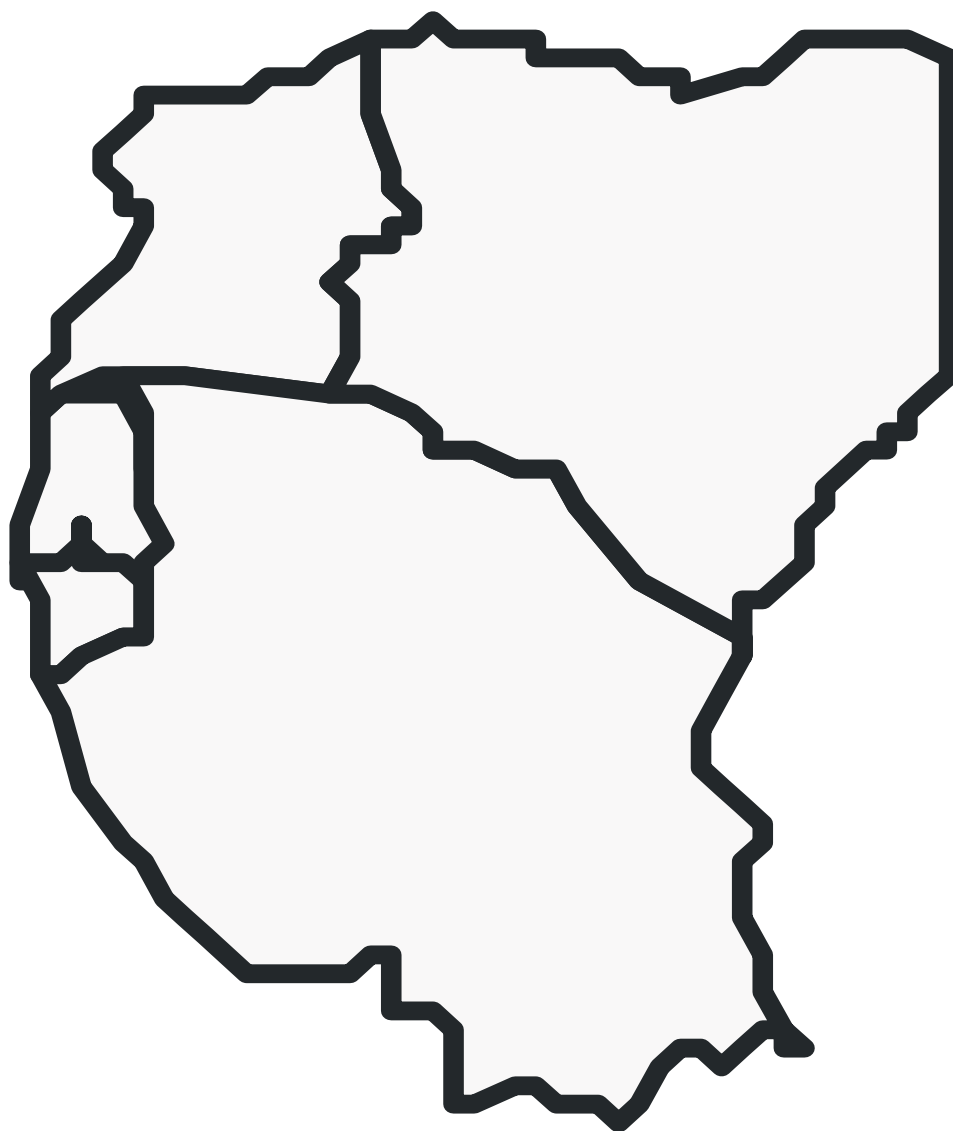


EAST AFRICA

East Africa is made up of three countries Uganda ,Kenya and Tanzania .



THE RELIEF REGIONS OF EAST AFRICA

a) THE COASTAL PLAINS

These plains lie upon level beds of sedimentary rocks which run out as sea level below the coral reefs that fringe most of the coast. The plains are over 160km broad around the Tana River in Kenya and around the lower Rufiji River in Tanganyika. In the centre and South they narrow to 50km or less.

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b) THE EASTERN PLATEAU

The Western edge of the coastal plains is marked in most places by a steep climb to the main African plateau. Its general level surface rises gradually towards the west, broken by steep sided, rounded inselbergs and by occasional mountain ranges such as the Taita hills which rise to over 2,000m in South – east Kenya, this region is known as the Nyika (Swahili – on open, grass plain) a term which is sometimes applied incorrectly to other parts of East Africa.

c) THE RIFT VALLEYS

The Western Rift Valley is deep, with steep rugged sides, and holds river, large lakes, Albert Tanganyika, George, Edward, Malawi shipping and fishing on these lakes are often interrupted by violent storms.

The Eastern Rift Valley holds three other large lakes namely:-

Turkana, Naivasha, Natron, Manyara, except in southern Kenya and northern Tanzania it is shallower and less sharply defined than the Western Rift Valley. To the South it splits and dies out; to the north, it extends beyond the frontiers of East Africa.

d) THE CENTRAL AND LAKE PLATEAU

Between the two Rift Valleys lie river saucer – shaped plateaus of average height about 1200m. most of the streams drain from the highland rim towards the level centre of each saucer. This explains the shape and shallow depth as well as the irregular and often swampy shore-line of the two main lakes namely Kyoga & Victoria. These lakes contrast sharply with the long, narrow, regular and sometimes very deep lakes of the Rift Valley.

e) THE HIGHLANDS OF EAST AFRICA

Rising above the general level of the plateau, form a separate and important geographical division. This is not because of their altitude but because of the cool, moist and healthy climate that results from it; and also because many of the highland areas consist of volcanic rocks which produce soils that are much more fertile than the average for East Africa. For both these reasons the Highlands offer better conditions for human settlement than any of the other regions.

A SKETCH MAP OF EAST AFRICA SHOWING THE RELIEF REGIONS OF EAST AFRICA

LAKES AND RIVERS IN EAST AFRICA

East Africa has a number of Lakes e.g L. Victoria , L. Tanganyika, L.Albert, L.Kyoga, L.George L.Edward, L.Turkana and Rivers e.g Nile,Pangani, Ruvuma , Tana, Kagera Kafu, etc Kilombero.

SKETCH MAP EAST SHOWING MAJOR LAKES AND RIVER ROCKS

IMPORTANCE OF LAKES AND RIVERS IN EAST AFRICA

1. Rivers / Lakes provide water for irrigation purpose e.g. L. Victoria R. Kilombero, River Nile.
2. Rivers / Lakes promote tourism in East Africa thus earn alternative source of foreign exchange.
3. Rivers / Lakes are source of Fish to the people of East Africa e.g L.Victoria,Kyoga, Nile, Tana etc.
4. They provide water both for domestic and industrial purposes.
5. Rivers / Lakes promotes Navigation i.e. water transport L. Victoria.
6. Rivers / Lakes promotes interstate cooperation.
7. Rivers / Lakes modify climate of the surrounding areas i.e L.Victoria, R.Nile, Pangani etc.
8. Rivers / Lakes helps in the generation of hydro electricity power eg L.Victoria, R.Nile, Pangani.
9. They are grounds for research and scientific study.
10. Rivers / Lakes provide employment opportunity for many people inh E.A e.g researchers , fishermen
11. Rivers / Lakes are dumping ground both for domestic and industrial wastes.
12. Rivers / Lakes promote Agriculture because of the alluvial soils.
13. Rivers / Lakes act as International boundaries L.Victoria, River Nile, Ruvuma.
14. Rivers / Lakes are grounds for recreation boating, swimming, sun bathing.
15. Rivers / Lakes are habitats for fish and other aquatic life.
16. They are resources of Government revenue through taxation and foreign exchange.
17. Lakes provide building materials inform of sand and clay.
18. They are grounds for mining

PROBLEMS FACING THE USE OF WATER RESOURCES IN EAST AFRICA

1. Presence of storms and waves which interfere with navigation and also lead to loss of lives and property.
2. Presence of water weeds.
3. Negative attitude of some people towards ting fish.
4. Shallowness of some lakes e.g. Kyoga, Victoria

5. Steep escarpments in some parts of the Rift Valley making rift valley lakes like Albert, Tanganyika inaccessible.
6. Seasonality of some lakes which interfere with navigation and fishing.
7. Flooding that paralyses other activities in East Africa like Agriculture.
8. Water pollution by industries.
9. Diseases like mabria and bilharea
10. Swampy shores of some lakes like Victoria making accessibility difficult.
12. Presence of waterfalls and rapids.
13. Low levels of technology.
14. Presence of predators and pirates
15. Poor fishing materials.

PROBLEMS FACED BY THE PEOPLE LIVING AROUND RIVERS

1. Flooding which destroy property and lives.
2. Accidents
3. Pollution by industries
4. Diseases the malaria and bilharzias
5. Pests and diseases like mosquitoes, water snails
6. Soil erosion and land slides
7. Unfavorable Climate conditions
8. Presence of protruding rocks e.g (rock out crops)
9. Many rivers are seasonal

ROCKS IN EAST AFRICA

A rock is an aggregate of minerals

In East Africa there are 3 types of rocks

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

MAP OF EAST AFRICA SHOWING THE DISTRIBUTION OF ROCKS

IGNEOUS ROCKS

Igneous rocks are fire formed rocks.

Igneous rocks are formed when molten rock (magma) under intense heat and pressure beneath the Earth crust is ejected out through crack/vent/lines of weakness onto the surface or within the earth crust.

The magma or molten rocks cools to form igneous rock. When magma comes out of the Earth crust, it is called lava.

When magma solidifies on the Earth surface extrusive or volcanic rocks are formed. They cool and solidify quickly in the open air and so they are fine grained e.g. basalt, sometimes or are glassy in appearance e.g. obsidian and some are spongy pumice. Other volcanic rocks include Rhyolite, Andesite etc.

Sometimes magma solidify deep within the Earth crust to form intrusive / plutonic / Abyssal rock. They cool slowly and minerals are coarsely crystallised e.g. granite, diorite, gabbic, peridotite, quartz, trachyte.

Magma may also solidify near the surface of the Earth crust to form Hypabyssal rocks e.g. diorite, Granophyre, paryphim quartz, trachyte.

Characteristics of Igneous rocks

1. They are fire formed
2. They are crystallized rocks crystalline rocks
3. They are formed as a result of cooling and solidification magma.
4. They don't have fossils

5. They are hard and resistant to erosion.
6. They have large crystals when formed deep under the ground.
7. They are fine grained when formed on the surface e.g. basalt
8. Some igneous rocks are spongy and glassy in appearance.

SEDIMENTARY ROCKS

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Sedimentary rocks are laid down and are stratified (layered)

Sedimentary rocks are formed when rocks are broken down by weathering, eroded, transported by wind and water and finally deposited in layers and later compacted or cemented to form sedimentary rocks.

Sedimentary rocks can be formed by mechanical, organic or chemical processes.

1. Mechanically – Sedimentary rocks are formed when pre-existing sediments are broken down, eroded and transport and deposited in layers which compacted to form a hard rock e.g. clay, shale, gravel, mud stone, silt, sand stone, conglomerate.

2. Organically – these are formed from the remains of dead animals and plants which are later laid down and compressed to form a rock e.g. chalk, limestone, coral reefs, coal, etc.

3. Chemically – these are formed by the evaporation of water to form stones containing minerals. The minerals are then compacted to form a rock e.g. salt (edible), dolomite, Gypsum, potash, hematite, limonite, etc.

Characteristics of sedimentary rocks

1. They are layered (stratified)
2. The layers are separated bedding planes
3. They contain fossils (remains of dead plants and animals)
4. They are non – crystalline
5. They are laid down rock wastes
6. They are made up of sediments
7. Some are porous / permeable
8. Some are soft etc.

Metamorphic Rocks

These are changed rocks. They are formed when the pre-existing rocks (Igneous and sedimentary) are subjected to intensive heat and pressure causing change in the physical and chemical composition of the original rock e.g.

Original Rock

Limestone
Clay
Granite
Sand
Coal

Changed Rock (metamorphic)

Marble
Slate, schist, slate, shale
Gneiss
Quartzite
Graphite

Characteristics of metamorphic rocks:-

1. They are changed rocks due to heat and pressure
2. Their chemical and physical composition are different from original rock
3. They are brittle rocks
4. They are compacted rocks due to pressure and heat
5. They contain precious minerals like diamond, marble etc
6. They form the basement with the continental crust.

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Importance of Rocks to the people of East Africa

1. Rocks contain valuable minerals such as copper, gold diamond thus promoting the mining industry in East Africa.
2. Sedimentary rocks contain oil and natural gas which are sources of energy or fuel.
3. Rocks provide building materials for construction purposes e.g. granite
4. Rocks especially sedimentary and igneous provide fertile soils for agriculture
5. Rocks give rise to soil formation which also promote agriculture or vegetational growth
6. Rocky areas and rock out crops provide beautiful scenery for tourism
7. The coral reefs shelter harbours from strong waves e.g. Dar-es-salaam and Mombasa port.
8. Rocks hold underground water and thus sources of water to man.
9. Rocks are sources of medicine e.g. lime clay etc
10. Rocks are ground for research
11. Rocks are raw materials to industries e.g. clay
12. Rocks are also important increase domestic use e.g.
13. Rocks in East Africa Inselbergs, mountains etc.
14. They are sources of income to the local people
15. They also lead to the provision of employment opportunities especially in the mining and quarrying industries.
16. Rocks are used for decoration purposes

Negative contributions of rocks (problems experienced by people living around rocks)

1. Rocks provide homes for wild animals which are dangerous to man and his property.
2. Promote soil erosion and land slides
3. They are barriers to transport and communication routes
4. Porous rocks lead to water shortage in some areas of East Africa
5. Hinder settlement and agriculture.
6. Some rocks when weathered laid to the development of poor sandy soils e.g. granite rocks.
7. Coral reefs hinder fishing and water transport

8. Rocks form mountains hindering settlement and other activities because of very low temperatures, steep slopes and aridity on the lee ward side.

Questions

1. a) Differentiate between sedimentary and igneous rocks
 b) Describe the process which led to the formation of:-
 (i) Sedimentary (ii) Igneous rocks in East Africa
 c) (i) Explain the benefits of rocks to East Africa
 (ii) Outline the problems faced by people living (around rocks) in areas where either
 Sedimentary or igneous rocks are found.
 d) Name any one area of East Africa where each rock is found.
2. a) Name any three types of rocks found in East Africa
 b) Describe the characteristics of any two types of rocks named in (a) above
 c) For any type of rock named in (a) above, describe the processes which led to its
 Formation.
 d) Explain the importance of rocks to the people of East Africa

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LAND FORMS EVOLUTION IN EAST AFRICA (FEATURES)

They are a result of a number of processes. These processes modify the landscape to produce a number of land forms or features.

These processes are categorized into two.

- a) Endogenic processes which originate from deep within the Earth Interior i.e.
 -Faulting
 -Vulcanicity
 -Folding
 -Earth quakes
 -Warping

These processes are referred to as Earth movements or Tectonism.

- b) Exogenic processes which operate at close to the surface of the earth. They include:- Weathering - Deposition
 Mass wasting

Erosion

FAULTING AND LANDSCAPE

Definition: Faulting is the fracturing / cracking / breaking of rocks doing which displacement takes place. This displacement may be vertical lateral or horizontal. Page | 11

Faulting leads to the breaking of rocks, these cracks are called faults. These are three types of faults.

1. Normal faults
2. Reversed faults
3. Tear faults

Faulting is caused by two forces

1. Tension force

These areas pull the earth crust apart leading to the formation of normal faults.

2. Compression forces

These forces act towards each leading to the formation of reversed faults.

Tear faults

Sketch map of East Africa showing the main faulted region in

Land forms due to faulting

In East Africa faulting has led to the formation of the following land forms

- | | |
|---------------------------------|-------------------------------|
| - Block mountains (Hosts) | - Rift valleys |
| - Escarpments / fault scarp | - Rift valley lakes |
| - Fault gilded valleys / rivers | - Mountain block / and scapes |
| - Fault line scarps | - Gravel |

Fault gilded valley

This is a river or stream following a fault line e.g. River Aswa, River Ewasu Ngiro, River Kerio (Uganda and Kenya respectively)

Escarpment / fault scarp

This is a steep slope formed when one slab or block of land slips/ falls downwards relative to the other.

They are normally seen at the side of the Rift Valley.

Examples of escarpments in East Africa e.g.

- | | |
|--------------------|----------------------|
| - Butiaba (Uganda) | - } Ruaha (Tanzania) |
| | } |

- Mau
 - Aberdare
 - Nandi
- } Kenya
- Iringu

Rift Valley

It is an elongated depression with fault scarps on either sides.

The East Africa Rift Valley is divided into two i.e. the Eastern arm which runs through Kenya and Tanzania. It contains numerous lakes like Eyast, Manyura, Nakuru, Naivasha, Elementeita, Magadi, Baringo, Turkan, Natron, Bugona, etc.

The western arm is deep and rugged and it contains five large lakes i.e. Albert, George, Edward, Tanganyika, Rukwa.

NB: The deepest Lake is Tanganyika

Most Rift Valley lakes are salty because they don't have intakes and outtakes.

SKETCH MAP OF EAST AFRICA SHOWING THE RIFT VALLEY AND ALL THE LAKES

These are many theories put forward to explain the formation of the Rift Valley
e.g.

1. Tension forces

Convectional currents within the Earth crust cause, tensional forces which leads to the formation of parallel normal faults making the middle block unstable. Continuous tension makes the middle block to subside to form a Rift Valley

2. Compressional forces

Convectional currents within the earth crust cause compressional forces which lead to the formation of reversed parallel faults. Continuous compression, force the side blocks to thrust up to form a Rift valley. Page | 15

The over hanging sides of the Rift valley are within back by erosion.

BENEFITS / IMPORTANCE OF THE RIFT VALLEY TO THE PEOPLE OF EAST AFRICA.

1. The Rift Valley promotes tourism and thus a source of foreign exchange e.g. Lake Nakuru is the world's biggest flamingo attraction.
2. The Rift valley contains a number of lakes such as Tanganyika Albert etc. These lakes are sources of fish (food) is the people of East Africa.
3. The Rift Valley is a source of salt to the people of East Africa e.g. Lake Magadi and Lake Katwe.
4. The Rift valley such as Naivasha, Tanganyika, Edward etc. modify climate through formation of convectional rainfall.
5. The Rift Valley lakes further provide water for domestic industrial and irrigation purposes.
6. Rift valley lakes promote water transport.
7. the Rift valley acts as an international boundary e.g. the western arm is a boundary between Uganda and DRC.
8. The Rift valley provides employment to many people in East Africa e.g. miners, researchers, etc.
9. Ground for re-creation e.g. swimming, sun bathing, etc.
10. The Rift valley is also a ground for livestock rearing and wild life conservation.

PROBLEMS FACING THE PEOPLE LIVING ALONG THE RIFT VALLEY

1. Water in the Rift valley lakes is salty and thus not fresh for human consumption.

2. Soil erosion and landslides due to the steep slopes along the Rift valley.
3. Pests and diseases e.g. tsetse flies which spread sleeping sickness and Nagana
4. Steep slopes hinder human settlements
5. Earth quakes and aridity because these regions are within tectonic plates
6. Poor transport and communication network because of the steep Rift valley slopes

Rift valley lakes

These are lakes formed within the Rift valley floor.

NB: Rift valley lakes / Graben lakes are formed due to secondary faulting within the Rift valley floor. These basins are then filled with water to form Rift valley or Graben lakes e.g. L. Tanganyika, Albert, George, Turkana, Naivasha, etc.

Note: Explain the processes that led to the formation of Rift valley lakes

1. Rift valley are formed by faulting
2. They were formed by either tensional or compressional forces (explain the formation of the Rift valley)
3. Basin within a Rift valley was formed by secondary faulting which was filled by water to form a lake.

Grabens are depressions or basins within the Rift valley that when filled with water, they become Rift valley lakes.

Horst / Block Mountain

A block mountain is an upland bounded by rocks on one or both more sides.

Formation of Block Mountains

Block Mountains are formed by either compression or tensional forces.

1. Compressional forces.

Compressional forces acted on a stable block of land leading to formation of reversed faults.

Continued pressure forced the middle block to be uplifted to form a block mountain. The side blocks remained stable.

2. Tensional forces

Tensional forces acted on a stable block of land leading to its formation of normal faults. Continued tension leads to sinking /subsiding of the side blocks to form a block mountain.

Examples of Block Mountain in East Africa

Rwenzori (Uganda)

Mountain Mathias (Kenya)

Mountain Usambara

Mountain Ufipa

Mountain Uluguru

Mountain Mahenge

} Tanzania

A SKETCH MAP OF EAST AFRICA SHOWING BLOCK MOUNTAIN

IMPORTANCE OF BLOCK MOUNTAINS (MOUNTAINS)

1. Mountains are tourist attractions and thus sources of foreign exchange for development.
2. Sources of minerals e.g. copper and cobalt in Mountain Rwenzori
3. Mountains promote the development of forestry on either slopes e.g. Mt. Elgon forest reserve.
4. They also provide building materials in form of sand, clay and stones.
5. They promote wild life conservation e.g. Mt. Rwenzori National Park.
6. Mountains in East Africa modify climate through formation of aerographic rainfall
7. They attract dense settlement because of gentle slopes, fertile soils, heavy rainfall and low temperatures.

8. They act as water catchment areas i.e. forming sources of rivers in East Africa e.g. Nyamwamba river on Mountain Rwenzori, River Manafwa on Mt. Elgon.
9. They act as international boundaries e.g. Mt. Rwenzori on Uganda and DRC and Mt. Elgon between Uganda and Kenya
10. Mountains promote research and scientific study
11. They promote Agriculture due to deep fertile soils and heavy rainfall
12. Mountains are sites for telecommunication gadgets
13. Mountains promote re-creation as on Mt. Rwenzori where there is Mountain climbing.

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PROBLEMS FACED BY PEOPLE LIVING IN THE HIGHLAND AREAS OF EAST AFRICA

1. Landslides which destroy lives and property
2. Pest and diseases
3. Poor transport network due to poor relief
4. Soil erosion on steep slopes which interfere with agriculture
5. Volcanic eruption which also destroy lives and property
6. Mountains act as hiding grounds for wrong doers (rebels)
7. Wild animals like snakes, lions, etc.
8. Low temperatures which limit human settlement
9. The steep slopes limit accessibility and use of land in mountain water rain shadow effect (aridity on the lee-ward)

THE SOLUTIONS TO THE ABOVE PROBLEMS MAY INCLUDE

1. Terracing
2. Contour ploughing
3. Growing of cover crops
4. Afforestation
5. Re-afforestation
6. Mulching
7. Resettlement of population
8. Mass education and awareness
9. Spraying of pests
10. Construction of winding roads
11. Improving on security

FOLDING

Folding is the bending of soft young sedimentary rocks due to compressional forces

Folding results into the formation of anticlines (hills) and synclines (valleys)

Folding can be seen around Kigezi Buganda hills, Bukoba sand stone hills

WARPING

Warping is a gental deformation of the earth crust over a considerable area as a result of compressional force.

Warping in East Africa has resulted into up and down warping of the earth crust.

Warping in East Africa has also led to the general subsidence of central Uganda form 2 lakes i.e. Lake Victoria and Kyoga and also reversed of the following rivers e.g. Kafu, Katonga and Kagera

EARTHQUAKES

An earth quake is a violent tremor of the earth. Earth quakes begin from the focus and the point above the focus as the epicenter

Earthquakes are often caused by collusion of tectonic plates which cause vibrations within the crust; it may also be caused by the movement of magma beneath the earth crust, man's activities etc.

The intensity of an earth quake is measured by an instrument called seismograph which is equipped with Richter scale to indicate the intensity of the earth quake.

In East Africa Earthquakes are common along the Rift Valley.

VULCANICITY / VULCANISM

Definition: Vulcanicity is the process by which molten rock (magma) and materials in solid, liquid and gases form the interior of the Earth are intruded into or extruded onto the surface of the earth through lines of weakness.

Vulcanicity on the other hand is a process by which molten rock (magma) is extruded or poured on the surface of the earth. Page | 21

Origin of Vulcanicity

The molten rock (magma) is in a semi-solid plastic form. This is due to the following:-

1. Great pressure exerted by the over lying laid rocks
2. Great heat beneath the earth crust due to friction of the tectonic plates.

NB: Convectional currents within the earth crust cause tensional and compressional forces which in turn create lines of weakness through which molten rock flows in /on to the earth.

When magma erupts on the earth surface is called Lava
There are 3 types of lava.

1. Acidic lava
This solidifies rapidly and flows for short distances. It is very acidic
2. Basic lava
Takes a long time to solidify and thus flow for long distances
3. Intermediate lava
This contains the characteristic of both acidic and basic lava

LANDFORMS DUE TO VULCANICITY

The landforms due to vulcanicity in East Africa are categorized into 2 i.e. Extrusive volcanic land forms (magma comes on top) and Intrusive volcanic land forms (magma remains inside)

1. Extrusive volcanic landforms

These are formed when magma is extruded on the land surface. They include the following.

- Volcanic mountains (volcanoes) e.g. Mufumbiro, Meru, Kenya, Kilimanjaro
- Volcanic plugs (Neck / spine) e.g. Tororo rock, Maweru peak
- Explosion craters e.g. Katwe, Basoti, Nyungu,
- Calderas e.g. Meru, Longonot, menengav, suswa, nafak
- Lava dammed lakes e.g. L. Bunyonyi, Mulehe
- Cumulo domes e.g. Nfumbi, Rurgwe
- Lava plateau / plain e.g Nyika plateau, Mau ranges
- Hot springs e.g. Kitagata, Molo, Kisiizi, Ssempaya

- Geysers e.g. L. Bogaia, and L. Hannington
- Fumeroles e.g. at the side of Nyamulagira and

VOLCANIC MOUNTAINS (VOLCANOES)

These are conical-shaped features formed by cooling and solidification of magma on the surface of the earth through lines of weakness. Page | 22

Formation of volcanic mountain

A volcanic mountain is formed when magma flows through the vent or lines of weakness (through an eruption or explosion), the materials building and accumulate on the surface of the Earth in layers to form a volcanic mountain e.g. Kilimajaro, Moroto, Napak, Mufumbiro, Elgon, Kenya, Meru, Muhavura, Oldonyo – lengai

SKETCH MAP OF EAST SHOWING VOLCANIC MOUNTAINS

Volcanoes are of different types e.g.

Ash and cinder e.g. Elgon, Teleki
 Lava cones e.g. Longonot Meru
 Composite cones e.g. Kilimanjaro, Muhavura
 Dissected cones e.g. Mt. Kenya
 Basal domes e.g. Mt. Nyamulangira
 Cumulo domese.g. Rungrve, Ntumbi.

Volcanoes usually pass 3 stages in their life cycle. In the beginning, eruptions are frequent and the volcano is active i.e. Active volcanic mountains.

They have rumbling sound e.g. Mt. Mufumbiro, Muhuvura, Ol donyo – lengai, Meru, Nyamulagira and Nyiragongo etc.

Later eruptions become so (infrequent that the volcano is said to be Dormant (sleeping) e.g. Kilimanjaro, Longonot (lava cone)

This is followed by a long period of inactivity Volcanoes which have not erupted in historic times are said to be extinct e.g. Elgon (Ash & Cinder)

NB: Highlands of East Africa are mainly formed by the following processes

Folding	-	Faulting
Vucanicity	-	Weathering and erosion

VOLCANIC PLUG / SPINE

This is a cylindrical feature formed when acidic lava solidifies within the central pipe and becomes harder e.g. Tororo rock, Mawenzi peak etc.

LAVE PLATEAUS / PLANS

This is an upland with a flat / gently sloping surface made of several layers of lava.

It is formed when basic lava, flows through lines of weakness through successive eruption e.g. Kisoro plains, Nyika plateau, Mau ranges, Laikipia plains, Kino plains, Valla plateau.

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LAVA DAMMED LAKES

These are lakes formed when basic lava blocks a river valley e.g. L.Mulehe, Bunyonyi, Mutanda.

HOT SPRING, GYCERS AND FUMEROLES

Rain water and water from beneath sip through rocks and collect in under ground reservoirs.

During passage, it comes into contact with hot heated volcanic rocks and later emerge into the Earth surface due to great pressure as:-

- a) A stream or spring (This is called a hot spring) e.g. Kitagata, Kisiizi, Sempaya, Maji ya moto
- b) At regular intervals.(This is called a gycers) e.g. near L.Bogona, L.Hannington e.t.c.
- c) As hot gases or steam (This is called a fumerole) e.g. at the sides of Nyamulagira and Longonot mountains.

EXPLOSION CRATERS

These are shallow flat flowed depression surrounded by a low rim of pyroclasts (particles) and local or country rock.

It is formed when an eruption of gases, explodes and punches a hole in the ground.

The ash and dust thrown up will fall back around the

CALDERAS

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Calderas are formed in 2 ways

- a) Violent eruption which destroys the top of the volcano.
- b) It's also formed by a process known as cauldron subsidence of the top of the volcano following a volcanic eruption. e.g. Meru, Menengai, Ngorongoro, Napak, Langonot and Suswa.

INTRUSIVE VOLCANIC LANDFORMS

(Plutonic / Abyssal)

These are formed when magma cools and solidifies beneath the Earth crust. These landforms include; Batholith, Sills, Dykes, Lacolith, Lopolith.

BATHOLITH

This is a huge mass of magma formed at great depth e.g. Mubende batholith.

SILL

This is a sheet of magma lying along the rock strata or layers. It is a horizontal sheet of magma near Mobasa. In Thinka.

DYKE

This a vertical or inclined sheet of magma i.e. magma cuts across the rock strata or layers e.g. Sikulu hills in tororo.

Page | 26**LACOLITH**

This a dome shaped mass of magma almost at the surface of the Earth, e.g. Near Voi in Kenya.

LAPOLITH

This is a large sourcer shaped intrusion body. The sourcer shape is due to the weight of the Earth crust.

BENEFITS / IMPORTANCE OF VULCANICITY

1. Vulcanicity has led to a formation of a number of landforms. These landforms are important in East Africa in the following ways.

POSITIVE IMPORTANCE

1. The diversity of volcanic features like volcanic mountains, cumulo-domes, lava plateaus e.t.c. promote tourism and thus earn alternative source of foreign exchange.
2. Lava plateaus and lower slopes of volcanic mountains are favourable for agriculture because of fertile volcanic soils and heavy rainfall.
3. Volcanic landforms are sources of minerals e.g. diamonds from volcanic plugs, Limestone from the Tororo plug e.t.c.
4. They provide man with building materials e.g. granites.
5. Sills and dykes provide favourable sites for waterfalls where HEP is generated e.g. Thika falls.
6. Hot springs are sources of duo-thermal power e.g. around L.Nakuru and Bogoria and they are used for natural medication(contain sulphur good for the skin)
7. Volcanic landforms e.g. volcanic mountains are sources of rivers which provide water for domestic, Industrial and Irrigation purposes e.g. R. Sipi and manafna from Mt. Elgon.
8. Explosion craters are sources of salts e.g. L. Kwate.
9. Volcanic landforms are habitats for wildlife especially the volcanic mountains.
10. Volcanic mountains like Kilimanjaro, Elgon e.t.c. modify climate through formation of relief rainfall.
11. They are grounds for research and scientific study.
12. Volcanic mountains like Elgon act as international boundary between Uganda and Kenya.
13. Volcanic mountains promote forestry on their local slopes e.g. Mt. Elgon forest reserve.
14. Lava dammed lakes like Bunyonyi, Mulehe e.t.c. provide water for domestic, Industrial and Irrigation purposes.

NEGATIVE IMPORTANCE (PROBLEMS EXPERIENCED BY P'PLE LIVING AROUND VOLCANIC MOUNTAINS)

1. Danger of wild animals.
2. Landsides and soil erosion due to steep slopes.
3. Pollution of the environment.
4. Risk of earthquakes.

5. The upper slopes are too steep and cold for human use as well as settlement.
6. Danger of secondary eruption leading to loss of lives and property.
7. Difficulty to construct transport network.
8. Volcanic mountains are infested with tsetse flies.
9. Aridity on the lee-ward side due to rain shadow effect.

MEASURES THAT CAN BE TAKEN TO THE ABOVE PROBLEMS

1. Construction of winding roads.
2. Planting of trees on steep slopes.
3. Spraying with insecticides especially like the forests.
4. Application of soil erosion control measures like Terracing, Contour Ploughing, Strip Cropping, Inter cropping,
5. Irrigation farming on the lee ward side of mountains.
6. Carrying out agro-forestry to stabilize farming.
7. Application of farm yard manure to increase the water retention capacity of the soil.

INFLUENCE OF VULCANICITY ON AGRICULTURE

Positive

- Production of fertile volcanic soils.
- Orographical rainfall for the growth of perennial and
- Variety of crops can be drawn both temperate & tropic

Negative

- Aridity on the lee-ward side require irrigation
- Young volcanic soils are prone to soil erosion and

Porous volcanic soils are too fragile for continuous agricultural production

STEPS THAT SHOULD BE TAKEN TO IMPROVE ON AGRICULTURE

- Irrigation farming
- Agro forestry
- Terracing
- Application of farm yard manure
- Intercropping to provide cover crops for the fragile soils

Influence of vulcanicity on climate

- Influences rainfall on lee-ward side.
- Rain shadow effect on the windward side.
- Aspect i.e. the East and West facing slopes receive abound sunshine.

- Volcanicity has created highlands on which there is climatic variation.

GLACIATION IN EAST AFRICA

Introduction

Glaciation is a process of glacier formation and accumulation.

A glacier is a mass of ice flowing down slope or it's a nice river. In East Africa, glaciers are found on the following 3 mountains, Mt. Rwenzori, Kenya & Kilimanjaro.

The level above which there is perpetual snow cover is called a snow line.

Glaciers perform 3 major roles i.e. erosion, transportation and deposition.

GLACIAL LANDFORMS

Glacial landform are categorized into two:-

- Glacial erosional landforms
- Glacial depositional landforms

GLACIAL EROSIONAL LANDFORMS

Glacial erosional landforms are produced by 2 major processes i.e.

a) Plucking

This is tearing away of blocks of rocks by a glacier presence of a crack.

b) Abrasion

This is wearing or polishing away of rocks by a glacier.

Other erosional processes include the following:-

- Freeze and thaw
- Basal sapping

The above processes have led to the formation of glacial erosion landforms on mountains. Rwenzori, Kenya and Kilimanjaro.

These landforms include the following;

- Corrie /arque/crom
- Arêtes

- Pyramidal peaks/horns
- Hanging valleys
- Truncated spurs
- Crag and tail
- Roche montanee

1. CORRIE / CIRQUE / CWM

A corrie is a steep sided rock basin (arm-chair) formed by glacier erosion on the side of a mountain.

It is formed when water freezes into the cracks in rock and later breaking into particles.

NB:

If a corrie contains water, it is called a glacial lake or a tarn.

Examples of tarn in East Africa; Lake Teleki, Lac du Speke, Lac Catherine, L. Baker, L. Speke, Tyndoll.

2. ARETE

An arête is a narrow steep sided rock ridge or knife-edge like ridges separating two cirques e.g. Arête radiating eastward down to Mugusu valley.

3. PYRAMIDAL PEAK / HORN

This is a pointed peak formed where 3 or more arêtes meet.

It is formed by back wall recession.

NB: If a pyramidal peak peeps out a glacier, it is called a Nunatak.

4. U-SHAPED VALLEY

This is a broad valley with flat bottom. Originally it was a small valley but widened by processed plucking and abrasion e.g. Mugusu, Bujuku, Teleki valley e.t.c.

5. HANGING VALLEY/WATERFALLS

A hanging valley is formed when a small tributary joins a major stream of glacier. The major stream erodes its valley faster than its tributary. Thus deeper than the tributary valley.

This makes the tributary valley to remain hanging up as a hanging valley.

NB: The hanging valley will then pour its water into the main valley to form a water fall.

e.g. Speke glacier, joining Bujuku valley.

GLACIAL DEPOSITION LANDFORMS

The deposit or load carried by a glacier is known as moraine which can be;

- a) Lateral/side
- b) Dorsal (top)
- c) Medial (middle)
- d) Ground (bottom)

Glacial deposition landforms include the following

- Drift
- Tills
- Erratic
- Eskers
- Kames
- Out wash plain
- Kettle holes
- Moraine dammed

ESKERS

It is a long winding stick sided ridge lying parallel to the direction of the ice movement e.g. river Nithi gully valley, Mobuka valley

KAMES

This is an irregular undulating mounds of bedded sands and gravel deposited randomly.

KAME TERRACE

A narrow flat topped like ridge of sand gravel along the valley sides e.g. Kamusoso valley on Mt. Rwenzori, Hobley valley on Mt. Kenya.

Erratic

Boulders transported by moving ice for a long distance & deposited e.g. Nithi valley, Bujuku, Kamusoso valley.

Till plain

This is an extensive area of mountains landscape formed when moving ice transport boulders and clay covering former hills and valleys e.g. Teleki valley, Mobuku valley.

Drumlins

These are elongated hills formed when fragments of brown moraine are compressed by ice movements e.g. Teleki valley.

Outwash plains

A wide gently sloping plain of gravel, sand, clay and silt e.g. Kibo and Mawenzi on Mt. Kilimanjaro and Mobuku and Bujuku valleys on Mt. Rwenzori.

Moraines

Unsorted glacial deposits made up of boulders, clay, silt & sand.

Kettle holes

These are circular holes in glaciated areas formed when blocks of ice are detouched leaving behind circular depressions e.g. Mahoma kettle hole on Mt. Rwenzori.

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Moraine dammed lakes

Lakes formed when moraine blocks a river valley or stream.

NB: the lakes due to glaciations include the following:-

- Tarns
- Ribbon lakes
- Moraine dammed lake

REASONS WHY GLACIERS IN EAST AFRICA ARE LIMITED TO THE MOUNTAINS KILIMANJARO, RWENZORI AND KENYA.

Glaciers however are limited in East Africa because of the following:-

1. Many parts of East Africa have low altitudes i.e. below 3000m above sea level.
2. East Africa lies astride the equator where temperatures are high for glacial accumulation.
3. There is influence of global warming.
4. Deforestation.
5. Influence of volcanicity i.e. vulcanicity is associated with high temperatures affecting glacial accumulation.
6. Large scale industrialization i.e. industries emit CO₂ into the atmosphere which raises temperatures affecting glacial accumulation.
7. The rain shadow effect especially on the lee ward side of mountains which doesn't allow the formation of glacier.
8. East Africa does not experience winter conditions.

Importance/Advantages of Glaciation in East Africa

1. Promote research and scientific study.
2. Glacial landform such as arête, pyramidal peaks e.t.c. are tourist attraction thus source of forex.
3. Glacial lakes in a glaciers are sources of rivers which provide water for domestic, Industrial & Educational purposes e.g. river Mobuku on Mt. Rwenzori which provide water to Mobuku irrigation scheme.
4. Moraines provide fertile soils for Agriculture.
5. Hanging for H.E.P generation
6. Glaciations promote finishing in the lakes e.g. Tarns, Ribbon lakes, Moraine dammed lakes.

7. Glaciations also lead to provision of construction materials especially the boulders.
8. U- shaped valleys provide natural route ways.
9. Glaciations promotes sports and re-creation e.g skiing on Mt. Rwenzori.
10. Provides employment to a number of people in East Africa.
11. Glaciations has led to the development of infrastructure e.g. roads, holes e.t.c.

Disadvantages of Glaciation

1. Promotes soil erosion and land slides (Avalanches) this may lead to the destruction of property and lives.
2. Formation of out wash plains which contain infertile soils for Agriculture.
3. Leads to cold temperatures discouraging settlements on Mt. slopes.
4. Glaciated areas sometimes turn into many small lakes thus making the area to be a waste land.
5. Melting of glaciers may cause flooding of rivers which destroys lives and property.

RIVERS AND RIVER SYSTEMS IN EAST AFRICA

A river is a body of water flowing over the land surface through a definite channel I a linear direction.

There are three forms of rivers:-

1. Permanent rivers.
2. Seasonal rivers.
3. Ephemeral rivers.

A place or point where a river begins is called a source which can be a spring, glacier, swamp, lake, e.t.c. and a place or point where it ends is called a mouth. It can be a swamp, sea, ocean, lake e.t.c.

The junction of two or more rivers is known as a confluence.

When a small river or a stream joins a major river is called a tributary.

The area drained by a river and its tributaries is called a river basin or a catchment area or a drainage basin e.g. lake Victoria basin e.t.c.

An area of a higher land that separates two or more basins is called a river divide or a water shed or water parting.

The main river and all its tributaries together form a river system.

A river regime is a seasonal variation of water volumes.

This can be simple (one), double (2) or complex (many).

The materials carried by a river are known as LOAD.

A river competence is a measure of the ability of a river to carry its load.

NATURE OF FLOW

The water in a river flows in two ways

1. Laminar flow

This is a smooth flow of a river over its base bend bed.

2. Turbulent flow

A river flows in a circular or rough manner because of flowing over a rough bed.

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WORKS OF THE RIVER

A river performs three basic functions namely

1. Erosion 2. Transportation 3. Deposition

River Erosion

It involves the following processes

1. Attrition

A processes by which the load itself is broken down because the rock fragments are in motion and colliding with each other.

2. Corrosion /Abrasion

This is the wearing away of the sides and bed of the river channel by the load.

3. Solution

Soluble minerals dissolve in water and are carried away in solution.

4. Hydraulic Action

This is the mechanic source of moving water which is able to remove loose materials such as gravel, sand and silt.

River erosion operates in three ways:-

- a) Head ward erosion (lengthens the valley)
- b) Vertical erosion (Deepens the valley)
- c) Lateral erosion (Widens the valley)

NB: The lowest point to which a river can erode its bed is called Base level.

River Transport

A river transports its load in four major ways / processes.

1. Traction

This is the dragging /rolling of large materials on its bed e.g. pebbles.

2. Saltation

This is bouncing of small particles on its bed.

3. Suspension

This is the transportation of life particles held in water (suspended) e.g. silt, mud e.t.c.

4. Solution

Small particles are dissolved in water and then transported e.g. lime stone.

River Deposition

A river deposits its load when its energy to carry has greatly reduced. The materials deposited by a river are called alluvium.

River Profile

A river profile is a measured slope of a river along its base bed and surface from the source to the mouth. It's a cross-section of a river from its source to the mouth.

A river profile has three stages:-

1. Youthful /Torrent /Source /Upper stage
2. Mature /Middle /Valley stage
3. Old /Senile / Mouth / Flood plain

Youthful Stage

This is a stage where a river originates in East Africa, the following are in their youthful stages:-

R. Mobuku
R.Nile at Bujagali
R.Manafwa
R.Sironko
R.Nyamwamba

Characteristics of the youthful stage

The gradient is very steep.

The water speed is very fast.

Vertical erosion is dominant.

No deposition

The valley is very narrow

Small volume of water

The flow of water is turbulent (rough)

The major features or landforms in this stage include the following:-

Waterfalls, rapids, plunge pools, V-shaped valley, gorges interlocking spurs, pot holes.

Waterfall

A waterfall is a mass of water falling from a higher to a lower level.

Waterfalls are formed in the following ways:-

- a) When a resistant rock lies across a river.

- b) When a river falls across a fault line.
- c) When a river falls across along the edge of a plateau.
- d) Where a river enters a hanging valley.
- e) When a river enters the soci at a cliff.

Examples of waterfalls in East Africa

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- Sezibwa falls - Karuma falls - Sipi falls -
- Adamson
- Thinka falls

Plunge Pool

This is a depression at the bottom of a waterfall. Plunge Pool are formed by haudralic action and abrasion.

Pot Holes

These are circular depressions on the river bed. They are formed when pebbles are carried by a swirling river cut circular depression in the river bed.

Rapid

A section of rough, fast flowing water in a river channel. Its formed where a waterfall has been eroded.

A Gorge (Canyons/Ravine)

This is a deep narrow valley with high vertical banks resulting from vertical erosion.

V-Shaped Valley

These are formed by vertical erosion and they are pronounced in valleys with beds less resistant than those on the sides of the valley.

Interlocking Spurs

Vertical erosion rapidly deepens the valley. The river twists and turns around obstacles of hard rock erosion is pronounced on the concave banks of the bends and these ultimately causes spurs (land projections) which alternate on each side of the river to interlock (Interlocking Spurs)

Interlocking spurs can be seen on the following rivers:-

- Semiliki
- Mobuku
- Nyamugasani

MATURE /MIDDLE STAGE /VALLEY STAGE

This is the middle stage in the river profile

X-tics of this stage

1. The gradient is more gentle
2. Lateral erosion is dominant
3. River meanders begin to form
4. The valley flow is wide
5. The speed of water is relatively slow
6. Deposition begins to take place
7. The valley has a U-shaped section

The landforms in this stage include U-shaped valleys, Meanders, River cliffs /Bluff, Slip off slopes e.t.c.

1. U-Shaped Valley

This is an original valley which has been widened by lateral erosion.

2. Meander

It's a current bend of river channel.

It is formed by an alternate undercutting and deposition at the concave and convex banks and the river channel respectively.

NB: The concave bank because of rampant erosion, a river cliff or bluff is formed while on a convex bank deposition is dominant leading to a formation of slip off slope.

Rivers with meanders in East Africa include the following:-

- R.Rwizi - R. Mpanga - R.Manafwa - R.Ngaila - R.Kagera

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3. OLD STAGE

This is a stage where the river is about to reach its destination.

X-tics of old stage

1. The gradient is more gentle or flat.
2. There is much deposition.
3. The river flows in a wide flood plain.
4. The river carries a load consisting of majorly silt.
5. The H₂O is very slow and gentle.
6. Meanders and ox-bow lakes begin to develop.

Rivers in this stage include the following :-

- R.Rwinzi
- R. Moroto
- R. Malaba
- R.Nyando
- R.Tana
- R.Athi

The landforms in this stage include the following:-

- Ox-bow lakes
- Meander scars
- Flood plains
- Levees /bums
- Graded channels
- Deferred tributaries
- Delta

Ox – bow lakes

An ox-bow lake is a crescent shaped final section of once pronounced meander but now cut off from the main stream.

Ox – bow lakes are formed in the flood plains with meanders which are very sharp that only a narrow neck remains.

During flooding, the narrow neck is broken through and the river by passes the meander cutting off by deposition to form an ox-bow lake (cut off or bayous)

When an ox-bow lake is filled with alluvium, it dries out leaving behind a meander scar.

Ox – bow lakes can be seen along the following rivers; Nzoia, Rufiji, Ngoula, Kilombero e.t.c.

Flood Plain

This is an area of land at the sides of the river which is susceptible to the periodic erosion.

Levees /bums

When a river is in the flood plain, it deposits most of its load close to the river side's forming embankments called levees/bums.

Braided channels

A braided channel is a wide shallow channel in which a river divides and sub divides in a series of minor channels separated by islands of alluvium.

Braided channels can be seen on the following rivers Rufiji, Nzoia, Valo, Nyando, Sondu, Kilombero.

Deferred tributaries and confluence

A deferred tributary is one which flows parallel to the main river for several kilometer before joining the river due to the levees.

The confluence at which the tributary joins the main river is called deferred confluence.

DELTA

A triangular low lying swampy plain which gradually is colonized by vegetation.

The growth of a delta interferes with the flow of the river causing the river to split up into several separate channels called distributaries e.g. R.Rufiji

Stages in the formation of a delta.

1. The river reaches the coast and deposits sediments.

2. The river is obstructed by sediments and branches into distributaries to discharge more sediments brought down.

3. The delta takes a x-tics fan shape extending side ways and sea wards.

Conditions for Delta formation.

1. A river must have a large load.
2. The velocity of the river must be sufficiently low to allow most of its load to be deposited in the river mouth.
3. The river's load must be deposited faster than it can be removed by the action of tides and currents.

Types of deltas

There are 3 basic types of deltas

1. Arcuate Delta

This delta consists of both coarse and fine sediments and it has the shape of an inverted cone crossed by numerous distributaries e.g. Nile Delta, Niger Delta.

2. Birds' Foot Coarse

This delta consists of very fine materials and it has a few long distributaries like the foot of a bird.

NB: landforms as a resultant of river action therefore can be categorized into two

1. Erosional landforms

They include the following:-

- V-Shaped valley
- Waterfalls
- Plung pools
- Rapids
- Interlocking spurs
- Cliffs or bluffs
- U – shaped valleys

2. Depositional landforms

e.g. Meanders, Ox-bow lakes, Meander scars, flood plain, levees or bums, deltas, alluvial fan e.t.c.

RIVER CAPTURE

It is the diversion of part or whole of a river into a system of another adjacent powerful river able to erode its valley or rapidly than its neighbor.

The following conditions must be in place for river capture to take place

1. Two rivers should be flowing parallel to each other.
2. The pirate river must have more water than its neighbor.
3. The pirate river should flow over easily over eroded rock.

River capture happens when one river with a big erosive floor/power elongates its basin at the expense of a weaker one.

The powerful river erodes backwards (head ward erosion) and eventually capturing the flow of a weak river.

Alter Capture

NB: the bend at which piracy occurs is called elbow of capture. The captured stream is called misfit or beheaded stream. The valley below the elbow of capture is called wind or dries.

RIVER REJUVENATION

It is a renewed erosive activity of river.
It may be caused by the following.

1. Earth movements of uplift
 - Down warping
 - Tilting
2. Lowering of the sea level.
3. Increase in the stream volume due to increased rainfall.
4. Decrease in the load that a river is carrying e.t.c.

River rejuvenation has led to a formation of no of land forms in East Africa.
These landforms include:-

1. River Terrace /rejuvenation terrace

This is a step or bench like feature formed on a side of a river after the river has renewed its erosive power or activity.

2. Valley – in – valley

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This is a new valley created within an old valley after rejuvenation.

3. Incised meander

This is a curve or bend of a river that has been deeply cut vertically (Incised) after rejuvenation.

Incised meander can be of two types

a) Entrenched meander**b) Ingrown meander**

4. Knick point /Rejuvenation head

This is a break of slope in the long profile of a river caused by renewed erosive activity knick points are good sites for the generation of HEP.

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DRAINAGE PATTERNS

A drainage pattern is a plan/design/layout by a river and its tributaries. Its how a river & its tributaries are arranged on the Earth surface.

1. Trellis/Rectangular pattern

e.g. Aswa. The tributaries joined the main stream at more or less right angles.

it develops in areas with heterogeneous rocks and faulted area.

2. Dendritic drainage pattern

It looks like a tree trunk and its branches. They develop in areas with homogenous rocks and a gentle slope.

3. Radial drainage pattern

Rivers flow from a central point (highlands) downwards in many directions e.g. R. Manafwa, R. Sipi on Mt. Elgon e.t.c.

4. Parallel drainage pattern

The rivers flow parallel to each other for a long distance. E.g. R. Mayanja and Kato.

5. Centripetal drainage pattern

River converges into a central point from all directions.

6. Barbed/Hooked drainage pattern

Tributaries flow in the opposite direction of the main river before joining at acute angles e.g. R. Katonga, Kagera & Rwizi.

7. Angular

Rivers join at sharp angles and arranged in series of curves around a basin.

8. Braided

Rivers divided and subdivide in series of interconnecting minor channels separated by sand banks.

Diagrams

1. Trellis / Rectangular pattern 2. Dendritic drainage

3. Radial drainage pattern 4. Parallel drainage pattern

5. Centripetal drainage pattern

6. Barbed / Hooked

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7. Angular

8. Braided

COASTLINES

Definition of terms

COAST

It is that broad area where the sea or lake comes into the contact with the land.

SHORE

This is that area near the coast lying between the higher and the lowest water levels.

BEACH

This is an accumulation of deposits (sand, shingles e.t.c.)

WAVES

These are oscillations on the surface of the water body. These waves move up and down to create troughs and crests.

Waves are caused by the following:

1. Wind duration
2. Catastrophic events like earthquakes
3. Effects of moving objects in water e.g. ships large sea animals
4. Wind velocity and fetch (distance travelled by waves on the water surface)

Waves are of two types:**1. Destructive waves (storms)**

These destroy the coastal lands.

2. Constructive waves (gentle waves)

They build on the coastal land or beaches.

NB: swash:- is when water runs up on the shores sweeping materials forward on the slope.

When water is exhausted the water runs back to the sea under the influence of gravity, this is called a back wash.

Landforms or features due to wave action

Wave action along the coast results in the formation of two types of landforms

- A. Wave erosional landforms
- B. Wave depositional landforms

WAVE EROSIONAL LANDFORMS

These landforms are brought about by the following process

1. Abrasion or corrosion

The load in form of boulders pebbles and sand are hurled against the shore line by the waves.

2. Hydraulic Action by the waves

This is the wave force heating against the shore line by compressing air in areas of weakness.

3. Corrosion/Solution

This is the solvent action of waves on soft rocks like limestone.

4. Attrition

The load carried by the waves are broken to successive smaller particles by heating each other as they move.

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The wave erosional landforms therefore include the following:-

- a. Bays /Inlets /Coves
- b. Headlands /Cape/Promontories
- c. Cliffs
- d. Inlets /Geos
- e. Stacks /Chimney /Skerries
- f. Arches
- g. Stump
- h. Blowhole /gloup

Headland & Bay

Headland is a piece of land projecting into a water body. A Bay on the other hand is an indentation of the coastal lands by water.

Formation

On exposed coasts, the continued action of waves on rocks of varying resistance causes the coast line to be eroded irregularly. This is pronounced where hard rocks like granite occur in alternate bands with softer rocks. The softer rocks are eroded back to form bays inlets or coves e.g. Murchison and Kibanga bays on lake Victoria. The harder resistant rock persists to form headlands or promontories or caves e.g. Kibanga headlands on L.Victoria and Watamu on the Keyan coast.

CLIFFS AND WAVE OUT PLATFORM

A cliff is a steep rock face along the coast.

Cliffs are formed when waves cut a notch (small opening) on the coastal land by abrasion haudralic action and solvent action of waves.

Repeated wave action will enlarge a notch transforming it into a steep slope called a cliff.

A wave cut platform is a bench like feature sloping sea-wards below the cliff it is formed when the cliff recedes (erode backwards) leaving behind a gentle sloping platform called wave cut platform.

Caves, Blow Holes (gloop) and a geo (Inlet)

A cave

A cave is a cylindrical tunnel drilled through the cliff or headland by wave erosion.

The breaking of waves compress air in areas of weakness like faults enlarging it to form a cave.

A BLOW HOLE/GLOUP

It is a vertical shaft above the cave.

splashing of waves against the roof of a cave may enlarge the joints when compressed air is trapped. A natural shaft is thus formed which may eventually pierce through to the surfaces. This is called a gloop or blow hole.

A Geo is a narrow sea inlet formed when the roof of the arch collapses.

Arches, Stacks and Stumps

An arch is a raised bridge like feature above a passage drilled through a headland. It is formed when two caves approach one another from either sides of a headland and unite or join.

The roof of this arch may collapse leaving a piece of land detached at a sea or lake to form a stack

These stacks may be worn down by wave erosion to form a small related landform called a stump.

LANDFORMS DUE TO WAVE DEPOSITION

Materials along the coast are transported by long shore drift and deposited along the coast to form wave depositional landforms. These landforms include beaches, sand bars, Spits, Cuspate foreland, Tombolos and Mud flats.

A BEACH

A beach is a coastal accumulation of sand and shingle (small rounded stones) on the shore or coast. Examples of beaches in East Africa:- Mombasa beach, Gaba beach, Lutembe beach, Lido beach, Imperial beach, Nyali beach.

SAND BAR

This is an elongated ridge of sand or shingle running roughly parallel to the coast.

SPITS

This is a low narrow ridge of pebbles or sand joined to the land at one end with the other terminating in the sea or lake e.g. Tonya spit on L.Albert, Nabugabo spit on L.Victoria.

CUSPOTE FORELAND

This is a large triangular deposit of sand and shingle projecting seawards.

TOMBOLO

This is a spit which grows at the coast linking an island to the coast e.g. Bukakata tombolo on L.Victoria.

MUD FLATS

This is a flat form of mud composed of silt or alluvium formed along gently sloping coasts especially in bays, estuaries and delta.

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EUSTATISM /EUSTATIC MOVEMENTS

Eustatism refers to changes in the sea level which may be positive involving a rise in sea level or negative involving a fall in sea level relative to the coastal land.

The changes in the sea level may be caused by the following:-

1. Increased plaviation (rainfall) and desiccation (drought).
2. Glaciations (freezing) and deglaciation (melting).
3. Increase in temperature will lead to a rise in sea level because H₂O expands when heated from beneath.
4. Tectonic movements e.g. uplift of the coastal land down warping of the coastal lands. Expansion and contraction of ocean basins.
5. Sedimentation of materials into ocean basins.

LANDFORMS DUE TO SEA LEVEL CHANGES

Sea level charges have led to the formation of two types of landforms e.g.

a). **Submergence coasts.**

These landforms are formed when there is rise in sea level and include

e.g.

1. **Hord** – Narrow sea inlet (Not found in East Africa) filled with water during deglaciation.
2. **Ria /Creek** – This is a drowned river valley formed due to a rise in sea level e.g. Kilindini harbor, Port Tudor, (Mombasa) Mtwapa and Kilifi creeks (Dar-est-salaam)

3. Estuary

This is a wide shallow drowned river mouth formed as a result of a rise in sea level e.g. R.Rufigi and R.Mwachi.

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4. Dalmatian /Longitudinal coasts

These are highlands running parallel to the coast due to a rise in sea level e.g. Islands of Pemba, Mafia and Zanzibar, Chake –Chake.

b). Emergence Coasts or Landforms

these are formed when there is a fall in sea level. They led to the exposure of the formerly submerged landforms.

Such landforms include:-

1. Raised beach (Former beach)
2. Raised cliff (Former cliff)
3. Raised terrace (Former wave at platform)

CORAL REEFS

A coral reef is a limestone rock made up of skeletons of tiny marine organisms called polyps. These skeletons contain calcium CaCO_3 carbonate that when polyps die their skeletons accumulate on the continental shelf to form white coral limestone rocks.

Coral reefs occur on the East Africa coast especially at Bamburi, Mombasa.

Conditions or Factors for coral growth

1. The ocean waters must be warm between 20-30°C.
2. The water must be salty.
3. There must be an environment of water.
4. The water should be shallow.
5. There should be presence of polyps or marine organisms.
6. Presences of a continental shelf on which the corals grow from.
7. The water should be clear, clean and oxygenated.
8. Absence of strong currents to interfere with coral reefs accumulation.

TYPES OF CORAL REEFS

There are three types of coral reefs.

1. Fringing reef.

This is a coral platform up to 1km wide, joined to the coast or separated from a shallow lagoon.

2. Barrier reef.

This is a coral platform separated from the coast by a wide and deep lagoon.

3. An Atoll.

This is a circular coral reef or a ring of coral surrounding a fairly deep lagoon.

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ECONOMIC IMPORTANCE OF CORAL REEFS TO MAN IN EAST AFRICA

1. Coral reefs provide man with raw materials for the manufacture of cement.
2. Coral reefs are tourist attractions and thus alternative sources of foreign exchange.
3. They protect the ports from direct wave attack e.g. port Mombasa.
4. Coral reefs are sources of minerals e.g. petroleum.
5. Lagoons within the coral reefs provide grounds for re-creation e.g. swimming and sun bathing.
6. The lagoons also provide water for domestic, industrial and irrigation purposes.
7. Coral reefs promote industrial development e.g. the Bamburi cement factory in Mombasa.
8. Coral reefs provide employment to many people e.g. miners, industrial workers, researchers e.t.c.
9. Coral reefs are sources of fertile soils for agriculture especially the growing of cloves and coconut.
10. They are grounds for research and scientific study.

11. Sources of fertilizers like SSP.
12. Coral reefs are platforms for port development.

Problems /Disadvantages of Coral Reefs.

1. Hinder fishing and navigation e.g. fringing and barrier,
2. The lagoons are breeding grounds for mosquitoes and snails which spread malaria and biharzia respectively.
3. Some coral reefs lead to the formation of poor and infertile soils which are not suitable for agriculture.
4. Industries related to coral reefs like the Bamburi cement factory pollute the environment.

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DENUDEATION

Denudation is the wearing down of the Earth's crust.

It involves the following processes:-

1. Weathering
2. Transport (Mass wasting and erosion)
3. Deposition

WEATHERING

Weathering is the breaking or shattering of rocks on site (In Situ). It also involves the loosening, decay and break up of rocks into smaller fragments.

TYPES OF WEATHERING

There are three types of weathering

1. PHYSICAL OR MECHANICAL WEATHERING
2. CHEMICAL WEATHERING
3. BIOLOGICAL OR ORGANIC WEATHERING

1. PHYSICAL WEATHERING

The breaking of rocks into two increasingly smaller particles without causing any chemical change in the rock.

The processes of physical weathering include the following:-

a. Exfoliation (Onion Weathering)

During day time rock surfaces expand and during night rock surfaces contract. Repeated expansion and contraction due to temperature changes will lead to peeling off of rock surfaces. This leads to the formation of a smooth rounded dome called an exfoliation dome. E.g. Soroti rock, Kachumbala and Mubende hills, Kalongo hills, Kongwa and Akia hills.

Exfoliation is common in the dry areas of East Africa

b. Frost action /Frost shattering

This type of weathering is common on the following mountains. Kenya, Rwenzori and Kilimanjaro.

During day, water collects in the cracks between the rocks. During night when temperature fall the water freezes into ice and its volume increases. This exerts pressure leading to the breaking up of rocks.

c. Rock Disintegration (Crystal Growth)

This is caused by enlargement of salt crystals between rock grains when the crystals are moistened. Heating and cooling and occasional dampening cause physical expansion of salts particles creating stress and loosening surface grains.

This type of weathering is common in North Eastern Kenya e.g. L.Maggadi and L.Katwe.

d. Pressure Release (Uncalculating)

This occurs where the rock mass has been exposed by the removal of the over lying rock beds or debris the gradual release of pressure causes the rocks particularly granite to expand leading to the breakup of rocks.

e. Block Disintegration

This takes place in well jointed rocks, alternate expansion and contraction widens the rock joints and the rock will eventually break into smaller blocks along the widened joints. This type of weathering is common in the desert and semi-desert areas of East Africa.

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f. Granular weathering

This break down is due to different minerals in a rock mineral grains expand and contract at different rates and times causing stresses and eventual break down of rocks.

g. Alternate Wetting and Drying (Slaking)

Alternate wetting and drying of rocks lead to contraction and expansion of rocks leading to break up. It is common in the coastal areas of East Africa.

2. CHEMICAL WEATHERING

Chemical weathering is the decomposition or decay of rocks due to chemical reactions that take place between the rock minerals.

Water and certain atmospheric gases like oxygen & CO₂.

The processes of chemical weathering include the following:-

1. Hydrolysis

- The reaction between H₂O and mineral elements. It's a major process in the decomposition of feldspars.

2. Oxidation

- It's that reaction that occurs when additional oxygen is taken up by a mineral compound.

3. Solution

- This is the dissolving of rocks and carried away in a solution for.

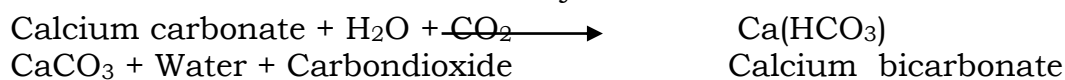
4. Hydration

- A process by which certain minerals absorb water and expand causing internal stress and fracturing of the rock.

NB: Chemical weathering is common in the coastal areas of East Africa. The shores of lake Victoria and highlands above 200m above the sea level.

5. Carbonation

- A reaction between rocks containing limestone and rain water to form a weak carbonic acid which eats away the rock.



Carbonation leads to the formation of Kaarst Scenery e.g. Stalactites and stalagmites, Grikes and Clikes.

NB: Water in limestone areas like Eastern Uganda. The coastal areas and then Nyakasura carry calcium water when it evaporates, it leaves behind solid calcium carbonate (stalagmites). As moisture drips, calcium is deposited to form stalactites.

3. BIOLOGICAL OR ORGANIC WEATHERING

It is break down or decomposition of rocks by living organisms.

This can take the form of chemical or organic weathering.

The processes of biological weathering include:-

1. Respiration of vegetation and soil organisms which raises the levels of vegetation and carbondioxide.
2. Burrowing and churning animals like rabbits, earthworms, termites e.t.c.
3. Influence of human activities like stone quarrying, road construction, rock dredging for port development, Industrial activities e.t.c.
4. The growing of plant roots through the rocks.

FACTORS INFLUENCING THE RATE AND CHARACTER OF WEATHERING

1. Climate (Rainfall and Temperature)

Equatorial areas because of high temperatures and rainfall promote chemical weathering because of the presence of H_2O .

Arid and semi-arid areas have low cloud cover, low rainfall and high temperatures. Thus promoting physical weathering.

Indirectly climate influences the growth of vegetation which promote biological weathering.

Rainfall influences weathering through the intensity of falling on rocks.

2. Parent Rock (Nature of the original Rock)

This is the rock which is broken down and influences weathering through its texture e.g. brightly coloured rocks are less weathered physically compared to dark coloured rocks.

The texture of rocks will also influence weathering, coarse rocks break faster than fine grained rocks because the expansion and contraction capacities of coarse rocks are greater than fine grained rocks.

Soft rocks are weathered faster compared to hard rocks.

3. Relief (Topography)

Relief determines the rate and time of weathering because it determines the speed at which weathered materials are quickly removed.

Weathering therefore is faster on gentle slopes because of the rate of removal of weathered materials (debris)

4. Living Organisms

The longer the time taken for weathering process to operate, the deeper the weathering and the shorter the time the shallower the weathering.

IMPORTANCE OF WEATHERING POSITIVE

1. It leads to the formation of soils and thus boosting agriculture.
2. It leads to the formation of different landforms like tors, exfoliation domes, earth pillars e.t.c. these landforms are tourist attractions and hence sources of foreign exchange.
3. Weathering also leads to the exposure of minerals i.e promoting the mining industry.

NEGATIVE IMPORTANCE

4. It promotes mass wasting and soil erosion. These are destructive to man as well as his crops.
5. The karst scenery is barren and thus not suitable for agriculture.

6. Weathering destroyed buildings.
7. Weathering hinders agricultural mechanization.

SOIL.

Soil is a weathered layer of parent rock covering the Earth's surface which sustains plant growth.

It is a natural accumulation of unconsolidated particles and organic matter (humus) that covers the Earth's surface and forms the supporting medium of plant growth.

It is formed when rocks are weathered into tiny particles e.g. loam, clay, alluvium etc.

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The importance of soil to man.

1. Soil promotes Agriculture because it forms the supporting medium of plant growth.
2. Soil forms bases for research and scientific study.
3. They are sources of minerals like gold.
4. Soil provides employment to a number of people leading to earning of income builders, brick makers, miners etc.
5. Soil a platform for construction (settlement).
6. Soil provides building materials to man e.g. sand.
7. Soil promotes industrial development by providing raw materials such industries include tiles industries, ceramics industries.
8. Soils are used for decoration purposes.
9. Soils modify climate through formation of rainfall.

The composition of soils.

Soil has the following contents/composition.

1. Inorganic Matter (minerals)-plant food.
2. Organic Matter (humus)-adds colour, fertility of the soil.
3. Water-used by living organisms.
4. Living organisms-Air provision.
5. Air.

SOIL TERMS.

1. Soil texture.

This is the physical size of soil particles.

2. Soil Ph

This is the degree of acidity and alkalinity of the soil.

3. Soil structure.

4. Soil profile and soil Horizon.

Soil profile is the vertical section through the soil to underlying solid rock.

Soil horizon is the horizontal layering of the soil.

5. **Soil catenia.**

This is the arrangement of soils down slope or .The horizontal sequence of soils along the slope.

NB: Its formation is influenced majority by relief.

6. **Leaching.**

This is the removal or washing down of soluble minerals like aluminium and silica from the upper layer to the deeper layer of the soil.

Leaching is responsible for the formation of laterites (murrum soils). They are formed when surface cover of decayed rock fragments recements laterites are usually stained rake red .These soils are of little nourishment for plants because useful in road construction and brick making.

7. **Eluviation.**

This is the movement of solid materials in solution/suspension from one place to another in the soil.

8. **Illuviation.**

This is the precipitation and accumulation of leached and eluviated materials in the B horizon in the soil profile

FACTORS INFLUENCING SOIL FORMATION.

1. **Parent rock.**

This is the rock material that breaks down to form soil particles (regolith) soft rocks like limestone are weathered quickly to form deep soils while hard rocks like granite weather slowly to form thin soils.

The colour of the rock will also determine whether the soils will be deep or thin. Soils coarse grained parent rock gives rise to deep soils while fine grained soils give rise to shallow soils.

2. Climate (Temperature and Rainfall).

Rainfall leads to flooding which speeds up the rate of weathering, the intensity of rain falling on rocks will also influence soil formation. Temperature changes further will influence soil formation etc.

Climate also influences the growth of vegetation which adds on humus in the soil.

3. Living Organisms

(eg burrowing and churning animals like rabbits, earthworms, termites etc).

The vegetation provides humus which is a very important aspect in the soil.

Man through his activities may also influence soil formation e.g. construction, deforestation, mining, industrialization, agriculture etc

4. Relief.

Steep slopes form shallow or thin soils because of excessive run off which prevents deep weathering while gentle slopes form mature soils because the rate of removal of soil is the same with rate of deposition.

Valley relief promotes water logging and leaching leading to poor soils.

5. Time.

Rocks which have had a long time of operation of the soil formation forming processes have less time tend to be shallow and immature.

SOIL EROSION IN EAST AFRICA

Soil erosion is the removal or washing away of the top soil by agents like running water, wind, moving ice and animals.

Types of soil erosion:

In East Africa there are 3 types of erosion

1. WIND EROSION:

This type of erosion is experienced in the following areas Machakos (Kenya), Northern Uganda (Kilimanjaro), Northern Kenya (Turkana), Nyanza Province (Kenya) Ankole Masaka, Kondoa (Tanzania)

The Kondoa district in central Tanzania experiences severe soil erosion in East Africa.

2. BIOLOGICAL / ORGANIC EROSION:

3. WATER EROSION:

The following are the processes of water erosion.

i. Splash erosion

Which is the impact of rain drops directly on the soil.

ii. Sheet erosion

This is the uniform removal of top soil by water

iii. Rill erosion

An even removal of the top soil by water

iv. Gulley erosion

This is the deep cutting of the grooves on the land by water. It's the common type of erosion in the Kondoa district (Tanzania). Running water is by far the most important, wide spread and destructive as far as erosion is concerned in East Africa.

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In East Africa Soil erosion is common on highlands, the East Africa Rift Valley, mining areas and areas with heavy rainfall.

Soil erosion by glacier is expanded on the following mountains; Kenya, Kilimanjaro, Rwenzori.

Causes of soil erosion

Physical causes and Natural causes

1. Relief – steep slopes such as the slopes of Mt. Elgon, Kilimanjaro etc. promote soil erosion especially if there is no vegetation and there is heavy rainfall.
2. Heavy rainfall on steep slopes e.g. Kigezi in South Western Uganda
3. Constant occurrence of drought which leaves the land bare for agent of erosion e.g. North Eastern Uganda, Northern Kenya, Central Tanzania.
4. Earth quakes

SKETCH MAP OF EAST AFRICA SHOWING AREAS AFFECTED BY SOIL EROSION

Human factors / causes of soil erosion

(Accelerated caused by man's activities)

1. Monoculture i.e. the growing of one crop over and over again leads to soil deterioration and then soil erosion.
2. Deforestation – cutting down of trees on steep slopes leaves the land bare for agents of erosion e.g. Kigezi highlands, Kenya highlands and Mt. Elgon.
3. Over cropping without a period of rest like the Kenyan highlands, Kigezi highlands, and slopes of Mt. Kilimanjaro.
4. Overgrazing by the pastoralists resulting from keeping too many animals for the available pastures e.g. Karamoja lands, Masai and Turkana lands.
5. Ploughing the land up and down the slope without use of natural manures.
6. Burning of grass by the pastoralists also leaves the land bare to agents of erosion.
7. Increase in population leading to over use and misuse of the land.
8. Cultivation on steep slopes
9. Open cast mining

Effects of Soil Erosion

1. Loss of soil fertility and thus decline in crop production
2. Soil erosion pollutes the environment through the dust.
3. Gully erosion interferes with Agriculture mechanization.
4. Erosion leads to over flooding of rivers due to constant deposition of silt.
5. It leads to death of animals due to lack of pastures
6. It also leads to famine due to decline in crop production
7. Soil erosion also leads to the death of aquatic life due to deposition of silt.
8. It leaves the soils bare for further erosion
9. It leads to growth of poor vegetation thus leading to high temperature and low rainfall (drought)
10. It leads to the destruction of the environment e.g. gully erosion.
11. It leads to the formation of landforms e.g. inselbergs; volcanic plugs, etc thus promoting tourism

Soil Conservation Methods / Measures to Reduce soil exhaustion and erosion.

1. Contour ploughing especially on hilly areas.
2. Crop rotation
3. Controlling over grazing and bush burning.
4. Family planning control measures e.g. Kabale, Kenya highlands
5. Afforestation and Re-afforestation.
6. Educating the people about dangers of soil erosion.
7. Carrying out mulching and inter-cropping
8. Terracing. This is the most effective measure against soil erosion on hilly or mountaneous areas.
9. Application of fertilizers to improve on the soil structure.
10. Planting of cover crops like pumpkins, beans, potatoes, water melon
11. Agro-forestry – planting selected trees along the crops.
12. Strip – cropping i.e. growing of crops in strips along the slope altering with grass.
13. Digging of pits along hill sides. This is practiced by the Umatengo of South Eastern Tanzania.

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MASS WASTING OR MASS MOVEMENT

Definition:

Mass wasting is the downhill or down slope movement of materials under the influence of gravity. It is the creeping, flow sliding or falling of rocks and weathered materials the influence of gravity.

NB: Mass wasting in East Africa is common on highlands or mountains like Elgon, Kilimanjaro, Kenya, Rwenzori, etc. Clift mining holes, rift valley sides (escarpments), quarries and others.

A. THE SLOW FLOWAGE (CREEP)

These include the following;

1. Soil creep: this is a slow movement of fine and unconsolidated materials on gentle slope caused by alternate cooling and heating or wetting and drying.
2. Solifluction: this is a slow movement of solid gravel and weathered saturated materials over frozen grounds.

B. RAPID FLOWAGE TYPES (LANDSLIDES)

These include the following:

1. Slumping: this is the trust movement of debris and rock wastes over steep slope
2. Rock slide: this consists of a bedrock wash sliding on a flat surface either on a fault plane, bedding plane or joint plane.
3. Rock fall: this is a fast movement of materials over a steep slope.
4. Mudflows: this is a rapid movement of mud, gravel and unconsolidated materials, super saturated and flowing over a steep slope.

5. Earth flows: this is a rapid down slope movement of water saturated materials against a steep slope.
6. Landslides: this is a fast movement of weathered materials over a steep slope.

CAUSES OF MASS WASTING

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1. Heavy rainfall along steep slopes
2. Earthquakes and volcanic eruptions
3. Nature of the rock e.g. fault plane, joint plane, bending plane.
4. Mining activities
5. Deforestation, overgrazing along slopes
6. Nature of the slope i.e. steep slope
7. Overloading of materials along the slope
8. Nature of the soils

EFFECTS OF MASS WASTING

1. Loss of lives and property
2. It blocks roads and also destroys bridges.
3. Displacement of people which calls for expensive resettlements
4. Destruction of agricultural land
5. Damming or blocking of rivers to form lakes e.g. L. Mbak (Tanzania)
6. Destruction of the landscape/scenery
7. Destruction of forests (bio-diversity) e.g. Mt. Elgon

MEASURES OR SOLUTIONS

1. Afforestation and re-afforestation along steep slopes
2. Evacuation or displacement of people during rainy season.
3. Carrying out practices like terracing contour ploughing, mulching, etc.
4. Controlling grazing
5. Prohibit agriculture on steep slopes
6. Controlling grazing on slopes and massive education and awareness.

LAKES IN EAST AFRICA

A Lake is a body of water occupying a hollow or depression on the earth surface.

Lakes can be small or large, temporary or permanent, fresh or salty etc.

Examples of lakes in East Africa include; Victoria, Kyoga, Tanganyika, Naivasha, Rukwa, Nakuru, Turkana, Malawi, Magadi, Albert, Edward, George.

CLASSIFICATION OF LAKES ACCORDING TO ORIGIN OR FORMATION

1. TECTONIC LAKES

They are formed as a result of earth movement and they include the following:-

a. Rift valley lakes: these lakes were formed by faulting caused by tensional or compressional forces that caused fracturing of the earth crust.

Forces pushed sideways the side blocks while the central blocks sunk forming a forming a rift valley

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A basin (hollow or depression) in the rift valley was formed due to secondary faulting.

The basin was then filled with water to form a rift valley lake or Graben e.g. L. Natron, Albert, Turkana, Magadi.

NB: Rift valley lakes don't have swampy vegetation. These are long, deep and narrow. They have salty water because they have inlets and no outlets.

Both down warping and upward processes led to the formation of troughs and ridges (rims)

Warping was caused by earth movements

Warping led to reversed drainage of rivers which filled the basin leading to the formation of a lake e.g. R. Kafu, R. Katonga, R. Nzoia, R. Kagera to form L. Victoria.

Examples of these lakes are L. Kyoga and L. Victoria.

These lakes have swamp vegetation along their shores have fresh water and they have many islands.

Qn: a) Draw a sketch map of East Africa on it mark and label lakes Victoria, Tanganyika, and Magadi. Rivers: Kafu, Athi and Rufigi

b) Describe the processes which led to the formation of any one lake above.

c) Explain the economic benefits of lakes in East Africa

d) outline the problems facing the use of water sources in East Africa

2. VOLCANIC LAKES

These lakes are formed as result of volcanic activities e.g. Caldera lakes which are formed on extinct mountains e.g. Ngorongoro

3 EXPLOSION CRATES e.g. lake Katwe

These lakes are circular and occupy small areas

4 LAVA DAMMED LAKES

These are formed when lava blocks a river valley e.g. L. Mulanda, L. Munyonyi, L. Mulehe, L. Kivu, L. Butale

5) EROSION LAKES

These are formed by erosion activities e.g. glacial lakes e.g. L. Michealson, L. Teleki, Bujuku, Lake Catherine, L. Stanley, Lac du Speke.

Kelle lakes e.g. L. Mahoma (Mt. Rwenzori) L. Etlis (Mt. Kenya)

6. DEPOSITIONAL LAKES

- a) Ox-bow lakes e.g. Rwizi, Tana, Nzoia, Mara, Valla, Nyando. These are by River deposition.
- b) Lagoons e.g. Nabugabo. These are by wave deposition
- c) Moraine dammed lakes e.g. L. Tyndall, L. Ctris)

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7. MAN MADE LAKES e.g.

- a) Valley dams
- b) Mining holes e.g. L. Kajansi, L. Kibimba, etc
- c) L. Kabaka ie. To connect Lubiri to L. Victoria
- d) Owen falls dam

Qn. Draw a sketch map of East Africa and on it, mark and draw all Tectonic lakes (Rift valley lakes) down warped lakes.

A SKETCH MAP OF EAST ARICA SHOWING TECTONIC LAKES (RIFT VALLEY LAKES) AND DOWN WARPED LAKES (L. KYOGA AND VICTORIA).

ASSIGNMENT

Qn: Draw a sketch map of East Africa and on it mark and label

- i) Lakes; Victoria, Tanganyika, and Magadi
- ii) Rivers; Kafu, Athi and Rufigi
- iii) Describe the processes which led to the formation of anyone lake above
a(i)
- iv) Explain the economic benefits of lakes in East Africa
- v) Outline the problems facing the use of water resources in East Africa

WEATHER AND CLIMATE OF EAST AFRICA

Weather is the state of the atmosphere of a particular given place and time. It is the state of the atmosphere of a place for a short period of time.

Climate is the average weather conditions of a given place measured and recorded after along period of time usually 30 – 35 years.

These elements of weather include the following

Element	Instrument
Pressure	Barometer
Humidity	Hygrometer
Rainfall	Rain gauge
Sunshine	Sunshine recorder or Campbell stokes
Temperature thermometer	Maximum and Minimum thermometer or six's

Cloud Cover	Observation
Wind speed	Anemometer
Wind direction	Wind Vane or Weather cock
Visibility	Observation

The measurement and recording elements of weather are done in a weather station. A weather station therefore is a place where all elements of weather are measured and recorded.

NB: Atmospheric pressure is the force exerted on the Earth surface by the weight of the atmosphere.

2. Temperature Inversion is the increase, in temperature with increase in altitude.
3. Temperature inversion is the higher you go the cooler/warm it becomes.
4. Environmental lapse rate – this the decrease in temperature with increase in altitude.

CLIMATE TYPES AND REGIONS OF EAST AFRICA

Broadly speaking the climate of East Africa can be categorized into 3 major types

1. Equatorial climate
2. Tropical climate or Savannah

EQUATORIAL CLIMATE

The equatorial climate, in East Africa has been modified due to altitude water bodies etc. to increase the following types.

- a) Equatorial lake shore type (True Equatorial Climate)
This type of climate is around L. Victoria region
- b) Modified Equatorial types
This is found around the plateau and highlands
- c) Coastal Tropical Type, which is along the East Africa coast
Equatorial climate region therefore extends from Lamu in Kenya to Tanga area south of R. Pangani in Tanzania, along L. Victoria basin (Buganda), Nyanza province – Bukoba, etc.

Characteristics of Equatorial Climate

1. Heavy rainfall of between 1500 – 2000 mm well distributed throughout the year.
2. High/Hot temperatures between 21 – 27°C
3. High humidity throughout the year of 80%
4. High cloud cover
5. Double maxima (peaks) or rainfall
6. Small annual range of temperature of between 2 – 5°C
7. Rainfall is mainly correctional
8. No district dry season is experienced in this climate

Bukoba in Tanzania

Month	J	F	M	A	M	J	J	A	S	O	N	D
Temp o c												
Rainfall mm												

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Draw a graph to represent the above data.

TROPICAL CLIMATE (SAVANNAH)

This type of climate is divided into 2

- Tropical Northern i.e. Northern Uganda and Central Tanzania
- Tropical Southern i.e. Southern Highlands of Tanzania

This type of climate in East Africa is extensive covering North, Eastern and Western Uganda. Most of Tanzania especially the southern parts and South West Kenya

Characteristics

- High/Hot temperatures throughout the year between 25 – 30°C
- It experiences one maximum peak of rainfall (Unimodal)
- Modal rate rainfall of 750 – 1000 mm per annum.
- Moderate temperature range going up to 10°C (5-10°C)
- Mean annual temperature is high i.e. 21°C
- Wet season alternates with dry season

Gulu in Uganda

Month	J	F	M	A	M	J	J	A	S	O	N	D
Temp o c												
Rainfall mm												

Draw a graph to represent the above data

NB: The economic activities carried out in this climatic region include:

Bee keeping, charcoal burning, wild life conservation, fruit gathering, growth of annual crops like millet, sorghum, maize, etc.

SEMI DESERT AND DESERT CLIMATE

This region stretches to North Eastern Tanzania, Eastern and Northern Kenya to North Eastern Uganda (Karamoja), Ankole Masaka corridor etc.

Characteristics of this climate:

1. High temperatures of about 30°C/Hot temperatures
2. Very little rainfall ranging from 325-620mm per annum.
3. Rainfall is unreliable
4. Daily/Diurnal range of temperature is very large.
5. Low humidity
6. Mean annual temperature is high

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NB: The common type of vegetation include scrub, thicket and thorny bushes, Cacti, Euphorbia, etc.

MONTANE / SUB TROPICAL CLIMATE (Cool High Climate)

This type of climate is limited to the highland areas of East Africa e.g. Kenya highlands, Rwenzori, Elgon, Kilimanjaro etc.]

Characteristics

1. Heavy rainfall of over 2000mm
2. Receives orographic / relief rainfall
3. Low temperature due to high altitude
4. Low humidity due to low temperatures.
5. Dense cloud cover due to the high condensation resulting from low temperatures.

SKETCH MAP OF EAST AFRICA SHOWING THE CLIMATIC TYPES /RAINFALL PATTERN

KEY:

1. Coastal tropical climate
2. Cool highland climate
3. Tropical Northern climate
4. Lake Equatorial climate
5. Modified Equatorial climate
6. Desert / Semi desert climate
7. Tropical climate / Savannah

FACTORS INFLUENCING THE CLIMATE OF EAST AFRICA

1. Relief / altitude

2. Latitude / Distance from the Equator
3. Influence of winds like the North Eastern and South Eastern trade winds
4. Distance from water bodies
5. Vegetation cover
6. Cloud cover
7. Man's activities e.g. industrialization, deforestation
8. Influence of the ITCZ (Inter Tropical Convergence Zone)
9. Ocean currents / sea and land breezes
10. Influence of aspect i.e. direction in which the land faces the sun.

RAINFALL DISTRIBUTION IN EAST AFRICA

Rainfall is water vapour but it takes the form of tiny drops of water

For rainfall to form, the following conditions must be met;

- a) Air must be saturated
- b) Air must be cool
- c) Air must contain small particles like dust to act as nuclei for rainfall formation.
- d) Rainfall in East Africa is uneven distributed, some areas receive heavy rainfall while others receive low or moderate rainfall.

In East Africa there are 3 types of rainfall.

1. Convectional rainfall e.g. Entebbe, Kampala, Mwanza, Bukoba,
2. Orographic/relief rainfall e.g. Elgon, Rwenzori, Kilimanjaro, Kenya etc
3. Cyclonic/ frontal rainfall e.g. around the equator (not common) (look at the formation and characteristics in S.1 Book Geography)

Climatic calculations

1. Mean daily temperature (MDI) = $\frac{\text{MAX} + \text{MIN}}{2}$
2. Daily range of temperature = $\text{Max} - \text{Min}$
3. Mean monthly temperature = $\frac{\text{Sum of mean daily temperature of 1 month}}{\text{Numbers of days in that month}}$
4. Mean Annual temperature = $\frac{\text{Sum of mean monthly temperature for 1 year}}{12}$
5. Mean Annual Rainfall = $\frac{\text{Sum of mean monthly Rainfall for 1 year}}{12}$

THE FOLLOWING FACTORS AFFECT OR INFLUENCE RAINFALL UNIT AND DISTRIBUTION.

1. Relief /Altitude

High land areas receive more rainfall than low lands of lower plateau e.g. Kigezi Highlands, Kenyan Highlands, Elgon, Kilimanjaro, Meru.

NB: Most Highland of East Africa Receive rainfall on the South east Slopes (effect of Aspect)

2. Winds

The North East westlines and the south east trade winds mostly affect rainfall distribution in East Africa

3. Nearness to water bodies :

Areas near water bodies receive heavy rain fall than those far away from water bodies.

4. Man activities like Deforestation and forestation, industrialization,
5. Vegetation

Areas with dense forests receive heavy rain fall while areas with skunty vegetation receive / low rain fall.

NB: 1. Humidity is the amount of water vapour in the atmosphere

2. Relative humidity is the ration of the actual amount of water vapour present in a given volume of air at a given temperature and atmospheric pressure, measured in percentage.

3. Absolute humidity is the total amount of water vapour that is actually present in a given volume of air at a given temperature and atmospheric pressure.

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Lines on maps showing equal places with;

1. Temperature – Isotherms
2. Pressure – isobars
3. Rainfall – isohyets
4. Sunshine – isohels
5. Cloud cover – isonephs
6. Sea bed with equal depth – isobaths
7. Ocean with equal salinity – isohaline
8. Equal intensity of earthquake shokes – isoseismal.
9. Altitude – contours.

VEGETATION OF EAST AFRICA

Vegetation refers to all plant life which it includes trees, pastures, shrubs herbs e.t.c. Vegetation can either be natural or artificial.

NB: East Africa is mostly covered by grass lands compared to forests

MAJOR VEGETATION TYPES IN EAST AFRICA

East Africa has the following major vegetation types

1. Equatorial forests (Trpical rain forests/Selva)
2. Savannah vegetation
3. Desert /Semi desert vegetation
4. Montane / Highland vegetation
5. Mangrove forests

SKETCH MAP OF EAST AFRICA SHOWING MAJOR VEGETATION TYPES IN EAST AFRICA

EQUATORIAL FORESTS

These forests are categorized into two i.e. lowland forests and highland or Montane forests.

a) Lowland forests

These forests are found in the lowland areas of East Africa e.g Mabira, Bwindi Impenetrable, Kibale, Ssesse forests, Budongo forests, Maramagambo, Kisii, Bugoma, Bukoba forests e.t.c.

Their existence has been favored by the following factors.

1. High humidity
2. Heavy rainfall of more than 1500mm per annum
3. High temperatures of over of 27°C
4. Low altitude of between 1000 – 1500mm above sea level
5. Presence of deep fertile and well drained soils

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Characteristics of Equatorial Lowland Forests

1. The trees are ever green throughout the year i.e. trees shed their leaves at different intervals.
2. The tree are not in pure stands i.e. they have many different tree species.
3. The trees take long to mature (50-80yrs)
4. The trees have broad leaves.
5. Trees have little or no undergrowth.
6. The forests have little or no undergrowth.
7. The trees are of hardwood species e.g. mahogany, red wood, green heart, red heart, rose wood, ebony, iron wood e.t.c.
8. The trees have thick canopies (layers) which are devices into three.
9. Trees have buttress roots with numerous climbing plants.

b) Montane or Highland Forests

They are found on highlands of East Africa e.g. Rwenzori, Elgon, Kilimanjaro, Meru, Kenya e.t.c.

The major tree species e.g. cedar, podo carp, Bamboo, Camphor e.t.c.

Montane forests are favoured by the following factors;-

1. Heavy rainfall of over 1500mm per annum.
2. Cool temperatures modified by altitude.
3. Well drained fertile soils.
4. Limited man's interference.
5. Relatively high altitude of between 2500m above sea level.

Characteristics

1. The trees are ever green.
2. They appear in pure stands.
3. Trees have small leaves.
4. Their characterized by a single canopy.
5. Trees are mainly of soft wood species.
6. The forests have thick cover of moss and tree ferns.

Economic Importance of Equatorial Forests

1. Equatorial forests modify climate of the surrounding areas through evapotranspiration which leads to the formation of convectional rainfall.
2. Equatorial forests attract tourists because they harbor a number of wild animals of tourist's interest.
3. They are alternative sources of foreign exchange.
4. They provide employment opportunities to a number of people e.g. Lumber jacks, Forest rangers, researchers.
5. Equatorial forests help in controlling soil erosion.
6. They provide raw materials for industries such as saw mills, pulp and paper industries.
7. They provide constructional materials like timber.
8. They provide grounds for research and scientific study.
9. They are sources of energy in form of fire wood, charcoal e.t.c.
10. They provide man with a variety of fruits which are wild. (Wild fruits) and herbs.
11. They promote re-creation i.e. They provide grounds for picnics.
12. Provides good scenery.

SAVANNAH VEGETATION

It covers more than $\frac{1}{2}$ of East Africa. This type of vegetation is categorized into three;-

a) Savannah woodlands (Mombo)

They are found towards the equatorial forests in the following areas;- Murchison falls National Park, Ntungano, Mubende, some parts of N. Ug, Central Tanzania, Rakai.

Savannah woodlands are favoured by the following conditions

1. High temperatures of between 27-30°C
2. Moderate rainfall between 760-1000mm per annum.
3. Fairly fertile and well drained soils.

NB: The main economic activity is bee keeping

Characteristics

1. The trees are umbrella shaped.
2. Trees are deciduous and are thorny.
3. They have long top roots.
4. The trees form the continuous cover i.e. shot and scattered.
5. They store water in their trunks.
6. The trees are drought and fire resistant.
7. They are thick barks with small leaves to control transpiration. E.g. baobab, Acacia e.t.c.

b) Savannah Grasslands.

They are found in areas with 750-1000mm rainfall in the following areas, Nyika, Tsavo National Park, Bukoba, Central Tz, E.Uganda e.t.c.

They are favoured by the following:-

1. Moderate to heavy rainfall (750-1000)
2. Fairly high relative humidity
3. High temperatures of between 28-30°C
4. Fairly fertile soils
5. Low lying gentle relief
6. Alternating wet and dry seasons

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Characteristics

1. They are composed of mainly grass with scattered trees. Major activities, animal conservation, nomadic pastoralism.
2. The trees are short, scattered and are umbrella shaped.
3. The trees are also deciduous in nature.
4. The trees are resistant to drought.

The major species of grass include elephant grass, specially grass, tussock grass e.t.c.

Dry Bush Savannah

They are found in areas which receive rainfall of between 250-500mm. majorly occupied by nomadic pastoralists e.g. N.E.Uganda, Ankole masaka corridor, N.Tz and Kenya as well as the flow of the W.Rift valley.

Factors which favoured it include:-

1. High temperatures.
2. Low rainfall of between 250-500mm.
3. Low humidity.
4. Fairly fertile soils.

Characteristics scanty

1. Vegetation and scattered, some areas have bare ground.
2. The trees are thorny with few leaves.
3. They have long tap roots.
4. The leaves and stems are waxy.

Importance of Savannah Vegetation

1. It promotes Agriculture especially cattle rearing because of abundant pastures.
2. The woodlands resources of timber and other building materials.
3. Grounds for settlement because of the flat nature of the land scape.
4. The vegetation also controls soil erosion.

5. The vegetation promotes research and scientific study.
6. The savannah vegetation promotes bee keeping and hunting.
7. Used for wild life conservation which promotes tourism.

ALPINE /MONTANE VEGETATION

This type of vegetation is found on the highlands of East Africa like Mt. Kenya, Elgon, Rwenzori, Kilimanjaro.

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Semi Desert and Desert Vegetation

This vegetation is found in the dry semi desert areas of East Africa like North East of Uganda (Moroto and Katido), Turkana land (N.Kenya), Parts of Central Tanzania.

The following conditions favour their existence

1. Poor sandy soils.
2. Hot temperature of over 35°C.
3. Very little and unreliable rainfall of about 250mm.
4. Low humidity.

Characteristics

1. Trees are drought resistant.
2. They shed off their leaves during dry season.
3. They have woody stems.
4. Trees store water in their trunks.
5. Trees are very short and scattered.
6. The leaves are small and stems are thorny.

Desert vegetation promotes the following:-

1. Wild life conservation (game parks)
2. Pastoralism
3. Hunting

Swampy Vegetation and Mangrove Forests

Swampy vegetation occur in areas with permanent swamps like L.Victoria, Kyoga and along some rivers.

The Mangrove forests concentrate long the coastal area of East Africa because of the following factors.

1. Heavy rainfall.
2. High temperatures and humidity.
3. Low altitude.
4. Deep fertile soils.

5. Salty and muddy water.

Characteristics

1. The trees are short drunks with broad leaves.
2. They are ever green because of too much H₂O.
3. Some trees have twisted trunks.
4. They have aerial roots.
5. The trees are very close together and are of hard wood spears.

Factors Influencing Vegetation Distribution in East Africa

1. Climate

Abundant rainfall which is well distributed throughout the year and high temperatures give rise to equatorial forests. Moderate rainfall and throughout the year give rise to savannah vegetation. white areas with low and unreliable rainfall influence the growth of semi desert vegetation.

2. Relief /Topography /Altitude

On steep slopes soils are thin and water drainage is rapid giving rise to stunted vegetation areas which are gently sloping and flat, soils tend to accumulate favouring the development of forests while in valleys soils are water logged leading to swamp vegetation.

3. Eolaphic Factors (Soils)

Deep and fertile soils support dense equatorial forests, soils with moderate fertility support savannah. Thin, immature and infertile soils support stunted vegetation while dump coastal soils influence the growth of mangrove forests.

4. Biotic Factors

Pests such as locusts, wood peckers lead to destruction of grass and trees respectively. Wild animals also lead to the destruction of vegetation cover.

5. Latitude

Areas near the equator have tropical rain forests because of heavy rainfall and then high temperatures.

6. Drainage

When drained areas are characterized by vegetation ranging from savannah to equatorial forests while poorly drained areas favour swamp vegetation.

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7. Anthropic Factors (Man)

In many parts of East Africa man has destroyed vegetation through his activities like deforestation, mining, agriculture, industrialization, road construction e.t.c. changing thick forests into savannah, semi desert and then shrub.

However, man in some areas has tried to develop vegetation through afforestation, re-afforestation, gazetted more forest reserves, restricting encroachers, educating the masses a lot the importance of forests e.t.c.

FORESTRY INDUSTRY IN EAST AFRICA

Forestry is the sciences of managing forest resources for human benefit like maintain adequate supply of timber, wood production e.t.c.

In East Africa the following are the types of forests;-

1. Tropical rain forests /Equatorial rain forests

These occur in the low land areas of East Africa e.g. Mabira, Budong, Bwindi impenetrable, Ssesse forests e.t.c.

2. Montane Forests

These occur on slopes of mountains like Elgon, Kilimanjaro, Kenya, Rwenzori e.t.c.

3. River in the Forests

These occur along major rivers of East Africa e.g. R.Nile, Tana, Pangani e.t.c.

4. Planted or Artificial forests

These forests are planted by man and are majorly soft wood e.g. eucalyptus, firs e.t.c.

Factors favouring the growth of forests or Development of the forestry Industry in East Africa.

1. Availability of heavy and reliable rainfall throughout the year favour the growth of equatorial forests.
2. Presence of high temperatures throughout the year favouring the grow of forests.
3. Availability of fertile soils to sustain the growth of forest.
4. Presence of a variety of trees species of commercial e.g. Mahogany, Iron wool, Muvule, Green heart.
5. Presence of low population leading to vast land permitting the growth and development of forests.
6. Favourable government policies o forestry e.g. policies on afforestation and re-afforestation, restricting encroachers, gazettement more forest reserves e.t.c.
7. Availability of advanced and appropriate technology in forest exploitation. E.g. power driven saws, tractors.
8. Presence of adequate and cheap labour both skilled and un skilled from within East Africa abroad.
9. Availability of large market for forest related products especially timber.
10. Presence of advanced researched in forest development.

THE CONTRIBUTION OF THE FORESTRY INDUSTRY IN EAST AFRICA

1. The forestry industry in East Africa provides the people with timber for construction and furniture making.
2. The industry generates employment opportunities to the people of East Africa e.g. forest rangers, lumber jacks, drivers, charcoal burners.
3. Forests in East Africa modify climate through evapotranspiration leading to rainfall formation.
4. The forestry industry provides raw materials for industrial development (saw mills)
5. The forestry industry generates revenue for the government through taxation of the people employed, companies e.t.c.
6. It diversifies the economy of East Africa and thus widening the tax base.
7. It has promoted tourism in East Africa thus source of foreign exchange since act as habitats for wild animals.
8. It promotes research and scientific study.
9. Promotes the development of infrastructure like roads, skills, hospitals e.t.c.
10. Forestry is also a source of income to the local people which has helped in the improving of the standards of living of the people.
11. The forestry industry is a source of fuel inform of fire wood and charcoal.
12. It has led to development of towns and urban centres.

13. Forests also provides man with food inform of fruits, herbs and wild animals.
14. Source of foreign exchange through exportation of forest products to countries like USA, France e.t.c.
15. The forestry industry has promoted trade and international relations.

Problems Facing People Living Around forests

1. Pests and disease, e.g. mosquitoes, tsetse flies.
2. Wild animals.
3. Difficulty in cleaning the forest for settlement, agriculture, construction of transport routes.
4. The humid conditions interfere with man's activities.

FACTORS LIMITING /HINDERING THE EXPLOITATION OF FORESTS IN EAST AFRICA.

1. The trees do not grow in pure stands i.e. they are scattered and therefore locating and exploitation become hard.
2. Tropical forests have buttress roots making them very difficult to cut.
3. Trees are enlungled with climbing plants making it difficult.
4. Presence of pests and diseases e.g. tsetse flies.
5. Forests are dark, dump and impenetrable.
6. The trees take long to mature.
7. The rate of tree cutting exceed replacements leading deforestation.
8. Wild animals e.g. lions, tigers e.t.c.
9. Presence of poor and inappropriate technology.
10. Lack of sufficient capital to set up saw mills.
11. Absence of reliable transport to deliver timber.

Problems Facing the Forestry Industry in East Africa.

1. The valuable species are scattered all over the forest making their exploitation very costly.
2. Presence of wild animals like lions, leopards, snake e.t.c. scare away the workers.
3. Remoteness of the forested areas. i.e. poor accessibility of poor impassible roads.
4. Inadequate machinery like cahin saws, traders leads to the use of crude materials like pangas used, axes e.t.c.
5. Insufficient capital to modernize the forestry industry.
6. Competition with other land uses especially agriculture for labour.
7. Pests and diseases which attack the trees reducing the quality and value.
8. Competition foe market with other producing countries like DRC, Swaziland.

9. Political instability in the forested areas. Forests in East Africa
10. Unfavourable government policies e.g. putting much emphasis on agriculture, industrialization e.t.c. other than forestry.
11. Fire outbreaks during dry seasons also lead to the destruction of the forested land.
12. Illegal cutting down of trees by encroachers.

NB: In East Africa the forest cover is declining because of the following;-

1. Population increase.
2. Need for firewood and charcoal.
3. Need for timber for construction.
4. Clearing of trees for infrastructural development.
5. Industrial expansion
6. Encroachment for agriculture.
7. Increase in the number of wild animals.
8. Need for land for settlement.
9. Fire outbreaks.
10. Cutting down of trees to control tsetse flies.

Effects of Deforestation on the Environment of East Africa

- Loss of valuable wood.
- Decrease in wood fuel.
- Reduction in the water table.
- Increased global warming due to removal of trees that absorb carbondioxide.
- Accelerated landslides due to removal of protective soil cover and removal of soil binding roots.
- Deforestation interferes with the water cycle i.e. micro-climate, changes/reduction of rainfall.
- Filtration of river basins leading to floods/pollution of water/drying up of streams.
- Destruction of wildlife habitat leading to unbalanced ecosystem.
- Creation of Bad Lands i.e. gullied lands which are useless for any activity.
- Destruction of valuable tree species/extinction of valuable plants e.g. medical plants.
- Destruction of the natural beauty of the environment through forest clearance.

CONSERVATION AND MANAGEMENT OF FORESTS

- The East Africa governments are doing to following to improve upon the forestry industry.

1. Carrying out afforestation and re-afforestation programmes.
2. Controlling excessive lumbering by banning timber exports.
3. Encouraging family planning to control population growth and thus reduce pressure on forests.
4. Encouraging the use of alternative energy sources like solar, Bio gas e.t.c.
5. Carrying out research in forest management.
6. Educating people about the importance of forests through the mass media.
7. Training and deployment of forest rangers to guard and protect the forest.
8. Planting of exotic trees which mature faster e.g. eucalyptus.
9. Establishing or gazetted more forest reserves.
10. Introducing of energy saving stores.
11. Introducing strict legislation on deforestation.
12. Licensing of tree cutters to reduce on illegal cutting down of trees.

FORESTRY IN TANZANIA

The main catchment forest in Tanzania are on the slopes of Mt. Kilimanjaro, Usambara, Meru, Uluguru, Tukuyu forests also exist in iringa and Tanga regions. The main objectives for the development of forests in Tanzania include;-

1. To protect the water catchment areas.
2. To provide forest products sufficient to meet the country's requirements.

FORESTRY IN KENYA

Forests form one of Kenya's important resources and in Kenya there are both indigenous and exotic soft woods.

Examples of forest reserves include;-

1. Western province on Mt.Elgon and Kakamega.

Rift Valley Province (Manu ranges, Nandi Ranges, Mathew ranges, Loronghi)

Aberdane

Eastern slopes of Kenya E. Slopes of Mt Kenya, Marsabit, at the coast, Shimba hills, Ara buku, Sikoke.

The conservation of forests in Kenya has the following major objectives

- 1- To maintain and improve the climatic and physical conditions of the country
- 2- To conserve and then regulate water supplies by protecting the catchment areas.
- 3- Conserve the soil through prevention of desertification and soil erosion.

- 4- To control and maintain the country's supply of timber and in other forest products.

The paper manufacturing industry in Kenya is at Webuye (W. Kenya).

FORESTRY IN UGANDA

The major forests include, Mabiron, Budongo, Semiliki; Maramigambo, Kibale, Bugoma, Bwindi Impenetrable, Ssesse forests, Mt. Elgon. Edunya, Lenda, "Ngahinga, Zoka, Itwara etc.

Plantation forests in Uganda make up 22%, these plantations are based on pines and the eucalyptus e.g Lendu (W.Nile), Abera (Gulu) Mafuga (Kabale) Kateera (Kiboga) , agwatta (Lira) , Mutai (Jinja)

The more to establish forest plantations was due to the Industrial wood, wood fuel, poles for building and construction on well ass for power distribution (electricity)

Major True species

Indigenous Species

East Africa (color) Softwood	East Africa Comphor
Pods	Sandal wood
Muvule	Mukinduri
Muhgu	Muringa
Cape chest nut	
Elgon Olive	

Soft wood
Eucalyptus
Kei appl.

SKETCH MAP OF E. AFRICA SHOWING FOREST DISTRIBUTION.

Distribution of forests in Uganda

Distribution of forests in Kenya and Tanzania

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A- Lendu	F- Semiliki	K- Maramagambo	P- Ssesse
B- Zoka	G- Rwenzori	L- Bwindi	Q- Mabira
C- Budongo	H- Kosyohia Kitomi	M - Kibale	R - Elgon
D- Bugoma	I - Mafuga	N - Mgahinga	
E-	J -	O-	

AGRICULTURE /FARMING IN E. AFRICA

Agriculture is the growing of crops and rearing of animals. In E. Africa Agriculture is important in the following ways;

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1. It is a source of food to the people of E. Africa e.g. bananas, millet, potatoes, meat, milk, egg. Etc.
2. It has led to the provision of employment opportunities to the people of E. Africa
3. It has provided /source of income to the farmers which has helped in the raising of standards of living.
4. It has diversified the economy of E. Africa and thus widening the tax base.
5. It is a main source of raw materials for the Agro based industries in E. Africa examples of raw materials include, skins, cotton, coffee etc.
6. It has led to the generation of government revenue through taxation of the farmers, Industries and companies.
7. It has led to the development of important infrastructure like hospitals roads, schools, banks etc.
8. It has promoted trade and international cooperation, Uganda and U.K Kenya, Tanzania etc.
9. It has promoted research and scientific study in E. Africa.
10. It has led to the industrial development e.g. Posho mills, breweries, bakeries, Meat Packers, Tanneries.
11. It has led to the generation of foreign exchange through the exportation of products to other countries like France, U. K Japan.
12. It has promoted tourism in E. African
13. Development of towns and ports
14. It has led to the provision of market to other industries e.g. those that manufacture fertilizers, chemicals, Agric machinery.

TYPES OF AGRIC IN E. AFRICA.

- 1- Subsistence farming
- 2- Planting farming
- 3- Irrigation farming
- 4- Mixed Farming
- 5- Horticulture is growing of flowers, vegetables and fruits for urban areas.

SKETCH MAP OF E.AFRICA SHOWING THE MAJOR POSTORAL AREAS

Characteristics of Nomadic Pastoralism

- 1- The nomads move from one place to another in search for water and pastures
- 2- The animals kept are normally under weight
- 3- The animals kept are for subsistence purposes
- 4- Nomads graze their animals communally
- 5- The animals are resistant to pests, diseases drought and long distances.
- 6- They are confined to dry areas of E.Africa
- 7- Animals are kept for prestige

- 8- They overstock and overgraze
- 9- Nomads have no permanent settlement
- 10- They burn grass as they move with their animals.
- 11- Nomads keep large herds of local poor breeds e.g Zebu, Ankole cattle, Sangai

The Nomads of E.Africa keep large herds of cattle for the following reasons.

- 1- For paying bride price
- 2- For prestige
- 3- Source of food
- 4- Source of Income (Wealth
- 5- Culture and Tradition
- 6- For Insurance purposes
- 7- Animals are sources of labour and transport
- 8- Animals provide energy in form of cowdung

Factors favouring Nomadic Pastoralism (Why nomadic Pastoralism is practiced)

- 1- Presence of extensive land which permits the Nomadis to move freely with their animals.
- 2- Presence of space population in these areas giving more land.
- 3- High temperatures and low, it have favoured Nomadic Pastoralism this leads a shortage of water and pastures foiling the Nomads to move.
- 4- The Nomads to move from place to place in search of water and pastures.
- 5- It is also favoured by their culture or tradition of keeping large herds of animals
- 6- Presence of infertile soils in these areas which do not support crop growing but livestock rearing.
- 7- High incidence of animal pests and diseases e.g. tsetse flies, ticks etc e.g Nagana, East Coast Fever, foot and mouth diseases etc.
- 8- Remoteness of pastoral areas has led to persistence of Nomadic Pastoralism.
- 9- Negligence by government
- 10- Flatness of the area which enables the animals to move easily. Change from livestock rearing because they are illiterates
- 11- Nomads depend on their animals for their livelihood.
- 12- Presence of extensive pastures (Savana grasslands)

- 13- Presence of local breed which are resistant to pests, diseases and long distances.

THE MASAAL/ MASAI OF KENYA AND TANZANIA

These are Nomadic pastoralists found in Kenya and Tanzania and they practice transhumance i.e. Movement with their animals in relation to seasons. They keep goats, sheep, cattle and donkey for transport they keep animals purposely for meat, milk, prestige and wealth. Their major areas is Narok and between L. Natron and Manyara. These areas experience high temperature of 27°C and R./F OF 500MM PER annum. The vegetation is mainly savannah grasslands with scattered trees. The warriors are known as Maran, their settlement is called Manyatta or Kraal. (Enkang) They have simple temporally house made of mud and sticks and the animals and people are protected by thorny bushes.

PROBLEMS FACED BY NOMADS IN E. AFRICA.

Physical /Environmental /problems (not by their own making)

- 1- Prolonged droughts which leads to shortage of water and pastures leading to death of animals.
- 2- Pests and diseases e.g. Rinder pest, foot and mouth, anthrax Nagana, ticks, tsetse flies. These affect the quality of the animals.
- 3- Wild animals which attack both the animals and nomads e.g. Hyenas , lions and Snakes etc.
- 4- Poor breeds of animals which lead to production of poor quality products.

Man made problems (Problems of own making)

- 5- Overstocking which leads to overgrazing and soil erosion
- 6- Constant famine because the Nomads don't grow crops
- 7- Cattle rustling which leads to loss of lives and property.
- 8- Lack of veterinary services because of government negligence
- 9- Insecurity in these areas
- 10- Long distances moved by animals in search of water and pastures
- 11- Inadequate transport network (remoteness) that the nomads can't transport their products to markets.
- 12- Lack of market for their products because of the poor quality products
- 13- Lack of capital to improve on their animals husbandry because the animals kept are for home consumption.
- 14- Communal grazing by the Nomads leads to easy spread animal diseases.

- 15- Burning of pastures as they move which leads to growth of hard and unpalatable pastures.
- 16- Ignorance (illiteracy) among nomads that they prefer quantity than quality

Measures being taken to Solve the problems faced by Nomads

- 1- The government is educating the nomads to improve on their livestock
- 2- Cross-breeding is being encouraged between the local and exist breeds to improve on the quality of the animals.
- 3- Planting of better pastures for the animals
- 4- The government is improving on security of the neighbouring areas especially Karamoja and disarming the Nomads.
- 5- Spraying with pesticides to control the pests and diseases
- 6- They are encouraged to grow some crops to control famine especially Sorghum, maize etc.
- 7- The government has also extended veterinary services to the pastoral areas.
- 8- Water supply has also been improved by constructing boreholes, valley dams, water holes etc.
- 9- Feeder roads have been constructed to help the nomads to transport their products to markets.
- 10- Loans have also been extended to the Nomads to help them improve on their animal husbandry.
- 11- In some parts like Mbarara the government has established industries to provide markets to their products as well as processing their products.
- 12- The Nomads have also been advised to reduce on the number of the animals in order to improve quality and to control overstocking and overgrazing.
- 13- The government has also imposed quarantine measures to control spread of diseases.
- 14- Local markets have been improved so that the nomads may sell off some of their animals.
- 15- Nomads are also being encouraged to establish ranches where modern farming methods can be carried out e.g. paddocking artificial insemination etc.

EFFECTS OF NOMADIC PASTORALISM IN THE ENVIRONMENT

Negative effects.

- 1- soil texture is destroyed leading to soil erosion
- 2- vegetation is also destroyed during dry seasons when there is extensive fires
- 3- Nomadism accelerates the extension of desert lands.
- 4- Grass is also destroyed.
- 5- The eco-systems is also destroyed by nomadism.
- 6- It also leads to soil exhaustion as a result of erosion
- 7- Pollution of environment through the dust as the animals move and flies

Positive Effects

- 1- vegetable burning improves on soil fertility (ash)

RANCHING IN E. AFRICA

This is the keeping of livestock purposely of meat e.g. of ranches in E.Africa include with effect.

- | | |
|----------|---|
| Uganda | - Ankole Masaka Ranching Scheme |
| | - Aswa Ranching Scheme |
| | - Buruli Ranching Scheme |
| | - Kisozi Ranching Scheme |
| Kenya | - Kaputei Ranching Scheme - Kenya highlands |
| | - Karuma Ranching Scheme |
| | - Ol-Kalour Ranching Scheme |
| Tanzania | - Kongwa Ranching Scheme |
| | - Mt. Kilimanjaro |
| | - Southern Highlands. |

Characteristics of Ranching

- 1- Animals are kept for commercial purposes
- 2- They specialize on the rearing of one type of animal
- 3- They employ scientific methods of animal rearing like cross breeds, artificial insemination, use of machines etc.
- 4- Animals on ranches are grazed on natural pastures
- 5- Ranches are confined in dry areas of E. Africa as well as areas of sparse populations.
- 6- The movement of the animal is restricted by fencing and paddocking
- 7- They have permanent water source and well developed transport network

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Factors which have favoured the establishment in E. Africa.

Physical factors include;

- 1- Presence of vast land for the establishment of ranches
- 2- Availability of natural pastures for the animals to feed on
- 3- Presence of sparse population favouring the establishment of large ranches as well as permitting free movement of animals.
- 4- Presence of good breeds of animals such as Hereford, Boran, Aberdeen Angus.
- 5- Presence of infertile soils which don't permit/allow crop growth and thus encouraging ranching.
- 6- Availability of permanent water sources for the animals e.g. a river, lake dam etc.

Human Factors

- 1- presence of advanced technology and research
- 2- favourable government policy of promoting livestock rearing
- 3- Presence of large market for meat both in E. Africa and abroad.
- 4- Availability of a large capital based provided by the government financial institutions etc.
- 5- Presence of reliable means of transport enabling the transportation of meat to markets and processing centres.
- 6- Availability of large supply of labour both skilled and unskilled.
- 7- Political stability

Ankole Masaka Ranching Scheme.

The scheme is located at the border of Masaka and Mbarara district.

The area was originally occupied by the Bahima but later they abandoned because of rinder pest and then Nagana.

Problems facing Ankole Masaka Ranching Scheme.

- 1- Pests like tsetseflies and diseases like Nagana
- 2- Poor breeds of animals
- 3- Infertile soils leading to the growth of poor pastures
- 4- Political instability within the area.
- 5- Overgrazing promotes soil erosion and exhaustion
- 6- Harsh climatic conditions leading to scarcity of water and pastures.
- 7- Low carrying capacity of the land promoting overgrazing
- 8- Growing of poor quality pastures which are not palatable to the animals

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Importance of the Scheme.

- 1- It has promoted research into better animal rearing methods.
- 2- Livestock rearing skills have been taught to the people like crossbreeding, fencing, spraying, dipping etc.
- 3- A market has developed at Sanga and this has promoted trade in the area.
- 4- Tsetseflies have been wiped out and ticks have also been reduced.
- 5- The scheme has led to generation of employment opportunities to surrounding people.
- 6- It has led to generation of revenue to government through taxation of scheme, employees etc.
- 7- A major source of income to the local farmers enabling them to improve on their standards of living.

THE ANKOLE/MASAKA RANCHING SCHEME.

Importance of Livestock rearing in E. Africa.

- 1- The livestock industry provides man with food in form of meat, milk, blood etc.
- 2- It has led to the generation of employment opportunities to the people of E. Africa
- 3- It is a source of income to the people, enabling them to improve on their standards of living.
- 4- It has led to the generation of revenue to the government through taxation of the farmers.
- 5- It has lead diversified the economy of E. Africa, leading to widening the government tax base.
- 6- It has also leads to urbanization e.g. Mbarara, Tororo, Eldoret, Mandera.
- 7- It has promoted research in E. Africa
- 8- It has created market for industries like animal feeds.
- 9- Development of industries like creameries, Meat packers, leather horning industries.
- 10- Development of infrastructure like roads, hospitals, xub research centres.
- 11- Promoted tourism and thus earn alternative source of foreign exchange.
- 12- Animals provide man with products like hides, skins, bones etc.
- 13- Source of prestige and labour.

PLANTATION AGRICULTURE/ ESTATES FARMING IN E.A

Plantation Agriculture is the growing of one or two cash crops on a large scale using scientific methods. In E. Africa pest crops include the effect, tea, sisal, pyrethrum, coffee, pineapples, rice, cotton and cloves, sugarcane. Most of these crops are perennial.

Characteristics of PLANTATION AGRICULTURE .

- 1- Farming is done on a large scale i.e. over 100 hectares
- 2- Farming is highly mechanized involving use of machines like tractors.
- 3- Plantations in E. Africa are owned by foreigners especially Indians, Americans and Europeans.
- 4- The crops grown are for commercial purposes.
- 5- Processing of the crop is done within the plantation
- 6- They specialize on the production of either 1 or 2 crops
- 7- Plantation Agriculture involves high output because of increased mechanization.
- 8- Farming is scientifically managed involving record keeping, use of fertilizers, research etc.
- 9- Plantations have well developed infrastructure like roads, include hospitals, banks etc.
- 10- Plantations employ large number of people

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Factors which have favoured the establishment of plantations.

- 1- Favourable climatic conditions i.e. heavy rainfall etc.
- 2- High/low temperature depending on the crop, high humidity
- 3- Availability of extensive land for the establishment of large farms
- 4- Presence of fertile well drained soils.
- 5- Presence of a flat, gentle or undulating landscape for easy mechanization and establishment of transport network
- 6- Availability of large capital base provided by foreigners and even the government.
- 7- Presence of abundant labour supply i.e. skilled labour provided by foreigners and unskilled labour people provided by the local people.
- 8- Presence of a reliable and ready transport network for the transportation of the products to market. E.g. roads, railways etc.
- 9- The favourable government policies of attracting investors, leasing of land to the investors, maintaining political stability etc.
- 10- Presence of a wide market for the products both in E. Africa and abroad
- 11- Presence of sparse population to permit large scale farming.
- 12- Presence of abundant power for processing the crop
- 13- Advanced and appropriate technology in form of machines like tractors, water sprinklers for irrigation etc.

ADVANTAGES OF PLANTATION FARMING.

- 1- Plantation Farming provides employment to a number of people in E. Africa e.g. drivers, cultivators, machine operators.
- 2- Plantations have lead to the generation of government revenue through
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- 3- Plantation are sources of raw materials to industries which process their crops e.g. tea processing, industries, sugar refineries.
- 4- It has led to the generation of foreign exchange through the exportation of the crop to USA, France, India etc.
- 5- Plantations have also lead to the development of infrastructure like roads, xuls, hospitals, housing estates.
- 6- Plantations in E. Africa have also led to the development of towns e.g. Kisumu, Lugazi, Jinja, Kericho.
- 7- Plantation has diversified the economy thus widening the government tax base.
- 8- Plantations have promoted tourism and thus another alternative source of forex
- 9- Plantations have promoted research and scientific study leading to high quality and output.
- 10- Plantations are sources of income to the pole employed, thereby helping them to improve on their standards of living.
- 11- Plantation has promoted trade and international relations with the trading partners.
- 12- Plantations have provided market for industrial products.
- 13- Plantations provides people with products e.g. sugar, coffee etc.
- 14- It has promoted industrial development in E. Africa e.g. sugar refineries in Kakira etc
- 15- The people employed on plantation acquire skills, related to Plantation
- 16- People in E. Africa have encouraged in out growers scheme. Out growers the farmers who grow the same crop as that on plantation.
- 17- People process their products before exports thus increasing the products value.

Disadvantage of Plantation.

- 1- It is expensive to maintain and establish because of the high investment involved.

- 2- People practice monoculture which lead to soil erosion and exhaustion
- 3- Repatriation of profits because they are owned by foreigners.
- 4- People associated with over productions which leads to price fluctuations.
- 5- Plantation displace a number of people in E. Africa calling for expensive resettlement.
- 6- There is easy spread of diseases because the growing the same crop.
- 7- Incase of any natural disaster like drought, pest invasion heavy loses are incurred.
- 8- Plantation leads to decline in food production which may lead to famine.
- 9- Plantation require a lot of labour
- 10- The crops take long to mature leading to redundancy on the farm.
- 11- Plantations are associated with strikes because of low wages and poor working end...

Examples of Plantations in E. Africa include;

- 1- Kilombero Sugar Plantation (Tanzania)
- 2- Kakira Sugar Works (Uganda)
- 3- Lugazi Sugar Corporation (Uganda)
- 4- Mumias Sugar Plantation (Kenya)
- 5- Kinyara Sugar Plantation (Uganda)
- 6- Kirecho and Limuru Tea Plantation (Kenya)
- 7- Sisal Plantation (Tanga, Tanzania)

SUGARCANE GROWING IN E.AFRICA.

The crops is grown in the following areas of E. Africa

- Uganda. - In the shores of L. Victoria (Kakira and Lugazi)
- Kinyara (Masindi)
- Sango – Bay (Rakai)

- Kenya - Coastal Province
- Nyanza (Kisumu and Kano Plains)

- Tanzania - Moshi
- Kilombero Valley
- Bukoba
- Mwanza

- Morogoro

Conditions for Growth

- 1- High rainfall of over 1500mm or irrigation water
- 2- Temperature of about 20°C
- 3- Fertile alluvial soils
- 4- Attitude of 1500m above sea level
- 5- Flat or undulating low lands for easy mechanization
- 6- Presence of a dry and warm season for ripening and harvesting
- 7- Reliable and quick means of transport and large market.
- 8- Presence of cheap labour supply for cutting/harvesting
- 9- Large capital stock.

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CULTIVATION

The areas cleared using machinery like tractors, canes for planting are selected, chopped into 40mm long, the pieces are then dipped into fungicide solutions. After treatment, they are planted in 1.5m apart. While growing, weeding and spraying are very important. Harvesting begins after 1 or 1 ½ years and it is done using pangas.

It is then loaded on lorries, tractors or small wagons to factories.

Processing

At the factory, the cane is weighed, chopped and crushed after which the juice is treated with lime, and sulphur then heated and clarified, boiled and the crystals are separated from the molasses.

N.B MoLas is dark brown using for making alcohol (Waragi) and the residue is used as animal feeds.

The sugar crystals are then dried, graded, stored and then transported to the consumers.

Use of Sugar

- 1- Making of alcohol
- 2- Used as food
- 3- For sweetening medicines
- 4- Making paper boards, chemicals, animal feeds etc.

KILOMBERO SUGAR PLANTATION.

K.C.P is located in central Tanzania between rivers great Ruaha and Kilombero. It is owned by S.U.D.E Co (sugar development Cooperation) water for irrigation is provided by the Great Ruaha and the method for irrigation is overhead sprinkler.

AIMS FOR EAST OF K.S.P

- 1- To provide sugar for home, consumption and exports.
- 2- To open up the remote area of Kilemboro for development.
- 3- To provide employment to the local people.

MAP OF KILOMBERO VALLEY IRRIGATION SCHEME.

Factors which have favoured the East of Kilombero Sugar Plantation.

- 1- Availability of large supplies of water for irrigation provided by the great Ruaha River.
- 2- Presence of a gently sloping land permitting free movement of Water for irrigation, use of machinery and easy construction of transport network.
- 3- Availability of fertile. Alluvial soils in the valley favouring the growth of sugarcane.
- 4- Presence of heavy rainfall of over 1500mm and high temperatures of over 20°C which also favour the growth of high quality sugarcane
- 5- Presence of sparse population in the region giving room the establishment of the population.

- 6- Availability of a reliable and ready transport for the transportation of the sugarcane processing centres and to markets e.g. the roads, railways (Tazara railways)
- 7- Presence of wide market for sugar both in Tanzania and abroad.
- 8- Favourable government policy of developing this area of Tanzania as well as financing the plantation. Page | 110
- 9- Presence of a large capital base provided by the government purchasing machinery and payment of employees.
- 10- Presence of vast lands with lowlands for the establishment of a large plantation.
- 11- Availability of large supply of labour both skilled and unskilled
- 12- Presence of advanced technology used in clearing the land as well as processing the crop.
- 13- Advanced research.

KAKIRA SUGAR WORKS, (UGANDA)

It is located at the shores of Lake Victoria along Jinja Iganga high way. It is owned by the Madhvani family, water, Irrigation is obtained from L. Victoria and the method for irrigation is overhead sprinkler.

N.B. Factors for development are the same as those of Kilombero Sugar Plantation.

Problems facing sugarcane growers in E. Africa

- 1- Pests of grasshopper, man etc. and then diseases like yellow wilt)
- 2- Shortage of labour for cutting the cane.
- 3- Soil erosion and exhaustion due to monoculture.
- 4- Price fluctuation on the wild market.
- 5- Fire out breaks
- 6- Inadequate capital 2 purchaser machinery and to pay the workers or expensive machinery.
- 7- Competition from other sugar producing countries e.g Cuba, Brazil, Malaysia.
- 8- Competition from sugar beet.

SISAL GROWING IN E. AFRICA

Sisal is grown for its sharp leaves which crushed yield a coarse fibre. It is a cheap commercial crop in E. Africa.

In Tanzania, it is grown around Usambara mountains, Morogoro, Kilosa, Lindi, Arusha, Mtwara. The loading area is Tanga.

N.B. However due to price fluctuations sisal and dates have been turned into horticulture, dairy farms, cattle ranches.

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In Kenya is grown in Muranga, coastal areas and fringes of the Kenya highlands.

In Uganda, sisal has never been an important commercial crops because of climate.

Conditions of Growth.

- 1- It requires a wide range of soil conditions
- 2- High temperatures of between 25- 30°C.
- 3- Rainfall of about 750mm per annum.
- 4- Plenty of sunshine
- 5- Gentle and flat land
- 6- Attitude of between 0 – 180m above sea level.
- 7- Quick and cheap transport network.
- 8- Large manual labour.

CULTIVATION

- 1- The bulbils/suckers are planted in nurseries and after 9 months
- 2- They are transplanted into fields. Weeding and harvesting are done by knives.

PROCESSING

After harvesting the leaves are taken to factories where the fibre is exposed by stripping using a machine called Decorticator. The fibre is washed, dried, bleached in the sun, brushed graded and bared and export.

Uses of Sisal.

- 1- For making sacks, mats, carpets, fibres, strings, drugs (cortisone, (a pain killer)
- 2- The new use for making pulp and paper and its factory is a Tanga.

Problems facing sisal farmers.

- 1- Shortage of labour

- 2- High costs of machinery
- 3- Price fluctuation on the world market.
- 4- Pests and diseases.
- 5- Soil erosion and exhaustion due to monoculture
- 6- Competition from artificial fibres like silk, nylon etc.

CLOVE GROWING IN E.A

Cloves in E. Africa are grown in Zanzibar (the largest producer in the World). Pemba islands. In Zanzibar and Pemba, the crop is grown the Western parts of fertile soils and heavy rainfall.

Clove growing areas of Zanzibar and Pemba.

Conditions for growth.

- 1- Heavy rainfall of between 1500 – 2000mm per annum
- 2- High temperatures of 27°C .
- 3- Flat and gentle land
- 4- Deep, fertile and well drained soils.
- 5- High humidity
- 6- Dry picking season.
- 7- Availability of abundant labour for harvesting
- 8- Shelter from dry winds.

Problems Facing the Clove Growers.

- 1- Soil exhaustion due to monoculture
- 2- Insufficient labour for harvesting
- 3- Price fluctuation on the world market.

- 4- Competition from other producing countries especially Madagascar
- 5- Pests and diseases.

However some of these problems are controlled by digging up of disease trees and replacing them with new ones

Diversification of Agriculture by into other crops and economic activities

Uses of cloves

- 1- For spicing food and cigarettes
- 2- For making cooking oil, soap, perfumes, flavouring medicines, cosmetics, chocolates, and sweets.

PYRETHRUM GROWING IN E. AFRICAN

Pyrethrum is a white flowering plant which contains a chemical substance used for making insecticides.

It is a commercial crop grown around the Kenyan highlands, Mt. Meru, Mbeya, Arusha in Tanzania.

Conditions for the Growth.

- 1- Low temperatures of below 15°C at bud formation time.
- 2- Altitude of over 2000m
- 3- Heavy and well distributed rainfall of between 1000 – 1250mm.
- 4- Rich, well drained volcanic soils.
- 5- Abundant labour for picking
- 6- A fairly cool and moist conditions.

Cultivation and processing

The seeds are planted in nurseries after which transplanted in major fields in rows, weeded and mature in one year. It is picked every 2 – 3 weeks in the flowering season for up to four years. Pyrethrum is grown on small farms and then some large farms.

Flowers are dried in the sun over burners, bagged in sacks and sent to factories for extraction of pyrethrums for use in insecticide. N.B. The Biggest factory is in Nakuru. It is exported to U.S.A and Britain.

Problems.

- 1- Soil Exhaustion because of monoculture

- 2- Shortage of labour
- 3- Pests and diseases.
- 4- Competition from synthetic insecticides

However the above problems are solved by application of fertilizers, spraying, limited production of pyrethrum, banning of synthetic/chemical insecticide

Uses of Pyrethrum

- 1- Making of insecticides, perfumes, herbs, proteins, for animals.

TEA GROWING IN E. AFRICA

Tea is a major plantation crop in E.Africa obtained by plucking, drying and curing.

In Uganda, it is grown in the forest areas; Lugazi (Kasaku and Luwala), Mityana, Kabarole, Bushenyi, Mubende, Luwero, Masaka, Kigezi, Buhweju.

In Kenya, it is grown in Kericho, Limuru, Kisii, Nyeri, Kakamega, Nandi hills, Embu, Meru, Kiambu, and Muranga.

In Tanzania it is grown in Bukoba, Rungwe, Iringa, Tanga i.e. (S. & W. of Usambara Mounts), Mbeya, slopes of Mt. Kilimanjor. South highlands (Tukuyu, Njombe and Mufundi).

Conditions for growth.

- 1- Low temperatures of 13°C.
- 2- Gentle sloping land/undulating land
- 3- Altitude of between 1000 – 2000m above sea level.
- 4- Heavy rainfall of between 1000 – 2000mm
- 5- Acidic, deep, well drained soils.
- 6- Abundant labour for weeding and harvesting
- 7- Constant pruning, weeding and application of fertilizers.
- 8- Constant spraying against pests and diseases.
- 9- Quick and reliable means of transport and ready market
- 10- Machinery for processing the leaves.

N.B. Tea pluckers normally used sticks leaves while plucking to keep the activity at one level

Cultivation

There are four methods of growing;

- 1- Leaf cuttings and planted in Nurseries after which transplanted into rows.
- 2- Seeds are planted in nurseries and after two years transplanted into the main estate in rows.
- 3- Once on estates, constant weeding and pruning are done because the more branches, the more the shoot and thus high production.
- 4- During harvesting, two leaves and a bud are plucked and taken to the factory.

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Processing

The plucked leaves and the buds are carried to the factories on heads, bicycles, pickups, tractors and lorries. Tea must be processed within the first 24 hours. On reaching the factory, it is weighed and passed through withering lofts where hot air is blown to remove moisture and making the leaves soft.

The leaves are put on rollers where they are cut into small pieces, allowed to ferment for 2 hours where it turns brown to acquire the taste/flavour of tea.

Tea is then graded, weighed, packed and sealed for sale/ exports.

N.B. Forests/trees are normally planted near tea estates to perform the following

- 1- Control soil erosion
- 2- They are wind brakes
- 3- They provide shade
- 4- Rainfall formation
- 5- Source of energy firewood for drying the tea.

Tea growing in Kericho. (Tagabi Tea Estates.)

Kericho is the main tea growing area in Kenya and E. Africa as a whole. The main growing areas are the gentle slopes of Mau Escarpments.

At Kericho tea is grown under 3 main categories.

- 1- Large scale estates owned by rich companies like Brooke Bond Tea Company.

- 2- Small scale growing but with assistance from the Kenya Tea Development.
- 3- Production on cooperative basis owned by the cooperatives

Tea growing in Kericho was encouraged by the following factors.

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- 1- Heavy rainfall of over 200mm p.a.
- 2- Altitude of 1800m above the sea level
- 3- Presence of fertile and slightly acidic soils.
- 4- Availability of extensive land for the establishment of estates.
- 5- Presence of abundant labour from the Nyanza province.
- 6- Large supply of water for processing the tea i.e. from R. Kilho.
- 7- Availability of machinery like tractors.
- 8- Transport
- 9- Market
- 10- Government policy.

Tea from Kericho is exported to the middle East Netherlands, Canada, Germany, U.S.A, Britain etc.

N.B. The major problem facing tea growers in Kericho is severe hailstorms. This is the only place in the world where hail falls at all seasons.

Problems facing Tea Growers.

- 1- Competition from other producing countries like Sri-Lanka
- 2- Pests and diseases
- 3- Rain during the picking season
- 4- Competition from other beverages like coffee.
- 5- Soil exhaustion due to monoculture
- 6- Over production leading to price fluctuation in the world market
- 7- Inefficient labour for packing
- 8- Inadequate transport facilities

Solutions

- 1- For soil exhaustion: application of fertilizers
- 2- Competition: improving on the quality
- 3- Pests of diseases: spraying using chemicals
- 4- Shortage: of labour mechanization
- 5- Weeds: Constant pruning

- 6- Hailstorms, use of aircrafts to spray silver/iodide and hail suppression scheme.

Uses of Tea.

- 1- Beverage
- 2- It is used as a drug.

TOBACCO GROWING

It is grown on small scale (Small holders because it is done by peasants. In Kenya, it is grown in Kipei, Kisii and Embu.

In Uganda, it is grown in W. Nile (Arua), Kitgum, Kabarole, Bushenyi, Gulu, Bunyoro, N. Kigezi.

There are two varieties of tobacco grown in Uganda ie.

- a) Fire cured, which require fire for drying. Mostly grown in Arua.
- b) Flue cured which require wind for drying. Mostly grown in Kabarole

Conditions for Growth

- High temps of about 22°C.
- Well drained soils
- Rainfall of about 500 – 600mm during the growing season.
- Altitude of between 1000 – 1200m above sea level.
- Abundant labour for weeding and harvesting
- Constant attention

N.B. Tobacco is an annual crop and it is grown in rotation in other crops because it exhausts the soil quickly.

Cultivation

Tobacco is planted in nurseries and after 2 months transported in 2 fields, where weeding and addition of fertilizers are necessary.

The curing plants of tobacco are called burns.

Processing/Curing

There are two types of curing namely;

- (a) Flue curing: leaves are hanging in an enclosed or heated room to limit the dangers of moisture which can make the leaves go bad.
- (b) Fire curing: This involves hanging with leaves on fire until the leaves turn yellow/brown.

Problems facing Tobacco Growers.

- 1- Pests and disease
- 2- Shortage of labour for weeding and harvesting
- 3- Drought and low rainfall and high temperature
- 4- Price fluctuations in the world market.
- 5- Soil erosion and exhaustion because of monoculture
- 6- Accidents especially in the burns.
- 7- Limited fire wood for processing
- 8- Competition from other producing countries e.g. Cuba, Sri Lanka
- 9- Reptiles especially snakes
- 10- Poor transport network
- 11- Shortage of capital
- 12- Processing is time consuming

Users

- 1- For making cigarettes, stuff
 - 2- Medicine
- B.A.T limited is the sole buyer of tobacco in E. Africa

RICE GROWING IN E.AFRICA.

Rice requires fertile soils with plenty of water. It is an annual crop. In Kenya it is grown in Mwea Lebere and Ahero Irrigation Scheme. In Uganda, it is grown in Kibimba, Palisa, Dolo the shores of L. Victoria, Kyoga and Olweny Irrigation Scheme in Lira.

In Tanzania it's grown in Mkombozi Rufigi, Usungu and shores of L. Malawi

WATTLE GROWING IN E. AFRICA.

Wattle trees are grown from their bark which yield an extract used in tanning leather. It's a commercial crop and Kenya is the chief producer. It is mainly transported to India.

Wattle requires a fairly dry condition and the most producing areas are Kikuyu land and Trans- zoia.

WHEAT GROWING IN E. AFRICA

Mainly grown in Uasin Gishu.

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They require a fairly fertile and heavy soil, light to moderate rainfall and a warm and sunny ripening period.

Wheat growing areas in Kenya include; Kenya highlands, Eldoret, Nakuru, Londrani and the living producer is to UASIN GISHU.

In Tanzania it is grown in Arusha and mainly exported to Britian.

COTTON GROWING IN E. AFRICA.

Cotton is a small holding crop and the chief growing areas are the shores at L. Victoria i.e. S.E. Mwanza, Nyanza Province in Kisumu and in Uganda its grown around.

Others growing areas include; Lira, Gulu, Soroti, Kumi, Tororo, and Busoga, It is also grown along the E. African, coast and the Ruligi delta ad R.Tan

Conditions for Growth

- 1- Labour
- 2- Capital
- 3- Requires dry seasons for picking
- 4- High temperature of not less than 25°C.
- 5- Rainfall of about 750mm
- 6- Altitude of 1400mm above sea level
- 7- Fertile and well drained soils
- 8- Abundant labour supply for picking

Cultivation and Processing

The land is ploughed and seed are planted in rows of about 1 m apart. After germination, thinning, weeding and spraying are done.

Harvesting is done by hand. Sorting is then done to remove the unwanted fibres. Cotton is then packed and taken to the stores and finally ginneries where the seeds and fibres are separated.

Problems Facing Cotton Growers.

- Pests e.g. ball weevils
- Diseases e.g. bacterial blight.
- Unreliable rainfall during the growing seasons.
- Inadequate labour for picking and sorting
- Competition in other cash crops like coffee
- Poor storage facilities
- Price fluctuations in the world market
- Soil exhaustion on due to monoculture
- Heavy rainfall during picking season
- Uses of cotton – competition from synthetic fibres like nylon, silk.
- Poor transport in rural areas.

Uses of Cotton

- Making of cotton
- Cotton fibre
- Cattle feeds
- Cotton textiles
- Making cooling oil
- Stuffing mattresses and pillows
- Cotton wool used in hospitals.

COFFEE GROWING IN E. AFRICA.

In E. A there are 3 varieties of coffee

- a) Arabica Coffee. Grown in highland areas e.g. Mt. Elgon, Rwenzori, Kirimanjaro, Meru, Kenyan Highlands, Usambara.
- b) Robusta Coffee, this makes the best instant coffee and it does well around L. Victoria shores (mwanza, Kisumu, bukoba, and central Uganda
- c) Clonal Coffee

Conditions for Growth

- 1- Deep fertile and well drained soils as well as volcanic soils.
- 2- Moderate rainfall of 1000 – 1500mm
- 3- Temperature of between 20 – 26°C for robust 19- 23 for Arabica Coffee.
- 4- Altitude of 1000- 1200m for Arabica , 1000 – 1500 Robusta Coffee

- 5- Labour for picking
- 6- Capital, market etc.
- 7- Protection from winds
- 8- Transport

Cultivation

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Coffee is grown from seeds in nursery beds which also must be protected from the sun. its transplanted after one year followed by weeding, spraying and addition of fertility. Coffee is ready for picking after the 3 years and it is done by hand.

Processing

There are to methods of processing i.e.

- 1- Wet processing (Cherry wet processing/coffee is put in a tank of water for it to ferment for easy is moral of pulp. The beans are sun dried roasted graded and packed. This mainly for Arabica Coffee.
- 2- Dry processing (cherry dry processing). The beans are sun dried then sent to hulleries for removal of pulp. It's then roasted, graded and parked.

Problems

- 1- Price fluctuations in the world markets.
- 2- Soil erosion and exhaustion due to monoculture.
- 3- Competition from other beverages like tea, cocoa
- 4- Inadequate labour for picking
- 5- Difficulty in carrying out mechanization
- 6- Poor transport in the rural areas.
- 7- Limited/poor storage facilities
- 8- Competition from other countries like Brazil, Ethiopia
- 9- Pests e.g. Coffee berry borer and diseases e.g. leaf root diseases.

CONTRIBUTION OF IMPORTANCE OF CASH CROP GROWING TO ECONOMIC DEVELOPMENT

- 1- Sources of foreign exchange after exploitation e.g. coffee, tea,
- 2- Cash drops have led to development of infrastructure like roads, schools, hospitals.
- 3- They have promoted international trade e.g. cooperation
- 4- They have provided employment to many people.

- 5- They have led to urbanization e.g. Kericho.
- 6- They have led to research.
- 7- Sources of food e.g. coffee, tea.
- 8- Provide raw materials for industrial development e.g. jaggery for sugarcane, jiggery for cotton.
- 9- Sources of government revenue through taxation.
- 10- Sources of income to the peasants which lead to the improving of the standard of living.
- 11- Diversified the economy

Problems Facing Agriculture in E. Africa

- 1- Pests and Diseases
- 2- Competition from the development countries
- 3- Poor breeds of crops and animals
- 4- Price fluctuation in the world products.
- 5- Lack of market because of poor products.
- 6- Political instability especially in Northern Uganda
- 7- Poor soils like clay and sand.
- 8- Poor technology i.e. many farmers still use traditional tools like pangas, hand hoes.
- 9- Climate problems like high temperature, low rainfall, floods,
- 10- Shortage of labour for harvesting
- 11- Poor storage facilities
- 12- Poor transport network from the growing areas to markets.
- 13- Population increased which leads to shortage of land, land fragmentation and land disputes.
- 14- Poor /relief which hinders mechanization of Agriculture
- 15- Illiteracy among farmers.
- 16- Limited research in the agricultural sector

IRRIGATION AND RESETTLEMENT SCHEMES IN EAST AFRICA.

Irrigation is the artificial supply of water to growing crops. Irrigation schemes in E. A were mainly established for resettlement purposes. However other aims include;

- 1- To provide extra water to meet the rainfall shortages
- 2- To improve on the soil conditions.
- 3- To control flood and increase production
- 4- To ensure full production throughout the year.

Factors favouring the establishment of Irrigation Schemes in E. Africa.

- 1- Presence of flat land for easy mechanisation as well as movement of water under the influence of gravity.
- 2- Presence of fertile alluvial soils
- 3- Availability of extensive land for establishment of large irrigation schemes
- 4- Presence of a permanent water source in form of rivers, lakes etc.
- 5- Presence of a large capital base for purchasing machinery as well as payment of workers.
- 6- Favourable government policies of maintaining political stability and attracting foreign investors.
- 7- Availability of ready and efficient transport network in form of roads, railways etc.
- 8- Presence of large supply of labour both skilled and unskilled.
- 9- Availability of ready and wide market.
- 10- Low and unreliable rainfall favouring irrigation farming

Examples of Irrigation Schemes in E.Africa.

Scheme	District	Source of Water	Crop
Uganda:			
Olwiny Irrigation Scheme	Lira	Lake Kwana	Rice
Mubuku Irrigation scheme	Kasese Sebwe	River Sebweli Mubuku	Rice and vegetables
Sango Bay irrigation scheme	Rakai	L. Victoria	Sugarcane
Kibimba irrigation Scheme	Bugiri	L. Kibimba & R. Mpologoma	Rice
Alera Irrigation Scheme	Apac	L. Kyoga	Rice and vegetables
Doho Irrigation Scheme	Buteleja	R. Manalwa	Rice
Ongom Irrigation Scheme	Lira	R. Owemeri	Citrus fruits
Kiige Irrigation Scheme	Kamuli	R. Nabigaga	Citrus Fruits

Scheme	District	Source of Water	Crop
Ahero Pilot Irrigation Scheme	Kisumu	R. Nyondo	Rice
Mwea Tebere Irrigation Scheme	Kirnyaga	R. Ihiba and Nyamindi	Rice
Bunyala Pilot Irrigation Scheme	Busia	R. Nzoï	Rice
Galole/Hola Irrigation Scheme	Tana River	R. Tana	Cotton
Kibirigwi Irrigation Scheme	Kirnyaga	R. Sagana	Onions, Tomatoes, vegetables
Katiru Irrigation Scheme	Turkana	R. Turkwell	Maize
Taveta Irrigation Scheme	Taita- Tovele	Njoro Springs	Vegetables
Kibwezi Irrigation Scheme	Makuweri	r. Kiboko	Rice
Lari Irrigation Scheme	Tana River	River Tana	Vegetables
Pakere Irrigation Scheme	Morogoro	Great Ruaha	Sugarcane
Kilombero Irrigation Scheme			
Usangu Irrigation Scheme			
Rungwa Irrigation Scheme			

AHERO PILOT IRRIGATION SCHEME.

The scheme is found in W. Kenya on R. Nyando in Kisumu. The major crop is rice and water for irrigation is from R. Nyando and R. Miriu drains the water from the scheme. The method for irrigation is furrow and the aim for the establishment was to taste the success of large scale irrigation.

Factors for development include the following;

- 1- Presence of suitable fertile soils for the growing of rice.
- 2- Availability of large supplies of water for irrigation from R. Nyando.
- 3- Presence of large supplies of cheap labour both unskilled and skilled.
- 4- Presence of a flat land between R. Nyando and Miriu which allowed free flow of water under the influence of gravity and easy use of machines.

The Ahero Rice Scheme.

Irrigation block	New Villages
Main irrigation channels	Tracks
And water intake	roads.

MWEA TEBERE IRRIGATION SCHEME.

The scheme is located on R. Tana. N. E of Nairobi near the fat hills of Mt. Kenya. The major crop is rice and water for irrigation is obtained from the following areas; R. Thiba, Nyamindi, and Murubara.

The aims for establishments.

- 1- To make use of arid land
- 2- To resettle and employ the detainees (from Mau Mau re...)
- 3- To increase rice production in the country for self reliance.

Conditions which have favoured the location of the project.

- 1- Presence of permanent water sources such as Rivers Tana, Thiba and Nyamindi
- 2- The gently sloping landscape - Predominant plain on the lower slopes of Mt. Kenya allowing irrigation by gravity flow.
- 3- Presence of fertile block cotton volcanic soils, red clay loams which support rice growing.
- 4- Low average unreliable rainfall of less than 750mm per annum.
- 5- Large/extensive tracts of land was sparsely populated thus for the project.

- 6- Favourable government policy of promoting irrigation projects in remote or marginal lands.
- 7- Proximity to communications lines e.g. the Nairobi – Nyeri Railway.
- 8- Availability of landless people who could be recruited
- 9- Availability of capital
- 10- Ready market for the crops etc.

Explain the benefits of the Irrigation Project to the people of Kenya

- 1- Source of vital food ie. Rice.
- 2- Provision of employment to people
- 3- Source of income to farmers
- 4- Resettlement of the population which was formerly landless
- 5- Improvement in infrastructure i.e. roads, towns, schools,
- 6- Improvements in research
- 7- Source of government revenue
- 8- Establishment of processing industries
- 9- Effective utilization and marginal lands
- 10- Development of towns.
- 11- Farmers acquired modern farming techniques

Outline the problems faced by farmers on the irrigation project

- 1- Poor yields of rice
- 2- Reduction in soil fertility
- 3- Pests which destroy the crops
- 4- The Problem of Weather conditions i.e. cool temperatures, storms etc.
- 5- Price fluctuations leading to unstable farmer's income.
- 6- Sitting of canals
- 7- Limited capital
- 8- Soil Exhaustion
- 9- Soil Salination

MWEA –TEBERE IRRIGATION PROJECT

Key

- A - Tebere
- B - Muers
- C- Karaba
- D- Thiba

- 1- R. Tana
- 2- Nyamindi
- 3- Thiba
- 4- Embu

AGRICULTURE IN E. AFRICA CHIEF COMMERCIAL CROPS IN E.A

Coffee	Cashewnuts
Tabbacco	Rice
Sisal	Irrigation Project
Sugarcane	Pyrethrum
Tea	Cotton
River	
Coconuts.	

Measurers/Solutions to the problems.

- 1- Regular spraying to control pests diseases
- 2- Application of fertilizers and farm manure to improve on soil fertility
- 3- Regular dredging of canals to get rid of silt
- 4- Building of embankments along the rivers to control flooding
- 5- Encourage the farmers to form cooperatives to get more money.

N.B.

- 1- Gable/Hola is located on R. Tana East of Nairobi, Major crop is cotton and water for irrigation is from R. Tana. Other crops grown include g. nuts and sugarcane. The aim was to act as a model scheme by which an arid area could be developed.
- 2- The Kano plains pilot irrigation scheme (Kenya is located on the Kavirondo gulf out the shores of L. Victoria near Kisumu. The major crop is sugarcane and others include rice. The flood plains of the following, rivers provide water for irrigation e.g. Nzoi, Yalla, Nyando and Sondu. The aim was to improve the farming system which was subsistence and to improve food production to Famine.
- 3- **Lari Irrigation Scheme:** - This is a multipurpose irrigation scheme located on the Kenyan Highlands N. W. of Nairobi town. The major aim was to resettle the Kikuyu Farmers to grow pyrethrum and to rear dairy cattle.
- 4- **Yalla and Bunyala.** These schemes are found on the shores of L. Victoria on R. Yalla Major crops include sugar cane and rice. The aim was to reduce population pressure on the Kano plains as well as to eliminate Malaria and Bilharzia.
- 5- **Mobuku Irrigation Schemes:-** This is a multipurpose irrigation scheme located on the slope of Mt. Rwenzori. The major crop is onions others include cotton, g.nuts, maize, vegetables etc and irrigation water is from R. Ssebrue.

The aim (major was to resettle people from over populated areas especially Akonjo, Bakiga, Bwamba.

- 6- Doho Irrigation Scheme – Major crop is rice and it is found in Bulaleja Water for Irrigation is from R. Manalwa.
- 7- Kibimba irrigation Scheme:- its located in Bujiri district, major crop is rice and irrigation water is from R. Mpologoma and L. Kibimba

Contribution of Irrigation Schemes in E. Africa

- 1- Schemes provide employment opportunities to many people in E. Africa.
- 2- Source of food to man. E.g. Rice maize, onions, vegetation
- 3- Sources of raw materials to industries
- 4- Sources of Income to the local people thus helping them to raise their standards of living.
- 5- The schemes promote research and scientific study in E. Africa .
- 6- They promote the development of infrastructure like roads, railways,
- 7- Development of towns like Embu.
- 8- Schemes in E. Africa are sources of government revenue through taxation of the people as well as the schemes themselves.
- 9- The employed people acquire skills on modern farming techniques.
- 10- Attract tourists leading to the development of tourist industry.
- 11- Promote industrial development in E.Africa.
- 12- Resettlement of the population which was formally landless.
- 13- Generation of foreign exchange through the exportation of the crop
- 14- Diversification of the economy thus widening the government tax base.
- 15- Have promoted international trade and relations.
- 16- Have led to the effective utilization of marginal lands. E.g. dry lands, swamp

Problems facing Irrigation Schemes in E.Africa.

- 1- Pests and diseases
- 2- Monoculture which leads to soil exhaustion
- 3- Over production leading to fluctuations on international markets
- 4- Break down of machinery
- 5- Inadequate labour force
- 6- Limited land for expansion
- 7- Shortage of water for irrigation because of drought conditions

- 8- The schemes are expensive to establish and maintain/inadequate capital
- 9- Limited market for the crop.
- 10- Pollution of the environment by industries and tractors.
- 11- High evaporation rates leading to salinity of the soils.
- 12- Silting or blocking of canals etc.

SKETCH MAP OF E.A. SHOWING IRRIGATION SCHEMES.

River

Irrigation Scheme.

POPULATION IN EAST AFRICA

Population refers to the number of people in or given area and time. This is established during a census (counting of people), which is normally done after every year. 10 years because its expensive. The counting of people helps the government to plan for the social services like schools, hospitals etc.

TERMS RELATED TO POPULATION

Over population

This is when the number of people exceeds the available resources given the available technology

Under population

This is when there are fewer people than the available resource given the available technology.

Optimum Population

This is when the number of people is in balance or equal to the available resources.

Population Density

This is the number of people per unit area.

$$P. D = \frac{\text{Total population}}{\text{Land area}} = x \text{ people / Kms}$$

Birth Rate

This is the number of children born in a year per thousand of the total population.

Death Rate

This is the number of people who die in a year per thousand of the total population.

Population growth rate.

This is the natural increase in population

Infant mortality rate

This is the number of newly born babies who die every year per thousand of the total population.

Infant natality rate

This is the number of newly born babies every year per thousand of the total population

Life expectancy

This is the average age most people live in a given area.

Population Distribution in E. Africa

This is the way people are spread across the earth surface of the scatter of people over the earth surface. This can be described as dense, moderates and sparse

The densely populated areas of E.Africa include the mining areas, mountainous areas e.g. Mt. Kiliro, Elgon, Rwenzori etc. shore of L. Victoria. The coastal areas including islands of Zanzibar and Pemba etc, as well as towns like Kampala. Jinja, Mbale, Nairobi , Kisumu Dar es salaam.

The sparsely populated areas of E. Africa include, Karamoja central Tanzania. N. E. Kenya, Kitgum, Wajiri Marsabit, Rukwa, Sigida, Tabora.

The moderately populated areas in E. Africa include N. Uganda, W. Nile, Central Kenya, parts of W. Uganda as well as towns like Hoima, Gulu, Lira, Michakas, Kituli, Tanga, Mologoro, Mtwara.

A SKETCH MAP OF E.A SHOWING POPULATION DISTRIBUTION

Factors influencing population Distribution in E. Africa

Physical factors /Environmental Factors

1- Soils

Areas with fertile soils like mountainous areas of E. Africa like Elgon, Rwenzori, Kilimanjaro etc. have dense population while areas with poor infertile soils have sparse population because these areas can't sustain agriculture e.g. Karamoja, N.E Kenya, Central Tanzania.

3- Climate (most important factors)

In E. Africa this is the most important factors for population distribution. Areas with heavy and reliable rainfall with moderate temperature attract dense population like the coastal areas, areas around L. Victoria, highland areas etc. while areas with high temperature and an unreliable rainfall have sparse population e.g. Northern Kenya, N. E Uganda, Central Tanzania.

4- Relief

The wind ward sides of mountains with gentle slopes have dense population because the heavy rainfall and fertile soils. While the ice ward sides are sparsely populated because they are dry.

5- Drainage

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Well drained areas have dense population like the shores of L. Victoria while poorly drained areas have sparse population e.g. the swampy areas such areas also harbour pests which transmit diseases.

6- Vegetation

Forested areas have sparse population because of the presence of wild animals and pests and its also difficult to clear the thick vegetables for settlement and agriculture. However areas with moderate vegetables attract dense population because its easy to clear for settlement and agriculture.

7- Pests and Diseases and Wild Animals.

Human Factors

Urbanization

Urban centres in E. Africa have dense population because of better social services and security e.g. Kampala, Jinja, Nairobi, Kisumu, Dar-es-salaam, Dodoma.

8- Mining Activities

Provide Availability of many employment opportunities e.g. Mombasa, Shinyanga etc

9 Industrialization

Industrial areas of E. Africa attract dense population because of better social services, employment opportunities e.g. Kampala, Jinja, Nairobi, Dar-es-salaam

10 Government Policy

The government may also influence population distribution through establishing national parks, game reserves etc leading to sparse population, establishment of industries in some areas leading to dense population e.g. Jinja.

11 Historical Factors

Areas around former kingdoms like Buganda, Nyamwezi etc. have dense population while other parts like Bunyoro, Central Tanzania etc. are sparsely populated because of slave trade.

12 .Political Atmosphere/Climate

Areas with stable political climate like central Uganda the coastal areas, urban centres etc have dense population while politically unstable areas like N. Uganda have sparse populations.

Population Growth

Population growth is the natural increase of the numbers of people in an area. The reasons for the rapid population growth in E. Africa include;

- 1- High fertility rates among the women.
- 2- High birth rates and decline in death rates as a result of improved standards of living
- 3- Illiteracy among the people leading to ignorance about formerly planning methods.
- 4- Improved medical and health services
- 5- Influence of polygamy
- 6- Early marriages lengthening the productive life span of women.

Effects of Rapid population Growth

Positive effects.

- 1- Large population provides labour for full utilization of resources
- 2- It provides enut.. man power for defensive purposes.
- 3- Large population provides a large tax base thus high revenue for the government
- 4- It encourages competition and innovation among the people.
- 5- Large population provides market for both industrial and agricultural products
- 6- Large populations is a measure/index of development i.e. if shows that a country has well developed social infrastructure like hospitals.
- 7- It leads to urbanization.

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Negative Effects

- 1- Promotes unemployment. The government may not provide the necessary employment opportunities for a large population.
- 2- Large population leads to overcrowding congestion and easy spread of diseases.
- 3- Large population leads to shortage of social services for the people
- 4- It encourages land shortage, land fragmentation and then and disputes.
- 5- Large population leads to shortage of accommodation leading to the development of slums with their associated problems like poor sanitation.
- 6- It increases the levels of crime because of lack of jobs.
- 7- Rapid population growth leads to high dependency burden.
- 8- It leads to juvenile delinquencies with associated problems like drug addition, alcoholism.
- 9- Over exportation of resources.

Effects of Large/Dense Population on the environment

- 1- It promotes deforestation
- 2- Pollution of the environment
- 3- Easy spread of diseases

- 4- Land slides and soil erosion
- 5- Land fragmentation leading to poor yields and famine
- 6- Swamp reclamation
- 7- Over exploitation of resources leading to their depletion
- 8- Soil exhaustion due to over cultivation

Solutions to the above problems

- 1- Soil erosion control measures like terracing crop rotation, contour ploughing
- 2- Afforestation and re-afforestation programmes.
- 3- Treating/recycling of industrial wastes.
- 4- Education of the masses.
- 5- Application of fertilizers
- 6- Enforcing strict laws against swamp reclamation
- 7- Improving medical and health facilities.

Low/sparse Population.

- 1- Presence of pests and diseases e.g. tsetseflies in Bunyoro, Ankole, Masaka corridor.
- 2- Political instability like Northern Uganda
- 3- Influence of immigration
- 4- Presence of poor infrastructure like roads,
- 5- Limited employment opportunities
- 6- Poor infertile soils which can't sustain Agriculture.
- 7- Lower and unreliable rainfall
- 8- Hot temperatures
- 9- Influence of slave trade especially in S. Tanzania

Effects of low population

Positive effects.

- 1- Leads to low levels of unemployment. Many people will be assured of what to do.
- 2- Social services will be enuffor the population.
- 3- Encourages large scale farming and Agriculture mechanization

- 4- Moro land will be unutilized for future development.
- 5- Reduces the rates of the crimes like stealing

Negative Effects

- 1- Shortage of manpower leading to under utilization of resources
- 2- Low tax base i.e low revenue for the government
- 3- Lower levels of economic development because of low investments
- 4- Shortage of labour for defensive purposes
- 5- Small market for industrial and agricultural products
- 6- It is an economical to develop social services
- 7- Leads to social and economic dependency on other countries especially the developed.
- 8- It doesn't encourage innovation and competition.

WILD LIFE CONSERVATION AND TOURISM IN EAST AFRICA

Wild life refers to undomesticated flora (plants) and fauna (animals) found in their natural habitats.

East Africa major tourist attraction is the wild life (animals and plants in the natural habitats).

The following factors have led to decline of wild life in East Africa.

- 1. Poaching

2. Increase in population
3. Political instability
4. Completion from other land uses like Agriculture.
5. Traditional hunters.
6. Pest and diseases.

The conservation of wild life, in East Africa can be done through the following ways.

- a) Establishing of national parks, games reserves and sanctuaries.
- b) Banning trade in wild games products
- c) Leasing of wild game hunting
- d) Education of the masses on importance of wild life.
- e) Training and deploying game, rangers to protect the protect the gazetted areas
- f) Forming anti-poaching units

The protected wild life areas or conservation areas in east Africa include the following:

- (i) National parks.

These are large tracts of land in their natural states set by act of parliament to protect the natural and smoke lecture for public benefit

- (ii) Game Reserves

These are gazette areas by the law of the state where wild life is set a side for further use or development

- (iii) Sanctuary

These are areas gazette by the state to preserve wild life which are rare and nearly extinction e.g Ngamba Island Sanctuary (Chimpanzees) Bwindi Impenetrable (Gorillas) lake Nakuni

This where various animals and birds are raged or fenced and provided with similar conditions existing in the natural habitats for public viewing or research.

Controlled Hunting area.

This is an area where hunting of certain animals is limited and accepted and thus reducing on the number of animals known as cropping.

Reasons for promoting Wildlife conservation

- To conserve nature (flora and fauna)
- To promote tourism in East Africa
- To provide animal products like meat, ivory, hides and skins e.t.c
- To provide employment to the game rangers or guides etc
- To recreation purpose i.e. Hunting and game cropping
- To prevent extinction of some animal species
- They are sources of revenue and a foreign exchange.

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Problems affecting the conservation of wild life in East Africa

- Poaching of wild game for their products like skins, born, tusks, hides
- Wild fires set by holiday makes, poachers smokers
- Population pressure, which has led to encroachment of national parks and other gazetted area.
- Drought leading to shortage of water and pastures for the animals and other gazelled area
- Political instability leading to depletion of wild life.
- Limited skilled personnel
- Pollution of the environment.

Steps taken to solve the above problems

- Controlling population thought family planning methods.
- Educating the masses about the importance at wild life.
- Eviction of encroaches.
- Establishment of animal orphanages e.g. Ngamba Island sanctuary.
- Training and equipping game rangers
- A forestation and re-a forestation programme.

TOURISM.

Define:

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Tourism is a practice of traveling for purposes of leisure or relaxation, curiosity and or study.

Tourism may be domestic or international.

Tourism therefore is an invisible export, a major source of foreign exchange in East Africa.

N: B the development of tourism is based on the off

1. Landscape/ Relief
2. Drainage features
3. Wildlife (animals and vegetation)
4. Climate
5. Historical sites like Kasubitombs fort Jesus.
6. Culture.

Conditions or factors favoring the development of Tourism in East Africa physical factors.

1. Presence of variety of wild life in East Africa in form of wild animals like Elephants, Snakes, Lions, Baboons e.t.c and vegetation like Equatorial rainforests, Savannah e.t.c attract tourists for viewing photography.
2. Presence of conducive climate that promotes swimming, heating sun bathing e/t/c these attracted people from the temperate countries.
3. Presence of beautiful scenery in form of volcanic mountains Block Mountains, rift valley, plateau attracting tourist for viewing Research, photography.
4. East Africa has a variety of drainage features in form of lakes, rivers, beaches e.t.c these attract tourists for raffling, beating, swimming, sun bathing, fish sport e.t.c
5. Strategic location of East Africa at the coast making it accessible to international markets.

Mention any 3 tourist attractions found in East Africa other than plants and animals

- Mountains
- Rivers and Lakes
- Rift Valley
- Historical Sites
- Culture.

Human Factors.

1. Presence of improved accommodation facilities in the major cities and towns, game parks and game reserves e.g. hotels, holiday's apartments, motels, Inns e.t.c
2. The d hospitality exhibited by the people of East Africa that dates back the colonial times. The hospitality is being shown in hotels, banks, and airports.
3. Political stability which favours the development of the tourism industry.
4. Availability of adequate capital to invest in tourism related facilities. Like hotels, roads, lodges etc
5. Capital is provided by the government and investors
6. Presence of large supply of skilled man power inform of waiters, tour guides hotelians, accountants.
7. Increased and improved advertisements both at home and abroad through the media like T.VS newspapers magazine.
8. Presence of reliable and adequate transport inform at road, sir facilitating the movement of tourists to areas of their interest.
9. Favorable government policies on tourism e.g. protection of the wild life. Attracting foreign investors in the industry maintaining political instability.
10. Development of tour packages. They organize accommodation facilities, transport, and meals, tour guides.
11. Presence of a variety of cultural attractions e.g. dancing dressing food, marriage ceremonies.

12. Availability of a variety of historical sites e.g. fort Jesus Nyero paintings, Gedi ruins, Fort Jesus Kasubi/ Karambita.

A MAP OF E. AFRICA SHOWING TOURIST SITES AND ATTRACTIONS.

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Tourism in Kenya

Of the 3 East African countries, Kenya has the most developed tourism industry because of the factors,

1. Kenya is renowned for its richest and largest animal population in the world mainly in the national parks like Serengeti, Amboseli, Masai Mara, and Maasai Mara.
2. Presence of magnificent scenery provided by markets like lakes e.g. Nakuru, Naivasha, Victoria etc and Rivers like Tana, Athi etc these attract tourists for sport fishing, swimming, sunbathing etc.

3. Presence of a variety of drainage features like lakes e,g Nakuru, Naivaha, Victoria etc. and Rivers like Tana, Athi etc these attract tourist for sort fishing swimming, sun bathing e.tc.
4. Presence of adequate and reliable transport network based on roads, railways and air making the tourist sites accessible.
5. Kenya has a stable political climate than Uganda and Tanzania
6. The strategic location of Kenya at the coast in relation to international markets.
7. Presence of a variety of historical sites like fart Jesus, Vasco Da Gama fort Gedi rain etc.
8. Availability to modern banking services Kenya has more banks compared to other countries in East Africa e.g. Baroda, Kenya Commercial bank Standard Chattered etc
9. Availability of sufficient and comfortable accommodation facilities inform of hotels, inns holiday apartments etc.
10. Favorable climate of Kenya i.e. its sunny throughout the year promoting swimming and sun bathing.
11. Favorable government policies of advertising maintaining political stability.
12. Availability of strong capital base provided by the government as well as private investors.
13. Adequate skilled manpower.
14. Presence of affluent class.
15. Advertisements.
16. Presence of a Varity of languages Spoken in Kenya e.g. Arabic Swahili English etc

N: B Kenya's visitors come from U.S.A, u.k. Germany Holy, India, Republic of south Africa France, Ug, Tz, Rwanda.

The most visited areas in Kenya include:

- Nairobi National Park
- Tsaro National Park
- Arbodare National Park

- Fort Jesus (Mombasa) etc.

TOURISM IN TANZANIA

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The major tourist attractions include.

The Wild Game in the National, Parks Like Serengti (The Largest and most attractive)

Arusbia National park (The smallest with large number of elephants and black rhinos)

Ruaha National park

Lake Manyara National Park

The Game reserves include.

- Katavi Plains
- Gombe stream.
- Biharamulo.
- Mkomazi etc.

Other attractions in Tanzania include

Mountain Scenery

Lakes and Rivers

Coastal features

Historical sites

The major tourist activities in Tanzania include Sport-fishing Mountain climbing, Swimming, sun bathing diving etc

TOURISM IN UGANDA

The major attractions include:

1. Wild life in National parks, Games reserves and sanctuaries e.g.
mountain Rwenzori National park (Mountain Climbing)
Kidepo valley National park (Elephants Uganda kob, Giraffes)
Queen Elizabeth National park (Boat riding and game viewing)
Bwindi impenetrable (Gorillg tracking)

- Murchison fall (the largest, it has sport fishing and game viewing)
2. Water bodies e.g. L.Victoria R. Nile and tells Like Karuma. Bujagali)
 3. Favorable climate
 4. Variety of Vegetation types
 5. Recoupable government polices
 6. Hospitality of the people
 7. Rich cultural heritage
 8. Historical sites e.g. Kasubi tombs Nyero Rock Paintings (Kumbi district(fort Baken Etc

Problems facing limiting the tours industry in East Africa

1. Competition from development countries as well as member countries in East Africa because of similar tourist attractions especially the wild game.
2. Poaching of the wild animals in the National parks leading to the extinction e.g. the white rhines.
3. Pests and diseases, which attack the animals as well as the tounts.
4. Inadequate capital to up grade the tourist facilities like hotels airports etc
5. Political instability in some parts of East Africa like National Uganda etc searing away the potential tourist
6. Inadequate skilled personnel to manage the industry especially hotels, airports, banks, tourist sites etc
7. Entrenchment on the existing tourist potential sites like National Parks games reserves because of rapid population increase.
8. Inadequate transport and communication networks making areas to tourist interest inaccessible e.g. Bundibugyo, Kidepo valley national packs bruindi

Seasonal migration of animals from one place to another e.g. many elephants migrate from Queen Elizabeth national park to other game parks.

- Establishment of training institutions to impart skills on people to improve on the tourism industry
- Gazetting more national parks and game reserves
- Controlling pests and diseases through spraying
- Intensifying advertisements to encourage the culture of visiting the tourist sites by the local people.
- Rehabilitation of the cultural sites and roads
- Encouraging the study of foreign international languages like French, Germany, Spanish e.t.c
- Setting up of anti- poaching units.
- Privatization of the tourist related industries like hotels
- Deployment of security personnel to maintain political stabiles in the tourist areas.
- Banning trade in wild life trade like skills ivory
- Injecting more capital in the tourist industry.
- Encouraging the development of private tour companies.

MINING IN EAST AFRICA

Mining refers to all attempts to extract valuable minerals both solid and liquid from the earth crust.

East Africa endowed which a number of mineral like diamonds, copper soda ash, salt gold iron etc

Many of these minerals are in small quantities like gold in west Kenya, Coal in south Tanzania etc however the most important minerals in East Africa include diamonds, copper and soda ash.

TYPES OF MINERALS IN EAST AFRICA

There are three types of minerals

Metallic Minerals: which include silver gold, copper, zinc, lead, aluminum, tin etc

Non-metallic minerals: Phosphates, caladium, salt, nitrates, potash, sulphur, mica

Minerals, which provide power. Includes petroleum, natural gas uranium, water

Methods of Mining in East Africa

Open cast methods

This method is employed when the mineral occurs near the earth surface. The over lying soil is removed (stripped off) and dumped near by the mineral deposit is then removed by digging using picks and shovels sometimes explores are used, it is then loaded on tracks

In East Africa, it is used for mining the following, copper, diamonds, gold, phosphates, salt etc.

This method destroys vegetation, soil profile and structure it also leaders to the creation of deep holes on the earth crust.

Underground Mining

This method is used when the mineral deposit is at great depth below the surface of the earth. The methods involve the effect.

Adit Mining

This method is used when the mineral is on the hillside like copper on mountain Ruwenzori

Horizontal/inclined tunnels are dug in the hill site where the mineral occurs at the site of the mountain.

The roof of the tunnel is supported by steel or concrete beams to prevent it from collapsing.

The mineral bearing rock is blasted and transported to the surface by light railways or conveyor belts.

The methods is used in the mining of copper in Kilembo mineral

SHAFT MINING

Vertical shafts are sunk into the earth crust to reach the mineral deposit. From these shafts horizontal shafts are dug to reach concrete beams to prevent it from collapsing.

Light railways are used to transport the deposit to the shaft hoisting to the surface. Page | 149

Disadvantages of Underground Mining

- Accidents due to caving of the mines
- Pollution due to poor ventilation.
- High temperatures below the earth crust.
- High costs of mining
- Diseases, which affect the respiratory organs.

ALLUVIAL/ PLACER MINING

This method is used when the minerals appear as alluvial deposits. It involves mining of the alluvial deposits in a container. The mixture is rotated until light particles such as sand mud and small stones are washed off leaving mineral particles such as gold, platinum and diamond.

DRILLING e.g. oil on L. Albert.

DREDGING: dredging of the minerals like soda ash.

Factors favoring the development of mining in East Africa.

1. Presence of large deposits of minerals like gold petroleum limestone, soda ash etc that attract the government and foreign investors to come and export.
2. The occurrence of the minerals near the Earth surface making extraction relatively easy and cheap using open cast method.
3. Presence of adequate supplies of power for processing and transporting of minerals, e.g. H.E.P from Nalubaale power project petroleum etc.

4. Availability of adequate and reliable source of capital provided by the government and foreign investors to buy machinery.
5. Presence of efficient and reliable transport network based on roads and railways, that have facilitated the transportation of the minerals to processing centres
6. Favorable government policies of attracting foreign investors and diversifying the economy.
7. Political stability wins the mining areas to attract many foreign investors in the industry.
8. Presence at large supplies of water for processing the minerals provided by rivers and lakes like Victoria
9. Availability of large supplies of labour both skilled and unskilled to work in the industry.
10. Presence of improved and appropriate technology enabling easy construction and transportation of the minerals.
11. Availability of a large and ready market both domestic and foreign.

Distribution of Major Minerals in East Africa Minerals in Uganda

The following are the major minerals in Uganda

1. Copper and cobalt from Kasese (Kilembe)
2. Gold Karamoja and Busia
3. Phosphates and Limestone from Tororo
4. Limestone from Hima
5. Petroleum from L. Albert
6. Arsenic from Tororo
7. Salt from L. Katwe.
8. Tin, Iron Ore, tungsten Kigezi.

N.B Copper in Uganda a major mineral mined at the foot at Mountain Ruwenzori on the steep valleys of River Nyawmamba

Mining in Tanzania

The minerals in Tanzania include diamonds at Mwadui, Gold in Lramba-sekenke, Musarra Cooper and Coal Ruhuhu valley iron are in Mbeya hills and liganga. Mica in Kilosa and Mpanda etc.

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Diamonds mining in Tanzania

Diamonds are mined 20km from shinyanga at Mwadui, these diamonds are formed by the intrusion of magma of solidified in a pipe to form a plug. The plug was later exposed by erosion are also scattered the diamonds. The diamond bearing rock is called Kimberlite. the methods of mining is open cast or quarrying. The processing procedure includes separation crushing extraction and processing.

Uses of Diamonds

1. For making Jewellery
2. For making drilling bits
3. For making precision goods like watches

Factors, which favored diamond mining at Mwadui in Tanzania

1. Presence at large diamond deposits at Mwadui
2. The deposits occur close to the earth surface making it easier and cheaper to mine.
3. The diamonds in Tanzania are dense, hard and repel water thus it is easy to extract.
4. The land is relatively the allowing easy construction of roads and railways as well as use of machines like tractors
5. The diamonds in Mwadui are at high quality.
6. Adequate capital
7. Reliable transport
8. Large market
9. Abundant supply of labour
10. Favorable government policies

Contribution of the Mining Industry in East Africa.

- It provides employment opportunities to many people like drivers, Engineers, researchers etc.
- It diversifies the economy of East Africa and thus widening the government tax base.
- The mining industry is the major source of foreign exchange through the exportation of major minerals like gold to France UK, U.S.A etc
- The industry has also led to the development of infrastructure like Roads, Railways etc that have facilitated the transportation of minerals to processing centers.
- Mining has lead to the development of industries in East Africa especially those processing the minerals e.g. Tororo and Hima cement factories etc.
- It has led to the development of towns associated which mining e.g Kasese Shinganga, Mambasa etc.
- It has promoted research and scientific study.
- It has promoted tourism in East Africa and thus earn alternative source of foreign exchange.
- It's also a source of income to the local people employed in the mining industry helping to improve their standards of living.
- The mining population provides market for both Agriculture and industrial products

Effects of mining on the Environment

- ❑ Pollution of the Environment
- ❑ Displacement of many people calling for expensive resettlement
- ❑ Associated with accidents leading to death of many people.
- ❑ Open cast mining leads to the creation of pits on the Earth surface
- ❑ Mining leads to urbanization with associated problem like unemployment, high crime rate prostitution slum development
- ❑ If leads to loss soil fertility.

- ❑ Mining promotes landslides, which also lead to death of many people.
- ❑ Underground mining promotes earth quakes because it weakens the rock strata
- ❑ Mining leads to fall of the water table.

The above can be solved through.

1. Application of artificial fertilizers
2. Spraying to cultural disease vectors
3. Resettlement or displaced people
4. Carrying out forestation and re-a forestation
5. Transforming mining holes into man made lakes for fishing.
6. Deflection of the landscape can be solves by land filling.

CONDITIONS / FACTORS HINDERING/ LIMITING THE DEVELOPMENT OF THE MINING INDUSTRY IN EAST AFRICA.

1. Inadequate capital from mineral exploitation, transport and processing.
2. Inadequate supply of skilled manpower in the mining industry because of the problems associated with it. Like accidents low pay and etc.
3. Political instability in some mining areas like Karamoja South West Uganda.
4. Minerals in East Africa occur in small quantities e.g. tin beryllium, gold etc.
5. Price Punctuation on international markets
6. Inadequate supply of power for transportation processing and extractions
7. Small market for the minerals because of poor guides or quality e.g. coal in South Tanzania.
8. Some mineral deposits are un remote areas e.g. coal in Tanzania, uranium in Mrima hiss in the south coast of Mambasa.
9. Minerals in east Africa are scattered making exploitation difficult.
10. Competition which other development countries like Germany
11. Limited research in the mining industry.
12. Exhaustion of some of the minerals
13. Ube of inappropriate technology like hoes.
14. Unfavorable government polices of favoring other sectors with the economy.

Steps taken to solve the above problems.

1. Maintaining political stability in the mining areas.

2. Diversification of the economy to include industries Agriculture, Tourism.
3. Attracting foreign investors in the mining industry by providing concessions, maintaining political stability.
4. Privatization of the mines like Tororo and Hima cement.
5. Training more labours in the mining industry
6. Establishing of industries to provide market for the minerals.
7. Construction of more Hydro Electricity power dams to provide power.
8. Increased research in mineral exploration.
9. Extension of feeder roads and railways to the mining areas.

INDUSTRIALIZATION IN EAST AFRICA

An industry is a working set up which produces goods and services that a community uses.

Industries are very diverse and may include activities like mining manufacturing building, quarrying etc.

However, the word industries are often used to describe factories that change raw metals into finished goods. Most industries in East Africa are mainly concerned with processing Agricultural raw metals. (Agro-based industries) Industries therefore are categorized into 4

1. Primary Industries

These are mainly extractive industries involving the exploitation of natural resources e.g. fishing mining, forestry quarrying.

2. Secondary or Manufacturing industries

These process goods from primary industries into finished products. These industries are further divided into two:

a) Heavy industries

Deal with heavy or bulky raw materials and involve heavy capital investment e.g. engineering, ship building, heavy chemical industries etc.

b) Light industries

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Use light and compact materials and produce small and light articles e.g. plastics, textiles, cosmetics, toiletries, cigarettes, food processing.

3. Tertiary or Miscellaneous industries

These involve provision of back up services e.g. Administration, banking, Insurance, entertainment etc.

4. Quaternary industries

Involve provision of hi-tech and information services e.g. universities.

Markets oriented industries, are those whose location is determined by market e.g. breweries, milk processing, flour milling, bread making, fish processing, cigarette making.

Raw metals oriented industries. The location is determined by presence of raw metals e.g. Hima, Bamburi, Tororo.

Import substitution industries. These industries provide goods which substitute for imports i.e. they make goods that would have been imported e.g. sugar factories.

N: B in this case therefore we are combined to manufacturing or secondary industries i.e. the processing of raw metals and semi processed materials into finished or more complex materials of great value that can be used by man.

The principal industries in East Africa

Jinja- Industries include.

Textiles, food processing, steel rolling mills, breweries, matches, pulp and paper, printing and publishing, sugar processing, saw milling, manufacture of bicycle tyres, mattresses, soap etc.

Kampala- Industries include.

Chemical processing, food processing, Engineering, steel rolling, motor vehicle assembly, tobacco processing, pharmaceuticals, leather tanning, textiles etc.

Nairobi

Food processing, printing and publishing, railway and motor vehicle repair
breweries textiles cigarettes, cigarettes milk processing plastics etc

Mombasa

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Food processing, steel works motor vehicle assembly, oil refinery (changawiwe),
cement works ship repair, manufacture of iron sheets, bottles, fertilizers etc.

Eldora.

Metallurgical, Engineering, food processing, Textiles, leather tanning tobacco
etc

Nakuru.

Cigarette Making, textiles, motor vehicle repair insecticides food processing
sweaters.

Dar-es-salaam

Grain milling, meat packing motor vehicle repair sisal processing cement,
plastics, breweries, sacks bicycle assembling

Tanga

Cement manufactures, food processing, chemical, engineering. Metallurgical,
textiles etc.

Draw a skelch map of east Africa and on it mark and name

- (i) Mts, Rwenzori and Usambara.
- (ii) Rivers; Tana and Pangani
- (iii) Industrial centers, Kisumu Songea and Arusha.

Name any 3 types of industries in any one industrial center in A (iii) above

Other industrial centers in East Africa include, Mbale, Mbarara Morogoro
Songea Kisumu etc.

Draw a sketch map of East Africa showing the major industrial

Conditions / factors which have favored the Development of industries in East Africa.

1. Presence of abundant supply of power to run the industries e.g. Hydro Electricity power from Nalubaale power plant, Hale and Seven folks dam etc petroleum. Page | 158
2. Availability of enough capital for investments provided by the government World Bank private investors like Madhiran.
3. Favorable government policy on industrialization which encourages investors of marinating political stability tax reduction etc.
4. Accessibility by water land and air to enable assembling of raw mountains and distribution of finished produce
5. Presence of abundant raw mtrls to feed the industries in the making of finished products e.g minerals and Agricultural raw mtrls
6. Existence of a large market both at home and abroad to consume the finished products
7. Presence of large supply of labour both skilled and unskilled by foreigners e.g Indians
8. Presence of flat and vast land for the establishment and expansion and industries
9. Presence of adequate and appropriate technology and research in industrial, development
10. Political, stability, which attract foreign investors on well as investment opportunities.
11. The influence of geographical/ industrial inertia. I.e. the ability of an industry remain in a given place because at associated advantages e.g. raw mtrls established infrastructure experienced source of labour etc.

Contribution of industrial development in east Africa.

1. Stimulates the development of infrastructure e.g. roads xuls hospitals, railway lines etc.
2. Create employment opportunities for the local population e.g. technicians, drivers, security guards etc.
3. Source of government revenue through taxation of the employees the investors as well as goods in transit.

4. Generation of income for the local population helping them to improve on their standards of living.
5. Provision of consumer goods to the local population.
6. Sources of foreign exchange through the exportation of semi and finished products to other countries like U.S.A India Egypt.
7. It has led to development of urban centers because of many employment opportunities e.g. Jinja, Kampala, Nairobi
8. Diversification to the economy and thus wide widening the government tax base.
9. Promotes international trade and co-operation between east Africa and her trading partners like S.Africa, India, U.K flowers.
10. Further promotes research and scientific study in East Africa.
11. Reduced on the costs of importing finished products like shoes, sugar, cooking oil etc.
12. Provide market for Agricultural products like tea, pyrethrum cotton sisal etc
13. Promotes domestic tourism
14. The local population employed in these industries acquire skills related to industrial development.

Problems resulting from industrial Development in East Africa.

1. Increased struggle for land leading to land disputes.
2. Exhaustion of raw mtrls threatening the future of industries leading to unemployment.
3. Pollution of air water and land.
4. Urbanization and its related problems e.g. unemployment's high crime rates slum development etc
5. Increased land degradation i.e. recantation of swamps deforestation, destruction of landscape.
6. Repatriation of profits by foreign investors
7. Industrial accidents which led to loss of lives and property
8. Displacement of the population calling for expensive resettlement

Problems facing industrial Development in East Africa

(Factors hindering effective industrial development)

1. Political instability in some parts of east Africa scaring always-potential investors.

2. Insufficient capital in the industrial center because of high costs of production.
3. Incidequate, skilled man power to run the industries
4. Incidequate technology and research limiting automation and efficiency in production.
5. Shortage of industrial raw mtrls i.e. most of the minerals occur in small quantities and other are of low grades.
6. Unfavorable government polices i.e. putting much emphasis on Agriculture imposing high taxes on investors etc.
7. Incidequate for industrial expansion and development due to the rapid population growth in East Africa.
8. Limited domestic market for industrial product because of poverty and low purchasing power.
9. Completion for market for industrial products because of poverty and low purchasing power.
10. Competition for market which development countries like Japan, China, U.K.
11. Industrial accidents
12. Poor and unreliable transport network affecting the delivery of raw mountains and finished products.
13. Shortage of water for industrial development especially in Kenya.
14. Fluctuations in climate affecting the production and distribution of Agricultural raw metals like cotton, coffee, sugar etc.

Steps being taken to promote industrial development in East Africa

1. Expansion of the East Africa community to widen the market e.g Rwanda and Burudi.
2. Privatization of industries for efficient management and production e.g Nytil to pictare.
3. Construction of more power projects to increase power supply e.g. Kiira dam Nalubaala power projects etc as well as diversifying to other power sources like petroleum.
4. Construction of new roads and widening the existing one to localities the transportation of raw units and finished goods.
5. Encouraging foreign investors to come and invest in the industry.

6. Restricting importation of manufactured goods which are locally produced i.e. encourage the development of import substitution industries.
7. Advertise to encourage consumption of locally manufactured goods
8. Recycling of scrap to provide raw metals for the steel related industries.
9. Applying for financial support from internal financial institution like the world Bank
10. Training of more manpower as well as carrying out research to improve on automation and efficiency
11. Encouraging the development of small-scale industries e.g. cottage industries.

The industries have the following advantages

1. Promote employment opportunities
2. They require limited skilled man power
3. They can be started anywhere
4. They use very little raw materials.
5. There is minimal pollution of the environment.
6. They use locally produced raw metals
7. They generate revenue for the government.

Fishing is the hunting of aquatic lives from water bodies e.g. Fish lobsters, crabs whales, shrimps, crocodiles; these water bodies are referred to as fishing ground / fisheries.

There are 2 types of fisheries in East Africa

a) Fresh water fisheries.

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These involve fishing in the inland water bodies like swamps, ponds, rivers and lakes.

The major species of fish in the inland fisheries include Nile perch. Lungfish catfish, Tilapia, mud fish Bagrus Dagaa electric fish etc.

The major inland water bodies in east Africa include:

1. Lake Victoria.

It offers the biggest catch and the main species include tilapia Nile perch perch bagrus haplachramus etc

The major fishing methods is gill netting and preservation m/ds include smoking freezing and deep flying

2. Lake kyoga

is the most intensively fished lake in east Africa because it is shallor. Fishing is done by the bakenyi using methods like fish traps gill nets baskets and angling.

The main fish species include tilapia, pretentious. The landing sites include Bulaingu, Namansale, Lwampanga.

3. Lake Tangayika

The main type of fish caught is dagaa, the main fishing mtd is lampard and the major port is Kigoma.

4. Lake George.

It is the most productive lake in east Africa as it is only 3m deep and because of dropping of hippos, which fertilize the water. However the main problem is presence of crocodiles the main port is Kasenyi.

N: B the marketing of the fish is done by TUFMAC (The Uganda fish marketing cooperation).

Lake Turkana.

Fishing is attested by remoteness and lack of market. However it is important for sport fishing in East Africa as applies to lake Nairasha.

Lake Albert.

It is the most important fishing ground and the major ports or landing sites include Ntoroko, Butiaba, Wanseke, Tonya e.tc.

Lake Edward.

The major is Rwenshama

b) MARINE FISHERIES.

This fishing is called out in salty waters i.e. oceans and seas most produced in Kenya and Tanzania (Pemba and Zanzibar)

The major marine fish species include sardines cod mackerel, tuna, anchovy, Mackerel, Haddock, halibut etc

Marine fish species are categorized.

1. Pelagic species

They live near the water surface e.g. sardines mackerel tuna and anchovies.

2. Demersal species.

These live and breed near the seabed e.g. haddock, halibut cod etc.

4. Crustacean species.

These have external skeletons e.g. lobsters, shrimps, Crabs oysters, prawns.

Fishing methods in east Africa.

There are major 2 types of fishing methods in east Africa.

a) Commercial or modern methods of fishing

These include trawling, drifting, lobster traps long lining and purse seining.

b) Traditional or Primitive methods

These include gill netting, use of baskets, use of spears bows and arrowa lampara (lamp attracting) using hooks and fish traps

N: B. Marine fisheries in east Africa are underdeveloped because of the following

1. Presence of a narrow continental shelf affecting the multiplication of planktons and fish
2. High temps at the coast making the fish bad easily and quickly.
3. The ocean floor covered by coral reefs which interfere with the fishing activities
4. Presence of a straight coastline which is not suitable for the development of ports and fishing villages.
5. Inadequate capital to purchase the modern fishing equipment
6. Presence of strong ocean currents along the coast which discourage the use of small vessels
7. Limited fish species of commercial values.
8. Limited planktons at the coast because of the depth of the ocean
9. Presence of inappropriate technology i.e. the fishermen at the coast still use primitive methods like baskets.
10. Inaccessibility of some of the fishing grounds
11. Competition with developed countries like Norway Japan etc.
12. The people along the coast making it very unpopular

Preservation methods.

- Smoking - Salting
- Sun drying - Freezing / Refrigeration
- Deep frying - Canning

Uses of fish in east Africa

1. Animal feeds
2. Food/ Sources of proteins

3. Glue
4. Soap
5. Fertilizers
6. Medicine
7. Cosmetics

Factors favoring the development of the fishing industry in east Africa.

1. Presence of extensive water bodies both fresh and salty e.g. Lake Victoria, Tanganyika. Kyoga Indian ocean
2. Presence of a large market both at home and abroad in countries like U.K Japan Canada etc.
3. Favorable government of providing loans to the fishermen, protection against foreign competition diversification of the economy.
4. Presence of improved refrigeration facilities like freezing, canning etc.
5. Abundant supply of labour both skilled and unskilled due to the dense population around lakes, rivers and the Indian Ocean.
6. Presence of a variety of fish species of commercial value like Nile perch meckerel etc
7. Availability of modern fishing gears inform of motorized boats
8. Abundant supply of planlators due to the shallowness of the water bodies to support large shoal.
9. Availability of adequate capital provided by the government and foreign investors to purchases modern fishing gears.
10. Presence of a well development and reliable transport network for quick transportation of fish from fishing grounds to inland markets.
11. Presence of fish companies that after support to the fish men inform of providing nets, boat engines as well as market.
12. Existence of forests and forests productions for making boats and providing firewood.
13. Presence of fish processing industries which provide market e,g Mases fish company, Gomba fish company etc.
14. The existence of an extensive, shallow continental shelf favoring the growth of planktons and subsequent multiplication of fish.

Contribution/ importance of the fishing industry to East Africa

Fishing industry has provided employment opportunities to many people living at the coast and on islands i.e. as fishermen, processors, and Transporters e.tc

1. It has promoted research and scientific education in E.Africa
2. The fishing industry has also led to the improvement of peoples diet.
3. The industry is also a major source of government revenue through taxation of the fishermen as well as the companies involved.
4. The fishing industry has diversified the economy of East Africa thereby widening the government tax base.
5. The industry has diversified the economy of east Africa thereby widening the government tax base.
6. It has led to the development of towns and parts e,g infrastructure like, roads ice, plants, school etc.
7. The industry has also promoted the development of infrastructure like roads, ice, plants, school etc.
8. It is a source of income to the local population along the coasts.
9. The fishing industry in East Africa has promoted trade and internal relations between east Africa and her trading partners like U, S.A
10. The people employed in the fishing industry have acquired new and modern skills related to fishing.
11. It has promoted tourism.
12. It has led to the improvement of standards of living at the people.
13. The industry is also a major sources of raw metals used for in the manufacture of fertilizers animals feeds, glue, medicine, cosmetics

The problems associated with the fishing industry

1. Pollution of the waters by the vessels and industries along the coast.
2. Deforestation because of the high demand for firewood and timber for smoking and boat making respect ring.
3. Extinction of some fish species because of over fishing
4. Accidents treading to loss of lives and property.
5. Conflicts over territorial water e.g Mijingo
6. Urbanization with related problems like unemployment high crime rates, slum development etc

Problems affecting the Development of the fishing industry in East Africa

1. Inappropriate technology in the fishing industry. The fishermen also use poor fishing gears.
2. Inadequate capital to improve on the fishing activities.
3. Inaccessibility of some of the fishing, grounds making the transportation of fish to the inland markets difficult.

4. Presence of predation like crocodiles and sharks in the oceans which feed on other aquatic lives.
5. Limited processing and preservation methods in east Africa.
6. Presence of shallow areas of the east Africa coastline limiting the use of big vessels.
7. Pollution of the waters by domestic and industrial effluence which affects the metabolism of aquatic lives.
8. Competition for market with developed countries like Japan, Norway, Canada etc.
9. Profit repatriation by foreign companies.
10. Indiscriminate fishing leading to depletion of some of the fishing industries.
11. Theft of nets, boats and boat engines.
12. Compact nature of the east Africa coast line limiting the development of landing sites as well as multiplication of fish
13. Presence of water needs which limit fish metabolism and movement of boats in the inland water bodies like L. Victoria.
14. Limited fish species of economic value.
15. Presence of shared water resources leading to uncultured fishing and dispute
16. Limited government support to the in some cultures people don't eat fish hence limiting markets.
17. Small market for fish and fish products ie in some cultures people don't eat fish hence limiting market.

Steps being taken to solve the problems affecting development of fishing industry in east Africa.

1. Encouraging fish farming to reduce pressure on the existing water bodies as well as reducing over fishing.
2. Fishermen are being encouraged to form cooperatives to help them markets their products as well as obtain loans.
3. Removing water needs mechanically and sometimes biologically.
4. Improving on the transport network by upgrading the existing roads linking landing sites.

5. Fish processing industries have been set up to ensure that they are processed by exports.
6. Educating the fishermen on the dangers of over fishing indiscriminate fishing and fish poisoning
7. Fishermen are being issued with licenses to reduce indiscriminate fishing.
8. Restocking of the over fished water bodies like Kyoga, George etc.
9. Patrolling of the waters and landing sites to keep security
10. Modernizing of the landing sites e.g Kasenye, Masese.
11. Broadening external markets through advertisements.
12. Provision of better fishing gears to the fishermen in form of motorized boats.
13. Promoting research on new species to maintain supply.
14. Establishment of add storage, facilities (ice plants) e.g in Luziro Masese Lamu etc.

TRANSPORT

Types: Road, Air, Water and Railway

Advantages of road transport

1. They are flexible hence can reach most parts of the country.
2. Cheaper and quicker over long distances.
3. Can be used to carry a wide range of goods from parcels to wide.
4. Roads can be built over steep gradients unlike railway lines.

Disadvantages.

1. Expensive over long distances.
2. Very large cargo cannot be carried at once.
3. Roads are costly to build and maintain
4. Susceptible to many accidents.

Advantages of Air transport.

1. Great speed
2. Time saving because of speed
3. No physical barriers e.g. mountains
4. Freedom of movement in air
5. Ideal for transporting light and expensive freight e.g Jewellery
6. Remote to inaccessible areas ca

Disadvantages.

1. Expensive for most people.
2. Limited carrying capacity
3. Interruptions by bad weather e,g thick fog. Ice snow and storms.

Advantages of Water transport.

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1. Cheap since less fuel is used
2. Heavy and bulky goods can be transported
3. Often less effected by joins and congestion.

Disadvantages.

1. It is slow and therefore unlit for perishable commodities.
2. Double coast of loading and unloading have to be incurred at the terminals.

Advantages of Water transport.

1. Movement of large qualities of cargo
2. Coaches or wagons can be designed for specialized goods.
3. Avoid congestion which is often found on roads,
4. The railway lines are much easier to maintain once laid.
5. Heavy and bulky commodities can be transported at ago

Disadvantages.

1. They are slow had to be incurred at terminals of loading
2. Not flexible as fixed routes must be followed and double costs

The Tazara/ Tanzam Railway.

The Chinese constructed this railway, it was opened in 1975, it runs from Dar-es-salaam in Tanzania to Kapiri-Mpashi in Zambia a distance of 1800km. it is owned by both the and Tanzanian government him for its constructions.

To provide a safer alternative route to the land locked Zambia

To encourage economic activities in South Tanzania by providing access to the Northern markets

To Export Zambia\s copper

To promote regional cooperation and inter territorial trade.

Sketch map showing the Tazara Railway and pipeline

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Contribution of the Tazara Railway

1. The railway has opened up an alternative route through the southern highlands of Tanzania.
2. It has helped in the exportation of copper from Zambia and D.R.C through the part
3. It has promoted regional cooperation and trade between Zambia and Tanzania.
4. Generation of employment opportunities to many people in Zambia and Tanzania e,g engineers,
5. The tazara railway has promoted tourism in the region thus an alternative source of forex.
6. It has led to the growth and development of urban centers like Kasama, Kapiri-Mposhi, Kidatu, Ndola etc.
7. It is also a major source of government revenue through taxation of goods on transit.

8. It has enabled the importation of goods into the land located
9. It has led to the development of infrastructure like Roads, schools Hospitals etc.
10. Source of forex abstained through taxation of goods and the chiriese.
11. It has facilitated the exploration of iron are from Mbeya region etc.
12. Sources of income.
13. It has led to industrial development.

The products carried by the railway

- | | |
|------------|----------|
| - Soda ash | - Gold |
| - Rice | - Sugar |
| - Iron ore | - Coal |
| - Salt etc | - Copper |

Problems faced by the Railway.

1. Congestion at port of Dar-as- salaam.
2. Delays in traffic and services due to congestion
3. Shortage of expert administrators because of inadequate foreign exchange.
4. Conslant break-down of machines (wagons)
5. Shortage of spare parts
6. Inadequate modern handling facilities at the port of Dar-es-Salaam.
7. Pollution of the environment
8. Little profits because the railway passes through unproductive
9. Inter state sabotage
10. Flooding which washes way the rolils
11. Competition from other routes for trade goods.

Solution to the above problems

1. Containerization to reduce congestion.

2. An oil pipeline has been constructed from Dar to Ndola.
3. New warehouses have been constructed at ubangi.
4. An oil terminal has been constructed to accommodate huge oil tankers.
5. Alternative routes have been opened e.g
6. Through Angola by Railway to lobito and Banguela
7. By road southwards to caps town, port Elizabeth and Duiban
8. Through Mozambique to port Beira
9. Through Malawi by road to port Salimi etc

ENERGY RESOURCES IN EAST AFRICA

Energy in east Africa is dandified into to main groups

1. Non-renewable Energy resources: these include oil, natural gas and coal.
2. Renewable Energy resources e.g. Biomas from vegetation matter e.g. coffee and rice husks sorghum husks.

Forest e.g. charcoal and firewood

- Solid energy
- Wind energy
- Geothermal energy obtained in the following areas, Sempaya, Rwagimpa, Kitagata, Kisiizi, Kibiro Kihangoro and Burabga (All in Uganda) Karia, Ebaru, L. Bogalo, Butor etc (Kenya)

Water for H.E.P generation. This type of energy is very clean i.e doesn't pollute the environment and it the main source of power for industries in east Africa

H.E.P production in East Africa

Factors Favouring the especially or development of River Dam projects /H.E.P dams in East Africa.

1. Presence of water fall necessary to turn the turbines
2. Presence of a large and ready markets for H.E.P
3. Presence of improved and appropriate technology for constructing as well as generation of H.e.P

4. Availability of adequate capital provided by the government and foreign investors.
5. Presence of large supply of labour for dam construction as well as its migration.
6. Availability of ready and reliable transport network.
7. Presence of a narrow river valley (Gorge) To increase on the speed of water to turn the turbines.
8. Availability of a large water reservoir inform of a lake.
9. Favorable government polices on power generation
10. Availability of regular and reliable water supply throughout the year. Provided by a permanent river

Several H.E.P dams have been constructed across east Africa and they include the following.

Uganda

Nalubaale power project (former Owen fall)

Is the most important sources of power project in east Africa opened in 1954. It has a capacity of 150 megawatts and generates over 97% of Uganda's exports 1/3 of its power to Kenya and Rwanda.

Mobuku power project on R. mebuku in Kasese District

N:B other potentral site for H.E.P generation in Uganda industries

- Bujjagali falls on R.Nile
- Karuma falls on R. Nile
- Murchisen falls R. nile
- Sszibwa falls R. ssezibwa
- Sippifalls in Kapchorwa district
- Maziba falls in Kabale

Tanzania

This smallest consumer and producer of H.E.P in East Africa.

The major project includes.

- Hale dam on R. pangani on Pangani falls
- Kidatu on great Rwaha
- Taita Taveta dam on R. pangani
- Stiegler's George project on Rufigi

Other potential include.

- Kalambo on Kalamba falls

Kenya

Kenya a much smaller H.E.P potential compared to Uganda Marjory on R. Tana and Ahi (Galana)

The most important project in Kenya is on R. Tana and the seven folks dam. The dam involved the construction of several

- Kindaruma (44)
- Kamburu (94 mega watts)
- Gitaru. (145 mega walts(

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Other potential sites on R.Tana include,

- Mutonga
- Kora Kora
- Grand falls
- Adam falls

Fourteen falls on R. Athi

Thompson falls on R. Ewaso. Ngiro

Lugard falls on R. Galaria

Webuye on R. Nzora etc.

Problems faced in the generation of H.E.P in East Africa

1. Fluctuations in the water levels i.e. lakes and rivers.
2. Inadequate skilled man power leading to over dependence on expatriates
3. Presence of inappropriate technology in the generation of H.E.P
4. Small markets due to poverty and low levels of industrial development
5. Limited capital
6. Competition from other sources of power.
7. High cost of transmission
8. Vandalism of the H, E, P facilities etc.
9. Presence of waterweeds.

Contribution of dams in East Africa.

1. Provide water for irrigation
2. Have helped to culture flooding of rivers
3. Promote tourism and thus sources of forex.
4. Source of government revenue through taxation,
5. Development of foreign exchange through power exportation.
6. Modification of climate through evaporation, condensation and then rain.
7. Modification of climate through evaporation, condensation and then rain.
8. Provision of employment opportunities e.g. engines.

9. Sources of income to the local people.
10. Diversification of the economy
11. The man-made lakes behind the dams have promoted fishing.

TRADE

Terms associated with trade

Barter trade

Visible trade

Invisible trade

External/ international/ foreign trade

Internal/ home trade

Balance of payments

Bilateral trade

Nature of trade

- a) Exports of east Africa (majorly primary products)
(Agriculture, Minerals, fish)

skilled man power.

- b) Imports- Machinery, Chemicals, Textiles, Vehicles, Weapons
Thermal power)

Barter trade- Exchange of goods for goods

Problem- Hard to get somebody who needs your commodity

- Double coincidence of goods.

Visible trade- Trade involving tangible goods

Invisible trade- Trade in services e.g tourism

External trade: Trade across boundaries or borders

Balance of trade – Difference between exports and imports

Balance of payments – Difference between the country's total profits from both invisible and visible goods and receipts from invisible and visible goods and receipts from invisible and receipts from invisible and visible goods.

Bilateral trade- trade carried out between two countries

Multilateral trade- between many countries.

UBANIZATION

This is the process where by an increasing proportion of the total population in a country settles in a town.

It is the process of growth and development of urban centers or nucleated settlements.

N: B the causes of urbanization are the some of rural urban migration
The major urban centers in East Africa include.

- a) Towns: Kmapala, Mbarara, Mbala, Nairobi Nakuru, Arusha, Dodoma
- b) Ports, (I) Inland ports eg
Bukoba, musoma mwanza, Kisumu, Jinja
Portbell, Kigoma Bukakata
(ii) Sea ports.eg
Mombasa, Malindi, Tanga, Lamu, Mtwara, Dar-es-salaam

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SITE AND SITUATION OF A TOWN

A site of a town is the ground on which it stands while situation of a town shows a town's position in relation to the surrounding areas.

FUNCTIONS OF URBAN CENTERS IN EAST AFRICA (PORTS AND TOWNS)

1. They act as Commercial Centers
2. They act as Industrial Centers
3. They act as Residential Centers
4. They act as Financial Centers
5. They act as Educational Centers
6. They act as Administrative Centers
7. They act as Tourist Centers
8. They act as Recreational Centers
9. They act as cultural Centers
10. They act as transport. Centers

PROBLEMS FACING URBAN CENTERS IN EAST AFRICA.

1. Limited accommodation facilities.
2. Unemployment
3. High crime rates
4. Easy spread of diseases
5. Inadequate social amenities
6. Pollution of the environment
7. Growth of dums with associated problems.
8. High cost of living

9. Limited space for expansion
10. Congestion
11. Careless people cause accidents

Solutions

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1. Vertical expansion i.e sky scrappers
2. Encouraging family planning
3. Enforcing law and order to reduce the crime rates
4. Emphasize laws that govern the development of modern cities.
5. Establishment of traffic lights
6. Construction of fly over
7. Development of rural areas.

NAIROBI

This is the largest town and industrial center of east Africa; originally it was a place for repairing railways

Factors for the growth and development of Nairobi city

1. Influence of early European and Asian administrators
2. Presence of rich agricultural hinterland.
3. Adequate supplies of power from Jinja and later from power project from river tana.
4. Existence of dense population that provided manpower.
5. Favorable government policies on urban development
6. Availability of large supplies of water from R. Tana
7. Favorable cool climate influenced by the Kenyan
8. Adequate Capital for the development of infrastructure
9. Presence of adequate and reliable transport network
10. political stability

MOMBASA.

Is the largest port in east Africa and the 2nd largest industrial town in east Africa it developed on Ria ground. It has the largest oil refinery in East Africa at a place called Changamwe.

Factors growth and development of Mombasa.

1. Presence of deep waters, which allow large vessels to anchor
2. Presence of a natural harbour which is well sheltered from the waves of the Indian ocean

3. Availability of hard basement rocks for the construction of the port
4. Presences of a large hinterland i.e., Kenya, Uganda Rwanda and DRC.
5. Presence of ice free conditions through the year permitting port activities
6. Presences of efficient transport network based on roads
7. Presence of many industries
8. Strategic location in relation to intentional markets
9. Influence of historical factors e.g. Mazrui families Asians and Portuguese.
10. Favorable government policies on port development
11. Presence of advanced and appropriate technology inform of containers, lifts etc.

JINJA

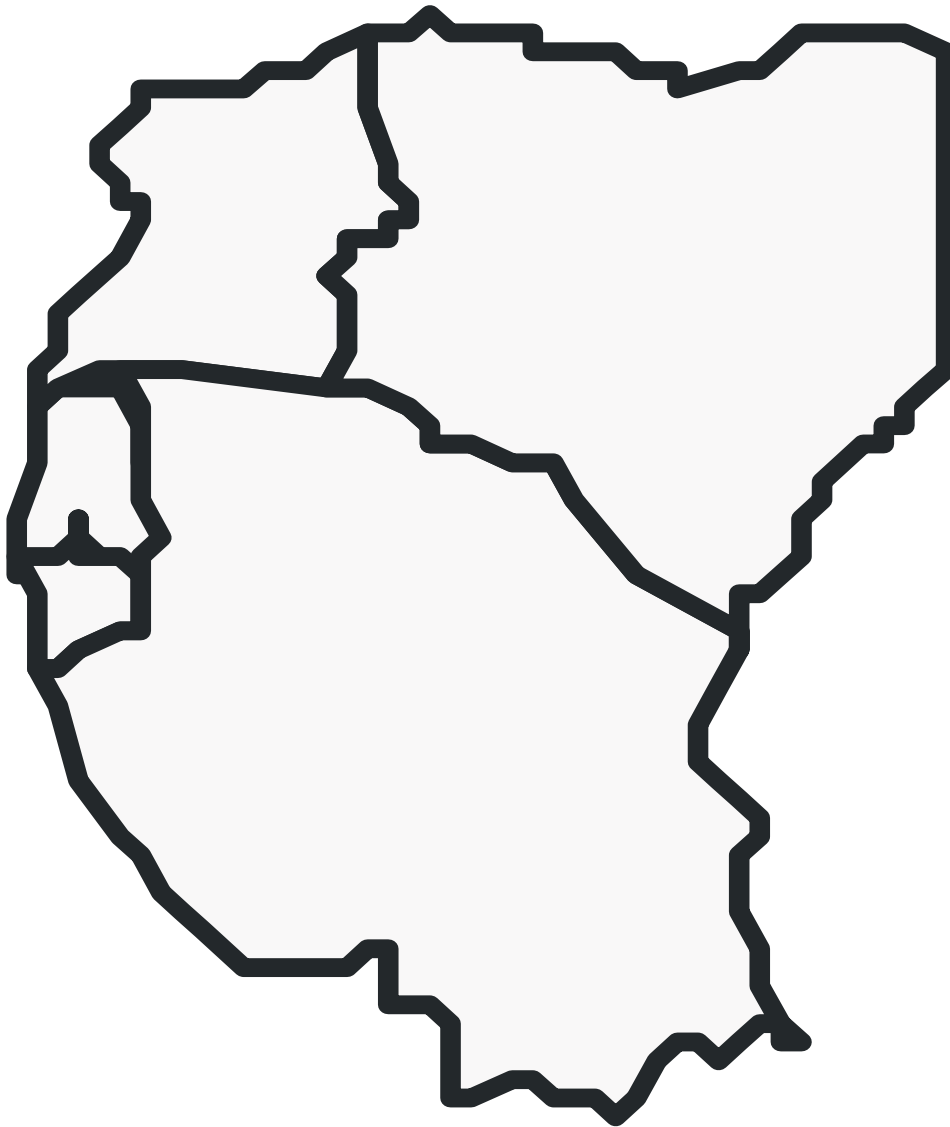
Jinja is located in the North of L. Victoria occupying a headland surrounded by water of the Napolion galf.

Factors for growth and development.

1. Presence of rich agricultural hinterland
2. Presence of vast land for port development
3. Favorable government policy for port development
4. Large supplies of H.E.P for u=industrial development from owen fall dam.
5. Presence of large supplies of water from the Nile and L.vicatoria.
6. Historical factors i.e it was a regional headquarters for the Eastern region and a seat for Kyabazinga .
7. Large population in the eastern region.
8. Adequate and reliable transport network based on the water railway and road.
9. Adequate capital for the development of the town

sEAST AFRICA

East Africa is made up of three countries Uganda ,Kenya and Tanzania .



THE RELIEF REGIONS OF EAST AFRICA

a) THE COASTAL PLAINS

These plains lie upon level beds of sedimentary rocks which run out as seal level below the coral reefs that fringe most of the coast. The plains are over 160km broad around the Tana River in Kenya and around the lower Rufiji River in Tanganyika. In the centre and South they narrow to 50km or less.

b) THE EASTERN PLATEAU

The Western edge of the coastal plains is marked in most places by a steep climb to the main African plateau. Its general level surface rises gradually towards the west, broken by steep sided, rounded insebergs and by occasional mountain ranges such as the Taita tills which rise to over 2,000m in South – east Kenya, this region is known as the Nyika (Swahili – on open, grass plain) a term which is sometimes applied incorrectly to other parts of East Africa.

c) THE RIFT VALLEYS

The Western Rift Valley is deep, with steep rugged sides, and holds river, large lakes, Albert Tanganyika, George, Edward, Malawi shipping and fishing on these lakes are often interrupted by violent storms.

The Eastern Rift Valley holds three other large lakes namely:- Turkana, Naivasha, Natron, Manyara, except in southern Kenya and northern Tanzania it is shallower and less sharply defined than the Western Rift Valley. To the South it splits and dies out; to the north, it extends beyond the frontiers of East Africa.

d) THE CENTRAL AND LAKE PLATEAU

Between the two Rift Valleys lie river saucer – shaped plateaus of average height about 1200m. most of the streams drain from the highland rim towards the level centre of each saucer. This explains the shape and shallow depth as well as the irregular and often swampy shore-line of the two main lakes namely Kyoga & Victoria. These lakes contrast sharply with the long, narrow, regular and sometimes very deep lakes of the Rift Valley.

e) THE HIGHLANDS OF EAST AFRICA

Rising above the general level of the plateau, form a separate and important geographical division. This is not because of them altitude but because of the cool, moist and healthy climate that results from it; and also because many of the highland areas consist of volcanic rocks which produce soils that are much more fertile than the average for East Arica. For both these reasons the Highlands offer better conditions for human settlement than any of the other regions.

A SKETCH MAP OF EAST AFRICA SHOWING THE RELIEF REGIONS OF EAST AFRICA

LAKES AND RIVERS IN EAST AFRICA

East Africa has a number of Lakes e.g L. Victoria , L. Tanganyika, L. Albert, L. Kyoga, L. George L. Edward, L. Turkana and Rivers e.g Nile, Pangani, Ruvuma , Tana, Kagera Kafu, etc Kilombero.

SKETCH MAP EAST SHOWING MAJOR LAKES AND RIVER ROCKS

IMPORTANCE OF LAKES AND RIVERS IN EAST AFRICA

19. Rivers / Lakes provide water for irrigation purpose e.g. L. Victoria R. Kilombero, River Nile.
20. Rivers / Lakes promote tourism in East Africa thus earn alternative source of foreign exchange.
21. Rivers / Lakes are source of Fish to the people of East Africa e.g L.Victoria,Kyoga, Nile, Tana etc.
22. They provide water both for domestic and industrial purposes.
23. Rivers / Lakes promotes Navigation i.e. water transport L. Victoria.
24. Rivers / Lakes promotes interstate cooperation.
25. Rivers / Lakes modify climate of the surrounding areas i.e L.Victoria, R.Nile, Pangani etc.
26. Rivers / Lakes helps in the generation of hydro electricity power eg L.Victoria, R.Nile, Pangani.
27. They are grounds for research and scientific study.
28. Rivers / Lakes provide employment opportunity for many people inh E.A e.g researchers , fishermen
29. Rivers / Lakes are dumping ground both for domestic and industrial wastes.
30. Rivers / Lakes promote Agriculture because of the alluvial soils.
31. Rivers / Lakes act as International boundaries L.Victoria, River Nile, Ruvuma.
32. Rivers / Lakes are grounds for recreation boating, swimming, sun bathing.
33. Rivers / Lakes are habitats for fish and other aquatic life.
34. They are resources of Government revenue through taxation and foreign exchange.
35. Lakes provide building materials inform of sand and clay.
36. They are grounds for mining

PROBLEMS FACING THE USE OF WATER RESOURCES IN EAST AFRICA

1. Presence of storms and waves which interfere with navigation and also lead to loss of lives and property.
2. Presence of water weeds.
3. Negative attitude of some people towards ting fish.
4. Shallowness of some lakes e.g. Kyoga, Victoria
5. Steep escarpments in some parts of the Rift Valley making rift valley lakes like Albert, Tanganyika inaccessible.
6. Seasonality of some lakes which interfere with navigation and fishing.
7. Flooding that paralyses other activities in East Africa like Agriculture.

8. Water pollution by industries.
9. Diseases like mabria and bilharea
10. Swampy shores of some lakes like Victoria making accessibility difficult.
12. Presence of waterfalls and rapids.
13. Low levels of technology.
14. Presence of predators and pirates
15. Poor fishing materials.

PROBLEMS FACED BY THE PEOPLE LIVING AROUND RIVERS

10. Flooding which destroy property and lives.
11. Accidents
12. Pollution by industries
13. Diseases the malaria and bilharzias
14. Pests and diseases like mosquitoes, water snails
15. Soil erosion and land slides
16. Unfavorable Climate conditions
17. Presence of protruding rocks e.g (rock out crops)
18. Many rivers are seasonal

ROCKS IN EAST AFRICA

A rock is an aggregate of minerals

In East Africa there are 3 types of rocks

4. Igneous rocks
5. Sedimentary rocks
6. Metamorphic rocks

MAP OF EAST AFRICA SHOWING THE DISTRIBUTION OF ROCKS

IGNEOUS ROCKS

Igneous rocks are fire formed rocks.

Igneous rocks are formed when molten rock (magma) under intense heat and pressure beneath the Earth crust is ejected out through crack/vent/lines of weakness onto the surface or within the earth crust.

The magma or molten rocks cools to form igneous rock. When magma comes out of the Earth crust, it is called lava.

When magma solidifies on the Earth surface extrusive or volcanic rocks are formed. They cool and solidify quickly in the open air and so they are fine grained e.g. basalt, sometimes or are glassy in appearance e.g. obsidian and some are spongy pumice. Other volcanic rocks include Rhyolite, Andesite etc.

Sometimes magma solidify deep within the Earth crust to form intrusive / plutonic / Abyssal rock. They cool slowly and minerals are coarsely crystallised e.g. granite, diorite, gabbro, peridotite, quartz, trachyte.

Magma may also solidify near the surface of the Earth crust to form Hypabyssal rocks e.g. diorite, Granophyre, perthite quartz, trachyte.

Characteristics of Igneous rocks

9. They are fire formed
10. They are crystallized rocks crystalline rocks
11. They are formed as a result of cooling and solidification magma.
12. They don't have fossils
13. They are hard and resistant to erosion.
14. They have large crystals when formed deep under the ground.
15. They are fine grained when formed on the surface e.g. basalt
16. Some igneous rocks are spongy and glassy in appearance.

SEDIMENTARY ROCKS

Sedimentary rocks are laid down and are stratified (layered)

Sedimentary rocks are formed when rocks are broken down by weathering, eroded, transported by wind and water and finally deposited in layers and later compacted or cemented to form sedimentary rocks.

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Sedimentary rocks can be formed by mechanical, organic or chemical processes.

1. Mechanically – Sedimentary rocks are formed when pre-existing sediments are broken down, eroded and transport and deposited in layers which compacted to form a hard rock e.g. clay, shale, gravel, mud stone, silt, sand stone, conglomerate.

2. Organically – these are formed from the remains of dead animals and plants which are later laid down and compressed to form a rock e.g. chalk, limestone, coral reefs, coal, etc.

3. Chemically – these are formed by the evaporation of water to form stones containing minerals. The minerals are then compacted to form a rock e.g. salt (edible), dolomite, Gypsum, potash, hematite, limonite, etc.

Characteristics of sedimentary rocks

9. They are layered (stratified)
10. The layers are separated bedding planes
11. They contain fossils (remains of dead plants and animals)
12. They are non – crystalline
13. They are laid down rock wastes
14. They are made up of sediments
15. Some are porous / permeable
16. Some are soft etc.

Metamorphic Rocks

These are changed rocks. They are formed when the pre-existing rocks (Igneous and sedimentary) are subjected to intensive heat and pressure causing change in the physical and chemical composition of the original rock e.g.

Original Rock

Limestone
Clay
Granite
Sand
Coal

Changed Rock (metamorphic)

Marble
Slate, schist, slate, shale
Gneiss
Quartzite
Graphite

Characteristics of metamorphic rocks:-

7. They are changed rocks due to heat and pressure

8. Their chemical and physical composition are different from original rock
9. They are brittle rocks
10. They are compacted rocks due to pressure and heat
11. They contain precious minerals like diamond, marble etc
12. They form the basement with the continental crust.

Importance of Rocks to the people of East Africa

17. Rocks contain valuable minerals such as copper, gold diamond thus promoting the mining industry in East Africa.
18. Sedimentary rocks contain oil and natural gas which are sources of energy or fuel.
19. Rocks provide building materials for construction purposes e.g. granite
20. Rocks especially sedimentary and igneous provide fertile soils for agriculture
21. Rocks give rise to soil formation which also promote agriculture or vegetational growth
22. Rocky areas and rock out crops provide beautiful scenery for tourism
23. The coral reefs shelter harbours from strong waves e.g. Dar-es-salaam and Mombasa port.
24. Rocks hold underground water and thus sources of water to man.
25. Rocks are sources of medicine e.g. lime clay etc
26. Rocks are ground for research
27. Rocks are raw materials to industries e.g. clay
28. Rocks are also important increase domestic use e.g.
29. Rocks in East Africa Inselbergs, mountains etc.
30. They are sources of income to the local people
31. They also lead to the provision of employment opportunities especially in the mining and quarrying industries.
32. Rocks are used for decoration purposes

Negative contributions of rocks (problems experienced by people living around rocks)

9. Rocks provide homes for wild animals which are dangerous to man and his property.
10. Promote soil erosion and land slides
11. They are barriers to transport and communication routes
12. Porous rocks lead to water shortage in some areas of East Africa
13. Hinder settlement and agriculture.
14. Some rocks when weathered lead to the development of poor sandy soils e.g. granite rocks.
15. Coral reefs hinder fishing and water transport
16. Rocks form mountains hindering settlement and other activities because of very low temperatures, steep slopes and aridity on the lee ward side.

Questions

1.
 - a) Differentiate between sedimentary and igneous rocks
 - b) Describe the process which led to the formation of:-
 - (i) Sedimentary
 - (ii) Igneous rocks in East Africa
 - c) (i) Explain the benefits of rocks to East Africa
 (ii) Outline the problems faced by people living (around rocks) in areas where either
 Sedimentary or igneous rocks are found.
 - d) Name any one area of East Africa where each rock is found.

2.
 - a) Name any three types of rocks found in East Africa
 - b) Describe the characteristics of any two types of rocks named in (a) above
 - c) For any type of rock named in (a) above, describe the processes which led to its
 Formation.
 - d) Explain the importance of rocks to the people of East Africa

LAND FORMS EVOLUTION IN EAST AFRICA (FEATURES)

They are a result of a number of processes. These processes modify the landscape to produce a number of land forms or features.

These processes are categorized into two.

- c) Endogenic processes which originate from deep within the Earth Interior i.e.
 - Faulting
 - Vulcanicity
 - Folding
 - Earth quakes
 - Warping

These processes are referred to as Earth movements or Tectonism.

- d) Exogenic processes which operate at close to the surface of the earth. They include:- Weathering - Deposition
 Mass wasting
 Erosion

FAULTING AND LANDSCAPE

Definition: Faulting is the fracturing / cracking / breaking of rocks doing which displacement takes place. This displacement may be vertical lateral or horizontal.

Faulting leads to the breaking of rocks, these cracks are called faults. These are three types of faults.

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- 4. Normal faults
- 5. Reversed faults
- 6. Tear faults

Faulting is caused by two forces

1. **Tension force**

These areas pull the earth crust apart leading to the formation of normal faults.

2. **Compression forces**

These forces act towards each leading to the formation of reversed faults.

Tear faults

Sketch map of East Africa showing the main faulted region in

Land forms due to faulting

In East Africa faulting has led to the formation of the following land forms

- | | |
|---------------------------------|-------------------------------|
| - Block mountains (Hosts) | - Rift valleys |
| - Escarpments / fault scarp | - Rift valley lakes |
| - Fault gilded valleys / rivers | - Mountain block / and scapes |
| - Fault line scarps | - Gravel |

Fault gilded valley

This is a river or stream following a fault line e.g. River Aswa, River Ewasu Ngiro, River Kerio (Uganda and Kenya respectively)

Escarpment / fault scarp

This is a steep slope formed when one slab or block of land slips/ falls downwards relative to the other.

They are normally seen at the side of the Rift Valley.

Examples of escarpments in East Africa e.g.

- | | |
|--------------------|--------------------|
| - Butiaba (Uganda) | - Ruaha (Tanzania) |
| - Mau | - Iringu |
| - Aberdare Kenya | |

- Nandi

Rift Valley

It is an elongated depression with fault scarps on either sides.

The East Africa Rift Valley is divided into two i.e. the Eastern arm which runs through Kenya and Tanzania. It contains numerous lakes like Eyast, Manyura, Nakuru, Naivasha, Elementeita, Magadi, Baringo, Turkan, Natron, Bugona, etc.

The western arm is deep and rugged and it contains five large lakes i.e. Albert, George, Edward, Tanganyika, Rukwa.

NB: The deepest Lake is Tanganyika

Most Rift Valley lakes are salty because they don't have intakes and outtakes.

SKETCH MAP OF EAST AFRICA SHOWING THE RIFT VALLEY AND ALL THE LAKES

These are many theories put forward to explain the formation of the Rift Valley e.g.

1. Tension forces

Convectional currents within the Earth crust cause, tensional forces which leads to the formation of parallel normal faults making the middle block unstable. Continuous tension makes the middle block to subside to form a Rift Valley

2. Compressional forces

Convectional currents within the earth crust cause compressional forces which lead to the formation of reversed parallel faults. Continuous compression, force the side blocks to thrust up to form a Rift valley.

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The over hanging sides of the Rift valley are within back by erosion.

BENEFITS / IMPORTANCE OF THE RIFT VALLEY TO THE PEOPLE OF EAST AFRICA.

1. The Rift Valley promotes tourism and thus a source of foreign exchange e.g. Lake Nakuru is the world's biggest flamingo attraction.
2. The Rift valley contains a number of lakes such as Tanganyika Albert etc. These lakes are sources of fish (food) is the people of East Africa.
3. The Rift Valley is a source of salt to the people of East Africa e.g. Lake Magadi and Lake Katwe.
4. The Rift valley such as Naivasha, Tanganyika, Edward etc. modify climate through formation of convectional rainfall.
5. The Rift Valley lakes further provide water for domestic industrial and irrigation purposes.
6. Rift valley lakes promote water transport.
7. the Rift valley acts as an international boundary e.g. the western arm is a boundary between Uganda and DRC.
8. The Rift valley provides employment to many people in East Africa e.g. miners, researchers, etc.
9. Ground for re-creation e.g. swimming, sun bathing, etc.
10. The Rift valley is also a ground for livestock rearing and wild life conservation.

PROBLEMS FACING THE PEOPLE LIVING ALONG THE RIFT VALLEY

7. Water in the Rift valley lakes is salty and thus not fresh for human consumption.
8. Soil erosion and landslides due to the steep slopes along the Rift valley.

9. Pests and diseases e.g. tsetse flies which spread sleeping sickness and Nagana
10. Steep slopes hinder human settlements
11. Earth quakes and aridity because these regions are within tectonic plates
12. Poor transport and communication network because of the steep Rift valley slopes

Rift valley lakes

These are lakes formed within the Rift valley floor.

NB: Rift valley lakes / Graben lakes are formed due to secondary faulting within the Rift valley floor. These basins are then filled with water to form Rift valley or Graben lakes e.g. L. Tanganyika, Albert, George, Turkana, Naivasha, etc.

Note: Explain the processes that led to the formation of Rift valley lakes

4. Rift valley are formed by faulting
5. They were formed by either tensional or compressional forces (explain the formation of the Rift valley)
6. Basin within a Rift valley was formed by secondary faulting which was filled by water to form a lake.

Grabens are depressions or basins within the Rift valley that when filled with water, they become Rift valley lakes.

Horst / Block Mountain

A block mountain is an upland bounded by rocks in one or both more sides.

Formation of Block Mountains

Block Mountains are formed by either compression or tensional forces.

1. Compressional forces.

Compressional forces acted on a stable block of land leading to formation of reversed faults.

Continued pressure forced the middle block to be uplifted to form a block mountain. The side blocks remained stable.

2. Tensional forces

Tensional forces acted on a stable block of land leading to its formation of normal faults. Continued tension leads to sinking /subsiding of the side blocks to form a block mountain.

Examples of Block Mountain in East Africa

Rwenzori (Uganda)

Mountain Mathias (Kenya)

Mountain Usambara

Mountain Ufipa

Mountain Uluguru

Mountain Mahenge

} Tanzania

A SKETCH MAP OF EAST AFRICA SHOWING BLOCK MOUNTAIN

IMPORTANCE OF BLOCK MOUNTAINS (MOUNTAINS)

14. Mountains are tourist attractions and thus sources of foreign exchange for development.
15. Sources of minerals e.g. copper and cobalt in Mountain Rwenzori
16. Mountains promote the development of forestry on either slopes e.g. Mt. Elgon forest reserve.
17. They also provide building materials in form of sand, clay and stones.
18. They promote wild life conservation e.g. Mt. Rwenzori National Park.
19. Mountains in East Africa modify climate through formation of aerographic rainfall
20. They attract dense settlement because of gentle slopes, fertile soils, heavy rainfall and low temperatures.

21. They act as water catchment areas i.e. forming sources of rivers in East Africa e.g. Nyamwamba river on Mountain Rwenzori, River Manafwa on Mt. Elgon.
22. They act as international boundaries e.g. Mt. Rwenzori on Uganda and DRC and Mt. Elgon between Uganda and Kenya
23. Mountains promote research and scientific study
24. They promote Agriculture due to deep fertile soils and heavy rainfall
25. Mountains are sites for telecommunication gadgets
26. Mountains promote re-creation as on Mt. Rwenzori where there is Mountain climbing.

PROBLEMS FACED BY PEOPLE LIVING IN THE HIGHLAND AREAS OF EAST AFRICA

10. Landslides which destroy lives and property
11. Pest and diseases
12. Poor transport network due to poor relief
13. Soil erosion on steep slopes which interfere with agriculture
14. Volcanic eruption which also destroy lives and property
15. Mountains act as hiding grounds for wrong doers (rebels)
16. Wild animals like snakes, lions, etc.
17. Low temperatures which limit human settlement
18. The steep slopes limit accessibility and use of land in mountain water rain shadow effect (aridity on the lee-ward)

THE SOLUTIONS TO THE ABOVE PROBLEMS MAY INCLUDE

12. Terracing
13. Contour ploughing
14. Growing of cover crops
15. Afforestation
16. Re-afforestation
17. Mulching
18. Resettlement of population
19. Mass education and awareness
20. Spraying of pests
21. Construction of winding roads
22. Improving on security

FOLDING

Folding is the bending of soft young sedimentary rocks due to compressional forces

Folding results into the formation of anticlines (hills) and synclines (valleys)

Folding can be seen around Kigezi Buganda hills, Bukoba sand stone hills

WARPING

Warping is a gental deformation of the earth crust over a considerable area as a result of compressional force.

Warping in East Africa has resulted into up and down warping of the earth crust.

Warping in East Africa has also led to the general subsidence of central Uganda form 2 lakes i.e. Lake Victoria and Kyoga and also reversed of the following rivers e.g. Kafu, Katonga and Kagera

EARTHQUAKES

An earth quake is a violent tremor of the earth. Earth quakes begin from the focus and the point above the focus as the epicenter

Earthquakes are often caused by collusion of tectonic plates which cause vibrations within the crust; it may also be caused by the movement of magma beneath the earth crust, man's activities etc.

The intensity of an earth quake is measured by an instrument called seismograph which is equipped with Richter scale to indicate the intensity of the earth quake.

In East Africa Earthquakes are common along the Rift Valley.

VULCANICITY / VULCANISM

Definition: Vulcanicity is the process by which molten rock (magma) and materials in solid, liquid and gases form the interior of the Earth are intruded into or extruded onto the surface of the earth through lines of weakness.

Vulcanicity on the other hand is a process by which molten rock (magma) is extruded or poured on the surface of the earth. Page | 199

Origin of Vulcanicity

The molten rock (magma) is in a semi-solid plastic form. This is due to the following:-

3. Great pressure exerted by the over lying laid rocks
4. Great heat beneath the earth crust due to friction of the tectonic plates.

NB: Convectional currents within the earth crust cause tensional and compressional forces which in turn create lines of weakness through which molten rock flows in /on to the earth.

When magma erupts on the earth surface is called Lava
There are 3 types of lava.

4. Acidic lava
This solidifies rapidly and flows for short distances. It is very acidic
5. Basic lava
Takes a long time to solidify and thus flow for long distances
6. Intermediate lava
This contains the characteristic of both acidic and basic lava

LANDFORMS DUE TO VULCANICITY

The landforms due to vulcanicity in East Africa are categorized into 2 i.e. Extrusive volcanic land forms (magma comes on top) and Intrusive volcanic land forms (magma remains inside)

2. Extrusive volcanic landforms

These are formed when magma is extruded on the land surface. They include the following.

- Volcanic mountains (volcanoes) e.g. Mufumbiro, Meru, Kenya, Kilimanjaro
- Volcanic plugs (Neck / spine) e.g. Tororo rock, Maweru peak
- Explosion craters e.g. Katwe, Basoti, Nyungu,
- Calderas e.g. Meru, Longonot, menengav, suswa, nafak
- Lava dammed lakes e.g. L. Bunyonyi, Mulehe
- Cumulo domes e.g. Nfumbi, Rurgwe
- Lava plateau / plain e.g Nyika plateau, Mau ranges
- Hot springs e.g. Kitagata, Molo, Kisiizi, Ssempaya

- Geysers e.g. L. Bogaia, and L. Hannington
- Fumeroles e.g. at the side of Nyamulagira and

VOLCANIC MOUNTAINS (VOLCANOES)

These are conical-shaped features formed by cooling and solidification of magma on the surface of the earth through lines of weakness. Page | 200

Formation of volcanic mountain

A volcanic mountain is formed when magma flows through the vent or lines of weakness (through an eruption or explosion), the materials building and accumulate on the surface of the Earth in layers to form a volcanic mountain e.g. Kilimajaro, Moroto, Napak, Mufumbiro, Elgon, Kenya, Meru, Muhavura, Oldonyo – lengai

SKETCH MAP OF EAST SHOWING VOLCANIC MOUNTAINS

Volcanoes are of different types e.g.

Ash and cinder e.g. Elgon, Teleki
 Lava cones e.g. Longonot Meru
 Composite cones e.g. Kilimanjaro, Muhavura
 Dissected cones e.g. Mt. Kenya
 Basal domes e.g. Mt. Nyamulangira
 Cumulo domese.g. Rungrve, Ntumbi.

Volcanoes usually pass 3 stages in their life cycle. In the beginning, eruptions are frequent and the volcano is active i.e. Active volcanic mountains.

They have rumbling sound e.g. Mt. Mufumbiro, Muhuvura, Ol donyo – lengai, Meru, Nyamulagira and Nyiragongo etc.

Later eruptions become so (infrequent that the volcano is said to be Dormant (sleeping) e.g. Kilimanjaro, Longonot (lava cone)

This is followed by a long period of inactivity Volcanoes which have not erupted in historic times are said to be extinct e.g. Elgon (Ash & Cinder)

NB: Highlands of East Africa are mainly formed by the following processes

Folding	-	Faulting
Vucanicity	-	Weathering and erosion

VOLCANIC PLUG / SPINE

This is a cylindrical feature formed when acidic lava solidifies within the central pipe and becomes harder e.g. Tororo rock, Mawenzi peak etc.

LAVE PLATEAUS / PLANS

This is an upland with a flat / gently sloping surface made of several layers of lava.

It is formed when basic lava, flows through lines of weakness through successive eruption e.g. Kisoro plains, Nyika plateau, Mau ranges, Laikipia plains, Kino plains, Valla plateau.

LAVA DAMMED LAKES

These are lakes formed when basic lava blocks a river valley e.g. L.Mulehe, Bunyonyi, Mutanda.

HOT SPRING, GYCERS AND FUMEROLES

Rain water and water from beneath seep through rocks and collect in under ground reservoirs.

During passage, it comes into contact with hot heated volcanic rocks and later emerge into the Earth surface due to great pressure as:-

- d) A stream or spring (This is called a hot spring) e.g. Kitagata, Kisiizi, Sempaya, Maji ya moto
- e) At regular intervals.(This is called a gycers) e.g. near L.Bogona, L.Hannington e.t.c.
- f) As hot gases or steam (This is called a fumerole) e.g. at the sides of Nyamulagira and Longonot mountains.

EXPLOSION CRATERS

These are shallow flat flowed depression surrounded by a low rim of pyroclasts (particles) and local or country rock.

It is formed when an eruption of gases, explodes and punches a hole in the ground.

The ash and dust thrown up will fall back around the

CALDERAS

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Calderas are formed in 2 ways

- c) Violent eruption which destroys the top of the volcano.
- d) It's also formed by a process known as cauldron subsidence of the top of the volcano following a volcanic eruption. e.g. Meru, Menengai, Ngorongoro, Napak, Langonot and Suswa.

INTRUSIVE VOLCANIC LANDFORMS

(Plutonic / Abyssal)

These are formed when magma cools and solidifies beneath the Earth crust. These landforms include; Batholith, Sills, Dykes, Lacolith, Lopolith.

BATHOLITH

This is a huge mass of magma formed at great depth e.g. Mubende batholith.

SILL

This is a sheet of magma lying along the rock strata or layers. It is a horizontal sheet of magma near Mobasa. In Thinka.

DYKE

This a vertical or inclined sheet of magma i.e. magma cuts across the rock strata or layers e.g. Sikulu hills in tororo.

Page | 204**LACOLITH**

This a dome shaped mass of magma almost at the surface of the Earth, e.g. Near Voi in Kenya.

LAPOLITH

This is a large sourcer shaped intrusion body. The sourcer shape is due to the weight of the Earth crust.

BENEFITS / IMPORTANCE OF VULCANICITY

2. Vulcanicity has led to a formation of a number of landforms. These landforms are important in East Africa in the following ways.

POSITIVE IMPORTANCE

15. The diversity of volcanic features like volcanic mountains, cumulo-domes, lava plateaus e.t.c. promote tourism and thus earn alternative source of foreign exchange.
16. Lava plateaus and lower slopes of volcanic mountains are favourable for agriculture because of fertile volcanic soils and heavy rainfall.
17. Volcanic landforms are sources of minerals e.g. diamonds from volcanic plugs, Limestone from the Tororo plug e.t.c.
18. They provide man with building materials e.g. granites.
19. Sills and dykes provide favourable sites for waterfalls where HEP is generated e.g. Thika falls.
20. Hot springs are sources of duo-thermal power e.g. around L.Nakuru and Bogoria and they are used for natural medication(contain sulphur good for the skin)
21. Volcanic landforms e.g. volcanic mountains are sources of rivers which provide water for domestic, Industrial and Irrigation purposes e.g. R. Sipi and manafna from Mt. Elgon.
22. Explosion craters are sources of salts e.g. L. Kwate.
23. Volcanic landforms are habitats for wildlife especially the volcanic mountains.
24. Volcanic mountains like Kilimanjaro, Elgon e.t.c. modify climate through formation of relief rainfall.
25. They are grounds for research and scientific study.
26. Volcanic mountains like Elgon act as international boundary between Uganda and Kenya.
27. Volcanic mountains promote forestry on their local slopes e.g. Mt. Elgon forest reserve.
28. Lava dammed lakes like Bunyonyi, Mulehe e.t.c. provide water for domestic, Industrial and Irrigation purposes.

NEGATIVE IMPORTANCE (PROBLEMS EXPERIENCED BY P'PLE LIVING AROUND VOLCANIC MOUNTAINS)

1. Danger of wild animals.
2. Landsides and soil erosion due to steep slopes.
3. Pollution of the environment.
4. Risk of earthquakes.

5. The upper slopes are too steep and cold for human use as well as settlement.
6. Danger of secondary eruption leading to loss of lives and property.
7. Difficulty to construct transport network.
8. Volcanic mountains are infested with tsetse flies.
9. Aridity on the lee-ward side due to rain shadow effect.

MEASURES THAT CAN BE TAKEN TO THE ABOVE PROBLEMS

8. Construction of winding roads.
9. Planting of trees on steep slopes.
10. Spraying with insecticides especially like the forests.
11. Application of soil erosion control measures like Terracing, Contour Ploughing, Strip Cropping, Inter cropping,
12. Irrigation farming on the lee ward side of mountains.
13. Carrying out agro-forestry to stabilize farming.
14. Application of farm yard manure to increase the water retention capacity of the soil.

INFLUENCE OF VULCANICITY ON AGRICULTURE

Positive

- Production of fertile volcanic soils.
- Orographical rainfall for the growth of perennial and
- Variety of crops can be drawn both temperate & tropic

Negative

- Aridity on the lee-ward side require irrigation
- Young volcanic soils are prone to soil erosion and

Porous volcanic soils are too fragile for continuous agricultural production

STEPS THAT SHOULD BE TAKEN TO IMPROVE ON AGRICULTURE

- Irrigation farming
- Agro forestry
- Terracing
- Application of farm yard manure
- Intercropping to provide cover crops for the fragile soils

Influence of vulcanicity on climate

- Influences rainfall on lee-ward side.
- Rain shadow effect on the windward side.
- Aspect i.e. the East and West facing slopes receive abound sunshine.

- Volcanicity has created highlands on which there is climatic variation.

GLACIATION IN EAST AFRICA

Introduction

Glaciation is a process of glacier formation and accumulation.

A glacier is a mass of ice flowing down slope or it's a frozen river. In East Africa, glaciers are found on the following 3 mountains, Mt. Rwenzori, Kenya & Kilimanjaro.

The level above which there is perpetual snow cover is called a snow line.

Glaciers perform 3 major roles i.e. erosion, transportation and deposition.

GLACIAL LANDFORMS

Glacial landforms are categorized into two:-

- iii. Glacial erosional landforms
- iv. Glacial depositional landforms

GLACIAL EROSIONAL LANDFORMS

Glacial erosional landforms are produced by 2 major processes i.e.

c) Plucking

This is tearing away of blocks of rocks by a glacier presence of a crack.

d) Abrasion

This is wearing or polishing away of rocks by a glacier.

Other erosional processes include the following:-

- Freeze and thaw
- Basal sapping

The above processes have led to the formation of glacial erosion landforms on mountains. Rwenzori, Kenya and Kilimanjaro.

These landforms include the following;

- Corrie /arête/crom
- Arêtes

- Pyramidal peaks/horns
- Hanging valleys
- Truncated spurs
- Crag and tail
- Roche montanee

6. CORRIE / CIRQUE / CWM

A corrie is a steep sided rock basin (arm-chair) formed by glacier erosion on the side of a mountain.

It is formed when water freezes into the cracks in rock and later breaking into particles.

NB:

If a corrie contains water, it is called a glacial lake or a tarn.

Examples of tarn in East Africa; Lake Teleki, Lac du Speke, Lac Catherine, L. Baker, L. Speke, Tyndoll.

7. ARETE

An arête is a narrow steep sided rock ridge or knife-edge like ridges separating two cirques e.g. Arête radiating eastward down to Mugusu valley.

8. PYRAMIDAL PEAK / HORN

This is a pointed peak formed where 3 or more arêtes meet.

It is formed by back wall recession.

NB: If a pyramidal peak peeps out a glacier, it is called a Nunatak.

9. U-SHAPED VALLEY

This is a broad valley with flat bottom. Originally it was a small valley but widened by processed plucking and abrasion e.g. Mugusu, Bujuku, Teleki valley e.t.c.

10. HANGING VALLEY/WATERFALLS

A hanging valley is formed when a small tributary joins a major stream of glacier. The major stream erodes its valley faster than its tributary. Thus deeper than the tributary valley.

This makes the tributary valley to remain hanging up as a hanging valley.

NB: The hanging valley will then pour its water into the main valley to form a water fall.

e.g. Speke glacier, joining Bujuku valley.

GLACIAL DEPOSITION LANDFORMS

The deposit or load carried by a glacier is known as moraine which can be;

- e) Lateral/side
- f) Dorsal (top)
- g) Medial (middle)
- h) Ground (bottom)

Glacial deposition landforms include the following

- Drift
- Tills
- Erratic
- Eskers
- Kames
- Out wash plain
- Kettle holes
- Moraine dammed

ESKERS

It is a long winding stick sided ridge lying parallel to the direction of the ice movement e.g. river Nithi gully valley, Mobuka valley

KAMES

This is an irregular undulating mounds of bedded sands and gravel deposited randomly.

KAME TERRACE

A narrow flat topped like ridge of sand gravel along the valley sides e.g. Kamusoso valley on Mt. Rwenzori, Hobley valley on Mt. Kenya.

Erratic

Boulders transported by moving ice for a long distance & deposited e.g. Nithi valley, Bujuku, Kamusoso valley.

Till plain

This is an extensive area of mountains landscape formed when moving ice transport boulders and clay covering former hills and valleys e.g. Teleki valley, Mobuku valley.

Drumlins

These are elongated hills formed when fragments of brown moraine are compressed by ice movements e.g. Teleki valley.

Outwash plains

A wide gently sloping plain of gravel, sand, clay and silt e.g. Kibo and Mawenzi on Mt. Kilimanjaro and Mobuku and Bujuku valleys on Mt. Rwenzori.

Moraines

Unsorted glacial deposits made up of boulders, clay, silt & sand.

Kettle holes

These are circular holes in glaciated areas formed when blocks of ice are detouched leaving behind circular depressions e.g. Mahoma kettle hole on Mt. Rwenzori.

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Moraine dammed lakes

Lakes formed when moraine blocks a river valley or stream.

NB: the lakes due to glaciations include the following:-

- Tarns
- Ribbon lakes
- Moraine dammed lake

REASONS WHY GLACIERS IN EAST AFRICA ARE LIMITED TO THE MOUNTAINS KILIMANJARO, RWENZORI AND KENYA.

Glaciers however are limited in East Africa because of the following:-

9. Many parts of East Africa have low altitudes i.e. below 3000m above sea level.
10. East Africa lies astride the equator where temperatures are high for glacial accumulation.
11. There is influence of global warming.
12. Deforestation.
13. Influence of volcanicity i.e. volcanicity is associated with high temperatures affecting glacial accumulation.
14. Large scale industrialization i.e. industries emit CO₂ into the atmosphere which raises temperatures affecting glacial accumulation.
15. The rain shadow effect especially on the lee ward side of mountains which doesn't allow the formation of glacier.
16. East Africa does not experience winter conditions.

Importance/Advantages of Glaciation in East Africa

12. Promote research and scientific study.
13. Glacial landform such as arête, pyramidal peaks e.t.c. are tourist attraction thus source of forex.
14. Glacial lakes in a glaciers are sources of rivers which provide water for domestic, Industrial & Educational purposes e.g. river Mobuku on Mt. Rwenzori which provide water to Mobuku irrigation scheme.
15. Moraines provide fertile soils for Agriculture.
16. Hanging for H.E.P generation
17. Glaciations promote finishing in the lakes e.g. Tarns, Ribbon lakes, Moraine dammed lakes.

18. Glaciations also lead to provision of construction materials especially the boulders.
19. U- shaped valleys provide natural route ways.
20. Glaciations promotes sports and re-creation e.g skiing on Mt. Rwenzori.
21. Provides employment to a number of people in East Africa.
22. Glaciations has led to the development of infrastructure e.g. roads, holes e.t.c.

Disadvantages of Glaciation

6. Promotes soil erosion and land slides (Avalanches) this may lead to the destruction of property and lives.
7. Formation of out wash plains which contain infertile soils for Agriculture.
8. Leads to cold temperatures discouraging settlements on Mt. slopes.
9. Glaciated areas sometimes turn into many small lakes thus making the area to be a waste land.
10. Melting of glaciers may cause flooding of rivers which destroys lives and property.

RIVERS AND RIVER SYSTEMS IN EAST AFRICA

A river is a body of water flowing over the land surface through a definite channel I a linear direction.

There are three forms of rivers:-

4. Permanent rivers.
5. Seasonal rivers.
6. Ephemeral rivers.

A place or point where a river begins is called a source which can be a spring, glacier, swamp, lake, e.t.c. and a place or point where it ends is called a mouth. It can be a swamp, sea, ocean, lake e.t.c.

The junction of two or more rivers is known as a confluence.

When a small river or a stream joins a major river is called a tributary.

The area drained by a river and its tributaries is called a river basin or a catchment area or a drainage basin e.g. lake Victoria basin e.t.c.

An area of a higher land that separates two or more basins is called a river divide or a water shed or water parting.

The main river and all its tributaries together form a river system.

A river regime is a seasonal variation of water volumes.

This can be simple (one), double (2) or complex (many).

The materials carried by a river are known as LOAD.

A river competence is a measure of the ability of a river to carry its load.

NATURE OF FLOW

The water in a river flows in two ways

3. Laminar flow

This is a smooth flow of a river over its base bed.

4. Turbulent flow

A river flows in a circular or rough manner because of flowing over a rough bed.

WORKS OF THE RIVER

A river performs three basic functions namely

2. Erosion 2. Transportation 3. Deposition

River Erosion

It involves the following processes

5. Attrition

A processes by which the load itself is broken down because the rock fragments are in motion and colliding with each other.

6. Corrosion /Abrasion

This is the wearing away of the sides and bed of the river channel by the load.

7. Solution

Soluble minerals dissolve in water and are carried away in solution.

8. Hydraulic Action

This is the mechanic source of moving water which is able to remove loose materials such as gravel, sand and silt.

River erosion operates in three ways:-

- d) Head ward erosion (lengthens the valley)
- e) Vertical erosion (Deepens the valley)
- f) Lateral erosion (Widens the valley)

NB: The lowest point to which a river can erode its bed is called Base level.

River Transport

A river transports its load in four major ways / processes.

5. Traction

This is the dragging /rolling of large materials on its bed e.g. pebbles.

6. Saltation

This is bouncing of small particles on its bed.

7. Suspension

This is the transportation of fine particles held in water (suspended) e.g. silt, mud e.t.c.

8. Solution

Small particles are dissolved in water and then transported e.g. lime stone.

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River Deposition

A river deposits its load when its energy to carry has greatly reduced. The materials deposited by a river are called alluvium.

River Profile

A river profile is a measured slope of a river along its base bed and surface from the source to the mouth. It's a cross-section of a river from its source to the mouth.

A river profile has three stages:-

4. Youthful /Torrent /Source /Upper stage
5. Mature /Middle /Valley stage
6. Old /Senile / Mouth / Flood plain

Youthful Stage

This is a stage where a river originates in East Africa, the following are in their youthful stages:-

- R. Mobuku
- R.Nile at Bujagali
- R.Manafwa
- R.Sironko
- R.Nyamwamba

Characteristics of the youthful stage

- The gradient is very steep.
- The water speed is very fast.
- Vertical erosion is dominant.
- No deposition
- The valley is very narrow
- Small volume of water
- The flow of water is turbulent (rough)

The major features or landforms in this stage include the following:-

Waterfalls, rapids, plunge pools, V-shaped valley, gorges interlocking spurs, pot holes.

Waterfall

A waterfall is a mass of water falling from a higher to a lower level. Waterfalls are formed in the following ways:-

- f) When a resistant rock lies across a river.
- g) When a river falls across a fault line.
- h) When a river falls across along the edge of a plateau.
- i) Where a river enters a hanging valley.
- j) When a river enters the sea at a cliff.

Examples of waterfalls in East Africa

- Sezibwa falls - Karuma falls - Sipi falls -
- Adamson
- Thinka falls

Plunge Pool

This is a depression at the bottom of a waterfall. Plunge Pool are formed by hydraulic action and abrasion.

Pot Holes

These are circular depressions on the river bed. They are formed when pebbles are carried by a swirling river cut circular depression in the river bed.

Rapid

A section of rough, fast flowing water in a river channel. Its formed where a waterfall has been eroded.

Page | 216**A Gorge (Canyons/Ravine)**

This is a deep narrow valley with high vertical banks resulting from vertical erosion.

V-Shaped Valley

These are formed by vertical erosion and they are pronounced in valleys with beds less resistant than those on the sides of the valley.

Interlocking Spurs

Vertical erosion rapidly deepens the valley. The river twists and turns around obstacles of hard rock erosion is pronounced on the concave banks of

the bends and these ultimately causes spurs (land projections) which alternate on each side of the river to interlock (Interlocking Spurs)

Interlocking spurs can be seen on the following rivers:-

- Semiliki
- Mobuku
- Nyamugasani

MATURE /MIDDLE STAGE /VALLEY STAGE

This is the middle stage in the river profile

X-tics of this stage

8. The gradient is more gentle
9. Lateral erosion is dominant
10. River meanders begin to form
11. The valley flow is wide
12. The speed of water is relatively slow
13. Deposition begins to take place
14. The valley has a U-shaped section

The landforms in this stage include U-shaped valleys, Meanders, River cliffs /Bluff, Slip off slopes e.t.c.

4. U-Shaped Valley

This is an original valley which has been widened by lateral erosion.

5. Meander

It's a current bend of river channel.

It is formed by an alternate undercutting and deposition at the concave and convex banks and the river channel respectively.

NB: The concave bank because of rampant erosion, a river cliff or bluff is formed while on a convex bank deposition is dominant leading to a formation of slip off slope.

Rivers with meanders in East Africa include the following:-

- R.Rwizi - R. Mpanga - R.Manafwa - R.Ngaila - R.Kagera

6. OLD STAGE

This is a stage where the river is about to reach its destination.

X-tics of old stage

7. The gradient is more gentle or flat.
8. There is much deposition.
9. The river flows in a wide flood plain.
10. The river carries a load consisting of majorly silt.
11. The H₂O is very slow and gentle.
12. Meanders and ox-bow lakes begin to develop.

Rivers in this stage include the following :-

- R.Rwinzi
- R. Moroto
- R. Malaba
- R.Nyando
- R.Tana
- R.Athi

The landforms in this stage include the following:-

- Ox-bow lakes
- Meander scars
- Flood plains
- Levees /bums
- Graded channels
- Deferred tributaries
- Delta

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Ox – bow lakes

An ox-bow lake is a crescent shaped final section of once pronounced meander but now cut off from the main stream.

Ox – bow lakes are formed in the flood plains with meanders which are very sharp that only a narrow neck remains.

During flooding, the narrow neck is broken through and the river by passes the meander cutting off by deposition to form an ox-bow lake (cut off or bayous)

When an ox-bow lake is filled with alluvium, it dries out living behind a meander scar.

Ox – bow lakes can be seen along the following rivers; Nzoia, Rufiji, Ngoula, Kilombero e.t.c.

Flood Plain

This is an area of land at the sides of the river which is susceptible to the periodic erosion.

Levees / bums

When a river is in the flood plain, it deposits most of its load close to the river side's forming embankments called levees/bums.

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Braided channels

A braided channel is a wide shallow channel in which a river divides and sub divides in a series of minor channels separated by islands of alluvium.

Braided channels can be seen on the following rivers Rufiji, Nzoia, Valo, Nyando, Sondu, Kilomboro.

Deferred tributaries and confluence

A deferred tributary is one which flows parallel to the main river for several kilometer before joining the river due to the levees.

The confluence at which the tributary joins the main river is called deferred confluence.

DELTA

A triangular low lying swampy plain which gradually is colonized by vegetation.

The growth of a delta interferes with the flow of the river causing the river to split up into several separate channels called distributes e.g. R.Rufiji

Stages in the formation of a delta.

4. The river reaches the coast and deposits sediments.

5. The river is obstructed by sediments and branches into distributaries to discharge more sediments brought down.

6. The delta takes a x-tics fan shape extending side ways and sea wards.

Conditions for Delta formation.

4. A river must have a large load.

5. The velocity of the river must be sufficiently low to allow most of its load to be deposited in the river mouth.

6. The river's load must be deposited faster than it can be removed by the action of tides and currents.

Types of deltas

There are 3 basic types of deltas

3. Arcuate Delta

This delta consists of both coarse and fine sediments and it has the shape of an inverted cone crossed by numerous distributaries e.g. Nile Delta, Niger Delta.

4. Birds' Foot Coarse

This delta consists of very fine materials and it has a few long distributaries like the foot of a bird.

NB: landforms as a resultant of river action therefore can be categorized into two

3. Erosional landforms

They include the following:-

- V-Shaped valley
- Waterfalls
- Plung pools
- Rapids
- Interlocking spurs
- Cliffs or bluffs
- U – shaped valleys

4. Depositional landforms

e.g. Meanders, Ox-bow lakes, Meander scars, flood plain, levees or bums, deltas, alluvial fan e.t.c.

RIVER CAPTURE

It is the diversion of part or whole of a river into a system of another adjacent powerful river able to erode its valley or rapidly than its neighbor.

The following conditions must be in place for river capture to take place

4. Two rivers should be flowing parallel to each other.
5. The pirate river must have more water than its neighbor.
6. The pirate river should flow over easily over eroded rock.

River capture happens when one river with a big erosive floor/power elongates its basin at the expense of a weaker one.

The powerful river erodes backwards (head ward erosion) and eventually capturing the flow of a weak river.

Alter Capture

NB: the bend at which piracy occurs is called elbow of capture. The captured stream is called misfit or beheaded stream. The valley below the elbow of capture is called wind or dries.

RIVER REJUVENATION

It is a renewed erosive activity of river.
It may be caused by the following.

5. Earth movements of uplift
 - Down warping
 - Tilting
6. Lowering of the sea level.
7. Increase in the stream volume due to increased rainfall.
8. Decrease in the load that a river is carrying e.t.c.

River rejuvenation has led to a formation of no of land forms in East Africa. These landforms include:-

6. River Terrace /rejuvenation terrace

This is a step or bench like feature formed on a side of a river after the river has renewed its erosive power or activity.

7. Valley – in – valley

This is a new valley created within an old valley after rejuvenation.

8. Incised meander

This is a curve or bend of a river that has been deeply cut vertically (Incised) after rejuvenation.

Incised meander can be of two types

c) Entrenched meander**d) Ingrown meander**

9. Knick point /Rejuvenation head

This is a break of slope in the long profile of a river caused by renewed erosive activity knick points are good sites for the generation of HEP.

DRAINAGE PATTERNS

A drainage pattern is a plan/design/layout by a river and its tributaries. Its how a river & its tributaries are arranged on the Earth surface.

9. Trellis/Rectangular pattern

e.g. Aswa. The tributaries joined the main stream at more or less right angles.

it develops in areas with heterogeneous rocks and faulted area.

10. Dendritic drainage pattern

It looks like a tree trunk and its branches. They develop in areas with homogenous rocks and a gentle slope.

11. Radial drainage pattern

Rivers flow from a central point (highlands) downwards in many directions e.g. R. Manafwa, R. Sipi on Mt. Elgon e.t.c.

12. Parallel drainage pattern

The rivers flow parallel to each other for a long distance. E.g. R. Mayanja and Kato.

13. Centripetal drainage pattern

River converges into a central point from all directions.

14. Barbed/Hooked drainage pattern

Tributaries flow in the opposite direction of the main river before joining at acute angles e.g. R. Katonga, Kagera & Rwizi.

15. Angular

Rivers join at sharp angles and arranged in series of curves around a basin.

16. Braided

Rivers divided and subdivide in series of interconnecting minor channels separated by sand banks.

Diagrams

5. Trellis / Rectangular pattern 2. Dendritic drainage

3. Radial drainage pattern 4. Parallel drainage pattern

10. Centripetal drainage pattern

6. Barbed / Hooked

7. Angular

8. Braided

COASTLINES

Definition of terms

COAST

It is that broad area where the sea or lake comes into the contact with the land.

SHORE

This is that area near the coast lying between the higher and the lowest water levels.

BEACH

This is an accumulation of deposits (sand, shingles e.t.c.)

WAVES

These are oscillations on the surface of the water body. These waves move up and down to create troughs and crests.

Waves are caused by the following:

5. Wind duration
6. Catastrophic events like earthquakes
7. Effects of moving objects in water e.g. ships large sea animals
8. Wind velocity and fetch (distance travelled by waves on the water surface)

Waves are of two types:

3. Destructive waves (storms)

These destroy the coastal lands.

6. Constructive waves (gentle waves)

They build on the coastal land or beaches.

NB: swash:- is when water runs up on the shores sweeping materials forward on the slope.

When water is exhausted the water runs back to the sea under the influence of gravity, this is called a back wash.

Landforms or features due to wave action

Wave action along the coast results in the formation of two types of landforms

- C. Wave erosional landforms
- D. Wave depositional landforms

WAVE EROSIONAL LANDFORMS

These landforms are brought about by the following process

5. Abrasion or corrosion

The load in form of boulders pebbles and sand are hurled against the shore line by the waves.

6. Hydraulic Action by the waves

This is the wave force heating against the shore line by compressing air in areas of weakness.

7. Corrosion/Solution

This is the solvent action of waves on soft rocks like limestone.

8. Attrition

The load carried by the waves are broken to successive smaller particles by heating each other as they move.

The wave erosional landforms therefore include the following:-

- i. Bays /Inlets /Coves
- j. Headlands /Cape/Promontories
- k. Cliffs
- l. Inlets /Geos
- m. Stacks /Chimney /Skerries
- n. Arches
- o. Stump
- p. Blowhole /gloup

Headland & Bay

Headland is a piece of land projecting into a water body. A Bay on the other hand is an indentation of the coastal lands by water.

Formation

On exposed coasts, the continued action of waves on rocks of varying resistance causes the coast line to be eroded irregularly. This is pronounced where hard rocks like granite occur in alternate bands with softer rocks. The softer rocks are eroded back to form bays inlets or coves e.g. Murchison and Kibanga bays on lake Victoria. The harder resistant rock persists to form headlands or promontories or caves e.g. Kibanga headlands on L.Victoria and Watamu on the Keyan coast.

CLIFFS AND WAVE OUT PLATFORM

A cliff is a steep rock face along the coast.

Cliffs are formed when waves cut a notch (small opening) on the coastal land by abrasion hydraulic action and solvent action of waves.

Repeated wave action will enlarge a notch transforming it into a steep slope called a cliff.

A wave cut platform is a bench like feature sloping sea-wards below the cliff it is formed when the cliff recedes (erode backwards) leaving behind a gentle sloping platform called wave cut platform.

Caves, Blow Holes (gloop) and a geo (Inlet)

A cave

A cave is a cylindrical tunnel drilled through the cliff or headland by wave erosion.

The breaking of waves compress air in areas of weakness like faults enlarging it to form a cave.

A BLOW HOLE/GLOOP

It is a vertical shaft above the cave.

splashing of waves against the roof of a cave may enlarge the joints when compressed air is trapped. A natural shaft is thus formed which may eventually pierce through to the surfaces. This is called a gloop or blow hole.

A Geo is a narrow sea inlet formed when the roof of the arch collapses.

Arches, Stacks and Stumps

An arch is a raised bridge like feature above a passage drilled through a headland. It is formed when two caves approach one another from either sides of a headland and unite or join.

The roof of this arch may collapse leaving a piece of land detached at a sea or lake to form a stack

These stacks may be worn down by wave erosion to form a small related landform called a stump.

LANDFORMS DUE TO WAVE DEPOSITION

Materials along the coast are transported by long shore drift and deposited along the coast to form wave depositional landforms. These landforms include beaches, sand bars, Spits, Cuspate foreland, Tombolos and Mud flats.

A BEACH

A beach is a coastal accumulation of sand and shingle (small rounded stones) on the shore or coast. Examples of beaches in East Africa:- Mombasa beach, Gaba beach, Lutembe beach, Lido beach, Imperial beach, Nyali beach.

SAND BAR

This is an elongated ridge of sand or shingle running roughly parallel to the coast.

Page | 231**SPITS**

This is a low narrow ridge of pebbles or sand joined to the land at one end with the other terminating in the sea or lake e.g. Tonya spit on L.Albert, Nabugabo spit on L.Victoria.

CUSPOTE FORELAND

This is a large triangular deposit of sand and shingle projecting seawards.

TOMBOLO

This is a spit which grows at the coast linking an island to the coast e.g. Bukakata tombolo on L.Victoria.

MUD FLATS

This is a flat form of mud composed of silt or alluvium formed along gently sloping coasts especially in bays, estuaries and delta.

EUSTATISM /EUSTATIC MOVEMENTS

Eustatism refers to changes in the sea level which may be positive involving a rise in sea level or negative involving a fall in sea level relative to the coastal land.

The changes in the sea level may be caused by the following:-

6. Increased plaviation (rainfall) and desiccation (drought).
7. Glaciations (freezing) and deglaciation (melting).
8. Increase in temperature will lead to a rise in sea level because H₂O expands when heated from beneath.
9. Tectonic movements e.g. uplift of the coastal land down warping of the coastal lands. Expansion and contraction of ocean basins.
10. Sedimentation of materials into ocean basins.

LANDFORMS DUE TO SEA LEVEL CHANGES

Sea level charges have led to the formation of two types of landforms e.g.

a). **Submergence coasts.**

These landforms are formed when there is rise in sea level and include

e.g.

1. **Hord** – Narrow sea inlet (Not found in East Africa) filled with water during deglaciation.
2. **Ria /Creek** – This is a drowned river valley formed due to a rise in sea level e.g. Kilindini harbor, Port Tudor, (Mombasa) Mtwapa and Kilifi creeks (Dar-est-salaam)

7. Estuary

This is a wide shallow drowned river mouth formed as a result of a rise in sea level e.g. R.Rufigi and R.Mwachi.

8. Dalmatian /Longitudinal coasts

These are highlands running parallel to the coast due to a rise in sea level e.g. Islands of Pemba, Mafia and Zanzibar, Chake –Chake.

b). Emergence Coasts or Landforms

these are formed when there is a fall in sea level. They led to the exposure of the formerly submerged landforms.

Such landforms include:-

4. Raised beach (Former beach)
5. Raised cliff (Former cliff)
6. Raised terrace (Former wave at platform)

CORAL REEFS

A coral reef is a limestone rock made up of skeletons of tiny marine organisms called polyps. These skeletons contain calcium CaCO_3 carbonate that when polyps die their skeletons accumulate on the continental shelf to form white coral limestone rocks.

Coral reefs occur on the East Africa coast especially at Bamburi, Mombasa.

Conditions or Factors for coral growth

9. The ocean waters must be warm between 20-30°C.
10. The water must be salty.
11. There must be an environment of water.
12. The water should be shallow.
13. There should be presence of polyps or marine organisms.
14. Presences of a continental shelf on which the corals grow from.
15. The water should be clear, clean and oxygenated.
16. Absence of strong currents to interfere with coral reefs accumulation.

TYPES OF CORAL REEFS

There are three types of coral reefs.

4. Fringing reef.

This is a coral platform up to 1km wide, joined to the coast or separated from a shallow lagoon.

5. Barrier reef.

This is a coral platform separated from the coast by a wide and deep lagoon.

6. An Atoll.

This is a circular coral reef or a ring of coral surrounding a fairly deep lagoon.

ECONOMIC IMPORTANCE OF CORAL REEFS TO MAN IN EAST AFRICA

13. Coral reefs provide man with raw materials for the manufacture of cement.
14. Coral reefs are tourist attractions and thus alternative sources of foreign exchange.
15. They protect the ports from direct wave attack e.g. port Mombasa.
16. Coral reefs are sources of minerals e.g. petroleum.
17. Lagoons within the coral reefs provide grounds for re-creation e.g. swimming and sun bathing.
18. The lagoons also provide water for domestic, industrial and irrigation purposes.
19. Coral reefs promote industrial development e.g. the Bamburi cement factory in Mombasa.
20. Coral reefs provide employment to many people e.g. miners, industrial workers, researchers e.t.c.

21. Coral reefs are sources of fertile soils for agriculture especially the growing of cloves and coconut.
22. They are grounds for research and scientific study.
23. Sources of fertilizers like SSP.
24. Coral reefs are platforms for port development.

Problems /Disadvantages of Coral Reefs.

5. Hinder fishing and navigation e.g. fringing and barrier,
6. The lagoons are breeding grounds for mosquitoes and snails which spread malaria and biharzia respectively.
7. Some coral reefs lead to the formation of poor and infertile soils which are not suitable for agriculture.
8. Industries related to coral reefs like the Bamburi cement factory pollute the environment.

DENUATION

Denudation is the wearing down of the Earth crust.

It involves the following processes:-

4. Weathering
5. Transport (Mass wasting and erosion)
6. Deposition

WEATHERING

Weathering is the breaking or shattering of rocks on site (In Situ). Its also the loosening, decay and break up of rocks into smaller fragments.

TYPES OF WEATHERING

There are three types of weathering

4. PHYSICAL OR MECHANICAL WEATHERING
5. CHEMICAL WEATHERING
6. BIOLOGICAL OR ORGANIC WEATHERING

4. PHYSICAL WEATHERING

The breaking of rocks into two increasingly smaller particles without causing any chemical change in the rock.

The processes of physical weathering include the following:-

h. Exfoliation (Onion Weathering)

During day time rock surfaces expand and during night rock surfaces contract. Repeated expansion and contraction due to temperature changes will lead to peeling off of rock surfaces. This leads to the formation of a smooth rounded dome called an exfoliation dome. E.g. Soroti rock, Kachumbala and Mubende hills, Kalongo hills, Kongwa and Akia hills.

Exfoliation is common in the dry areas of East Africa

i. Frost action /Frost shattering

This type of weathering is common on the following mountains. Kenya, Rwenzori and Kilimanjaro.

During day, water collects in the cracks between the rocks. During night when temperature fall the water freezes into ice and its volume increases. This exerts pressure leading to the breaking up of rocks.

j. Rock Disintegration (Crystal Growth)

This is caused by enlargement of salt crystals between rock grains when the crystals are moistened. Heating and cooling and occasional dampening cause physical expansion of salts particles creating stress and loosening surface grains.

This type of weathering is common in North Eastern Kenya e.g. L.Maggadi and L.Katwe.

k. Pressure Release (Uncalculating)

This occurs where the rock mass has been exposed by the removal of the over lying rock beds or debris the gradual release of pressure causes the rocks particularly granite to expand leading to the breakup of rocks.

1. Block Disintegration

This takes place in well jointed rocks, alternate expansion and contraction widens the rock joints and the rock will eventually break into smaller blocks along the widened joints. This type of weathering is common in the desert and semi-desert areas of East Africa.

m. Granular weathering

This break down is due to different minerals in a rock mineral grains expand and contract at different rates and times causing stresses and eventual break down of rocks.

n. Alternate Wetting and Drying (Slaking)

Alternate wetting and drying of rocks lead to contraction and expansion of rocks leading to break up. It is common in the coastal areas of East Africa.

5. CHEMICAL WEATHERING

Chemical weathering is the decomposition or decay of rocks due to chemical reactions that take place between the rock minerals.

Water and certain atmospheric gases like oxygen & CO₂.

The processes of chemical weathering include the following:-

6. Hydrolysis

- The reaction between H₂O and mineral elements. It's a major process in the decomposition of feldspars.

7. Oxidation

- It's that reaction that occurs when additional oxygen is taken up by a mineral compound.

8. Solution

- This is the dissolving of rocks and carried away in a solution for.

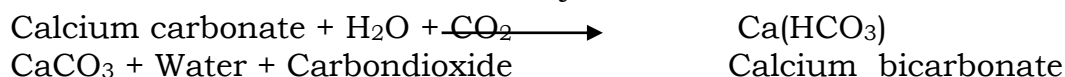
9. Hydration

- A process by which certain minerals absorb water and expand causing internal stress and fracturing of the rock.

NB: Chemical weathering is common in the coastal areas of East Africa. The shores of lake Victoria and highlands above 200m above the sea level.

10. Carbonation

- A reaction between rocks containing limestone and rain water to form a weak carbonic acid which eats away the rock.



Carbonation leads to the formation of Kaarst Scenery e.g. Stalactites and stalagmites, Grikes and Clikes.

NB: Water in limestone areas like Eastern Uganda. The coastal areas and then Nyakasura carry calcium water when it evaporates, it leaves behind solid calcium carbonate (stalagmites). As moisture drips, calcium is deposited to form stalactites.

6. BIOLOGICAL OR ORGANIC WEATHERING

It is break down or decomposition of rocks by living organisms.

This can take the form of chemical or organic weathering.

The processes of biological weathering include:-

5. Respiration of vegetation and soil organisms which raises the levels of vegetation and carbondioxide.
6. Burrowing and churning animals like rabbits, earthworms, termites e.t.c.
7. Influence of human activities like stone quarrying, road construction, rock dredging for port development, Industrial activities e.t.c.
8. The growing of plant roots through the rocks.

FACTORS INFLUENCING THE RATE AND CHARACTER OF WEATHERING

5. Climate (Rainfall and Temperature)

Equatorial areas because of high temperatures and rainfall promote chemical weathering because of the presence of H_2O .

Arid and semi-arid areas have low cloud cover, low rainfall and high temperatures. Thus promoting physical weathering.

Indirectly climate influences the growth of vegetation which promotes biological weathering.

Rainfall influences weathering through the intensity of falling on rocks.

6. Parent Rock (Nature of the original Rock)

This is the rock which is broken down and influences weathering through its texture e.g. brightly coloured rocks are less weathered physically compared to dark coloured rocks.

The texture of rocks will also influence weathering, coarse rocks break faster than fine grained rocks because the expansion and contraction capacities of coarse rocks are greater than fine grained rocks.

Soft rocks are weathered faster compared to hard rocks.

7. Relief (Topography)

Relief determines the rate and time of weathering because it determines the speed at which weathered materials are quickly removed.

Weathering therefore is faster on gentle slopes because of the rate of removal of weathered materials (debris)

8. Living Organisms

The longer the time taken for weathering process to operate, the deeper the weathering and the shorter the time the shallower the weathering.

IMPORTANCE OF WEATHERING POSITIVE

8. It leads to the formation of soils and thus boosting agriculture.
9. It leads to the formation of different landforms like tors, exfoliation domes, earth pillars etc. these landforms are tourist attractions and hence sources of foreign exchange.
10. Weathering also leads to the exposure of minerals i.e promoting the mining industry.

NEGATIVE IMPORTANCE

11. It promotes mass washing and soil erosion. These are destructive to man as well as his crops.
12. The kaarst scenery is barren and thus not suitable for agriculture.
13. Weathering destroyed buildings.
14. Weathering hinders agricultural mechanization.

SOIL.

Soil is a weathered layer of parent rock covering the Earth's surface which sustains plant growth.

It is a natural accumulation of unconsolidated particles and organic matter (humus) that covers the Earth's surface and forms the supporting medium of plant growth.

It is formed when rocks are weathered into tiny particles e.g. loam, clay, alluvium etc.

The importance of soil to man.

10. Soil promotes Agriculture because it forms the supporting medium of plant growth.
11. Soil forms bases for research and scientific study.
12. They are sources of minerals like gold.
13. Soil provides employment to a number of people leading to earning of income builders, brick makers, miners etc.
14. Soil a platform for construction (settlement).
15. Soil provides building materials to man e.g. sand.
16. Soil promotes industrial development by providing raw materials such industries include tiles industries, ceramics industries.
17. Soils are used for decoration purposes.
18. Soils modify climate through formation of rainfall.

The composition of soils.

Soil has the following contents/composition.

1. Inorganic Matter (minerals)-plant food.
2. Organic Matter (humus)-adds colour, fertility of the soil.
3. Water-used by living organisms.
4. Living organisms-Air provision.
5. Air.

SOIL TERMS.

6. Soil texture.

This is the physical size of soil particles.

7. Soil Ph

This is the degree of acidity and alkalinity of the soil.

8. Soil structure.

9. **Soil profile and soil Horizon.**

Soil profile is the vertical section through the soil to underlying solid rock.

Soil horizon is the horizontal layering of the soil.

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10. **Soil catenia.**

This is the arrangement of soils down slope or .The horizontal sequence of soils along the slope.

NB: Its formation is influenced majority by relief.

6. **Leaching.**

This is the removal or washing down of soluble minerals like aluminium and silica from the upper layer to the deeper layer of the soil.

Leaching is responsible for the formation of laterites (murram soils). They are formed when surface cover of decayed rock fragments recements laterites are usually stained rake red .These soils are of little nourishment for plants because useful in road construction and brick making.

7. **Elluviation.**

This is the movement of solid materials in solution/suspension from one place to another in the soil.

8. **Illuviation.**

This is the precipitation and accumulation of leached and elluviated materials in the B horizon in the soil profile

FACTORS INFLUENCING SOIL FORMATION.

2. **Parent rock.**

This is the rock material that breaks down to form soil particles (regolith) soft rocks like limestone are weathered quickly to form deep soils while hard rocks like granite weather slowly to form thin soils.

The colour of the rock will also determine whether the soils will be deep or thin. Coarse grained parent rock gives rise to deep soils while fine grained soils give rise to shallow soils.

4. Climate (Temperature and Rainfall).

Rainfall leads to flooding which speeds up the rate of weathering, the intensity of rain falling on rocks will also influence soil formation. Temperature changes further will influence soil formation etc.

Climate also influences the growth of vegetation which adds on humus in the soil.

3. Living Organisms

(eg burrowing and churning animals like rabbits, earthworms, termites etc).

The vegetation provides humus which is a very important aspect in the soil.

Man through his activities may also influence soil formation e.g. construction, deforestation, mining, industrialization, agriculture etc

4. Relief.

Steep slopes form shallow or thin soils because of excessive run off which prevents deep weathering while gentle slopes form mature soils because the rate of removal of soil is the same with rate of deposition.

Valley relief promotes water logging and leaching leading to poor soils.

5. Time.

Rocks which have had a long time of operation of the soil formation forming processes have less time tend to be shallow and immature.

SOIL EROSION IN EAST AFRICA

Soil erosion is the removal or washing away of the top soil by agents like running water, wind, moving ice and animals.

Types of soil erosion:

In East Africa there are 3 types of erosion

2. WIND EROSION:

This type of erosion is experienced in the following areas Machakos (Kenya), Northern Uganda (Kilimanjaro), Northern Kenya (Turkana), Nyanza Province (Kenya) Ankole Masaka, Kondoa (Tanzania)

The Kondoa district in central Tanzania experiences severe soil erosion in East Africa.

2. BIOLOGICAL / ORGANIC EROSION:

3. WATER EROSION:

The following are the processes of water erosion.

v. Splash erosion

Which is the impact of rain drops directly on the soil.

vi. Sheet erosion

This is the uniform removal of top soil by water

vii. Rill erosion

An even removal of the top soil by water

viii. Gulley erosion

This is the deep cutting of the grooves on the land by water. It's the common type of erosion in the Kondoa district (Tanzania). Running water is by far the most important, wide spread and destructive as far as erosion is concerned in East Africa.

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In East Africa Soil erosion is common on highlands, the East Africa Rift Valley, mining areas and areas with heavy rainfall.

Soil erosion by glacier is expanded on the following mountains; Kenya, Kilimanjaro, Rwenzori.

Causes of soil erosion

Physical causes and Natural causes

5. Relief – steep slopes such as the slopes of Mt. Elgon, Kilimanjaro etc. promote soil erosion especially if there is no vegetation and there is heavy rainfall.
6. Heavy rainfall on steep slopes e.g. Kigezi in South Western Uganda
7. Constant occurrence of drought which leaves the land bare for agent of erosion e.g. North Eastern Uganda, Northern Kenya, Central Tanzania.
8. Earth quakes

SKETCH MAP OF EAST AFRICA SHOWING AREAS AFFECTED BY SOIL EROSION

Human factors / causes of soil erosion

(Accelerated caused by man's activities)

10. Monoculture i.e. the growing of one crop over and over again leads to soil deterioration and then soil erosion.
11. Deforestation – cutting down of trees on steep slopes leaves the land bare for agents of erosion e.g. Kigezi highlands, Kenya highlands and Mt. Elgon.
12. Over cropping without a period of rest like the Kenyan highlands, Kigezi highlands, and slopes of Mt. Kilimanjaro.
13. Overgrazing by the pastoralists resulting from keeping too many animals for the available pastures e.g. Karamoja lands, Masai and Turkana lands.
14. Ploughing the land up and down the slope without use of natural manures.
15. Burning of grass by the pastoralists also leaves the land bare to agents of erosion.
16. Increase in population leading to over use and misuse of the land.
17. Cultivation on steep slopes
18. Open cast mining

Effects of Soil Erosion

12. Loss of soil fertility and thus decline in crop production
13. Soil erosion pollutes the environment through the dust.
14. Gully erosion interferes with Agriculture mechanization.
15. Erosion leads to over flooding of rivers due to constant deposition of silt.
16. It leads to death of animals due to lack of pastures
17. It also leads to famine due to decline in crop production
18. Soil erosion also leads to the death of aquatic life due to deposition of silt.
19. It leaves the soils bare for further erosion
20. It leads to growth of poor vegetation thus leading to high temperature and low rainfall (drought)
21. It leads to the destruction of the environment e.g. gully erosion.

22. It leads to the formation of landforms e.g. inselbergs; volcanic plugs, etc thus promoting tourism

Soil Conservation Methods / Measures to Reduce soil exhaustion and erosion.

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14. Contour ploughing especially on hilly areas.
15. Crop rotation
16. Controlling over grazing and bush burning.
17. Family planning control measures e.g. Kabale, Kenya highlands
18. Afforestation and Re-afforestation.
19. Educating the people about dangers of soil erosion.
20. Carrying out mulching and inter-cropping
21. Terracing. This is the most effective measure against soil erosion on hilly or mountaneous areas.
22. Application of fertilizers to improve on the soil structure.
23. Planting of cover crops like pumpkins, beans, potatoes, water melon
24. Agro-forestry – planting selected trees along the crops.
25. Strip – cropping i.e. growing of crops in strips along the slope altering with grass.
26. Digging of pits along hill sides. This is practiced by the Umatengo of South Eastern Tanzania.

MASS WASTING OR MASS MOVEMENT

Definition:

Mass wasting is the downhill or down slope movement of materials under the influence of gravity. It is the creeping, flow sliding or falling of rocks and weathered materials the influence of gravity.

NB: Mass wasting in East Africa is common on highlands or mountains like Elgon, Kilimanjaro, Kenya, Rwenzori, etc. Clift mining holes, rift valley sides (escarpments), quarries and others.

A. THE SLOW FLOWAGE (CREEP)

These include the following;

3. Soil creep: this is a slow movement of fine and unconsolidated materials on gentle slope caused by alternate cooling and heating or wetting and drying.
4. Solifluction: this is a slow movement of solid gravel and weathered saturated materials over frozen grounds.

B. RAPID FLOWAGE TYPES (LANDSLIDES)

These include the following:

7. Slumping: this is the trust movement of debris and rock wastes over steep slope
8. Rock slide: this consists of a bedrock wash sliding on a flat surface either on a fault plane, bedding plane or joint plane.
9. Rock fall: this is a fast movement of materials over a steep slope.
10. Mudflows: this is a rapid movement of mud, gravel and unconsolidated materials, super saturated and flowing over a steep slope.

11. Earth flows: this is a rapid down slope movement of water saturated materials against a steep slope.
12. Landslides: this is a fast movement of weathered materials over a steep slope.

CAUSES OF MASS WASTING

9. Heavy rainfall along steep slopes
10. Earthquakes and volcanic eruptions
11. Nature of the rock e.g. fault plane, joint plane, bending plane.
12. Mining activities
13. Deforestation, overgrazing along slopes
14. Nature of the slope i.e. steep slope
15. Overloading of materials along the slope
16. Nature of the soils

EFFECTS OF MASS WASTING

8. Loss of lives and property
9. It blocks roads and also destroys bridges.
10. Displacement of people which calls for expensive resettlements
11. Destruction of agricultural land
12. Damming or blocking of rivers to form lakes e.g. L. Mbak (Tanzania)
13. Destruction of the landscape/scenery
14. Destruction of forests (bio-diversity) e.g. Mt. Elgon

MEASURES OR SOLUTIONS

7. Afforestation and re-afforestation along steep slopes
8. Evacuation or displacement of people during rainy season.
9. Carrying out practices like terracing contour ploughing, mulching, etc.
10. Controlling grazing
11. Prohibit agriculture on steep slopes
12. Controlling grazing on slopes and massive education and awareness.

LAKES IN EAST AFRICA

A Lake is a body of water occupying a hollow or depression on the earth surface.

Lakes can be small or large, temporary or permanent, fresh or salty etc.

Examples of lakes in East Africa include; Victoria, Kyoga, Tanganyika, Naivasha, Rukwa, Nakuru, Turkana, Malawi, Magadi, Albert, Edward, George.

CLASSIFICATION OF LAKES ACCORDING TO ORIGIN OR FORMATION

5. TECTONIC LAKES

They are formed as a result of earth movement and they include the following:-

- a. Rift valley lakes: these lakes were formed by faulting caused by tensional or compressional forces that caused fracturing of the earth crust. Page | 249

Forces pushed sideways the side blocks while the central blocks sunk forming a forming a rift valley

A basin (hollow or depression) in the rift valley was formed due to secondary faulting.

The basin was then filled with water to form a rift valley lake or Graben e.g. L. Natron, Albert, Turkana, Magadi.

NB: Rift valley lakes don't have swampy vegetation. These are long, deep and narrow. They have salty water because they have inlets and no outlets.

Both down warping and upward processes led to the formation of troughs and ridges (rims)

Warping was caused by earth movements

Warping led to reversed drainage of rivers which filled the basin leading to the formation of a lake e.g. R. Kafu, R. Katonga, R. Nzoia, R. Kagera to form L. Victoria.

Examples of these lakes are L. Kyoga and L. Victoria.

These lakes have swamp vegetation along their shores have fresh water and they have many islands.

Qn: a) Draw a sketch map of East Africa on it mark and label lakes Victoria, Tanganyika, and Magadi. Rivers: Kafu, Athi and Rufigi

b) Describe the processes which led to the formation of any one lake above.

c) Explain the economic benefits of lakes in East Africa

d) outline the problems facing the use of water sources in East Africa

2. VOLCANIC LAKES

These lakes are formed as result of volcanic activities e.g. Caldera lakes which are formed on extinct mountains e.g. Ngorongoro

3 EXPLOSION CRATES e.g. lake Katwe

These lakes are circular and occupy small areas

4 LAVA DAMMED LAKES

These are formed when lava blocks a river valley e.g. L. Mulanda, L. Munyonyi, L. Mulehe, L. Kivu, L. Butale

5) EROSION LAKES

These are formed by erosion activities e.g. glacial lakes e.g. L. Michealson, L. Teleki, Bujuku, Lake Catherine, L. Stanley, Lac du Speke.
Kelle lakes e.g. L. Mahoma (Mt. Rwenzori) L. Etlis (Mt. Kenya)

6. DEPOSITIONAL LAKES

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- a) Ox-bow lakes e.g. Rwizi, Tana, Nzoia, Mara, Valla, Nyando.
These are by River deposition.
- b) Lagoons e.g. Nabugabo. These are by wave deposition
- c) Moraine dammed lakes e.g. L. Tyndall, L. Ctris)

7. MAN MADE LAKES e.g.

- a) Valley dams
- b) Mining holes e.g. L. Kajansi, L. Kibimba, etc
- c) L. Kabaka ie. To connect Lubiri to L. Victoria
- d) Owen falls dam

Qn. Draw a sketch map of East Africa and on it, mark and draw all Tectonic lakes (Rift valley lakes) down warped lakes.

A SKETCH MAP OF EAST ARICA SHOWING TECTONIC LAKES (RIFT VALLEY LAKES) AND DOWN WARPED LAKES (L. KYOGA AND VICTORIA).

ASSIGNMENT

Qn: Draw a sketch map of East Africa and on it mark and label

- vi) Lakes; Victoria, Tanganyika, and Magadi
- vii) Rivers; Kafu, Athi and Rufigi
- viii) Describe the processes which led to the formation of anyone lake above a(i)
- ix) Explain the economic benefits of lakes in East Africa
- x) Outline the problems facing the use of water resources in East Africa

WEATHER AND CLIMATE OF EAST AFRICA

Weather is the state of the atmosphere of a particular given place and time. It is the state of the atmosphere of a place for a short period of time.

Climate is the average weather conditions of a given place measured and recorded after along period of time usually 30 – 35 years.

These elements of weather include the following

Element	Instrument
Pressure	Barometer
Humidity	Hygrometer

Rainfall	Rain gauge
Sunshine	Sunshine recorder or Campbell stokes
Temperature thermometer	Maximum and Minimum thermometer or six's
Cloud Cover	Observation
Wind speed	Anemometer
Wind direction	Wind Vane or Weather cock
Visibility	Observation

The measurement and recording elements of weather are done in a weather station. A weather station therefore is a place where all elements of weather are measured and recorded.

NB: Atmospheric pressure is the force exerted on the Earth surface by the weight of the atmosphere.

6. Temperature Inversion is the increase, in temperature with increase in altitude.
7. Temperature inversion is the higher you go the cooler/warm it becomes.
8. Environmental lapse rate – this the decrease in temperature with increase in altitude.

CLIMATE TYPES AND REGIONS OF EAST AFRICA

Broadly speaking the climate of East Africa can be categorized into 3 major types

3. Equatorial climate
4. Tropical climate or Savannah

EQUATORIAL CLIMATE

The equatorial climate, in East Africa has been modified due to altitude water bodies etc. to increase the following types.

- d) Equatorial lake shore type (True Equatorial Climate)
This type of climate is around L. Victoria region
- e) Modified Equatorial types
This is found around the plateau and highlands
- f) Coastal Tropical Type, which is along the East Africa coast
Equatorial climate region therefore extends from Lamu in Kenya to Tanga area south of R. Pangani in Tanzania, along L. Victoria basin (Buganda), Nyanza province – Bukoba, etc.

Characteristics of Equatorial Climate

9. Heavy rainfall of between 1500 – 2000 mm well distributed throughout the year.
10. High/Hot temperatures between 21 – 27°C
11. High humidity throughout the year of 80%
12. High cloud cover
13. Double maxima (peaks) or rainfall

14. Small annual range of temperature of between 2 – 5°C
15. Rainfall is mainly correctional
16. No district dry season is experienced in this climate

Bukoba in Tanzania

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Month	J	F	M	A	M	J	J	A	S	O	N	D
Temp o c												
Rainfall mm												

Draw a graph to represent the above data.

TROPICAL CLIMATE (SAVANNAH)

This type of climate is divided into 2

- c) Tropical Northern i.e. Northern Uganda and Central Tanzania
- d) Tropical Southern i.e. Southern Highlands of Tanzania

This type of climate in East Africa is extensive covering North, Eastern and Western Uganda. Most of Tanzania especially the southern parts and South West Kenya

Characteristics

- High/Hot temperatures throughout the year between 25 – 30°C
- It experiences one maximum peak of rainfall (Unimodal)
- Modal rate rainfall of 750 – 1000 mm per annum.
- Moderate temperature range going up to 10°C (5-10°C)
- Mean annual temperature is high i.e. 21oC
- Wet season alternates with dry season

Gulu in Uganda

Month	J	F	M	A	M	J	J	A	S	O	N	D
Temp o c												
Rainfall mm												

Draw a graph to represent the above data

NB: The economic activities carried out in this climatic region include:

Bee keeping, charcoal burning, wild life conservation, fruit gathering, growth of annual crops like millet, sorghum, maize, etc.

SEMI DESERT AND DESERT CLIMATE

This region stretches to North Eastern Tanzania, Eastern and Northern Kenya to North Eastern Uganda (Karamoja), Ankole Masaka corridor etc.

Characteristics of this climate:

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7. High temperatures of about 30°C/Hot temperatures
8. Very little rainfall ranging from 325-620mm per annum.
9. Rainfall is unreliable
10. Daily/Diurnal range of temperature is very large.
11. Low humidity
12. Mean annual temperature is high

NB: The common type of vegetation include scrub, thicket and thorny bushes, Cacti, Euphorbia, etc.

MONTANE / SUB TROPICAL CLIMATE (Cool High Climate)

This type of climate is limited to the highland areas of East Africa e.g. Kenya highlands, Rwenzori, Elgon, Kilimanjaro etc.]

Characteristics

6. Heavy rainfall of over 2000mm
7. Receives orographic / relief rainfall
8. Low temperature due to high altitude
9. Low humidity due to low temperatures.
10. Dense cloud cover due to the high condensation resulting from low temperatures.

**SKETCH MAP OF EAST AFRICA SHOWING THE CLIMATIC TYPES
/RAINFALL PATTERN**

KEY:

1. Coastal tropical climate
2. Cool highland climate
3. Tropical Northern climate
4. Lake Equatorial climate
5. Modified Equatorial climate
6. Desert / Semi desert climate
7. Tropical climate / Savannah

FACTORS INFLUENCING THE CLIMATE OF EAST AFRICA

11. Relief / altitude
12. Latitude / Distance from the Equator
13. Influence of winds like the North Eastern and South Eastern trade winds
14. Distance from water bodies
15. Vegetation cover
16. Cloud cover
17. Man's activities e.g. industrialization, deforestation
18. Influence of the ITCZ (Inter Tropical Convergence Zone)
19. Ocean currents / sea and land breezes
20. Influence of aspect i.e. direction in which the land faces the sun.

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RAINFALL DISTRIBUTION IN EAST AFRICA

Rainfall is water vapour but it takes the form of tiny drops of water

For rainfall to form, the following conditions must be met;

- e) Air must be saturated
- f) Air must be cool
- g) Air must contain small particles like dust to act as nuclei for rainfall formation.
- h) Rainfall in East Africa is uneven distributed, some areas receive heavy rainfall while others receive low or moderate rainfall.

In East Africa there are 3 types of rainfall.

4. Convectional rainfall e.g. Entebbe, Kampala, Mwanza, Bukoba,
5. Orographic/relief rainfall e.g. Elgon, Rwenzori, Kilimanjaro, Kenya etc
6. Cyclonic/ frontal rainfall e.g. around the equator (not common)(look at the formation and characteristics in S.1 Book Geography)

Climatic calculations

6. Mean daily temperature (MDI) = $\frac{\text{MAX} + \text{MIN}}{2}$
7. Daily range of temperature = $\text{Max} - \text{Min}$
8. Mean monthly temperature = $\frac{\text{Sum of mean daily temperature of 1 month}}{\text{Numbers of days in that month}}$
9. Mean Annual temperature = $\frac{\text{Sum of mean monthly temperature for 1 year}}{12}$
10. Mean Annual Rainfall = $\frac{\text{Sum of mean monthly Rain fall for 1 year}}{12}$

THE FOLLOWING FACTORS AFFECT OR INFLUENCE RAIN FALL UNIT AND DISTRIBUTION.

6. Relief /Altitude

High land areas receive more rainfall than low lands of lower plateau e.g. Kigezi Highlands, Kenyan Highlands, Elgon, Kilimanjaro, Meru.

NB: Most Highland of East Africa Receive rainfall on the South east Slopes (effect of Aspect)

7. Winds

The North East westlines and the south east trade winds mostly affect rain fall distribution in East Africa

8. Nearness to water bodies :

Areas near water bodies receive heavy rain fall than those far away from water bodies.

9. Man activities like Deforestation and forestation, industrialization,

10. Vegetation

Areas with dense forests receive heavy rain fall while areas with skunty vegetation receive / low rain fall.

NB: 1. Humidity is the amount of water vapour in the atmosphere

2. Relative humidity is the ration of the actual amount of water vapour present in a given volume of air at a given temperature and atmospheric pressure, measured in percentage.

3. Absolute humidity is the total amount of water vapour that is actually present in a given volume of air at a given temperature and atmospheric pressure.

Lines on maps showing equal places with;

10. Temperature – Isotherms
11. Pressure – isobars
12. Rainfall – isohyets
13. Sunshine – isohels
14. Cloud cover – isonephs
15. Sea bed with equal depth – isobaths
16. Ocean with equal salinity – isohaline
17. Equal intensity of earthquake shokes – isoseismal.
18. Altitude – contours.

VEGETATION OF EAST AFRICA

Vegetation refers to all plant life which it includes trees, pastures, shrubs herbs e.t.c. Vegetation can either be natural or artificial.

NB: East Africa is mostly covered by grass lands compared to forests

MAJOR VEGETATION TYPES IN EAST AFRICA

East Africa has the following major vegetation types

6. Equatorial forests (Trpical rain forests/Selva)
7. Savannah vegetation
8. Desert /Semi desert vegetation
9. Montane / Highland vegetation
10. Mangrove forests

SKETCH MAP OF EAST AFRICA SHOWING MAJOR VEGETATION TYPES IN EAST AFRICA

EQUATORIAL FORESTS

These forests are categorized into two i.e. lowland forests and highland or Montane forests.

c) Lowland forests

These forests are found in the lowland areas of East Africa e.g. Mabira, Bwindi Impenetrable, Kibale, Ssesse forests, Budongo forests, Maramagambo, Kisii, Bugoma, Bukoba forests e.t.c.

Their existence has been favored by the following factors.

6. High humidity
7. Heavy rainfall of more than 1500mm per annum
8. High temperatures of over of 27°C
9. Low altitude of between 1000 – 1500mm above sea level
10. Presence of deep fertile and well drained soils

Characteristics of Equatorial Lowland Forests

10. The trees are ever green throughout the year i.e. trees shed their leaves at different intervals.
11. The trees are not in pure stands i.e. they have many different tree species.
12. The trees take long to mature (50-80yrs)
13. The trees have broad leaves.
14. Trees have little or no undergrowth.
15. The forests have little or no undergrowth.
16. The trees are of hardwood species e.g. mahogany, red wood, green heart, red heart, rose wood, ebony, iron wood e.t.c.
17. The trees have thick canopies (layers) which are divided into three.
18. Trees have buttress roots with numerous climbing plants.

d) Montane or Highland Forests

They are found on highlands of East Africa e.g. Rwenzori, Elgon, Kilimanjaro, Meru, Kenya e.t.c.

The major tree species e.g. cedar, podocarp, Bamboo, Camphor e.t.c.

Montane forests are favoured by the following factors;-

6. Heavy rainfall of over 1500mm per annum.
7. Cool temperatures modified by altitude.
8. Well drained fertile soils.
9. Limited man's interference.
10. Relatively high altitude of between 2500m above sea level.

Characteristics

7. The trees are ever green.
8. They appear in pure stands.
9. Trees have small leaves.
10. They are characterized by a single canopy.

11. Trees are mainly of soft wood species.
12. The forests have thick cover of moss and tree ferns.

Economic Importance of Equatorial Forests

13. Equatorial forests modify climate of the surrounding areas through evapotranspiration which leads to the formation of convectional rainfall.
14. Equatorial forests attract tourists because they harbor a number of wild animals of tourist's interest.
15. They are alternative sources of foreign exchange.
16. They provide employment opportunities to a number of people e.g. Lumber jacks, Forest rangers, researchers.
17. Equatorial forests help in controlling soil erosion.
18. They provide raw materials for industries such as saw mills, pulp and paper industries.
19. They provide constructional materials like timber.
20. They provide grounds for research and scientific study.
21. They are sources of energy in form of fire wood, charcoal e.t.c.
22. They provide man with a variety of fruits which are wild. (Wild fruits) and herbs.
23. They promote re-creation i.e. They provide grounds for picnics.
24. Provides good scenery.

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SAVANNAH VEGETATION

It covers more than $\frac{1}{2}$ of East Africa. This type of vegetation is categorized into three;-

c) Savannah woodlands (Mombo)

They are found towards the equatorial forests in the following areas;- Murchison falls National Park, Ntungano, Mubende, some parts of N. Ug, Central Tanzania, Rakai.

Savannah woodlands are favoured by the following conditions

4. High temperatures of between 27-30°C
5. Moderate rainfall between 760-1000mm per annum.
6. Fairly fertile and well drained soils.

NB: The main economic activity is bee keeping

Characteristics

8. The trees are umbrella shaped.
 9. Trees are deciduous and are thorny.
 10. They have long top roots.
 11. The trees form the continuous cover i.e. shot and scattered.
 12. They store water in their trunks.
 13. The trees are drought and fire resistant.
 14. They are thick barks with small leaves to control transpiration.
- E.g. baobab, Acacia e.t.c.

d) Savannah Grasslands.

They are found in areas with 750-1000mm rainfall in the following areas, Nyika, Tsavo National Park, Bukoba, Central Tz, E.Uganda e.t.c.

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They are favoured by the following:-

7. Moderate to heavy rainfall (750-1000)
8. Fairly high relative humidity
9. High temperatures of between 28-30°C
10. Fairly fertile soils
11. Low lying gentle relief
12. Alternating wet and dry seasons

Characteristics

5. They are composed of mainly grass with scattered trees. Major activities, animal conservation, nomadic pastoralism.
6. The trees are short, scattered and are umbrella shaped.
7. The trees are also deciduous in nature.
8. The trees are resistant to drought.

The major species of grass include elephant grass, specially grass, tussock grass e.t.c.

Dry Bush Savannah

They are found in areas which receive rainfall of between 250-500mm. majorly occupied by nomadic pastoralists e.g. N.E.Uganda, Ankole masaka corridor, N.Tz and Kenya as well as the flow of the W.Rift valley.

Factors which favoured it include:-

5. High temperatures.
6. Low rainfall of between 250-500mm.
7. Low humidity.
8. Fairly fertile soils.

Characteristics scanty

5. Vegetation is scattered, some areas have bare ground.
6. The trees are thorny with few leaves.
7. They have long tap roots.
8. The leaves and stems are waxy.

Importance of Savannah Vegetation

8. It promotes Agriculture especially cattle rearing because of abundant pastures.
9. The woodlands resources of timber and other building materials.

10. Grounds for settlement because of the flat nature of the land scape.
11. The vegetation also controls soil erosion.
12. The vegetation promotes research and scientific study.
13. The savannah vegetation promotes bee keeping and hunting.
14. Used for wild life conservation which promotes tourism.

ALPINE /MONTANE VEGETATION

This type of vegetation is found on the highlands of East Africa like Mt. Kenya, Elgon, Rwenzori, Kilimanjaro.

Semi Desert and Desert Vegetation

This vegetation is found in the dry semi desert areas of East Africa like North East of Uganda (Moroto and Katido), Turkana land (N.Kenya), Parts of Central Tanzania.

The following conditions favour their existence

5. Poor sandy soils.
6. Hot temperature of over 35°C.
7. Very little and unreliable rainfall of about 250mm.
8. Low humidity.

Characteristics

7. Trees are drought resistant.
8. They shed off their leaves during dry season.
9. They have woody stems.
10. Trees store water in their trunks.
11. Trees are very short and scattered.
12. The leaves are small and stems are thorny.

Desert vegetation promotes the following;-

4. Wild life conservation (game parks)
5. Pastoralism
6. Hunting

Swampy Vegetation and Mangrove Forests

Swampy vegetation occur in areas with permanent swamps like L.Victoria, Kyoga and along some rivers.

The Mangrove forests concentrate long the coastal area of East Africa because of the following factors.

6. Heavy rainfall.

7. High temperatures and humidity.
8. Low attitude.
9. Deep fertile soils.
10. Salty and muddy water.

Characteristics

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6. The trees are short drunks with broad leaves.
7. They are ever green because of too much H₂O.
8. Some trees have twisted trunks.
9. They have aerial roots.
10. The trees are very close together and are of hard wood spears.

Factors Influencing Vegetation Distribution in East Africa

8. Climate

Abundant rainfall which is well distributed throughout the year and high temperatures give rise to equatorial forests. Moderate rainfall and throughout the year give rise to savannah vegetation. white areas with low and unreliable rainfall influence the growth of semi desert vegetation.

9. Relief /Topography /Altitude

On steep slopes soils are thin and water drainage is rapid giving rise to stunted vegetation areas which are gently sloping and flat, soils tend to accumulate favouring the development of forests while in valleys soils are water logged leading to swamp vegetation.

10. Eolaphic Factors (Soils)

Deep and fertile soils support dense equatorial forests, soils with moderate fertility support savannah. Thin, immature and infertile soils support stunted vegetation while dump coastal soils influence the growth of mangrove forests.

11. Biotic Factors

Pests such as locusts, wood peckers lead to destruction of grass and trees respectively. Wild animals also lead to the destruction of vegetation cover.

12. Latitude

Areas near the equator have tropical rain forests because of heavy rainfall and then high temperatures.

13. Drainage

When drained areas are characterized by vegetation ranging from savannah to equatorial forests while poorly drained areas favour swamp vegetation.

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14. Anthropic Factors (Man)

In many parts of East Africa man has destroyed vegetation through his activities like deforestation, mining, agriculture, industrialization, road construction e.t.c. changing thick forests into savannah, semi desert and then shrub.

However, man in some areas has tried to develop vegetation through afforestation, re-afforestation, gazetted more forest reserves, restricting encroachers, educating the masses a lot the importance of forests e.t.c.

FORESTRY INDUSTRY IN EAST AFRICA

Forestry is the sciences of managing forest resources for human benefit like maintain adequate supply of timber, wood production e.t.c.

In East Africa the following are the types of forests:-

5. Tropical rain forests /Equatorial rain forests

These occur in the low land areas of East Africa e.g. Mabira, Budong, Bwindi impenetrable, Ssesse forests e.t.c.

6. Montane Forests

These occur on slopes of mountains like Elgon, Kilimanjaro, Kenya, Rwenzori e.t.c.

7. River in the Forests

These occur along major rivers of East Africa e.g. R.Nile, Tana, Pangani e.t.c.

8. Planted or Artificial forests

These forests are planted by man and are majorly soft wood e.g. eucalyptus, firs e.t.c.

Factors favouring the growth of forests or Development of the forestry Industry in East Africa.

11. Availability of heavy and reliable rainfall throughout the year favour the growth of equatorial forests.
12. Presence of high temperatures throughout the year favouring the grow of forests.
13. Availability of fertile soils to sustain the growth of forest.
14. Presence of a variety of trees species of commercial e.g. Mahogany, Iron wool, Muvule, Green heart.
15. Presence of low population leading to vast land permitting the growth and development of forests.
16. Favourable government policies o forestry e.g. policies on afforestation and re-afforestation, restricting encroachers, gazettement more forest reserves e.t.c.
17. Availability of advanced and appropriate technology in forest exploitation. E.g. power driven saws, tractors.
18. Presence of adequate and cheap labour both skilled and un skilled from within East Africa abroad.
19. Availability of large market for forest related products especially timber.
20. Presence of advanced researched in forest development.

THE CONTRIBUTION OF THE FORESTRY INDUSTRY IN EAST AFRICA

16. The forestry industry in East Africa provides the people with timber for construction and furniture making.
17. The industry generates employment opportunities to the people of East Africa e.g. forest rangers, lumber jacks, drivers, charcoal burners.
18. Forests in East Africa modify climate through evapotranspiration leading to rainfall formation.
19. The forestry industry provides raw materials for industrial development (saw mills)
20. The forestry industry generates revenue for the government through taxation of the people employed, companies e.t.c.
21. It diversifies the economy of East Africa and thus widening the tax base.
22. It has promoted tourism in East Africa thus source of foreign exchange since act as habitats for wild animals.
23. It promotes research and scientific study.
24. Promotes the development of infrastructure like roads, skills, hospitals e.t.c.
25. Forestry is also a source of income to the local people which has helped in the improving of the standards of living of the people.

26. The forestry industry is a source of fuel in form of fire wood and charcoal.
27. It has led to development of towns and urban centres.
28. Forests also provide man with food in form of fruits, herbs and wild animals.
29. Source of foreign exchange through exportation of forest products to countries like USA, France etc.
30. The forestry industry has promoted trade and international relations.

Problems Facing People Living Around forests

5. Pests and disease, e.g. mosquitoes, tsetse flies.
6. Wild animals.
7. Difficulty in clearing the forest for settlement, agriculture, construction of transport routes.
8. The humid conditions interfere with man's activities.

FACTORS LIMITING /HINDERING THE EXPLOITATION OF FORESTS IN EAST AFRICA.

12. The trees do not grow in pure stands i.e. they are scattered and therefore locating and exploitation become hard.
13. Tropical forests have buttress roots making them very difficult to cut.
14. Trees are entangled with climbing plants making it difficult.
15. Presence of pests and diseases e.g. tsetse flies.
16. Forests are dark, damp and impenetrable.
17. The trees take long to mature.
18. The rate of tree cutting exceeds replacements leading to deforestation.
19. Wild animals e.g. lions, tigers etc.
20. Presence of poor and inappropriate technology.
21. Lack of sufficient capital to set up saw mills.
22. Absence of reliable transport to deliver timber.

Problems Facing the Forestry Industry in East Africa.

13. The valuable species are scattered all over the forest making their exploitation very costly.
14. Presence of wild animals like lions, leopards, snake etc. scare away the workers.
15. Remoteness of the forested areas. i.e. poor accessibility of poor impassible roads.
16. Inadequate machinery like chain saws, traders leads to the use of crude materials like pangas used, axes etc.
17. Insufficient capital to modernize the forestry industry.

18. Competition with other land uses especially agriculture for labour.
19. Pests and diseases which attack the trees reducing the quality and value.
20. Competition for market with other producing countries like DRC, Swaziland.
21. Political instability in the forested areas. Forests in East Africa
22. Unfavourable government policies e.g. putting much emphasis on agriculture, industrialization e.t.c. other than forestry.
23. Fire outbreaks during dry seasons also lead to the destruction of the forested land.
24. Illegal cutting down of trees by encroachers.

NB: In East Africa the forest cover is declining because of the following:-

11. Population increase.
12. Need for firewood and charcoal.
13. Need for timber for construction.
14. Clearing of trees for infrastructural development.
15. Industrial expansion
16. Encroachment for agriculture.
17. Increase in the number of wild animals.
18. Need for land for settlement.
19. Fire outbreaks.
20. Cutting down of trees to control tsetse flies.

Effects of Deforestation on the Environment of East Africa

- Loss of valuable wood.
- Decrease in wood fuel.
- Reduction in the water table.
- Increased global warming due to removal of trees that absorb carbon dioxide.
- Accelerated landslides due to removal of protective soil cover and removal of soil binding roots.
- Deforestation interferes with the water cycle i.e. micro-climate, changes/reduction of rainfall.
- Filtration of river basins leading to floods/pollution of water/drying up of streams.
- Destruction of wildlife habitat leading to unbalanced ecosystem.
- Creation of Bad Lands i.e. gullied lands which are useless for any activity.
- Destruction of valuable tree species/extinction of valuable plants e.g. medical plants.

- Destruction of the natural beauty of the environment through forest clearance.

CONSERVATION AND MANAGEMENT OF FORESTS

- The East Africa governments are doing to following to improve upon the forestry industry.
13. Carrying out afforestation and re-afforestation programmes.
 14. Controlling excessive lumbering by banning timber exports.
 15. Encouraging family planning to control population growth and thus reduce pressure on forests.
 16. Encouraging the use of alternative energy sources like solar, Bio gas e.t.c.
 17. Carrying out research in forest management.
 18. Educating people about the importance of forests through the mass media.
 19. Training and deployment of forest rangers to guard and protect the forest.
 20. Planting of exotic trees which mature faster e.g. eucalyptus.
 21. Establishing or gazetted more forest reserves.
 22. Introducing of energy saving stores.
 23. Introducing strict legislation on deforestation.
 24. Licensing of tree cutters to reduce on it legal cutting down of trees.

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FORESTRY IN TANZANIA

The main catchment forest in Tanzania are on the slopes of Mt. Kilimanjaro, Usambara, Meru, Uluguru, Tukuyu forests also exist in iringa and Tanga regions. The main objectives for the development of forests in Tanzania include;-

3. To protect the water catchment areas.
4. To provide forest products sufficient to meet the country's requirements.

FORESTRY IN KENYA

Forests form one of Kenya's important resources and in Kenya there are both indigenous and exotic soft woods.

Examples of forest reserves include;-

2. Western province on Mt.Elgon and Kakamega.

Rift Valley Province (Manu ranges, Nandi Ranges, Mathew ranges, Loronghi)

Aberdane

Eastern slopes of Kenya E. Slopes of Mt Kenya, Marsabit, at the coast, Shimba hills, Ara buku, Sikoke.

The conservation of forests in Kenya has the following major objectives

- 5- To maintain and improve the climatic and physical conditions of the country
- 6- To conserve and then regulate water supplies by protecting the catchment areas.
- 7- Conserve the soil through prevention of desertification and soil erosion.
- 8- To control and maintain the country's supply of timber and in other forest products.

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The paper manufacturing industry in Kenya is at Webuye (W. Kenya).

FORESTRY IN UGANDA

The major forests include, Mabiron, Budongo, Semiliki; Maramigambo, Kibale, Bugoma, Bwindi Impenetrable, Ssesse forests, Mt. Elgon. Edunya, Lenda, "Ngahinga, Zoka, Itwara etc.

Plantation forests in Uganda make up 22%, these plantations are based on pines and the eucalyptus e.g Lendu (W.Nile), Abera (Gulu) Mafuga (Kabale) Kateera (Kiboga) , agwatta (Lira) , Mutai (Jinja)

The more to establish forest plantations was due to the Industrial wood, wood fuel, poles for building and construction on well as for power distribution (electricity)

Major True species

Indigenous Species

East Africa (color) Softwood	East Africa Comphor
Pods	Sandal wood
Muvule	Mukinduri
Muhgu	Muringa

Cape chest nut
Elgon Olive

Soft wood
Eucalyptus
Kei appl.

SKETCH MAP OF E. AFRICA SHOWING FOREST DISTRIBUTION.

Distribution of forests in Uganda

Distribution of forests in Kenya and Tanzania

A- Lendu	F- Semiliki	K- Maramagambo	P- Ssesse
B- Zoka	G- Rwenzori	L- Bwindi	Q- Mabira
C- Budongo	H- Kosyohia Kitomi	M - Kibale	R - Elgon
D- Bugoma	I - Mafuga	N - Mgahinga	
E-	J -	O-	

AGRICULTURE / FARMING IN E. AFRICA

Agriculture is the growing of crops and rearing of animals. In E. Africa Agriculture is important in the following ways;

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15. It is a source of food to the people of E. Africa e.g. bananas, millet, potatoes, meat, milk, egg. Etc.
16. It has led to the provision of employment opportunities to the people of E. Africa
17. It has provided /source of income to the farmers which has helped in the raising of standards of living.
18. It has diversified the economy of E. Africa and thus widening the tax base.
19. It is a main source of raw materials for the Agro based industries in E. Africa examples of raw materials include, skins, cotton, coffee etc.
20. It has led to the generation of government revenue through taxation of the farmers, Industries and companies.
21. It has led to the development of important infrastructure like hospitals roads, schools, banks etc.
22. It has promoted trade and international cooperation, Uganda and U.K Kenya, Tanzania etc.
23. It has promoted research and scientific study in E. Africa.
24. It has led to the industrial development e.g. Posho mills, breweries, bakeries, Meat Packers, Tanneries.
25. It has led to the generation of foreign exchange through the exportation of products to other countries like France, U. K Japan.
26. It has promoted tourism in E. African
27. Development of towns and ports
28. It has led to the provision of market to other industries e.g. those that manufacture fertilizers, chemicals, Agric machinery.

TYPES OF AGRIC IN E. AFRICA.

- 6- Subsistence farming
- 7- Planting farming
- 8- Irrigation farming
- 9- Mixed Farming
- 10- Horticulture is growing of flowers, vegetables and fruits for urban areas.

SKETCH MAP OF E.AFRICA SHOWING THE MAJOR POSTORAL AREAS**Characteristics of Nomadic Pastoralism**

- 12- The nomads move from one place to another in search for water and pastures
- 13- The animals kept are normally under weight
- 14- The animals kept are for subsistence purposes
- 15- Nomads graze their animals communally
- 16- The animals are resistant to pests, diseases drought and long distances.
- 17- They are confined to dry areas of E.Africa
- 18- Animals are kept for prestige

- 19- They overstock and overgraze
- 20- Nomads have no permanent settlement
- 21- They burn grass as they move with their animals.
- 22- Nomads keep large herds of local poor breeds e.g Zebu, Ankole cattle, Sangai

The Nomads of E.Africa keep large herds of cattle for the following reasons.

- 9- For paying bride price
- 10- For prestige
- 11- Source of food
- 12- Source of Income (Wealth
- 13- Culture and Tradition
- 14- For Insurance purposes
- 15- Animals are sources of labour and transport
- 16- Animals provide energy in form of cowdung

Factors favouring Nomadic Pastoralism (Why nomadic Pastoralism is practiced)

- 14- Presence of extensive land which permits the Nomadis to move freely with their animals.
- 15- Presence of space population in these areas giving more land.
- 16- High temperatures and low, it have favoured Nomadic Pastoralism this leads a shortage of water and pastures foiling the Nomads to move.
- 17- The Nomads to move from place to place in search of water and pastures.
- 18- It is also favoured by their culture or tradition of keeping large herds of animals
- 19- Presence of infertile soils in these areas which do not support crop growing but livestock rearing.
- 20- High incidence of animal pests and diseases e.g. tsetse flies, ticks etc e.g Nagana, East Coast Fever, foot and mouth diseases etc.
- 21- Remoteness of pastoral areas has led to persistence of Nomadic Pastoralism.
- 22- Negligence by government
- 23- Flatness of the area which enables the animals to move easily. Change from livestock rearing because they are illiterates
- 24- Nomads depend on their animals for their livelihood.

- 25- Presence of extensive pastures (Savanna grasslands)
- 26- Presence of local breed which are resistant to pests, diseases and long distances.

THE MASAAL/ MASAI OF KENYA AND TANZANIA

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These are Nomadic pastoralists found in Kenya and Tanzania and they practice transhumance i.e. Movement with their animals in relation to seasons. They keep goats, sheep, cattle and donkey for transport they keep animals purposely for meat, milk, prestige and wealth. Their major areas is Narok and between L. Natron and Manyara. These areas experience high temperature of 27°C and R./F OF 500MM PER annum. The vegetation is mainly savannah grasslands with scattered trees. The warriors are known as Maran, their settlement is called Manyatta or Kraal. (Enkang) They have simple temporally house made of mud and sticks and the animals and people are protected by thorny bushes.

PROBLEMS FACED BY NOMADS IN E. AFRICA.

Physical /Environmental /problems (not by their own making)

- 17- Prolonged droughts which leads to shortage of water and pastures leading to death of animals.
- 18- Pests and diseases e.g. Rinder pest, foot and mouth, anthrax Nagana, ticks, tsetse flies. These affect the quality of the animals.
- 19- Wild animals which attack both the animals and nomads e.g. Hyenas , lions and Snakes etc.
- 20- Poor breeds of animals which lead to production of poor quality products.

Man made problems (Problems of own making)

- 21- Overstocking which leads to overgrazing and soil erosion
- 22- Constant famine because the Nomads don't grow crops
- 23- Cattle rustling which leads to loss of lives and property.
- 24- Lack of veterinary services because of government negligence
- 25- Insecurity in these areas
- 26- Long distances moved by animals in search of water and pastures
- 27- Inadequate transport network (remoteness) that the nomads can't transport their products to markets.
- 28- Lack of market for their products because of the poor quality products
- 29- Lack of capital to improve on their animals husbandry because the animals kept are for home consumption.
- 30- Communal grazing by the Nomads leads to easy spread animal diseases.

- 31- Burning of pastures as they move which leads to growth of hard and unpalatable pastures.
- 32- Ignorance (illiteracy) among nomads that they prefer quantity than quality

Measures being taken to Solve the problems faced by Nomads

- 16- The government is educating the nomads to improve on their livestock
- 17- Cross-breeding is being encouraged between the local and exist breeds to improve on the quality of the animals.
- 18- Planting of better pastures for the animals
- 19- The government is improving on security of the neighbouring areas especially Karamoja and disarming the Nomads.
- 20- Spraying with pesticides to control the pests and diseases
- 21- They are encouraged to grow some crops to control famine especially Sorghum, maize etc.
- 22- The government has also extended veterinary services to the pastoral areas.
- 23- Water supply has also been improved by constructing boreholes, valley dams, water holes etc.
- 24- Feeder roads have been constructed to help the nomads to transport their products to markets.
- 25- Loans have also been extended to the Nomads to help them improve on their animal husbandry.
- 26- In some parts like Mbarara the government has established industries to provide markets to their products as well as processing their products.
- 27- The Nomads have also been advised to reduce on the number of the animals in order to improve quality and to control overstocking and overgrazing.
- 28- The government has also imposed quarantine measures to control spread of diseases.
- 29- Local markets have been improved so that the nomads may sell off some of their animals.
- 30- Nomads are also being encouraged to establish ranches where modern farming methods can be carried out e.g. paddocking artificial insemination etc.

EFFECTS OF NOMADIC PASTORALISM IN THE ENVIRONMENT

Negative effects.

- 8- soil texture is destroyed leading to soil erosion
- 9- vegetation is also destroyed during dry seasons when there is extensive fires
- 10- Nomadism accelerates the extension of desert lands.
- 11- Grass is also destroyed.
- 12- The eco-systems is also destroyed by nomadism.
- 13- It also leads to soil exhaustion as a result of erosion
- 14- Pollution of environment through the dust as the animals move and flies

Positive Effects

- 2- vegetable burning improves on soil fertility (ash)

RANCHING IN E. AFRICA

This is the keeping of livestock purposely of meat e.g. of ranches in E.Africa include with effect.

- Uganda
 - Ankole Masaka Ranching Scheme
 - Aswa Ranching Scheme
 - Buruli Ranching Scheme
 - Kisozi Ranching Scheme
- Kenya
 - Kaputei Ranching Scheme - Kenya highlands
 - Karuma Ranching Scheme
 - Ol-Kalour Ranching Scheme
- Tanzania
 - Kongwa Ranching Scheme
 - Mt. Kilimanjaro
 - Southern Highlands.

Characteristics of Ranching

- 8- Animals are kept for commercial purposes
- 9- They specialize on the rearing of one type of animal
- 10- They employ scientific methods of animal rearing like cross breeds, artificial insemination, use of machines etc.
- 11- Animals on ranches are grazed on natural pastures
- 12- Ranches are confined in dry areas of E. Africa as well as areas of sparse populations.
- 13- The movement of the animal is restricted by fencing and paddocking
- 14- They have permanent water source and well developed transport network

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Factors which have favoured the establishment in E. Africa.

Physical factors include;

- 7- Presence of vast land for the establishment of ranches
- 8- Availability of natural pastures for the animals to feed on
- 9- Presence of sparse population favouring the establishment of large ranches as well as permitting free movement of animals.
- 10- Presence of good breeds of animals such as Hereford, Boran, Aberdeen Angus.
- 11- Presence of infertile soils which don't permit/allow crop growth and thus encouraging ranching.
- 12- Availability of permanent water sources for the animals e.g. a river, lake dam etc.

Human Factors

- 8- presence of advanced technology and research
- 9- favourable government policy of promoting livestock rearing
- 10- Presence of large market for meat both in E. Africa and abroad.
- 11- Availability of a large capital based provided by the government financial institutions etc.
- 12- Presence of reliable means of transport enabling the transportation of meat to markets and processing centres.
- 13- Availability of large supply of labour both skilled and unskilled.
- 14- Political stability

Ankole Masaka Ranching Scheme.

The scheme is located at the border of Masaka and Mbarara district.

The area was originally occupied by the Bahima but later they abandoned because of rinder pest and then Nagana.

Problems facing Ankole Masaka Ranching Scheme.

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- 9- Pests like tsetseflies and diseases like Nagana
- 10- Poor breeds of animals
- 11- Infertile soils leading to the growth of poor pastures
- 12- Political instability within the area.
- 13- Overgrazing promotes soil erosion and exhaustion
- 14- Harsh climatic conditions leading to scarcity of water and pastures.
- 15- Low carrying capacity of the land promoting overgrazing
- 16- Growing of poor quality pastures which are not palatable the animals

Importance of the Scheme.

- 8- It has promoted research into better animal rearing methods.
- 9- Livestock rearing skills have been taught to the people like crossbreeding, fencing, spraying, dipping etc.
- 10- A market has developed at Sanga and this has promoted trade in the area.
- 11- Tsetseflies have been wiped out and ticks have also been reduced.
- 12- The scheme has led to generation of employment opportunities to surrounding people.
- 13- It has led to generation of revenue to government through taxation of scheme, employees etc.
- 14- A major source of income to the local farmers enabling them to improve on their standards of living.

THE ANKOLE/MASAKA RANCHING SCHEME.

Importance of Livestock rearing in E. Africa.

- 14- The livestock industry provides man with food inform of meat, milk, blood etc.
- 15- It has led to the generation of employment opportunities to the people of E. Africa
- 16- It is a source of income to the people, enabling them to improve on their standards of living.
- 17- It has led to the generation of revenue to the government through taxation of the farmers.
- 18- It has lead diversified the economy of E. Africa, leading to widening the government tax base.
- 19- It has also leads to urbanization e.g. Mbarara, Tororo, Eldoret, Mandera.
- 20- It has promoted research in E. Africa
- 21- It has created market for industries like animal feeds.
- 22- Development of industries like creameries, Meat packers, leather horning industries.
- 23- Development of infrastructure like roads, hospitals, xub research centrees.
- 24- Promoted tourism and thus earn alternative source of foreign exchange.
- 25- Animals provide man with products like hides, skins, bones etc.
- 26- Source of prestige and labour.

PLANTATION AGRICULTURE/ ESTATES FARMING IN E.A

Plantation Agriculture is the growing of one or two cash crops on a large scale using scientific methods. In E. Africa pest crops include the effect, tea, sisal,

pyrethrum, coffee, pineapples, rice, cotton and cloves, sugarcane. Most of these crops are perennial.

Characteristics of PLANTATION AGRICULTURE .

- 11- Farming is done on a large scale i.e. over 100 hectares
- 12- Farming is highly mechanized involving use of machines like tractors.
- 13- Plantations in E. Africa are owned by foreigners especially Indians, Americans and Europeans.
- 14- The crops grown are for commercial purposes.
- 15- Processing of the crop is done within the population
- 16- They specialize on the production of either 1 or 2 crops
- 17- Plantation Agriculture involves high output because of increased mechanism.
- 18- Farming is scientifically managed involving record keeping, use of fertilizers, research etc.
- 19- Plantations have well developed infrastructure like roads, include hospitals, banks etc.
- 20- Plantations employ large number of people

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Factors which have favoured the establishment of plantations.

- 14- Favourable climatic conditions i.e. heavy rainfall etc.
- 15- High/low temperature depending on the crop, high humidity
- 16- Availability of extensive land for the establishment of large farms
- 17- Presence of fertile well drained soils.
- 18- Presence of a flat, gentle or undulating landscape for easy mechanization and establishment of transport network
- 19- Availability of large capital base provided by foreigners and even the government.
- 20- Presence of abundant labour supply i.e. skilled labour provided by foreigners and unskilled labour people provided by the local people.
- 21- Presence of a reliable and ready transport network for the transportation of the products to market. E.g. roads, railways etc.
- 22- The favourable government policies of attracting investors, leasing of land to the investors, maintaining political stability etc.
- 23- Presence of a wide market for the products both in E. Africa and abroad

- 24- Presence of sparse population to permit large scale farming.
- 25- Presence of abundant power for processing the crop
- 26- Advanced and appropriate technology in form of machines like tractors, water sprinklers for irrigation etc.

ADVANTAGES OF PLANTATION FARMING.

- 18- Plantation Farming provides employment to a number of people in E. Africa e.g. drivers, cultivators, machine operators.
- 19- Plantations have led to the generation of government revenue through
- 20- Plantations are sources of raw materials to industries which process their crops e.g. tea processing, industries, sugar refineries.
- 21- It has led to the generation of foreign exchange through the exportation of the crop to USA, France, India etc.
- 22- Plantations have also led to the development of infrastructure like roads, schools, hospitals, housing estates.
- 23- Plantations in E. Africa have also led to the development of towns e.g. Kisumu, Lugazi, Jinja, Kericho.
- 24- Plantation has diversified the economy thus widening the government tax base.
- 25- Plantations have promoted tourism and thus another alternative source of forex
- 26- Plantations have promoted research and scientific study leading to high quality and output.
- 27- Plantations are sources of income to the people employed, thereby helping them to improve on their standards of living.
- 28- Plantation has promoted trade and international relations with the trading partners.
- 29- Plantations have provided market for industrial products.
- 30- Plantations provide people with products e.g. sugar, coffee etc.
- 31- It has promoted industrial development in E. Africa e.g. sugar refineries in Kakira etc
- 32- The people employed on plantation acquire skills, related to Plantation
- 33- People in E. Africa have encouraged in out growers scheme. Out growers the farmers who grow the same crop as that on plantation.
- 34- People process their products before exports thus increasing the products value.

Disadvantage of Plantation.

- 12- It is expensive to maintain and establish because of the high investment involved.
- 13- People practice monoculture which lead to soil erosion and exhaustion
- 14- Repatriation of profits because they are owned by foreigners.
- 15- People associated with over productions which leads to price fluctuations.
- 16- Plantation displace a number of people in E. Africa calling for expensive resettlement.
- 17- There is easy spread of diseases because the growing the same crop.
- 18- Incase of any natural disaster like drought, pest invasion heavy loses are incurred.
- 19- Plantation leads to decline in food production which may lead to famine.
- 20- Plantation require a lot of labour
- 21- The crops take long to mature leading to redundancy on the farm.
- 22- Plantations are associated with strikes because of low wages and poor working end...

Examples of Plantations in E. Africa include;

- 8- Kilombero Sugar Plantation (Tanzania)
- 9- Kakira Sugar Works (Uganda)
- 10- Lugazi Sugar Corporation (Uganda)
- 11- Mumias Sugar Plantation (Kenya)
- 12- Kinyara Sugar Plantation (Uganda)
- 13- Kirecho and Limuru Tea Plantation (Kenya)
- 14- Sisal Plantation (Tanga, Tanzania)

SUGARCANE GROWING IN E.AFRICA.

The crops is grown in the following areas of E. Africa

- Uganda.
- In the shores of L. Victoria (Kakira and Lugazi)
 - Kinyara (Masindi)
 - Sango – Bay (Rakai)

Kenya - Coastal Province
 - Nyanza (Kisumu and Kano Plains)

Tanzania - Moshi
 - Kilombero Valley
 - Bukoba
 - Mwanza
 - Morogoro

Conditions for Growth

- 10- High rainfall of over 1500mm or irrigation water
- 11- Temperature of about 20^oc
- 12- Fertile alluvial soils
- 13- Attitude of 1500m above sea level
- 14- Flat or undulating low lands for easy mechanization
- 15- Preserve of a dray and warm season for ripening and harvesting
- 16- Reliable and quick means of transport and large market.
- 17- Presence of cheap labour supply for cutting/harvesting
- 18- Large capital stock.

CULTIVATION

The areas cleared using machinery like tractors, canes for planting are selected, shopped into 40mm long, the pieces are then dipped into fungicide solutions. After treatment, they are planted in 1.5m apart. While growing, weeding and spraying are very important. Harvesting begins after 1 or 1 ½ years and it is done using pangas.

It is then loaded on lorries, tractors or small wagons to factories.

Processing

At the factory, the cane is weighed, chopped and crushed after which the juice is treated with lime, and sulphur then heated and clarified, boiled and the crystals are separated from the molasses.

N.B MoLas is dark brown using for making alcohol (Waragi) and the residue is used as animal feeds.

The sugar crystals are then dried, graded, stored and then transported to the consumers.

Use of Sugar

- 5- Making of alcohol
- 6- Used as food
- 7- For sweetening medicines
- 8- Making paper boards, chemicals, animal feeds etc.

KILOMBERO SUGAR PLANTATION.

K.C.P is located in central Tanzania between rivers great Ruaha and Kilombero. It is owned by S.U.D.E Co (sugar development Cooperation) water for irrigation is provided by the Great Ruaha and the method for irrigation is overhead sprinkler.

AIMS FOR EAST OF K.S.P

- 4- To provide sugar for home, consumption and exports.
- 5- To open up the remote area of Kilemboro for development.
- 6- To provide employment to the local people.

MAP OF KILOMBERO VALLEY IRRIGATION SCHEME.

Factors which have favoured the East of Kilombero Sugar Plantation.

- 14- Availability of large supplies of water for irrigation provided by the great Ruaha River.
- 15- Presence of a gently sloping land permitting free movement of Water for irrigation, use of machinery and easy construction of transport network.
- 16- Availability of fertile. Alluvial soils in the valley favouring the growth of sugarcane.
- 17- Presence of heavy rainfall of over 1500mm and high temperatures of over 20°C which also favour the growth of high quality sugarcane
- 18- Presence of sparse population in the region giving room the establishment of the population.

- 19- Availability of a reliable and ready transport for the transportation of the sugarcane processing centres and to markets e.g. the roads, railways (Tazara railways)
- 20- Presence of wide market for sugar both in Tanzania and abroad.
- 21- Favourable government policy of developing this area of Tanzania as well as financing the plantation. Page | 288
- 22- Presence of a large capital base provided by the government purchasing machinery and payment of employees.
- 23- Presence of vast lands with lowlands for the establishment of a large plantation.
- 24- Availability of large supply of labour both skilled and unskilled
- 25- Presence of advanced technology used in clearing the land as well as processing the crop.
- 26- Advanced research.

KAKIRA SUGAR WORKS, (UGANDA)

It is located at the shores of Lake Victoria along Jinja Iganga high way. It is owned by the Madhvani family, water, Irrigation is obtained from L. Victoria and the method for irrigation is overhead sprinkler.

N.B. Factors for development are the same as those of Kilombero Sugar Plantation.

Problems facing sugarcane growers in E. Africa

- 9- Pests of grasshopper, man etc. and then diseases like yellow wilt)
- 10- Shortage of labour for cutting the cane.
- 11- Soil erosion and exhaustion due to monoculture.
- 12- Price fluctuation on the wild market.
- 13- Fire out breaks
- 14- Inadequate capital to purchase machinery and to pay the workers or expensive machinery.
- 15- Competition from other sugar producing countries e.g Cuba, Brazil, Malaysia.
- 16- Competition from sugar beet.

SISAL GROWING IN E. AFRICA

Sisal is grown for its sharp leaves which crushed yield a coarse fibre. It is a cheap commercial crop in E. Africa.

In Tanzania, it is grown around Usambara mountains, Morogoro, Kilosa, Lindi, Arusha, Mtwara. The loading area is Tanga.

N.B. However due to price fluctuations sisal and dates have been turned into horticulture, dairy farms, cattle ranches.

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In Kenya is grown in Muranga, coastal areas and fringes of the Kenya highlands.

In Uganda, sisal has never been an important commercial crops because of climate.

Conditions of Growth.

- 9- It requires a wide range of soil conditions
- 10- High temperatures of between 25- 30°C.
- 11- Rainfall of about 750mm per annum.
- 12- Plenty of sunshine
- 13- Gentle and flat land
- 14- Attitude of between 0 – 180m above sea level.
- 15- Quick and cheap transport network.
- 16- Large manual labour.

CULTIVATION

- 3- The bulbils/suckers are planted in nurseries and after 9 months
- 4- They are transplanted into fields. Weeding and harvesting are done by knives.

PROCESSING

After harvesting the leaves are taken to factories where the fibre is exposed by stripping using a machine called Decorticator. The fibre is washed, dried, bleached in the sun, brushed graded and bared and export.

Uses of Sisal.

- 3- For making sacks, mats, carpets, fibres, strings, drugs (cortisone, (a pain killer)
- 4- The new use for making pulp and paper and its factory is a Tanga.

Problems facing sisal farmers.

- 7- Shortage of labour

- 8- High costs of machinery
- 9- Price fluctuation on the world market.
- 10- Pests and diseases.
- 11- Soil erosion and exhaustion due to monoculture
- 12- Competition from artificial fibres like silk, nylon etc.

CLOVE GROWING IN E.A

Cloves in E. Africa are grown in Zanzibar (the largest producer in the World). Pemba islands. In Zanzibar and Pemba, the crop is grown the Western parts of fertile soils and heavy rainfall.

Clove growing areas of Zanzibar and Pemba.

Conditions for growth.

- 9- Heavy rainfall of between 1500 – 2000mm per annum
- 10- High temperatures of 27°C .
- 11- Flat and gentle land
- 12- Deep, fertile and well drained soils.
- 13- High humidity
- 14- Dry picking season.
- 15- Availability of abundant labour for harvesting
- 16- Shelter from dry winds.

Problems Facing the Clove Growers.

- 6- Soil exhaustion due to monoculture
- 7- Insufficient labour for harvesting
- 8- Price fluctuation on the world market.

- 9- Competition from other producing countries especially Madagascar
- 10- Pests and diseases.

However some of these problems are controlled by digging up of disease trees and replacing them with new ones

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Diversification of Agriculture by into other crops and economic activities

Uses of cloves

- 3- For spicing food and cigarettes
- 4- For making cooking oil, soap, perfumes, flavouring medicines, cosmetics, chocolates, and sweets.

PYRETHRUM GROWING IN E. AFRICAN

Pyrethrum is a white flowering plant which contains a chemical substance used for making insecticides.

It is a commercial crop grown around the Kenyan highlands, Mt. Meru, Mbeya, Arusha in Tanzania.

Conditions for the Growth.

- 7- Low temperatures of below 15°C at bud formation time.
- 8- Altitude of over 2000m
- 9- Heavy and well distributed rainfall of between 1000 – 1250mm.
- 10- Rich, well drained volcanic soils.
- 11- Abundant labour for picking
- 12- A fairly cool and moist conditions.

Cultivation and processing

The seeds are planted in nurseries after which transplanted in major fields in rows, weeded and mature in one year. It is picked every 2 – 3 weeks in the flowering season for up to four years. Pyrethrum is grown on small farms and then some large farms.

Flowers are dried in the sun over burners, bagged in sacks and sent to factories for extraction of pyrethrums for use in insecticide. N.B. The Biggest factory is in Nakuru. It is exported to U.S.A and Britain.

Problems.

- 5- Soil Exhaustion because of monoculture

- 6- Shortage of labour
- 7- Pests and diseases.
- 8- Competition from synthetic insecticides

However the above problems are solved by application of fertilizers, spraying, limited production of pyrethrum, banning of synthetic/chemical insecticide

Uses of Pyrethrum

- 2- Making of insecticides, perfumes, herbs, proteins, for animals.

TEA GROWING IN E. AFRICA

Tea is a major plantation crop in E.Africa obtained by plucking, drying and curing.

In Uganda, it is grown in the forest areas; Lugazi (Kasaku and Luwala), Mityana, Kabarole, Bushenyi, Mubende, Luwero, Masaka, Kigezi, Buhweju.

In Kenya, it is grown in Kericho, Limuru, Kisii, Nyeri, Kakamega, Nandi hills, Embu, Meru, Kiambu, and Muranga.

In Tanzania it is grown in Bukoba, Rungwe, Iringa, Tanga i.e. (S. & W. of Usambara Mounts), Mbeya, slopes of Mt. Kilimanjor. South highlands (Tukuyu, Njombe and Mufundi).

Conditions for growth.

- 11- Low temperatures of 13°C.
- 12- Gentle sloping land/undulating land
- 13- Altitude of between 1000 – 2000m above sea level.
- 14- Heavy rainfall of between 1000 – 2000mm
- 15- Acidic, deep, well drained soils.
- 16- Abundant labour for weeding and harvesting
- 17- Constant pruning, weeding and application of fertilizers.
- 18- Constant spraying against pests and diseases.
- 19- Quick and reliable means of transport and ready market
- 20- Machinery for processing the leaves.

N.B. Tea pluckers normally used sticks leaves while plucking to keep the activity at one level

Cultivation

There are four methods of growing;

- 5- Leaf cuttings and planted in Nurseries after which transplanted into rows.
- 6- Seeds are planted in nurseries and after two years transplanted into the main estate in rows.
- 7- Once on estates, constant weeding and pruning are done because the more branches, the more the shoot and thus high production.
- 8- During harvesting, two leaves and a bud are plucked and taken to the factory.

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Processing

The plucked leaves and the buds are carried to the factories on heads, bicycles, pickups, tractors and lorries. Tea must be processed within the first 24 hours. On reaching the factory, it is weighed and passed through withering lofts where hot air is blown to remove moisture and making the leaves soft.

The leaves are put on rollers where they are cut into small pieces, allowed to ferment for 2 hours where it turns brown to acquire the taste/flavour of tea.

Tea is then graded, weighed, packed and sealed for sale/ exports.

N.B. Forests/trees are normally planted near tea estates to perform the following

- 6- Control soil erosion
- 7- They are wind brakes
- 8- They provide shade
- 9- Rainfall formation
- 10- Source of energy firewood for drying the tea.

Tea growing in Kericho. (Tagabi Tea Estates.)

Kericho is the main tea growing area in Kenya and E. Africa as a whole. The main growing areas are the gentle slopes of Mau Escarpments.

At Kericho tea is grown under 3 main categories.

- 4- Large scale estates owned by rich companies like Brooke Bond Tea Company.

- 5- Small scale growing but with assistance from the Kenya Tea Development.
- 6- Production on cooperative basis owned by the cooperatives

Tea growing in Kericho was encouraged by the following factors.

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- 11- Heavy rainfall of over 200mm p.a.
- 12- Altitude of 1800m above the sea level
- 13- Presence of fertile and slightly acidic soils.
- 14- Availability of extensive land for the establishment of estates.
- 15- Presence of abundant labour from the Nyanza province.
- 16- Large supply of water for processing the tea i.e. from R. Kilho.
- 17- Availability of machinery like tractors.
- 18- Transport
- 19- Market
- 20- Government policy.

Tea from Kericho is exported to the middle East Netherlands, Canada, Germany, US.A, Britain etc.

N.B. The major problem facing tea growers in Kericho is severe hailstorms. This is the only place in the world where hail falls at all seasons.

Problems facing Tea Growers.

- 9- Competition from other producing countries like Sri-Lonka
- 10- Pests and diseases
- 11- Rain during the picking season
- 12- Competition from other beverages like coffee.
- 13- Soil exhaustion due to monoculture
- 14- Over production leading to price fluctuation in the world market
- 15- Inefficient labour for packing
- 16- Inadequate transport facilities

Solutions

- 7- For soil exhaustion: application of fertilizers
- 8- Competition: improving on the quality
- 9- Pests of diseases: spraying using chemicals
- 10- Shortage: of labour mechanization
- 11- Weeds: Constant pruning

- 12- Hailstorms, use of aircrafts to spray silver/iodide and hail suppression scheme.

Uses of Tea.

- 3- Beverage
- 4- It is used as a drug.

TOBACCO GROWING

It is grown on small scale (Small holders because it is done by peasants. In Kenya, it is grown in Kipei, Kisii and Embu.

In Uganda, it is grown in W. Nile (Arua), Kitgum, Kabarole, Bushenyi, Gulu, Bunyoro, N. Kigezi.

There are two varieties of tobacco grown in Uganda ie.

- c) Fire cured, which require fire for drying. Mostly grown in Arua.
- d) Flue cured which require wind for drying. Mostly grown in Kabarole

Conditions for Growth

- High temps of about 22°C.
- Well drained soils
- Rainfall of about 500 – 600mm during the growing season.
- Altitude of between 1000 – 1200m above sea level.
- Abundant labour for weeding and harvesting
- Constant attention

N.B. Tobacco is an annual crop and it is grown in rotation in other crops because it exhausts the soil quickly.

Cultivation

Tobacco is planted in nurseries and after 2 months transported in 2 fields, where weeding and addition of fertilizers are necessary.

The curing plants of tobacco are called burns.

Processing/Curing

There are two types of curing namely;

- (a) Flue curing: leaves are hanging in an enclosed or heated room to limit the dangers of moisture which can make the leaves go bad.
- (b) Fire curing: This involves hanging with leaves on fire until the leaves turn yellow/brown.

Problems facing Tobacco Growers.

- 13- Pests and disease
- 14- Shortage of labour for weeding and harvesting
- 15- Drought and low rainfall and high temperature
- 16- Price fluctuations in the world market.
- 17- Soil erosion and exhaustion because of monoculture
- 18- Accidents especially in the burns.
- 19- Limited fire wood for processing
- 20- Competition from other producing countries e.g. Cuba, Sri Lanka
- 21- Reptiles especially snakes
- 22- Poor transport network
- 23- Shortage of capital
- 24- Processing is time consuming

Users

- 3- For making cigarettes, stuff
- 4- Medicine

B.A.T limited is the sole buyer of tobacco in E. Africa

RICE GROWING IN E.AFRICA.

Rice requires fertile soils with plenty of water. It is an annual crop. In Kenya it is grown in Mwea Lebere and Ahero Irrigation Scheme. In Uganda, it is grown in Kibimba, Palisa, Dolo the shores of L. Victoria, Kyoga and Olweny Irrigation Scheme in Lira.

In Tanzania it is grown in Mkombozi Rufigi, Usungu and shores of L. Malawi

WATTLE GROWING IN E. AFRICA.

Wattle trees are grown from their bark which yield an extract used in tanning leather. It's a commercial crop and Kenya is the chief producer. It is mainly transported to India.

Wattle requires a fairly dry condition and the most producing areas are Kikuyu land and Trans- zoia.

WHEAT GROWING IN E. AFRICA

Mainly grown in Uasin Gishu.

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They require a fairly fertile and heavy soil, light to moderate rainfall and a warm and sunny ripening period.

Wheat growing areas in Kenya include; Kenya highlands, Eldoret, Nakuru, Londrani and the living producer is to UASIN GISHU.

In Tanzania it is grown in Arusha and mainly exported to Britian.

COTTON GROWING IN E. AFRICA.

Cotton is a small holding crop and the chief growing areas are the shores at L. Victoria i.e. S.E. Mwanza, Nyanza Province in Kisumu and in Uganda its grown around.

Others growing areas include; Lira, Gulu, Soroti, Kumi, Tororo, and Busoga, It is also grown along the E. African, coast and the Ruligi delta ad R.Tan

Conditions for Growth

- 1- Labour
- 2- Capital
- 3- Requires dry seasons for picking
- 4- High temperature of not less than 25°C.
- 5- Rainfall of about 750mm
- 6- Altitude of 1400mm above sea level
- 7- Fertile and well drained soils
- 8- Abundant labour supply for picking

Cultivation and Processing

The land is ploughed and seed are planted in rows of about 1 m apart. After germination, thinning, weeding and spraying are done.

Harvesting is done by hand. Sorting is then done to remove the unwanted fibres. Cotton is then packed and taken to the stores and finally ginneries where the seeds and fibres are separated.

Problems Facing Cotton Growers.

- Pests e.g. ball weevils
- Diseases e.g. bacterial blight.
- Unreliable rainfall during the growing seasons.
- Inadequate labour for picking and sorting
- Competition in other cash crops like coffee
- Poor storage facilities
- Price fluctuations in the world market
- Soil exhaustion on due to monoculture
- Heavy rainfall during picking season
- Uses of cotton – competition from synthetic fibres like nylon, silk.
- Poor transport in rural areas.

Uses of Cotton

- Making of cotton
- Cotton fibre
- Cattle feeds
- Cotton textiles
- Making cooling oil
- Stuffing mattresses and pillows
- Cotton wool used in hospitals.

COFFEE GROWING IN E. AFRICA.

In E. A there are 3 varieties of coffee

- d) Arabica Coffee. Grown in highland areas e.g. Mt. Elgon, Rwenzori, Kirimanjaro, Meru, Kenyan Highlands, Usambara.
- e) Robusta Coffee, this makes the best instant coffee and it does well around L. Victoria shores (Mwanza, Kisumu, Bukoba, and central Uganda)
- f) Clonal Coffee

Conditions for Growth

- 9- Deep fertile and well drained soils as well as volcanic soils.
- 10- Moderate rainfall of 1000 – 1500mm
- 11- Temperature of between 20 – 26°C for robust 19- 23 for Arabica Coffee.

- 12- Altitude of 1000- 1200m for Arabica , 1000 – 1500 Robusta Coffee
- 13- Labour for picking
- 14- Capital, market etc.
- 15- Protection from winds
- 16- Transport

Cultivation

Coffee is grown from seeds in nursery beds which also must be protected from the sun. its transplanted after one year followed by weeding, spraying and addition of fertility. Coffee is ready for picking after the 3 years and it is done by hand.

Processing

There are to methods of processing i.e.

- 1- Wet processing (Cherry wet processing/ coffee is put in a tank of water for it to ferment for easy is moral of pulp. The beans are sun dried roasted graded and packed. This mainly for Arabica Coffee.
- 2- Dry processing (cherry dry processing). The beans are sun dried then sent to hulleries for removal of pulp. It's then roasted, graded and parked.

Problems

- 10- Price fluctuations in the world markets.
- 11- Soil erosion and exhaustion due to monoculture.
- 12- Competition from other beverages like tea, cocoa
- 13- Inadequate labour for picking
- 14- Difficulty in carrying out mechanization
- 15- Poor transport in the rural areas.
- 16- Limited/poor storage facilities
- 17- Competition from other countries like Brazil, Ethiopia
- 18- Pests e.g. Coffee berry borer and diseases e.g. leaf root diseases.

CONTRIBUTION OF IMPORTANCE OF CASH CROP GROWING TO ECONOMIC DEVELOPMENT

- 12- Sources of foreign exchange after exploitation e.g. coffee, tea,
- 13- Cash drops have led to development of infrastructure like roads, schools, hospitals.
- 14- They have promoted international trade e.g. cooperation

- 15- They have provided employment to many people.
- 16- They have led to urbanization e.g. Kericho.
- 17- They have led to research.
- 18- Sources of food e.g. coffee, tea.
- 19- Provide raw materials for industrial development e.g. jaggery for sugarcane, jiggery for cotton.
- 20- Sources of government revenue through taxation.
- 21- Sources of income to the peasants which lead to the improving of the standard of living.
- 22- Diversified the economy

Problems Facing Agriculture in E. Africa

- 17- Pests and Diseases
- 18- Competition from the development countries
- 19- Poor breeds of crops and animals
- 20- Price fluctuation in the world products.
- 21- Lack of market because of poor products.
- 22- Political instability especially in Northern Uganda
- 23- Poor soils like clay and sand.
- 24- Poor technology i.e. many farmers still use traditional tools like pangas, hand hoes.
- 25- Climate problems like high temperature, low rainfall, floods,
- 26- Shortage of labour for harvesting
- 27- Poor storage facilities
- 28- Poor transport network from the growing areas to markets.
- 29- Population increased which leads to shortage of land, land fragmentation and land disputes.
- 30- Poor /relief which hinders mechanization of Agriculture
- 31- Illiteracy among farmers.
- 32- Limited research in the agricultural sector

IRRIGATION AND RESETTLEMENT SCHEMES IN EAST AFRICA.

Irrigation is the artificial supply of water to growing crops. Irrigation schemes in E. A were mainly established for resettlement purposes. However other aims include;

- 5- To provide extra water to meet the rainfall shortages
- 6- To improve on the soil conditions.
- 7- To control flood and increase production
- 8- To ensure full production throughout the year.

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Factors favouring the establishment of Irrigation Schemes in E. Africa.

- 11- Presence of flat land for easy mechanisation as well as movement of water under the influence of gravity.
- 12- Presence of fertile alluvial soils
- 13- Availability of extensive land for establishment of large irrigation schemes
- 14- Presence of a permanent water source in form of rivers, lakes etc.
- 15- Presence of a large capital base for purchasing machinery as well as payment of workers.
- 16- Favourable government policies of maintaining political stability and attracting foreign investors.
- 17- Availability of ready and efficient transport network in form of roads, railways etc.
- 18- Presence of large supply of labour both skilled and unskilled.
- 19- Availability of ready and wide market.
- 20- Low and unreliable rainfall favouring irrigation farming

Examples of Irrigation Schemes in E.Africa.

Scheme	District	Source of Water	Crop
Uganda:			
Olwiny Irrigation Scheme	Lira	Lake Kwana	Rice
Mubuku Irrigatio scheme	Kasese Sebwe	River Sebweli Mubuku	Rice and vegetables
Sango Bay irrigation scheme	Rakai	L. Victoria	Sugarcane
Kibimba irrigation Scheme	Bugiri	L. Kibimba & R. Mpologoma	Rice
Alera Irrigation Scheme	Apac	L.Kyoga	Rice and vegetables
Doho Irrigation Scheme	Buteleja	R. Manalwa	Rice

Scheme	District	Source of Water	Crop
Ongom Irrigation Scheme	Lira	R. Owemeru	Citrus fruits
Kiige Irrigation Scheme	Kamuli	R. Nabigaga	Citrus Fruits
Ahero Pilot Irrigation Scheme	Kisumu	R. Nyando	Rice
Mwea Tebere Irrigation Scheme	Kirnyaga	R. Ihiba and Nyamindi	Rice
Bunyala Pilot Irrigation Scheme	Busia	R. Nzozi	Rice
Galole/Hola Irrigation Scheme	Tana River	R. Tana	Cotton
Kibirigwi Irrigation Scheme	Kirnyaga	R. Sagana	Onions, Tomatoes, vegetables
Katiru Irrigation Scheme	Turkana	R. Turkwell	Maize
Taveta Irrigation Scheme	Taita- Taveta	Njoro Springs	Vegetables
Kibwezi Irrigation Scheme	Makueni	r. Kiboko	Rice
Lari Irrigation Scheme	Tana River	River Tana	Vegetables
Pakere Irrigation Scheme	Morogoro	Great Ruaha	Sugarcane
Kilombero Irrigation Scheme			
Usangu Irrigation Scheme			
Rungwa Irrigation Scheme			

AHERO PILOT IRRIGATION SCHEME.

The scheme is found in W. Kenya on R. Nyando in Kisumu. The major crop is rice and water for irrigation is from R. Nyando and R. Miriu drains the water from the scheme. The method for irrigation is furrow and the aim for the establishment was to taste the success of large scale irrigation.

Factors for development include the following;

- 5- Presence of suitable fertile soils for the growing of rice.
- 6- Availability of large supplies of water for irrigation from R. Nyando.
- 7- Presence of large supplies of cheap labour both unskilled and skilled.
- 8- Presence of a flat land between R. Nyando and Miriu which allowed free flow of water under the influence of gravity and easy use of machines.

The Ahero Rice Scheme.

Irrigation block	New Villages
Main irrigation channels	Tracks
And water intake	roads.

MWEA TEBERE IRRIGATION SCHEME.

The scheme is located on R. Tana. N. E of Nairobi near the fat hills of Mt. Kenya. The major crop is rice and water for irrigation is obtained from the following areas; R. Thiba, Nyamindi, and Murubara.

The aims for establishments.

- 4- To make use of arid land
- 5- To resettle and employ the detainees (from Mau Mau re...)
- 6- To increase rice production in the country for self reliance.

Conditions which have favoured the location of the project.

- 11- Presence of permanent water sources such as Rivers Tana, Thiba and Nyamindi
- 12- The gently sloping landscape - Predominant plain on the lower slopes of Mt. Kenya allowing irrigation by gravity flow.
- 13- Presence of fertile block cotton volcanic soils, red clay loams which support rice growing.
- 14- Low average unreliable rainfall of less than 750mm per annum.

- 15- Large/extensive tracts of land was sparsely populated thus for the project.
- 16- Favourable government policy of promoting irrigation projects in remote or marginal lands.
- 17- Proximity to communications lines e.g. the Nairobi – Nyeri Railway. Page | 304
- 18- Availability of landless people who could be recruited
- 19- Availability of capital
- 20- Ready market for the crops etc.

Explain the benefits of the Irrigation Project to the people of Kenya

- 12- Source of vital food ie. Rice.
- 13- Provision of employment to people
- 14- Source of income to farmers
- 15- Resettlement of the population which was formerly landless
- 16- Improvement in infrastructure i.e. roads, towns, schools,
- 17- Improvements in research
- 18- Source of government revenue
- 19- Establishment of processing industries
- 20- Effective utilization and marginal lands
- 21- Development of towns.
- 22- Farmers acquired modern farming techniques

Outline the problems faced by farmers on the irrigation project

- 10- Poor yields of rice
- 11- Reduction in soil fertility
- 12- Pests which destroy the crops
- 13- The Problem of Weather conditions i.e. cool temperatures, storms etc.
- 14- Price fluctuations leading to unstable farmer's income.
- 15- Siting of canals
- 16- Limited capital
- 17- Soil Exhaustion
- 18- Soil Salination

MWEA –TEBERE IRRIGATION PROJECT

Key

- A - Tebere
- B - Muers
- C- Karaba
- D- Thiba

- 5- R. Tana
- 6- Nyamindi
- 7- Thiba
- 8- Embu

AGRICULTURE IN E. AFRICA CHIEF COMMERCIAL CROPS IN E.A

Coffee	Cashewnuts
Tabbacco	Rice
Sisal	Irrigation Project
Sugarcane	Pyrethrum
Tea	Cotton
River	

Coconuts.

Measurers/Solutions to the problems.

- 1- Regular spraying to control pests diseases
- 2- Application of fertilizers and form manure to improve on soil fertility
- 3- Regular dredging of canals to get rid of silt
- 4- Building of embodiments along the rivers to control flooding
- 5- Encourage the farmers to form cooperatives to get more money.

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N.B.

- 8- Gable/Hola is located on R. Tana East of Nairobi, Major crop is cotton and water for irrigation is from R. Tana. Other crops grown include g. nuts and sugarcane. The aim was to act as a model scheme by which an arid area could be developed.
- 9- The Kano plains pilot irrigation scheme (Kenya is located on the Kavirondo gulf out the shores of L. Victoria near Kisumu. The major crop is sugarcane and others include rice. The flood plains of the following, rivers provide water for irrigation e.g. Nzoi, valla, Nyando and Sondu. The aim was to improve the farming system which was substance and to improve food production to Famine.
- 10-**Lari Irrigation Scheme:** - This is a multipurpose irrigation scheme located on the Kenyan Highlands N. W. of Nairobi town. The major aim was to resettle the Kikuyu Farmers to grow pyrethrum and to rear dairy cattle.
- 11-**Yalla and Bunyala.** These schemes are found on the shores of L. Victoria on R. Yalla Major crops include sugar cane and rice. The aim was to reduce population pressure on the Kano plains as well as to eliminate Malaria and Bilharzia.
- 12-**Mobuku Irrigation Schemes:-** This is a multipurpose irrigation scheme located on the slope of Mt. Rwenzori. The major crop is onions others include cotton, g.nuts, maize, vegetables etc and irrigation water is from R. Ssebrue.

The aim (major was to resettle people from over populated areas especially Akonjo, Bakiga, Bwamba.

- 13-Doho Irrigation Scheme – Major crop is rice and it is found in Bulaleja
Water for Irrigation is from R. Manalwa.

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- 14-Kibimba irrigation Scheme:- its located in Bujiri dstrict, major crop is rice and irrigation water is from R. Mpologoma and L. Kibimba

Contribution of Irrigation Schemes in E. Africa

- 17- Schemes provide employment opportunities to many people in E. Africa.
- 18- Source of food to man. E.g. Rice maize, onions, vegetation
- 19- Sources of raw materials to industries
- 20- Sources of Income to the local people thus helping them to raise their standards of living.
- 21- The schemes promote research and scientific study in E. Africa .
- 22- They promote the development of infrastructure like roads, railways,
- 23- Development of towns like Embu.
- 24- Schemes in E. Africa are sources of government revenue through taxation of the people as well as the schemes themselves.
- 25- The employed people acquire skills on modern farming techniques.
- 26- Attract tourists leading to the development of tourist industry.
- 27- Promote industrial development in E.Africa.
- 28- Resettlement of the population which was formally landless.
- 29- Generation of foreign exchange through the exportation of the crop
- 30- Diversification of the economy thus widening the government tax base.
- 31- Have promoted international trade and relations.
- 32- Have led to the effective utilization of marginal lands. E.g. dry lands, swamp

Problems facing Irrigation Schemes in E.Africa.

- 13- Pests and diseases
- 14- Monoculture which leads to soil exhaustion

- 15- Over production leading to fluctuations on international markets
- 16- Break down of machinery
- 17- Inadequate labour force
- 18- Limited land for expansion
- 19- Shortage of water for irrigation because of drought conditions
- 20- The schemes are expensive to establish and maintain/inadequate capital
- 21- Limited market for the crop.
- 22- Pollution of the environment by industries and tractors.
- 23- High evaporation rates leading to salinity of the soils.
- 24- Silting or blocking of canals etc.

SKETCH MAP OF E.A. SHOWING IRRIGATION SCHEMES.

River

Irrigation Scheme.

POPULATION IN EAST AFRICA

Population refers to the number of people in or given area and time. This is established during a census (counting of people), which is normally done after every year. 10 years because its expensive. The counting of people helps the government to plan for the social services like schools, hospitals etc.

TERMS RELATED TO POPULATION

Over population

This is when the number of people exceeds the available resources given the available technology

Under population

This is when there are fewer people than the available resource given the available technology.

Optimum Population

This is when the number of people is in balance or equal to the available resources.

Population Density

This is the number of people per unit area.

$$P. D = \frac{\text{Total population}}{\text{Land area}} = x \text{ people / Kms}$$

Birth Rate

This is the number of children born in a year per thousand of the total population.

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Death Rate

This is the number of people who die in a year per thousand of the total population.

Population growth rate.

This is the natural increase in population

Infant mortality rate

This is the number of newly born babies who die every year per thousand of the total population.

Infant natality rate

This is the number of newly born babies every year per thousand of the total population

Life expectancy

This is the average age most people live in a given area.

Population Distribution in E. Africa

This is the way people are spread across the earth surface of the scatter of people over the earth surface. This can be described as dense, moderates and sparse

The densely populated areas of E.Africa include the mining areas, mountainous areas e.g. Mt. Kiliro, Elgon, Rwenzori etc. shore of L. Victoria. The coastal areas including islands of Zanzibar and Pemba etc, as well as towns like Kampala. Jinja, Mbale, Nairobi , Kisumu Dar es salaam.

The sparsely populated areas of E. Africa include, Karamoja central Tanzania. N. E. Kenya, Kitgum, Wajiri Marsabit, Rukwa, Sigida, Tabora.

The moderately populated areas in E. Africa include N. Uganda, W. Nile, Central Kenya, parts of W. Uganda as well as towns like Hoima, Gulu, Lira, Michakas, Kituli, Tanga, Mologoro, Mtwara.

A SKETCH MAP OF E.A SHOWING POPULATION DISTRIBUTION

Factors influencing population Distribution in E. Africa

Physical factors /Environmental Factors

1- Soils

Areas with fertile soils like mountainous areas of E. Africa like Elgon, Rwenzori, Kilimanjaro etc. have dense population while areas with poor infertile soils have sparse population because these areas can't sustain agriculture e.g. Karamoja, N.E Kenya, Central Tanzania.

3- Climate (most important factors)

In E. Africa this is the most important factors for population distribution. Areas with heavy and reliable rainfall with moderate temperature attract

dense population like the coastal areas, areas around L. Victoria, highland areas etc. while areas with high temperature and an unreliable rainfall have sparse population e.g. Northern Kenya, N. E Uganda, Central Tanzania.

4- Relief

The wind ward sides of mountains with gentle slopes have dense population because the heavy rainfall and fertile soils. While the lee ward sides are sparsely populated because they are dry.

5- Drainage

Well drained areas have dense population like the shores of L. Victoria while poorly drained areas have sparse population e.g. the swampy areas such areas also harbour pests which transmit diseases.

6- Vegetation

Forested areas have sparse population because of the presence of wild animals and pests and its also difficult to clear the thick vegetables for settlement and agriculture. However areas with moderate vegetation attract dense population because its easy to clear for settlement and agriculture.

7- Pests and Diseases and Wild Animals.

Human Factors

Urbanization

Urban centres in E. Africa have dense population because of better social services and security e.g. Kampala, Jinja, Nairobi, Kisumu, Dar-es-salaam, Dodoma.

8- Mining Activities

Provide Availability of many employment opportunities e.g. Mombasa, Shinyanga etc

9 Industrialization

Industrial areas of E. Africa attract dense population because of better social services, employment opportunities e.g. Kampala, Jinja, Nairobi, Dar-es-salaam

10 Government Policy

The government may also influence population distribution through establishing national parks, game reserves etc leading to sparse population, establishment of industries in some areas leading to dense population e.g. Jinja.

11 Historical Factors

Areas around former kingdoms like Buganda, Nyamwezi etc. have dense population while other parts like Bunyoro, Central Tanzania etc. are sparsely populated because of slave trade.

12 .Political Atmosphere/Climate

Areas with stable political climate like central Uganda the coastal areas, urban centres etc have dense population while politically unstable areas like N. Uganda have sparse populations.

Population Growth

Population growth is the natural increase of the numbers of people in an area. The reasons for the rapid population growth in E. Africa include;

- 7- High fertility rates among the women.
- 8- High birth rates and decline in death rates as a result of improved standards of living
- 9- Illiteracy among the people leading to ignorance about formerly planning methods.
- 10- Improved medical and health services
- 11- Influence of polygamy
- 12- Early marriages lengthening the productive life span of women.

Effects of Rapid population Growth

Positive effects.

- 8- Large population provides labour for full utilization of resources
- 9- It provides enut.. man power for defensive purposes.
- 10- Large population provides a large tax base thus high revenue for the government
- 11- It encourages competition and innovation among the people.
- 12- Large population provides market for both industrial and agricultural products
- 13- Large populations is a measure/index of development i.e. if shows that a country has well developed social infrastructure like hospitals.
- 14- It leads to urbanization.

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Negative Effects

- 10- Promotes unemployment. The government may not provide the necessary employment opportunities for a large population.
- 11- Large population leads to overcrowding congestion and easy spread of diseases.
- 12- Large population leads to shortage of social services for the people
- 13- It encourages land shortage, land fragmentation and then and disputes.
- 14- Large population leads to shortage of accommodation leading to the development of slums with their associated problems like poor sanitation.
- 15- It increases the levels of crime because of lack of jobs.
- 16- Rapid population growth leads to high dependency burden.
- 17- It leads to juvenile delinquencies with associated problems like drug addition, alcoholism.
- 18- Over exportation of resources.

Effects of Large/Dense Population on the environment

- 9- It promotes deforestation
- 10- Pollution of the environment
- 11- Easy spread of diseases

- 12- Land slides and soil erosion
- 13- Land fragmentation leading to poor yields and famine
- 14- Swamp reclamation
- 15- Over exploitation of resources leading to their depletion
- 16- Soil exhaustion due to over cultivation

Solutions to the above problems

- 8- Soil erosion control measures like terracing crop rotation, contour ploughing
- 9- Afforestation and re-afforestation programmes.
- 10- Treating/recycling of industrial wastes.
- 11- Education of the masses.
- 12- Application of fertilizers
- 13- Enforcing strict laws against swamp reclamation
- 14- Improving medical and health facilities.

Low/sparse Population.

- 10- Presence of pests and diseases e.g. tsetseflies in Bunyoro, Ankole, Masaka corridor.
- 11- Political instability like Northern Uganda
- 12- Influence of immigration
- 13- Presence of poor infrastructure like roads,
- 14- Limited employment opportunities
- 15- Poor infertile soils which can't sustain Agriculture.
- 16- Lower and unreliable rainfall
- 17- Hot temperatures
- 18- Influence of slave trade especially in S. Tanzania

Effects of low population

Positive effects.

- 6- Leads to low levels of unemployment. Many people will be assured of what to do.
- 7- Social services will be enuffor the population.
- 8- Encourages large scale farming and Agriculture mechanization

- 9- Moro land will be unutilized for future development.
- 10- Reduces the rates of the crimes like stealing

Negative Effects

- 9- Shortage of manpower leading to under utilization of resources
- 10- Low tax base i.e low revenue for the government
- 11- Lower levels of economic development because of low investments
- 12- Shortage of labour for defensive purposes
- 13- Small market for industrial and agricultural products
- 14- It is an economical to develop social services
- 15- Leads to social and economic dependency on other countries especially the developed.
- 16- It doesn't encourage innovation and competition.

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WILD LIFE CONSERVATION AND TOURISM IN EAST AFRICA

Wild life refers to undomesticated flora (plants) and fauna (animals) found in their natural habitats.

East Africa major tourist attraction is the wild life (animals and plants in the natural habitats).

The following factors have led to decline of wild life in East Africa.

- 7. Poaching

8. Increase in population
9. Political instability
10. Completion from other land uses like Agriculture.
11. Traditional hunters.
12. Pest and diseases.

The conservation of wild life, in East Africa can be done through the following ways.

- a) Establishing of national parks, games reserves and sanctuaries.
- b) Banning trade in wild games products
- c) Leasing of wild game hunting
- d) Education of the masses on importance of wild life.
- e) Training and deploying game, rangers to protect the protect the gazetted areas
- f) Forming anti-poaching units

The protected wild life areas or conservation areas in east Africa include the following:

- (i) National parks.

These are large tracts of land in their natural states set by act of parliament to protect the natural and smoke lecture for public benefit

- (ii) Game Reserves

These are gazette areas by the law of the state where wild life is set a side for further use or development

- (iii) Sanctuary

These are areas gazette by the state to preserve wild life which are rare and nearly extinction e.g Ngamba Island Sanctuary (Chimpanzees) Bwindi Impenetrable (Gorillas) lake Nakuni

This where various animals and birds are raged or fenced and provided with similar conditions existing in the natural habitats for public viewing or research.

Controlled Hunting area.

This is an area where hunting of certain animals is limited and accepted and thus reducing on the number of animals known as cropping.

Reasons for promoting Wildlife conservation

- To conserve nature (flora and fauna)
- To promote tourism in East Africa
- To provide animal products like meat, ivory, hides and skins e.t.c
- To provide employment to the game rangers or guides etc
- To recreation purpose i.e. Hunting and game cropping
- To prevent extinction of some animal species
- They are sources of revenue and a foreign exchange.

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Problems affecting the conservation of wild life in East Africa

- Poaching of wild game for their products like skins, born, tusks, hides
- Wild fires set by holiday makes, poachers smokers
- Population pressure, which has led to encroachment of national parks and other gazetted area.
- Drought leading to shortage of water and pastures for the animals and other gazelled area
- Political instability leading to depletion of wild life.
- Limited skilled personnel
- Pollution of the environment.

Steps taken to solve the above problems

- Controlling population thought family planning methods.
- Educating the masses about the importance at wild life.
- Eviction of encroaches.
- Establishment of animal orphanages e.g. Ngamba Island sanctuary.
- Training and equipping game rangers
- A forestation and re-a forestation programme.

TOURISM.

Define:

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Tourism is a practice of traveling for purposes of leisure or relaxation, curiosity and or study.

Tourism may be domestic or international.

Tourism therefore is an invisible export, a major source of foreign exchange in East Africa.

N: B the development of tourism is based on the off

7. Landscape/ Relief
8. Drainage features
9. Wildlife (animals and vegetation)
10. Climate
11. Historical sites like Kasubitombs fort Jesus.
12. Culture.

Conditions or factors favoring the development of Tourism in East Africa
physical factors.

6. Presence of variety of wild life in East Africa in form of wild animals like Elephants, Snakes, Lions, Baboons e.t.c and vegetation like Equatorial rainforests, Savannah e.t.c attract tourists for viewing photography.
7. Presence of conducive climate that promotes swimming, heating sun bathing e/t/c these attracted people from the temperate countries.
8. Presence of beautiful scenery in form of volcanic mountains Block Mountains, rift valley, plateau attracting tourist for viewing Research, photography.
9. East Africa has a variety of drainage features in form of lakes, rivers, beaches e.t.c these attract tourists for raffling, beating, swimming, sun bathing, fish sport e.t.c
10. Strategic location of East Africa at the coast making it accessible to international markets.

Mention any 3 tourist attractions found in East Africa other than plants and animals

- Mountains
- Rivers and Lakes
- Rift Valley
- Historical Sites
- Culture.

Human Factors.

13. Presence of improved accommodation facilities in the major cities and towns, game parks and game reserves e.g. hotels, holiday's apartments, motels, Inns e.t.c
14. The d hospitality exhibited by the people of East Africa that dates back the colonial times. The hospitality is being shown in hotels, banks, and airports.
15. Political stability which favours the development of the tourism industry.
16. Availability of adequate capital to invest in tourism related facilities. Like hotels, roads, lodges etc
17. Capital is provided by the government and investors
18. Presence of large supply of skilled man power inform of waiters, tour guides hotelians, accountants.
19. Increased and improved advertisements both at home and abroad through the media like T.VS newspapers magazine.
20. Presence of reliable and adequate transport inform at road, sir facilitating the movement of tourists to areas of their interest.
21. Favorable government policies on tourism e.g. protection of the wild life. Attracting foreign investors in the industry maintaining political instability.
22. Development of tour packages. They organize accommodation facilities, transport, and meals, tour guides.
23. Presence of a variety of cultural attractions e.g. dancing dressing food, marriage ceremonies.

24. Availability of a variety of historical sites e.g. fort Jesus Nyero paintings, Gedi ruins, Fort Jesus Kasubi/ Karambita.

A MAP OF E. AFRICA SHOWING TOURIST SITES AND ATTRACTIONS.

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Tourism in Kenya

Of the 3 East African countries, Kenya has the most developed tourism industry because of the factors,

17. Kenya is renowned for the richest and largest animal population in the world mainly in the national parks like Isara, Amboseli, Masai Mara, and Maasai Mara.
18. Presence of magnificent scenery provided by markets like lakes e.g. Nakuru, Naivasha, Victoria etc and Rivers like Tana, Athi etc these attract tourists for sport fishing, swimming, sunbathing etc.

19. Presence of a variety of drainage features like lakes e,g Nakuru, Naivaha, Victoria etc. and Rivers like Tana, Athi etc these attract tourist for sort fishing swimming, sun bathing e.tc.
20. Presence of adequate and reliable transport network based on roads, railways and air making the tourist sites accessible.
21. Kenya has a stable political climate than Uganda and Tanzania
22. The strategic location of Kenya at the coast in relation to international markets.
23. Presence of a variety of historical sites like fart Jesus, Vasco Da Gama fort Gedi rain etc.
24. Availability to modern banking services Kenya has more banks compared to other countries in East Africa e.g. Baroda, Kenya Commercial bank Standard Chattered etc
25. Availability of sufficient and comfortable accommodation facilities inform of hotels, inns holiday apartments etc.
26. Favorable climate of Kenya i.e. its sunny throughout the year promoting swimming and sun bathing.
27. Favorable government policies of advertising maintaining political stability.
28. Availability of strong capital base provided by the government as well as private investors.
29. Adequate skilled manpower.
30. Presence of affluent class.
31. Advertisements.
32. Presence of a Varity of languages Spoken in Kenya e.g. Arabic Swahili English etc

N: B Kenya's visitors come from U.S.A, u.k. Germany Holy, India, Republic of south Africa France, Ug, Tz, Rwanda.

The most visited areas in Kenya include:

- Nairobi National Park
- Tsaro National Park
- Arbodare National Park

- Fort Jesus (Mombasa) etc.

TOURISM IN TANZANIA

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The major tourist attractions include.

The Wild Game in the National, Parks Like Serengti (The Largest and most attractive)

Arusbia National park (The smallest with large number of elephants and black rhinos)

Ruaha National park

Lake Manyara National Park

The Game reserves include.

- Katavi Plains
- Gombe stream.
- Biharamulo.
- Mkomazi etc.

Other attractions in Tanzania include

Mountain Scenery

Lakes and Rivers

Coastal features

Historical sites

The major tourist activities in Tanzania include Sport-fishing Mountain climbing, Swimming, sun bathing diving etc

TOURISM IN UGANDA

The major attractions include:

9. Wild life in National parks, Games reserves and sanctuaries e.g. mountain Rwenzori National park (Mountain Climbing)

Kidepo valley National park (Elephants Uganda kob, Giraffes)

Queen Elizabeth National park (Boat riding and game viewing)

Bwindi impenetrable (Gorillg tracking)

Murchison fall (the largest, it has sport fishing and game viewing)

10. Water bodies e.g. L.Victoria R. Nile and tells Like Karuma. Bujagali)
11. Favorable climate
12. Variety of Vegetation types
13. Recoupable government polices
14. Hospitality of the people
15. Rich cultural heritage
16. Historical sites e.g. Kasubi tombs Nyero Rock Paintings (Kumbi district(fort Baken Etc

Problems facing limiting the tours industry in East Africa

9. Competition from development countries as well as member countries in East Africa because of similar tourist attractions especially the wild game.
10. Poaching of the wild animals in the National parks leading to the extinction e.g. the white rhines.
11. Pests and diseases, which attack the animals as well as the tounts.
12. Inadequate capital to up grade the tourist facilities like hotels airports etc
13. Political instability in some parts of East Africa like National Uganda etc searing away the potential tourist
14. Inadequate skilled personnel to manage the industry especially hotels, airports, banks, tourist sites etc
15. Entrenchment on the existing tourist potential sites like National Parks games reserves because of rapid population increase.
16. Inadequate transport and communication networks making areas to tourist interest inaccessible e.g. Bundibugyo, Kidepo valley national packs bruindi

Seasonal migration of animals from one place to another e.g. many elephants migrate from Queen Elizabeth national park to other game parks.

- Establishment of training institutions to impart skills on people to improve on the tourism industry
- Gazetting more national parks and game reserves
- Controlling pests and diseases through spraying
- Intensifying advertisements to encourage the culture of visiting the tourist sites by the local people.
- Rehabilitation of the cultural sites and roads
- Encouraging the study of foreign international languages like French, Germany, Spanish e.t.c
- Setting up of anti- poaching units.
- Privatization of the tourist related industries like hotels
- Deployment of security personnel to maintain political stables in the tourist areas.
- Banning trade in wild life trade like skills ivory
- Injecting more capital in the tourist industry.
- Encouraging the development of private tour companies.

MINING IN EAST AFRICA

Mining refers to all attempts to extract valuable minerals both solid and liquid from the earth crust.

East Africa endowed with a number of mineral like diamonds, copper soda ash, salt gold iron etc

Many of these minerals are in small quantities like gold in west Kenya, Coal in south Tanzania etc however the most important minerals in East Africa include diamonds, copper and soda ash.

TYPES OF MINERALS IN EAST AFRICA

There are three types of minerals

Metallic Minerals: which include silver gold, copper, zinc, lead, aluminum, tin etc

Non-metallic minerals: Phosphates, caladium, salt, nitrates, potash, sulphur, mica

Minerals, which provide power. Includes petroleum, natural gas uranium, water

Methods of Mining in East Africa

Open cast methods

This method is employed when the mineral occurs near the earth surface. The over lying soil is removed (stripped off) and dumped near by the mineral deposit is then removed by digging using picks and shovels sometimes explores are used, it is then loaded on tracks

In East Africa, it is used for mining the following, copper, diamonds, gold, phosphates, salt etc.

This method destroys vegetation, soil profile and structure it also leaders to the creation of deep holes on the earth crust.

Underground Mining

This method is used when the mineral deposit is at great depth below the surface of the earth. The methods involve the effect.

Adit Mining

This method is used when the mineral is on the hillside like copper on mountain Ruwenzori

Horizontal/inclined tunnels are dug in the hill site where the mineral occurs at the site of the mountain.

The roof of the tunnel is supported by steel or concrete beams to prevent it from collapsing.

The mineral bearing rock is blasted and transported to the surface by light railways or conveyor belts.

The methods is used in the mining of copper in Kilembo mineral

SHAFT MINING

Vertical shafts are sunk into the earth crust to reach the mineral deposit. From these shafts horizontal shafts are dug to reach concrete beams to prevent it from collapsing. Page | 327

Light railways are used to transport the deposit to the shaft hoisting to the surface.

Disadvantages of Underground Mining

- Accidents due to caving of the mines
- Pollution due to poor ventilation.
- High temperatures below the earth crust.
- High costs of mining
- Diseases, which affect the respiratory organs.

ALLUVIAL/ PLACER MINING

This method is used when the minerals appear as alluvial deposits. It involves mining of the alluvial deposits in a container. The mixture is rotated until light particles such as sand mud and small stones are washed off leaving mineral particles such as gold, platinum and diamond.

DRILLING e.g. oil on L. Albert.

DREDGING: dredging of the minerals like soda ash.

Factors favoring the development of mining in East Africa.

12. Presence of large deposits of minerals like gold petroleum limestone, soda ash etc that attract the government and foreign investors to come and export.
13. The occurrence of the minerals near the Earth surface making extraction relatively easy and cheap using open cast method.
14. Presence of adequate supplies of power for processing and transporting of minerals, e.g. H.E.P from Nalubaale power project petroleum etc.

15. Availability of adequate and reliable source of capital provided by the government and foreign investors to buy machinery.
16. Presence of efficient and reliable transport network based on roads and railways, that have facilitated the transportation of the minerals to processing centres
17. Favorable government policies of attracting foreign investors and diversifying the economy.
18. Political stability within the mining areas to attract many foreign investors in the industry.
19. Presence at large supplies of water for processing the minerals provided by rivers and lakes like Victoria
20. Availability of large supplies of labour both skilled and unskilled to work in the industry.
21. Presence of improved and appropriate technology enabling easy construction and transportation of the minerals.
22. Availability of a large and ready market both domestic and foreign.

Distribution of Major Minerals in East Africa Minerals in Uganda

The following are the major minerals in Uganda

9. Copper and cobalt from Kasese (Kilembe)
10. Gold Karamoja and Busia
11. Phosphates and Limestone from Tororo
12. Limestone from Hima
13. Petroleum from L. Albert
14. Arsenic from Tororo
15. Salt from L. Katwe.
16. Tin, Iron Ore, tungsten Kigezi.

N.B Copper in Uganda a major mineral mined at the foot at Mountain Ruwenzori on the steep valleys of River Nyawmamba

Mining in Tanzania

The minerals in Tanzania include diamonds at Mwadui, Gold in Lramba-sekenke, Musarra Cooper and Coal Ruhuhu valley iron are in Mbeya hills and liganga. Mica in Kilosa and Mpanda etc. Page | 329

Diamonds mining in Tanzania

Diamonds are mined 20km from shinyanga at Mwadui, these diamonds are formed by the intrusion of magma of solidified in a pipe to form a plug. The plug was later exposed by erosion are also scattered the diamonds. The diamond bearing rock is called Kimberlite. the methods of mining is open cast or quarrying. The processing procedure includes separation crushing extraction and processing.

Uses of Diamonds

4. For making Jewellery
5. For making drilling bits
6. For making precision goods like watches

Factors, which favored diamond mining at Mwadui in Tanzania

11. Presence at large diamond deposits at Mwadui
12. The deposits occur close to the earth surface making it easier and cheaper to mine.
13. The diamonds in Tanzania are dense, hard and repel water thus it is easy to extract.
14. The land is relatively the allowing easy construction of roads and railways as well as use of machines like tractors
15. The diamonds in Mwadui are at high quality.
16. Adequate capital
17. Reliable transport
18. Large market
19. Abundant supply of labour
20. Favorable government policies

Contribution of the Mining Industry in East Africa.

- It provides employment opportunities to many people like drivers, Engineers, researchers etc.
- It diversifies the economy of East Africa and thus widening the government tax base.
- The mining industry is the major source of foreign exchange through the exportation of major minerals like gold to France UK, U.S.A etc
- The industry has also led to the development of infrastructure like Roads, Railways etc that have facilitated the transportation of minerals to processing centers.
- Mining has lead to the development of industries in East Africa especially those processing the minerals e.g. Tororo and Hima cement factories etc.
- It has led to the development of towns associated which mining e.g Kasese Shinganga, Mambasa etc.
- It has promoted research and scientific study.
- It has promoted tourism in East Africa and thus earn alternative source of foreign exchange.
- It's also a source of income to the local people employed in the mining industry helping to improve their standards of living.
- The mining population provides market for both Agriculture and industrial products

Effects of mining on the Environment

- ❑ Pollution of the Environment
- ❑ Displacement of many people calling for expensive resettlement
- ❑ Associated with accidents leading to death of many people.
- ❑ Open cast mining leads to the creation of pits on the Earth surface
- ❑ Mining leads to urbanization with associated problem like unemployment, high crime rate prostitution slum development
- ❑ If leads to loss soil fertility.

- ❑ Mining promotes landslides, which also lead to death of many people.
- ❑ Underground mining promotes earth quakes because it weakens the rock strata
- ❑ Mining leads to fall of the water table.

The above can be solved through.

7. Application of artificial fertilizers
8. Spraying to cultural disease vectors
9. Resettlement or displaced people
10. Carrying out forestation and re-a forestation
11. Transforming mining holes into man made lakes for fishing.
12. Deflection of the landscape can be solves by land filling.

CONDITIONS / FACTORS HINDERING/ LIMITING THE DEVELOPMENT OF THE MINING INDUSTRY IN EAST AFRICA.

15. Inadequate capital from mineral exploitation, transport and processing.
16. Inadequate supply of skilled manpower in the mining industry because of the problems associated with it. Like accidents low pay and etc.
17. Political instability in some mining areas like Karamoja South West Uganda.
18. Minerals in East Africa occur in small quantities e.g. tin beryllium, gold etc.
19. Price Punctuation on international markets
20. Inadequate supply of power for transportation processing and extractions
21. Small market for the minerals because of poor guides or quality e.g. coal in South Tanzania.
22. Some mineral deposits are un remote areas e.g. coal in Tanzania, uranium in Mrima hiss in the south coast of Mambasa.
23. Minerals in east Africa are scattered making exploitation difficult.
24. Competition which other development countries like Germany
25. Limited research in the mining industry.
26. Exhaustion of some of the minerals
27. Ube of inappropriate technology like hoes.
28. Unfavorable government polices of favoring other sectors with the economy.

Steps taken to solve the above problems.

10. Maintaining political stability in the mining areas.
11. Diversification of the economy to include industries Agriculture, Tourism.
12. Attracting foreign investors in the mining industry by providing concessions, maintaining political stability.
13. Privatization of the mines like Tororo and Hima cement.
14. Training more labours in the mining industry
15. Establishing of industries to provide market for the minerals.
16. Construction of more Hydro Electricity power dams to provide power.
17. Increased research in mineral exploration.
18. Extension of feeder roads and railways to the mining areas.

INDUSTRIALIZATION IN EAST AFRICA

An industry is a working set up which produces goods and services that a community uses.

Industries are very diverse and may include activities like mining manufacturing building, quarrying etc.

However, the word industries are often used to describe factories that change raw metals into finished goods. Most industries in East Africa are mainly concerned with processing Agricultural raw metals. (Agro-based industries)

Industries therefore are categorized into 4

5. Primary Industries

These are mainly extractive industries involving the exploitation of natural resources e.g. fishing mining, forestry quarrying.

6. Secondary or Manufacturing industries

These process goods from primary industries in to finished products. These industries are further divided into two:

a) Heavy industries

Deal with heavy or bulky raw materials and involve heavy capital investment e.g. engineering, ship building, heavy chemical industries etc. Page | 333

b) Light industries

Use light and compact Materials and produce small and light articles e.g. plastics, textiles, cosmetics, toiletries, cigarettes food processing.

7. Tertiary or Miscellaneous industries

These involve provision of back up services e.g. Administration banking, Insurance, entertainment etc.

8. Quaternary industries

Involve provision of hi-tech and information services e.g. universities.

Markets oriented industries, are those whose location are determined by market e.g. breweries milk processing flour milling, bread making, fish processing cigarette making.

Raw metals oriented industries. The location is determined by presence of raw metals e.g. Hima Bamburi, Tororo

Import substitution industries. These industries provide goods which substitute for imports i.e. they make goods that would have been imported e.g. sugar factories.

N: B in this case therefore we are combined to manufacturing or secondary industries i.e. the processing of raw metals and semi processed materials into finished or more complex materials of great value that can be used by man.

The principal industries in East Africa

Jinja- Industries include.

Textiles, food processing steel rolling mills breweries matches, pulp and paper, printing and publishing sugar processing, saw milling, manufacture of bicycle tyres mattresses, soap etc.

Kampala- Industries include.

Chemical processing, food processing, Engineering steel rolling motor vehicle assembly tobacco processing pharmaceuticals, leather tanning textiles etc.

Nairobi

Food processing, printing and publishing, railway and motor vehicle repair
breweries textiles cigarettes, cigarettes milk processing plastics etc

Mombasa

Food processing, steel works motor vehicle assembly, oil refinery (changawiwe), cement works ship repair, manufacture of iron sheets, bottles, fertilizers etc.

Eldora.

Metallurgical, Engineering, food processing, Textiles, leather tanning tobacco etc

Nakuru.

Cigarette Making, textiles, motor vehicle repair insecticides food processing sweaters.

Dar-es-salaam

Grain milling, meat packing motor vehicle repair sisal processing cement, plastics, breweries, sacks bicycle assembling

Tanga

Cement manufactures, food processing, chemical, engineering. Metallurgical, textiles etc.

Draw a skelch map of east Africa and on it mark and name

- (i) Mts, Rwenzori and Usambara.
- (ii) Rivers; Tana and Pangani
- (iii) Industrial centers, Kisumu Songea and Arusha.

Name any 3 types of industries in any one industrial center in A (iii) above

Other industrial centers in East Africa include, Mbale, Mbarara Morogoro Songea Kisumu etc.

Draw a sketch map of East Africa showing the major industrial

Conditions / factors which have favored the Development of industries in East Africa.

12. Presence of abundant supply of power to run the industries e.g. Hydro Electricity power from Nalubaale power plant, Hale and Seven folks dam etc petroleum.
13. Availability of enough capital for investments provided by the government World Bank private investors like Madhiran.
14. Favorable government policy on industrialization which encourages investors of marinating political stability tax reduction etc.
15. Accessibility by water land and air to enable assembling of raw mountains and distribution of finished produce
16. Presence of abundant raw mtrls to feed the industries in the making of finished products e.g minerals and Agricultural raw mtrls
17. Existence of a large market both at home and abroad to consume the finished products
18. Presence of large supply of labour both skilled and unskilled by foreigners e.g Indians
19. Presence of flat and vast land for the establishment and expansion and industries
20. Presence of adequate and appropriate technology and research in industrial, development
21. Political, stability, which attract foreign investors on well as investment opportunities.
22. The influence of geographical/ industrial inertia. I.e. the ability of an industry remain in a given place because at associated advantages e.g. raw mtrls established infrastructure experienced source of labour etc.

Contribution of industrial development in east Africa.

15. Stimulates the development of infrastructure e.g. roads xuls hospitals, railway lines etc.
16. Create employment opportunities for the local population e.g. technicians, drivers, security guards etc.

17. Source of government revenue through taxation of the employees the investors as well as goods in transit.
18. Generation of income for the local population helping them to improve on their standards of living.
19. Provision of consumer goods to the local population.
20. Sources of foreign exchange through the exportation of semi and finished products to other countries like U.S.A India Egypt.
21. It has led to development of urban centers because of many employment opportunities e.g. Jinja, Kampala, Nairobi
22. Diversification to the economy and thus wide widening the government tax base.
23. Promotes international trade and co-operation between east Africa and her trading partners like S.Africa, India, U.K flowers.
24. Further promotes research and scientific study in East Africa.
25. Reduced on the costs of importing finished products like shoes, sugar, cooking oil etc.
26. Provide market for Agricultural products like tea, pyrethrum cotton sisal etc
27. Promotes domestic tourism
28. The local population employed in these industries acquire skills related to industrial development.

Problems resulting from industrial Development in East Africa.

9. Increased struggle for land leading to land disputes.
10. Exhaustion of raw mtrls threatening the future of industries leading to unemployment.
11. Pollution of air water and land.
12. Urbanization and its related problems e.g. unemployment's high crime rates slum development etc
13. Increased land degradation i.e. recantation of swamps deforestation, destruction of landscape.
14. Repatriation of profits by foreign investors
15. Industrial accidents which led to loss of lives and property
16. Displacement of the population calling for expensive resettlement

Problems facing industrial Development in East Africa

(Factors hindering effective industrial development)

15. Political instability in some parts of east Africa scaring always-potential investors.
16. Insufficient capital in the industrial center because of high costs of production.
17. Incidequate, skilled man power to run the industries
18. Incidequate technology and research limiting automation and efficiency in production.
19. Shortage of industrial raw mtrls i.e. most of the minerals occur in small quantities and other are of low grades.
20. Unfavorable government polices i.e. putting much emphasis on Agriculture imposing high taxes on investors etc.
21. Incidequate for industrial expansion and development due to the rapid population growth in East Africa.
22. Limited domestic market for industrial product because of poverty and low purchasing power.
23. Completion for market for industrial products because of poverty and low purchasing power.
24. Competition for market which development countries like Japan, China, U.K.
25. Industrial accidents
26. Poor and unreliable transport network affecting the delivery of raw mountains and finished products.
27. Shortage of water for industrial development especially in Kenya.
28. Fluctuations in climate affecting the production and distribution of Agricultural raw metals like cotton, coffee, sugar etc.

Steps being taken to promote industrial development in East Africa

12. Expansion of the East Africa community to widen the market e.g Rwanda and Burudi.
13. Privatization of industries for efficient management and production e.g Nytil to pictare.
14. Construction of more power projects to increase power supply e.g. Kiira dam Nalubaala power projects etc as well as diversifying to other power sources like petroleum.

15. Construction of new roads and widening the existing one to localities the transportation of raw units and finished goods.
16. Encouraging foreign investors to come and invest in the industry.
17. Restricting importation of manufactured goods which are locally produced i.e. encourage the development of import substitution industries. Page | 339
18. Advertise to encourage consumption of locally manufactured goods
19. Recycling of scrap to provide raw metals for the steel related industries.
20. Applying for financial support from internal financial institution like the world Bank
21. Training of more manpower as well as carrying out research to improve on automation and efficiency
22. Encouraging the development of small-scale industries e.g. cottage industries.

The industries have the following advantages

8. Promote employment opportunities
9. They require limited skilled man power
10. They can be started anywhere
11. They use very little raw materials.
12. There is minimal pollution of the environment.
13. They use locally produced raw metals
14. They generate revenue for the government.

FISHING IN EAST AFRICA.

Fishing is the hunting of aquatic lives from water bodies e.g. Fish lobsters, crabs whales, shrimps, crocodiles; these water bodies are referred to as fishing ground / fisheries. Page | 340

There are 2 types of fisheries in East Africa

a) Fresh water fisheries.

These involve fishing in the inland water bodies like swamps, ponds, rivers and lakes.

The major species of fish in the inland fisheries include Nile perch. Lungfish catfish, Tilapia, mud fish Bagrus Dagaa electric fish etc.

The major inland water bodies in east Africa include:

1. Lake Victoria.

It offers the biggest catch and the main species include tilapia Nile perch perch bagrus haplachramus etc

The major fishing methods is gill netting and preservation m/ds include smoking freezing and deep flying

2. Lake kyoga

is the most intensively fished lake in east Africa because it is shallor. Fishing is done by the bakenyi using methods like fish traps gill nets baskets and angling.

The main fish species include tilapia, pretentious. The landing sites include Bulaingu, Namansale, Lwampanga.

5. Lake Tangayika

The main type of fish caught is dagaa, the main fishing mtd is lampard and the major port is Kigoma.

6. Lake George.

It is the most productive lake in east Africa as it is only 3m deep and because of dropping of hippos, which fertilize the water. However the main problem is presence of crocodiles the main port is Kasenyi.

N: B the marketing of the fish is done by TUFMAC (The Uganda fish marketing cooperation).

Lake Turkana.

Fishing is attested by remoteness and lack of market. However it is important for sport fishing in East Africa as applies to lake Nairasha.

Lake Albert.

It is the most important fishing ground and the major ports or landing sites include Ntoroko, Butiaba, Wanseke, Tonya e.tc.

Lake Edward.

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The major is Rwenshama

b) MARINE FISHERIES.

This fishing is called out in salty waters i.e. oceans and seas most produced in Kenya and Tanzania (Pemba and Zamibar)

The major marine fish species include sardines cod mackerel, tuna, anchery Melin, Haddock, halibut etc

Marine fish species are categorized.

5. Pelagic species

The live the near the water surface e.g. sardines mackerel tuna and anchories.

6. Dimersal species.

7. These live and breed near the seabed e.g. hard lock, halibut cod etc.

8. Crustaceous species.

These have external skeletons e.g lobsters, shrimps, Crabs oysters, prawns.

Fishing methods in east Africa.

There are major 2 types of fishing methods in east Africa.

a) Commercial or modern methods of fishing

These include trawling, drifting, lobster traps long lining and purse seining.

b) Traditional or Primitive methods

These include gill netting, use of baskets, use of spears bows and arrowa lampara (lamp attracting) using hooks and fish traps

N: B. Marine fisheries in east Africa are underdeveloped because of the following

13. Presence of a narrow continental shelf affecting the multiplication of planktons and fish
14. High temps at the coast making the fish bad easily and quickly.
15. The ocean floor covered by coral reefs which interfere with the fishing activities
16. Presence of a straight coastline which is not suitable for the development of ports and fishing villages.
17. Inadequate capital to purchase the modern fishing equipment
18. Presence of strong ocean currents along the coast which discourage the use of small vessels
19. Limited fish species of commercial values.
20. Limited planktons at the coast because of the depth of the ocean
21. Presence of inappropriate technology i.e. the fishermen at the coast still use primitive methods like baskets.
22. Inaccessibility of some of the fishing grounds
23. Competition with developed countries like Norway Japan etc.
24. The people along the coast making it very unpopular

Preservation methods.

- Smoking - Salting
- Sun drying - Freezing / Refrigeration
- Deep frying - Canning

Uses of fish in east Africa

8. Animal feeds
9. Food/ Sources of proteins
10. Glue
11. Soap
12. Fertilizers
13. Medicine
14. Cosmetics

Factors favoring the development of the fishing industry in east Africa.

15. Presence of extensive water bodies both fresh and salty e.g. Lake Victoria, Tanganyika. Kyoga Indian ocean
16. Presence of a large market both at home and abroad in countries like U.K Japan Canada etc.
17. Favorable government of providing loans to the fishermen, protection against foreign competition diversification of the economy.
18. Presence of improved refrigeration facilities like freezing, canning etc.
19. Abundant supply of labour both skilled and unskilled due to the dense population around lakes, rivers and the Indian Ocean.
20. Presence of a variety of fish species of commercial value like Nile perch meckerel etc
21. Availability of modern fishing gears in form of motorized boats
22. Abundant supply of planlotors due to the shallowness of the water bodies to support large shoal.
23. Availability of adequate capital provided by the government and foreign investors to purchase modern fishing gears.
24. Presence of a well development and reliable transport network for quick transportation of fish from fishing grounds to inland markets.
25. Presence of fish companies that offer support to the fish men in form of providing nets, boat engines as well as market.
26. Existence of forests and forest products for making boats and providing firewood.
27. Presence of fish processing industries which provide market e.g. Mases fish company, Gomba fish company etc.
28. The existence of an extensive, shallow continental shelf favoring the growth of planktons and subsequent multiplication of fish.

Contribution/ importance of the fishing industry to East Africa

Fishing industry has provided employment opportunities to many people living at the coast and on islands i.e. as fishermen, processors, and Transporters e.tc

14. It has promoted research and scientific education in E.Africa
15. The fishing industry has also led to the improvement of peoples diet. Page | 344
16. The industry is also a major source of government revenue through taxation of the fishermen as well as the companies involved.
17. The fishing industry has diversified the economy of East Africa thereby widening the government tax base.
18. The industry has diversified the economy of east Africa thereby widening the government tax base.
19. It has led to the development of towns and parts e,g infrastructure like, roads, ice, plants, school etc.
20. The industry has also promoted the development of infrastructure like roads, ice, plants, school etc.
21. It is a source of income to the local population along the coasts.
22. The fishing industry in East Africa has promoted trade and internal relations between east Africa and her trading partners like U, S.A
23. The people employed in the fishing industry have acquired new and modern skills related to fishing.
24. It has promoted tourism.
25. It has led to the improvement of standards of living at the people.
26. The industry is also a major sources of raw materials used for in the manufacture of fertilizers animals feeds, glue, medicine, cosmetics

The problems associated with the fishing industry

7. Pollution of the waters by the vessels and industries along the coast.
8. Deforestation because of the high demand for firewood and timber for smoking and boat making respect ring.
9. Extinction of some fish species because of over fishing
10. Accidents treading to loss of lives and property.
11. Conflicts over territorial water e.g Mijingo
12. Urbanization with related problems like unemployment high crime rates, slum development etc

Problems affecting the Development of the fishing industry in East Africa

18. Inappropriate technology in the fishing industry. The fishermen also use poor fishing gears.
19. Inadequate capital to improve on the fishing activities.
20. Inaccessibility of some of the fishing grounds making the transportation of fish to the inland markets difficult.
21. Presence of predation like crocodiles and sharks in the oceans which feed on other aquatic lives.
22. Limited processing and preservation methods in east Africa.
23. Presence of shallow areas of the east Africa coastline limiting the use of big vessels.
24. Pollution of the waters by domestic and industrial effluence which affects the metabolism of aquatic lives.
25. Competition for market with developed countries like Japan, Norway, Canada etc.
26. Profit repatriation by foreign companies.
27. Indiscriminate fishing leading to depletion of some of the fishing industries.
28. Theft of nets, boats and boat engines.
29. Compact nature of the east Africa coast line limiting the development of landing sites as well as multiplication of fish
30. Presence of water needs which limit fish metabolism and movement of boats in the inland water bodies like L. Victoria.
31. Limited fish species of economic value.
32. Presence of shared water resources leading to uncultured fishing and dispute
33. Limited government support to the in some cultures people don't eat fish hence limiting markets.
34. Small market for fish and fish products ie in some cultures people don't eat fish hence limiting market.

Steps being taken to solve the problems affecting development of fishing industry in east Africa.

15. Encouraging fish farming to reduce pressure on the existing water bodies as well as reducing over fishing.

16. Fishermen are being encouraged to form cooperatives to help them markets their products as well as obtain loans.
17. Removing water needs mechanically and sometimes biologically.
18. Improving on the transport network by upgrading the existing roads linking landing sites.
19. Fish processing industries have been set up to ensure that they are processed by exports.
20. Educating the fishermen on the dangers of over fishing indiscriminate fishing and fish poisoning
21. Fishermen are being issued with licenses to reduce indiscriminate fishing.
22. Restocking of the over fished water bodies like Kyoga, George etc.
23. Patrolling of the waters and landing sites to keep security
24. Modernizing of the landing sites e.g Kasenyei, Masese.
25. Broadening external markets through advertisements.
26. Provision of better fishing gears to the fishermen in form of motorized boats.
27. Promoting research on new species to maintain supply.
28. Establishment of add storage, facilities (ice plants) e.g in Luziro Masese Lamu etc.

TRANSPORT

Types: Road, Air, Water and Railway

Advantages of road transport

5. They are flexible hence can reach most parts of the country.
6. Cheaper and quicker over long distances.
7. Can be used to carry a wide range of goods from parcels to wide.
8. Roads can be built over steep gradients unlike railway lines.

Disadvantages.

5. Expensive over long distances.
6. Very large cargo cannot be carried at once.
7. Roads are costly to build and maintain
8. Susceptible to many accidents.

Advantages of Air transport.

7. Great speed
8. Time saving because of speed
9. No physical barriers e.g. mountains

10. Freedom of movement in air
11. Ideal for transporting light and expensive freight e.g Jewellery
12. Remote to inaccessible areas ca

Disadvantages.

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4. Expensive for most people.
5. Limited carrying capacity
6. Interruptions by bad weather e,g thick fog. Ice snow and storms.

Advantages of Water transport.

4. Cheap since less fuel is used
5. Heavy and bulky goods can be transported
6. Often less effected by joins and congestion.

Disadvantages.

3. It is slow and therefore unfit for perishable commodities.
4. Double cost of loading and unloading have to be incurred at the terminals.

Advantages of Water transport.

6. Movement of large quantities of cargo
7. Coaches or wagons can be designed for specialized goods.
8. Avoid congestion which is often found on roads,
9. The railway lines are much easier to maintain once laid.
10. Heavy and bulky commodities can be transported at ago

Disadvantages.

3. They are slow had to be incurred at terminals of loading
4. Not flexible as fixed routes must be followed and double costs

The Tazara/ Tanzam Railway.

The Chinese constructed this railway, it was opened in 1975, it runs from Dar-es-salaam in Tanzania to Kapiri-Mpashi in Zambia a distance of 1800km. it is owned by both the and Tanzanian government him for its constructions.

To provide a safer alternative route to the land locked Zambia

To encourage economic activities in South Tanzania by providing access to the Northern markets

To Export Zambia's copper

To promote regional cooperation and inter territorial trade.

Sketch map showing the Tazara Railway and pipeline

Contribution of the Tazara Railway

14. The railway has opened up an alternative route through the southern highlands of Tanzania.
15. It has helped in the exportation of copper from Zambia and D.R.C through the part
16. It has promoted regional cooperation and trade between Zambia and Tanzania.
17. Generation of employment opportunities to many people in Zambia and Tanzania e,g engineers,

18. The tazara railway has promoted tourism in the region thus an alternative source of forex.
19. It has led to the growth and development of urban centers like Kasama, Kapiri-Mposhi, Kidatu, Ndola etc.
20. It is also a major source of government revenue through taxation of goods on transit. Page | 349
21. It has enabled the importation of goods into the land located
22. It has led to the development of infrastructure like Roads, schools Hospitals etc.
23. Source of forex abstained through taxation of goods and the chiriese.
24. It has facilitated the exploration of iron are from Mbeya region etc.
25. Sources of income.
26. It has led to industrial development.

The products carried by the railway

- | | |
|------------|----------|
| - Soda ash | - Gold |
| - Rice | - Sugar |
| - Iron ore | - Coal |
| - Salt etc | - Copper |

Problems faced by the Railway.

12. Congestion at port of Dar-as- salaam.
13. Delays in traffic and services due to congestion
14. Shortage of expert administrators because of inadequate foreign exchange.
15. Conslant break-down of machines (wagons)
16. Shortage of spare parts
17. Inadequate modern handling facilities at the port of Dar-es-Salaam.
18. Pollution of the environment
19. Little profits because the railway passes through unproductive
20. Inter state sabotage

21. Flooding which washes away the roads
22. Competition from other routes for trade goods.

Solution to the above problems

10. Containerization to reduce congestion.
11. An oil pipeline has been constructed from Dar to Ndola.
12. New warehouses have been constructed at Ubungu.
13. An oil terminal has been constructed to accommodate huge oil tankers.
14. Alternative routes have been opened e.g.
15. Through Angola by Railway to Lobito and Benguela
16. By road southwards to Cape Town, Port Elizabeth and Durban
17. Through Mozambique to Port Beira
18. Through Malawi by road to Port Salami etc

ENERGY RESOURCES IN EAST AFRICA

Energy in East Africa is divided into two main groups

3. Non-renewable Energy resources: these include oil, natural gas and coal.
4. Renewable Energy resources e.g. Biomass from vegetation matter e.g. coffee and rice husks sorghum husks.

Forest e.g. charcoal and firewood

- Solid energy
- Wind energy
- Geothermal energy obtained in the following areas, Sempaya, Rwagimpa, Kitagata, Kisiizi, Kibiro Kihangoro and Burabga (All in Uganda) Karia, Ebarus, L. Bogalo, Butor etc (Kenya)

Water for H.E.P generation. This type of energy is very clean i.e. doesn't pollute the environment and it is the main source of power for industries in East Africa

H.E.P production in East Africa

Factors Favouring the especially or development of River Dam projects /H.E.P dams in East Africa.

11. Presence of water fall necessary to turn the turbines
12. Presence of a large and ready markets for H.E.P
13. Presence of improved and appropriate technology for constructing as well as generation of H.e.P
14. Availability of adequate capital provided by the government and foreign investors.
15. Presence of large supply of labour for dam construction as well as its migration.
16. Availability of ready and reliable transport network.
17. Presence of a narrow river valley (Gorge) To increase on the speed of water to turn the turbines.
18. Availability of a large water reservoir inform of a lake.
19. Favorable government polices on power generation
20. Availability of regular and reliable water supply throughout the year. Provided by a permanent river

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Several H.E.P dams have been constructed across east Africa and they include the following.

Uganda

Nalubaale power project (former Owen fall)

Is the most important sources of power project in east Africa opened in 1954. It has a capacity of 150 megawatts and generates over 97% of Uganda's exports 1/3 of its power to Kenya and Rwanda.

Mobuku power project on R. mebukku in Kasese District

N:B other potentral site for H.E.P generation in Uganda industries

- Bujjagali falls on R.Nile
- Karuma falls on R. Nile
- Murchisen falls R. nile
- Sszibwa falls R. ssezibwa
- Sippifalls in Kapchorwa district
- Maziba falls in Kabale

Tanzania

This smallest consumer and producer of H.E.P in East Africa.

The major project includes.

- Hale dam on R. pangani on Pangani falls
- Kidatu on great Rwaha
- Taita Taveta dam on R. pangani
- Stiegler's George project on Rufigi

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Other potential include.

- Kalambo on Kalamba falls

Kenya

Kenya a much smaller H.E.P potential compared to Uganda Marjory on R. Tana and Ahi (Galana)

The most important project in Kenya is on R. Tana and the seven folks dam. The dam involved the construction of several

- Kindaruma (44)
- Kamburu (94 mega watts)
- Gitaru. (145 mega walts(

Other potential sites on R.Tana include,

- Mutonga
- Kora Kora
- Grand falls
- Adam falls

Fourteen falls on R. Athi

Thompson falls on R. Ewaso. Ngiro

Lugard falls on R. Galaria

Webuye on R. Nzora etc.

Problems faced in the generation of H.E.P in East Africa

10. Fluctuations in the water levels i.e. lakes and rivers.
11. Inadequate skilled man power leading to over dependence on expatriates
12. Presence of inappropriate technology in the generation of H.E.P
13. Small markets due to poverty and low levels of industrial development
14. Limited capital
15. Competition from other sources of power.
16. High cost of transmission
17. Vandalism of the H, E, P facilities etc.
18. Presence of waterweeds.

Contribution of dams in East Africa.

12. Provide water for irrigation
13. Have helped to culture flooding of rivers
14. Promote tourism and thus sources of forex.
15. Source of government revenue through taxation,
16. Development of foreign exchange through power exportation.
17. Modification of climate through evaporation, condensation and then rain.
18. Modification of climate through evaporation, condensation and then rain.
19. Provision of employment opportunities e.g. engines.
20. Sources of income to the local people.
21. Diversification of the economy
22. The man-made lakes behind the dams have promoted fishing.

TRADE

Terms associated with trade

Barter trade

Visible trade

Invisible trade

External/ international/ foreign trade

Internal/ home trade

Balance of payments

Bilateral trade

Nature of trade

- a) Exports of east Africa (majorly primary products)
(Agriculture, Minerals, fish)

skilled man power.

- b) Imports- Machinery, Chemicals, Textiles, Vehicles, Weapons
Thermal power)

Barter trade- Exchange of goods for goods

Problem- Hard to get somebody who needs your commodity

- Double coincidence of goods.

Visible trade- Trade involving tangible goods

Invisible trade- Trade in services e.g tourism

External trade: Trade across boundaries or borders

Balance of trade – Difference between exports and imports

Balance of payments – Difference between the country's total profits from both invisible and visible goods and receipts from invisible and visible goods and receipts from invisible and receipts from invisible and visible goods.

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Bilateral trade- trade carried out between two countries

Multilateral trade- between many countries.

UBANIZATION

This is the process where by an increasing proportion of the total population in a country settles in a town.

It is the process of growth and development of urban centers or nucleated settlements.

N: B the causes of urbanization are the some of rural urban migration

The major urban centers in East Africa include.

- a) Towns: Kmapala, Mbarara, Mbala, Nairobi Nakuru, Arusha, Dodoma
- b) Ports, (I) Inland ports eg
 Bukoba, musoma mwanza, Kisumu, Jinja
 Portbell, Kigoma Bukakata
 (ii) Sea ports.eg
 Mombasa, Malindi, Tanga, Lamu, Mtwara, Dar-es-salaam

SITE AND SITUATION OF A TOWN

A site of a town is the ground on which it stands while situation of a town shows a town's position in relation to the surrounding areas.

FUNCTIONS OF URBAN CENTERS IN EAST AFRICA (PORTS AND TOWNS)

- 11. They act as Commercial Centers
- 12. They act as Industrial Centers
- 13. They act as Residential Centers
- 14. They act as Financial Centers
- 15. They act as Educational Centers
- 16. They act as Administrative Centers
- 17. They act as Tourist Centers
- 18. They act as Recreational Centers

19. They act as cultural Centers
20. They act as transport. Centers

PROBLEMS FACING URBAN CENTERS IN EAST AFRICA.

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12. Limited accommodation facilities.
13. Unemployment
14. High crime rates
15. Easy spread of diseases
16. Inadequate social amenities
17. Pollution of the environment
18. Growth of dums with associated problems.
19. High cost of living
20. Limited space for expansion
21. Congestion
22. Careless people cause accidents

Solutions

8. Vertical expansion i.e sky scrappers
9. Encouraging family planning
10. Enforcing law and order to reduce the crime rates
11. Emphasize laws that govern the development of modern cities.
12. Establishment of traffic lights
13. Construction of fly over
14. Development of rural areas.

NAIROBI

This is the largest town and industrial center of east Africa; originally it was a place for repairing railways

Factors for the growth and development of Nairobi city

11. Influence of early European and Asian administrators
12. Presence of rich agricultural hinterland.
13. Adequate supplies of power from Jinja and later from power project from river tana.
14. Existence of dense population that provided manpower.
15. Favorable government policies on urban development
16. Availability of large supplies of water from R. Tana
17. Favorable cool climate influenced by the Kenyan

18. Adequate Capital for the development of infrastructure
19. Presence of adequate and reliable transport network
20. political stability

MOMBASA.

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Is the largest port in east Africa and the 2nd largest industrial town in east Africa it developed on Ria ground. It has the largest oil refinery in East Africa at a place called Changamwe.

Factors growth and development of Mombasa.

12. Presence of deep waters, which allow large vessels to anchor
13. Presence of a natural harbour which is well shattered from the waves of the Indian ocean
14. Availability of hard basement rocks for the construction of the port
15. Presences of a large hinterland i.e., Kenya, Uganda Rwanda and DRC.
16. Presence of ice free conditions through the year permitting port activities
17. Presences of efficient transport network based on roads
18. Presence of many industries
19. Strategic location in relation to intentional markets
20. Influence of historical factors e.g. Mazrui families Asians and Portuguese.
21. Favorable government polices on port development
22. Presence of advanced and appropriate technology inform of containers, lifts etc.

JINJA

Jinja is located in the North of L. Victoria occupying a headland surrounded by water of the Napolion galf.

Factors for growth and development.

10. Presence of rich agricultural hinterland
11. Presence of vast land for port development
12. Favorable government policy for port development
13. Large supplies of H.E.P for u=industrial development from owen fall dam.
14. Presence of large supplies of water from the Nile and L.vicatoria.

15. Historical factors i.e it was a regional headquarters for the Eastern region and a seat for Kyabazinga .
16. Large population in the eastern region.
17. Adequate and reliable transport network based on the water railway and road.
18. Adequate capital for the development of the town