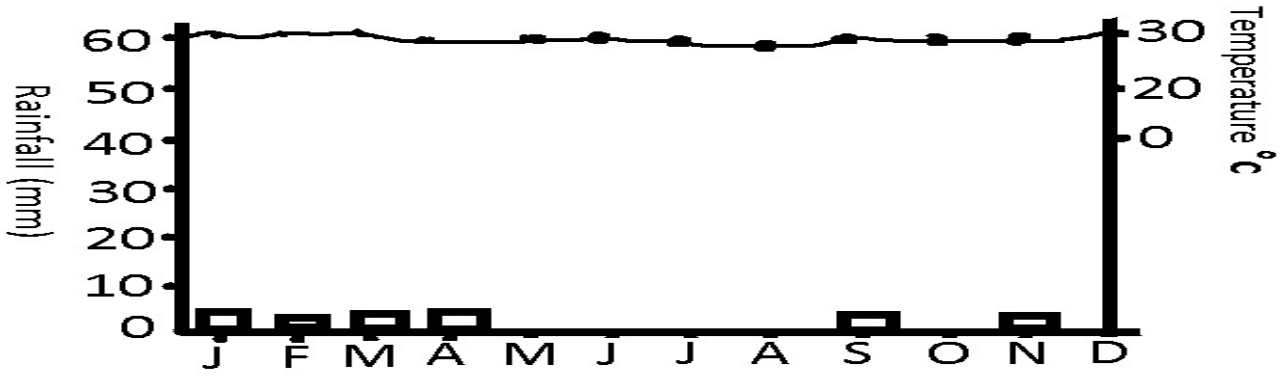
Vegetation

Cacti, thorny bushes, date palms, shrubs, acacias, long rooted grass

Economic activities

- Irrigation is common to support farming in Nile valley, Tigris-Euphrates and Indus rivers
- Crops grown include Dates wheat, vegetables, fruits
- Nomadic hunters and mining of gold, petroleum oil, copper, diamond etc.

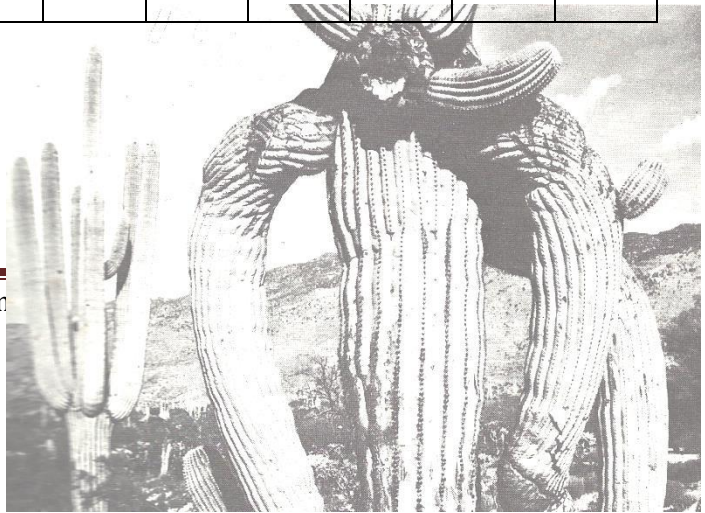
Rainfall, temperature of tropical deserts



Month	J	F	M	A	M	J	J	A	S	O	N	D
Temp	20	22	25	30	32	33	31	30	30	30	30	20
Rainfall	0	0	0	2	3	25	77	83	37	0	0	0

Factors hindering development in tropical deserts

- High temperature throughout the year
- Poor sandy soil not suitable for agriculture
- Acidity conditions with poor rainfall



Tropical monsoon climate

Location

- It lies in the tropical and temperate latitudes
- Caused by monsoon winds
- Developed in Asia and Australia

Climatic characteristics

- It has seasonal reversal of winds
- Annual rainfall ranges from 620mm-1,250mm
- Temperature ranges from 15°c in cool season to 32°c in hot season

It has three types of seasons such as:-

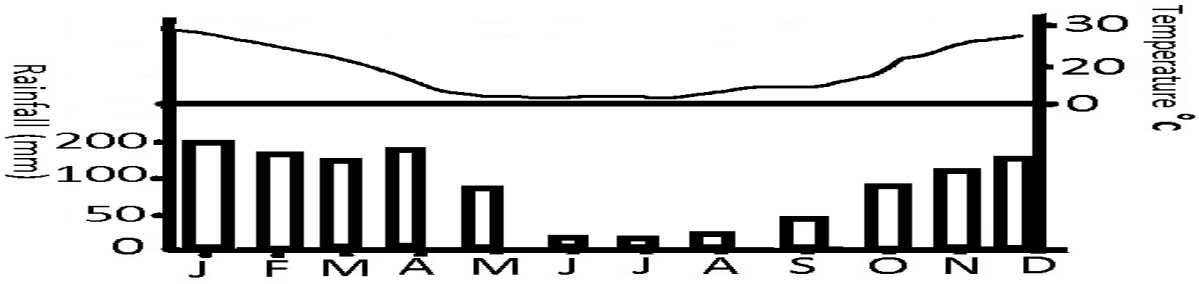
i) Cool/dry season from November-February
ii) Hot/dry season from March to May
iii) Hot/wet season from June to October

Vegetation

Plantation trees e.g bananas

Economic activities

- There is intensive cultivation of food crops in pads
- Plantation agriculture such as the growing of tea and sugar cane
- Rainfall/temperature in tropical Monsoon (See below)



Factors hindering economic development

- Farmer ignorance on modern ways of farming
- The subdivision of land makes it difficult to use machinery
- Over dependence on on-shore monsoon winds poses a danger on climatic change

The warm temperate western margin (Mediterranean climate- 30° North-45° North/ 30°-45° south)

Location

Shores of Mediterranean Sea, south West Africa, Central Chile, central California, south west and southern Australia, Cape Town

Climatic characteristics

- Temperature ranges from 21°c in summer to 10°c in winter
- Winds are off shore in summer and on shore in winter
- On-shore westerly wind brings cyclonic rains in winter
- Annual rainfall ranges from 500mm to 760mm
- They experience hot and cold local winds such as Sirocco mistral and Bora winds

Note:

i) Sirocco blows in summer and is hot dusty and dry from the Sahara desert across the Mediterranean sea
ii) Mistral blows in winter and its strong and cold from north down to the Rhone valley
iii) Bora blows in winter and develops because of pressure differences

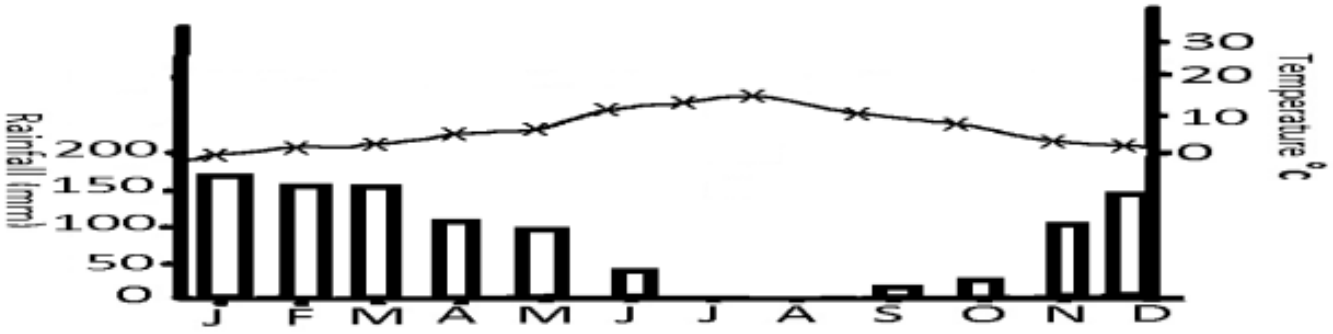
Vegetation

- Evergreen forests, open woodlands with evergreen oaks
- Evergreen coniferous trees such as pine, firs, cedars, cypress
- Short evergreen shrubs and bushes

Economic activities

- Fruit farming eg orchards, grape vines etc
- Lumbering eg cutting trees for timber
- The climate suits growth of many crops e.g fruits and cereals, cotton, tobacco, flowers, beans
- Growing of citrus fruits such as oranges, lemon limes. Grape fruits (viticulture)
- Grapes are processed into wine
- Wheat and barley are grown and processed into baking flour
- Animal farming include: goat, cattle, sheep

Rainfall/ temperature of Mediterranean climate (warm temperate western margin) see below



MONTHS	TEMPERATURE °C	RAINFALL (mm)
J	9	99
F	10	81
M	11	81
A	12	49
M	19	35
J	**20**	**10**
J	**22**	**-**
A	**22**	**-**
S	**21**	**5**
O	**18**	**11**
N	**12**	**80**
D	**9**	**98**

Factors hindering economic development

a. Summer temperature are often high and no precipitation
b. There is minimum amount of rainfall per annum
c. Temperatures are low in winter

The cool temperate continental climate (Siberian-35° North-60° North)

Location

Alberta, Saskatchewan and Manitoba (Canada) North-Central USA, Central and Eastern Europe and Western Russia, Alaska, Sweden

Climatic characteristics

a. Winter temperature are very low-19°c
b. Summer temperature rise to over 18°c
c. There is a high temperature range of over 37°c
d. There is a minimum rainfall of 400-500mm
e. There is snow falling and freezing of rivers in winter

Vegetation

Coniferous trees, pine, fir, spruce, larch

Evergreen trees and conically shaped

Small needle-like leaves to withstand snow and ice formation

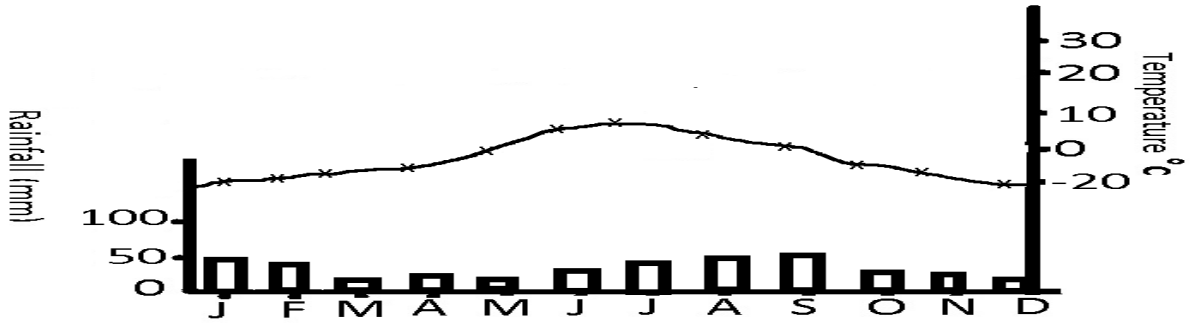
Economic activities

a. Lumbering is common that include: saw milling timber; paper and pul industry in USA/ Canada; soft wood burnt for fuel; processing of matches, furniture is common
b. Trapping is common that include fur bearing animals such as silver-fox, ermine, bears and muskrat

Rainfall/temperature in Siberian climate

See below

MONTH	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
TEMP	-19	-18	-10	0	13	17	20	17	12	0	-8	-17
RAINFALL	25	25	32	36	57	76	75	62	61	37	27	25



Factors hindering economic activities in Siberia

- Winter temperatures are very low that cause freezing of river
- Snow falling often affects the growth of crops
- The low temperature in winter does not support the growth of crops
- The freezing of rivers and lakes at Hudson Bay often affect navigation (sailing)

Names of different tropical grasslands

i) Campos (tropical grassland in Brazil)
ii) Llanos (Guinea Highlands)

iii) Savanna (Africa/ Australia)

Names of temperate grasslands

i) Prairies (Canada/USA)
ii) Pampas (Argentina)
iii) Steppes (Eurasia)
iv) Darling Murray (Australia)
v) Veldt (south africa)

Differences between vegetation in equatorial climate and in savanna climate

a. Equatorial vegetation is dominated by trees while the Savanna type is dominated by grass
b. Equatorial vegetation has a continuous canopy while the Savanna does not because in most caes it is mixed-up with tall-grass
c. Growing and flowering and bearing of fruits is there all the time in equatorial due to continuous rainfall while in Savanna it is seasonal
d. There are more species of crops and animals in equatorial than in Savanna
e. Tree in equatorial are evergreen while in savanna it is deciduous

Desert vegetation

Characteristics of desert plants

a. They grow long roots that get to the depth to capture water
b. They have very thick leaves and stems to store water
c. They have waxy leaves that prevent transpiration and also tiny leaves
d. They produce sleepy seeds that only germinate with availability of water
e. They have scattered vegetation of drought resistant species e.g cacti, date palm, shrubs, thorn bushes e.t.c

Classes of vegetation

a. Forests
b. Savanna (forests and grass)
c. Grassland
d. Desert

Forms of vegetation

a. Trees-have trunk and braches
b. Lianas-climb other plants

c. Herbs-have no woody structure
d. Epiphytes-survive on other plants
e. Flowerless and flowering plants

ENVIRONMENTAL ISSUES

Success criteria:

- Explain environmental issues
- Explain the meaning of the term pollution
- Describe causes and effects of pollution
- Suggest ways of controlling pollution

Environmental issues:-

These are problems that affect our surrounding and endanger aquatic and wild life species

THEY INCLUDE

1. Poor farming practices such as shifting cultivation
2. Cutting down trees wantonly that endanger wild and aquatic life
3. Misuse of pesticides that destroy habitat for aquatic life e.g. D.D.T
4. Air and water pollution that endanger aquatic life
5. Poor waste disposal from industries that affect aquatic life
6. Disruption of the food chain following illegal hunting and killing of some species of animals
7. Careless bushfires that destroys vegetation and kills some wild life
8. Over fishing that may lead to extinction of some species of aquatic life such as chambo
9. Illegal hunting of wild animals that may lead to extraction of their species e.g. Elephant, Black Rhinos, etc.
10. Draining of marshes and swamps in wetland that may endanger a variety of wild life in those wetlands

POLLUTION

- It's the changing of status of a substance that was originally pure by mixing it with other elements that are not desirable to it
- It's the contamination of a pure substance or air by other elements

TYPES OF POLLUTION

1. Air pollution
2. Water pollution

3. Land pollution

CAUSE OF AIR POLLUTION

1. Removal of vegetation cover that result in dust rising into the atmosphere without being trapped
2. Emission of gases from motor vehicle and industries
3. Noise caused by motor cars, industrial machines, etc.
4. Poor waste disposal cause filth smell

CAUSE OF WATER POLLUTION

1. Discharge from sewage
2. Oil spill from leaking ships on the sea
3. Disposing of chemicals and wastes into river and water bodies
4. Use of poison when catching fish

CAUSE OF LAND POLLUTION

1. Poor disposal of human feaces
2. Un necessary dumping of waste products
3. Poor disposal of nuclear rode's
4. Nuclear testing by some developed countries e.g. North Korea

EFFECTS OF POLLUTION TO ENVIRONMENT

1. AIR POLLUTION

- Respiratory problems
- Odour bad smell
- Acid rain
- Poor visibility

2. WATER POLLUTION

- Loss of aquatic life e.g. fish
- Diarrhea problems e.g. cholera
- Scarcity of safe water for drinking
- Affects the water cycle

3. LAND POLLUTION

- Loss of biodiversity
- Reduced productivity of land

- It result into injury of feet i.e. broken pieces of bottles
- Unsightly due to scattered wastes

WAYS OF CONTROLLING POLLUTION

1. Exercising proper waste disposal
2. Developing and using environmentally friendly form of energy eg e.g. Hydro Electric Power
3. Legislation of laws to protect the environment
4. Maintenance of ship to void leaking of oil into sea
5. Digging of a pit latrine to avoid unnecessary disposing of human wastes

DESERTIFICATION

Success criteria:

- Explain the meaning of the term desertification
- Describe causes of desertification
- Assess the effects of desertification

Desertification:

It's the downgrading of land surface that may result into a desert condition

World deserts

i) Atacama desert of south America
ii) Mohane desert of USA
iii) Sahara desert in North Africa
iv) Kalahari desert of Botswana
v) Namib desert of Namibia
vi) Iranian desert of Asia
vii) Downs/Australia desert

CAUSE OF DESERTIFICATION

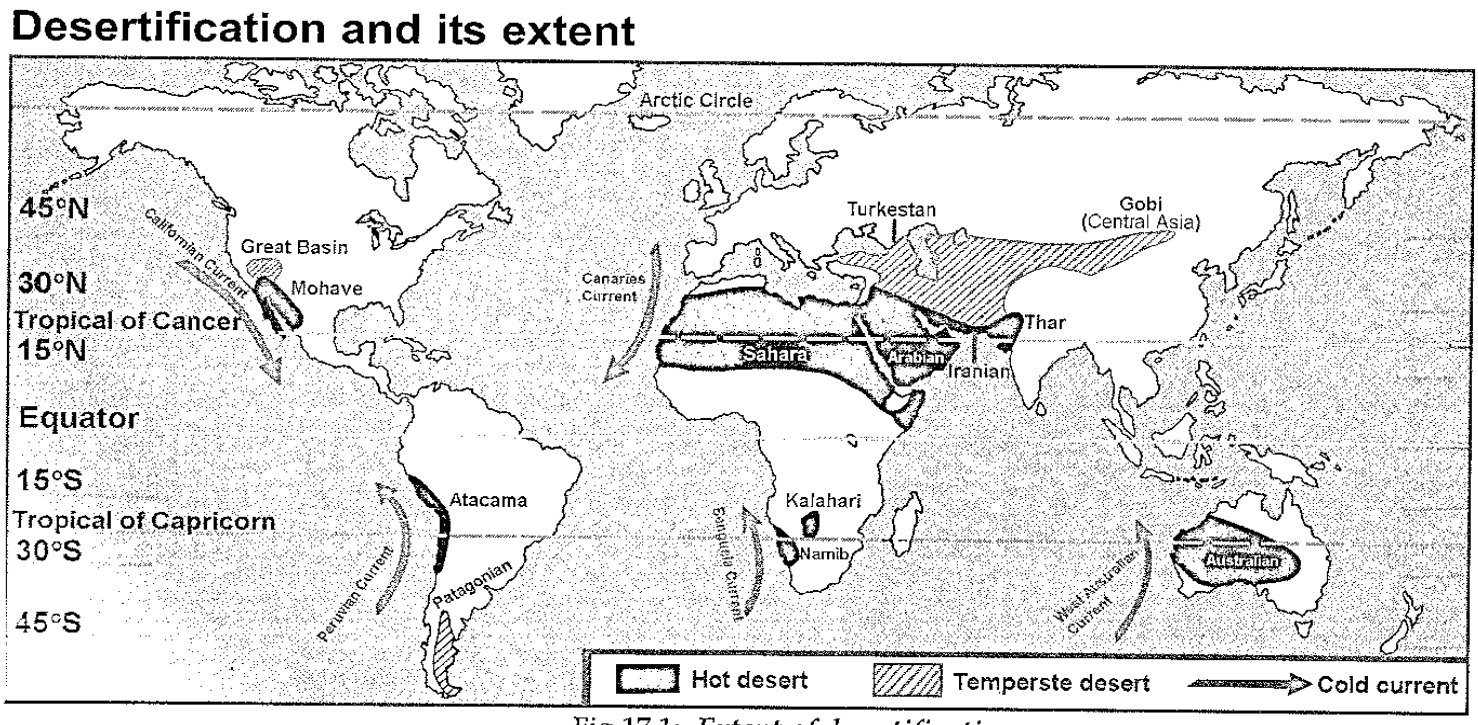


Fig 17.1: *Extent of desertification*

1. Shifting cultivation
2. Wanton cutting down of trees
3. Cultivation of crops on steep slope
4. Setting of harmful bush fires
5. Changing climate from cool to dry arid condition

EFFECTS OF DESERTIFICATION

1. It may affect the water cycle creating arid condition
2. Growth of some important plants and animal species is affected
3. Bare steep slope may be prone to land slide
4. It may lead to increased run off and may cause silt in rivers
5. It may contribute to climate change i.e. cool temperature-warm temperature
6. The arid condition may affect crop production

WAYS OF CONTROLLING DESERTIFICATION

1. Practicing afforestation on bare land
2. Re-afforestation where trees have been destroyed hence need replacement
3. Proper land husbandry by avoiding harmful bushfire as well as shifting cultivation
4. Providing civic education on the dangers of desertification

5. Legislation of by laws against wanton cutting down of trees
6. Provision of alternative form of energy for domestic purpose i.e. solar, Hydro Electric Power
7. Controlling rapid population growth that exert pressure on vegetation

CLIMATE CHANGE

Success criteria:

- Explain the meaning of the term climate change
- Examine causes and effects of climate change
- Explain climate change mitigation and adaptation measures

Climate change:-

It's the varying state of the atmosphere attributed by pollution and deforestation over the land surface

Causes of climate change

- Wanton cutting down of trees that affects the rate of evapotranspiration
- Emission of gases from industries that causes acid rain and destroy vegetation
- Burning of waste and harmful bushfires
- The accumulation of heavy gases such as the Carbon dioxide on the earth surface that increases the rate of evaporation and floods

Effects of climate change

- It may lead to global warming as caused by accumulation of gases in the atmosphere
- It may result in increased storms due to high temperature and evaporation
- It may result into changing ocean current direction
- It may cause the shrinking of arctic and Antarctic ice cups which are water storage
- It may result into increased flooding of low coastal land due to increased water level
- It may result into crop failure caused by distributed rainfall pattern

Possible solution to causes of climate change

- Civic education on the importance of tree planting
- Avoid use of cooling systems that uses CFC gas Methane etc which are dangerous to the environment
- Practicing afforestation and re-afforestation to reverse the trend
- Avoiding setting harmful bushfires

- Adhere to international protocol against use of some harmful gases eg CFC

Adaptation measures

- Use of cooling machines that are CFS free
- Use of environmentally friendly energy devices such as solar energy
- Use of energy saving devices
- Afforestation
- Civic education on effects of climate change
- Use of manure instead of artificial fertilizer

Indicators of climate change

- reduction or increase in rainfall pattern
- increase in temperature globally (global warming)
- shrinking of polar ice caps
- disappearing of

Causes of climate change

a. Deforestation that affects the rate of transpiration (water vapour) and hence reduce rainfall.
b. Emission of gasses (greenhouse effect) that destroy the ozone layer or accumulate on earth surface leading to an increase in temperature

Effects of climate change

a. Global warming caused by the trapping of heat on the earth's surface by heavy gasses such as carbon dioxide
b. Increasing storm due to global warming that causes rapid evaporation causing heavy rainfall in an area that results into flooding
c. Changing ocean currents with an increase in temperature in polar region that affects movement of cold ocean currents
d. Shrinking of Antarctic ice gap due to the increasing temperature that meets the ice in polar regions

Possible solutions to causes of climate change

a. There is need to provide civic education on dangers of deforestation and importance of afforestation to environment

b. Avoid use of machine that release dangerous gasses such as C.F.C, methane, carbon dioxide e.t.c that destroy ozone layer
c. Encouraging people to practice afforestation and reforestation to avert effects of global warming
d. Set-up laws against industrial pollution that releases gases in the atmosphere
e. Encouraging industries to adopt new technologies that help reduce emission of gases e.g release of vapour in cars instead of smoke
f. Avoid setting of harmful bushfires that destroy vegetation

The environment

Endangered wild and aquatic life species in Malawi

a. Chambo fish
b. Elephants (tasks)
c. Nyala
d. Black Rhino

Ways how wild and aquatic life species are endangered

a. Poor farming practice such as shifting cultivation that destroy habitat for animals
b. Deforestation that contributes to climate change affects the survival adaptation of wildlife
c. Misuse or use of pesticides in gardens such as D.D.T affects aquatic life as chemicals get washed into rivers and lakes
d. Poor waste disposal that tend to pollute rivers and lakes affecting survival of aquatic species
e. Use of poison when catching fish that tend to destroy aquatic species and affects the ecosystem
f. Setting of harmful bushfires especially in September-October when vegetation are completely dry, may lead to destruction of vegetation
g. Poaching of games in protected areas may lead to extinction of some animal species
h. Draining of marshes and swamps for farming may destroy habitat for marine species

Reasons for conservation of environment

a. It is based on ethical reason that plants and animals too have the right to habitate the earth
b. Human beings , scientists have a lot to learn or research on the environment
c. The environment that is pure and undisrupted has an aesthetic appeal (beauty) to a country
d. Conservation of the environment help preserve the genetic diversity

e. Environmental conservation would help ensure environmental stability and enhance the ecosystem
f. The environment has an economic incentive since it promotes tourism to a country

Ways of conserving wild and aquatic species

a. Establishment of conservation areas for wildlife such as forest reserve, national parks e.t.c
b. Relocating of overpopulation or animals facing extinction in the environment
c. Protecting rare and endangered species e.g Black Rhino, chambo fish e.t.c
d. Providing civic education on conservation and importance of a pure environment

Importance of wild and aquatic life species

a. It help promote the tourism industry that brings forex
b. They are a source of protein, calcium to body especially fish
c. It is a source of income as people sell fish or firewood from environment
d. They help bring about an ecological balance in the environment

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