REGIONAL GEOGRAPHY OF UGANDA AND FIELDWORK P250/3

COURSE OUTLINE:

1. PHYSICAL GEOGRAPHY
1.1. INTRODUCTION TO UGANDA
1.2. RELIEF DIVISIONS
1.3. GEOMORPHOLOGICAL PROCESSES
1.4. DRAINAGE
1.5. CLIMATE
1.6. VEGETATION
1.7. WETLAND RESOURCES
2. HUMAN GEOGRAPHY
2.1. AGRICULTURE
2.2. FISHING
2.3. FORESTRY
2.4. MINING
2.5. INDUSTRIALIZATION
2.6. TOURISM
2.7. TRANSPORT AND COMMUNICATION
2.8. TRADE
2.9. POPULATION OF UGANDA
2.10. URBANIZATION
2.11. ENERGY RESOURCES (POWER)
2.12. ENVIRONMENTAL DEGRADATION
3. FIELDWORK
3.1. INTRODUCTION
3.2. FIELDWORK STAGES
3.3. FIELDWORK EXCURSION

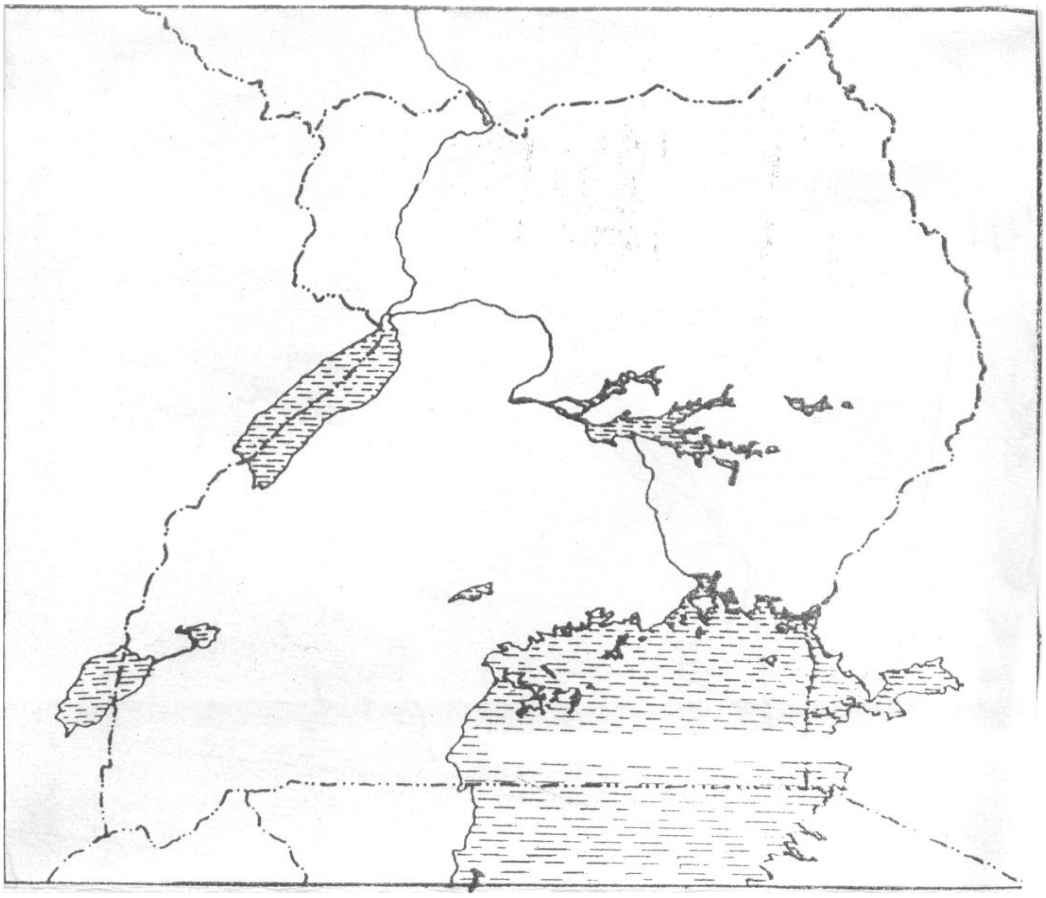
INTRODUCTION
Uganda is a landlocked country consisting of 112 districts as per December 2016 which do change due to public demand and politics.

LOCATION AND SIZE
Uganda is one of the East African countries found in the eastern part of the African continent and it is the smallest in total size area.

COUNTRY	**Area Km sq.**
Tanzania	943,800
Kenya	544,400
Uganda	241,039
Total	**1,729,239**

Uganda covers a total land area of 241,039 km^2, with so much open water in terms of lakes, rivers and swamps but the land surface is only 197,086 km^2.

It's surrounded by the following neighbouring countries; to the North is South Sudan, to the East is Kenya, to the South is Tanzania, to the southwest is Rwanda and to the West is Democratic Republic of Congo.
Uganda is located approximately within 4° North and 1½°South of the equator and between 29° and 35° East of the Greenwich meridian.



SKETCH MAP OF UGANDA SHOWING ITS LOCATION AND NEIGHBOURING COUNTRIES

Revision question

1. "Uganda's latitudinal location is worth an asset than a liability" discuss.

UGANDA'S POPULATION

The population of Uganda is one of most growing one in the World that annually, one million people is added and its estimated to be growing at rate of 3.0%.
Over years, the population has changed as follows;

YEAR	NUMBER	STATUS
1949	4.9 million	Census
1959	6.4 million	Census
1969	9.5 million	Census
1980	12.6 million	Census
1991	16.7 million	Census
2002	24.2 million	Census
2014	34.6 million	Census
2018	36 million	Estimation

UGANDA'S POLITICS

Uganda attained her independence in 1962 from Britain and became a Republic in 1967 after the abolition of all Kingdoms and chiefdoms.

Since 1962, Uganda has had a number of Presidents from Sir Edward Muteesa II to H.E. Mr. Yoweri Kaguta Museveni.
Initially Uganda was made up of a few districts but now number is in 100's from 34 districts in 1980's and this has been due to public demand and politics.
Internationally, Uganda is a member of the organizations like African Union (AU), Preferential Trade Area (PTA), United Nations (UN), Commonwealth (COMESA), East African Community (EAC), etc which have indeed helped her to develop politically and economically with other member countries.

UGANDA'S ECONOMICS

Uganda is among the least developed countries in the World and her economy mainly based on primary products from agriculture, mining, forestry, fishing and a few from manufacturing industry and her markets for those goods are in Germany, Japan, USA, China, Canada, India, Saudi Arabia, Italy, etc.
However, Uganda's export trade has big problem of prices being very low and fluctuating on international level.

PHYSICAL BACKGROUND AND RELIEF OF UGANDA

Relief refers to the nature of the landscape **or** the general appearance of the earth surface.
Uganda is situated on the African plateau and so with varied relief regions, which means that she has non-uniform landscape due to the geomorphic processes.
The major causes of these varied relief regions in Uganda were the tectonic activity / earth movements / endogenic processes namely: faulting, folding, warping, vulcanicity and their resultant process of earthquaking; and exogenic processes or denudational forces namely; weathering, erosion, transportation and deposition which are thought to have taken place 2 million years ago up to date.
Topographically, Uganda mainly ranges between 610 meters and 2134 meters above sea level whereby areas around Nimule near Uganda – South Sudan border are the lowest and the highest areas are on Mount Rwenzori with a height of 5109 meters above sea level which makes Uganda to range from areas which are hot and dry of Western Rift Valley of Uganda to snow lying areas on Mt. Rwenzori giving her numerous diversity of economic activities as the relief varies. Therefore the difference in the relief of Uganda has resulted into differences in natural resource endowments.
Because of the above processes both the former (endogenic) and the later (exogenic), Uganda's relief is non-uniform, as they have made it to have diversified landscape, which is grouped into four major relief regions namely;

- Rift valley or lowland regions
- Plateau region
- Upland regions
- Highland or Mountain region

RIFT VALLEY / LOWLAND REGION

The main lowlands of Uganda range between 600metres – 900metres above sea level, covering a total land area of about 9% of Uganda, which is equivalent to 17482.6 kilometres squared. The lowlands form only a narrow long belt, which differs, from the neighbouring regions in altitude.
The lowlands are located within the rift valley running down along the western side, stretching from the south western Uganda below where Lake Edward is found at a height approximately 900metres and extends northwards up to Nimule town where it gets as low as 600 metres above sea level.
Since the lowlands are fully found in the rift valley, they are believed to have been formed as a result of faulting through the compressional forces.
The major distinct areas of the lowlands of Uganda are the Lake George - Edward flatlands, the Semliki river valley, the Lake Albert flatlands and Rhino camp basin along Albert Nile.
Within the lowland region, there are other features such as craters, escarpments, lake basins, river valleys, etc.

THE PLATEAU REGION

The Plateau of Uganda is undulating landscape characterized with ups and downs ranging between 900 meters -1500 meters above sea level and covering the biggest part of Uganda of about 84% of Uganda's total land area, which is 163170.8 kilometres squared.
This plateau is part of the East African Plateau which was formed as result of warping, folding and faulting due to compressional and tensional forces acted on one of the oldest rocks known as the Basement complex.
This plateau region is found in Central (Buganda), Northern (Acholi and Lango) and Western Uganda (Bunyoro) where areas rise with an angle of elevation with the northern shores of Lake Victoria basin generally higher at an average height of 1500metres above sea level and Kyoga basin in the north at an average height of 900metres above sea level represents the drowned river basin.
In this plateau region, there is a variety of minor relief features like the flat topped hills, gentle sloping hills, steep and narrow valleys, inselbergs and broad valleys.

UPLAND REGION

This region ranges between 1500 - 2000 meters above sea level covering an area of about 5%, which is 9712.6 kilometres squared of Uganda's total land area.
It's mainly found in Southwest Uganda (Kigezi highland and Ankole hills), Eastern Uganda and Western Uganda (Bunyoro hills, Mubende, Toro hills) and West Nile uplands.
The uplands were mainly formed as result of vulcanicity, folding and faulting.
These uplands have a lot of drainage features such as lakes, rivers, swamps and streams.

MOUNTAIN / HIGHLAND REGION

This region consists of the relief features, which are 2000meters above sea level. It constitutes 2%, which is 3885.0 km^2 of the total land area of Uganda.
The mountain region is mainly found in the west with Rwenzori mountain ranges, southwest with Mufumbiro mountain ranges (Mount Muhavura, Mount Mgahinga and Mountain Sabino), east with Elgon highlands and Sukulu hills in Tororo and north east of Uganda with Moroto Mountain, Napak Mountain, Kadam Mountain, Timu mountain and Morungole Mountain as well as the residual hills of Madi, Karamoja and Acholi.
These highland areas are mainly as a result of volcanicity except Rwenzori, a block mountain that was formed as a result of faulting though others especially inselbergs (residual hills) are / were due to denudational forces of weathering and erosion.
These relief regions of Uganda are then sub categorized into minor regions such as lake basins, river valleys, flat-topped hills, gentle sloping hills, steep hills, broad valleys, ridges, escarpments, flat plains, inselbergs, etc.
In conclusion, these relief regions existed due to tectonism thus responsible for the geomorphology of Uganda i.e. the formation of Uganda's relief features.
However, to certain extent the relief of Uganda is due to denudational processes / exogenic processes.

HOW TO WRITE AN ESSAY OF CONTRIBUTION / IMPORTANCE USING AN ACRONYM OF "SPELED"
S – Starting word (s) / concept (s) (Who)
P- Point (What)
E – Explanation of the point (How / Why)
LED – Local Examples and District

POSITIVE SIDE

- First joining words in essay writing (+ 1) after **the Starting key word / concept (Who)** for **What / Point (Land use / Economic activity)**

Has / Have encouraged
Promoted
Stimulated
Facilitated
Accelerated
Favoured
Attracted
Led to development
Supported

- Second joining words in essay writing (+ 2) after **the Landuse / Economic activity** for **Why / Reason (Explanation)**

Because of
Due to
Caused by
Brought about by

- Third joining words in essay writing (+ 3) after **the Reason** for **How / Outcome (Explanation)**

Resulting into
Leading to

- Fourth joining words in essay writing (+ 4) (or before + 1) after the **Out come** for an **Example** (s)

For example
For instance
Like
Such as

NEGATIVE SIDE

- First joining words in essay writing (+ 1) after **the Starting key word / concept (Who)** for **What / Point (Problem / Obstacle)**

Has / Have discouraged
Limited
Blocked
Difficult
Hindered
Hard
Disfavoured
Scared away
Led

Vulnerable to
Subjected to

- Second joining words in essay writing (+ 2) after **the Problem / Obstacle** for **Why / Reason (Explanation)**

Because of
Due to
Caused by
Brought about by

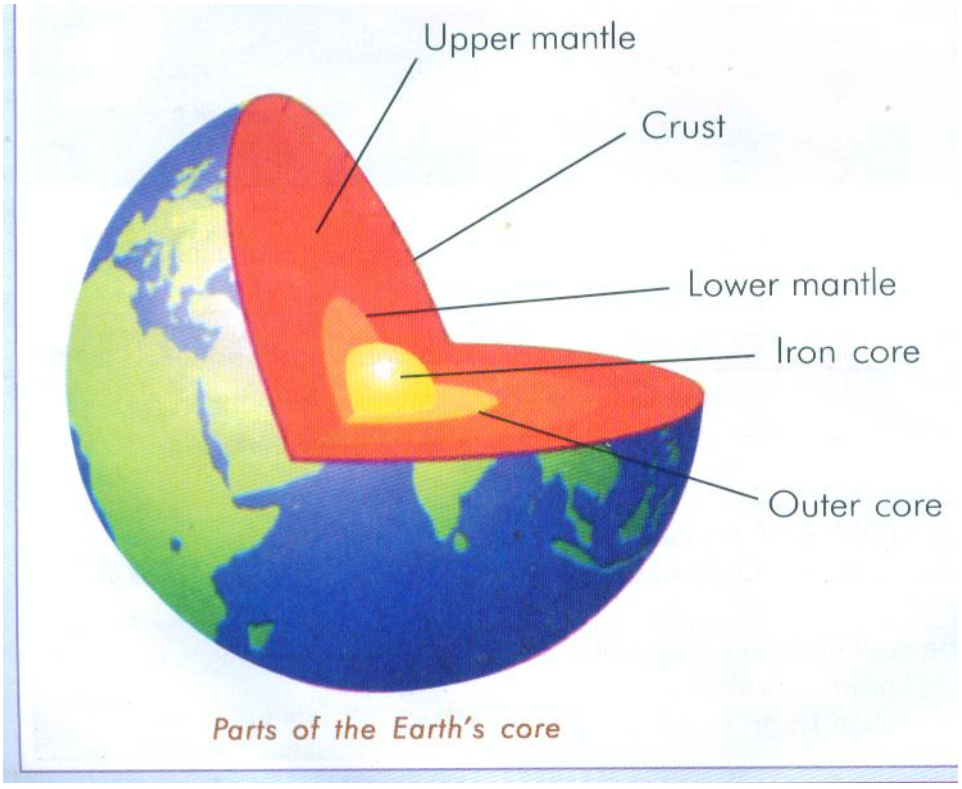
- Third joining words in essay writing (+ 3) after **the Reason** for **How / Outcome (Explanation)**

Resulting into
Leading to
Bringing about
Causing

- Fourth joining words in essay writing (+ 4) (or before + 1) after the **Out come** for an **Example** (s)

For example
For instance
Like
Such as

SKETCH MAP OF UGANDA SHOWING THE RELIEF REGIONS



Parts of the Earth's core

IMPORTANCE OF RELIEF REGIONS TO UGANDA

The relief features have both advantages (assets) and disadvantages (liabilities) in Uganda because of their influence;

Positives;

❖ Relief features such as highlands or mountains like Mt. Elgon in Kapchorwa and Mt. Rwenzori in Bundibugyo have led to the development of tourism due to the their beautiful scenery to attract tourists leading to foreign exchange earning for infrastructure.

❖ Relief features have encouraged crop growing because of fertile alluvial and volcanic soils reuslting into increased food production / improved human diet for example lake basins like Lake Victoria basin in Jinja for sugarcane growing and river valleys like Mpologoma river valley in Bugiri for rice growing.

❖ Forestry and lumbering + different forest types and tree speciess + getting the timber and making furniture + Mt. Elgon with forests in Bududa and Mt. Muhavura forests in Kisoro.

❖ Transportation + navigable waterbodies and undulating landscape for easy construction + cheap movement of goods and passenges / growth of trade and commerce + L. Victoria basin at Kasenyi landing site in Wakiso to Ssese Isands and Kampala – Jinja road and rail on Buganda plateau.

❖ Livestock rearing + natural grasses in open lands + production of animal products like milk and meat + Western rift valley in Buliisa with Balaalo cattle keepers.

❖ Fishing + different edible fish species + protein building food / improved human diet + Nile perch and tilapia in Lake Victoria at Luzira and Ggaba in Kampala.

❖ Education and research + nature of appearance and formation as field work study areas and for scientific experiments + acquisition of more geographical knowledge + Mt. Elgon slopes in Bukwa and rift valley areas in Kasese.

❖ Water supply + sources of rivers / water catchment areas + provision of water for domestic, industrial and irrigation purposes + River Malaba in Malaba and R. Manafwa in Manafwa from Mount Elgon and then River Nyamwamba in Kasese from Mount Rwenzori.

❖ Humansettlement + undulating / gentle surface for easy establishment of houses + growth of towns + Buganda plateau in Wakiso and Kampala.

❖ Natural boundaries + nature of formation / natural appearance + mutual understanding, peace and harmony + Mount Elgon in Bukwa and Bududa separates Uganda from Kenya, Mount Rwenzori in Kasese and Bundibugyo separates Uganda From the democratic republic of congo.

❖ Wild life conservation and protection + natural habitants + attraction of tourists for foreign exchange + Mount Elgon National Park in Mbale and Bwindi impeneratable forest national park in Kanungu.

❖ Mining and quarrying activities + valuable minerals + sand and clay mining in the lowlands and valleys of Lake Victoria at Kajjansi in Wakiso and Lake Albert flatlands with Oil in Buliisa.

❖ Construction and building + building materials and precious stones + improved infrastructure and houses + sand at Lwera lowland in Lake Victoria basin in Kalungu and granite stones at Muyenga in Kampala.

Negatives;

❖ Relief regions such as highlands like Mt. Elgon in Mbale have hindered the construction of transport and communication like roads and railway lines because of rugged surface and steep slopes causing inaccessibility to such areas

❖ Subjected to severe soil erosion due to rugged relief and heavy rainfall leading to loss of soil fertility for crop farming such as Kigezi highlands in Kisoro and Kabale.

❖ Deadly landslides / mass wasting + heavy relief rains and steep slopes + destruction to the human lives, livestock and farmlands like in Bududa on Mt. Elgon slopes and in Bundibugyo on Western rift valley escapements.

❖ Wastelands / idle lands + Large expanse of space and rugged surface + limited agriculture, settlement and other economic activities + Mt. Rwenzori ranges in Kasese and Bundibugyo and Mufumbiro ranges in Kisoro and Kabale.

❖ Dangerous wild animals + natural habibats or homes + attacking man and his livestock as well as destroying crops + Mount Elgon is a home of monkeys and baboons in Mbale and Manafwa

❖ Highlands / mountains and rift vallies like Mt. Elgon areas in Kapchorwa and Rift valley escarpments at Butiaba in Buliisa have blocked mechanised agriculture due to steep slopes and rugged surface there by leading to famine and low food production.

❖ Mountaineous regions like Mt. Rwenzori in Bundibugyo have cold temperatures because of the ice at the peak and high altitude which eventually limits settlement and crop farming.

❖ Seasonal flooding + heavy rainfall and low altitude / lowlands + destruction of settlement, crop farm and infrastuctures + Western Rift valley flats in Kasese and River valleys of Manafwa in Manafwa and Mbale.

❖ Little rainfall + rain shadow effect on the lee ward side + Limiting crop farming + Mt. Rwenzori dry areas in Kasese.

- ❖ Dangerous pests and disease carrying vectors + breeding sites + attacking people and livestock and destroying crop farms.
- ❖ Anti – governmental elements / rebels + hiding grounds in Forests and swamps + misunderstanding and insecurity + Allied Democratic Front (ADF) rebels in Mt. Rwnzori forests in Bundibugyo
- ❖ Regional and inter terrritoial conflicts + shared features + misunderstanding and instability + Mujingo Island in Lake Victoria in Bugiri with Kenya.

In conclusion, relief features have both positive and negative importance because their influence on human and economic activities and land use patterns.

Revision Question:

1. Examine the influence of relief regions on the land use patterns in Uganda.
2. Assess the economic value of the relief features of Uganda.
3. "The relief of Uganda presents opportunities and failures'' Discuss.
4. Examine the significance of highlands to the economic development of Uganda.

EFFECTS OF TECTONISM ON RELIEF OF UGANDA

Tectonic activity is sometimes referred as earth movements / endogenic processes / diastrophic forces.

Tectonic activities are the internal processes both vertical and lateral forces produced by the convective currents caused from intense heat and pressure generated by geochemical and geophysical reactions as well as radio activity owing their origin beneath or within the earth crust leading to faulting, warping, folding and vulcanicity as well as their resultant effect of earth quaking.

Therefore the physical landscape or relief (geomorphology) of Uganda is mainly composed of landforms / features formed by tectonic activities.

NB: Geomorphology refers to the study of landforms on the Earth's surface and within the Earth's crust.

FAULTING

Faulting is endo - process within the earth crust where rocks were fractured and displaced relatively away from each other either horizontally, vertically or in opposite direction, giving rise to the normal, reversed and tear fault due to tensional and compressional forces brought about by the convective currents produced by the intense heat and pressure resulting from the geochemical and geophysical reactions as well as radio activity in the interior of the earth crust.

In Uganda, faulting started in paleocene period (70 million years ago) and it continued severely up to the pleistocene period (2 million years ago) affecting mainly the Western parts and small areas in the northern Uganda.

EFFECTS OF FAULTING ON THE RELIEF OF UGANDA

Faulting is responsible for the formation of the following landforms both as direct and indirect effects;

The faulted features in Uganda are;

The rift valley such as the Western rift valley along the border of Uganda - D.R.C in Buliisa and Bundibugyo.

A horst is Mt. Rwenzori found in Western Uganda on the floor of the Western rift valley on Uganda – DRC border, in Bundibugyo, Kasese and Kabarole districts.

A tilt block is found on Mt. Rwenzori ranges at Mt Stanley, which forms Margherita peak in Bundibugyo.

Faulted lakes / grabens such as L. Albert in Buliisa and Hoima, L. Edward and L. George in Kasese and Bushenyi, all in the floor of the Western rift valley.

Fault guided valleys such as R. Aswa in Adjumani in Northern Uganda and R. Wassa in Bundibugyo.

Fault scarps / fault - line scarps / escarpments such as Butiaba in Buliisa, Kichwamba in Kasese and Kambura in Kasese, those around Bunyaruguru near Lake George in Rubirizi and those along Lake Albert in Hoima.

A faulted formed waterfalls such as Murchison falls along Victoria Nile in Buliisa.

SKETCH MAP OF UGANDA SHOWING THE FAULTED FEATURES.

FORMATION OF RIFT VALLEY

It's an elongated trough or depression with fault scarps on either sides along the more or less parallel faults. It is the real opposite of horst [Block Mountain].

The Western rift valley of Uganda stretches from Nimule on Northern border of Uganda – South Sudan in Moyo, Southwards to the border of Uganda - D.R.C until it reaches the border of Uganda - T.Z and Rwanda in Kisoro.

Several theories were advanced to explain the formation of the rift valley. However, one of these theories has been put forward to best explain the genesis of the western rift valley of Uganda and this is Compressional theory.

Other theories include; Tensional theory, differential uplift and relative sinking theory.

COMPRESSIONAL THEORY

According to this theory, it is believed that geochemical and geophysical reactions as well as radioactivity from the core / mantle beneath the crust generated the intense heat and pressure which made molten rocks to move as convective currents leading to compressional forces within the earth crust that caused a stress as they were pushing in the same direction or towards each other.

Later this stress led to the formation of reversed fault lines within the earth crust and forced outer blocks to over ride / thrust up the central block leaving it as a depression.

Then the hanging fault scarps were removed by the weathering and erosion to modify a rift valley.

Step I

5 lines

Step II

5 Lines

Step III

7 Lines

TENSIONAL THEORY

According to this theory, it is believed that geochemical and geophysical reactions as well as radioactivity from the core / mantle beneath the crust generated the intense heat and pressure which made molten rocks to move as convective currents leading to tensional forces within the earth crust that caused a strain which was pulling the earth crust apart / in either direction.

This later led to the formation of normal fault lines on the either side of the central block which then sunk / slid downwards due to its weight to form a depression and eventually modified by erosion to form a rift valley leaving the adjacent blocks standing up.

Step I

5 lines

Step II

5 Lines

Step III

7 Lines

ECONOMIC IMPORTANCE OF WESTERN RIFT VALLEY TO THE PEOPLE OF UGANDA

The Western rift valley of Uganda has influenced a number of economic activities in the surrounding areas and Uganda as whole, which are both positive and negative. These are:

Positives are:

- Western rift valley and its associated features have promoted the tourism industry in a way that they act beautiful sceneries which are tourist attractions. For instance the Butiaba escarpments in Buliisa, the rift valley lakes of Edward in Kasese and Albert in Hoima within the rift valley, etc have attracted tourists for foreign exchange earnings to Uganda's economy.
- Western rift valley floor has grabens with water which have encouraged fishing activities due to the presence of different fish species like tilapia, lung fish, cat fish and silver fish which are great sources of proteins to man like Lake Albert at Wanseko fish landing sites in Buliisa, George and Edward at Kasenyi and Katwe respectively in Kasese.
- Western rift valley has acted as a mining ground for valuable minerals like copper mines and cobalt mines at Kilembe in Kasese, salt at Katwe in Kasese and Kibiro in Hoima, limestone deposits at Hima and Muhokya in Kasese and oil deposits on shores of Lake Albert in Buliisa which has led to development of industries in Uganda's economy.
- Promoted transport routes + natural way in Kasese, navigable rivers like Semliki in Ntoroko and graben lakes like Lake Albert at Butiaba and Wanseko ports in Buliisa connect Uganda to D.R.C at Muhangi and Kasenyi ports + cheap movement of passengers as well as cargo and development of trade and commerce
- Encouraged crop farming + heavy relief on windward shoulders and convectional rainfall of over 1500mm per annum as well as fertile alluvial soils + increased food production like rice growing at Mubuku irrigation in Kasese, Coffee and banana growing in Bundibugyo and Kabarole.
- Promoted livestock farming and bee keeping + natural pastures on the escarpments and thickets which flower for bees + production of meat and milk and honey collection + Balaalo cattle keepers in Buliisa and Basongora pastoralists at Muhokya in Kasese and Alur bee keepers in Nebbi.
- Education and research purposes for students from Higher Institute of learning, Universities as well as secondary schools + fieldwork study areas as unique formation and nature + acquisition of more geographical skills and knowledge + Kichwamba escarpments and Murchison falls in Buliisa.
- Natural boundary or the border of Uganda and DR Congo like at Bwera in Kasese + elongated in shape from north to south + peace and harmony.
- Water supply + Fresh waters from radiating rivers like R. Nyamwamba in Kasese and Semliki in Bundibugyo and in graben lakes like Albert in Buliisa and George at Katunguru in Kasese + domestic and industrial uses.
- Settlement + gently sloping and relatively flat landscape as well as heavy rains and fertile soils + attraction of high population densities + development of towns like Kasese and Fort portal towns in rift valley floors.
- Wild life conservation and preservation + suitable condition for habitation in forests, savanna grasslands and lakes like crocodiles and hippopotamus in Queen Elizabeth NP in Kasese and Semliki NP with monkeys in Bundibugyo.
- Power generation (HEP) + waterfalls on the western rift valley escarpments + domestic and industrial use such as Murchison falls along Victoria Nile in Buliisa is a potential site for the generation of HEP.
- Lumbering / forestry + different tree species and forest types on the rift valley escarpments + timber production and other furniture as well as ecotourism like Semliki forests in the rift valley floor in Bundibugyo and Ntoroko
- Building and construction + building materials within the floor + improved houses and infrastructures such as sand and pebbles along R. Nyamwamba in Kasese.

Negatives:

- Some rift valley areas have attracted dangerous pests and diseases due to conducive conditions for breeding like Mosquitoes, which cause malaria, rinder pest disease and tsetse flies for sleeping sickness and nagana to man and livestock respectively like at Buliisa, Rwenshama, Ntoroko, Nyabirongo and Kasenyi.
- The western rift valley is subjected to accelerated soil erosion especially due to heavy rainfall and steep escarpments of Butiaba in Buliisa and Kichwamba in Kasese and the steep slopes in Kabarole and Bundibugyo which has led to loss of soil fertility hence limited agricultural activity.
- Frequent landslides / mass wasting + heavy rainfall and steep slopes + destroying crop farms, killing people and burying roads + Bundibugyo and Kabarole.
- Little rainfall + rain shadow effect on leeward side of western shoulders of Rift valley + aridity conditions in areas of Kasese, Semliki lowlands in Ntoroko and Albert flatlands in Buliisa
- Very hot temperatures of about 30^{o}C + low altitude within floor at Albert flats in Buliisa and Semliki valley in Ntoroko + limited human settlement and crop farming
- Dangerous wild animals + hiding place and natural habitants in forests like in Semliki forest Valley in Bundibugyo and on foothills of Mt. Rwenzori in Kasese + threat and insecurity to people and destroying their crop farms.
- Restricted fishing activities and navigation + deep and narrow faulted lakes as well as strong waves caused by the violent storms low fish catch and capsizing of boats + Lake Albert in Buliisa and Hoima.
- Difficulty in development of different infrastructure like roads and rails + steep slopes and rugged surface + inaccessibility + along Butiaba in Buliisa and Kichwamba escarpments in Kasese.
- Difficulty in construction of human settlement + steep slopes and rugged surface + remoteness + along Butiaba in Buliisa and Kichwamba escarpments in Kasese.
- Difficulty in mechanized agriculture + steep slopes and rugged surface + limited food production and famine + along Butiaba Buliisa and Kichwamba escarpments in Kasese.
- Vulnerable / subjected to natural hazards of earth quakes and volcanic eruptions in Bundibugyo, Kasese, Kabarole + constant earth crustal instabilities within the floor + destruction of human lives and crop farms, loss of property.
- Seasonal flooding + low altitude and heavy rainfall + destruction of human settlement, crop farms and infrastructures + R. Nyamwamba in Kasese destroyed town of Kilembe in 2014.
- Territorial conflicts between Uganda and DRC + shared ownership of Western rift valley + misunderstanding and political instability + Nkwanzi Island in L. Albert as well as oil deposits in the south of L. Albert in Ntoroko
- Anti- governmental elements (rebels) + hiding places in forests like Semliki and Mt Rwenzori forests in Bundibugyo with ADF rebels + insecurity

FORMATION OF THE HORST / BLOCK MOUNTAIN

This is a raised faulted block / faulted upland bordered by fault scarps on two or more sides. It's an opposite of a rift valley.
In Uganda, the best example of a horst is Mt. Rwenzori found in Western Uganda on the floor of the Western rift valley on Uganda – DRC border in Bundibugyo, Kasese and Kabarole districts.
Mt. Rwenzori is 4000 metres above the western rift valley floor and 5109 metres above the sea level, covering a wide distance of about 45km.

Several theories were advanced to explain the formation of a horst, among others are; compressional theory, tensional theory, differential up lift, relative sinking and others.

COMPRESSIONAL THEORY

In this theory, it is believed that geochemical and geophysical reactions as well as radioactivity from the core / mantle beneath the crust generated the intense heat and pressure which made molten rocks to move as convective currents leading to compressional forces that pushed the earth crust towards each other or in the same direction to cause stress within the crust which led to the formation of reversed fault lines.
Due to the continued stress within the crust, the middle block was eventually forced to thrust up / rise up / over ride the outer blocks to stand as a horst leaving the outer blocks stable.
Later denudational forces modified the fault scarps to form the current Mt. Rwenzori.

Step I

5 lines

Step II

5 Lines

Step III

7 Lines

TENSIONAL THEORY

In this theory, it is believed that geochemical and geophysical reactions as well as radioactivity from the core / mantle beneath the crust generated the intense heat and pressure which made molten rocks to move as convective currents leading to tensional forces that pulled the earth crust in opposite directions [apart] to cause strain within the crust which led to the development of normal fault lines.

Due to the continued strain within the crust, eventually the outer blocks sunk downwards leaving the middle block standing up as a horst or block mountain.

Later denudational processes modified it to create the present Mt. Rwenzori.

Step I

5 lines

Step II

5 Lines

Step III

7 Lines

ECONOMIC IMPORTANCE OF MOUNT RWENZORI TO UGANDA

Since Mt Rwenzori has different climatic zones which are influenced by altitude and relief to bring about variations in temperature and amount of rainfall at different heights, the following economic values have been given to rise both positive and negative in Uganda as follows;

Positives:

- Mt. Rwenzori has encouraged seasonal and perennial growing of crops due to the formation of orographic rainfall and fertile alluvial and moraine soils in the areas of Kabarole and Bundibugyo which has led to increased food production like beans, sweet potatoes, cotton, vegetables, maize, passion fruits, Irish potatoes, onions and other cereal crops.
- Livestock rearing like sheep, goats, donkeys, cattle, etc in Kasese and Nyabirongo by Basongora and Bagungu pastoralists + good natural grassland as inexhaustible pasture lands on foothills and flowering plants on moorland and heath zone + production of milk and meat.
- Lumbering activities / forestry + growth of thick forests and various tree species + production of timber and other furniture + Kasese saw mills of the Bakonjo and Bagungu timber traders in Kasese depend on Rwenzori forests
- Collecting of bamboo materials in the bamboo zone on the slopes + for making houses, fences and other handcraft materials + especially the Bakonjo and Bamba people in Kasese.

➢ Tourism + beautiful sceneries such as the snow-capped peaks like Margherita and glacial features Bujuku waterfalls and Lac Du Speke + attraction of tourists like Mountain climbers and film makers to bring foreign exchange for infrastructural development.

➢ Wild life conservation and preservation + natural homes / habitants in forests on the slopes + eco diversity and ecotourism + Mt. Rwenzori N.P. in Bundibugyo with monkeys and baboons

➢ Mining + valuable minerals such as cobalt and copper deposits at Kilembe in Kasese + set up of Kasese Cobalt Company and copper smelters in Jinja.

➢ Building and construction / Stone quarrying and boulder collection + beautiful stones on the foothills and boulders on the river banks of Nyamwamba in Kasese + improved houses, roads and compound decorations in Kasese, Fort Portal and Kilembe towns.

➢ Water supply + water catchment areas of rivers from glaciers and forests + domestic, industrial and irrigation purposes + R. Nyamwamba in Kasese is used by Mubuku irrigation scheme.

➢ Power generation (HEP) + radiating rivers with waterfalls + domestic and industrial use + R. Nyamwamba in Kasese is harnessed at Mubuku power dam and R. Mpanga on Mpanga power dam in Kamwenge.

➢ Defensive settlement by some tribes like Bakonjo and Bamba people in Kasese and Bundibugyo + safe hiding places + best human survival / reduced extinction of indigenous race and growth of trading centres

➢ Fruit gathering and herb and honey collection by the Bakonjo and Bamba tribes in Kasese on the Mt. Rwenzori forests + improved means of survival for food and medicine.

➢ Research and educational study purpose like education tours in Bundibugyo and Kasese + fieldwork ground and study centre of earthquakes + more geological skills and knowledge

Negatives:

➢ Mt. Rwenzori receives little / unreliable rainfall due to rain shadow effects on the leeward side resulting into dry climatic conditions or arid conditions in areas of Kasese and Kamwenge which limit crop farming.

➢ Difficulty in the development of transport and communication systems especially roads and railway lines + the steep slopes and rugged surface + inaccessibility + at Kilembe and Bwera in Kasese

- Landslides and mass wasting + high gradient, steep slopes and heavy relief rainfall + destructive to human life, farm crops and property in Bundibugyo, Kasese and Kabarole
- Periodic natural hazards of earthquakes + earth movements + dangerous to human life, farm crops and property in Bundibugyo, Kasese and Kabarole
- Wasteland and idle land + occupancy of Large land of 45km wide + restricted land uses or economic activities such as agriculture and settlement in Kilembe, Bwera and Buyoge in Kasese
- Hinderance to construction of human houses + steepness, rugged nature and coldness on its higher slopes of Margherita and Baker peaks + remoteness and pneumonia to the Bakonjo and Bamba tribes in Kasese.
- Severe soil erosion tendencies in Bundibugyo, Kabarole and Kasese + heavy relief rainfall and the steep gradient + loss of soil fertility hence less productive for agriculture.
- Blocked mechanized agriculture + steep slopes and rugged surface + shortage of food and famine at Kilembe and Bwera in Kasese.

- Seasonal flooding on the lower slopes + heavy relief rainfall and radiating rivers such as Mpanga in Kamwenge, Nyamwamba in Kasese and Semliki in Bundibugyo + destroying people's lives, crop farms and roads as well as easy spread of diseases like cholera and typhoid
- Dangerous pests and disease carrying vectors like tsetse flies, snails and mosquitoes + breeding sites in Mt. forests and flowing rivers such as Nyamwamba in Kasese and Semliki in Bundibugyo + transmission of dangerous diseases like sleeping sickness, Nagana, Bilharzias and malaria to human beings and livestock
- Harmful wild animals such as lions, hyenas, leopards, baboons and monkeys in Mt. Rwenzori N.P + hiding places and natural homes + feasting on people, even destroying their crops and killing their livestock in Kilembe, Nyabirongo, Katwe, Kasenyi and Rwenshama villages in Kasese.
- Territorial conflicts between Uganda and DRC + shared ownership over Margherita peak on and R. Semliki in Bundibugyo + misunderstanding and instability
- Anti governmental elements / bandits like ADF rebels in Bundibugyo + hiding places in Mt. forests + national insecurity.

WORK TO DO

Account for the formation of following features;

I. Tilted block
II. Graben
III. Fault guided river valley
IV. Fault scarp / escarpment

Sample questions:

1. Describe the processes that are responsible for the formation of either the rift valley or horst.
2. Examine the effects of either the western rift valley or Mt. Rwenzori to the economic development of Uganda.
3. Discuss the influence of either the western rift valley or Mt. Rwenzori on the climate of its surrounding areas.
4. Assess the contribution of landforms resulting from faulting to the economic development of Uganda.
5. Account for the formation of the various faulted landforms in Uganda.

WARPING

This involves the movement of rocks vertically and horizontally [laterally] where some parts of the earth crust were up warped [uplifted] while others were down warped (down sagged) due to compressional and tensional forces brought about by the convective currents that were produced by the intense heat and pressure resulting from the geochemical and geophysical reactions as well as radio activity beneath the earth crust in the mantle.

In Uganda, Warping occurred during Miocene period (25 million years ago) and Pleistocene period (2 million years ago) where it affected mainly the parts of Central and Southeastern Uganda.

EFFECTS OF WARPING ON THE PHYSICAL LANDSCAPE OF UGANDA

During that time, warping led to the formation of the following landforms in Uganda;

Crustal warped basin or depression such as Lake Victoria in Kampala and Masaka (south east) and Kyoga in Nakasongola and Serere (central) as well as other minor lakes like Kwania in Amolatar and Apac, Opeta in Katakwi, Bisina in Katakwi and Kumi, Wamala in Mubende, Mburo in Kiruhura, Nakivali in Isingiro, Kijanebalola and Kachira in Rakai and Lukaya in Masaka.

Reversed river valleys such as Kagera in Rakai, Kafu in Masindi and Hoima, Katonga in Masaka and Sembabule, Rwizi in Mbarara and others (in Kenya).

Warped plateaus in areas of Buganda in Kampala and Wakiso, Busoga in Jinja and Iganga, Acholi in Gulu, Lango in Lira and Ankole in Mbarara

Down warped islands such as Ssese islands in Kalangala, Buvuma near Mukono, Mujingo in Namayingo and others in L. Victoria.

Broad and narrow valleys occupied by now papyrus swamps like Mpologoma in Paliisa (Eastern), Ruizi in Mbarara (Western) and Lwera in Masaka (Central Uganda).

SKETCH MAP OF UGANDA SHOWING WARPED FEATURES.

Full page

FORMATION OF CRUSTAL / DOWN WARPED BASIN

Crustal / Down warped basin or depression is a saucer – shaped basin with gently tilted slope towards the north.

Before their existence, the landscape of Uganda was generally gently sloping towards the west and rivers were flowing westwards to the Congo basin (Atlantic ocean).

During their formation, Uganda was subjected to up and down warping culminated by tensional and compressional forces whereby the western parts and the eastern parts of Uganda were up lifted while the central parts were down sagged to form the down warped basins in between the two shoulders of the rift valleys.

In the due course, this up warping in relation to down warping caused rivers of Kagera, Kafu, Katonga, Ruizi and others to change / reverse their flow through back – pondering to pour their waters eastwards in the created depressions to form the current Lakes known as down warped lakes such as Victoria in Kampala and Masaka; and Kyoga in Serere and Nakasongola as well as other minor lakes like Kwania in Amolatar and Apac, Opeta in Katakwi, Bisina in Katakwi and Kumi, Wamala in Mubende, Mburo in Kiruhura, Nakivali in Isingiro, Kijanebalola and Kachira in Rakai and Lukaya in Masaka.

Step I

10 lines

Step II

15 lines

WORK TO DO:

Examine the formation of the following features resulting from warping;

a. Reversed River valley
b. Warped Plateau
c. Warped broad and narrow valleys.
d. Warped Islands

Sample questions:

1. Describe the processes that are responsible for the formation of down warped lakes.

APPROACH TO QUESTION 1

Introduction

- Define down warped lake and give its origin - 2
- Identify and locate the down warped lakes with name places in Uganda - 3
- Draw a sketch map to show the identified down warped lakes with name places (district names) - 2

Body

- State, explain and describe the processes that are responsible for the formation of down warped lake from the core / mantle through the crust up to the earth surface - 7
- Illustrate the down warped lake in a sequential and talking diagrams - 3

2. Examine the effects of the various warped landforms to the economic development of Uganda.

APPROACH TO QUESTION 2

Introduction

- Define warped land forms and give their origin - 2
- Identify, describe and locate the warped land forms with name places in Uganda - 3
- Draw a sketch map to show the identified warped land forms with name places (district names) - 2

Body

- State, explain and exemplify (illustrate) the effects of the various warped landforms to the economic development of Uganda both positively 12 / 8 and on other hand negatively 8 / 6 – 18 marks

3. Explain the causes of river reversal in Uganda and its economic value to development of Uganda.

APPROACH TO QUESTION 3

Introduction

- Define river reversal - 2
- Identify, and locate the rivers affected by river reversal with the name places / district names in Uganda - 3
- Draw a sketch map to show the identified rivers with name places (district names) - 2

Body

- First part state, explain and exemplify (illustrate) the causes of river reversal in Uganda - 8
- Second part give, explain and exemplify the economic value to development of Uganda both positively 6 / 5 and on the other hand negatively 5 / 4

VULCANICITY

This is a total endogenic process where gaseous, solid and liquid materials called magma from the earth's interior were injected into the earth crust to form intrusive / plutonic features and also ejected onto the earth surface to form extrusive / volcanic features / landforms through the lines of weakness called fissures which was caused by the up welling of magma / molten rocks in form of convective currents produced by intense heat and pressure generated from the geochemical and geophysical reactions as well as radio activity from the core / mantle beneath the earth crust.

In Uganda, vulcanicity occurred around two million years ago during Pleistocene period and it has continued up to date mainly in her neighbouring country of D.R Congo where several eruptions occurred in 1970s and 2001 on Nyamulangira cone along Uganda – DRC border.

The major vulcanic affected areas in Uganda include: S.Western Uganda (Kigezi highlands), the Eastern border (Gishu highlands), in Bushenyi district, in Tororo district, Mubende, North Eastern Uganda (Moroto and Kotido) and others.

EFFECTS OF VULCANICITY ON RELIEF OF UGANDA

The effect of vulcanicity on the relief of Uganda is both extrusive and intrusive in nature.

The volcanic / extrusive features in Uganda are;

Volcanoes / composite cones such as Muhavura in Kisoro, Elgon in Mbale, Kapchorwa, Bukwo, Sironko and Bududa; Moroto in Moroto, Kadam in Kadam and Napak in Napak.

Ash and cinder cones such as those on Mt Elgon in Eastern Uganda in Mbale, those in between Muhavura and Mutanda in Kisoro.

Lava domes found on Birunga ranges on the Uganda - D.R.C. border in Kisoro (southwest).

Craters are Wagagai on Mt. Elgon in Mbale, on Moroto in Moroto and Muhavura in Kisoro.

Explosive craters such as L. Katwe biggest, Kyamuringa, Nyungu, Nyamusingire, and Nyamunuka in Kasese, Rutoto in Rubirizi (Bushenyi), in western Uganda.

Calderas such as on Mount Kadam in Kadam and Mount Napak in Napak (North eastern Uganda).

Volcanic plugs / necks such as those in Sukulu hills in Tororo.

Lava plateaus / plains such as Kisoro and Kasese lava plateau.

Lava dammed basins such as L. Bunyonyi in Kabale; Mutanda, Chahafi, Kayumba and Mulehe in Kisoro, all in South west Uganda.

Hot spring / fumarole / geyser such as Sempaya in Kabarole and Rwagimba in Bundibugyo, Kitagata in Bushenyi, Kisizi in Rukungiri, Kibiro in Hoima, Kikagati in Isingiro, etc.

The intrusive features in Uganda are;

Batholiths such as Mubende batholith, Singo batholith in Mubende, Nakasongola and others.

Dykes such as those in Sukulu hills near Tororo and Mubende hills.

Sills such as those in Sukulu hills near Tororo and in Mubende hills.

Laccoliths such as those in major volcanic areas of Elgon in Mbale, Mufumbiro in Kisoro and Moroto.

Lapoliths such as those in Sukulu hills in Tororo, Mubende, Rubanda along Kabale – Kisoro road in Kabale, etc.

Waterfalls on Sills and dykes like Bujagali falls in Jinja, Karuma falls in Kiryadongo, Sezibwa falls in Mukono, Sippi falls in Kapchorwa and Kisiizi in Rukungiri, etc.

SKETCH MAP OF UGANDA SHOWING THE VULCANIC FEATURES AND AREAS.

FORMATION OF STRATO VOLCANO / COMPOSITE CONE

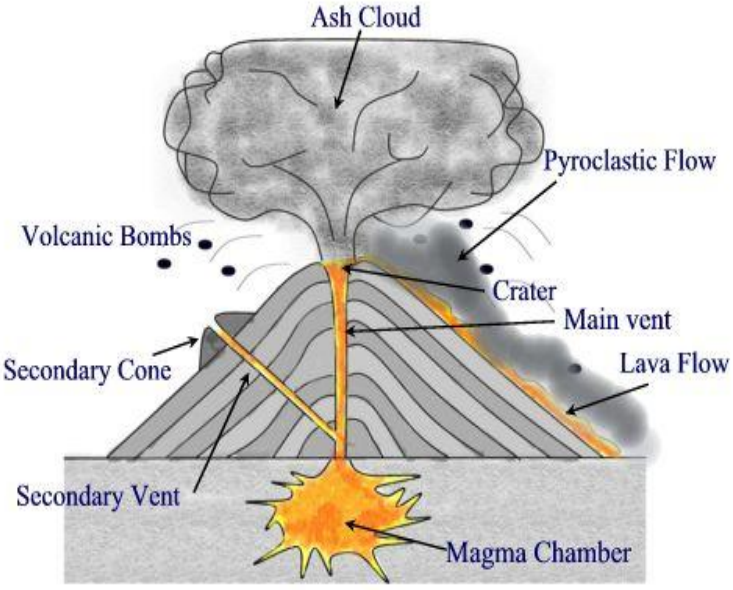
Volcanic cone is a large extrusive feature with fairly steep slopes built of alternating layers of lava and ash (pyroclasts) for over a long period of time through a single vent.

Volcanic cone was formed when extensive and large repeated movement of molten rock (magma) in form of violent eruptions of ashes and calm out-pourings of lava up-welled through single fissure and ejected over a long period of time via the central vent onto the earth surface, accumulated and built up in thousand metres high above the surface around the vent to form a cone - shaped mountain with alternate layers of ash and lava as a result of convective currents as well as intense heat and pressure underneath the earth crust which were caused by radio-activity, geo-chemical and geo-physical reactions from the core or mantle.

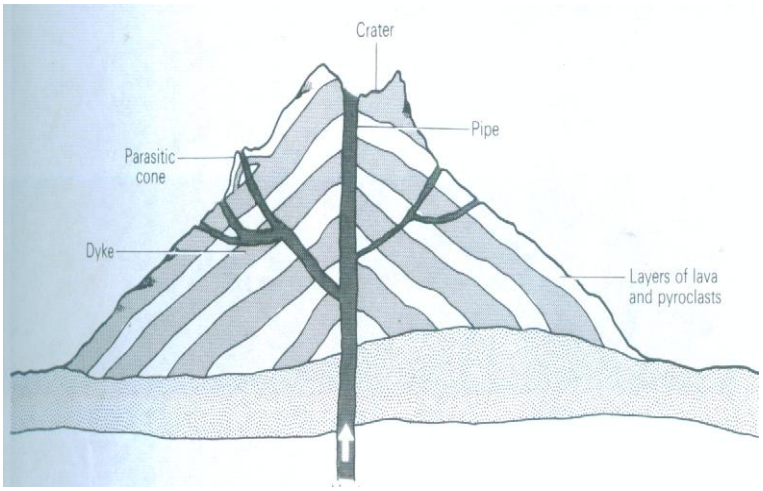
After formation the cone, magma solidified and so blocked the vent, then due to insufficient pressure and heat, a secondary eruption ejected out magma through side vents which formed parasitic cones along the sides / flanks.

Furthermore, a secondary eruption blew off the solidified magma in the vent on the top of the cone leaving behind a funnel shaped depression called a crater.

Examples in Uganda are Muhavura in Kisoro, Elgon in Mbale, Kapchorwa, Bukwa, Sironko and Bududa; Moroto in Moroto, Kadam in Kadam and Napak in Napak.



Main Features of a Volcano



WORK TO DO

Account for the formation of the following features resulting from vulcanicity?

a. Ash and cinder cone
b. Lava dome
c. Crater
d. Explosive crater
e. Caldera
f. Volcanic plug
g. Volcanic neck
h. Lava plateau / plain
i. Lava dammed lake
j. Hot spring / fumarole / geyser
k. Batholith
l. Dyke
m. Sill
n. Laccolith
o. Lapolith

ECONOMIC IMPORTANCE OF VULCANICITY TO UGANDANS

Vulcanicity has had great impact on the economic development of Uganda both positively and negatively. This has been manifested from its resultant landforms. These are:

Positive importance

- Vulcanicity has promoted agriculture through the formation of volcanic mountains with fertile volcanic soils, which are suitable for the growing of various crops e.g. Mt. Elgon, and Kigezi highlands have fertile volcanic soils, which encourage growing of Arabica coffee, Bananas, Irish potatoes and vegetables in Mbale - Manafwa and Kabale – Kisoro areas respectively.
- The different volcanic features are major tourist attractions because they offer beautiful sceneries to the viewers and in the end, earns Uganda foreign exchange e.g. crater lakes such as Katwe and Rutoto, Kitagata in Bushenyi and Sempaya hot springs in Fort Portal, Bunyonyi lava dammed lake and Muhavura volcano have attracted many tourists to Uganda.
- Volcanic mountains like Elgon and Muhavura have influenced the micro climatic conditions of the surrounding areas on their windward sides to receive heavy relief rainfall through ascending rain bearing winds amounting to over 1500mm per year in districts of Mbale, Kapchorwa, Sironko, Kisoro and Kabale.
- Volcanic lakes except Lake Katwe, lava dammed lakes like Bunyonyi and rivers originating from volcano like Manafwa and Sironko from Mt. Elgon are fishing areas for fish which is a body building food for many Ugandans. E.g. Tilapia and mud fish are caught from Bunyonyi and Mutanda in Southwest by Bakiga people.

- Volcanic rocks like those in Kabale, Mubende Mbale, Soroto and Tororo have been quarried and excavated to produce stones for building and constructional purposes like structures, bridges, roads etc. e.g. in Kampala, granite rocks at Muyenga, Maganjo and Kulambiro are crashed and used in the construction of tarmac roads and houses.
- Volcanic landforms contain valuable and commercial minerals exposed on / near the earth by vulcanicity which has promoted the mining industry in Uganda e.g. the Tororo volcanic rock has limestone and phosphates used in making building lime, cement and phosphate fertilizers respectively and the Crater Lake Katwe contains salt used for making edible salt.
- Volcanic features like Kitagata in Bushenyi, Kibiro in Hoima and Sempaya hot springs in Fort Portal are potential sites for generation of power known as geothermal energy, which may be used in small factories and for domestic appliances. Hot springs in the southwest like Ntungamo, Bundibuygo and Bushenyi are used to provide hot water in homes.
- Volcanic Mountains like Elgon, Mufumbiro and Kigezi highlands have attracted dense population of about 150 person/Km^2 mostly on their foothills because of condusive environmental conditions like fertile soils and high relief rainfall and relative high temperatures in Mbale, Kisoro and Kabale respectively.
- Volcanic landforms offer good natural habitants for wildlife like on slopes of Mt. Elgon and Muhavura which have later been turned into gazetted areas by the government as national parks and forest reserves. E.g. Mt. Elgon forested park and Muhavura national park a home of monkeys, baboons and chimpanzees which too attract tourists.
- The volcanic hot springs in different areas in Southwest and Western Uganda have acted as traditional medicine for treating various diseases e.g. Kitagata hot springs in Bushenyi is used to cure skin diseases, impotence, backaches, anaemia and others.
- Volcanic mountains and other features like sills have waterfalls which are potential areas for generation of H.E.P e.g. Mt. Elgon has Sippi falls along R. Sippi, Karuma falls along Victoria Nile are found on sills and dykes, etc.
- Volcanic highlands have acted as a source of many rivers, which are their catchment areas e.g. Mt. Elgon has rivers such as Manafwa, Sippi, Turkwel, Simu and Namatala. These rivers have provided water for irrigation, domestic use and industrial use in Mbale, Sironko, Manafwa, Tororo, Kapchorwa. Doho irrigation scheme uses R. Manafwa for rice growing.
- Since volcanic mountains are associated with fertile volcanic soils and heavy relief rainfall, thick and luxuriant vegetation and forests has grown on their slopes which encourage lumbering and collection of poles like on Mufumbiro, Moroto and Elgon. E.g. Mbale saw mills and timber traders depend on Mt. Elgon tropical forests and temperate trees. For bamboo trees are used as decorative materials as well as food known as Malewa.
- Volcanic features and other activities are a good field work study and research areas for students in secondary schools and other institutions. E.g. secondary school students from Mbale - Manafwa and Kabale – Kisoro areas make their geography trips to Mt. Elgon and Muhavura and their associated features respectively.
- Volcanic lakes and rivers associated with volcanicity have facilitated water transport in the areas where they are found. E.g. Lava dammed lakes Bunyonyi in Kabale and Mutanda in Kisoro as well as river Manafwa in Manafwa and Mbale are used for navigation thus stimulating trade and commerce.

Negative importance

- Some active volcanos with expected eruptions are dangerous to life and property e.g. in 1970's and 2000's lava from the Nyamulangira volcano on Birunga ranges along the Uganda - Zaire boarder erupted and destroyed people's lives, crops and animals.
- The steep slopes created by volcanic mountains such as Mt. Elgon and Mufumbiro ranges have hindered transport and communication like construction of roads and other communication links have been blocked in some areas of Mbale, Sironko, Kisoro and Kabale respectively because its expensive to grade such steep areas, thus making them remote and inaccessible.
- Volcanic mountains like Elgon and Kigezi highlands and other volcanic uplands like Sukulu hills are subjected to mass wasting, landslides and erosion which are destructive to human lives, crops and property in the nearby areas of Mbale, Kapchorwa, Tororo, Kisoro and Kabale. These incidents block roads, destroy houses, farm lands and even claim life as well as leading to reduction in land productivity**.**
- Volcanic mountains on other hand produce young, poor and infertile soils which are not good for growing of crops e.g. some Kabale and Kisoro soils are poor, porous and easily eroded because they are not fully developed due to the constant erosion, weathering and deposition.
- The steep slopes on volcanic highlands in Kabale and Mbale along Mt. Muhavura and Mt. Elgon respectively have hindered mechanized agriculture like use of tractors and other farm equipments because they cannot easily move across steep gradient and rugged surface. This has therefore crippled the commercialization of the agriculture sector**.**
- Volcanic mountains such as Mufumbiro and Elgon have led to low rainfall on the leeward side or the rain shadow side because the blowing winds reach when they are dry influencing desert conditions. E.g. Parts of Kapchorwa and Nakapiritirit districts are dry because they lie on leeward side of Mountain Elgon.
- Volcanic steep slopes have totally hindered human settlement because of the rugged surfaces and cold temperatures. E.g. the higher slopes of Mt. Elgon and Mufumbiro are not settled because they are too cold.
- Some volcanic features like mountains and igneous rocks are habitants of wild animals like monkeys and hyenas and even favour the growth of forests which are also a home for dangerous pests like mosquitoes and this has caused insecurity to the surrounding people and scaring them away as well as destructive to crops and property.
- In some volcanic regions, vulcanicity led to scarcity and loss of surface water because the rocks formed are both permeable or impermeable e.g. the limestone rocks of Tororo and Hima are permeable while the granite rocks of Kisoro plateau are porous or impermeable thus leading to loss of surface water.

- Mountains such as Mufumbiro and Moroto are hiding grounds for bandits like the Interahamwe rebels from Rwanda and the Pokot cattle raiders from Kenya respectively which has caused national insecurity to Uganda. For instance in Jan 2008, unknown bandits killed a Belgian tourist in Mt. Elgon forest reserves in Mbale district.

Sample questions:

1. (a) Describe the processes that led to the formation of volcanic mountains in Uganda.

APPROACH TO QUESTION 1

Introduction

- Define volcanic mountain and cite out its origin - 2
- Identify and locate volcanic mountains with name places in Uganda - 3
- Draw a sketch map to show the identified volcanic mountains with name places (district names) - 2

Body

- State, explain and describe the processes that led to the formation of volcanic mountains from the core / mantle through the crust up to the earth surface - 6
- Illustrate the volcanic mountain in a talking diagram - 2

1. (b) Discuss the impact of volcanic highlands on the climate of the surrounding areas.

Body

- Define the concept, climate
- Give, explain and discuss the impact of volcanic highlands (Elgon, Moroto, Kadam, Napak, Muhavura) on the climate of the surrounding areas in positive and negative way in terms of rainfall, temperature, atmospheric pressure and humidity. - 10

2. Assess the significance of vulcanic landforms to the economic development of Uganda.

APPROACH TO QUESTION 2

Introduction

- Define vulcanic landforms and cite out its origin - 2
- Identify, describe and locate vulcanic landforms (both extrusive at least 3 and intrusive at least 2) with name places / district names in Uganda - 3
- Draw a sketch map to show the identified vulcanic landforms with name places (district names) - 2

Body

- State, explain and exemplify (illustrate) the significance of vulcanic landforms to the economic development of Uganda positively 10 / 12 and on other hand negatively 8 / 6. - 18

3. Account for the formation of the various landforms resulting from vulcanicity in Uganda.

APPROACH TO QUESTION 3

Introduction

- Define vulcanicity and cite out its origin - 2
- Identify, describe and locate landforms resulting from vulcanicity (both extrusive at least 3 and intrusive at least 2) with name places / district names in Uganda - 3
- Draw a sketch map to show the identified landforms resulting from vulcanicity with name places (district names) - 2

Body

- Identify and define the landform resulting from vulcanicity, explain the reasons as processes the formation of it, exemplify it and illustrate it in a diagram (using FEED) for at least 5 extrusives and 3 intrusives. - 18

4. (a) Describe the formation of the volcanic lakes in Uganda.

APPROACH TO QUESTION 4

Introduction

- Define volcanic lake and cite out its origin - 2
- Identify, describe and locate different volcanic lake types with name places in Uganda - 3
- Draw a sketch map to show the identified volcanic lake types with name places (district names) - 2

Body

- Identify and define the volcanic lake type(F) , explain the processes the formation of it (E), exemplify it (E)and illustrate it (D) in a diagram (using FEED) for at least 4 types - 08

(b) Explain the importance of volcanic lakes to the economic development of Uganda.

Body

- State, explain and exemplify (illustrate) the importance of volcanic lakes to the economic development of Uganda positively 6 / 5 and on other hand negatively 4 / 5. - 10

INFLUENCE / EFFECT OF HIGHLANDS / RIFT VALLEY ON CLIMATE.

Climate is the **average weather conditions of a place** for a long period of time usually 30 – 35 years having studied and recorded the weather elements like temperature, rainfall, pressure, wind, sun shine, etc.

Affected areas of the Rift valley are western shoulders (windward slopes) of Western rift valley in Bundibugyo and Kabarole (Fort Portal) **against** Rift valley lowlands (leeward sides) of Kasese, Semliki flatlands in Bundibugyo, Albert flats in Ntoroko, Hoima and Buliisa.

Affected areas of highlands / mountains are;

- On the windward slopes of Mt. Rwenzori in Bundibugyo and Kabarole **against** the leeward sides in Kasese
- On the windward slopes of Mt. Elgon in Mbale, Bududa, Manafwa, Kapchorwa and Malaba **against** the leeward sides in Bukwo.
- On the windward slopes of Mt. Muhavura in Kisoro and Kabale **against** the leeward sides.

These influences are:

- The high altitudinal areas / high steep slopes / mountainous areas / rift valley shoulders have cold temperatures because temperature drops by $1^{o}C$ after every 150 meters of ascent.
- While low altitudinal areas / lowlands / valleys / flatlands or the foothills of the mountains and rift valley floor experience hot temperatures above $29^{0}C$ due to the normal lapse rate effect.
- The high altitudinal areas / high steep slopes / mountainous areas / rift valley shoulders receive heavy orographic / relief rainfall above 1500mm because the warm moistened ascending air masses cool, condense and form clouds as it rise a mountain leading to heavy rainfall on the wind ward side.
- While on the leeward / rain shadow side, little / no rain is received, which is less than 750mm per annum because of dry descending air masses.

And even those without high altitudinal areas / high steep slopes / mountainous areas don't receive relief rainfall because the warm moistened blowing air masses can't be trapped.

- High altitudinal areas / high steep slopes / mountainous areas / rift valley shoulders have low humidity because of cold temperatures.
- Whereas the relatively low altitudinal areas / lowlands / valley s/ flatlands or the foothills of the mountains and rift valley region have high humidity due to gravitational pull of water molecules and hot temperatures rising above $25^{o}C$.
- There is relatively low atmospheric pressure in high altitudinal areas especially on high mountain slopes and rift valley shoulders due to little air exerted on the ground.
- While in low altitudinal areas / lowlands / valleys / flatlands or the foothills of the mountains and rift valley floor have high atmospheric pressure due to large space for air exertion onto the ground.
- Low altitudinal areas / lowlands / valleys / flatlands or the foothills of the mountains and rift valley floor experience cold temperatures during night.
- While the higher altitudinal slopes / high steep slopes / mountainous areas have relatively warm temperatures due to negative (abnormal) lapse rate effect called temperature inversion as the cold heavy air masses from higher altitudes move down in the valley at night displacing the warm lighter air masses in the lower altitudes as the latter rise to the upper hill slopes.
- High altitudinal areas / high steep slopes / mountainous areas mainly mountain Rwenzori at 4800 metres asl receive precipitation as snow due to drop in temperatures to $0^{0}C$.
- Lakes on and radiating rivers from Mountains and associated thick forests and swamps lead to heavy convection rainfall over 1500mm through evaporation, the land and sea breezes and a process of evapo – transpiration due to sun heating.

LANDSLIDES IN UGANDA

Landslide is a rapid and sudden falling of weathered rock and soil materials down along hill slopes under the influence of gravity.

Landslides occur more frequently during the El-Nino season and water facilitates the movement by increasing the weight of the materials and lubricating the surface.

Landslides are commonly experienced in highland areas such as;

On the slopes of Mountain Elgon in Kapchorwa, Bududa, Manafwa, Sironko and Mbale;

On the slopes of Mt. Rwenzori in Kasese, Kabarole and Bundibugyo.

On the slopes of Kigezi highlands (Mt. Muhavura) in Kisoro and Kabale.

On the slopes of Mt. Moroto in Moroto.

CAUSES OF LANDSLIDES IN UGANDA

Physical causes;

Existence of heavy and prolonged rain fall such as El-Nino and Orographic received in highland areas of Mbale and Kisoro to provide huge quantities of water which infiltrates and soaks rock materials making them heavier and to also lubricate the surface for sliding, slumping or flowing down as a mass.

Presence of temperature fluctuations ranging between cold and hot to facilitate thawing leading to movement in glaciated mountain of Rwenzori in Bundibugyo.

Occurrence of cloud thunder to produce vibrations which set in motions weathered and unconsolidated materials down slope like in Bududa and Kisoro.

Existence of steep relief / high gradient to accelerate rock sliding as gravity increases with increase in gradient like on Mt. Rwenzori in Bundibugyo and Kasese.

Presence of weak and loose volcanic and sandy soils to easily saturate and soak very fast for flowing as mud especially in volcanic regions of Kigezi in Kabale and Kisoro.

Occurrence of crustal instabilities such as earth quakes and earth tremors to vigorously shake the already unstable slope causing rock slides on steep slopes and weathered and unconsolidated materials slump on gentle slope like on Mt. Rwenzori in Bundibugyo and Kasese.

Existence of different rock **nature / rock structure** whereby impermeable rock layer lie on top of permeable rock layer on a steep slope for triggering off slumping and sliding of materials like on the slopes of Mt. Elgon in Bududa and Mbale.

Existence of seasonal volcanic eruptions that cause earthquakes for destabilizing the slope causing easily soak and flow down slope like on Kigezi highlands in Kabale and Kisoro.

There are **various actions of living organisms** like burrowing rodents and trampling elephants that create tunnels and weakness leading to saturation, lubrication and weaken soil and rocks for easily moving down slope like on the slopes of Mt. Elgon in Mbale and Bududa.

There is continuous effect of r**iver and glacial erosion that create** cliffs for facilitating slumping of the over lying materials and rock fall like on Mt. Rwenzori in Bundibugyo and Mt. Elgon in Manafwa.

Absence of / limited vegetation cover has left the hilly areas exposed to easy movement of weathered materials downwards like on Mt. Moroto in Moroto and on Mt. Rwenzori in Kasese.

Human causes;

Availability of heavy traffic on roads in highlands such as trailers, tractors, lorries and buses that produce strong vibrations for vigorously shaking the hill slope cuttings causing rock fall, rock slide and slumping like Kigezi highlands in Kabale and Kisoro.

There is structure house and road construction **that has steepened the hill slope** through extraction and degrading that create under cuttings and cliffs leading to slumping, rock slides and fall like Kigezi highlands in Kabale and Kisoro.

There is increased set up of water tanks, planted forests and communication masts that destabilize the slope leading to soil sliding like in Kasese on the slopes of Mt. Rwenzori

There is massive **removal / destruction of slope forest cover** through lumbering and charcoal burning that exposes and weakens the soil structure and unconsolidated materials to direct saturation, lubrication and flow of materials down slope like on the slopes of Mt. Elgon in Mbale and Bududa.

There is **massive mining and quarrying** in highlands like Kigezi in Kabale and Rwenzori in Kasese using explosives which produce tremors for setting in the flow unconsolidated materials down slope.

There is large herds of animals grazing and trampling on steep slopes that make rocks loose and also produce minor tremors resulting into mass movement of unconsolidated materials down slope like Bundibugyo and Kasese on the slopes of Mt. Rwenzori.

There is heavy settlement on steep slopes that destroy slope forests and undercuts the slopes for construction and cultivation which encourage slumping, rock fall and slides like Kigezi highlands in Kabale and Kisoro.

There are poor farming methods such as monoculture, up and down hill ploughing, over stocking and overgrazing that weaken the slope leading to slope failure and movement like Kigezi highlands in Kabale and Kisoro and Mt. Moroto in Moroto.

EFFECTS OF LANDSLIDES IN UGANDA

Landslides have led to both negative and positive effects which are;

Negatives;

- It has led severe loss of top fertile soil resulting into low crop productivity / yields
- It has led to destruction of homesteads and farmlands resulting into massive loss of human life, crops and livestock.
- It has destroyed transport and communication lines making communication very difficult / inaccessible.
- It has led to seasonal flooding due to blockage of rivers resulting into silting, spread of water borne diseases and water contamination.
- It led destruction of forests in highland areas on leading to loss of forest resources and ecological problems.
- It has led to displacement and resettlement of people as well as destruction of crops resulting into famine, starvation and sometimes death
- It led to increased government expenditure in form of dredging, relief emergence and resettlement of people leading to balance of payment deficit.
- It has led to increased silting of drainage systems such as culvert, lakes and rivers as well as destruction of transport network leading to contamination of water sources, loss of marine organisms and inaccessibility respectively
- It has led to poor education standards through increased absenteeism of both children and teachers because of impassable muddy roads and blocking of roads.

Positives;

- It has led to the formation of temporary reservoir or a permanent lake due to blockage and back-pondering of rivers for provision of fresh water in homes.
- It has produced fertile soils in valleys and low lying areas to encourage crop cultivation.
- It has exposed underlying minerals making mining easy and cheap for industrialization.
- It has aided soil formation by removing overlying materials for exposure to fresh rocks to be weathered.
- It is a source of education and research for fieldwork studies in causes of mass wasting and mitigation measures.
- It promotes tourism due to landform developments which are beautiful sceneries to attract tourists for foreign exchange.

MEASURES BEING TAKEN TO CONTROL LANDSLIDES IN EAST AFRICA

- Planting trees on bare slopes through Environmental officers and local leaders because tree roots bind soil particles from slope failure.
- Constructing strong walls along the bottom of steep slopes such as road cuttings and cliffs to support the upper part of the slope against collapsing
- Implementing re-afforestation programmes in high land areas affected by deforestation so as to protect soil and other weathered materials from rain drop erosion, saturation and lubrication.
- Practicing agro forestry in highland areas to reduce the effect of rain drop erosion
- Enforcing controlled mining and quarrying in highlands like banning the use of explosives in highland areas and refilling of mining pits.
- Resettling excess population to reduce excess pressure on land in hilly areas.
- Discouraging tilling on the hill slope during the wet season to reduce on infiltration, saturation and lubrication.
- Planting cover crops such as pumpkins and potatoes to reduce on the infiltration rate, saturation and lubrication.
- Carrying out mulching using maize stalks, banana fibers and stems on slopes to reduce on the infiltration rate, saturation and lubrication.
- Planting grasses like Napier grass along river banks and cliffs to prevent slumping.
- Discouraging terracing on steep slopes as terraces hold water which increases high infiltration into the soil.
- Setting up draping metallic mesh / nets to trap loosened rocks and rock fall on cliffs
- Setting up departments such as National Forestry Authority (NFA) to guide and manage landuse in fragile areas that are prone to landslides through sensitization works, seminars, etc.
- Improving drainage systems by digging small canals and tarps to drain away excess water in the slope to reduce saturation and lubrication.
- Setting up the stone pitching on cliffs and road cuttings on major roads to prevent slope failure
- Encouraging controlled grazing by reducing the number of animals moving on slopes where landslides are pronounced.
- Strengthening environmental agencies such as National Environment Authority (NEMA), National forestry Authority (NFA) to regulate and guide land use in areas prone to mass wasting like eviction of encroachers on steep slopes to reduce landslides.
- Sensitizing continuously the masses and opinion leaders living in fragile zones about the dangers of poor landuse to reduce soil erosion, lubrication, slumping.etc.
- Gazetting mountain slopes and other landslide prone areas as National Game parks and Forest reserves to protect them from human degradation
- Strengthening collection, assessment and dissemination of information by the metrology department about El-Nino rains which trigger off landslides.

GLACIATIONS / GLACIERS IN UGANDA
(CASE STUDY ON MOUNT RWENZORI)

Glaciation is a denudational / exogenic process through which ice forms on highlands, accumulates, moves as glaciers to modify the landscape by erosion, transportation and deposition.

Glaciers forms where air temperatures fall below 0^0 Celsius constantly, causing water vapor to condense and freeze into crystals called **snow** which fall to surface and collect in hollows / depression on the mountain sides in areas.

Then the continuous fall of snow increases in depth and weight in the depressions year after year, compress and compact into small ice crystals forming sheets of solid mass of ice called glacier which is finally pulled down slope by the influence of gravity.

Glaciers in Uganda are formed on the peaks of Mt. Rwenzori from 4800m up to 5109m above sea level.

As glaciers move down the slope, they erode the surface of the mountain sides, valley bottoms and sides through processes of sapping, plucking and abrasion; transport; and finally deposit all eroded materials called **moraines** leading to formation of both glacial erosional and depositional features.

Examples of glacial erosional landforms on Mt. Rwenzori are;

Cirques / corries (tarns) like Lac du Catherine, Lac du Speke, Lac du Stanley and Lac du Noir.
Arêtes like on Mt. Baker peak and along Bujuku valley.
Pyramidal peaks / horns like Baker, Stanley and Margherita peaks.
Glacial troughs / U- shaped valleys like Mugusu, Bujuku, Kamusoso and Mubuku valleys.
Hanging valleys like Lac Vert and Speke hanging valleys towards Kamusoso Valley.
Roche-montonees like on the floor of Mubuku valley.
Rock step and basins like Lac Vert and Lac Noir in the floor of Kamusoso valley, Bujuku and Mubuku.

Examples of glacial depositional landforms on Mt. Rwenzori are;

Till plains like Mubuku valley.
Out-wash plains like Mubuku and Bujuku valleys.
Erratics like in Bujuku and Kamusoso valleys.
Kames like Moore Kame in Kamusoso valley.
Kettles / Kettle lakes like Lake Mahoma at the junction between Mubuku and Bujuku valley.

ECONOMIC IMPORTANCE OF GLACIATION IN UGANDA.

- Glacial landforms / features (glaciations / glaciers) have supported tourism due to created beautiful sceneries leading to earning of foreign exchange for infrastructural development .
- Some glacial features like glacial troughs have facilitated transport and accessibility due to relative flatness in natural routes in highlands leading to cheap transportation of tourists and promotion of trade and commerce like Mugusu, Bujuku, Kamusoso and Mubuku valleys.
- Provided and supplied fresh water due to radiating rivers and streams from glaciers for domestic, irrigation and industrial use like River Sebwe waters Mubuku irrigation scheme in Kasese.
- Glaciated highlands have encouraged crop cultivation because of modified micro-climate as cool temperature and formed fertile moraine soils leading to food production like Mubuku valley in Kasese for cotton and maize.
- Promoted livestock rearing due to presence of pleasant and alpine pastures in the troughs resulting into production of milk and meat like Bujuku and Semliki in Bundibugyo.
- Glaciated highlands have encouraged human settlement because of modified micro-climate as cool temperature, relative flatness and formed fertile moraine soils leading to development of towns like Kilembe town in Mobuku valley in Kasese.
- Stimulated power generation due to waterfalls across rivers radiating from glacial peaks and hanging valleys used for domestic and industrial purposes for example Mubuku power dam across River Mubuku on Mubuku valley in Kasese.

- Promoted education and research due to unique glacial features as fieldwork study areas resulting into acquiring more and widening the scope of geographical skills and knowledge.
- Encouraged wildlife conservation and preservation due to conducive conditions in troughs and on slopes as natural habitants resulting into attracting tourists for more foreign exchange like Bujuku and Mubuku valleys.
- Promoted lumbering / forestry due to different forests and tree species in the troughs and on slopes hence production of timber and other furniture items as well as ecological studies.
- Promoted hand craft and art industry due to boulders and gravels deposited in valleys leading to making pots and bowls as source of income like R. Nyamwamba in Kasese, Bujuku in Kasese and Semliki in Bundibugyo.
- Stimulated building and construction industry due to eroded rocks, boulders and other building materials resulting into better houses and other structures like R. Nyamwamba in Kasese, Bujuku and Semliki in Bundibugyo.
- Promoted entertainment and film industry due to suitable sites for acting, photograph, recreation and leisure activities which led to diversified economy and more jobs like on Margherita ice capped peak.

PROBLEMS ASSOCIATED TO GLACIATIONS IN EAST AFRICA

- Glaciations has led to **production of immature and infertile sandy soils and gravels** on out wash plains which has **discouraged crop cultivation** hence extensive **wasteland** like Nyamwamba, Semliki, Mugusu, Bujuku, and Kamusoso valleys.
- It has led to destructive avalanches (landslides of ice) due to huge ice on pyramidal peaks which claim human lives and destruction of property like Bujuku and Mubuku valleys.
- It has accelerated severe soil erosion due to moving ice and radiating rivers which leads to loss of soil fertility hindering crop farming like Nyamwamba, Bujuku, Mubuku, and Kamusoso valleys.
- Glaciated highlands are barriers to development of transport and communication net work because of steep slopes and rugged terrain leading to inaccessibility like Mugusu, Bujuku, Kamusoso and Mubuku valleys.
- Glaciated highlands on high altitude have limited settlement and agriculture due to cold temperature and steep slopes resulting into remoteness and shortage of food like Nyamwamba, Semliki and Kamusoso valleys.
  - Glaciated highlands have encouraged anti- government elements due to suitable hide-outs for rebels causing insurgence and conflicts like Semliki and Kamusoso valleys with Defunct Allied Democratic Forces.
  - Glaciated highlands have caused aridity on the lee ward side because of dry descending winds leading to desertification like in Mubuku valley in Kasese on the lee ward side.
- It has accelerated seasonal flooding due to melt water from glaciers leading to the destruction of crop farms, infrastructures and killing of people in the lower slopes like Nyamwamba and Semliki river valleys.
- Encouraged disease spreading vectors and pests like mosquitoes due to stagnant water on lower parts from glaciers as breeding grounds resulting into destruction of crop and transmission of diseases to people and livestock like Nyamwamba in Kasese and Semliki river valleys in Bundibugyo.
- Harboured dangerous wild animals due to natural homes and hiding places resulting into destruction of crop farms, killing of people and livestock like Kamusoso, Bujuku and Semliki river valleys.

SOILS OF UGANDA

Soil is a thin layer on top of the earth's crust that is composed of organic and inorganic materials, air (gases), living organisms and water that supports plant life.

TYPES OF SOILS IN UGANDA.

1. Loam soils which are composed of mostly sand, silt and a smaller amount of clay. Loam soils generally have more nutrients, moisture and aeration and water infiltration and therefore suitable for cultivation for example the volcanic soils made up of ash and cinder in Kabale and Kisoro, and the slopes of Mt. Elgon in Mbale, Bududa and Bulambuli, and in some parts of Masaka, Mukono, Kayunga.

2. Clay soils are fine grained soils composed of compacted tiny particles. They have a high water retention capacity and therefore are water logged during wet season but become brittle during dry seasons. They are normally found along river valleys, lakeshores and in wetlands / swampy areas.
3. Sandy soils which are granular soils that contain small rock and mineral particles. They are coarse or rough in nature with a high degree of permeability due to large pores.
   They are easy to cultivate but they are not suitable for agriculture since they contain less or no humus due to high degree of leaching. Sandy soils are mostly found in arid and semi-arid areas of Uganda like Kotido, Moroto, and Kaabong as well as in valleys and lowlands due to deposition like around Lake Victoria at Kasenyi in Wakiso and Bukakata in Masaka.
4. Laterite soils / latosols / murram soils which are reddish-brown soils due to the presence of Iron and aluminium oxides.
   Laterites are formed due to excessive leaching in humid and hot equatorial regions after leaching of the silica and other soluble compounds to Horizon B, leaving iron and Aluminium compounds in Horizon A.
   Laterites are mainly found on the flat topped hills of Buganda like Kayunga, Mukono, Masaka, Wakiso and Buyikwe.

SOIL PRODUCTIVITY IN UGANDA.

Soil productivity refers to the output per unit area of soil.

Soils of Uganda have been classified into six major groups according to productivity for agricultural purposes and these are;

(a) Soils of high productivity are volcanic and alluvial soils which constitute 8% of the total land area of Uganda, mainly found on the slopes of Mt. Elgon in Mbale, Bududa, Kigezi highlands of Kabale and Kisoro, large parts of Buganda in Masaka, Mukono and Wakiso, and Kabarole.

They mainly support perennial crops and are capable of supporting crops for many years.

(b) Soils of medium productivity are mainly derived from recent alluvial deposits. They cover 14% of the total land of Uganda which are found in parts of Kapchorwa, Bushenyi and parts of Kabale and Mukono.

They are capable of supporting a variety of crops.

(c) Soils of fair productivity cover 43% of the land in Uganda which are mainly found in areas of Mubende, Kamuli, Jinja, Apac, Luweero, parts of Gulu, around Mt. Rwenzori, Masindi and Hoima district.

They are suitable for both perennial and annual crops.

(d) Soils of low productivity cover 30% of the total area of Uganda which are mainly found in northern Uganda in Kitgum, western rift valley in Ntoroko, at mountain Kadam, Tororo, Aswa, Kidepo, etc.

(e) Soils of negligible productivity occupy 3% of the total land area of Uganda which are found in flat valley bottoms with swampy vegetation like Sango bay in Rakai, parts of Mubende, along R.Kafu in Masindi.

(f) Soil of nil productivity cover about 2% of the total land area of Uganda which are associated with water logging conditions like Lwera in Masaka and limited surface water like skeletal soils and exposed hard rocks on the steep slopes of Mountains like on Mt. Rwenzori in Kasese.

SOIL EROSION IN UGANDA

Soil erosion is the washing away / removal or detachment of top soil materials from one place to another normally / naturally by running water, wind and moving ice and by man's activities.

TYPES OF SOIL EROSION IN **UGANDA**

1. Sheet **erosion which** involves removal of uniform thin layer of the top soil from an extensive area by water and wind. It mainly occurs on gentle slopes with no vegetation cover such as Katakwi, Soroti, Kaberamaido, Lira and Pader.
2. **Rill erosion which involves** numerous small channels called rills of only few centimeters depth after surface runoff concentrating and scours the sides of the channel especially in the highland regions like Kabale, Kisoro, Budadiri, Manafwa, etc.
3. **Gulley erosion which involves** deep wide channels / grooves called gulleys through which soil is taken down slope by running water in areas of heavy rainfall, steep slopes or gentle slopes like Kabarole, Sironko, Kisoro, Kabale, Kapchorwa and Mbale.
4. **Wind erosion which involves the blowing away of** loose and unconsolidated rock particles easily by wind in semi-arid areas like in Moroto, Kotido, Kiruhura, Lyantonde and Ntoroko.
5. **Splash erosion which involves the** detachment of small soil particles hit by the rain drops on a consolidated soil in the flat areas like Nakasongola, Kamuli and Iganga.

AREAS AFFECTED BY SOIL EROSION IN UGANDA

In Uganda, soil erosion affected areas are;

Hilly / highlands areas like along the slopes of Kigezi (Mufumbiro) highlands in Kabale and Kisoro; Mt. Elgon in Manafwa, Bududa, Kapchorwa and Mbale; Mount Rwenzori in Kasese, Kabarole and Bundibugyo; Mt. Moroto in Moroto, etc.

Pastoral areas such as Karamoja in Kaabong, Kotido, Moroto and Nakapiripiriti; Kasese; Buliisa; Nakasongola; Teso in Soroti, Kumi, Serere and Katakwi; and Ankole – Masaka corridor in Mbarara, Sembabule, Kiruhura and Luwero.

Over cultivated areas like Nebbi, Masaka, etc.

Over mined areas like Sukulu hills in Tororo, Kilembe in Kasese

SKETCH MAP OF UGANDA SHOWING SOIL EROSION AFFECTED AREAS
LEAVE A FULL PAGE

CAUSES OF SOIL EROSION IN UGANDA

Soil erosion is caused by both physical factors and human factors;

Physical factors are;

- Presence of longer and steeper slope has led to greater the velocity and rapid power run off like along steep slopes of Mt. Elgon in Mbale and Kigezi highlands in Kisoro.
- Absence of / limited vegetation like Sembabule, Buliisa and Kotido has left the ground open to surface runoff and soil transportation as thin grass can't traps soil particles leading to soil loss.
- Existence of soil of low productivity and structurally unstable that are easily breakdown and therefore washed away easily like Tororo, Katakwi and Fort Portal.
- Occurrence of torrential rains like the El-nino causes severe run off of the surface like Kigezi highlands in Kabale and Mbale and around the L. Victoria basin in Kampala and Masaka.
- Presence of large number of wild game in the confined areas like Antelopes in Queen Elizabeth N.P in Kasese has exposed soils to run off due to overgrazing as well as weaken the soils to be carried away.
- Existence of strong and violent winds of northeast and southeast trade winds that easily carry away soil particles in Soroti, Abim and Moroto.
-

Human factors are;

- There is overstocking of livestock that has led to competition for the pasture and grass is being eaten up at a quick rate creating the bare land to agents of erosion like wind and running water for removing the topsoil with relative ease such as Karamoja in Kaabong and Moroto and Soroti.
- There is excessive lumbering and charcoal burning which has reduced the protective covers of the soil to encourage runoff and subsequent loss of the soil like Mabira forests in Buyikwe and Ssese Islands forests in Kalangala.
- There is monoculture of certain crops like Maize, cotton and banana has accelerated soil erosion in Masindi, Iganga and Mbale as it depletes the soil nutrients making the soils infertile and susceptible to erosion.
- There is up and down ploughing on hill slopes especially in Mbale, Kisoro and Rukungiri which has weaken the surface also leading to rills and soil erosion.
- There is massive construction of transport routes such as roads, railways and airstrips that involve removal of vegetation and expose soil to destructive raindrops, running water and wind like Kampala – Masaka road, Kampala – Jinja road.
- There is huge mining and civil engineering extraction like open cast mining that involves the removal of large quantities of surface materials to render vast areas susceptible to soil erosion for example the mining of copper at Kilembe, Limestone at Sukulu hills in Tororo and local brick making at Kajjansi clay pits in Wakiso.
- There is continued application of some fertilizers and pesticides which have had devastating effect on the soils in the long run by destroying the soil living micro-organisms leading to destruction of the soil structure for enhancing soil erosion like at Kasaku tea estates in Mukono and at Kakira Sugar plantation in Jinja.
- There is nature of crops grown which expose the soils to agents of erosion such as millet and sorghum in Kumi, Lira and Gulu.

MEASURES FOR COMBATING SOIL EROSION IN UGANDA

- Ensuring crop rotation that the soil nutrients are maintained and reinstated through the planting of crops in sequence to keep the soils fertile and productive like in Mbarara, Kayunga and Kawanda research institute in Wakiso.
- Planting of cover crops like beans and ground nuts to help in control of soil erosion because their leaves spread on top of the soil and protect it against the harmful impact of raindrops and the deflationary effects of wind like in Kisoro, Ntungamo, Mbale and other areas that receive heavy rains.
- Mulching is undertaken to protect the soil against the agents of erosion using saw dust, leaves, coffee husks, sorghum and maize stalk, grass and banana leaves like in Masaka, Tororo, Soroti and in many dry areas.
- Applying both artificial and natural fertilizers like Ammonium sulphate, single super phosphate, cow dung and kitchen refuse in Mbarara, Mukono, Masaka, and Mbale so as to replace the lost nutrients and to improve on the soil quality.

- Practicing strip cropping across the slope and at right angles to the natural direction of the slope as planted alternate strips of grass and crops trap the moving soil particles and intercept raindrops to reduce on their harmful effect of splashing the soil like in hilly areas like Kisoro, Mbale, Bundibugyo, Rukungiri and others.
- Carrying out contour farming in hilly areas like in Kabale, Kigezi, Bundibugyo, Rukungiri and others as the planted crops in rows of ridges across the slope along the same elevation check the flow of water and consequently reduce soil loss.
- Practicing terracing in the hilly areas of Kisoro and Bundibugyo as built embankments across the slope usually at fixed intervals minimize the loss of surface water gushing down the slope after heavy rains thereby reducing soil erosion.
- Setting up the gabions along slopes as the constructed structures with wires and filled with stones like in hills of Kabale and Bundibugyo or soils and stones are filled in sacks like in hilly areas of Ntinda, Naguru, Kansanga and Muyenga in Kampala reduce the rapid soil erosion especially with deep gullies.
- Constructing ridging in the valleys like in Kabale, Mbale, Bundibugyo, Masaka and Mbarara as the piled up top soil of raised elongated structures increase the depth of soil in which the plant roots grow to offer resistance to runoffs and prevent excessive loss of the soil.
- Encouraging afforestation and re-afforestation as the planted trees break winds and intercept the falling raindrops like planted trees are in Gulu, Moroto, Nebbi and Kisoro.
- Adopting controlled grazing and controlled stocking of cattle to control the rate at which the soil grass is depleted especially in the pastoral areas of Kaabong, Soroti and Sembabule.
- Providing education to the people on the soil management procedures involving dangers of soil erosion, its causes and ways of controlling it in Kayunga, Kisoro, Kabale, Mukono by the National agricultural advisory services(NAADS) through the media of radios, Television and public rallies.

EFFECTS OF SOIL EROSION IN UGANDA

Negative effects

- Soil erosion leads to l**oss of top fertile soils** thus leaving poor and less productive soils which results into low crop yields and persistent **famine** like in Kabale, Kaabong, etc
- It **creates bare ground / waste land** with low agricultural productivity like in some parts of Kaabong, Nakasongola, e.t.c
- Soil erosion facilitates **aridity and desertification** because the poor vegetation cover cannot give-off adequate moisture into the atmosphere leading to rain fall scarcity like Kaabong and Nakasongola.
- Soil erosion lowers **water table** due to limited infiltration leading to crop failure and low crop yields like in Kaabong and Nakasongola.
- It leads to **pollution of water bodies** such as lakes, streams valley dams and wet land due to discharge of soil particles / sediments leading to water contamination like L. Victoria in Kampala and Masaka.
- It causes **silting of water bodies due to d**ischarge of soil particles / sediments resulting into reduced storage capacity of these water sources and low hydro-power generation for example Lake Bunyonyi in Kabale, Victoria in Masaka and Jinja
- It leads **eutrophication** (growth of algae) which damages marine organisms especially fish leading to death of aquatic life in Lake Bunyonyi in Kabale and L. Wamala in Mubende
- It leads to **increased maintenance costs** through dredging of silted culverts and other drainage systems leading to financial deficit for example Lake Victoria in Kampala, Bunyonyi in Kabale and Mutanda in Kisoro.
- It leads **to flooding in low-lying areas / valleys due to** high surface run-off and silting leading to **destruction of property** such as gardens, houses, livestock, infrastructures and sometimes death of people for example in Bwayise and Natete in Kampala, the slopes of mountain Elgon in Mbale, River Kagera in Rakai
- It makes the **development of transport and communication net works difficult due to r**ills and Gullies resulting into remoteness / inaccessibility like Bundibugyo and Kasese
- It leads to dust pollution due to production of dusty storms causing **poor visibility and accidents** especially in arid areas such as Kaabong and Moroto
- It leads to water and air pollution due to the discharges of soil particles leading to easy **spread of air and water borne diseases** such as Cholera, bilharzias, dysentery and flue like R. Nyamwamba in Kasese and R. Manafwa in Mbale.
- Soil erosion facilitates weathering that exposes hard rocks underneath which **hinders agricultural mechanization** like in Kisoro and Kabale.
- Soil erosion leads to landslides in highland areas due weakened soil structure causing massive destruction of property and loss of lives like on Kigezi in Kabale, slopes of mountain Elgon in Bududa and Rwenzori in Bundibugyo.
- Soil erosion produces poor and immature soils which are less productive due to continued wearing away resulting into wastelands like slopes of mountain Elgon in Bududa and Rwenzori in Bundibugyo.

POSITIVE EFFECTS

- Soil erosion facilitates exposure of the fresh rocks to processes of weathering and formation of fresh and new soils like on the slopes of mountain Elgon in Bududa and Rwenzori in Bundibugyo.
- Soil erosion produces alluvial fertile soils in low lands and valleys for supporting crop cultivation for example Irish and sweet potatoes, vegetables, e.t.c in Kisoro and Kabale, lower slopes of mountain Elgon in Mbale.
- Soil erosion exposes inselbergs, volcanic plugs, batholiths, arenas e.t.c which create beautiful scenery for encouraging tourism industry resulting into earning of foreign exchange used for economic development like inselbergs in Kotido and Nakasongola
- Soil erosion exposes minerals like gold, diamond, limestone rocks hence promoting mining for setting up industries like Sukulu volcanic plug in Tororo.

Revision questions:

1. Discuss the factors that are responsible severe soil erosion in Uganda.

Approach:

Introduction

- Define soil erosion and mention types.
- Identify areas where soil erosion is common in Uganda
- Represent them on a sketch map with name places.

Body

- Identify, explain and illustrate how physical and human factors are responsible for soil erosion.

2. Examine the measures which have been taken to combat soil erosion in Uganda.

Approach:

Introduction

- Define soil erosion and mention types.
- Identify areas where soil erosion is common in Uganda
- Represent them on a sketch map with name places.

Body

- Identify, explain and illustrate the measures which have been taken to combat soil erosion.

DRAINAGE SYSTEMS IN UGANDA

Drainage systems refer to the water surface coverage in an area in terms of lakes, rivers and swamps.

STATUS OF UGANDA'S DRAINAGE;

- Most lakes are found in the southern part of Uganda
- Water surface occupies about 43,953 Km^2.
- Most lake types are down warped such as Lake Victoria in South east.
- The largest and biggest lake is Lake Victoria in South east.
- The longest river is Victoria Nile

MAJOR RIVER SYSTEMS IN UGANDA

Uganda is drained by 8 major rivers and these are:

1. **Victoria Nile** with its source on northern shores of L. Victoria in Jinja, running from the Rippon falls and enters L.Kyoga where it meete R. Kafu and proceeds up to L.Albert to join to Albert Nile.

Victoria Nile covers a total distance of 285 miles and has tributaries Tochi, Koli, Aroch and Ayago, etc.

2. Achwa – Moroto River is the second longest river in Uganda covering a distance of 223 miles. It flows the South Karamoja in the North Eastern Uganda through Acholiland and enters South Sudan to join White Nile.

Its main tributaries are Agago and Pager. River Achwa is a fault- guided river.

3. Dopeth – Okok River covers a total distance of 196 miles, originating from the North East of Karamoja Mountains and flows southwards towards Lake Bisina where it disappears in swamps.

4. River Pager is a tributary of Achwa River, covering a distance of 145 miles.

5. Albert Nile is a continuation of Victoria Nile flowing out of L. Albert on the Northern end.

It covers a distance of 135 miles and tributaries.

6. Mayanja – Kato River originates from the Northern parts of Lake Victoria and flows northwards to R. Kafu.

It covers a distance of 114 miles.

7. Katonga river flowing from Lake George eastward into Lake Victoria, covering a distance of 110 miles.

8. Mpologoma – Malaba River originates from Mt. Elgon and flows in the North Westwards until it reaches Lake Kyoga swamps.

It covers a distance of 108 miles.

LAKES IN UGANDA

A lake is a mass of water filled in a hollow or basin or trough on earth's surface either from rainfall, rivers, springs, glaciers or other streams.

The size, depth and shape of a lake depend on the nature of the hollow or basin it occupies or in which it is found.

Some lakes are permanent while others are temporary, some are shallow while others are deep, and some are natural while others are man - made / artificial.

Most of Ugandan lakes are found in Southern part of the country while the North is with fewer lakes.

CLASSIFICATION OF LAKES IN UGANDA

In Uganda, lakes are classified according to the origin of the hollows in which they are found were formed due to natural processes / factors and man's activities.

Generally, there are various lakes in Uganda and they fall under the following categories:

Tectonic / Endogenic lakes

Volcanic lakes

Crater lakes like Wagagai on Mt. Elgon in Mbale, on Moroto in Moroto and Muhavura in Kisoro.

Explosive crater lakes such as L. Katwe biggest, Kyamuringa, Nyungu, Nyamusingire, and Nyamunuka in Kasese, Rutoto in Bushenyi, in western Uganda.

Caldera lakes such as on Mount Kadam in Kadam and Mount Napak in Napak (North eastern Uganda).

Lava dammed lakes such as L. Bunyonyi in Kabale; Mutanda, Chahafi, Kayumba and Mulehe in Kisoro, all in South west Uganda.

Faulted lakes

A tilted block lake found on Mt. Rwenzori ranges in Kasese.

Rift valley / graben lakes such as L. Albert in Buliisa and Hoima, L. Edward and L. George in Kasese and Bushenyi, all in the floor of the Western rift valley.

Warped lakes

Crustal warped lakes such as Lake Victoria in Masaka and Mukono in south east and Kyoga in Nakasongola and Amulatar in central, Kwania in Amolatar and Apac, Opeta in Katakwi, Bisina in Katakwi and Kumi, Wamala in Mubende, Mburo in Kiruhura, Nakivali in Isingiro, Kijanebalola and Kachira in Rakai, Lukaya in Masaka and Nakuwa in Pallisa.

Exogenic / denudational lakes

Erosional lakes / glacial eroded lakes / tarn such as Lac du Speke, Lac Vert, Lac Noir and Lac Catherine on Mt. Rwenzori in Kasese.

Depositional lakes such as ox-bow lakes like along R. Ruizi in Mbarara, along R. Semliki in Bundibugyo and R. Birira in Rukungiri; flood plain lakes like along R. Ruizi in Mbarara and along R. Semliki in Bundibugyo; lagoon like former Nabugabo bay on L. Victoria in Masaka; and moraine dammed lake like Lac Gris on Mt. Rwenzori in Kasese

Solution lakes such as Lake Nyakasura in Kabarole.

Other lakes

Mining lakes such as those in Kajjansi in Wakiso by Uganda clays others at Seeta in Mukono and Kawanda in Wakiso.

Man - made lakes such as Kabaka's Lake at Mengo in Kampala, Kibimba Lake in Bugiri and Mubuku in Kasese.

SKETCH MAP OF UGANDA SHOWING MAJOR LAKE TYPES AND RIVERS

FORMATION OF LAKE TYPES

TECTONIC / ENDOGENIC LAKES

Down warped lake is a bowl or saucer shaped basin filled with water formed due to warping.

It was formed when the southeast and central parts of Uganda were forced to sag down by convective currents, which were followed by up warping of the western and eastern side to form the down warped basin.

In the due process of down and up warping, the rivers, such as Kafu, Rwizi, Katonga and Kagera. that used to flow west and eastwards changed their flow and flowed east and westwards respectively to fill the basin to form the down warped lakes currently known as Lake Victoria in Kampala and

Masaka in south east, Kyoga in Serere and Nakasongola in central and a chain of lakes due to back ponding of rivers like Kwania in Amolatar and Apac, Opeta in Katakwi, Bisina in Katakwi and Kumi, Wamala in Mubende, Mburo in Kiruhura, Nakivali in Isingiro, Kijanebalola and Kachira in Rakai, Lukaya in Masaka and Nakuwa in Pallisa.

Rift valley lake is a faulted depression filled with water in the floor of the rift valley as a result of faulting.

It was formed after the rift valley was formed by either compressional or tensional forces that within the rift valley floor, secondary faulting led to localized fracturing and displacement where some parts of the rift valley floor sunk to form a faulted basin called a graben.

This graben was later filled with water from rainfall, rivers and streams to form rift valley lakes.

In Uganda, these lakes are L. Albert in Buliisa and Hoima which was filled by Victoria Nile, R. Semliki and R. Nkusi; L. Edward in Kasese and Rukungiri by R. Birira and L. George in Kasese and Rubirizi by R. Mpanga.

Volcanic lake that under this, there are 4 types of volcanic lakes and these are;

i) **Lava dammed lake** is basin filled with water behind a dam of lava.

It was formed when flowing lava from a volcano downwards blocked the Valley of a nearby river which forced it back pond its waters to form a lava dammed lake.

Example of Lava dammed lakes are L. Bunyonyi across R. Heisensero in Kabale; Mutanda, Chahafi, Kayumba and Mulehe in Kisoro, all in South west Uganda.

ii) **Explosive crater / Crater Lake** is a small circular depression filled with water on the top of the earth's surface or a volcano.

It was formed when the top of the earth / volcano was blown off or destroyed by a violent eruption of magma which left behind a small circular depression surrounded by a rim of pyroclasts / ashes which was later filled with water to form an explosive crater / crater lake respectively.

E.g.s of explosive crater lakes are L. Katwe biggest, Kyamuringa, Nyungu, Nyamusingire, and Nyamunuka in Kasese, Rutoto in Bushenyi, in western Uganda while crater lakes are Wagagai on Mt. Elgon in Mbale, on Mt. Moroto in Moroto and Mt. Muhavura in Kisoro.

iii) Caldera lake is a large circular depression filled with water on the top of a volcano exceeding 1km in diameter.

It was formed similarly as a crater lake.

Or it was formed due to cauldron subsidence when huge magma in the vent of a volcano collapsed downwards due to its weight leaving a huge chasm / space on the top of the volcano called caldera which was later filled with water form a caldera lake.

E.g.s are Caldera lakes are L. Kadam on Mount Kadam in Kadam and L. Napak on Mount Napak in Napak (North eastern Uganda).

EXOGENIC / DENUDATIONAL LAKES

Erosional lakes

i) Glacial eroded lake / tarn is a semi – circular glacial basin filled with water found on the side of a glaciated mountain.

It was formed during the back wall recession of the steep sides of glaciated mountain where the moving ice (glacier) was able to over deepen and widen a pre- glacial crack to form a semi – circular basin called corrie / cirque which was later filled with water to form a glacial eroded lake called a tarn.

Examples of the tarns are Lac du Speke, Lac Vert, Lac Noir and Lac Catherine on Mt. Rwenzori in Kasese.

DEPOSITIONAL LAKES.

These lakes are formed as a result of river, glacial and wave deposition.

RIVER DEPOSITIONAL LAKES

i) Ox bow lake is a horse - shoe shaped basin filled with water found in the old stage of the river course.

It was formed as a meandering river eroded through the narrow neck leaving a meandering loop which was then sealed off by the river deposits and the loop was cut off to form a horse shoe basin with water called an ox bow lake.

Examples of ox - bow lakes are along R. Ruizi in Mbarara, along R. Semliki in Bundibugyo and Ntoroko and R. Birira in Rukungiri.

ii) Flood plain lake is depression with water on a flood plain.

It was / is formed on flood plain along a river especially during and after its flooding when the flooded water is unable to return back to the main river channel because of being trapped on the flood plains by the levees to form the flood plain lake.

Examples of them are along R. Rwizi in Mbarara, along R. Mpanga in Kamwenga and along R. Semliki in Bundibugyo.

WAVE DEPOSITIONAL LAKE

i) Coastal / shore lake (lagoon) is a depression with water separated from the sea / lake by a spit or sand bar.

It was formed as a result of wave deposition where a long shore drift from the either side of the lake / sea led to the formation of a spit / sand bar which eventually encircled a part of lake / sea waters to create calm water body known as a lagoon.

E.g. is the former Nabugabo bay on L. Victoria in Masaka.

GLACIAL DEPOSTIONAL LAKE

i) Moraine Dammed lake is a depression behind a dam of moraine with water.

It was formed when terminal moraine blocked a U - shaped valley on the glaciated mountain. The melted water from the snow fields flowed and accumulated behind the dam of terminal moraine in the valley to form the moraine dammed lake.

An example of it is Lac Gris on Mt. Rwenzori in Kasese.

Solution lake is a basin with water in chalk and lime stone rocks.

It was formed when the solution pits were left behind after chalk or lime stone had been dissolved or removed by rain water and later filled with water to form solution lakes.

E.g. of solution lake is Lake Nyakasura in Kabarole.

Man made lake is a man created basin filled with water.

It was formed as a result of man's activities when man built a dam across a river valley creating a water reservoir up the stream
Or when a man dug a big trough and later filled with water to a man made lake.

E.gs are Kabaka's Lake at Mengo in Kampala, Kibimba Lake in Bugiri and Mubuku in Kasese.

Mining pond / lake is a mine / quarry pit with water.

It was formed when the open cast mining and quarrying left big troughs in which water collected to form mining lakes / ponds.

Examples are those in Kajjansi clay mines in Wakiso by Uganda clays Ltd, clay mines at Seeta in Mukono and at Kawanda in Wakiso.

ECONOMIC IMPORTANCE OF LAKES AND RIVERS TO UGANDA.

The drainage features have played an important role in the lives of many Ugandans in different parts where they exist. This importance is both positive and negative as follows:

Positives:

- Lakes and rivers are major **water suppliers** both in rural and urban areas in industries and homes due to fresh and abundant waters. E.g. industries and homes in Masaka, Jinja and Kampala towns largely depend on Lake Victoria waters through NWSC.
- Rivers and lakes provide the **cheapest means of transport** to many Ugandans due to clear, open and navigable waters leading to trading purposes as well as transportation of cargo and passengers e.g. L. Victoria connects to Kenya and Tanzania via Port Bell in Kampala to Kisumu and Mwanza respectively, Lake Albert also connects Uganda to Democratic Republic of Congo (DRC) via Buitaba port in Buliisa to Muhagi port.
- Lakes and rivers have facilitated **fishing** because of various edible fish species leading to improved food diet with proteins to humans like Lake Victoria at Kasenyi in Wakiso, Kyoga at Lwampanga in Nakasongola, Albert at Wanseko in Buliisa, George at Kasenyi and and Edward at Katwe in Kasese with Nile perch, Tilapia, catfish, mudfish, silverfish, etc.
- Lakes and rivers act as **tourist attractions** for **tourism** as they offer beautiful sceneries to attract the viewers from different parts of Uganda and the whole World from USA, Japan and Netherlands which brings in foreign exchange for infrastructural development. E.g. Lake Victoria with beaches like Lido at Entebbe in Wakiso, Victoria Nile with waterfalls like Bujagali in Jinja and Murchison in Buliisa.
- Lakes and rivers have favoured **the growing of various crops** due to formation of heavy convectional rainfall of over 1500 mm per annum through evaporation and fertile alluvial soils leading to improved food production. For example the shores of Lake Victoria at Lugazi in Buyikwe and Kakira in Jinja are for sugarcane growing and Bugala islands in Kalangala in L. Victoria are for palm oil trees.
- Lakes and rivers have promoted **irrigation farming due to presence of fresh waters** to support crop growing in the areas with little water and during dry seasons e.g. Kakira sugar plantation uses lake Victoria waters in Jinja, Mubuku irrigation scheme uses R. Mubuku (Sebwe) water in Kasese, Kibimba irrigation scheme uses water from Mpologoma (Kitumbezi) in Bugiri, Doho uses water from river Manafwa in Tororo, etc.

- Lakes and rivers have engineered the **establishment of industries** as water is used as a raw material, detergent and coolant leading to production of cheap and capital goods e.g. Century bottling at Namanve in Mukono and Crown bottlers at Nakawa in Kampala, Nile Breweries at Njeru in Buyikwe and Uganda Breweries at Luzira in Kampala all use water to process sodas and beers from L. Victoria.
- Lakes and rivers have hand in hand **generated hydro electric power** from running water due to existence of waterfalls for use domestically and industrially. E.g. L. Victoria is a reservoir for Victoria Nile on which Kiira power dam and Bujagali power station are in Jinja were set up to produced power. HEP is also generated on River Mubuku in Kasese and R. Mpanga in Kamwenge.
- Most lakes and rivers have promoted **hand craft making due to presence of** papyrus vegetation on shores and banks resulting into production of papyrus and palm mats, carpets and baskets in Kampala, Wakiso and Mukono on the shores of L. Victoria and on banks of R. Katonga in Masaka, R. Kafu in Hoima, R. Mayanja in Wakiso, etc.
- Some lakes and rivers have promoted mining and construction sector because of existence of **valuable minerals** and **construction materials** such as L. Katwe in Kasese with salt and L. Albert with oil deposits in Buliisa for industrialisation and other lake shores and river banks have sand and clay for building purposes as well as pottery like Uganda clays at Kajansi in Waakiso on L.Victoria shores.
- Lakeshores and riverbanks have provided **ideal sites for livestock rearing** due to the presence of marsh grasses resulting into increased production of milk and meat like shores of L. Mburo in Kiruhura are grazing grounds of Bahima and L. Opeta in Katakwi by Itesots.
- Rivers and lakes have supported **forestry, lumbering and production of fuel wood** due to the growth of water - loving vegetation especially mangrove forests and papyruses on the shores and banks resulting into balanced ecosystem, timber production and supply of fire wood and charcoal like the Ssese islands forests in L. Victoria in Kalangala provide firewood to fishermen for smoking fish and timber for making boats.
- Lake and river features like waterfalls, cliffs, beaches and others have encouraged **research and education** for researchers and students in higher institutions of learning and secondary schools due to their nature appearance leading to developing more knowledge and skills geographically e.g. Students from Jinja, Wakiso, Mukono, Masaka and Entebbe usually visit Bujagali falls along Victoria Nile in Jinja, Sezibwa falls on R. Sezibwa in Mukono, Nabugabo lagoon in Masaka and Kasenyi cliff on shores in L. Victoria in Wakiso.
- Lakes and rivers act as **recreational grounds** for leisure and entertainment because of their conducive conditions and uniqueness like swimming, sun bathing, holiday camping, sport fishing, etc. E.g. beaches on the shores of L. Victoria in Entebbe such as Lido, Palm, Ssese Gateway, Kisubi beach and at Ggaba in Kampala for panics, beach volley ball, filming and photograghy.
- Lakes and rivers have **regulated water flow and reduced on flooding** during the rainy seasons as they absorb excessive after a heavy down pour and maintain the constant flow of the river especially in the dry periods. E.g. R. Mayanja in Wakiso absorbs excessive rain water in Nateete and Busega, Nakivubo stream for Kampala city, etc.
- Lakes and rivers are natural habitants for **wild life conservation** because of their suitable conditions which finally attract tourists for foreign exchange. E.g. L. Mburo in Kiruhura is a home of crocodiles, L. Edward – Kazinga channel – L. George complex is a home for crocodiles and hippopotamus in Kasese and Rubirizi.
- Lakes and rivers such as L. Victoria, Kyoga, Albert and Victoria Nile have beautiful and precious pebbles, boulders and shells for **decorating and building purposes** while building houses in towns of Kampala, Entebbe, Serere, Amolatar, Masindi, Buliisa, etc.
- Lakes and rivers have **led to development of animal and poultry industry** due to presence of shells and silver fish for processing and mixing with maize brand and cotton seeds leading to provision of animal and chicken feeds. E.g. Ugachic at Gayaza in Kampala, Bulemezi enterprise and Kagodo feeds in Kampala, Nuvita feeds in Jinja access shells and silver fish mainly from L. Victoria at Kasenyi in Entebbe and Masese in Jinja and L. Albert at Wanseko and Butiaba in Buliisa.
- Lakes and rivers are useful **dumping sites** for domestic and industrial wastes and garbage resulting into improved sanitation like L. Victoria at Ggaba in Kampala for sewage by NWSC.

Negatives:

- Lakes and rivers and their surrounding swamp vegetation have promoted **breeding sites for disease transmitting vectors and pests** due to stagnant water like mosquitoes, snails, black flies, tsetse flies and other bacterial insects which attack humans, crops and livestock e.g. at Luzira in Kampala, Bukakata in Masaka and Masese in Jinja on the shores of L. Victoria.
- Lakes and rivers are **socio – economic barriers** between people on opposite shores / banks thus hindering links in between like roads, power lines, knowledge fusion, etc leading to inaccessibility and remoteness e.g. L. Kyoga is a block between Nakasongola and Kayunga in the south and Amolatar and Apac in the North while L. Victoria between the people in Kampala, Mukono, Wakiso and Masaka with those on Buvuma and Ssese islands in Kalangala.
- Lakes and rivers are experience **water fluctuations** because of too much rainfall which are destructive to tourist attractions, settlement and other social amenities on shores and bank like Lake Albert in 1960's made the areas at Butiaba landing site in Buliisa to submerge.
- Lakes and rivers have turned out to be **wastelands** as they occupy large expanse of land other than being used for agriculture and settlement resulting into less productive economically like Lake Victoria and Kyoga cover almost the south east and central parts of Uganda.
- Lakes and rivers are **natural homes for wild animals** in and around them which are a threat to human life and their property e.g. the crocodiles on the northern shores of Lake Victoria in Bugiri, Busia and Mayuge and lakes Edward and George in Kasese and Rubirizi have feasted on fishermen.
- Lakes have led to **water accidents as ships, ferries and boats capsize across** because of heavy and strong storms caused by waves as result of Northeast and Southeast trade winds like on Lake Victoria, to and fro Kalangala and Buvuma thus destruction and loss of life and property.

- Rivers like Victoria Nile in Jinja and lakes like Victoria in Jinja, Wakiso and Masaka and Kyoga in Serere, Nakasongola and Amolatar have **floating vegetations** like water hyacinth and papyrus, which has hindered fishing activities, water transport and power harnessing as they intercept in the fishing gears, motor engineers and power turbines.
- Lakes and rivers have fueled **territorial boundary conflicts** as they are shared with other regions and countries bringing about misunderstanding and insecurity e.g. the discovery of oil deposits on the shores of L. Albert between Uganda and DRC and Mujingo Island in L. Victoria between Uganda and Kenya respectively.
- Lakes and rivers have promoted **smuggling of goods** like fish, cigarettes, petroleum products across borders to and fro Uganda and neighbouring countries especially on L. Victoria in Busia and Rakai, L. Edward in Kasese and L. Albert in Buliisa and Hoima due to open water routes leading to loss revenue.
- Lakes and rivers have accelerated **soil erosion and silting tendencies** as they flood during the rainy seasons leading to crop and property destruction like R. Manafwa in Mbale, Nyamwamba in Kasese and Awoja in Soroti.
- River banks and lake shores have hindered the **construction of firm and strong infrastructures** like roads and rails like at Ggaba in Kampala and Masese landing site in Jinja on L. Victoria due to smooth, boggy and soft surfaces and soils.
- Many rivers have **limited water navigation as well as fishing** along them due to existence of waterfalls and rapids like Bujagali rapids and Itanda falls in Jinja, Karuma falls in Kiryandongo and Murchison falls in Buliisa along Victoria Nile leading to remoteness, inaccessibility and backwardness.

EFFECT / INFLUENCE OF TECTONISM ON DRAINAGE OF UGANDA

In Uganda, the following are the effects of tectonic activity on the drainage as a result of faulting, warping and vulcanicity;

FAULTING

The following are the Faulting effects on drainage;

A tilted block lake found on Mt. Stanley on Rwenzori ranges in Kasese.

Faulted / graben / rift valley lakes such as L. Albert in Buliisa and Hoima, L. Edward and L. George in Kasese, Rubirizi and Bushenyi, all in the floor of the Western rift valley.

Fault guided river valleys such as R. Achwa in Adjumani and Gulu in Northern Uganda and R. Wassa in Bundibugyo.

A faulted waterfalls such as Murchison falls along Victoria Nile in Buliisa.

Parallel drainage pattern like R. Nkusi runs parallel to R. Hoima in Hoima.

Antecedent / superimposed drainage pattern like R. Birira in Rukungiri and Kanungu.

Radial drainage pattern on Mt. Rwenzori with radiating rivers like Semliki in Ntoroko (Bundibugyo); Lume, Bujuku, Mubuku (Sebwe) and Nyamwamba in Kasese; Mpanga in Kamwenge; etc.

Trellis / rectangular drainage pattern like R. Achwa in Adjumani and Gulu and Kafu in Hoima amd Masindi with their tributaries.

Hooked / Barbed drainage pattern like R. Kafu in Hoima and Masindi, Katonga in Kiruhura and Sembabule, Kagera Rakai and Isingiro and their tributaries flowing in different directions.

New water shed such as R. Katonga became Katonga – Mpanga in Kamwenge, R. Kafu became Kafu – Nkusi in Hoima and R. Kagera became Kagera – Birira in Ntungamo.

River capture such as Victoria Nile captured R. Tochi, Koli, Aroch and Ayago in Nwoya.

River rejuvenation like Victoria Nile as it leaves Kyoga towards L. Albert in Buliisa and Kiryandongo.

River features such as gorge like along Victoria Nile as it enters L. Albert in Buliisa and along Birira as it enters L. Edward in Rukungiri and Kanungu, ox bow lakes and meanders like along R. Semliki in Ntoroto (Bundibugyo), Rwizi in Mbarara, Mpanga in Kamwenga and Birira in Ntungamo.

WARPING

The following are the warping effects on drainage;

Crustal warped lakes such as Lake Victoria in Kampala and Masaka in south east, Kyoga in Serere and Nakasongola in central, Kwania in Amolatar and Apac, Opeta in Katakwi, Bisina in Katakwi and Kumi, Wamala in Mubende, Mburo in Kiruhura, Nakivali in Isingiro, Kijanebalola and Kachira in Rakai, Lukaya in Masaka and Nakuwa in Palisa.

Reversed rivers such as Kagera in Rakai, Kafu in Masindi and Hoima, Katonga in Masaka and Sembabule, Rwizi in Mbarara and others.

Lake Islands such as Ssese islands in Kalangala, Buvuma in (Buvuma) Mukuno, Mujingo in Bugiri, and Sigulu in Namayingo, Sagitu in Mayuge others in L. Victoria.

Extensive swamps due to impeded drainage like Mpologoma in Eastern, Rwizi in Western and Lwera in Central Uganda.

River out pour of Lake Victoria which is Victoria Nile in Jinja.

Centripetal drainage pattern of L. Victoria with rivers like Katonga in Masaka, Kagera in Rakai, …

Hooked / Barbed drainage pattern like R. Kafu in Hoima and Masindi, Katonga in Kiruhura and Sembabule, Kagera Rakai and Isingiro and their tributaries flowing in different directions.

Waterfalls on the northern shores of L. Victoria like Rippon falls along Victoria Nile in Jinja.

New water shed such as R. Katonga became Katonga – Mpanga in Kamwenge, R. Kafu became Kafu – Nkusi in Hoima and R. Kagera became Kagera – Birira in Ntungamo.

River capture such as Victoria Nile captured R. Kafu in Nakasongola.

River features such as gorge like along Victoria Nile in Jinja and Buliisa, ox bow lakes and meanders like along R. Rwizi in Mbarara and R. Birira in Rukungiri.

VULCANICITY

The following are the influences of extrusive and intrusive vulcanicity on drainage;

Extrusive vulcanicity effects on drainage;

Crater lakes like Wagagai on Mt. Elgon in Mbale, on Moroto in Moroto and Muhavura in Kisoro.

Explosive crater lakes such as L. Katwe biggest, Kyamuringa, Nyungu, Nyamusingire, and Nyamunuka in Kasese, Rutoto in Ruburizi (Bushenyi), in western Uganda.

Caldera lakes such as on Mount Kadam in Kadam and Mount Napak in Napak (North eastern Uganda).

Lava dammed lakes such as L. Bunyonyi in Kabale; Mutanda, Chahafi, Kayumba and Mulehe in Kisoro, all in South west Uganda.

Radial drainage on volcanic tops like Sippi in Kapchorwa, Sironko in Sironko and Manafwa in Mbale and Manafwa from Mt. Elgon; and on Muhavura in Kisoro.

Porous volcanic materials limiting drainage surface like the basalts in Kisoro areas and limestone in Bunguruguru areas in Rubirizi.

Intrusive vulcanicity effects on drainage;

Exposure of dykes and sills leading to waterfalls and rapids like Sippi falls in Kapchorwa, Kisiizi falls in Rukingiri, Bujagali falls in Jinja, Sezibwa falls in Mukono, Karuma falls in Kiryandongo (Masindi).

Formation of waterfalls and rapids on sills and dykes have led to gorges and plunge pools such as those on the above rivers.

Hot springs / fumaroles / geysers such as Sempaya in Kabarole and Rwagimba in Bundibugyo, Kitagata in Bushenyi, Kisizi in Rukungiri, Kibiro in Hoima, Kikagati in Isingiro, etc.

Bowl shaped lake in lapolith like Rubanda arena along Kabale – Kisoro road in Kabale.

Revision Questions:

1. To what extent are Ugandan lakes as result of tectonic activity?

APPROACH TO 1

Introduction

- Definition of tectonic activity and lake
- Identify, describe and locate major lakes types with name places (districts)
- Draw a sketch map to show the lake types with name places

Body

- State, explain, exemplify and illustrate the extent to which Ugandan lakes are as result of tectonic activity (show 1 for warping, 1 for faulting and at least 3 for volcanicity) that is using FEED
- However show the other processes besides tectonic activity such as glacial erosion, glacial deposition, river deposition, wave deposition, solution and man's activity using FEED also.

2. Explain the formation of lakes in Uganda.

APPROACH TO 2

Introduction

- Define a lake
- Identify, describe and locate major lakes types with name places (districts)
- Draw a sketch map to show the lake types with name places

Body

- State, explain, exemplify and illustrate the formation of lakes in Uganda (show 1 for warping, 1 for faulting,1 for volcanicity, 1 for glacial erosion, 1 for glacial deposition, 1 for river deposition, 1 for wave deposition, 1 for solution and 1 for man's activity) that is using FEED.

3. Discuss the economic value of drainage systems.

APPROACH TO 3

Introduction

- Define a drainage system
- Cite out the status of drainage systems in Uganda
- Identify, describe and locate major drainage systems (lakes, rivers and swamps) with name places (districts)
- Draw a sketch map to show the major drainage systems with name places

Body

- Identify, explain and exemplify / illustrate the economic value of drainage systems using PELED both positive (12/10) and on the other hand negatives (6/8).

4. Account for formation of volcanic lakes in Uganda
APPROACH TO 4
Introduction
- Definition of volcanic lake and citation of its origin
- Identify, describe and locate major volcanic lake types with name places (districts)
- Draw a sketch map to show the major volcanic lake types with name places

Body
- State, explain, exemplify and illustrate the formation of volcanic lakes in Uganda (crater, explosive crater, caldera and lava dammed lakes) that is using FEED

5. Describe the formation of either faulted lake or crustal warped lake in Uganda and discuss its economic value to the surrounding environment.
APPROACH TO 5
Introduction
- Choose the lake type and define it.
- Describe location of the chosen lake with name places (districts)

Body
- State, explain and describe the processes that led to the formation of the chosen lake from the core / mantle through the crust up to the earth surface.
- Illustrate the chosen lake in a talking diagram(s).

6. Examine the effects of tectonic activities on the drainage of Uganda.
APPROACH TO 6
Introduction
- Definition of tectonic activities and drainage
- Identify, describe and locate resultant effects of tectonic activity on drainage (tectonic drainage features) in Uganda with name places (districts)
- Draw a sketch map to show resultant features of tectonic activity on drainage in Uganda with name places

Body
- State, explain, exemplify and illustrate the effects of tectonic activity on drainage in Uganda (show 3 for warping, 3 for faulting and 3 for volcanicity) that is using FEED

7. Examine the influence of vulcanicity / warping / faulting on the drainage of Uganda.
APPROACH TO 7
Introduction
- Definition of the process (vulcanicity / warping / faulting) in the question
- Identify, describe and locate resultant features of the process (vulcanicity / warping / faulting) in the question on drainage (process drainage features) in Uganda with name places (districts)
- Draw a sketch map to show the resultant features of the process in the question on drainage in Uganda with name places

Body
- State, explain, exemplify and illustrate the resultant features of the process in the question on drainage in Uganda (for at least 5) that is using FEED

CLIMATE OF UGANDA

Climate is the **average weather conditions of a place** for a long period of time usually 30 – 35 years having studied and recorded the weather elements like temperature, rainfall, pressure, wind, sun shine, etc.

Weather is the **average atmospheric conditions of the place** recorded for a short period of time usually in a day.

CLIMATIC TYPES IN UGANDA

All the above factors in combination have led to the 4 major and distinct climatic types in Uganda which are interrelated namely:

1. Equatorial type.
2. Tropical type.
3. Semi – desert type.
4. Mountain type.

EQUATORIAL TYPE OF CLIMATE

The True equatorial type of climate is mainly found around the **Northern and western shores of Lake Victoria** covering Jinja, Kamuli, Mukono, Entebbe, Kampala, Kayunga, Masaka, etc and on Ssese islands in Kalangala, which lies **close to the Equator within between 2^0 N and 2^0 S**. This climate is characterised by;

- Having **hot temperatures ranging from 20^{o}C to 27^{o}C**.
- **Heavy rainfall over 1500mm** per annum.
- Double (bimodal) rainfall maxima with two peaks in March to May and September to November with the first being heavier than the later which corresponds with the ITCZ.
- Having relatively **high humidity of over 80 %.**
- Having a thick cloud cover.
- Rainfall is convectional type and it is received mainly in the afternoons.
- Short dry season in July and February.
- Small annual temperature range with an average of 2^{o}C.

TROPICAL TYPE

The tropical type of climate covers **most parts of Uganda** such as Hoima and Masindi in Western, Gulu and Lira in **Northern Uganda and some parts of south western Uganda** in Rakai. It emerges as one leaves the equator.

It is characterised by;

- **Moderate and unreliable rainfall** usually ranging from **1500mm** near the equatorial margin to about **750mm** on the semi desert fringes per annum.
- Experiencing **an alternating wet season and dry season** where the wet season comes when the sun is over head during the months of December-March in the southern hemisphere and during the months of May to August in the northern hemisphere respectively.
- Experiences **hot temperatures ranging from 25^o C to 30^o C throughout the year** but during the dry season, day time temperatures are much higher than night time temperatures.
- Its annual rainfall is high nearer the equator and less towards the semi desert area.
- Humidity is **relatively high of about 50%** during the wet season.
- The summers are the wet season and even hot while the winters are the dry season and warm.

SEMI DESERT TYPE

The semi arid type of climate is found in Kaabong and Moroto in **North eastern Uganda (Karamoja)**, Kasese region, in Buliisa and Ntoroko in **L. Albert lowlands**, Bundibugyo in **Semliki valley**, Nakasongola and Mbarara and Sembabule in **Ankole-Masaka dry corridor**. It is the driest climate in Uganda.

It is characterised by;

- A **prolonged dry season between 6 – 9 months** with **very hot temperatures rising 30^{o}C** and above.
- No well defined rain season but it **is less than 750 mm per annum**.
- **Low relative humidity of less than 25%.**
- Limited cloud covers with hot day time temperatures but relatively cold night temperatures.
- Large diurnal temperature range above 8^{0}C.

MONTANE / MOUNTAIN TYPE

The montane type of climate is also referred to as the **Modified Equatorial or sub tropical Climate**. It is mainly influenced by the **variations in temperature and rainfall** which are modified **by altitude and relief** of the place.

This climate is found in the **isolated hilly and mountainous areas of Uganda**, which are Kigezi highlands / Mufumbiro ranges in Kabale and Kisoro, Rwenzori Mountain in Kasese and Bundibugyo and Mount Elgon slopes in Mbale and Kapchorwa.

It is characterised by;

- The existence of **very cold temperatures near and at the tops** of the mountains with **snow at the top** about 4800m high.
- **Low atmospheric pressure on mountain tops** due to the rarefied air and reduction in gravitational effect.
- **High amounts of relief rain fall going above 1500mm per annum on the wind ward sides** on the middle slopes of the mountain at about 1500m asl.
- **High humidity of over 80%**.

A SKETCH MAP OF UGANDA SHOWING THE CLIMATIC TYPES

FACTORS AFFECTING THE CLIMATE OF UGANDA

The climate of Uganda is influenced by a number of factors as given below:

- **WATER SURFACE** influences the amount of rainfall and temperatures of a place in that; **large water bodies** in form of lakes, rivers and swamps modify the climate of surrounding areas through evaporation to form rain. For example through **high rate of evaporation due to sun heating** from L. Victoria and Kyoga, water vapour moves higher, cool and condense into heavy rainfall of over 1500mm which is received in the Kalangala islands and on Northern shores of L. Victoria particularly at Entebbe, Lugazi, Jinja and Mukono as well as L.Kyoga shores like some parts of Soroti and Kumi.

Where as areas such as Karamoja region in Kaabong, Kotido and Moroto with **few or limited lakes and rivers** have **less humidity** thus little or no rainfall in those areas.
These lakes also especially L.Victoria have been **great rechargers** of the dry South east trade winds as they blow over them. Since these winds dropped much of their warm moisture in Tanzania, they are **recharged** and **become warm with moist again to form rain** on shores of L.Victoria.

- **ALTITUDE** influences the atmospheric pressure, rainfall and the temperatures of a place in that; because the **higher you go, the cooler it becomes**, so as the height of land increases, temperature decreases at an average of 1^0 C of every 150 metres of asent which known as **normal lapse rate** which has made **the higher altitude areas** of Uganda such as Rwenzori in Kabarole, Elgon in Mbale, Moroto and Muhavura in Kisoro, which are above 3000 meters above sea level to **experience relatively cool temperatures** ranging from 18°C - 0°C and to receive heavy relief rains of over 1500mm on the windward side while at 4800 meters precipitation falls as snow especially on Rwenzori. Or because the temperatures increase as altitude decreases.

Altitude has also led to **differences in air pressure** in the mountainous regions of Uganda. **Atmospheric pressure decreases with increase in altitude** meaning that the **mountain tops** have **lower atmospheric pressure** due to the less weight of air exerted down on the surface than the foot hills of Mt. Rwenzori in Kasese.

- **RELIEF** has an effect on the **temperature variation and rainfall amounts** in a place in that most highlands of Uganda receive **heavy rainfall of over 1500mm known as relief or orographic** because **ascending rain bearing** or **rising warm moist winds** towards a mountain are forced to rise, cool and condense into rainfall **on the wind ward side**, leaving **the lee ward side dry with little or no rainfall** due to the **dry cool descending winds** e.g. heavy orographic rainfall is received on Mt. Rwenzori in Kabarole and Bundibugyo and on Mt Elgon in Mbale and Bududa while Kasese and Bukwa and Nakapiripirit receive very little rains respectively. And Karamoja region in Kaabong and Kotido are also dry because it is in the rain shadow of Ethiopian highlands.

- **LATITUDE** influences rainfall and temperature in Uganda because it lies astride the equator, meaning that it is in the hot belt. The **farther away from the equator**, the **lower the temperatures** while the **nearer the equator**, the **hotter the temperatures** because the mid day sun is always high in the sky within the topics and the **sunrays at the equator concentrate their heating capacity** on the ground therefore **getting much heat** than those away from the equator e.g. areas near the equator like Kampala, Kayabwe in Masaka, Entebbe, Mukono and Jinja experience hot temperatures and therefore heavy rains because the sun's rays are more concentrated and strike the surface at right angles than areas like Gulu, Lira and Rakai which are relatively away from the equator where insolation is less.

- **POSITION OF THE OVER HEAD SUN** influences **the apparent movement and the subsequent position** of Inter Tropical Convergence Zone (ITCZ) which is a region of **low pressure**. Therefore **winds from the high pressure zones** i.e. the North and south of the Equator **draw towards and converge in this low pressure zone bringing heavy rainfall** in many parts of Uganda due to **hot temperatures**.

When the overhead sun is in the southern hemisphere in December and January, a region of low pressure is created in South Western parts of Uganda mainly Rakai, Ntungamo and Isingiro which forces the North East trade winds drawn across the equator where they will meet the South East trade winds to cause convectional rainfall in those areas while other parts in North and North East of Uganda will remain dry. The same happens in the Northern hemisphere in June and July in Northern Uganda mainly in Gulu, Lira, Pader and Adjumani and the reverse is true. While the ITCZ in Uganda is also created twice a year (equinox) at areas astride the Equator when the sun overheads it around 21st March and 23rd September and within that period, areas along the equator receive a double heavy rainfall due to the convergence of the North East trade winds and the South East trade winds.

- **VEGETATION** determines the climate likewise climate determines vegetation in that **thick and Luxuriant forests, swamps and savanna woodlands** contribute to formation of **heavy rainfall through a process of evapo – transpiration** such as Budongo forest in Masindi and Bugoma in Hoima, Mabira in Buyikwe and Ssese in Kalangala; papyrus swamps in central, eastern and western Uganda and in those areas, cool temperature are experienced due the shade by the foliage. On the contrary areas devoid of such vegetation with **thickets and scrubs** like Kotido, Kaabong and Moroto in Karamoja; Isingiro and Kiruhura in Ankole – Masaka corridor and Nakasongola receive **little rainfall and very hot temperatures due to low humidity and direct heating** thus experiencing semi-desert climate.
- **CONTINENTALITY** or **the distance from the water body** also influences the climate of Uganda where by **areas along the shores of big water bodies receive heavy rainfall** resulting from **temperature adjustments due to the effect of moist onshore winds (land and sea breezes)** in that **during the night**, the **land cools faster** than the lake which makes **the temperatures cool over land** than the lake because the lake retains much of its heat, so low pressure is created over the warm lake and high pressure over the cool land, so winds blow from the high pressure zone (land) to the low pressure zone (lake) as land breeze which eventually brings heavy rainfall and cool temperatures over the Lakes and its adjacent areas like on Ssese Islands in Kalangala and Entebbe on L.Victoria shores. While **d**
than the continental areas far away from the water bodies such as Mbarara, Sembabule, Gulu and Kitgum which receive moderate and little rainfall due to the warm dry winds which lost their moisture along the lake shores.

- **WESTERLIES** are local and warm winds which originate and pick their moisture from the Atlantic Ocean and Congo basin and blow towards the parts of Western Uganda and West Nile where they have had a great effect on the local climate. The Westerlies / Zaire air streams **blow towards the**

parts of Western Uganda and West Nile from August to January and during this time, they **bring heavy rainfall** to the areas of Kabarole, Bundibugyo, Nebbi, Arua, Bushenyi and Kanungu but as they **continue in the interior, they cause little or no rain** in Mbarara, Kamwenge, Kiruhura and Kasese due to **having lost their moisture** enroute hence Semi desert climate.

- **SLOPE ASPECT** is the effect of the ground in relation to the sun rays i.e. is the inclination of the insolation over the land surface. The **direction is which a ground or a slope is facing** is very important in determining how the **sun's insolations are received** in a place. The South East facing slopes of highlands like Elgon in Mbale, Bukwa and Kapchorwa and Rwenzori in Bundibugyo and Kasese in the northern hemisphere and the North East facing slopes of the highlands like Kigezi in Kisoro and Kabale in southern hemisphere normally receive **direct heating and even their tops thus high rate of evaporation for rainfall formation and hot temperatures** because in the tropics from morning to the midday, the sun's heating capacity is high on those slopes and their tops than the North West facing slopes and South West facing slopes and their valleys which **receive little or no rain due to the shorter sun heating** respectively.

- **HUMAN ACTIVITIES** have had a great influence on the Ugandan climatic conditions which are both constructive and destructive. **Destructive activities** such as lumbering, increased urbanization, industrialization, crop growing and charcoal burning, sinking of bore holes and over grazing have led to reduced **amount of rainfall and increased temperatures** while **constructive activities** such as afforestration, reafforestation, creation of water reserviors and grass planting have led to **regulated temperatures and increased amount of rainfall through evapo – transpiration and evaporation.** For example negatively deforestation of Namanve forest in Wakiso, part of Mabira forest in Buyikwe, Bugala forests in Kalangala and Butamira forest in Jinja have led to reduced trees; overgrazing in Kaabong, Sembabule, Buliisa, Nakapiripirit and Nakasongola have led to scarcity of pastures; Sinking of boreholes as well as underground water wells have led to lowering of surface water in Nakasongola, Kotido and Moroto and reclamation of Luzira, Nateete, Nalukolongo, Mengo, Bugoloobi wetlands all in Kampala have led to the destruction of swamp plants, so therefore all those have led to reduced and unreliable rainfall, low humidity and rising temperatures around and in the affected areas hence facilitating the occurrence of semi desert and tropical climate. On the other hand positively afforestation, reafforestation, conservation of forests and grass planting have led to a considerable amount of rainfall received such as Lendu in Nebbi, Kateera in Kiboga, Muko in Kabale, Maga Maga planted forests in Jinja, etc as well as man-made depressions like Kabaka's Lake in Kampala, Kibimba irrigation reservoir in Iganga and clay mining ponds at Seeta in Mukono and at Kajjansi in Wakiso.

RAINFALL DISTRIBUTION IN UGANDA

Account for rainfall variations in Uganda

- **Candidate** is expected to define rainfall.

- **Candidate** is expected to identify, locate and describe rainfall variations in Uganda. These are:

- Areas with **very wet / heavy rainfall above 1500mm** above per annum (equatorial rainfall) experienced around the Northern and western shores of Lake Victoria covering Jinja, Kamuli, Mukono, Entebbe, Kampala, Kayunga, Masaka, etc and on Ssese islands in Kalangala;
- Areas with **heavy rainfall ranging between 1500mm – 1000mm** (tropical rainfall) received in Hoima, Kibale and Masindi in Western; Gulu and Lira in Northern Uganda and some parts of southern Uganda in Rakai and Isingiro;
- Areas **with heavy relief rainfall of 1500mm and above on windward side** and little or less than 750mm on the leeward side on the isolated hills and mountains such as Kigezi highlands and Mufumbiro ranges in Kabale and Kisoro; Rwenzori Mountain in Bundibugyo and Kabarole; and Mount Elgon slopes in Mbale, Sironko, Manafwa, Kapchorwa and Bududa (montane rainfall);
- Areas with **dry / light/ little rainfall less than 750mm** (semi-desert rainfall) found in Kaabong, Moroto, Abim and Kotido in North eastern Uganda (Karamoja); Kasese and Kamwenge; Buliisa, Kagadi and Hoima in L. Albert lowlands; Ntoroko in Semliki valley; Nakasongola and Mbarara, Kiruhura, Lyantonde and Sembabule in Ankole-Masaka dry corridor.

- **Candidate** is expected to draw a sketch map of Uganda showing rainfall variations with names of places.
- **Candidate** is expected to identify, explain and illustrate the reasons (factors) responsible rainfall variations in Uganda as follows:

~ **Altitude** due to the effect of lapse rate.
~ **Water bodies** through rate of evaporation
~ **Vegetation cover** through rate of evapo - transpiration
~ **Latitudinal location** through heating capacity
~ **Influence of the external winds** mainly Zaire/ Congo basin air stream (westerlies) through their movement with moisture.
~ **South and north east trade winds** causing ITCZ through their movement.
~ **Relief variations** through blocking moistened winds.
~ **Varied human activities** through constructive and destructive ways.
~ **The continentality / distance from the lake** through land and sea breezes.
~ **Position of the overhead sun** in the northern or southern hemisphere in the year through ITCZ.
~ **Slope aspect** due to the inclination of the sun rays / insolation over the land surface.

DESERTIFICATION

Desertification is **the reduction of the biological productivity of land** to low levels, especially as a result of human action in semi-arid areas.

In other words, desertification is the **spread / extension of desert-like conditions** to the adjacent areas such as little and unreliable rainfall less than 750mm, very hot temperatures above 30^0C, low humidity less than 25%, high evaporation rates, absence of cloud cover and scanty and stunted vegetation.

DESERTIFICATION RISK AREAS IN UGANDA

In Uganda, most concerned areas are **Karamoja areas** in districts of Kaabong, Moroto, Kotido and Nakapiripirit; **Ankole – Masaka corridor** in Mbarara, Isingiro, Kiruhura and Sembabule; **L. Albert flatlands** in Buliisa, Kagadi, Ntoroko and Semliki; and some parts of **Kasese, Nakasongola, Katakwi and Kitgum**.

CAUSES OF DESERTIFICATION IN UGANDA

1. **Lumbering and charcoal burning:** In many parts of Uganda, forests like Mabira in Buyikwe, Butamira in Jinja and Kibale in Kyenjojo and Kamwenge have been cut which used to form rainfall through a process of evapo-transpiration. These forests have now been replaced by unproductive open grass strides thus reducing the amount of rainfall received.
2. **Over grazing:** In areas such as Kasese for Basongora, Nakasongola and Buliisa for Balaalo and Karamoja land in Kaabong and Kotido; domestic animals are ever increasing in number subjecting the vegetation resource to ever-greater pressure. This has accelerated loss of vegetation, increased soil erosion and deterioration of the soil productivity thus desert conditions.
3. **Population increase:** The population of Uganda has been increasing over the years with 1.2 million people every year at 3.0% growth rate, therefore more land is needed for growing crops and settlement which has resulted into the uncontrolled settlement and extension of agricultural areas in marginal lands, thus destroying rainfall formers such as forests and swamps like Walugogo swamps in Iganga, Lubigi in Wakiso and Nabajuzi in Masaka.
4. **Bush burning:** The unnecessary burning of vegetation and other bush-fires especially by pastoral communities like Bahima in Kiruhura and Isingiro and shifting cultivators like Cereal growers in Soroti destroys forests and grasses have left land bare and soil erosion has set in thus dryness in the areas.
5. **Poor farming methods:** These methods such as monoculture and over cropping like cassava growing in Luwero and millet growing in Kitgum as well as ploughing up and down hill slopes on Mt. Elgon in Bukwa and Kapchorwa which has resulted into loss of soil fertility and soil erosion sets in thus dry conditions.
6. **Sinking of boreholes:** In areas such as Karamoja in Kaabong and Ankole land in Mbarara, many boreholes have been constructed which pump out the underground water resources resulting into the lowering of the water table thus less evaporation rates creating arid conditions.
7. **Industrial pollution:** World temperatures are gradually rising due to mainly air pollution, which destroys the ozone layer. Therefore the destruction of the ozone layer by pollution from industrial centres like Tororo, Kampala, Jinja and Mbale has resulted into increased temperatures, high evaporation rates thus aridity conditions.
8. **Infrastructural set up:** The increase in urban and industrial development has exerted much pressure on the forests and swamps near the urban and industrial areas for their expansion which led to their destruction thus dry conditions like Nalukolongo wetlands in Kampala, Namanve forest near Kampala and Wabisi – Wajjala forest in Nakasongola were cleared for railway workshop, century bottlers and Nakasongola army factory respectively.
9. **Low education:** Generally, there is lack of adequate environmental education and sensitization to create awareness against environmental hazards such as deforestation and swamp reclamation leaving many marginalized areas affected like Mt. Elgon forests in Mbale and Bududa and Lwera swamps in Lukaya (Masaka) leading to desert – like conditions.
10. **Siltation:** The water bodies of Uganda such as Kwania in Amolatar and Apac, Opeta in Katakwi, Bisina in Katakwi and Kumi and Wamala in Mubende are reducing in size due to siltation resulting from soil erosion and high rates of evaporation which has affected the rain formation of the surrounding areas and the productivity of the land thus dry conditions set in.
11. **Over-harvesting existing water sources** due to shortage of water, especially in wetlands and streams has led to desertification e.g. too many animals by Karamojongs and Itesots at water points has led to excessive draining of water in R. Okere and along its swamps in Moroto and

Katakwi, etc leading to less evaporation thus aridity.

12. **Inconsistent environmental laws:** Forest and swamps laws in Uganda are Inconsistent and unreliable leading to destruction of wetlands and forests due to the contradictory policies thus desert – like conditions like part of Namanve forests and swamps near Kampala, Kamonkoli wetlands in Mbale and Bugala forests in Kalangala were given away for industrialization and palm oil farming by the government respectively.

10. Lack of **comprehensive national land utilization policies** like planned human settlements leading to encroachment on marginal lands especially swamps such as Bugolobi swamps in Kampala, Makenke wetlands in Mbarara and Manafwa swamps in Mbale.

11. **Mining and quarrying** has led to desertification as it leads to the destruction of the vegetation cover. Heaps of rock wastes from mines and quarries and clearance process for mining and quarrying has led to the formation of extensive areas of wastelands for example gold mining in Kitaka mines in Kamwenge and oil mining in Semliki valley in Bundibugyo has led to the clearance of Kitaka forestand Semliki forests respectively thus unreliable rainfall.

12. Lack of **protection of water catchment areas** especially river banks like along R. Manafwa in Manafwa and R. Ssezibwe in Kayunga, steep and unstable slopes like Mt. Elgon in Bududa and Mt. Mgahinga in Kisoro from cultivation and clearance has resulted into landslides and erosion leading to the loss of vegetation lands thus reduced rainfall.

13. Some forests have been destroyed by **wild animals and pests** like Parabong forests in Nebbi and Kidepo forests in Kaabong are being damaged and destroyed by elephants and giraffes respectively leading to less evaporation thus low humidity.

14. Some forests have been cleared due to **political instabilities** as they are likely hiding grounds for the anti government elements leading to desertification e.g. In 1979, Nyamityobora forest in Mbarara was cleared for security reasons and between 1981 – 1986, other forests swamps were cleared for fear of any ambush especially along road sides in Luwero, Masaka, Mubende, Mpigi along R. Mayanja and R. Katonga.

15. **Natural calamities** such as hailstorms, floods and landslides accelerated by heavy and prolonged rainfall have destroyed some forests and swamps thus less humidity like Walugogo forests and wetlands have been destroyed by Walugogo river valley floodings in Iganga, Mt. Elgon forests in Bududa and Mt. Rwenzori forests in Bundibugyo have been destroyed by landslides.

16. **Fire outbreaks** both artificial and natural have destroyed hectares of forests and swamps hence affecting rainfall formation like Aber and Opit forests near Gulu in 1982 as well as Mount Mgahinga in Kabale in July 2009 were destroyed by fires clearing plant cover.

STEPS TAKEN TO CONTROL DESERTIFICATION

1. Government through NFA has launched **afforestation and re - afforestation programmes** such as Mount Elgon Forest Reserve Project in Mbale to combat desertification by improving the climatic conditions and providing fuel wood and charcoal for domestic use and provide fire wood and charcoal for domestic use.

2. Government has set up **local organizations** like NEMA and NFA as well as joined International organizations like Kagera Basin Organisation (KBO), Inter-Governmental Authority on Drought and Desertification for Eastern and Southern Africa (IGADD), which fight the causes and effects of desertification.

3. **Environmental education** has been undertaken by NEMA and NFA to create awareness on the dangers of desertification and how to combat it to the residents near and around Mt. Elgon forest in Mbale, Kibaale in Kamwenge, Semliki in Bundibuygo and Mabira in Buyikwe.

4. Ugandan government has established **environmental management bodies** like Ministry of Environmental protection which formulates guidelines through the Parliament on environmentally sound management policies and laws for proper utilization of forests and wetlands.

5. **Proper farming practices, soil erosion and fertility control measures** have been adopted in Kigezi highlands in Kabale and Kisoro; Gishu highlands in Kapchorwa and Mbale; and Toro highlands in Bundibugyo where terracing, mulching, application of fertilizers, crop rotation, inter-cropping, agro-forestry and use of manure like cow dung and poultry droppings are encouraged by NAADS.

6. **Alternative sources of energy or fuel** other than wood have been developed and introduced such as hydro-electric power at Bujagali in Jinja, solar energy by private companies like Solar Ug in Kampala, use of energy saving stoves from Kisenyi and Katwe in Kampala, biogas from cow dung in Soroti and Mbarara and biomas from coffee husks in Mbale and Mpigi, to reduce the rate at which forests are being exploited for desertification.

7. NFA through Police and Forest Department officials has **evicted forest encroachers** from forest reserves like Mabira in Buyikwe, Bwindi in Kanungu, Mgahinga in Kisoro, etc and even Bugangaizi resettlement scheme of about 30,000 Bakiga from Kibale forest was established by the government.

8. Pastoralists have **controlled overgrazing and over stocking** through the **introduction and promotion of proper livestock management and ranches** such as rotational grazing, fencing, controlled grazing and improving on the pasture in Mbarara, Mpigi and Masaka. They have also fed their animals on banana, sweet potato and cassava peels collected from markets like Kalerwe, Wandegeya and hotels like Africana in Kampala, etc.

9. Population secretariat has **controlled population pressure** through family planning programmes like use of condoms, taking pills and use of moon beads as well as setting up resettlement schemes where people are transferred from the densely populated areas to low populated areas like Bagishu from Bududa to Kiryandongo resettlement scheme.

10. Appropriate environmental laws have been **enacted by parliament**, the marginal lands like wetlands such as Lubigi in Wakiso and forest reserves such as Kibale in Kamwenge are protected against encroachment.

11. Ministry of Agriculture has **allocated range lands** to be exploited by domestic livestock on the basis of carrying capacity of the natural pastures like Albert lowlands in Buliisa to Balaalo pastoralists.

12. NAADS has encouraged farmers through Coops in Moroto, Katakwi and Kapchorwa **to set up irrigation schemes** for watering their crops during the dry seasons. And even drought resistant crops like millet, simsim and sorghum have been introduced in Mbarara in Ankole – Masaka corridor and Kaabong in Karamoja.

13. Private Co. such as Omega plastics at Kyambogo, Nice house of plastics at Bugoloobi, BMK plastics at Ntinda, Rwenzori bottlers at Namanve and Nile plastics in Jinja **have recycled plastics and polythene bags** while Moniko steel rolling industries at Lugazi recycle steel scraps for **re-use** so as to control land degradation and aridity.

EFFECTS OF DESERTIFICATION IN UGANDA

Negatives;

- Soil fertility lowers and soil productivity reduces.
- Food scarcity / famine set in.
- Pasture scarcity jets in.
- Soil erosion accelerates.
- Water shortages result.
- Migrations increase.
- Fuel wood and other wood products scarcity result.
- Wildlife and domestic livestock die.
- Biodiversity is lost too.

Positives;

- Great tourist attraction with sand dunes, inselbergs and extreme temperatures.
- Military training grounds.
- Creation of sand for mining and construction.

Sample questions:

1. To what extent has the climate of Uganda been influenced by relief or altitude?

APPROACH

Introduction

- Define climate and relief / altitude.
- Identify, locate and describe the climatic types of Uganda with characteristics and name places.
- Draw a sketch map of Uganda showing climatic types with names of places.

Body

- State, explain and illustrate the extent to which the climatic differences in Uganda have been influenced by **relief / altitude** in terms of temperature, atmospheric pressure and rainfall.
- **However**, give, explain and illustrate other factors that influence the climate of Uganda apart from relief / altitude in at least in two ways using while or whereas. (USING PELED)

2. (a)Explain how human activities have contributed to desertification in Uganda.

APPROACH

Introduction

- Define desertification
- Identify, describe and locate characteristics of desertification
- Draw a sketch map of Uganda to show areas affected by desertification

Body

- State, explain and illustrate the way how human activities have contributed to desertification in Uganda. (using PELED) 10 points

(b)Examine the steps being taken to combat desertification in Uganda.

- State, explain and illustrate the steps being taken to combat desertification in Uganda (using PELED) 10 points

3. (a) Differentiate between equatorial climate and semi – desert

APPROACH

Introduction as well as body

- Give the opposites of the two climatic type using the word while / whereas in terms of name places and weather characteristics in different paragraphs
- Draw a sketch map to show them with name places

(b)Examine the influence of climate on economic activities in Uganda.

- Give, explain and explain the influence of climate on economic activities in Uganda either positively and negatively using climatic characteristics of climatic type (using PELED) 15 points

4. To what extent is relief responsible for rainfall distribution in Uganda?

APPROACH

Introduction

- Define rainfall and relief.
- Identify, locate and describe the rainfall distribution in Uganda with name places.
- Draw a sketch map of Uganda to distribution of raifall with names of places.

Body

- State, explain and illustrate the extent to which the rainfall differences / distribution in Uganda is due to **relief** in terms of very heavy, heavy, moderate and little rainfall.
- **However**, give, explain and illustrate other factors that are responsible for rainfall distribution in Uganda apart from relief in at least in two ways using while or whereas. (USING PELED)

5. (a)Examine the relationship between climate and vegetation in Uganda.

APPROACH

Introduction

- Define climate and vegetation.
- Identify, locate and describe the climatic types of Uganda in relation to vegetation types with names of places.
- Draw a sketch map of Uganda showing climatic types in relation to vegetation with names of places.

Body

- Explain and illustrate how the climatic types in Uganda have influenced **vegetation distribution** through rate of evapo - transpiration as follows or reverse is true;

- Equatorial rainforest leading to wet / heavy rainfall above 1500mm above or heavy rainfall have led to growth of thick trees of equatorial type,
- Savanna / tropical woodlands leading to fairly heavy rainfall between 1000mm – 1500mm or….,
- Savanna / tropical grasslands leading to moderate rainfall between 1000mm – 750mm or….,
- Montane / mountain vegetation zones leading to heavy relief rainfall of 1500mm and above and little of less than 750mm or….,
- Swampy (papyrus and marshes) leading to very wet / heavy rainfall above 1500mm or…. , and
- Semi- desert (thickets and scrubs) leading to dry / light/ little rainfall between 250mm – 750mm or little rainfall has led to growth of thickets and scrubs.

(b) Discuss the impact of climate variability in Uganda

- Give, explain and explain the impact of climate variability in Uganda both positively (landuse types) and negatively (problems associated) using climatic characteristics of climatic type (using PELED) 10 points

6. (a) Account for the extensive desertification in Uganda.

APPROACH

Introduction

- Define desertification
- Identify, describe and locate characteristics of desertification
- Draw a sketch map of Uganda to show areas affected by desertification

Body

- State, explain and illustrate the reasons for extensive desertification in Uganda both physical and human. (using PELED) 10 points

(b) Outline the steps being taken to control the spread of the desert in Uganda

- State, explain and illustrate the steps being taken to control the spread of the desert in Uganda (using PELED) 10 points

7. Assess the impact of desertification on the physical and human geography of the some parts of Uganda.

APPROACH

Introduction

- Define desertification
- Identify, describe and locate characteristics of desertification
- Draw a sketch map of Uganda to show areas affected by desertification

Body

- State, explain and illustrate the impact of desertification on the physical and human geography of the some parts of Uganda both negative (10) and positive (8). (using PELED) 10 points

8. To what extent has vegetation influenced the climate of Uganda?

- **D**efine climate and vegetation.
- Identify, locate and describe the climatic types of Uganda.
- **D**raw a sketch map of Uganda showing climatic types with names of places.

Body

- Explain and illustrate the extent to which the climatic types in Uganda are influenced by **vegetation distribution** through rate of evapo - transpiration
- **However**, there are other factors which influence the climate of Uganda apart from vegetation distribution.

N.B: Candidates should be organized considering vegetation distribution first and then other factors come in later.

VEGETATION DISTRIBUTION IN UGANDA

Vegetation is the collective name given to the **plant cover of the earth's surface**. In other words, it is a kind of **plant life which grows** in a place naturally depending on the physical conditions that exist there or artificially due to influence of man.

In most parts of Uganda, the forested areas which used to form an important element of plant cover have been **largely destroyed** by man because of his need for land to do his activities like cultivation and settlement.

Because of this, the original forests have **emerged** into savanna woodlands or grasslands while the savanna vegetation has turned into semi arid vegetation. All this has been due to **man's activities but not climatic variations**.

TYPES OF VEGETATION IN UGANDA

There are five (5) major types of vegetation in Uganda namely:

1. Equatorial rainforest
2. Savanna
3. Semi desert
4. Swamp
5. Montane

EQUATORIAL / TROPICAL RAIN FOREST

`Equatorial rainforests are also known tropical rainforest. They are found within the **equatorial regions** where **heavy rainfall of over 1500mm and hot temperatures of above 25°C** exist throughout the year.

In Uganda, there are three major categories of equatorial rainforests and these are;

Tropical lowland forests which are mostly **found around the Victoria basin**. Examples are Mabira in Buyikwe, Malabigambo in Rakai, Maramagambo in Buhenyi, Bugala islands and Ssese islands in Kalangala, Budongo in Masindi, Bugoma in Hoima, Kasyoha – Kitomi in Bushenyi and many others.

Riverine equatorial forests which are found along the **major river banks** such as Victoria Nile in Jinja, Albert Nile in Nebbi, Katonga in Masaka, Kafu in Hoima, Mayanja in Kiboga, Mpologoma in Bugiri, Semliki in Bundibugyo and others.

Tropical highland or montane forests which are found in **highland areas** such as on Mt. Rwenzori, Elgon, Mgahinga and others. Examples are Rwenzori forest in Kasese and Bundibugyo, Mt. Elgon forest in Mbale, Bwindi impenetrable in Kanungu and Mgahinga forests in Kisoro.

The following are the characteristics of equatorial rainforest;

- A variety of **hard wood tree species** such as Rosewood, Red heart, Mahogany, Iron wood in Mabira and Elgon, Olive on Mt. Elgon forest and many others.
- Trees like Mahogany in Budongo, Mabira and Rwenzori equatorial forests are **broadleaved** in an attempt to trap enough sunlight for photosynthesis purposes as well as to quicken the process of transpiration.
- Most trees in Budongo forest and others take **long to mature** like Ebony, Mvule and Mahogany may take 50 years.
- There are **numerous climbing plants** such as Lianas and epiphytes growing on trees like Mahogany in Mabira equatorial forest.
- Equatorial forests such as Bugoma, Bwindi impenetrable are **ever green** because trees shed off their leaves at different intervals.
- Trees like Mahogany, Ebony in Mabira, Malabigambo forests are **very tall and have very straight trunks** with some trees as tall as 60m.
- Trees in equatorial forests like Bwindi, Kasyoha - Kitomi form **three canopies**. The top layer constitutes of very tall trees of about 60m, then the middle layer constitutes of tree ferns, Lianas e.g. rattan and epiphytes e.g. Orphic and the under layer constitutes of ferns, herbaceous plants and saprophytes.
- True equatorial rainforest such as Bwindi impenetrable have **little or no undergrowth** due to limited sunlight reaching the ground.

- Big trees such as Mvule and Mahogany in Mabira, Budongo forests have a **big buttress root system** to support their great height and weight.
- The trees in equatorial forests like Bwindi, Kalinzu do appear in **impure stands** i.e. different trees species are inter-mixed.
- Some are **hard wood** while others are **soft**.

SAVANNA VEGETATION

This covers the **biggest part** of Uganda however; much of it was once covered by natural forests. It is found in the **tropical climatic regions** which receive **moderate rainfall ranging between 1500 mm – 750 mm per annum and experience hot temperatures ranging between 27^{0}c – 29^{0}C.** Due to rainfall variations, this vegetation is sub divided into two categories namely the Savanna wood land and Savanna grass land.

SAVANNA WOOD LAND

This category is with **more or less continuous cover of trees and shrubs intertwined**. It is also known as **tropical woodland**. It grows near Tropical forest zones where rainfall **is heavy ranging between 1500mm -1000mm per annum**. Much of it is **found** in the West Nile at Kei in Yumbe and Otze in Moyo, small parts of Lira, Soroti, Paliisa, Timu and Morongole in Kaabong (Northeast), around the Edward and George flats in Kasese and Albert flats in Buliisa.

The following are the characteristics of the Savanna wood lands;

- A variety of trees ranging from **10 - 15 meters tall growing over** a wider area.
- Trees shade off their leaves during the dry season i.e. deciduous.
- Sufficient light penetrates through the trees leading to growth of a **thick under cover in form of bushes, tall grass and short trees**.
- Trees are generally **umbrella having bushy spreading tops**.
- **Drought resistant tree species** such as baobab and acacia are common.
- Some trees such as the Baobab have **swollen trunks to store water** during the dry season.
- Trees have **broad leaves and thick barks.**
- Trees are **fire resistant**. These include acacia and baobab.
- Most trees develop **branches close to the ground**.
- Trees are **intermixed with xerophytic thorny lianas**, Cacti, baobab and shrubs.

SAVANNA GRASS LAND

This category is some times refered to as the **rangeland area**. It is found on the **fringes of Savanna woodland** where rainfall totals range between **1000mm -750mm per annum**.

It is **dominant** in Gulu and Lira in Northern; Pallisa, Kumi and Soroti in Eastern; Hoima and Masindi in Western and Bushenyi and Isingiro in South western; and Nakasongola, Luwero, Masaka, Rakai in central parts of Uganda.

Savanna grassland is characterized by the following;

- It is **dominated by grasses of about 1 meter high** though some grass species like the elephant grass range between 3-4 meters of height
- **Short umbrella shaped scattered trees**.
- The **dominant grass species** are elephant grass, coach grass and spear grass.
- Trees have **small leaves**.
- Trees are **highly deciduous and drought resistant**.
- Trees have a **thick bark**.
- The **grass dries up** during the dry season to form a yellow or brown cover, while during the rainy season a **green cover is** created.
- Savannah grass land appears **bare and barren** as you move towards the semi – desert regions.

SEMI – DESERT VEGETATION

It's sometimes known as the **dry savanna or dry bush and scrub vegetation or dry rangelands**. This vegetation type **exists in dry areas experiencing semi – desert climatic conditions** where the rainfall is **below 750mm per year and very hot temperatures above 30^{0}C.**

It is **found** in the North Eastern parts of Uganda mainly in Kaabong, Nakapiripirit., Kotido and Moroti (Karamoja), in Mbarara, Sembabule and Kiruhura (Ankole – Masaka corridor) in southwestern Uganda, commonly around the Albert flats in Buliisa, Semliki zone in Ntoroko, Kasese, Nakasongola, Kitgum, etc.

The semi – desert vegetation is characterized by the following;

- **Bushy, thorny trees with stunted and poor scrubs** growing between them.
- It's also characterized by **growth of thickets**.
- Trees have **small leaves** to reduce transpiration.
- **Drought resistant trees with woody stems** are common and widely spaced over the bare ground such as the Baobab and acacia are also found here.
- The stems of some trees such as the Baobab are **photo synthetic and highly fibrous**.
- Trees tend to develop **a very long tap root system** to penetrate deep underground searching for water.

SWAMP VEGETATION

In Uganda, the swamp vegetation **exists in lowland or poorly drained areas** which are impeded mainly wet lands such as L. Victoria, Kyoga, along Victoria and Albert Nile and others in Central, Eastern and Western Uganda especially along the River Valleys where conditions permit it.

The swamp vegetation is characterized by mainly **composition of water loving plants** which are papyruses, sometimes palm trees, sedges and other forms of marsh grasses.

MONTANE VEGETATION

On **high mountains** of Uganda like Elgon in Mbale and Bududa; Muhavura in Kisoro and Rwenzori in Kasese, and Bundibugyo, a succession of vegetation is **found**. This is mainly determined by altitude, temperature, rainfall, soil and influencing factors.

Altitudinal increase along a mountain slope affects the **temperature and rain fall amounts** along different zones for example, **for every 150m of ascent**, **temperatures drop by approximately 1°C**. For this reason mainly, there are different zones of Vegetation along a Mountain slope as seen on the diagram below.

The mountain or montane vegetation has the following zones;

- At the **foot of the mountain**, there is the **savanna type of vegetation** at an altitude between **1000 - 1800 m above sea level** which is characterized by **tall grass and scattered trees as well as drought resistant trees** with swollen trunks, thick bark and deciduous;
- Followed by the **tropical rainforest zone** in the wetter areas upwards at an altitude between **1800 - 2500 m above sea level** which is characterized by **tall and ever green trees growing close to each other**;
- Above **2500m – 3500m**, the **temperate forest zone** emerges which is characterized by **slender and uniform tree species** similar to those in the temperate countries. Trees species in this are podocarp, camphor, cedar and pines. These trees produce cones rather than fruits and are generally cone - shaped with a thick bark, having small needle shaped leaves and thick bark. There is limited undergrowth. Trees have straight trunks and tend to shorten in height as rainfall decreases upwards;
- At about **3500m – 4200m asl**, the **Bamboo forest** occurs with the **segmented hollow stems** with small tough and sharp needle shaped leaves. Bamboo trees grow in patches, are ever green, have prop roots and appear in single layers;
- At an altitude of ranging between **4200 - 4500m above sea level**, **heath and moorland vegetation** emerges which a unique form of vegetation is varying from **short alpine grass** such as alchemilla to giant stands of seneschal, lobelia and groundsel. Tussock grass is also common;
- And lastly to the peak at **4500m asl** and above, **bare rocks** and **permanent snow** exist especially on Mt. Rwenzori after **4800m asl**.

VEGETATION ZONES ON MOUNTAIN

A SKETCH MAP OF UGANDA SHOWING VEGETATION TYPES

FACTORS INFLUENCING VEGETATION DISTRIBUTION IN UGANDA

There are several factors that affect the vegetation distribution in a given place. These are:

1. The differences in vegetation types in Uganda are mainly due to **climatic factors** e.g. **rainfall totals and temperatures differences**. Areas which **receive heavy, reliable and well distributed rainfall** throughout the year **above 1500 mm** and **hot temperatures** of about **25°C** have **attracted rainforests** like Bugoma and Budongo in Bunyoro areas, Bwindi in South Western Uganda, Mabira in Mukono, etc.

On the other hand, areas which **receive moderate rainfall between 1500mm – 750 mm** per year and experience **hot temperature of about 27^{0}C** in Uganda have favoured **savanna woodlands and grasslands** growth e.g. Gulu and Lira in Northern, Soroti and Paliisa in some parts of the Eastern, Luwero in Central and Hoima and Masindi in Western Uganda.

While areas which **receive little and unreliable rainfall below 750 mm and experience very hot temperature** of **over 30°C** has resulted into short trees and grasses of **semi arid vegetation** in Kaabong, Kasese, Kiruhuru in Ankole – Masaka corridor, Ntoroko in Semliki – Wanseko basin and Nakasongola.

Furthermore, the highlands like Mt. Elgon, Rwenzori and Mufumbiro have **montane vegetation zones** because of **differences in rainfall totals and temperature variations** from the foothills to the peak top.

2. The nature of **soils** determines the nature of vegetation in an area. **Fertile deep soils** favour **forest growth** like around the shores of the L. Victoria with alluvial fertile soils with Mabira and Ssese islands forests, on the highland areas like Elgon and Kigezi with fertile volcanic soils, etc.

On the other hand, infertile and poor soils have supported the **growth of scrubs and thorny bushes** in Karamoga region, the Albert flatlands and Ankole-Masaka corridor.

While areas with **fairly fertile soils which are sandy and lateritic** in nature have led to the **growth of Savanna woodlands and grasslands** like Timu and Morongole woodlands in north eastern Uganda and those in West Nile.

Furthermore, **acidic clay soils** mainly found in wetlands have supported **swamp vegetation growth** like Katonga, Mpologoma, Kafu, Awoja swamps, etc.

3. **Relief / topography.** Relief greatly determines the nature of vegetation types and zonation in the highland areas of Uganda such as Mt. Rwenzori, Elgon and Mt. Muhavura. Relief has indirectly influenced **the rate of water run off and the soil types along the land slope**.

On steeper slopes, the water drainage is so fast and soil carry away is also fast thus leaving **little water** for plant absorption and **thin skeleton soils** for plant growth leading to growth of **savanna grasses** like on Buganda hills and on Mt. Rwenzori and Mt. Elgon steep slopes where surface is **bare rock with thin soil**.

While on the gentle slopes, it is slow and water percolates in the ground for plant growth and even the **erosive power of soils is weak** leaving **thick and deep soils** like **tropical highland forests** grow on the wind ward slopes of mountain Rwenzori and Mt. Elgon with deep and fertile soils. And also **low lying plateaus** in Gulu, Moyo and L.George and Edward flats has led to **growth of short trees intermixed with shrubs** like in the Albert flats and northern Uganda at Kei and Otze woodland forests.

4. As **latitude** of an area changes, also it affects the **temperature experienced and rainfall totals** received and the same happens to the vegetation types. Latitude determines the vegetation type because it also determines the climate types of an area. Areas located near or astride **the equator** are characterized by **heavy rainfall of above 1500m and hot temperature of over 20^{o}C of equatorial type of climate** have favoured **thick forests** such as Mabira, Malabigambo and Ssese forests on northern and western shores of Lake Victoria shores.

While those areas located **far away from the equator** North or South or **within the tropics** have favoured the **growth of savannah vegetation** in northern Uganda and **semi desert vegetation** in north eastern Uganda depending on the amount of rainfall received and the temperatures experienced.

5. Due to the altitude depending on **lapse rate effect as the height of the areas** vary in Uganda, also the vegetation types vary. Therefore areas of **high altitude** on mountains such as Rwenzori and Elgon have favoured **tropical forests**, then **temperate forests** to **bamboo trees** and **alpine grasses** in the heath and moorland zone while areas **of low altitude** have enabled the **savanna along the windward side and semi desert or dry savanna vegetation** at the lee ward side. Such zonation is due to differences in temperature and rainfall, which are all influenced by altitude.

Also **equatorial forests** such as Mabira and Kibaale thrive in areas of **medium altitude** like in the Victoria basin and Kibaale district respective at altitudinal areas of above 1500m above sea level. While **lower altitude** at 1250 metres above sea level and below like along the western rift valley floor in Uganda covering areas like Semuliki - Wanseko basin and lowlands of Kaabong and Kotido districts has favoured the **growth of dry savanna vegetation**.

6. **Slope aspect** determines the **degree of the sun exposure on to the land scape**. **Slopes facing the sun** are **warmer** than **those facing away from the sun** thus influencing the vegetation types in a particular area.

South east facing slopes of Mt. Elgon and Rwenzori in the northern hemisphere and **north east facing slopes** of Kigezi highlands and Mufumbiro ranges in the southern hemisphere of Uganda are **warmer** than their counterparts in the same hemispheres i.e. North West facing slopes and south west facing slopes respectively which has led to **growth of different plant cover** like forests and woodlands in those highland areas.

7. The **drainage** also influences the vegetation distribution in Uganda. Relative lowlands and gentle areas like Mukono with Mabira forests with **well drained areas** have supported **good and luxuriant equatorial forests** while the steeper and hilly areas of Buganda hill tops, Mt. Rwenzori and Elgon with **poorly drained areas** have the **poor stunted plant growth of grasses**.

Furthermore, flatlands and valleys with **water logged and impeded conditions** have supported **water loving and marshy plants like papyruses, mangrove trees and palm trees** especially around Lake Victoria, Kyoga and other river banks of Victoria and Albert, Mayanja and Katonga with **swamp forests**.

Also **savanna woodland forests** grow in areas of **fairly well drained areas** like in West Nile with Mt. Kei and Otze woodlands while **shrubs, short trees and drought resistant trees** with deep roots of semi desert vegetation grow in areas with **low water content** in the soils like Karamoja region.

8. **Biotic factor in term of living organisms like earth worms, bacteria, animals**, etc influence the vegetation types by affecting the soil formation. For instance **bacterias found in Humid and equatorial regions** have led to the vegetation decay and other **living organisms** like animals including man which leads to **humus fertile soils** which in turn has led to the **forest growth** while dry areas like Karamoja **freed with bacterias** have **poor stunted grasses**.

On the other hand, the presence of **insects, ants, locusts, grasshoppers and birds** have led to vegetation destruction e.g. the **above organisms** may turn a **forest** into a **savannah wood land** and so forth because they **depend on them as their food** E.g. Wild browsing animals such as the giraffe and elephants reduced the formerly equatorial forests in Kotido and Queen Elizabeth national park to savanna woodland or grass lands. Elephants destroy trees in Timu and Parabong savanna woodlands in Kotido to savanna grasslands. On the other hand **wild animals disperse tree seeds** leading to extension of **forest trees** while existence of **vectors like Tsetse flies** and mosquitoes in **swampy and forested areas** have **scared away** man from destroying them like south Busoga in Mayuge, west Bunyoro in Masindi and Buliisa.

9. Due to **human** / **man's activities**, the vegetation types have continuously changed from one type to other either positively and negatively. E.g. positively, **man has conserved** the existence of **forests** such as Mabira, Budongo and Rwenzori forest reserve through government conservation policies which has led to the distribution and existence of these forests and secondly, through **afforestation and reafforestation programmes** have led to growth of forests such as Lendu, Muko, Kateera, Maga Maga and others which are composed of exotic tree species such as eucalyptus, Lucenea, pine and Sesbania as well as **agro-forestry programmes** where crops are grown together with trees have also led to the distribution of forests like in Mukono, vanilla is grown together with trees.

On other hand negatively, **deforestation** due to need of **land for cultivation** has led to loss of Kibaale forest, Butamira forests in Jinja, Kalangala forests, southern Busoga forests, Rwooho forest in Isingiro, Bugamba forest in Mbarara and many others, **lumbering** in Kibaale, Budongo, etc due to need of timber and building materials; **swamp reclamation for settlement and cultivation** like the Mpologoma wetlands in Iganga; **mining and quarrying** of vermiculite in Mbale woodlands and Mica in Lendu forest in Nebbi as well as gold mining in Kitaka woodlands in Kamwenge district; **livestock rearing by both ranchers and pastoralists** like Bahima in Mbarara and Sembabule as well as Karamojongs in Kotido and Moroto; **cutting of trees for fuel wood and charcoal burning** in Tirinyi wetlands, Mt. Kei woodlands, Luwero woodlands as well as Mabira and Kibaale lowland tropical forests; cutting down forests in Bunya in Mayuge to **control tsetseflies infestation**; and **road construction** along forests like Jinja road via Mabira forest and Namanva wetlands have all led to the **degeneration** of tropical forests to woodlands to grasslands into semi- desert vegetation or dry savanna vegetations accordingly.

ECONOMIC VALUE OF VEGETATION IN UGANDA

Different vegetation types provide different economic activities. The following are used as the basis for the land use planning for the natural vegetation;

Positives:

1. Vegetations especially rain forests, swamps and woodlands **influence micro – climate of the surrounding areas** by **attracting heavy and reliable rainfall through evapo – transpirations** which then is helpful in crop farming. The forested areas such as Mukono with Mabira (Buyikwe), Hoima with Bugoma and Kanunga with Bwindi experience heavy rainfall above 1500mm per annum since trees are rain makers through evapo-transpirations. This rain fall has in turn favoured perennial growing of crops like vanilla, sugarcanes and Tea in Mukono

2. The forest vegetation and the wood lands are **major source and supply of timber used in furniture making** e.g. chairs, beds, cupboards, etc. These act as a source of revenue and income to the government and people engaged in the lumbering industry respectively. E.g. Ssese and Bugala islands forests are exploited to provide timber for boat making and house building in Kalangala district and Bugala islands while Nile ply Timber Company in Jinja gets from Mabira and Budongo forests

3. The savanna grassland vegetation have **encouraged the rearing of animals of domestic type because it is free from harmful insects** e.g. tsetse flies which are dangerous to the live stock and even the grass land provides natural and nutritious pasture for the livestock e.g. the Ankole – Masaka ranch in Mbarara is found in Ankole – Masaka dry savanna region and the Teso grasslands are used by Itesos to graze their cattle in Soroti and Kumi districts.

4. The natural forest and woodland vegetation is **the major source of fuel wood in most of rural areas** of Uganda due to low rural electrification. More than 90% of Ugandan population depends on fuel generated by rainforests and the wood lands in form of fire wood and charcoal like people in Mukono, Masindi, Kalangala, etc get their wood fuel from Mabira, Budongo and Ssese forests respectively and in the Savanna woodlands of Otze in Moyo and Kei in Yumbe and Morongole in Kaabong.

5. Vegetation plays an important role as long as the **wildlife conservation** is concerned. Natural parks and game reserves have been located in areas with rainforests, montane forests, savannah grasslands and wood lands because **their conditions are favourable for wildlife survival** e.g. the Queen Elizabeth, L. Mburo, Murchison falls National parks, were located in Savanna grasslands to promote tourism as well as Bwindi, Mt. Mgahinga, Mt. Rwenzori and Mt. Elgon have been gazetted as forest reserves to conserve the habitat for wild animals like Gorillas in Bwindi, chimps in Mgahinga and Baboons in Rwenzori.

6. The vegetation especially the forests, grass lands and the woodlands are important as **soil covers to protect and conserve them from soil erosion**. Soils covered with vegetation are always free from the agents of erosion and the negative consequences of soil erosion. Furthermore areas covered by vegetation tend to the fertile due to the fact that grasses, tree leaves and others decay **providing humus to the soils**. E.g. Sugar cane at Jinja are grown just near the Mabira forests, Butamira forest were cut down to plant sugarcanes by Kakira sugar works and Bugala forests were cleared for palm oil trees by BIDCO oil co. due to the presence of fertile humus soils.

7. Vegetation is important as a **major supplier of building materials** such as ropes, poles, grasses, papyrus, etc. Most of the rural people have obtained these materials to construct their houses and other domestic items / materials from swamps, forests and savanna vegetation. E.g. brick and tiles manufacturing industry is located at Kajjansi due to presence of clay materials from Kajansi swamps around.

8. Rainforests, swamps and savannah vegetation are **major providers of traditional and modern medicine especially from leaves, roots, and barks / stem barks**, etc which are used for curing a variety of diseases like Malaria, skin disease, cough, etc. E.g. herbs collected are Peppermint and Ginger which reduces stomach gases, prevents vomiting, Nausea and aids digestion. Solanum Indicum or "Katunkuma in Luganda" or Namatala in Gisu and Uli in Alur for cure of high blood pressure, proper functioning of the pancreas, treatment of ulcers and many others.

9. Savanna vegetation **provides and supplies honey** because it has favourable conditions for the existence of bees and sometimes some people have turned out to be keepers where to earn their income in them. E.g. the Savanna woodland areas like Kadam, Timu and Morongole are used for bee keeping where honey extracted is either for export or local market.

10. Forests and savanna vegetation are **major providers and suppliers of food in form of edible fruits** like mangoes, jack fruits, etc and edible wild animals like Kobs, Antelopes, etc. E.g. Pygmies in Bundibugyo district are good fruit gatherers from Semliki and Mt. Rwenzori forests while the Batwa in Kisoro and Kabale gather the fruits from Mgahinga forests, The Kabaka of Buganda kingdom designated Bamunaanika woodlands as a royal hunting in Luweero district north of Kampala city.

11. Forests and swamps protect the **water catchment areas from drying up**. Water catchment areas are places where **rivers and streams originate**. So the vegetation keep such places wet and ensures **a continuous flow of water** incase such areas are exposed in open areas. E.g. Mt. Rwenzori, Mt.Elgon, Semliki forests and Katonga swamps are water catchments for Mubuku, Manafwa, Semliki and Katonga rivers.

12. Vegetations especially the forests act as the **major tourist attraction** in Uganda where many tourists visit forests for **their cool atmospheric conditions**, to **carry out their scientific researches** about a particular study and even **develop the film industry**. Furthermore, since some vegetation types are homes for wild animals, they do attract tourists e.g. the Bwindi impenetratable forest for gorillas. The tourists in turn have benefited the Uganda's economy in terms of foreign exchange, employment creation, market creation for local goods, etc.

13. **Fishing** is carried out in areas with swamp vegetation like along R. Mayanja, Katonga, around the shores of L. Kyoga and Victoria and most common type of fish caught is the mud fish and tilapia.

14. **Mining and settlements are the other forms of land use** within the savanna and tropical rainforest vegetation regions. For example Gold mining in Karamoja and oil drilling in Waseko - Semuliki basin dry savanna, oil mining in Semliki rainforests, etc.

Negatives:

- **Harmful pests and diseases** breeding sites and attack from rainforests like Bunya forests in Mayuge with tsetse flies and swamps like L. Mburo swamps with snails.
- **Destructive wild animals** scare in and around rainforests like Bwindi and Mgahinga with Gorillas and chimpanzes, woodlands and swamps.
- **Communication block** by rainforests like Bwindi forests in Kanunga and swamps.
- **Inaccessibility** due to thick rainforests like Bwindi forests in Kanunga and swamps around L. Victoria shores.

- **Seasonal flooding** due to rainforests like foothills on Rwenzori in Kasese and on Elgon in Mbale and swamps like Mayanja swamp in Nateete during heavy down pours.
- **Poor agricultural soils** like clay and sand nature in swamp areas.
- **Wastelands** like rainforests and swamps.
- **Anti governmental activities** such as robbers and rebels in rainforests e.g. Mt. Rwenzori forests with some wrong elements of ADF and swamps.

Sample questions:

1. Account for the distribution of Savanna Vegetation in Uganda
2. (a) To what extent have physical factors led to the growth of dry Savanna vegetation
(b) Explain the land use activities practiced in savanna regions.
3. (a) Discuss the problems associated with land use in savanna regions.
(b) Describe the steps taken to utilize savanna rangelands sustainability.
4. (a) With Reference to any Mountain in Uganda, account for the distribution of the various vegetation zones.
(b) Outline the economic values of the vegetation types in each zone above.
5. To what extent have human activities influenced the distribution of vegetation in Uganda?
6. Assess the extent to which the distribution of natural vegetation in Uganda provides the basis for land-use planning.

Sample approaches:

To what extent have human activities influenced the distribution of vegetation in Uganda?

Candidate is expected to:

- Define vegetation
- Identify, locate and describe vegetation types.
- Draw a sketch map of Uganda and locate those vegetation distributions with names of places.
- State, explain and illustrate the extent to which the human activities have affected the vegetation distribution in relation to that type of vegetation (both positive and negative activities).
- However, other factors besides human activities must be brought out; (each point should be, stated, explained and illustrated in two ways).

WETLANDS / SWAMPS IN UGANDA

Wetlands are also known as swamps which are all those areas where plants and animals have adopted with seasonally or permanently flooded water.

Or

Wetlands are the areas that are seasonally or permanently flooded by water, vegetation with their animal life.

STATUS OF WETLAND RESOURCES IN UGANDA

- Wetlands covered approximately 32,000 km^2 in 1964 but by 1999, it was 29,000 km^2 of the total land area, which was 13% as decline and in 2005, they reduced to 26,000 km^2 which is 11% of total land area.
- Of this coverage, 69% are wetlands with impeded drainage, 31% are pure swamps and the rest classified as swamp forests and mountain boggy.
- Most wetlands are not known to be gazetted although the colonial government placed them under control of central government
- Only gazetted wetlands are under NEMA such as …..
- Most wetlands are covered by papyrus vegetation such as ……
- Lowland and valley wet lands dominate the other types of wetlands.
- Most wetlands are connected to rivers and lakes such as Lake Victoria
- There is continuous effort by government through NEMA to evict wetland encroachers

CHARACTERISTICS OF WETLANDS / SWAMPS IN UGANDA

Most wetlands are characterized by:

- Papyrus vegetation, Spear grass, yams, sedges and Palm trees such as ……
- Clay - sandy soils, which are seasonally or permanently flooded such as ……
- Animals like Sitatunga, Antelope, water bucks, crocodiles, Uganda Kob and water loving birds like Egrets, crested crane, Shoe bill, snakes like pythons and water cobra such as .....
- And Swamps with many trees are called tree swamps while those where papyrus dominate are called papyrus swamps.

DISTRIBUTION OF WET LANDS IN UGANDA

Wetlands are widely spread in most areas of Uganda and they are categorized into:

1.Natural lakeshore and lacustrine wetlands which are;

Lake Victoria swamps are in bays and the inlets of the lake margins like Sango bay in Rakai district and Murchison bay at Luzira in Kampala, etc; on lake islands like Ssese, Bukasa and Bugala in Kalangala, Buvuma, Kome in Mukono, etc;

Lake George and Lake Edward in Kasese and Rubirizi;

Lake Bunyonyi in Kabale;

Lake Kyoga with Bugondo in Serere and Lwampanga wetlands in Nakasongola;

Lake Kwania in Apac;

Lake Mburo in Kiruhura;

Lake Wamala in Mubende;

Lake Bisina and Opeta in Kumi,

Lake Kijanebalola swamps in Rakai, etc.

2.Riverine swamps and flood plains such as along River Okere in Moroto, along River Kafu in Homia and Masindi, along River Katonga in Masaka, along River Kagera in Rakai, along River Mayanja in Mpigi and Wakiso, along Victoria Nile in Jinja and Kayunga and along Albert Nile in Moyo, Arua and Nebbi, along R.Sezibwa in Mukono and Kayunga, along R.Manafwa in Manafwa and Mbale, along R.Mpologoma in Manafwa and Tororo, along R.Doho wetlands in Tororo and their tributaries, etc.

3. Lowlands / valley or dambo wetlands in open valleys such as Walugogo valley wetland and Naigombwa in Iganga, Lumbuye in Bugiri, Busega swamp in Kampala, Kiruruma wetland in Kabale, Nyaruzinga wetland in Rukungiri, Lubigi and Kawaala swamp in Wakiso, Koga wetland in Mbarara, Awoja in Soroti, Omurokyekye wetlands in Rukungiri and many others.

SKETCH MAP OF UGANDA SHOWING THE MAJOR WETLAND TYPES.

ROLE OF WETLANDS / SWAMPS IN UGANDA

Wetlands are poorly appreciated yet they play a very important role in the Ugandan society which are both positive and negative:

POSITIVE ROLE:

- Wetlands act as sources of water for domestic, industrial and irrigation purposes. E.g. Masaka town gets its water from the nearby Nabujuzi swamps, Nsimbe horticultural farm in Mpigi district gets its water from the nearby Mayanja swamp, Uganda clays at Kajjansi get its water from Kachindo Swamps, etc.
- Wetlands are good grounds for fish which habit in clay bottomed and even different fish species feed and stay in them. For example Kyoga swamps at Lwampanga, Albert Nile swamps near Rhino camp in West Nile, Kyoga swamp at Wanseko, Lake Nabugabo, L. George swamp, Mpologoma, Naigombwa and Bisina wetlands are catching grounds for mud fish, Bagrus, Tilapia, Catfish, lung fish (Mamba), etc.
- Wetland vegetations like palms and papyrus filter and trap dirt, sediments and toxic wastes before reaching rivers and lakes. This is more evidenced with Nakivubo and Luzira swamps in Kampala and Masese and Kirinya swamps in Jinja where many industrial and domestic wastes are deposited and reach L. Victoria when the water is puified. Other swamps which filter include L. George swamp in Kasese and Nabujuzi swamps in Masaka.
- Wetlands have promoted tourism development in Uganda as they habit a variety of animals and birds. E.g. Kachindo wetlands in Lutembe bay, Kazinga channel wetlands and Lumbuye in Bugiri is rich with many birds and animals like hippopotamus, water ducks, crocodiles, gazelles, crested cranes, Kingfisher, African Jakana, African fish eagle, Blue swallows, Egrets and endangered shoe bill which have promoted bird watching and tourism.
- Wetlands are sources of raw materials such as papyrus, palms and other swamp vegetations which are used in weaving mats, baskets and hats, thatching, fuel and other hand crafts. Other forest swamps in Mukono, Wakiso and Mpigi have also been cleared for wood and other hand craft products. Lubigi papyrus swamp in Nansana along Hoima road, Katonga in Masaka, Sezibwa in Kayunga and Naigombwa wetlands in Iganga are used for handcrafts making.
- Due to increased population in Uganda, wetlands have been reclaimed for both settlement and cultivation. Kirinyi swamp in Jinja was reclaimed by Kakira sugar works for sugar cane growing, papyruses in Iganga and Pallisa have been reclaimed for rice growing. Others have Kibimba rice scheme in Bugiri, Doho rice scheme in Tororo and Olweny swamp in Lira for rice growing, Lutembe wetlands are used for growing of flowers while Kiruruma supports Irish potatoes in Kabale, at Bwaise, yams and sugarcanes are still grown in Kawaala swamp in Nansana.
- The different kinds of plant species in wetlands such as sedges, papyrus and other grasses have been useful for grazing animals during the dry seasons when pasture is scarce. This is common in the districts of Nakasongola at Lwampanga wetlands, Rukungiri at Nyaruzinga and Omurokyekye wetlands, Rakai at Sango bay wetlands, Soroti at Awoja swamp, Mbarara at L. Mburo swamps, Kabale at while Kiruruma wetlands, etc where the pastoralists move to the wetlands in search of pastures for their animals.
- Wetlands have helped to modify the micro - climate of the areas where they exist. The vegetation and water in the wetlands helps to influence the formation of convectional rainfall formation to the adjacent areas through evapo - transpiration. The major wetlands on the shores of Lake Victoria and Kyoga, Kabale district valley wetlands like Kiruruma, Sezibwa, Mpologoma and Katonga wetlands contribute a lot of moisture in the atmosphere which rises higher and condense into Cumulo - Nimbus clouds which later precipitates into rainfall.
- Over twenty species of edible wetland plants and fruits such as palm nuts exist in Uganda. However, their consumption level is still low except in food shortages. These edibles plants provide leaves, young shoots, stems, seeds and fruits for human consumption. Many species of plants in different wetlands are of medical and herbal value to Ugandans. These include the roots of Mondia whites (Mulondo) and Phoenix reclinata (Omukindo) which help to stop impotence among men, Abongodar (Lango) for cough, Bomo for measles (Teso), Akasaana for cough (Ganda), Omukazanyama for knees (Ankole) and Obugono gania for sore throats (Kiga). Traditional doctors get them to treat diseases.
- Wetlands provide raw materials such as sand, clay, poles, grass and papyrus used in building and constructional industry. For instance Tirinyi swamp in Iganga is a source of building materials in form of poles, grass and papyrus for thatching houses, Koga swamp in Mbarara, Sezibwa in Mukono, Lubigi swamp on Hoima road and Lwera swamp near Kajjansi are also important source of poles used for building or fencing livestock farms. Clay and sand are obtained for building purposes from Kajjansi, Kyetinda, Murchison bay, Nakawuka and Lutembe swamp on the shores of L. Victoria in Kampala and Wakiso and in Rukungiri it's obtained from Nyaruzinga and Omurokyekye swamp.
- Some wetlands with clear section of water are used as transport means for moving passengers and cargo by ferries, boats and canoes. E.g. the arms of L. Kyoga are .used for transport like from Lwampanga wetlands to Galiraya, Nabyeso, Lale, etc; Kazinga channel wetlands are also used in transporting of tourists along Lake Edward, George as well as linking Rwenshama landing site on L.Edward to Katwe landing site.
- Wetlands help in flood control by absorbing the overflowed water from rivers, lakes, after heavy rainfall and runoff. Sezibwa, Doho, Katonga and Kibimba wetlands control floods. E.g. flooding of R. Manafwa in Butaleja district is controlled by Doho and Kibimba wetlands, Kawaala swamp in Nansana - Wakiso district absorbs excess water from Bwaise trading centre and Kalerwe market in Kampala.

- Since wetlands are habitats for wild animals and birds, they have provided man with edible meat, skins and hides as man carries out hunting for both animals and birds like water bucks, wild rats, kobs, etc. E.g. hunting of Antelopes, water-bucks, Gazelles is carried out in Mburo, Katonga, Mpologoma, Lumbuye and Nyaruzinga swamps. Animals caught are de-skinned, the meat is eaten while the hides are kept as souvenirs and even sold to traditional doctors for Vodoo practices.
- The wetlands are good areas for research purposes for the educationists, geologists, ecologists, botanists and students both in secondary schools and higher institutions of learning. These studies are related to the wild life behaviours. E.g. Makerere University faculty of Botany and Zoology and Forestry department use Kachindo wet lands in Lutembe bay for ecological research. The Uganda wildlife Authority use Kazinga and Mpologoma wetlands for their research.
- Wetlands are important reservoirs of water to nearby lakes and rivers. The Katonga and Sezibwa wetlands for example recharge R. Katonga and Sezibwa during the dry season.
- Wetlands have been used as dumping areas of different wastes from the industries. For example Lugazi and Kakira sugar factory dumps its wastes in the nearby swamps of L. Victoria, Mukwano industries in Kampala dumps in Nakivubo swamp and those industries in Masaka dump in Nabujuzi swamp.
- Wetlands are used for industrial set up under restrictive laws. For example Sembule steel mills and Ntake loaf bread Ltd are located in Nalukolongo wetlands while Shumuk alluminium rolling mills, UNGA grain millers, Oxygen Ltd and Kiwa tile industries are in Nakawa - Kyambogo wetlands. Many industries were set up in Bugolobi swamps like Uganda Batteries Ltd, Bandag Tyre factory, Tri-Star apparel, Uganda Baati ltd, etc.
- Wetlands have been used to demarcate districts and county boundaries. For example Koga swamp separates Bushenyi from Mbarara, Kafu wetland separates Hoima from Kabarole, Awoja wetland separates Soroti from Kumi and Doho wetland separates Mbale from Tororo which has made region administration easier for collection of taxes by local governments.

NEGATIVE ROLE:

- Wetlands offer suitable conditions for the survival of snails and breeding of mosquitoes which spread bilhazia and malaria respectively. E.g. the people living on the shores of Lake Victoria in Kampala, Masaka, Wakiso, Entebbe, etc; and Kyoga swamps in Kumi, Soroti and Nakasongola are victims of the cause, Mosquitoes in Busega wetlands are also a threat to people around Kyengera and Mburo wetlands in Mbarara and Nakivali are infested with Tsetse flies which transmit sleeping sickness.
- The wetlands in soils especially the clay is sticky and difficult to be used for agricultural practices. In addition to that, wetlands are water logged with acidic soils which are unsuitable conditions for the growing of various crops. E.g. soils in Tirinyi, Walugogo, Naigombwa, Doho, Kibimba and Mpologoma are acidic clay soils which are unproductive, easily lose fertility, their productivity is restricted to two years of harvest and thereafter are abandoned.
- Wetlands provide good hiding places for the anti governmental elements like rebels and robbers. This is evidenced by highway robbers along Kampala-Masaka road who hide in Katonga and Lwera wetlands; along Iganga - Tororo road who hide in Doho wetlands; along Iganga - Mbale road, they hide in Tirinyi wetlands; in the South west i.e. Bushenyi - Rukungiri road, they use Omurokyekye swamp. Rebels of Alice Lakwena used Lumbuye and Naigombwa in Iganga - Butaleja districts and NRA rebels used Katonga wetland in 1984-85 bush war.
- Wetlands provide soft land surface for the construction of different infrastructures that they can not withstand for a long time. This is viewed in Kampala city where many roads are in wetlands like Jinja road at Nakawa and Namirembe road while other structures include stadiums like Nakivubo and Wakulukuku in Kampala, Nabukeera building, New Taxi in Kampala, etc.
- Wetlands provide habitat to dangerous predators and wild animals which are a threat to man. E.g. Crocodiles from Lumbuye and Naigombwa wetlands have limited farming and fishing in the area. They are also in the L. Edward - George - Kazinga wetlands complex in Kasese together with Hippos.
- Wetlands act as barrier to communication network. E.g. Walugogo valley wetland in Iganga has limited the construction of roads in the area; the Mpologoma swamp has also affected transport routes in Pallisa.
- During flood times, they cut off districts and destroy bridges especially in Pallisa, Mbale, Tororo districts like the flooding of Awoja wetland in 2007 blocked Soroti - Kumi road.
- Wetlands discourage settlement due to flooding for example Walugogo valley in Iganga, Kawaala wetlands in Kampala -Wakiso district, Mpologoma and Naigombwa in Pallisa and Iganga respectively. Bwaise - Kalerwe wetlands flood and displace human settlement as well as spreading diseases like cholera, dysentery and limit transport along the Kampala - Bombo road.

FACTORS THAT HAVE LED TO DETERIORATION / DEGRADATION OF WETLANDS IN UGANDA (Problems / threats related to the utilization of the wetlands in Uganda)

Today, the utilisation of wetlands has resulted into negative effects to the environment, so the following are the major factors that have contributed to deterioration and degradation of wetlands in Uganda;

Human factors:

- The unplanned conversion of wetlands into agricultural lands by private farmers has left many swamps cleared. E.g. Kakira sugar works have reclaimed Mutai swamps where R. Kiko originates for purposes of growing sugarcanes; Walukuba-Babu Patel wetlands have also been reclaimed; in Iganga and Paliisa. Over 64% - 68% of the seasonal wetlands have been reclaimed for rice growing such as Doho and Kibimba wetlends; Nakayiga swamp is reclaimed for planting crops and eucalyptus trees reclamation and degradation of wetlands.
- Pollution from mining and industries damages and destroys the wetlands' ecology system i.e. wildlife and impure wetlands natural functions. E.g. the southern range Nyanza textiles (NYTIL) discharges chlorine toxics in the Njeru wetlands; the Nile breweries discharge toxic caustic soda generated from bottle wash lines into the Nalufenya -Njeru wetlands; the Kilembe - Kasese cobalt mines discharges toxic wastes into Kazinga and George wetlands. This contaminates the water with dissolved copper, cobalt and iron, which affects wildlife in Queen Elizabeth National Park and aquatic life.
- Mining of clay for brick making and sand for structure construction which are demanded in the construction and building industry e.g. brick making in Seeta and Kawanda; Sand mining at Lwera swamp along Masaka and Lutembe swamp along Entebbe road as well as clay extraction by Uganda clays Ltd and Pan Kajjansi Bricks and Tiles Ltd in Kajjansi wetlands are all threats to wetlands.
- Clearing of swamp vegetation for the new industrial establishment, roads, landing sites, sports grounds and other infrastructures as well as houses have rendered a threat to the wetland systems e.g. Garden City complex in Kitante wetlands; BIDCO oil industry and Masese fish factory in Masese wetlands; Century bottling plant in Namanve swamps; Kampala northern by pass road in Kyebando - Kalerwa -Bwaise - Lubiji - Busega

swamps; Sembule Steel Rolling Mills,Family loaf Bread Ltd in Nalukolongo swamps, Avis cosmetics factory in Kalerwe - Bwaise wetlands, Nakawa - Kyambogo industrial centers in the Kyambogo - Mbuya wetlands; Port Bell authority and industries in Luzira wetland in Murchison bay have all been located there leading to destruction.

- The various products got from wetlands like papyrus, poles, and other plants for medicine have led to deterioration of swamps e.g. Lubigi swamp in Wakiso has been over harvested of the papyrus for screen making, mats, etc; continuous harvesting and collection of fruits and herbs like berries, "Matungulu" and Shea Nuts from Walugogo wetland, Katonga and Omurokyekye swamps have also led to degradation of wetlands.
- Deforestation of swamp forests like for timber and fuel in form of charcoal and firewood. This is done for wood and other crafts products. It is particularly a serious problem in the wetlands of Mukono such as Seeta and Namanve wetlands; Bukakata, Lwera, Nabajuzi and Nakayiga swamps in Masaka, Sango bay wetlands in Rakai district; and Lutembe bay wetlands at Kajjansi in Wakiso.
- Some times these fires are caused by people who carry out their activities around the swamps like pastoralists, crop farmers, the hunters, fisherman and careless smokers as well as the deliberate effort by the government to fight against anti -governmental elements which all exposed the wetlands to degradation e.g. in Apac, Lira, Luwero and Mpigi, as well as Katonga wetlands in Masaka, the fires are mainly started by hunters to smoke out wild game.
- The process of urbanization has led to wetland degradation. Kampala is expanding by reclaiming swamps. E.g. St Balikuddembe market, Kafumbe Mukasa road and the New Tax Park were constructed on the formerly Mengo Wetlands along Nakivubo channel; Small towns like Bwaise. Kalerwe and Nateete are all in swampy areas; and Kyengera town is expanding by encroaching on the Busega wetland along Masaka road.
- The wetlands are breeding sites for vectors like mosquitoes and snails which transmit malaria and bilharzia respectively is another factor that has contributed to the degradation of wetlands. Many swamps around urban areas were drained in the 1990s a way of the Malaria eradication scheme. E.g. the Katanga swamps at Mulago - Makerere, Kalerwe and Mengo swamps in Kampala were cleared down for that cause.
- Poor garbage disposal has led to degradation of wetlands. For instance in Kampala, garbage was initially dumped at Wakaliga wetlands by the Kampala City Council (KCC); today, it's dumped in Kiteezi swamps along Gayaza road. Domestic garbage including kitchen refuse is dumped in Kawaala and Luzira wetlands by several people nearby; and Masese swamp in Jinja and Walugogo valley in Iganga Town are also affected by illegal dumping of garbage by Jinja residents of Walukuba and Walugogo respectively.
- Poor sewerage disposal is another threat to wetlands whereby the toxic chemicals in the sewerage affect the aquatic life and papyrus plants. E.g. Sewerage from Masaka town is directly discharged into Nakayiga and Nabajuzi wetlands while Sewerage from Kampala is discharged into L.Victoria through Luzira in Murchison bay wetlands though relatively treated they have degraded those wetlands.
- Livestock rearing is also a problem to wetlands through establishing cattle farms on them and livestock grazing. For instance Kiruruma wetlands in Kabale were leased to dairy farmers who have drained them and replaced the swamp vegetation with pasture for dairy operations and the Awoja wetlands in Soroti, Lwampanga in Nakasongola, Mpologoma in Iganga and Sezibwa wetlands in Mukono by the Iteso, Baruli pastoralists and other cattle farmers have also been degraded by overgrazing of cattle on wetlands' grasses.
- Political interference and directives of continuous clearing for settlement and farming like in 2008, the Vice President gave away Nyamuliro wetlands in Kabale for Irish potatoes growing to Kashambya people.
- Planting of eucalyptus trees in swampy areas which drain a lot of water making them dry like Lubigi wetlands in Wakiso.
- Army veterans' involvement in clearance of wetlands for their developmental purposes like Port Bell – Luzira wetlands and Makerere – Katanga wetlands in Kampala.

Natural factors:

- Swamp diseases, pests like caterpillars, locusts and army worms lead to destruction of swamps.
- Wild browsing animals like antelopes eat up the wetland marsh grasses.
- The heavy prolonged rains like the EL - NINO weather phenomenon, hailstorms accompanied by thunders led to floods causing wetland degradation
- The abnormal insufficiency of water (drought) cause drying of swamps.
- Natural disasters like volcanic eruptions and earth quakes have also led to wetland degradation as well as the steep slopes on highlands created has promoted mass wasting and landslides to destroy wetlands.
- During the dry seasons, natural fire out breaks occur leading to massive destruction of the whole swamp vegetation.

THE EFFECTS OF WETLAND DEGRADATION

Due to the continuous utilization of wetlands in Uganda, it has eventually resulted into wetland degradation;

Positive effects;

- Destroys breeding grounds for mosquitoes hence helping to control pests and diseases e.g. around Kyoga swamp complex, Luzira - Mutungo wetland, etc.
- Destruction of wetlands create room for settlement e.g. the Kigezi wetlands destroyed settlement, Luzira swamps, Bwaise swamps, etc.
- Destruction creates room for crop growing e.g. rice growing in Hoima, Kibimba in Bugiri, Doho wetlands.
- Wetland depletion increases materials for craft industry like papyrus materials from Sezibwa wetland, Kyoga wetland and construction materials like clay and sand. Kajjansi wetlands but for a short period of time.
- Promotes road construction e.g. destruction of wetlands along the Masaka – Mbarara, Mpologoma wetland for the Iganga - Trinyi road, etc.
- Provided mining sites for clay and sand
- Encouraged eucalyptus tree planting
- Promoted fish farming

Negative effects;

- Wetlands in Jinja, Mukono and Kampala are the most degraded in Uganda leading to danger to survival of aquatic life and the quality of the water for human use. E.g. the reclamation by Kakira sugar works of the Mutai swamp forest from where river Kiko originates for purposes of growing sugar canes has led to the loss of the wetlands' capacity to clean the wastes in water originating from the Kakira sugar processing plant which has affected aquatic life and the quality of the water in L. Victoria and R. Kiko.
- The reclamation of wetlands has led to siltation of rivers and streams thus leading to flooding and loss of aquatic life. E.g. reclamation of Walukuba - Babu - Patel wetlands in Jinja has led to siltation of streams in Walukuba, Makenke and Maga Maga; reclamation of Doho and Kibimba wetlands, etc has led to serious siltation of R. Manafwa leading to flooding and loss of aquatic life.
- In Iganga, Pallisa and Butaleja districts. 64% to 68% of the total seasonal wetlands like Naigombwa, Lumbuye and part of Mpologoma wetlands have been reclaimed for rice growing which has led to scarcity of water and a reduction in the number of permanent streams, disappearance of permanent springs and a low underground water yield in the wells.
- In Kampala, Kabale and Bushenyi, the massive destruction of Mengo - Kisenyi, Kiruruma and Koga swamps respectively have led to an increase in the average temperatures because carbon oxide absorbers are no where and the incidence of malaria spread as mosquito habitants are cleared.
- Reduced rainfall as well as desertification due to reclamation of part of the Lumbuye and Naigombwa swamps has led to a shift from the growing of perennial crops such as coffee and bananas to annual crops like maize, sorghum and rice which has led to famine and drought in districts of Kumi, Pallisa, Butaleja and Iganga.
- Reclamation of Kachindo, Kibimba and upper Murchison bay wetlands has affected some bird species particularly the crested cranes, which required natural swamps for breeding. Migrant birds from Europe which visit Kachindo wetlands in Lutembe bay are also decreasing in number due to its encroachment which has in turn affected the tourism industry.
- The reclamation of wetlands has led to flooding which destroys infrastructures, farms and loss of human lives. E.g. encroachment on Bwaise – Kalerwe and Kyambogo - Nakawa wetlands has led to flooding during the rain season in those areas which has eventually led to destruction of Kampala – Bombo road and Kampala – Mukono road.
- It has led to increased incidences of easy and quick spread of water borne diseases like Cholera, dysentery and others due to too water pollution in Kyambogo, Banda, Bwaise, Kalerwe, Nakawa and Kamwokya wetlands in Kampala.
- Over exploitation of wetland materials has led to rising costs of house construction in Kampala and neighbouring suburbs e.g. Materials like sand and clay bricks and tiles are sold very expensively at Kajjansi, Lweza, Kawanda, Seeta and Kawempe.
- Loss of soil fertility due to monocropping like Kibimba
- Loss of fisheries of mud fish due to destruction of breeding sites and over fishing like river Katonga wetlands

MEASURES TAKEN TO CONSERVE AND PROTECT WETLANDS

The following are the steps being taken to conserve wetlands in Uganda;

- In 1986 the government has undertook a major step to protect wetlands of Uganda by declaring a ban on large-scale drainage of wetlands. In 1989, a National wetlands conservation programme was established so as to minimize encroachment on the Kyambogo, Kibimba, Tirinyi and Naigombwa wetlands.
- A wetland task force to monitor wetlands has established under the National Environment Management Authority (NEMA) which has created public awareness about the importance of wetlands through newspapers, workshops, mass media and public rallies held at areas near Busega, Kawala, Naigombwa, Tirinyi, Kawoya wetlands at Banda and upper Murchison bay wetlands which has discouraged people around these wetlands to encroach on them.
- The government has revised the land tenure ship Act declaring all wetlands to be under government property. It has taken over Murchison bay, Sango bay, Nabugabo bay, Nabajuzi, Tirinyi and Lumbuye wetlands which has help to minimize their degradation.
- The government has started evicting squatters and encroachers on wetlands such as Awoja wetlands in Soroti, Rufuha wetlands in Ntungamo, Agu wetland in Kumi, etc. E.g. Kampala City Council has evicted away people from Ntinda wetlands, Kyebando, Kinnawataka, Bugolobi and Luzira wetlands. The Kampala central division chairman's house, Mr Nyakaana which was built in Bugoloobi wetland was demolished down by NEMA in 2005 at Bugoloobi wetlands.
- The Uganda Wildlife Authority (UWA) and NEMA have put a ban on hunting of wild animals and birds such as the crested cranes, egrets, water bucks, monkeys, gazelles, and sitatunga which has minimized bush fires on Lumbuye, Naigombwa. Lubigi and Mpologoma wetlands that was initially started by hunters leading to their destruction.
- The government through NEMA has encouraged the use of alternative building materials like metal bars, iron sheets, polythene bags, artificial carpets and plastic buckets and baskets to people around Busega, Murchison bay and Nabajuzi wetlands which has led to a reduction in swamp exploitation to craft mats, baskets, etc.
- The government has gazetted specific industrial regions so as to avoid wetland misuse private investors. These swampy areas are Namanve, Kawaala, Kawempe, Nakawa, Nalukolongo, Kajjansi industrial parks; all in Kampala and others which operated on under NEMA supervision that has limited unlawful encroachment on those wetlands for industrial set up.
- Alternative sources of energy have developed to reduce encroachment on swamp forests for fuel wood. These include bio-gas, Liquid petroleum gas (LPG) sold by petrol stations like Shell and Kobil, increase of Hydro electricity generation at Jinja. Thermal generation at Lugogo, solar energy, etc which has reduced encroachment on urban wetlands like Masese in Jinja, Busega, Lubigi, Kajjansi and Murchison bay wetlands for fire wood.
- Urban centre administrations of Uganda have allocated specified areas for garbage dumping to reduce the degrading and destroying wetlands. E.g. Kampala city council has acquired a specific garbage dumping site at Kitezi on Gayaza road thus stopping garbage disposal at Wakaliga wetlands.

- Ranching has been introduced in pastoral areas like Mbarara, Soroti and Nakasongola to stop cattle grazing in wetlands e.g. Ankole - Masaka ranch in Mbarara to control livestock rearing within Koga, Lwera, L. Mburo and Nabajuzi wetlands.
- NEMA has emphasized covering of pits left behind after sand and clay mining at Kasenyi, Kajjansi, Seeta and Luzira. E.g. Uganda clays Ltd at Kajjansi fills clay pits after excavation under NEMA laws.
- The Ministry of Agriculture has introduced upland rice to discourage rice cultivation in wetlands such as Doho, Tirinyi, Mpologoma and Kibimba wetlands. Rice is now grown at Wakiso, Luwero. Masaka, Kalangala, etc other than looking wetlands found in lowlands.
- The National Water and Sewerage Corporation (NWSC) has treated sewage in different urban areas of Uganda. E.g. NWSC is treating sewage at Bugolobi before it's realized into Luzira wetlands around L. Victoria while Omega plastics recycle plastic wastes which pollute wetlands.

Note: Other measures could be extracted from previous and subsequent topics' measures.

SAMPLE QUESTIONS:

1. Assess the importance of Uganda's wetland resources to economic development
2. Examine the factors that have led to deterioration and degradation of wetlands (major threats).
3. Explain the measures taken to conserve and protect wetlands.
4. Examine the effects of wetland reclamation in Uganda.
5. Examine the role of human activities in the degradation of the wetland resources in Uganda.

SAMPLE APPROACH:

INTRODUCTION

You are expected to:

- Define the keyword(s).
- Cite out the status, coverage and characteristics in relation to the keyword(s).
- Identify, describe and locate the sub sectors of the keyword(s).
- Draw a sketch map to show the identified and located areas with names of places.

BODY

- Bring out, explain and illustrate the points (factors / reasons) in relation the demands of the command word in the question and the keyword(s).

FORESTRY IN UGANDA

A forest is a community of trees whether natural or artificial that grows densely and closely together.

While forestry is a scientific study that involves the exploitation, harvesting, preservation, conservation, processing and management of forest resources.

STATUS / TREND OF THE FORESTRY SECTOR IN UGANDA

- Most forest covers are in the districts of Kyenjojo, Bushenyi, Mukono, Hoima, Kibaale and Bundibugyo.
- The remaining original forests cover about 18.8% of the total land area which is equivalent to about 49500 km^2.
- Most forested areas are being gazetted and under National Forestry Authority.
- Some forested areas are being degazetted like Namanve planted forest in Mukono.
- Agro forestry is being emphasized and carried out in different parts of Uganda.
- The natural forests are the dominant but reducing in coverage / mainly affected by deforestation at 1.8% per annum.
- Most forest destruction is due to high demand for biomass (charcoal and fuelwood)
- Silviculture has been introduced for fight against climate change.
- Artificial forests are increasingly planted (afforestation and re-afforestation on increase).
- Most planted tree species are pine and eucalyptus.
- Most forests are found in central region of Uganda such as…….
- Artificial forests are owned by the government under National Forestry Authority and private individuals like ……...
- The forestry department was created way back in the late 1800 and its expansion began at Mabira and Budongo forests in 1920's.
- The remaining original forests cover about 18.8% of the total land area which is equivalent to about 49500 km^2 and of these 14,900km^2 are gazetted as forest reserves which are 23.6% while over 69.9% are non gazetted forests and 6.5% are forests under National parks.

- And of the types of forests in terms of kilometer squared; 7500 km^2 are savanna woodland forests and planted forests, 5000 km^2 are tropical lowland rainforests and 1500 km^2 are montane forests (Tropical High Mountain).
- While in terms of percentages; riverine forests are 1.2%, planted forests are 0.3%, savanna woodland and tropical lowland rainforests are 81.4% and montane forests (Tropical High Mountain), which is 17.9%.

TYPES OF MAJOR FORESTS IN UGANDA

In Uganda, there are five main types of forests namely;

i) Tropical low land rainforests such as Mabira in Buyikwe (Mukono), Bugoma in Hoima, Budongo in Masindi, Kibale in Kamwenge and Kabarole, Maramagambo in Bushenyi, Kalinzu in Bushenyi, Semliki in Bundibugyo, Kasyoha – Kitomi in Bushenyi and Ibanda, Bwindi impenetrable in Kanungu, Itwara in Kyenjojo, Malabigambo in Rakai, Zoka in Adjumani, Wiceri and Kilak in Amuru, West Bugwe in Tororo and Busia and Bunya in Mayuge, Echuya in Kabale, Mpanga in Mpigi, etc.

ii) Montane forests / tropical highland forests on mountains like Mt. Rwenzori in Kasese and Bundibugyo, Mt. Elgon in Sironko, Bukwa, Kapchorwa, Bududa, Manafwa and Mbale, Mt. Mgahinga in Kisoro, Sabinio in Kisoro and Mt. Muhavura in Kisoro, ...

iii) Riverine forests along the riverbanks such as along R. Katonga in Masaka and Kiruhura, Victoria Nile in Kayunga and Kamuli, along R.Kafu in Hoima and Masindi, Albert Nile in Arua and Moyo, along R. Mayanja in Kiboga and Wakiso, along R. Kagera in Rakai, along R. Achwa in Adjumani and Kitgum, …

iv) Artificial / Planted Forests such as Lendu in Nebbi, Zziwa and Kateera in Kibogo, Mafuga in Kabale, Magamaga in Jinja, Muko in Kabale, Kitubulu in Entebbe, Ibuje in Apac, Nakaseke in Nakaseke, Gomba in Mpigi, Katuugo in Nakasongola, Agwata in Dokolo (Apac), Bugamba in Mbarara, Aber and Zoka in Gulu, Gwala in Lira, Nyabyeya in Masindi, etc.

v) Savanna woodland forests such as Otze in Moyo, Mt. Kei in Yumbe, Timu and Morungole in Kaabong, Semliki in Bundibugyo, Kilak in Adjumani , Napak in Napak, Luku in Arua, Agoro – Agu in Kitgum, Moroto in Moroto, Kadam in Kadam…

A SKETCH MAP OF UGANDA SHOWING MAJOR FOREST TYPES.

FULL PAGE

FACTORS FOR THE DEVELOPMENT OF FORESTRY INDUSTRY IN UGANDA

- Uganda has varied climatic types that have favoured the growth of both natural and artificial forests where as tropical type of climate has led the growth of tropical rain forests like Mabira forests and even the montane type of climate has led to montane forests like on Mt. Rwenzori forest because of heavy rainfall received of 1500mm and hot temperatures of about 25^0C per annum.
- Presence of different nature of soils and soil fertility have led to growth of different types of forests where as deep fertile alluvial soils along river banks have led to the growth of riverine forests like Katonga and even deep fertile loam soils have led to tropical rain forests like Bunya forests as they facilitate the standing their great heights and size. More still savanna woodland forests also grown in areas with fairly fertile sand soils like Morungole forests.
- Relief favours the growth of various forests where as tropical rain forests have grown well in lowland and gentle areas like Bugoma and even temperate / mountain forests have survived on the windward slopes of high lands and steep areas such as Elgon forest.
- Altitude favours the growth of various types of forests where as areas of less than 2000 metres above sea level have favoured the growth of tropical lowland forests such as the Mabira forests and even high altitudinal areas above 2500m have also favoured the growth of Tropical highland forests (Montane forests) like Mgahinga forests.
- Presence of pests and diseases such as tsetse flies which transmit sleeping sickness in Bunya forests and the presence of fierce wild animals such as Leopards and lions have deterred people from encroaching upon those forests hence favouring their existence. More still wild animals like Monkeys, gorillas and chimpanzees have dispersed tree seeds leading to extension of Bwindi forests.
- Drainage favours the growth of different types of forests where as mountain and equatorial forests have survived in well drained areas of the L.Victoria basin with Mabira and even savanna woodland forests have grown in fairly well drained areas in West Nile with Otze. More so the presence of water bodies retain water for the growth of forests such as L. Victoria has Ssese forests and along river courses have riverine forests such as Mayanja.
- Sparse or low population density favours the growth of the forests such as Timu woodland forests due to less/no interference with the expansion since the areas where they are found are remote.
- Existence of large expanse of land has led to the growth of forests as well as allocation and gazettion by government e.g. N.F.A under the government evicts encroachers like about 30,000 Bakiga were evicted from Kibale forest to Bugangaizi resettlement scheme.
- Existence of a variety of commercial tree species such as Mahogany Ebony, Muvule in the natural forests like Mabira as well as pine and cypress in the artificial forests like Maga Maga that command a high price on the world market in Kenya and Sudan.
- Presence of reliable source of capital from the government and individual investors where as Kawolo pine forest was planted by HWANSUNG furniture Ltd and Lendu artificial forests were funded by the government under NFA due to deliberate government policy of afforestation to boost up the forestry sector.

- Presence of both skilled and semi skilled labour where as skilled labour is provided by foreign investors like the Koreans in HWANSUNG furniture Ltd while the semi skilled labour is provided by the locals like the people in Buyikwe as they do manual labour such as chopping off tree leaves and transportation of logs. And others as forest rangers, NEMA and NFA officials.
- Existence of relative political stability in the forested areas favouring both local and foreign investments in the forestry industry ensured by the UPDF and Uganda Police like Saudi Arabians of Forest Consult and Saudi Marble Company in Bunya forests.
- Presence of positive government policy of sensitizing the masses on radio and TV stations, news papers and public rallies like around Mt. Elgon forest in Mbale and Bududa on the need to preserve and protect the forests and the outcomes / dangers of destroying them.
- Presence of fairly developed roads, water routes and railways linking up forest areas such as Kampala – Jinja – Tororo road and Railway to Mabira and Bunya forests to ease the transportation of timber and other forestry products.
- Presence of relatively a big local and foreign market for forestry products in form of fabricated timber, door and window frames, building poles, etc from different forests such as Aber and timber processing factories and carpentry workshops in the towns of Kampala where they are on high demand for furniture, fuel, and other construction use.
- Presence of abundant energy resources in form of HEP from Owen falls dam in Jinja for the processing of forestry products in timber processing factories like HWANSUNG furniture Ltd in Kampala and carpentry workshops in the towns of Masaka.
- Presence of adequate entrepreneurs both local and foreign who have invested the forestry sector e.g. HWANSUNG in Kampala for furniture promoting growth of Kawolo forest in Mukono and Nile Ply in Jinja for Maga Maga.
- Existence of high level of technology in form of tractors, diesel saws and chainsaws are used to exploit the tree logs quickly and efficiently in Ssese forests by HWANSUNG in Kampala.
- Existence of intensive research activities in forestry resources to ensure their sustainable use and invention of quick maturing tree species e.g. Makerere University forestry department does its research on Kibale forests and at Namanve tree seeds centre in Wakiso, there are nursery tree seedlings for quick maturing and exotic tree species like Pines and Cypress.
- Presence of environmental laws and Act has come up with strict law to protect the forests through licensing and ensuring controlled tree harvest and exploit hence favouring forests like Budongo and Bugoma,
- Existence of good international relations between Uganda and other countries like those East Africa which has enabled her to get market for its forest products in Kenya and Sudan and overseas to attract foreign investors from Korea of HWANSUNG furniture Ltd.

ECONOMIC IMPORTANCE OF FORESTS IN UGANDA

The following are the economic uses of forests in Uganda which are both positive and negative;

POSITIVES:

- The trees are major sources of building and construction materials in form of poles for constructing houses, bridges, Railway lines, poles for electricity and telephones. Most of the roofs in Mukono and Buyikwe are built with timber and poles from Mabira and others.
- Forests are major rain makers to the surrounding areas by attracting convectional rainfall through evapo -transpiration. That is why forested areas receive heavy and reliable rainfall of about 1500mm per annum like Bwindi in Kanungu.
- Forests supply fuel in form of firewood and charcoal, which is of a high demand in rural areas used by over 90% of Ugandans. In addition to that the Uganda clays works and Pan Clay industries at Kajjansi use wood from Mabira for firing their clay products.
- Forests play a big role in protecting the soil against the agents of erosion. They act as a soil cover to safe guard soil from erosion, maintain soil fertility and prevent aridity like the planted forests found on Kakira sugar plantation and Lugazi
- Forests are major provider of both traditional and modern medicine derived from leaves, barks and roots for treating various diseases to contribute in maintaining the health standards of people. E.g. Aloe Vera and Moringa trees can treat over 200 ailments found in Mabira and Budongo.
- Forests are areas where rivers and streams originate or where they get their waters. They protect such areas from drying up because once they are dry; the rivers too will dry up. E.g. river Ssezibwa and river Musamya originate from Mabira forests.
- Forests provide different wood types as raw materials especially soft wood to the wood and pulp industries that make papers, match box, paper box, etc. E.g. Nile Ply Ltd in Jinja depends on Mabira forests for wood and veneer logs supply
- Many Ugandans get food from forestry resources since some forest's roots act as food and other trees have edible fruits which are depended on by the business people and the pygmies as well as Butwa of Western Uganda in Mt. Rwenzori forests like jack fruits, mangos, cocoa, cashew nut, avocado, solanum indica (Katunkuma), …
- Forests such as Bwindi are used as homes for animals and birds like monkeys, Gorillas, tree squirrels, leopards, chimpanzees,… which has in turn promoted eco - tourism thereby generating foreign exchange inflow in Uganda.
- Forests regulate the temperature in their locations by making them cool and mild conditions for human settlement e.g. Kitubulu forest in Entebbe clean the environment through absorbing the green house gases like carbon dioxide, carbon monoxide, methane, … At the same time, trees release oxygen during day and this is used for breathing purposes in animals like the gorillas and chimpanzees in Mgahinga.
- Forests like Mabira, Budongo, Kibale, etc are a source of products such as oil and rubber from palm oil trees and rubber trees respectively. Other products include; honey, bee wax, dyes, mushrooms, gum, …
- Forests provide opportunities for physical, emotional and mental recreation through game hunting and picnics e.g. Bwindi is famous for picnics, bird watching and photographing.. Tourists and local people usually use Mabira forest Lodge in Buyikwe operated by Alam group and Muaroo chain for accommodation facilities.
- Many crops such as Coffee, Tea, Pineapples, Bananas, Jack fruits, Cassava and many others originated from forests like Bwindi and Mabira which man, wild animals and birds, uses as their food.

- Forests protect against flooding and silting of lakes and rivers. For example the adjacent forests along R. Semliki in Bundibugyo filter their waters which have saved the death of aquatic life through ensuring safety water free from silts.
- Forests like Mabira, Ssese and Bunya help to maintain soil fertility and prevent soil erosion. For example part of Mabira forest was cut down to plant sugarcanes by the Mehta family, Butamira forest in Jinja was cut down to plant sugarcanes for Kakira sugar works and Bugala island and Ssese island forest was also cut for Palm oil trees by BIDCO.
- Forests are water catchment areas for example river Ssezibwa and river Musamya originates from Mabira forest, River Manafwa in Mbale and R. Malaba in Tororo originates from the forests along Mt. Elgon and River Mobuku originates from forests along Mt. Rwenzori which have supported crop farming and provided water for domestic and industrial use.
- Forests such as Ngamba in L.Victoria, Bwindi and Mgahinga are used for the protection of endangered animal species in Uganda and the world Such as Mountain Gorillas, chimpanzees and monkey, which were soon becoming extinct thus promoting the tourism sector.
- Forests are used for research and educational purposes as field work study and ecological areas especially by students from higher institutes of learning from which new species of plants and trees are identified as well as ecological studies. E.g. students of Nabyera Forest College use Maramagambo forest.
- Forestry resources have earned Uganda foreign exchange from timber supply export to other countries in form of hard wood and sometimes soft wood which is used to make a variety of furniture. E.g. Nile Ply factory in Jinja export timber from Mabira forests in Buyikwe to Kenya.
- Promotion of international friendship / relationship through external forest trade with other countries.
- Accumulation of capital in – flow from foreigner through more investment
- Forests like Bugoma have created employment opportunities to over 1 million categories of people such as forest rangers, woodcutters, lumberjacks, forestry officers and in other forestry related activities which have earned them incomes to improve their standards of living.
- Acquisition of forestry related skills through on –job training
- Growth of forestry towns as urban centres due to forestry related activities
- Forests like Bunya generate government revenue through offering licenses to lumbering companies like Erimu Timber Company in Wakiso and saw millers and imposing taxes on the carpentry and furniture workshops in Mukono. For instance in 1999, they generated 6% to GDP.
- Forests promote economic diversification especially among the farmers through agro-forestry programmes i.e. planting of crops together with trees. For example Vanilla and cocoa planting in Mukono and Bundibugyo have led to growth of forests and other trees have been planted by people in Nakasongola and Kiboga funded by National Forestry Authority (NFA) to supplement their local income from food crops.
- The harvesting and exploitation of forest resources have led to infrastructural development such as road, power station and schools because they aid in their forestry e.g. Nabyeya and Budongo forests in Masindi led to the set up of the Kampala - Hoima - Masindi road in the west as it led to their accessibility.
- Creation of market for other sectors through buying their outputs as forestry inputs.
- Development of forestry research centres for new inventions and discoveries in the sector.
- Advancements in technology for new changes and efficiencies in the sector.

NEGATIVES

- Forests are habitant of pests and vectors, which cause diseases in plants, animals and human beings. E.g. Bugoma, Budongo, Kibale and forests of South Busoga are infested with Tsetse flies which transmit Trypanosomiasis and Nagana to man and cattle respectively as well as mosquitoes from different forests transmit malaria to human beings which is the most killing disease in Uganda.
- Forests are also habitat of dangerous wild animals, which at times attack and kill people and destroy crops in the surrounding areas e.g. Foxes and Leopards from Budongo forest, elephants from Kibale forests, lions and hyenas from Mt. Rwenzori often terrorise villages in Masindi, Kibale and Kasese district as well as monkeys, chimpanzees and Mountain Gorillas from Mgahinga and Bwindi destroy crops from nearby farmers in Kabale and Kanungu respectively.
- Forests are hide outs of anti-government forces like rebels, bandits, robbers, etc e.g. Mt. Rwenzori forest is home for the Allied Democratic Front (ADF) Rebels and Mt. Kei, Otze and Lendu forests in the West Nile were once homes for the West Nile Bank Front Rebels in 1990s which cause (d) insecurities undermining long term investment in Uganda. Zoka and Kilak forests in the North were homes of rebels of the Lord's Resistance Army (LRA) from 1986 up to 2006.
- Forests like Bwindi, Ssese, Mabira and Kibale occupy large piece of land, which have limited settlement, agriculture, industrialization and tourism in Kanunga, Kalangala, Mukono (Buikwe) and Kibale respectively.
- Dense forests such as Bunya, Bwindi Impenetrable, Mabira and Ssese have restricted the construction of transport systems like roads and other infrastructures which has created economic regional imbalances and delay of transmission of ideas from one area to another.
- Some forests which are dense like Bwindi, Semliki, Otze, Timu and Malabigambo are located in remote areas and are therefore inaccessible thus becoming of less economic value as well as acting as social economic barriers between neighbouring areas.
- The planted artificial forests like Maga maga, Kateera, Muko, Lendu, Kitubulu, Katoogo, Mafuga and areas with eucalyptus trees have drained soils making them less productive and infertile and therefore not suitable for crop framing.
- Forests like Ssese, Mabira, Budongo, Kibale and others are being depleted to provide fuel wood, timber and land for cultivation as social and economic benefits to people, which is a serious upset to the balance of the natural environment.
- The forested areas cleared for agriculture only remain fertile for a short period of time and therefore become susceptible to soil erosion as well as causing marked changes in local climates resulting in lower and more unreliable rainfall in affected areas like Mukono, Kalangala, etc.
- Natural forests such as Mabira, Maramagambo, Malabigambo, Ssese island and others contain many different tree species, which do not grow in pure stands but intermixed which has made logging expensive and difficult.

- Most of the trees in the forests are hardwood and therefore of less demand on the world market especially in European market since there are very few tree species of high commercial value such as Mahogany, Muvule and Musizi in Semliki, Bugoma and Malabigambo.

REASONS FOR FOREST DEPLETION

In 1900, Uganda was much covered by forests estimated to ¾ of the total land area but from that time up to date, forested land has continued to decrease that only 18.8% is covered by original forests today and the rest has been cleared.

This is indicated as;

- In the central region over 1427.1 km^2 have been destroyed.
- In the eastern region over 486 km^2 have been destroyed.
- In the northern region over 0.1 km^2 have been destroyed.
- In the western and south western region over 894.6 km^2 have been destroyed.

So the following are the causes of this problem or phenomenon:

- The Ugandan population has increased year by year that currently in 2016, it is estimated to be 35 millions compared to that of the past which has demanded for more land for settlement. Most affected forests are found in the districts of Jinja, Mukono, Mayuge, Kisoro, Kabale, Luwero, Wakiso, Iganga, Mubende, Mbale and others. Of recent, Kibaale forest has been tampered by Bakiga immigrants from Kigezi.
- Due to the fact that the population is increasing, the need for food has also increased. Since forested areas receive heavy and reliable rainfall, they have been cleared to create more room for food cultivation e.g. Mabira forest, Bugala island forests, Semliki forest, Kibaale forest, Mt. Elgon forest and the Kigezi highland forests.
- The increase in urban population and need for industrialization has exerted much pressure on the forests near the urban areas for their expansion. Forests under such pressure are found in Mukono, Jinja, Mbale, Tororo, Soroti, Kabaale, Fort Portal, Gulu, Nakasongola and Namanve near Kampala.
- Since forests are a major source of fuel, many Ugandans both in rural and urban areas use firewood and charcoal respectively. Forests like Mabira, Malabigambo, Budongo, Kibale, etc have been exploited to cater for the increasing demand for energy resources.
- Ugandan forests are rapidly being exploited to supply the increasing demand for logs, wood and timber to be used in construction and building industry, carpentry, electrification of rural areas. This has been due to the high demand of forest products and services by the increasing population.
- Wild fires started deliberately or accidentally have led to forest disappearance. Hunters and loggers deliberately start off fire to drive out wild animals or careless smoking and due to friction, fire starts off. Forests that have faced this include; Aber and Opit near Gulu in 1982, over 200 ha of Mwenge forest in 1989, forest plantations in Pakwach in 1977 and others in Luwero and Mubende.
- Forests have suffered from political instabilities / insecurities as they are likely hiding grounds for the anti government elements e.g. In 1979, Nyamityobora forest in Mbarara was cleared for security reasons, between 1981 – 1986, others were cleared for fear of any ambush especially along road sides in Luwero, Masaka, Mubende, Mpigi, …
- The forest department in Uganda is too corrupt by using it for the employers' benefits other than the public benefit. This has involved personal acquiring of forest land for cultivation and settlement, unauthorized sale of timber, taking of bribery from the illegal settlers and timber exploiters etc. For example Mafuga forest reserve in Kigezi had a remaining unplanted part which was illegally given to farmers by the forest officers in 1980.
- The poor methods of felling down trees like indiscriminating cutting or block felling have led to the massive destruction of immature and young trees leaving a lot of wastage. E.g. in Mukono forest reserve, it is reported that a large number of trees are cut but a few are removed while others remain as a wastage because they aren't in pure stand.
- Over grazing and poor agricultural techniques like the slash and burn method have led to unnecessary destruction of trees leaving areas open. E.g. in Luwero, Kiboga, Mbarara, Rakai, Sembabule. This method of slash and burn has been common while in Karamoja, illegal grazing of animals is seen in Kadam forest reserve, Aber, Agwata, …
- Some forests have been destroyed as a result of dangerous pests and diseases as well as bird. For example many forests in southern Busoga like part of Mabira and Bunya forest in Mayuge were destroyed due to presence of locusts and tsetse flies and the soft wood planted trees of Muko and Mafuga in Kigezi and Lendu in Nebbi are extensively damaged by aphids, caterpillars and woodpeckers.
- The forestry department in Uganda has lost much of its former effective control over forest conservation because of lack of adequate money, forest equipments, low morale and on top of that, the department is under staffed to do the sufficient monitoring and patrolling of the forests to avoid the forest encroachers. Worse still the transport routes to the forests are in poor conditions to ensure regular patrol by the forest department staff.
- Road construction has led to the destruction of some parts of forests. E.g. Itwara forest was cleared through for Mityana - Fort Portal road, Mabira and Namanve were cleared through for Kampala-Jinja road, etc
- Illegal and unlawful pit sawing has led to massive destruction of forests. E.g. Lendu, Kilak, Wiceri, Aber, Agwata, Elgon and Malabigambo forests are facing illegal pit sawing by wood, pulp and timber smugglers to Kenya, Sudan and T.Z.
- Mining activity has led to the clearing of some forests. E.g. gold mining in Kitaka mines in Kamwenge has led to the clearance of Kitaka forest, oil mining in Semliki valley has led to depletion of Semliki forests, gold mining in Buhweju in Bushenyi also led to the clearing of forests around Kyamuhunga, …
- Some forests have been destroyed by wild animals. E.g. Parabong forests in Nebbi and Kidepo forests in Kaabong are being damaged and destroyed by elephants and giraffes respectively.
- Calamities such as storms, floods and landslides accelerated by heavy and prolonged rainfall have destroyed some forests. E.g. Walugogo forests have been destroyed by Walugogo valley floodings in Iganga, Mt. Elgon and Mt. Rwenzori forests have been destroyed by landslides, …

EFFECTS OF FOREST DESTRUCTION IN UGANDA

As forests are continuously being cleared, it has resulted into negative consequences as given below: -

- Since forests are known rainmakers through evapo-transpiration and they have reduced in number, it has led to reduced amount of rainfall received in the areas once with forests thus desertification e.g. Mt. Elgon, shores of Lake Victoria, Kigezi, around Mt. Rwenzori, etc.
- Due to increased deforestation, large amounts of carbon dioxide, carbon monoxide, and others are released in the atmosphere, which at the end has contributed to the green house effects (global warming). This is so in that the trees, which used to convert carbondioxide into oxygen, are cleared.
- The clearing of trees especially on the mountain slopes of Elgon, Rwenzori and the steeper slopes in Kigezi has resulted into serious soil loss and accelerated landslides which at the end has resulted into low soil productivity, low crop yields, etc.
- Due to the increased reduction in the number of trees, people in different parts of Uganda like Masaka, Luwero, Kigezi, Mbale, Lira, Gulu, etc are crying for fuel in form of firewood and charcoal as well as wood for construction purposes and furniture making as people have move for about 1 Km looking for firewood and other forest products.
- Due to the fact that forests are homes for wild game and many forests have been destroyed, therefore the wild life has been scared and lost as their homes have been destroyed e.g. the gorillas in Bwindi are nearly extinction, Parrots in Bunya forests and Ssese forests are disappearing, ...
- Many people depend mainly on forests for socio-economic benefits either directly or indirectly to earn their living, so their destruction has resulted into the loss of their survival base for their livelihood like the pygmies in Rwenzori forests.
- The increased destruction of trees has led to the destruction of the water supply sources, resulting into decreasing levels of lakes and rivers like Victoria, Kyoga, Victoria Nile, Sezibwa, Mayanja, … since forests are water catchment areas.
- Forest destruction has also resulted into the destruction of the bio-diversity i.e. flora and fauna on earth for tourism, recreation, research and ecology purposes.
- Their destruction has led to increased silting of rivers and lakes resulting into contamination of water and death of fish. E.g. clearance of Mabira has resulted into silting in rivers of Sezibwa and Musamya, Bwindi thus silting in Lakes of Mutanda and Bunyonyi, …
- Forest destruction has also led to scarcity of traditional medicines and herbs.
- Their destruction has led to marked changes in local climates where the rain seasons start and are becoming less reliable.

PROBLEMS FACED BY THE GOVERNMENT IN THE PROCESS OF CONSERVING THE FORESTS.

In the process of the government's efforts to conserve the forests, it has encountered the following problems;

- Illegal burning and clearing of forests for settlement and agriculture is one of the major problems facing the forestry industry as people clear and burn forests for several purposes. e.g. the pastoralists burn the forests with the hope of having fresh and good pastures while the crop farmers burn forests to clear away unwanted plants for cultivation.
- The government is facing inadequate capital to effect the forest conservation measures e.g. to employ the forest rangers, buy fire fighting equipments, to put up monitoring towers, to fund the forestry department, etc.
- Insecurity is also a threatening problem to forestry in Uganda especially in parts where forests have been cleared to remove the hiding places of the anti-government elements e.g. in Luwero triangle during the 1981-1986 guerilla war of NRM.
- Some forested areas are located in remote areas making them inaccessible in terms of transportation for conservation e.g. Bwindi, Mgahinga, Mt. Rwenzori and Mt. Elgon forests hard to be protected since they are not accessible.
- Fire outbreaks cause serious threats to the forest department that they destroy several hectares of forests hence denying a country its valuable resources in conservation for future use.
- The Ugandan forest department has weak and inconsistent policies and laws on forest conservation over the illegal cutters of trees, settlers in forested areas, etc. This has failed its proper implementation of conservation measures.
- Most forests in Uganda act as habitants for dangerous wild animals, poisonous snakes and biting insects which are a great threat to human life who act as forest rangers and even they destroy the trees under conservation since they depend on them as food.
- Forest encroachment, which is as a result of increased population in Uganda, has turned out to be a serious threat to forestry. As the population increases, people are forced to encroach on the marginalized areas, forests inclusive thus interfering with the conservation measures in the long run.
- Generally there is inadequate skilled labour to conserve the forests. This has been attributed to the presence of pests and diseases and wild animals, which scare human taskforce near the forested areas. More so lack of adequate capital by the forest department has led to low morale and less trained forest rangers thus understaffing.
- Most people in Uganda are not aware or ignorant of the reasons why forests are conserved, so they turn to and destroy them for their socio economic benefits.
- Geographically the climate of Uganda has changed because of different reasons that lead to spread of desertification, which has in turn slowed down the growth of trees to be conserved.
- The government itself has also been responsible for hindering its policies of forest conservation because of the need to set up industries and other activities for economic growth and development e.g. Namanve forest in Mukono was cleared for the Coca- Cola soft drink plant.
- The forest officials, who are in the process of conserving forests have neglected their duties. They have turned out to be corrupt in favour of illegal settlers, charcoal burners, fire wood cutters, etc. This too has hindered forest conservation.

GENERAL PROBLEMS FACING THE EXPLOITATION OF FORESTS IN UGANDA

Problems facing forest exploitation are physical, political, cultural, social, economic as well as human and these are;

Physical problems:

- Tropical forests don't grow in pure stands but rather intermixed with several species of trees together like Mahogany, Musizi, Muvule, ... This makes it difficult to select the needed valuable trees and forces the forest exploiters to cut down trees, which are not even needed until they reach the valuable ones.
- Tropical forests such as Bwindi, Semliki, Muko and others are not accessible due to the fact that they are too thick, impenetrable and lack transport systems like roads and railways as the areas are remote. This makes it difficult to exploit the trees, transport the timber from the forests to the market centres. In cases where the roads exit, they are seasonal i.e. during the dry season they are used and in the rainy season, they are impassable and muddy which discourages the transportation of forest products.
- Pests and diseases is one of the various problems of forest exploitation in Uganda. These forests are breeding grounds for dangerous pests and diseases e.g. mosquitoes which cause malaria, tsetse flies for sleeping sickness, etc. Such pests and diseases scare away the exploiters making the exploitation difficult.
- As forests are homes for wild animals e.g. lions, hyenas, leopards, snakes, elephants, and monkeys, etc they have in turn destroyed forests that would have exploited and even scaring aware human life.
- The unpredictable forest fires are another common problem facing the forest exploiters in Uganda where they do happen especially in the dry seasons resulting into the destruction of several hectares of forests or as a result of hunters and lumber jacks.
- Since Ugandan trees are of tropical type and hard wood, which take long time to mature, this has eventually affected the exploitation of trees to meet the demands on the market.
- The tropical rainforests have buttress roots, which have also been a problem to the exploiters because the roots themselves become an obstacle to the felling operations that necessitates raised platform.
- The Ugandan forests have few valuable tree species e.g. Mahogany, Muvule, Ebony and other species, which demoralizes the forest exploiters in search for them among the others.
- Mountain forests like Rwenzori and Elgon are located in mountainous areas with a rough and rugged relief making their accessibility very difficult for forest exploiters.
- Ugandan forests have an environment, which is hostile, unconducive and unfavorable for the exploiters but rather discouraging them from their work e.g. hot atmosphere of Morongole forest and constant dampness in Maramagambo, Mabira, ...
- Since most of the forests in Uganda fall under tropical rain forests which are of hard wood like Mahogany, Muvule, and others that at the time of exploitation, the tree logs are heavy and bulky and therefore difficult and expensive transport to the required places.
- Some forests are located in areas with impeded drainage like swamps along rivers like Katonga, Victoria, … and on lakeshores such as Victoria and Kyoga which do not have easy accessibility to them for exploitation, turning out to be a problem as they have soft and boggy soils thus making the transportation of the logs very hard.

Other factors:

- Generally inadequate capital is a problem in Uganda since she is among the third world countries. Many exploiters cannot afford to use the modern technology in exploiting the big forests such as electric saws, to build permanent roads, to buy heavy tracks and tractors to transport the forest products to the market, etc. All these have been impossible due to limited supply of capital.
- Most people are poor and they can't afford to use the modern technology like electric saws instead they are forced to use the poor and rudimentary tools for cutting down trees in Bugoma, Mabira and Budongo which are time wasting, slow and insufficient for commercial exploitation e.g. axes, pangas, handsaws, etc.
- Generally forest products in Uganda have limited domestic market i.e. low demand because they are of hard wood nature, which is of limited use unlike the soft woods of high demand on planted forests. This low demand is due to poverty among Ugandans.
- Some forested areas are politically insecure because rebels and other anti government elements hide in them which hinder their exploitation. This forces the government to cut down the forests with all its valuable trees to deny a home for rebels e.g. the Allied democratic front in mountain Rwenzori forests that had caused insecurity to the surrounding areas of Kasese and others.
- In the process of felling down trees, many accidents have occurred in the forests as trees fall on the lumberjacks causing injuries and sometimes leading to death.
- Ugandan forests are served with poor means of transport especially roads that are seasonal. During the wet season, they are muddy and impassable while during the dry season they are passable, this creates a problem in terms of exploitation of those forests and transportation of forest products to the market.
- Generally there is inadequate labour both skilled and semi skilled to exploit the forests like Kalinzu and Bwindi. This is due to the fact that pests and diseases scare away human taskforce. Some who are availed, are not knowledgeable of many trees of commercial value thus destruction of unwanted and young trees.
- Most forests in Uganda suffer from stiff competition from other land uses such as agriculture, settlement, and industrialization, which has reduced the total land under forests. Example of the encroached forests are; Namanve, Mabira, Mt. Elgon forest and others in different localities. More to this over, more than 30,000 Bakiga encroached on Kibaale forest.
- Forest exploiters cut trees indiscriminately i.e. both young and old trees without replacing them due to limited knowledge of cutting and felling trees. This has eventually resulted into the disappearance of large areas of forests.
- In Uganda, the forest rangers have less concern to the forests where some try to enforce national environment laws while others neglect it and in the end, there is illegal exploitation of trees like in Mabira, Kibaale and on Mt Elgon forests.
- Generally the local people of Uganda are ignorant of the reasons why forests are conserved and preserved for exploitation later, so they destroy them with few purposes for them as socio economic benefits.

- The Ugandan government has laws regarding the forest protection which are inconsistent that on the one hand, they ban the exploitation of some forests and on the other hand, it exploits them for its benefits like industrialization e.g. Namanve forest was cleared for industrial complex.
- The forest department in Uganda is involved in corruption in form of illegal felling of trees and collecting of timber, bribes, overlook unlicensed exploiters and use of forest reserves for other purposes.
- In Uganda, research on the methods of logging and felling trees is on low level and on small scale, which have affected the exploitation of forests that the methods used are still poor, primitive and out dated. Even research on identifying and exploiting valuable trees is inadequate in forests like Budongo, Bugoma, and others.
- There is scarcity of energy resources in form of electricity and diesel to exploit the trees from forests from Mabira, Budongo, and run machines at wood and pulp industries like Erimu wood quality industry, Nile ply factory, … This is worsened with the constant load shedding of power.

SOLUTIONS TO THE PROBLEMS AND MEASURES TAKEN IN CONSERVATION

- The Ugandan government has set up the Ministry of Water and Environment Protection with much emphasis on the country's natural resources, forests inclusive. Forest management practices have been put in place to conserve and preserve forests through National Forestry Authority.
- Many forest encroachers and squatters have been evicted from forests like Mabira, Semliki, Bwindi, Mgahinga, etc by police and Forest Department officials. Another is resettlement of about 30,000 Bakiga from Kibaale forest to Bugangaizi resettlement scheme.
- Through the mass media like tree talk, seminars and local authorities, NFA and NEMA have provided / are providing mass education and sensitization / campaigns to the farmers surrounding the forest on the needs to preserve and protect the forests and the outcomes / dangers of destroying them. Such programmes are being done around Mt. Elgon forest in Mbale, Kibaale, Semliki and to residents of Namawojjolo and Najjembe near Mabira, etc.
- Re-forestation and afforestation programmes have been implemented where forests are being cut and where they were did exist before respectively. Replanting of trees has been done in Arua, Tororo, Mbale, Luwero, Mayuge, Mukono and Mbarara while new planting of trees like the eucalyptus and pine trees has been done in Mbarara, Mpigi, Jinja, Mukono, Soroti, Kumi, Gulu, Wakiso, Apac, etc which are planted forests
- Other sources of energy have been introduced and developed in Nebbi, Gulu, Soroti, Mbale, … like biomass and biogas from agricultural wastes e.g. coffee, sugar, cotton and cow dung as well as solar energy to reduce on deforestation because of charcoal and firewood like in. Further more, energy saving stoves have been introduced in Mukono, Katwe and Mengo in Kampala to save 75% of charcoal and firewood on both rural and urban areas that in the long run forests could be conserved by the surrounding areas.
- The government through NFA has provided farmers with tree planting materials to grow their own trees like eucalyptus trees and later meet their domestic energy needs and other forestry products, which are quick maturing.
- Agro-forestry has been encouraged to deal with crop production as well as planting and conserving trees at the same time. Agro forestry demonstration centers have been set up at Kalengyere and Kachwenkano in Kabale, Kabanyolo in Wakiso, at Namulonge and in Bushenyi as well as coffee growing in Kayunga, Bugerere, Vanilla and cocoa planting in Mukono, Bundibugyo and Mubende has led to growth of forests.
- The forest department (National Forest Authority) has set up and maintained tree nurseries to continuously provide quick maturing tree species such as pines, cypress and eucalyptus trees to farmers and the rest of the population. These nurseries are found in Mbale, Luwero, Gulu, Mbarara, Masaka, Mukono at Namanve, etc.
- Some forests reserves like Kibaale, Bwindi, … have been made totally out of bounds from the tree exploiters and charcoal burners in order to allow the forests to regenerate where they were over exploited.
- Forest rangers have continued to patrol the forests regularly to stop the illegal clearing of the forests by the encroachers.
- Forests boundaries have been planted with firewood tree species in the densely populated areas e.g. Mt. Elgon forest in Mbale has a 10-meter wide forest boundary with firewood tree species on the densely populated slopes.
- Presently, the political situation in Uganda has greatly improved and restored by the UDPF army like ADF were drove away from Mt. Rwenzori forests, which implies that the forests are no longer at the risk of being destroyed by the government for security reasons.
- Peri -Urban forest plantations have been established and managed by forest department to provide saw timber and fuel wood in peri-urban areas of Uganda e.g. Jinja has 155.5 ha, Kampala has 144ha, Mbarara has 104 .7 ha, all these were planted in 1993 and Entebbe has Kitubulu planted forest.
- The government has encouraged the private sector to involve in the industrial wood production including saw mills, which harvest mature soft wood and invest in planting them e.g. Busoga Forest Company, Forest Consult and Saudi Marble Company in South Busoga.
- The forestry training project has been set up at Nabyeya in Masindi to train sawmill owners, logging, supervisors, sawmill operators and forestry staff (guards and rangers) in efficient log handling and timber production skills to maximize the utilization of logs cut.
- The forestry department (NFA) has started up a monitoring system of documenting forest produce being cut in each district in gazetted natural forests and those on private land. Uganda Revenue authority has helped this with other law enforcement agencies to regulate and control tree falling.
- Eco - tourism has been encouraged as an alternative option for the non-consumable use of forests. Pilot activities about eco-tourism have started at Mabira in Mukono, Budongo in Masindi and Mpanga forest reserve in Mpigi.
- Fire-fight equipments have been purchased and fire monitoring towers have been constructed to reduce on the fire out breaks in forests.
- Forests have been sprayed by deterring chemicals using aircraft in order to eliminate harmful pests and diseases, which destroy the forests and scare away human labour e.g. the tsetse flies, mosquitoes, leave rust, etc.
- The government has availed capital from internal and external means. Internally from taxes and externally from export earnings, loans and grants given by IMF and World Bank to buy the modern machines e.g. electric saws and employ more forest rangers.

- Transport links like roads leading to the forests have been rehabilitated and improved by the government so that they become more permanent than seasonal to facilitate forest exploitation and production.
- NEMA, NFA, MPs and the general public have continuously carried out national demonstrations and strikes against degazetting of forests like Mabira forest to Metha for sugarcane growing in 2007.
- Forestry related courses have been started at Makerere University to enhance research, ecology and implementation of NFA programmes. E.g. MUK is in the conservation of Mabira in Buyikwe and Kibaale forests in Kamwenge.
- Private companies have increasingly promoted tree planting as part of efforts to protect the environment like Lugazi sugar works planted Kawoolo forest in Buyikwe.

Sample questions:

1. "Forestry is a complementary rather than an obstacle to agricultural development in Uganda". Discuss.
2. Assess the contribution of the forestry industry to economy of Uganda.
3. Account for the continued deforestation in Uganda
4. Examine the factors facilitating the development of the forestry in Uganda.
5. Examine the factors limiting the utilization of the forests in Uganda
6. Discuss the measures being taken to promote the forestry sector in Uganda.
7. Account for the existence of different types of forests in Uganda.
8. To what extent have human activities influenced the distribution of forests in Uganda
9. Discuss the effects of forest depletion in Uganda

Sample Approaches:

You are expected to:

Account for the existence of different types of forests in Uganda.

- Define the key word (s) in the question.
- Cite out the status / stand/ situation of the forests.
- Identify, locate and describe the different types of forests in Uganda.
- Draw a sketch map showing the identified types with name of places.
- Give, explain and then illustrate the reasons responsible for the growth of different types of forests in Uganda both physical and human (each point in at least two ways).

Account for the continued deforestation in Uganda

- Define the key word (s) in the question.
- Cite out the status / stand / situation of deforestation.
- Identify and locate the distribution of forests in Uganda
- Then draw a proper sketch map to show the distribution of forests identified with their names of places.
- Give, explain and then illustrate the reasons responsible for the continued removal of forests in Uganda.

Assess the contribution of the forestry industry to economy of Uganda.

- Define the key word (s) in the question.
- Cite out the status / stand/ situation of the industry.
- Identify, locate and describe the types of forests in Uganda.
- Draw a sketch map showing the identified types with name of places.
- State, explain and then illustrate the points (both positive and negative contribution).

MINING INDUSTRY IN UGANDA

Mining is the extraction of mineral resources from the lithosphere in their primary form as well as processing them into the usable form / degree.

While minerals are substances which are both metallic and non - metallic those occur naturally in rocks and in the ground and have their own characteristics, appearance and chemical composition.

THE STATUS / TREND OF MINING SECTOR IN UGANDA

The status / trend of mining sector in Uganda are as follows;

~Non- traditional minerals are now being mined such as vermiculite at Namekhala in Manafwa and petroleum at Wanseko - Ssemliki basin on shores of L. Albert in Hoima, Buliisa and Masindi.

~There is an increase in the number of new mining areas such as Kitaka gold mine in Kamwenge and Namekhala vermiculite mines in Manafwa.

~The number of foreign firms engaged in mining has raised from 2 in the 1970s to over 18 companies by the year 2005 such as Tullow oil Ltd, and Neptune Petroleum Co. in petroleum drilling at Wanseko - Ssemliki basin on shores of L. Albert in Hoima and Masindi, Rio Tinto co. of South Africa in vermiculite mining at Namekhala in Manafwa, Anglovable Minerals of South Africa and Pacific Vanfold of Canada in copper and cobalt mining at Kilembe in Kasese, Saudi Marble Co, etc.

~ Over 260 mining firms are carrying out mineral survey under Airborne Geophysical Survey such as Tullow oil Ltd and Neptune Petroleum Co. in L. Albertine petroleum fields in Hoima, Buliisa, Ntoroko and Masindi.

~ Modem technology of oil drilling is being used at L. Albertine oil deposits in Buliisa by Tullow oil Ltd of U.K.

~ Mining sector has been declining since 1999 and the contribution of the mining sector to GDP decreased from 6.3% in 1999 - 2000 to 1.2% in 2003 - 2004. And now it has increased to 10.1 %.

~ The mining of Copper at Kilembe in Kasese is done on small scale.

~ Limestone mining at Sukulu in Tororo and at Hima in Kasese is at a low level.

~ The processing of lime at Kisoro, Toro at Muhokya and Gold in Kaabong, Kotido and Busia is being done using crude technology like spades and hoes.

~ Gold in Kaabong, Kotido and wolfram in Kabale are mined on small scale.

~ Most of the minerals are in small quantities and are of less economic use such as Gold in Kaabong, Kotido, Gulu and Kitgum.

~ Petroleum drilling in Wanseko - Semliki basin in Hoima and Masindi is in the secondary stages.

~ Vermiculite at Namekhala in Manafwa, colbalt in Kasese and gold in Busia, Mubende Kaabong, Kotido, Gulu and Kitgum are the leading mineral exports of value at the present.

~ Most of minerals like iron ore, clay, salt, limestone, sand and stones are mainly consumed locally.

~Quarrying of rocks at Muyenga in Kampala, sand and clay on the shores of L. Victoria in Wakiso, Kampala and Mukono are on the increase throughout the country.

THE DISTRIBUTION OF MINERAL RESOURCES IN UGANDA

The distribution of mineral resources in Uganda is as follows;

~**Kasese mining region with** cobalt and copper mined at Kilembe, lime stone at Hima, salt at Lake Katwe and L. Kasenyi, Gold at Kitaka in Kamwenge, gypsum and Kaolin.

~ **South western Uganda region** with tantelite and columbite in Kabale and Rukungiri, Gold in Kisoro, Iron ore at Muko in Kabale, diamonds in Ibanda, wolfram in Kisoro and Volcanic ash in most areas of South western Uganda.

~**Tororo mining region** with gold at Busia, limestone at Tororo and Sukulu hill, phosphate at Tororo in Sukulu hills, salt, pumice and asbestos at Tororo.

~Bushenyi and Buhweju with gold, diamond, columbite and tantalum.

~Karamoja with gold, Marble and mica at Moroto, Kotido and Kaabong, Limestone in Nakapiripiriti, volcanic ash and talc.

~Mubende with wolfram, gold and columbite.

~Lake Albert basin in Buliisa and Hoima, Semliki valley in Ntoroko, Rhino basin along Albert Nile in Amuru, L. Edward – George complex in Kanunga and Bushenyi with oil deposits (Petroleum).

~Lake Victoria shores in Kampala and Wakiso and Kyoga shores in Serere, Apac and Nakasongola with sand and clay.

~Sironko and Kapachorwa with Limestone.

~Manafwa at Namekhala with Vermiculite.

~Lake Albert in Hoima with salt.

~Mbarara with Tin at Kikagati and sand.

~West Nile with Gold, Miica, Marble in Moyo and Yumbe.

~Kampala area, Mbarara, Bushenyi, Ntungamo with Granite Gneiss.

~Kibaale, Mubende, Masindi and Busia with Uranium.

~Etc.

A SKETCH MAP OF UGANDA SHOWING THE DISTRIBUTION OF MINERALS

FACTORS RESPONSIBLE FOR THE GROWTH OF THE MINING INDUSTRY IN UGANDA

Mining has been able to develop because of number of factors both natural and human factors. These are:

- Presence of a variety of minerals of commercial value which are endowed in Uganda like vermiculite in Manafwa, Oil and Natural gas from Semliki- Wanseko basin, gold at Busia and Kitaka in Kamwenge, etc which has exploited as a basis for development of the mining industry.
- Existence of fairly and various transport routes which are constructed by the government to help in accessing the mining activities such as the Mbale - Kapchorwa road to facilitate the mining of Vermiculite in Manafwa, Gold in Busia and limestone in Kapchorwa; and others.
- Presence of revived plans initiated by the government to open up the formerly closed mineral areas so as to develop the mining industry. E.g. the Kasese – Kilembe mines were re-opened up and recycling of cobalt from copper residues is done by the Kasese Cobalt plant which is a foreign company.
- Existence of huge hydro electric and diesel generated power which has been developed or extended to mining regions so as to run the mining facilities. E.g. the

government through Uganda Electricity Ttransmission Company extended power to Kapchorwa for limestone mining and cement processing.

- Presence of both local and foreign investors which are attracted by the government for long investing in the mining Industry e.g. vermiculite in Manafwa is mined by a South Africa Co. called Rio Tinto and processing of cobalt in Kasese is a joint venture between Uganda, France and Australian government.
- Presence of adequate capital to be invested the mining industry which is obtained from the World Bank, IMF (International Monetary Fund), African development Bank and some from foreign investors such as Rio Tinto from S.A which mines vermiculite from Namekhala mines in Manafwa.
- Existence of positive government liberalization and privatization policies towards the development of the mining industry. For example in 1988, a gold buying centre was set up in Kampala which made more gold for export from Mubende and Busia gold mines and between 1988 -1992, more than one tone of gold was exported which earned Uganda US$ 970,750.
- Existence of reliable market for minerals in India, Australia and China for buying the extracted and processed minerals. Uganda has also opened up more market for minerals by joining economic integration organisations such as the, EAC, PTA, COMESA and KBO for increased markets of mineral resources. For example Uganda today exports cement and clay products to Rwanda, DR.Congo and Sudan.
- Existence of relative political stability for smooth and peaceful running of mining activities like Kasese where cobalt is recycled, Limestone at Hima and Salt at Katwe are mined have led to development of the mining industry which has been done through deployment of the UPDF and disarmament of the Karamajong warriors in Kaabong with gold.
- Presence of anti smuggling centers which were set up and stationed by the Government under URA by the special revenue protection services personnel to curb the smuggling of minerals like gold from Busia and Malaba and Cement from Tororo near the Uganda – Kenya border.
- Presence of both skilled and semi-skilled labour for operating mining activities. The Ministry of Energy and Mineral Resources sent students to USA, Libya, Nigeria, Venezuela and Peru to study geological survey, Mapping, remote sensing and exploration as well as mineral exploitation. Such skilled labour is the one that has discovered oil in the Semuliki basin in Buliisa with help foreign experts from Britian of Heritage oil co.
- Existence of some minerals near the earth's surface such that they are easy to mine using open cast mining method which is a cheapest method. E.g. sand and clay at Seeta and Kajjansi; Mica in Nebbi; etc are being exploited by the local population using the locally available tools like hoes, spades, stone hammers, mattocks and pickaxes.
- Presence of modem technology to carry out mining operation of extraction and processing that are being imported in Uganda from U.S.A, Canada and Japan. For example Tullow oil Uganda limited and Heritage oil and gas Ltd imported oil drilling machines to Wanseko - Semliki basin from USA, Canada and Japan leading to large scale mining of oil and natural gas.
- Existence of mineral research and mineral exploration which has been done to discover mineral potentials for exploitation in Uganda. Over 500 mining exploration licenses have been issued since the 2003 Mining Law was established. For example Gold deposits have been discovered in Busia, Uranium in Kibale; and others.
- Informative advertisements of mineral products for increased market like clay products by Uganda Clays at Kajjansiin Wakiso and limestone products like cements by Hima ltd in Kasese and Tororo limestone co. in Tororo.
- Presence of adequate water from lakes and rivers for processing and cleaning the mineral ore after being primarily extraction like Lake George near Cobalt mine in Kasese.

CONTRIBUTION OF MINING TO ECONOMIC DEVELOPMENT OF UGANDA

The mining sector has also contributed both positively and negatively to the development of Uganda. These are;

Positive values:

- Employment opportunities have been generated in various mining activities engaging thousands of Ugandans which has in turn earned income to them thus improving on their living conditions, paying PAYE and local service tax to the government. E.g. more than 100,000 people are employed within the Tororo and Hima limestone mines and other related activities.
- Mining has stimulated the growth and development of industries as they use the minerals as their raw materials in order to produce finished goods. E.g. limestone from Tororo and Hima in Kasese are used to manufacture cement at Tororo and Hima cement factories; salt from L. Katwe in Kasese for making edible salt at Katwe salt plant, and others.
- The mining sector have generated to Ugandan government revenue through licenses to taxes imposed on the mining companies like Canmin resources Ltd, Saudi Marble company, and others; and individual workers in the mines plus other individuals dealing in commercial mining related activities.
- Mining sector has contributed to Uganda's foreign exchange earnings through exportation of minerals and their products. For example Cobalt from Kasese is exported to Australia, Japan, etc.
- Mining has led the development of infrastructure in Uganda especially in the areas where the mines are located. E.g. copper mining in 1960's at Kilembe led to the extension of the railway line from Jinja to Kasese and the construction of Mubuku power station; and currently various roads in Hoima and Masindi are being renovated because Tullow oil Uganda Ltd that drills oil in L. Albert lowlands by 2007 invested over 1 million US dollars on social infrastructure.
- The mining industries have promoted the international relationship between Uganda and the countries to which it exports its minerals which has in turn attracted more foreign investors, immigrants labour and the exchange of other goods. E.g. copper mining at Kilembe had strengthened Uganda's relationship with Britain, the country which was mining it at that time.
- Mining has contributed to the growth and development of various social amenities in the areas where mining activities are carried out E.g. copper and cobalt mining at Kilembe, salt mining at Katwe and Limestone mining at Hima led to set up schools, recreation centres, water points and power station in Kasese town.
- Mining as a sector in Ugandan has attracted many foreign investors into the business among which are the Anglo - Lovable minerals of South Africa and Pacific Vanfold of Canada are involved in gold mining in Kaabong, Saudi Marble Company of South Arabia in Marble and mica mining in Nebbi, etc who have in turn raised the country's revenue, investment capital, market for the minerals and other consumable goods, the discovery of more minerals.
- The mining activities such as the copper and cobalt mines at Kilembe, limestone mines at Tororo and Hima, salt mining at Lake Katwe and Kibiro in Hoima, etc are used for educational purposes and research studies by students in A and 0 levels as well higher institutions of learning for tourism, geology, environmental conservation and geography field studies.
- The mining sector in Uganda has helped to train the employed labour force in mining related operations and even to set up institutions of mining, etc impart technical and managerial skills in the mining related activities. E.g. Tullow oil co in Buliia are training their workers to equip them with skills in mineral survey, mapping, drilling and mining, mineral economics and others.
- The mining sector has boosted tourism in the mining centres like Kilembe copper and cobalt mines, Hima and Tororo limestone mines, Mubende and Busia gold mines, etc as they are tourist attractions for both local and foreign tourists who come to see these sites for either adventurism or research which has in turn added on the country's foreign exchange.
- It has helped in the diversification of Uganda's economy which has been mostly depending on agricultural activities which are usually affected by biological and

climatic hazards and low international prices. E.g. Vermiculite mining in Manafwa has diversified banana and Arabica coffee growing among Bagisu, etc.

- Mining has led to development of towns in areas where mining related activities take place. E.g. Kilembe town in Kasese started as a residential area for workers in the Kilembe mines, which provides social, economic, political and cultural services such as accommodations, trade and commerce, banking, insurance, electricity, medicare and security leading to urban development.
- The mining sector has facilitated the exploitation of other resources which would otherwise be left idle like water, land and forest resources e.g. mining of cobalt in the Kasese - Kilembe mines facilitated the exploitation of timber from Rwenzori and Kibale forests in the Kasese mining region.
- The mining industry has led to development of the building and construction industry. For example mining of clay at Kajjansi has provided bricks and tiles used for house construction in Kampala, Wakiso, Entebbe and other towns; Cement from Tororo and Hima limestone mines is used in both road and house construction in Kampala, Tororo, Kasese, Jinja and other towns; etc.

Negative values:

- Opencast and adit mining has led to destruction of agricultural land. E.g. in the Kilembe copper mines in Kasese, a large piece of land was excavated and the heaps of soils extracted were dumped on the agricultural land which affected agricultural productivity and responsible for the destruction of flora and fauna where the soils were dumped.
- The excavated mineral pits created due to mining become breeding places of mosquitoes which transmit malaria, the most killer disease in Uganda. For example the incidences of malaria in the mining regions of Kajjansi and Seeta in Wakiso where clay is mined are quite high, due to presence of stagnant waters in the mining pits created.
- The mining sector has increased air pollution in the adjacent areas. For example the mining and processing of limestone in Tororo and Hima has led to air pollution in Tororo and Kasese from dust particles released into the atmosphere thus creating health hazards to animals and people in the area.
- Cobalt and copper wastes from Kilembe mines are usually dumped in L. George - Kazinga channel - Edward wetland complex and even the waters of R. Mpanga - Katonga which has polluted waters and harmed the aquatic life.
- Land pollution has also occurred due to the mining sector through dumped liquid and solid wastes. E.g. the toxic reagents used to clean minerals like iron ore, tin and gold in Kisoro and Kabale destroy plant and the soil living micro- oganisms once disposed on the land.
- Noise pollution from the explosive made in the mines in the due course of mining of copper at Kilembe, Limestone at Tororo and Hima is above the acceptable levels by the International Labour Organisation which has caused tension among workers and even to lose their hearing.
- Natural forests and open woodland such as Mabira in Buyikwe and Mt. Elgon forests in Mbale are being rapidly cut to provide fuel wood and timber for brick and tile firing which has in turn led to serious upset in the balance of the natural environment.
- The mining sector has led to growth of urban centers with negative effects like crime proliferation, slum development, unemployment, prostitution, etc which are threat to the country's development such as Kajjansi where clay is mined in Wakiso is with such urban evils.
- A decline in mining and mineral exhaustion has left some areas in Uganda with problems of unemployment e.g. Kilembe copper mines in 1970's closed due to mineral exhausted in the exposed portion and halting of salt mining from lake Katwe stopped in 1986 due to poor technology which affected people in the area with unemployment.
- Careless mining increases the incidence of mass wasting and landslides as pits are excavated in the earth, the soils in the area lose their compatibility due to vibrations caused by the mining machines. For example vermiculite mining in Manafwa, has led to mass wasting occurrences and even limestone mining in Tororo region led to the walls and roofs of Tororo girls' school to be damaged by ground vibrations.
- Clay mining like in Seeta and Kajjansi and oil drilling like in Semliki valley in Bundibugyo especially in wetland and forested areas has seriously interfered with wetland ecology and wildlife as vast vegetation is cleared in the process of mining.
- The search for gold has left behind open pits and scares in the landscape with serious impact on water quality and living organisms. E.g. the reckless use of mercury to recover gold in Kanungu and Kitgum has been dangerous to micro organisms, aquatic life and terrestrial organisms and toxic to human beings in those areas where gold is continuously searched.

PROBLEMS FACING THE MINING INDUSTRY IN UGANDA

The following are the problems hindering the progress of the mining sector in Uganda;

- Inadequate capital and indigenous technology to explore and to exploit the minerals. For example sand mining at Kasenyi on shores of L. Victoria is done through use of poor tools like hoes due to limited funds among the miners thus limiting the large scale commercial mining activities.
- Some minerals like wolfram in Kabale, Mica in Nebbi and gold in Kaabong are located in rural and remote areas with poor transport facilities which has posed the problem of moving machinery especially in the rainy season when the existing murrain roads become muddy and impassable.
- The high transport costs incurred in moving the machinery and exploited minerals has led to an increase in production costs. E.g. cement and limestone from Tororo and Hima is sold at high prices at the national level partly as away to recover the transport costs incurred.
- Limited skilled manpower to work in the mines like gold mines in Busia. For example the British mined copper from the Kilembe mines, Vermiculite from Manafwa is mined by South Africans and petroleum from Semliki - Wanseko basin is exploited foreigners from Britian since Uganda lacks the mineral expatriates.
- Limited advanced technology in the mining sector which has resulted into the use of rudimentary mining methods which are inefficient e.g. gold mining in Kaabong and Busia are through use of rudimentary methods. Due to the same case, oil drilling in L. Albert had delayed as oil drilling machines were lacked in Uganda.
- Most of the major mineral miners are foreign investors such as the Anglo -Lovable minerals of S. Africa, Saudi Arabia Company of Saudi Arabia, etc who have repatriated the profits to their home countries leaving Uganda drained of its mineral wealth thus failure of managing the mining sector sustainably.
- In some cases the mining activities are delayed and restricted by the environmental conservationists who first establish an environmental impact assessment over the areas where the mineral is to be mined E.g. the oil drilling in L. Albert lowlands was initially delayed by the National Environmental Management Authority (NEMA) which was still doing assessment work.
- Political instability in Kasese by ADF in 2000 affected the recycling of cobalt while insecurity and hostilities of some tribes by Karamoja warriors in Kotido and Moroto limits mining of gold and limestone.
- The mining sector of Uganda is suffering from stiff competition with other mineral producing countries which even have minerals of high quality e.g. DRC and Zambia have better copper ore than that from Kilembe
- The industry is also suffering from competition with other sectors like agriculture, forestry, tourism, etc of Uganda's economy in terms of financial assistance and needed labour e.g. pastoralism in Karamoja is out competing gold mining in Moroto, Kaabong and Kotido and limestone mining in Nakapiripirit, etc.

- There are limited power and energy supply to extract and process minerals like limestone in Kotido, Sironko and Moroto. which require large quantities of electricity which is not yet generated in Uganda and extended to those areas.
- Exhaustion of minerals has led to low level of the mining industry like tin from Kikagati in Mbarara and Wolfram in Kabale leading to the loss in form of machinery that where established to mine and process the mineral as well as experts.
- Some minerals occur in small quantities which is uneconomical to mine them like Busitema gold mine exports 4kg of gold per month which don't call for large scale investment in the industry.
- Prices of the minerals like gold mined in Busia and Kaabong and cobalt from Kasese on the world market tend to fluctuate which affected the mining earnings expected thus leading to closure of some mines.
- Mining as an activity is dangerous, risky and difficult because it involves underground collapse of the roofs leading to the death of the miners. This occurs at Kilembe where copper and cobalt are mined and at Muyenga in Kampala where stone quarrying.
- There is inadequate mineral exploration and research to discover the potential wealth of minerals. E.g. the first petroleum geological survey around Lake Albert in 1920s did not ascertain the presence of the mineral at the spot because it indicated that if at all petroleum existed, it was below a hard rock thus difficult to extract it.
- Some minerals such as iron ore in Kabale and copper from Kilembe are deeply burried under hard basement rocks which make them difficult and expensive to extract.
- Smuggling of minerals across borders is also a problem leading to low level of the mining industry in Uganda. For example gold from Busia and cement from Tororo are usually smuggled to Kenya, Tanzania and Dubai (United Arab Emirates) which therefore leads losses to the mining sector.
- The quality and concentration of minerals such as gold in Busia, copper in Kilembe, wolfram in Kabale, and others are poor and low which reduces the demand for such minerals on the world market whereas high costs are incurred to process the mineral from the bulky and impure ore to pure one.
- Some of the minerals such as Tin, Beryllium, Gold, and Columbite in Kabale -Kisoro region as well as oil deposits in Semliki - Wanseko valley are located in peoples' farmlands which have called for displacement and compensation of such people before extraction is under taken.
- During the process of exploitation, the minerals such as limestone at Hima and Tororo have caused air pollution particularly due to limestone particles in the air which has created health hazards such as lung cancer, asthma, and bronchitis not only to the workers in the mines but also to the people who live in the nearby villages of Kasese and Tororo respectively.
- There is reducing market for some minerals such as Copper from Kasese due to alternative materials and advanced technology which has been introduced like wireless communications in the Uganda telecommunications has greatly affected copper mining at Kilembe.
- Corruption, embezzlement and mismanagement of funds by government officials have affected the mining industry. For example copper pyrites from Kilembe were stolen by some government officers in Kilembe in the early 2000s and vermiculite mines in Manafwa was tendered inappropriately to Rio Tinto co. from S. Africa in 2007.
- Health problems including disease out break have affected the mining industry. For example out break of the Marburg Virus disease in 2007 which is similar to Ebola in 2000 led to temporary closure of the Kitaka gold mines in Kamwenge district within the Kakasi forest reserve, AIDS epidemic and malaria also slows down mining activities in Sironko limestone and Namekhala vermiculite mines.
- International territorial conflict between Uganda and DRC has affected mining like DRC claims the ownership of Rukwanzi Island in Lake Albert yet the island is strategic for Oil mining in and around Lake Albert.
- Poor processing facilities such as corrosion of mining and processing equipments led to closure of some mines. E.g. Lake Katwe salt mining in 1986 closed due to poor materials which corroded making salt smelly and unfit for human consumption by the Swiss company and left the country.

MEASURES BEING TAKEN TO REACTIVATE THE MINING SECTOR IN UGANDA

The following are the steps being taken to develop the mining sector;

♂ Political stability is being established in mining areas like Kasese where cobalt is recycled, mica in Gulu and gold in Kotido where are mined has been done through the Ministry of Defense using the UPDF to drive away the ADF and LRA rebel activities and disarmament of the Karamajong warriors.

♂ Aggressive and modem mineral survey techniques such as Aerial survey are being adopted. The ministry of energy resources is giving out over 260 licenses to foreign firms such as Tullow oil from London and others to conduct mineral survey of oil in Albertine basin.

♂ The government is encouraging both local and foreign investors to invest in the mining Industry for example vermiculite in Mbale is mined by a S. African firm called Rio Tinto, processing of cobalt at Kasese is done as a joint venture between Uganda, France and Australian governments, Hima Tibest from China in revived mining of copper at Kilembe.

♂ The government is improving road system such as the Mbale - Kapchorwa road to facilitate mining of Vermiculite in Manafwa, Gold in Busia and limestone in Kapchorwa; to facilitate transportation of limestone's and vermiculite products.

♂ The government is starting recycling of mineral by products such as cobalt from copper wastes at the Kasese Cobalt plant which is done by a foreign company called Kasese Cobalt Company as a joint venture between Uganda, France and Australian governments.

♂ The government under the Ministry of energy and mineral resources and Education and Sports is sending students on scholarships to USA, Libya, Nigeria, Venezuela and Peru to study geological survey, Mapping and exploration as well as other mining activities to discover more oil wells in the Semliki -Wanseko basin and Rhino camp basin in West Nile coupled with experts from Tullow oil co and Neptune Petroleum co. from London.

♂ The government is even allocating Shs 3b to a newly created Uganda Petroluem Institute in Kigumba, Masindi district which was commenced in October 2009 to train petroleum related workers.

♂ The Ugandan Government is opening more market for minerals by joining economic integration organisations such as the PTA, COMESA, Kagera Basin Organisation, Asiatic countries like China and India for increased markets of mineral resources. For example Uganda today exports cement from Hima and Tororo to Rwanda, DR.Congo, Sudan and other countries.

♂ The government is renovating and rehabilitating of the mineral factories that had come to a standstill. For example the Tororo phosphates fertilizers industry and the Katwe salt plant in Kasese are under renovation so as to resume processing and mining too.

♂ The Ugandan government is seeking financial support through the Ministry of Finance from financial institutions like the World Bank, IMF (International Monetary Fund), Paris club, African development Bank, etc to get the necessary capital, machinery needed in mining. For example funds for oil exploration in Semliki - Wanseko basin were obtained from the World Bank and Britain.

♂ There is extension of power to Kapchorwa for limestone mining and cement processing, in Yumbe, limestone quarrying is done using installed diesel generators and the Uganda Electricity Transmission Company is doing the extension of electricity in these areas as well as other areas in West Nile for exploitation of mica, gold and other minerals.

♂ The government is undertaking liberalisation of mining activities so as to develop the sector. For example in 1988, a gold buying centre was established and this generated more gold for exports in the country and between 1988 -1992, more than one tone of gold was exported.

♂ The government through joint ventures with foreign firms like Canmin resources from Canada has opened up new mining areas such as Kitaka gold mines in Kyenjojo district, Kasese cobalt plant at Kilembe, Tororo phosphate mines and many others.

♂ The government is trying to curb the evil practices in mining sector like smuggling by enforcing the law through the Anti smuggling units, Police, ISO. E.g. gold smuggling from Busia mine is being controlled by the special revenue services personnel who are stationed on every border like at Busia and Malaba near the Kenyan border and others.

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SAMPLE QUESTIONS:

1. Account for the development and expansion of the mining industry in Uganda.
2. Assess the contributions of the mining areas to the development of Uganda.
3. Account for the low level of the mining industry in Uganda.
4. Explain the steps being taken to develop the mining sector.

SAMPLE APPROACH:

INTRODUCTION

- You are expected to define the keyword(s) i.e. mining / mining sector (industry) / minerals.
- You are expected to give the positive / negative status (trend) in relation to the keyword(s).

Any 4 Points

- You are expected to bring out the areas in relation to the keyword(s) i.e. mining / mining sector (industry) / minerals.
- You are expected to draw a sketch map to show the identified and located areas with names of places. **BODY**
- You are expected to state, explain and illustrate the points (factors) in relation the demands of the command word in the question and the keyword(s). **Any 18 well explained and illustrated points.**

POPULATION DISTRIBUTION IN UGANDA

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

While population distribution is the wide spread of people over an area and population density is the number of people per square kilometre.

The following is the Ugandan population trend / status over decades and years past;

In 1948 census, the population was 4.9 million people at 2.0% growth rate.

In 1959 census, the population was 6.4 million people at 2.5%.

In 1969 census, the population was 9.5 million people at 3.9%.

In 1980 census, it was 12.6 million people at 2.7%.

In 1991 census, it was 16.7 million with females out numbering males at 2.5%.

In 2002 census, it was 24.2million at 3.2%.

In 2014 census, it was 34.6 million at 3.0%.

In 2016 projection, it has been estimated to be 35 million at 3.0%.

Population growth rate was 2.5 % in 1991 census and it rose to 3.2 % in 2002 census, and then it declined to 3.0% in 2014. Generally population has been increasing at inter - censal growth rate of between 0.2% and 0.5%.

Ugandan population added 10.4 million people from 2002 with an annual population growth rate of 3.0%.

The trend / status of the population density of Uganda over time are as follows;

In 1959, it was 33 persons per sq km
In 1969, it was 48 persons per sq km.
In 1980, it was 64 persons per sq km.
In 1991, it was 85 persons per sq km.
In 2002, it was 124 persons per sq km.
In 2014, it was 173 persons per sq km.

The population distribution / density in Uganda vary per region and are as follows;

Densely populated districts are Kampala, Jinja, Kabale, Mpigi, Tororo, Kabale, Kisoro, Mbale, Entebbe, Kayunga, Nebbi, Manafwa, Butaleja, Bududa, Isingiro, Kiruhura, Wakiso, Ntungamo, Iganga, Kamuli, Budadiri, Bundibugyo, Bagisu, Bunghoko, Manjiya, Rubanda, Kisoro and others with high population densities of over 150 persons per a square kilometer.

Moderately populated are Kasese, Bugiri, Bushenyi, Kibale, Hoima, Masindi, Gulu, Lira, Masaka, Bugiri, Mukono, Soroti, etc with medium population densities between 149 - 50 persons per a square kilometer.

Sparsely populated are Kitgum, Pader, Katakwi, Nakapiripirit, Moyo, the pastoral corridors of Ankole – Masaka in Sembabule, Buliisa, Nakasongola and Karamoja in Kaabong, Moroto and Kotido; (the Ankole - L. Kyoga area), and areas with national parks, game reserves, wetlands, steep slopes and forest reserves, etc with low population densities of less 49 persons per a square kilometer.

SKETCH MAP OF UGANDA SHOWING POPULATION DISTRIBUTION

FULL PAGE FOR A MAP

SKETCH MAP OF UGANDA SHOWING POPULATION DENSITY.

FULL PAGE FOR A MAP

FACTORS RESPONSIBLE FOR THE POPULATION DISTRIBUTION / DENSITY IN UGANDA

The following are the factors that have influenced the population distribution in Uganda either positively or negatively which are environmental and non-environmental:

Physical factors:

1. Climate is a major factor influencing the population concentration in an area especially in terms of rainfall and temperature where by areas like the shores of L. Victoria, Bugisu, Kabale and Rwenzori highlands which receive heavy rainfall of over 1500 mm per year and experiencing hot temperatures of about 25^{o} C – 27^{o} C have attracted high human settlement because that climate supports the growth of various crops like bananas, coffee, vegetables, etc.

On the other hand, areas like Gulu, Apac, Lira, Kiboga, Mubende, Masindi, Luweero, Mpigi, etc which receive moderate rainfall ranging between 750 – 1500 mm per year such as Gulu, Masindi, Lira, Sororti, etc and those receiving unreliable rainfall of less than 750mm per year such as Karamoja region, Ankole – Masaka corridor, Nakasongola and Buliisa support medium population because they support growing of seasonal and cereal crops like beans, maize, sorghrum, sweet potatoes, cassava, etc and low population densities because they do support the growing of cereal crops and pastoralism respectively.

2. Soils influence the population distribution through their productivity where by areas with rich and fertile soils especially of volcanic origin and loam alluvial type like Kigezi, Gishu and shores of L.Victoria areas have attracted high population since these soils support cultivation of various crops because a lot of food is grown to support that increased population.

On the other hand, areas with poor quality fertile soils and acidic soils support moderate and low population e.g. the upper slopes of Mt. Rwenzori and Elgon have thin stony soils, valley swamps have clay acidic soils like the shores of Lake Kyoga, Kitgum and Kotido in Northern Uganda have the ferralsol soils and sand in nature which have attracted low population because such soils cannot support a variety of crops.

3. Relief of an area also accounts for the population distribution in Uganda where by areas with steep slopes like the Butiaba and Kichwamba escarpments in the western rift valley, Kapchorwa and others areas with rough, rugged and hilly surfaces like the upper slopes of mountains of Rwenzori, Elgon and Muhavura attracted low or Nile population because of the unfavourable conditions for human settlement like difficulty in constructions, high soil erosion tenderness, landslides, etc.

While low lying areas like the Semliki areas, Lake Albert flats and the Nile valley areas hinder settlement because they tend to flood during the rainy seasons as well as experiencing high temperatures.

On the other hand, highlands' or mountains' foot hills of Elgon and Kigezi as well as Nakasero hill, Wakiso hills and other Buganda hills have attracted dense population especially on the gently sloping areas because they receive heavy relief rainfall, have fertile volcanic soils and undulating landscape which are good for human settlement.

4. Altitude influences the population distribution in different ways as the temperatures lower as one moves higher on high altitudes above 3,000 meters above see level like on Mt. Rwenzori, Muhavura and Elgon, the settlement also lowers because too much coldness, less oxygen and dense dew (dampness) scares away man. Further more as temperatures also tend to increase as the altitude lowers like in the western rift valley region the settlement decreases which too scares away population but on the other hand mildly, moderate and health temperatures on lower slopes of mountains and gentle areas with enough oxygen e.g. Kigezi highlands, Kampala and Mbale have attracted high population densities.

5. Drainage affects population where by wetlands or swampy areas attracted sparse or limited population because they are occupied by water, papyrus, subjected to flooding, breeding places for such mosquitoes and tsetse flies and barrier to communication lines such as immediate the shores of L. Kyoga and L. Victoria basin.

Further more, the wetlands are water logged giving rise to acidic clay and sandy soils which are unsuitable for agriculture thus low population density.

On the other hand, well drained areas like the Buganda gentle hills in Kampala, Mukono, Entebbe, etc have dense population because they favor easy infrastructural construction and agriculture.

6. Vegetation affect population where by thick vegetation like forested and swampy areas have low population densities because they are homes of dangerous pests like mosquitoes which transmits and wild animals like lions, monkeys and hyenas which scare away population, and others have been gazetted as forest reserves and National parks e.g. Mabira, Budongo, Bugoma, Maramagambo, Kabale forests reserves and Bwindi impenetrable forests which means that people are not supposed to settle there.

On the other hand, areas in Buganda like Kampala, Mukono, Masaka and Entebbe; in Busoga like Iganga and Jinja etc with less and thin vegetation of savanna type have dense population because they do not habitat dangerous vermines and are easy to clear by man for economic development.

7. **Biotic factor** is also responsible for the population distributions where by presence of pests, insects and others such as tsetse flies, mosquitoes, ticks and their associated diseases have been unattractive to human settlement in Masindi, Gulu, Moyo and along the shores of L. Victoria and Kyoga, South Busoga, between Karamoja and Teso as they do affect human life, crops and animal husbandry thus turning them to be areas of low population densities.

Whilst areas in Buganda like Kampala, Mukono, Masaka and Entebbe; in Bugishu like Mbale; Kigezi like Kabale and Kisoro with less incidents of pests and diseases have dense population because of the condusive atmosphere for human settlement and animal and crop husbandry.

Other factors:

1. Industrialization influences population where by major towns e.g. Kampala, Jinja, Mbarara, Tororo and Mbale are highly industrialized with industries dealing in soft drinks like century bottlers, brewing like Nile breweries, plastics like Nice and Mukwano, vegetable cooking oil like BIDCO, paper like Picface, soap like Yeyo, paints like Peacock, mattresses like Vita foam, etc have attracted job seekers to make these areas highly populated.

On other hand towns like Kaabong, Kitgum, Masindi and Moyo which lack manufacturing industries have low population density because they are not attractive for human settlement.

2. Mining influences population where by areas with mineral deposits have attracted high population e.g. the existence of cobalt, salt and copper in Kasese; lime stone and phosphates in Tororo and Limestone in Hima have attracted high population concentrations.

Whilst areas like Karamajong, Kitgum, Masindi and Moyo with less or on minerals have attracted low population density.

3. Plantations / Estates influences population where by large plantations or estates for agricultural purposes have attracted large populations such as Kakira in Jinja and Lugazi in Mukono for sugar canes and tea plantation in Kabalore, Mityana and Mukono (Kasaku) have high population in terms of job seekers and out growers around them.

On the contrary, areas like Kotido, Kitgum, Masindi, Moroto and Moyo without major agricultural lands have attracted less people to settle in them.

4. Urbanisation influences population where by urban centres such as Jinja, Gulu, Mbale, Kampala, Kasese, Kabale, Mbarara, etc have attracted high population concentration despite of favourable and unfavourable climatic conditions because of presence of social services like education, good transport services, medical care, power, water, etc which are ideal essential for living e.g. most of the schools and hospitals in Uganda were first established in Buganda, then Busoga, Bugishu and Kabale.

On the contrary areas with less social services and essentials for human survival like Kotido and Ankole-Masaka corridor have limited settlement thus sparse population.

5. Transport and Communication influences population where by the presence of major transport and communication networks in certain areas of Uganda like in Kampala, Jinja, Mbale, Tororo and Mbarara have attracted high population especially the roads and the railways in terms of lineal settlement due to the desire for easy accessibility. For example people have settled in large numbers along Kampala - Jinja road from Nakawa, Banda, Kireka, Bweyogerere, Sseeta up to Mukono because it enhance human mobility, trade and commerce.

Whilst remoteness and inaccessibility in some districts like Kaabong, Moroto and Kotido has turned these regions to be of low populations because they are not attractive to human settlement due to lack of developed transport and communication network.

6. Market potentiality influences population where by areas with market potentials have attracted and accounted for high population distribution in Uganda because people mainly like to settle near market centres where they can easily buy what they want and sell what they produce e.g. Kalerwe market, Nakawa market, Owino (St Balikuddembe) market and Nakasero market in Kampala and being near Wakiso, Mpigi and Entebbe have attracted people to settle in them.

On other hand regions with less market potentials like Karamoja have attracted less people because people are not motivated to carry out any activity without market for the produce.

7. Cultural Factor influences population where by the pastoral economy of cattle keeping demands large areas for grazing the animals which means that such areas have low population concentrations because of the need of the vast / very big piece of land e.g. the Bahima of Ankole and Karamojong of North Eastern Uganda are sparsely populated.

On the contrary some tribes like the Bakiga, Basoga and Baganda have had a history of high population densities and they still exist, so those areas like in Kabale, Iganga, Mbale, Kampala, Wakiso and Masaka districts have ended up being high populated.

8. No Man's Land influences population where by in the past, Uganda had strips of land left unoccupied known as no man's land between the conflicting tribes. This existed between tribal wars among the Teso and the Karamojongs in Katawi, Baganda and Banyoro in Kibaale and Kiboga,

Banyori and Japadhola which situation left such areas with low population unlike of the recent few settlements. Whilst ancient kingdoms such as Buganda in Wakiso and Kampala, Busoga in Jinja are densily populated because of security and cultural reasons.

9. Tribal Location influences population where by the headquarters or seats of the traditional leaders e.g. chiefs, kings and clan leaders became highly populated because people liked to settle near their leaders e.g. Mengo in Buganda, Mbale in Bugishu, Jinja in, Fort portal in Tororo, Hoima in Bunyoro and Mbarara in Ankole. While those areas far away the traditional seats like Kayunga and Rakai in Buganda, Kamuli in Busoga, Masindi in Bunyoro and Ntungamo in Ankole called for low or moderate population because nothing was a centre of attraction traditionally.

10. Security influences population where by Gulu and Lira districts as well as its neighbors in northern Uganda, their population densities were decreasing continuously because of the political instabilities caused by the LRA rebels led Kony between 1986 and 2006. Similarly insecurity caused by the Karamoja has led to low population in a certain zones between them and the Iteso land as people run away from the battling grounds.

On the other hand areas which are politically stable such as Mbale, Kabale, Masaka, Mbarara and Kampala have high population densities because people have chances to carryout their activities freely like farming, trade, commerce and other forms of investments without fear of losing anything.

11. Government policy through its policies has influenced the population distribution in Uganda in different ways as the government has gazetted certain areas as national parks, games reserves and forest reserves where settlement is strictly prohibited e.g. Kabalega National park, Kidepo, Queen Elizabeth, Semliki game reserve and forest reserve as well as Bwindi impenetrable forest, Kibale forests, etc, so such areas have no population.

While the government has also designed resettlement schemes so as to transfer people from densily populated areas to areas of low population e.g. many landless Bakiga were resettled in Kasese, Kibale, Hoima, Masindi and Apac, making those areas to have more population concentrations.

More also the government established irrigation schemes or plantations which attract settlements as workers on them such as Mubuku irrigation scheme in Kasese and Kibimba irrigation scheme in Bugiri while the other way the government scares away the population is by displacing them to establish there a firm or an industry like Namanve industrial area near Kampala.

12. Historical incidence influences population where by the slavery event which happened in 1800s in areas such as Western Uganda in Bunyoro, Northern Uganda in Acholi and Lango as well as Toro region led to relatively low population densties because they were depopulated by getting slaves from them. Whilst areas like Busoga, Bugishu and Buganda were not affected by slavery just because they were administrative centres and bases for Arab traders and missionaries thus the population remained not disrupted but to increase.

POPULATION GROWTH

Population growth is the natural increase in number of people or inhabitants in a given area in terms of birth rates, death rates and migrations.

Areas of rapid population growth are as follows;

- Central region in the districts of Kampala, Wakiso, Mukono, Masaka, etc.
- Western region in the districts of Kasese, Kibale, etc.
- South western region in the districts of Kisoro, Kabale, Rukungiri, etc.
- Eastern region in the districts of Mbale, Soroti, Jinja, Tororo, Busia, etc.
- Northern region in the districts of Gulu, Lira, etc.

Characteristics of population growth in Uganda are as follows;

- Most population is concentrated in rural areas.
- Wakiso district is the most populous with 2m residents followed by Kampala (1.5m), and then Kibaale (0.78m) while Kalangala is least populous with 60,000 persons.
- Most population is concentrated by females with 17.5m while males are 17m.
- Most population is dominated by children (infants) aged below 15 years.
- People aged 65years and above are very few ranging between 6% - 10% of Uganda's population.
- Population is dominated by high dependency rate due to being non – productive population.
- Biggest population of the population is still illiterate.
- Population is unevenly distributed with dense, moderate and sparse.
- The dominant tribe of the population is the Baganda with 17%, followed by Banyankore (10%), Basoga (8.8%) and Bakiga (7.1%).
- Population is dominated by Christians having 80% of its total as Catholics and Anglicans share the biggest percentage.
- Most people have low income per capita due to low GDP.
- Total fertility rate per woman in her reproductive age is averaged at 5.8 children from 7.1 in 1991.
- Average life expectancy stands 63.3 years, an increase from 50.4 years in 2002.
- Infant mortality rate was estimated at 53 deaths per 1000 live births in 2014 from 87 in 2002.
- Under-five mortality rate was estimated at 80 deaths per 1000 live births in 2014 from 156 in 2002.

CAUSES OF HIGH POPULATION GROWTH IN UGANDA.

The following are the reasons why the Ugandan population is continuously increasing over years and years;

1. Increased Birth rate; The major cause of population growth in Uganda is the excessive natural increase in the number of births at a ratio of 50/1000 persons since 1969 due to better health care like supply of free ARV's to AIDS patients, and other services which has led to high population growth.

2. Reduced death rate; There has been a decline in the number of death from a ratio of 200/1000 persons to a ratio of 170/1000 persons.

3. Infant mortality rates; The high infant mortality rate in Uganda has also contributed to high population because some parents are not sure for the number of children who are likely to survive so they produce many children as possible to ensure that a reasonable number survives after

others have died in rural areas like in Tororo, Iganga, Kamuli and others while in urban areas like Kampala, Mbale, Mbarara, Masaka and Mukono, there has been a decline in the infant mortality rate from a ratio of 88/1000 children in 2002 to a ratio of 76/1000 children in 2007 due to the introduction of immunization to mothers as well as infants and reinforced frequent antenatals.

4. High fertility rate; Fertility rate is the number of children born per woman. Population growth is mainly a function of fertility rate. The higher the fertility rate, the higher the rate of the population growth. In Uganda, there is a high fertility rate varying from district to district e.g. Western Uganda has the highest, followed by the Northern and Eastern regions but the central regions have the lowest fertility rate due to education, family planning, urbanization, etc. And even nationally the fertility rate on average has increased from 5.9 /1000 children in 1969 to 7.2/1000 children in 2009 e.g. in Kigezi, Bugishu, Busoga, Tororo, Buganda and others.

5. Medical care; There has been continuous improvement in medical services in Uganda has reduced on the death rates due to improved immunization against the six killer diseases like Measles, tentanus, and polio; antenatal care; use of treated mosquito nets to control malaria; spraying DDT; distribution of free malaria drugs, ARV's and condoms; and other services has led to increased population in Kampala, Mbale, Kisoro, Mbarara, Jinja etc.

6. Sex ratio; According to the Uganda's population census 2014, it was indicated that the number of women out number that of men at approximate ratio of 17.5 millions:17 millions in areas of Kisoro, Kabale, Masaka, Mbarara, Kasese, Mbale, Busia and Kampala which assured high birth rates because all women married or not are interested in having children.

7. Values attached to children; In many parts of Uganda, parents have many children because of social and economic benefits they expect from them in return thus high demand for children causing rapid population growth for bride wealth, security and labour force e.g. in Buganda for assurance and prestige like Mr. Eriabu Ssempala of Kabuntu village, Najjembe sub county, Mukono district in 2009 had over 70 children with 21 wives, Ankole and Bugishu for bride wealth, in Kigezi for labour force on crop farms, etc.

8. Polygamy; In Uganda, it is estimated that about 40% of men have more than one wife which implies that they live in a polygamous marriage which ensures large families with many children like in Teso land, Kigezi land, etc. E.g. a renowned local musician Paul Kafeero of Mukono who died in 2007 had over 19 wives with 45 children at the age of 37 years.

9. Early marriages; Most women in Uganda especially girls at a percentage of 44% marry before the age of 18 - 22 resulting into producing many children since they have a long productive period, young and still fertile to bear many children like Bakiga girls in Kisoro and Kabale, Bahima girls in Bushenyi and Mbarara, Bagishu girls in Mbale and Manafwa, etc.

10. Education; High population growth rates have also been due to low levels of education among the people in rural areas of Kigezi, Mbale, Butaleja, Manafwa, Kibale and Bukedea where there is less education facilities and services making them to stay shorter period in schools, unable to take up modern employment and being ignorant of the disadvantages of large families and use of family planning methods thus high birth rates.

11. Level of income; In Uganda, the poor people have limited ambitious and with more free time so they produce much in their leisure time than working followed by the middle class because they have less future motives of investment as they are low income earners like people in Kisoro, Kabale, Kibale, Iganga, etc thus high birth rates.

12. Religious doctrines; In Uganda, religious beliefs have contributed to high population growth like Catholicism encourages the multiplication of the universe as God's command to man as opposed to all birth controls and abortion which increase the population growth in Kampala, Masaka, Iganga and Kabale while Islam encourages the marrying of four wives which ensures the production of many children like Kawempe and Kibuli in Kampala, Butambala in Mpigi.

13. Family planning facilities; In Uganda, the family planning programs have reached only the small portion of people in urban areas about 24% compared to those in the rural areas like in Kabale, Masaka, Luwero, Kisoro and Mbale who are 76% lacking the knowledge of the use of family planning methods especially which has left them in the wide space and chance of producing whenever they have sex.

14. Improved nutrition; Due to the availability of better quality food like milk, bananas and rice because of improvement in agriculture in Masaka, Mbarara, Mbale, Iganga and Wakiso has ensured better nutrition among Ugandan women which has increased their fertility rate hence high birth rate as well as rise in life expectancy from 38 years in 1969 to 50.4 years by 2007 among Ugandans.

15. Youthful population; In Uganda, out of the total population of about 30 million the young who are still active, fertile and reliable to produce many children, out number the rest of the population, the according to age, which has it possible to have rapid population.

16. Gender inequality; Some Ugandan societies like among the Itesots in Soroti and Kaberamaido, Bakiga in Kigezi and Bagishu in Mbale and Manafwa, Madi in Nebbi and in Sebei in Kapchorwa have high population growth because women have little or no say about the size of the family and number of children to produce which has made them to be looked at as factories to manufacture babies.

17. Migration; Uganda has received for the past years many people in form of refugees in the districts of Kisoro, Kabale, Masaka, Gulu, Moyo, Arua, Mbarara, Kasese, Mbale, Busia and Kampala from its neighbouring countries of DRC, Rwanda, Kenya, Somali and Tanzania due to different reasons e.g. social, political and cultural wars in those countries, improved education in Uganda, business transaction, etc.

18. Urbanisation; In Uganda, population growth has also been caused by urbanization process because urbanized areas e.g. Jinja, Kampala, Tororo, Mbarara and Mbale have better medical services, educational services, employment opportunities in industries and other commercial businesses, power, water and accessibility to family planning which called for rapid population growth in those areas through RUM. And in rural areas of Mbale, Luwero, Masaka and Kabale, since most of the population in Uganda is rural based, therefore the traditional customs and beliefs that encourage high population growth are still strong thus increased birth rates.

19. Social factors; Some Ugandan societies like Bakiga and Banyakole do not have traditional taboos which prevent women to have sex while still breast feeding and immediately after birth which has opened them to higher chances of producing many children in their life time hence high population growth in those areas.

EFFECTS OF HIGH POPULATION GROWTH IN UGANDA

There is both positive and negative economic and social impact of high or rapid population growth rate in a given country and for Uganda's case these are:

Positive impact:

High population growth rate provides adequate skilled and semi-skilled labour for agriculture in rural areas like Kisoro, Mbale, Kasese and Nebbi and for industries in urban centres like Kampala, Jinja, Mukono and Mbarara. The number of house maids or house girls in Kampala, Wakiso and Mbarara has increased as a result of high population growth rates. It also supply adequate labour force for security organs like UPDF, Uganda Police force, LDU's, Saracen, Securiko, Tight, etc.

It has provided ready market for agricultural and industrial goods in Kampala, Jinja Mbarara, Mbale and Kasese. Many industries are reaping high gains from this big population in Kampala of about 1.5 millions according to 2014 census like Samona beauty products, Rwenzori mineral water, Karesh beverages for Storm bread and Karesh juice, Cheers, Mukwano industries, Hot loaf, Century bottlers, Nice plastics, Uganda breweries and many others.

It has increased government revenue in form of taxes from a wide tax base of the high population especially in Kampala, Mbarara, Mbale and Jinja. Uganda Revenue Authority earns billions of shillings from VAT taxes which are almost paid by every body in the country, as well as PAYE and local service tax from every employee.

It has ensured maximum resource utilisation such as fishing at L. Victoria, lumbering in Bugoma and Mabira, mining of Vermiculite in Manafwa and salt at Lake Katwe. Therefore to sustain such a big population requires maximum resource utilization for it to earn a living.

The government has developed several infrastructures such as roads in Kampala like the Kampala northern by - pass road from Bweyogerere via Kiwatule - Bwayise to Busega, schools, health centres at division levels known as KCC health centres and provided free education in primary schools [UPE] and in secondary schools (U.S.E) to cater for a rapid population growth.

Social seed capital [Entandikwa] to SACCO groups and Upland rice to farmers have been provided in Luwero, Wakiso, Kampala and Masaka through Ministry of micro - finance and office of the Vice president respectively to eradicate poverty and to ensure self employment to increased population.

It has promoted rapid urbanisation like the growth and expansion of Kampala, Jinja, Mbale, Tororo and Mbarara with their associated infrastructures like hospitals, Hotels, roads, banks, shopping malls and power stations. Such towns like Kampala provide social services such as University education at Makerere, Kyambogo and Nakawa; trade and commerce in Kikuubo, Nakaseero, St. Balikuddembe, Mukwano arcade, Shop rite, Garden city, Game at Lugogo; banking services in CERUDEB, Stanbic, Equity, UBA, Barclays and BOA; insurance in NIC, First insurance, Gold star and SWICO; etc.

High population growth rate has forced people to be innovative, hardworking and creative in different means of survival. For example there has been the introduction of non - traditional crops like Vanilla in Mukono, Wakiso and Kayunga as well as the development of small scale industries at Kawempe like Maganjo industries, at Bugoloobi like Phoenix logistics, at Mengo – Kisenyi like grain millers, at Katwe like iron and aluminium smith workers, etc.

High population growth rate has led to provision of social services like water, health care, education, electricity and garbage collection in Kampala, Mbarara, Mbale, Jinja, etc. For example National water and Sewage Corporation based at Ggaba on L. Victoria has extended hygienic water in all suburbs of Kampala capital city like Kawempe, Nateete, Kanyanya, Kamwokya, Kibuye, Kasubi, Bwayise, Nakawa, Makindye, etc.

Negative impact:

A dependence burden is the ratio of non - working population. High fertility results into high total population which is dominated by children aged below 15 years. In addition to the youthful population, are people aged above 55 years. This is the unproductive group which requires food, education, medical care, clothing, housing, etc but it doesn't contribute productively as far as output of the country is concerned hence a burden on the working population in Kampala, Entebbe, Mbale, etc.

High population growth rate reduces the country's capital to save, invest and produce. This is because a lot of resources are utilized to cater for the things the population needs e.g. social services like health countries, education, transport facilities etc like in Kabale, Kampala, Mbarara, Mbale, etc.

High population growth has resulted into the shortage of land in areas like Kampala, Kamuli, Mbale, Jinja, Kisoro, Kabale, etc which has caused some people to become landless or even over use the land without any resting period leading to soil erosion, deterioration and reduced productivity hence starvation.

It has resulted into rural – urban migration due to limited land especially by the landless people e.g. many people migrate from the rural areas of Kamuli, Kisoro, Kabale and go to Jinja, Wakiso and Kampala urban centers. This has later led to rapid growth of urban areas and their associated problems such as slum development at Katanga, Nateete, Kamwokya in Kampala, theft in Old taxi park, prostitution in Kabalagala, limited social services, etc as well as a decline in food productivity from rural areas like Kigezi since it is usually the strong youths that migrate living cultivation to the weak old people.

High population growth led to sub - division of land into small plots in areas of Kampala, Kabale, Kisoro, Kamuli and Mbale hence land fragmentation and its associated problems such as discouraging large scale farming due to the small land, the decline in land productivity, increased soil deterioration and wastage of time in moving to widely spread farm holdings.

High population growth has been the main cause of unemployment problems and under employment in Uganda especially in urban areas of Masaka, Entebbe, Kampala, Mbale, Jinja, and others. This has not only led to wastage of human resources but also promotion of poverty, high crime rate as a way of survival and decline in standards of living due to failure to secure basic needs .

High population growth in Uganda has resulted into the settlement of people on marginal agricultural lands, on wildlife reserves and forested areas. This has been due to increased demand to fed the population which has left many forests destroyed e.g. the Murchison falls, Bwindi and Kibaale national parks are suffering agricultural encroachment, Basongora pastoralists in Kasese encroached on Queen Elizabeth N.P. Forests such as Mabira, Mt. Elgon and Malabigambo and Namanve are also suffering from agricultural and industrial encroachment. Encroachment on forests has led to environmental degradation in form of deforestation, reduced rainfall, soil erosion etc. While encroachment on game parks and reserves like Ajai in West Nile has led to extinction of several animal and bird species thus affecting the tourism industry and the Eco-system.

High population growth has resulted into congestion of people which has resulted into easy spread of diseases e.g. the cholera epidemic in 1997 easily affected many people in congested urban center of Kampala and suburbs like Kalerwe, Katanga, Kamwokya and Bwaise in Kampala due to congestion and poor hygiene. Airborne diseases like Tuberculosis, coughs and flu as well as AIDS are also on the increase due to high population growth rate.

High population growth in Uganda has led to low standards of living among people in Kabale, Masaka, Kampala and Mbale because those employed spend their money in providing basic needs to the dependants and others who are unemployed implying they are in total poverty hence low standards of living and miserable life.

High population growth rate has led to an increase in the number of street children or juvenile delinquency in Mbarara, Mbale, Kampala and Jinja. Some of the children are bustards who don't have parents, others come from Karamoja region and war - torn areas of Gulu, Kitgum and Pader, some are sent by their parents to beg for a living, some are orphans whose parents died due to AIDS in Rakai and other areas and so have no one to help, etc.

High population growth in Kampala, Wakiso, Mbale, Kisoro and Kabale has resulted in high inflation tendencies because the government spends much of foreign exchange on its population by importing more social goods like drugs, books of universal primary and secondary education and others and yet this money would be used to develop other fixed developments like industries, electricity dams, roads, etc thus balance of payment problems.

High population growth rate have led to over crowding and congestion in Kampala, Jinja and Mukono like traffic congestion in Nakawa, Kireka, Seeta, Mukono and Njeru along Kampala - Jinja road; on Bombo road in Wandegeya, Bwaise and Kawempe. Such traffic congestion has disrupted operation of businesses, loss of lives by people in medical Ambulances, inhalation of Carbon monoxide gas and vehicle fumes which are dangerous to human life.

High population growth rate has resulted into high crime rates in Kampala, Jinja and Masaka. Such crimes in Kampala city range from big crimes of car robbery, bank robbery, rape, murder cases to small crimes such as pick-pocketing, mobile phone and jewellery snatching, conning people of their belongings by conmen especially along Ben Kiwanuka, Namirembe road, along Kafumbe - Mukasa road, in St. Balikuddembe market, etc.

SOLUTIONS TO PROBLEMS OF HIGH POPULATION GROWTH IN UGANDA

The problems of high population in Uganda are not real population numbers but its rate of growth which exceeds the rate of economic development. Therefore the Uganda government is trying to find measures of reducing population growth rate to a manageable level. These measures are those that lead to low birth rate and those that relieve on the population pressure in densely populated areas. These are:

Massive education and sensitization have been aimed at especially to women by Women activists of FIDA and others so as to uplift their education levels and to breakup the traditional customs and valves to favour large families e.g. Polygamy in Mbale and Tororo, early marriages in Kigezi region, early sex after birth among the Bakiga and Banyakole, etc.

Modern methods of birth control like use of contraceptives have been encouraged by the population secretariat in Kabale, Mbale, Kampala, Wakiso, etc and used to reduce on the high population growth in Uganda. In addition to that, there has been an initiative to educate to women men about population control policies as a way of encouraging the use of family planning methods like condoms, pills, injectant plan, moon beads, etc.

The government of Uganda has tried to improve on the living standards of people as a long term method of reducing high population growth so that children are no longer taken as economic assets. Such social facilities have been set up like schools for universal primary and secondary education, hospitals, rural electrification and rehabilitating rural roads in all districts like Masaka, Mpigi, Ntungamo, Mayuge and Luwero.

Ugandan government has tried to reduce on the rural - urban migrations a way of reducing population growth in rural areas. This has been possible by encouraging qualitative improvement in the living conditions of people in rural areas through supporting agricultural activities by NAADS, constructing better infrastructures like feeder roads and small scale industries to increase employment opportunities thus reduced movements to urban areas.

The government has established resettlement schemes to transfer people from densely populated areas to unsettled areas to reduce on the population pressure e.g. between 1946 and 1976, government implemented a number of resettlement schemes in which about 80,000 Bakiga from Kisoro and Kabale were settled in Mubende, Kibaale, parts of Kabarole, Hoima, Mukono, Kamuli and Luwero.

The government has encouraged voluntary out migration of people from the densely populated areas like Kabale, Kampala, Jinja, Mbale and Wakiso to the areas suitable for them either internally like Kibale, Kasese, Kayunga, Kamuli, etc or externally to Rwanda and DRC.

The government has developed other economic sectors in country such as industries like Century factory in Mbarara and West Nile spirit distillers in Arua, mining of Vermiculite in Manafwa, fishing on Ssese and Buvuma Islands in L.Victoria and gorilla tourism at Bwindi forests in Kanungu which has relieved the excessive population on land in Mbarara, Nebbi, Mbale, Manafwa, Wakiso, Mukono, Masaka, Kampala, Kabale and Kisoro respectively.

The government through NEMA has allocated some wetlands near urban areas like swamps along Mbale – Soroto road in Mbale; Masese wetlands in Jinja; Kajjansi, Busega and Namanve swamps in Kampala and Nabujuzi wetlands in Masaka for land reclamation in case the environment is not damaged and under regulatory laws to provide land for developmental projects like Industries and residential estates in the densely populated area.

The government provided economic incentives to people with small families so as to encourage producing of fewer children e.g. in 1996 the NRM government offered free education for the four children per family under UPE programme, free medical services like immunization of children under the age of five as well as giving ARV's to infested people from Public health centres such as at Mulago, Soroti, Jinja, etc.

Women activists and MPs through the parliament of 2001 -2006 tabled a bill to legalize abortion such that the unwanted / untimely pregnancies and those under cases of rape, defilement and prostitution are terminated so as to reduce birth rates.

POPULATION MIGRATION IN UGANDA

This is the movement of people from one region or country to another. It happens over a short or long distance involving individuals or groups of people due to different reasons. It is sub divided into two:

1. **International migration**: This is the act of people entering / leaving a country or region who are called emigrants / immigrants. In other wards, international migration is the movement of people beyond their countries' boundaries.
2. **Internal migration:** This is the movement of people from one place to another within the same country. In Uganda, there are of two types namely;

Rural – rural migration

Rural – urban migration

RURAL - URBAN MIGRATION

Rural - urban migration is the movement of people from undeveloped rural areas (villages) to urban areas (towns). This movement differs from one individual to another due to the economic, social, cultural and political reasons attached.

In Uganda, the most urban areas affected by this movement are Kampala, Jinja, Mbale, Tororo, Masaka, Mbarara, Kasese, Bushenyi, Busia, Malaba, etc while the rural areas are Ndorwa, Rubanda, and Mufumbiro of Kigezi; Bunghokho in Mbale; Luwero; Masindi and others.

SKETCH MAP OF UGANDA SHOWING INTERNAL AND EXTERNAL MIGRATIONS

FULL PAGE FOR A MAP

CAUSES OF RURAL - URBAN MIGRATION

These causes of RUM are grouped into two namely: pull and push factors; however, they are as a result of natural and human factors.

The push factors operates at the centre of migration making the place unsuitable for human settlement while the pull factors operate at the destination of the migration offering conducive conditions of human settlement . These factors are:

1. Unemployment; In rural areas, employment opportunities are generally lacked being responsible for the movement of people from rural areas to urban areas. So because agriculture is the sole source of employment in rural areas while the administration, commercial, mining, construction and industrial activities are concentrated in urban areas of Uganda like Kampala city, Entebbe, Tororo, Kasese, Mbale, and Jinja have attracted large number of people from villages looking for numerous job opportunities.

2. Better social amenities; Urban centres like Kampala, Jinja, Mbale, Tororo, etc have better developed social amenities which are basic services for human survival such as health centres, electricity stations, roads, piped water, etc which have pulled people from their rural areas to go and have easy access to them.

3. Education; Lack of adequate educational facilities and better educational institutes ranging from lower levels to higher education levels has made people to migrate from villages to urban centres where they do exist e.g. people have found their way to Mpigi, Mukono, Jinja, Kampala, Mbale, Mbarara and others for better education in primary schools like Nakasero and Bat valley in Kampala; secondary schools like Seeta high in Mukono, Naalya and Namugongo in Wakiso; universities like MUK, KU, MUBS,SLAU and KU in Kampala and MUST in Mbarara.

4. Civil wars: In some parts of Uganda, there are or have been civil wars, insurgencies and general insecurity especially in the Northern, western and other parts which have forced people to move from those affected villages of the districts concerned like Gulu, Lira, Apac, Moroto, Kitgum, Kasese, Luwero, Mbale, Tororo, Kapchorwa, etc to towns for security reasons as they escape the Lord's Resistance Army (LRA) and Allied Democratic Front (ADF).

5. **Entertainment** i.e. **recreation centres;** Majority of the youths have left villages to towns because of recreation, entertainment and excitements found in such urban areas such as cinema halls, film shows, theatres, beaches, lodges, pubs, amusement parks, casino halls, etc. In Kampala and Entebbe; night clubs like club silk, Angenoir discotheque, etc; theatres like La Bonita and National theaters; cinema halls like Cineplex, resort beaches like Imperial Resort, Lutembe, Botanical, Speke resort, etc; and amusement parts like Didi's world amazement park in Kansanga have all attracted young from different localities.

6. **Over population;** Some Ugandan rural areas are densely populated due to the reduced mortality rates and the concomitant high rates of population growth like in districts of Kabale, Kisoro, Mbale and others which have necessitated their migrations to Kampala, Masaka, Jinja, Mbarara and others as result of population pressure on land.

7. **Better wages and salaries;** The differences in wages and salaries between the rural land urban areas have led people to rural - urban migration where crowds of different people are leaving villages like Kabale, Kanungu, Masindi, Kitgum, etc to towns like Jinja, Kampala and Entebbe for higher pay especially in government parastatals like ministerial offices, NARO, NEMA, NFA, UNRA, UWA, URA, and other organs.

8. **Traditional customs;** In Uganda, cultural practices e.g. forced marriages in Karamoja, circumcision of males in Mbale, Bududa and Manafwa in Bugisu region; and among the Bakonja in Kasese, female circumcision among the Sebei and other rigidities have forced people to run from their home rural areas to urban areas like Kampala, Wakiso, Mukono, Mityana, Kasese, Fort portal and Mbale for hiding where such practices are at a minimum or are not valued.

9. **Social misfit;** Some people either voluntarily migrated to urban centers like Kampala, Wakiso, Jinja others or are being forced to migrate by the local councils or the village chiefs and villagers from Mukono, Masaka, Luwero, Mbale, Mayuge, etc after having committed a crime or social disgrace that he / she is no longer fit in society but as an out cast like being a thief, having raped or defiled, having murdered, being a prostitute, bewitcher, adultery etc.

10**. Relations;** Rural urban migration is also caused by relatives from rural areas such Kabarole, Kisoro Masindi, Moyo, etc in need to see those in the urban areas of Kampala, Bombo, Jinja,Mbarara, etc in order to maintain their family relationships e.g. brothers, sisters, friends, etc.

11. **Bond wages;** Rural urban migration is also caused by bond wages whereby some people especially among the youth like among the Batoro in Kabarole, Bakiga in Kisoro and Basoga in Kamuli move to towns like Fort Portal, Kampala, Mbarara and Jinja because others are moving / moved due to peer influence and admiration.

12**. Political conflicts;** Some people have left villages like Luwero, Nakasongola, Kamuli, etc to towns like Kampala, Jinja, etc because of political misunderstandings from different political idealogies among themselves especially when they belong to different political parties like NRM vs DP, UPC and FDC.

14. **Unpredictable harvest;** Since agricultural harvest depend on seasonal changes, meaning that the income of farmers is unstable, therefore it has forced many to abandon farming to move urban areas where they could get work of stable income in offices and commercial businesses.

15. **Shortage of land;** In densely populated districts, there is shortage of land for agricultural practices. The landless people in Mbale, Manafwa, Kabale and Kisoro are forced to seek other forms of employment by migrating to urban towns like Kampala, Jinja and Mbarara. For instance most of the cargo or luggage lifters and people employed in the informal sector are migrants from rural areas of Tororo, Kisoro, Iganga, Bundibugyo, Mbale and others.

16. **Natural hazards;** Natural factors such as drought, pests and diseases, floods and landslides which are harmful to man, crop cultivation, livestock and property e.g. tsetse flies in Hoima and Mayuge have forced people to abandon such areas and farming to urban centers like Hoima and Mayuge towns for other forms of employment in informal sectors and even of recent in March 2010, landslides are forcing the survivors in Bududa district to move to Mbale, Tororo and Manafwa towns.

EFFECTS OF RURAL - URBAN MIGRATION IN UGANDA

Rural - urban migration has positive and negative effects to both areas of origin of migrants and their destination and these are:

Positive:

Consequences to places of destination

Rural-urban migration has led to rapid growth of urban centers like Kampala, Entebbe, Jinja, Lira, Soroti, Kasese, Fort Portal, etc. For instance Kampala rapidly expanded and grew during the 1981 - 88 period in which many people from politically unstable districts like Luwero, Mpigi, Masaka and Mukono flocked it. This has led to economic growth and development in form of accommodations as real estate businesses, trade, and others.

The rural -urban migrants from Lira, Soroti, Mubende, Kabale and West Nile region provide cheap semi - skilled labour for industries like Mukwano oil industry in Kampala, Lugazi sugar works in Mukono and Kakira sugar works in Jinja and in the service sector like ministerial office messengers, security guards e.g. Tight; housekeepers in Kampala, Mbale, Jinja, etc.

The rural - urban migrants have provided a big and ready market for manufactured goods from industries in Kampala such as Samona cosmetics, Karesh juice, Movit cosmetics, Mukwano oil and merchandise from numerous shops along Kikuubo and Kiyembe lanes and supermarkets such as Shoprite, Embassy, Game, Garden city, Nakumanti and others.

The government tax base has increased by taxes imposed on many people and the activities carried out in urban centres like Jinja, Mbarara, Mbale, Kampala, etc in form of licenses, PAYE, Local Service Tax, etc.

There is optimum use of the available resources in the towns especially land like in Kampala, the former unoccupied hills such as Ntinda, Naguru, Kololo, Kanyanya, Kawempe ,etc have been utilized for residential houses and setting factories.

The formerly unutilized and the under utilized natural resources are bought to use productively in urban centres e.g. clay at Kawanda and Kajjansi both in Wakiso, Seeta in Mukono, Red sand in Entebbe and granite rocks at Muyenga in Kampala for building and constructional purposes.

Consequences to the places of origin

It has reduced population pressure on land and has created more land for agricultural production in the densely populated districts such as Kabale, Kisoro, Mbale, Kamuli and others hence promoting farming and reduced land related problems like land conflicts.

The rural urban migrants get exposed to better health, education, water and other social services, which have therefore improved their standards of living and declining illiteracy rates. In Uganda today, most of the elites in Kampala are migrants from Mbarara, Masaka, Luwero and other areas.

Rural urban migrants have earned increased income from towns of which they have used to develop their rural areas. Currently former rural areas like Semuto in Luwero, Bukomansimbi in Masaka, Ruhaama in Mbarara and others have been developed to a certain level which has been spearheaded by sons and daughters who went in towns and combined wealth.

Negative:

Consequences to places of destination

Rural-urban migration has led to rapid urbanization and associated problems like Kampala, Jinja, Mbale, Lira, Kasese, etc such as the increase in unemployment and crime rates like theft, prostitution; rising expenditure on provision of basic social facilities like water points, garbage collection and health centres all of which are not desirable.

It has led to the destruction of wetlands and Peri urban forests in need of land for settlement. For example wetlands of Kampala at Namuwongo, Kamwokya, Kyebando, Ggaba and Nateeta have been reclaimed by migrants to construct their houses which have led to environmental degradation.

Migrants from rural areas have led to easy spread of diseases in urban centres for example AIDS was spread in Kampala by migrants from Rakai and Masaka, Ebola was also spread in Gulu town by migrants from rural areas like Atiak, Alero and others.

It has accelerated racial, tribal and ethnic diversity which has often led to racial and tribal conflicts as well as tension for example between the northerners (Acholis and Langis) and westerners (Bakigas and Banyakoles). This has also led disappearance of good values and norms (cultural erosion) among people of different tribes living together in Kampala like loss of mother language for English, drug abuse, social etiquette among the Baganda, Iteso and Bahima in Kampala, etc.

Slum development in urban centres such as Makerere - Kivulu, Katanga, Mengo- Kisenyi, Kamwokya - Kifumbira, Kalerwa and Bwayise in Kampala is an effect of RUM. Due to high social cost of living in towns, most of the migrants can't build decent houses, so they end up building poor houses thus creating slums.

It has led to an increase in traffic and congestion in urban centres like Kampala, Jinja and Entebbe which has affected normal business transactions as well as movements. It has also caused easy spread of diseases like Cholera, tuberculosis and flu in the congested areas of Mulago, Katanga, Mengo- Kisenyi, Kamwokya, Kalerwa and Bwayise in Kampala.

There has been increased environmental pollution on land, in water and air in form of smoke, noise and dumping of domestic and industrial toxic wastes in the major towns. E.g. in central Kampala, the residents of Kamwokya, Kyebando and Kalerwe have dumped their wastes in Nsooba stream while those of Mengo – Kisenyi, St. Balikuddembe market, New Taxi park and Mukwano oil industry have polluted Nakivubo swamp.

Consequences to the places of origin

It has resulted into depopulation of rural areas like Luwero, Mpigi, Bukomansimbi in Masaka, Tororo, Kapchorwa, Ntungamo and other parts as all the energetic youth have migrated to urban centers. This has left the weak and old people to practice agriculture thus leading to low agricultural productivity. In fact today, famine and lack of enough food are experienced in many rural areas because of this reason.

It has led to scarcity of cheap labour in rural areas like Kisoro, Masaka in Bukomansimbi, Sembabule, Mbarara in Ruhama which has affected economic activities like mining, fishing, forestry and others.

It has led to neglect of parents and the entire family which is left in rural areas like Luwero, Sembabule and others. This has raised social constraints among family members for example the late Local musician Paul Kafeero from Nkokonjeru village in Mukono district refused any of his relatives to be involved in his burial arrangement in case he dies.

MEASURES TAKEN TO CURB RURAL - URBAN MIGRATION IN UGANDA

The following are the steps being taken to reduce on rural - urban migration in Uganda:

Government is establishing basic social facilities like schools for universal primary and secondary education at sub county level in all districts, recreational centres, health centres, rural electrification and rehabilitating rural feeder roads to tarmac in all districts like Masaka, Mpigi, Ntungamo, Mayuge, Luwero, etc to reduce the rate of rural-urban migration.

Rural industrialization has been encouraged so as to create employment opportunities to the rural dwellers and to provide manufactured goods to them at relatively cheaper prices. For example the Century bottling factory in Mbarara, West Nile distillers in Arua, Alpha and JBK dairies in Mbarara, and many more.

The government is sensitizing the public on sub county levels in different rural districts through National Agricultural Advisory Services (NAADS) and NARO / OWC to improve agricultural farming on application of fertilizers, crop rotation, fallowing, irrigation and use of pesticides to increase agricultural productivity. Demonstration ranches like Ankole – Masaka in Mbarara, Maruzi in Amoro, and Aswa ranches in Kitgum have been established to improve livestock productivity.

Land reform policies e.g. land consolidation as opposed to land fragmentation are being undertaken to create bigger plots of land for increased output in Kisoro, Mityana, Mbarara, Mbale and Tororo.

The Population secretariat has under taken population control measures through introduction of family planning practices such as use of contraceptives like injectant plans, moon beads and pill plans in Kisoro, Mbale and Luwero which could reduce population pressure on land.

The government has provided security in rural areas of Kasese, Gulu, Pader, Kitgum, Soroti and Amuria to facilitate economic investment and peace. The Arrow boys and Amuka security personnels together with UPDF were deployed in Teso and Gulu, Lira and Pader to drive away the LRA rebels.

The government is opening up a wide market for agricultural products from rural areas like Sembabule, Nakasongola, West Nile and revising prices for agricultural goods such as milk, tobacco, vanilla, Coffee and cotton so as to support the rural farmers economically. Farmers, cooperatives have also been established e.g. Bugisu cooperatives in Mbale, Banyankole Kweterana cooperatives in Mbarara and Bushenyi.

The Ministry of agriculture has diversified agricultural crops so as to reduce seasonal unemployment among the rural dwellers by introducing a variety of crops both perennial and seasonal crops such as Vanilla, Moringa, Aloe vera, sun flower, colonial coffee and organic cotton in Mukono, Rukungiri, Wakiso, Lira, Moyo, etc.

The government is reducing the rate of rural - urban migration by providing social seed capital (Entandikwa) for people in rural areas of Luwero, Wakiso, Kayunga, Mayuge, Rakai, Ruhaama, etc. The capital is in form of cash, hybrid seeds e.g. upland rice in Wakiso is given by the vice president, cassava planting stems in Soroti, Luwero and Tororo etc. Prosperity for all 'Bonna bagaggawale loans' is also given out to people in SACCO (savings and credit cooperatives) groups through Micro finance institutions in every corner of the country be it villages or towns.

The government is discouraging rural-urban migration through seminars, magazines, workshops and mass media like new papers, FM radios and T.Vs. Public seminars are held in rural areas of Masaka, Luwero, Kisoro, Mbale, Mbarara and others teaching people better ways of utilizing rural facilities like land, forests and water to become self sufficient rather than going to towns.

The Uganda parliament together with women activities and FIDA tabled and established laws in 2009 against the unbecoming cultural activity of the women circumcision among the Sebei in Kapchorwa district as an effort to protect their marital rights which could eventually curb RUM.

The government encouraged rural –rural migration especially of the landless people from the densely populated areas of Kigezi and Gishu lands. This happened among the Bakiga from Kisoro and Kabale who were taken to Kibaale, Kasese, Mubende, Kibaale, Kabarole, Luwero, Hoima, etc as well as the Bagishu from Mbale to Mukono, Kamuli

Sample questions:

1. (a) Account for the high population growth rates experienced in many parts of Uganda

(b) Discuss the effects arising from the rapid population growth in the areas identified in (a) above.

2. The table below shows population distribution in selected districts of Eastern Uganda.

DISTRICT	*AREA (KM²)*	*POPULATION*	*POPN DENSITY*
Kotido	*13, 207.8*	*161,44*	*1.2*
Moroto	*14,113.3*	*188,641*	*13*
Kaabong	*8, 526.2*	*476, 629*	*56*
Bundjbugyo	*2,456.7*	*239. 539*	*98*
Kisoro	*2. 503.6*	*556,941*	*223*
Kitgum	*1,738.3*	*73, 967*	*43*
Kampala	*3. 889.3*	*668,410*	*171*

Wakiso	*4, 822.9*	*643, 881*	*134*
Kabale	*677.0*	*228. 520*	*338*
Ntungamo	*3, 332,2*	*349, 549*	*—*

a). Using the statistics in the table and the base map of Uganda provided, prepare a population density map (chloropheth map) and dot map.

b) Account for the variations in population densities in selected districts in the table.

3. To what extent have physical factors influenced population distribution in Uganda?

4. To what extent has rural to rural migration been a solution to the population pressure problem in Uganda?

5. (a) Examine the causes of rural urban migration in Uganda?

(b) What are the consequences of rural urban migration?

(c) Outline the steps being taken reduce rural - urban migration in Uganda?

6. Examine the causes of population migration in Uganda since 1900.

7. Discuss the factors responsible for rural population redistribution since 1900-1962.

8. Study the table below showing immigration and emigration rate of selected districts in Uganda 1991) and answer questions which follow

DISTRICT	*% Immigration rate*	*% Emmigration rate*
Kampala	*57.45*	*32*
Kalangala	*40.03*	*30.83*
Kabale	*1.96*	*35.33*
National Average(Uganda)	*17.68*	*17.68*

Adapted from Nema (1996), State of the environment report of Uganda P.156

a) Draw a suitable graph represent the information in the table

b) Account for the high : i) Immigration rate in Kampala district

ii) Emigration rate in Kabale district

c) Explain the effects of migration on the areas of:

i) Origin ii) Destination

9. Examine the relationship between the population density and rainfall distribution in Uganda.

SAMPLE APPROACH:

INTRODUCTION

- You are expected to define the keyword(s) i.e. population density / distribution / growth / migration / RUM / RRM.
- You are expected to cite out the status / stand / trend in relation to the keyword(s).
- You are expected to identify and locate the areas in relation to the keyword(s)
- You are expected to draw a sketch map to show the identified and located areas with names of places. **BODY**
- You are expected to bring out, explain and illustrate the points (factors / reasons) in relation the demands of the command word in the question and the keyword(s).

AGRICULTURE IN UGANDA

The term agriculture refers to the growing of crops and rearing of animals either for home consumption or commercial purposes.

STATUS / TREND OF THE AGRICULTURAL SECTOR IN UGANDA

- Uganda is an agricultural country employing over 75% of her total population mainly in rural areas either directly or indirectly.
- It contributes about 49% to GDP annually from the produce sales like coffee from Mbale and vanilla from Mukono.
- It practiced mainly on subsistence level for home consumption like the pastoralists in Kaabong, Kotido and Moroto of Karamoja region and Mbarara of Ankole – Masaka corridor.
- Commercial farming is dominated by foreigners like Madhvan of Kakira sugarcane plantation in Jinja, Mehta of Lugazi sugarcane and tea plantations in Mukono and Sudhir of Rosebud flower farm in Entebbe.
- The level of production is still low due to the low level of technology (labour intensive tools) used like use of hands and hoes by cassava growers in Kayunga, banana growers in Masaka, coffee growers in Wakiso and vanilla growers in Mukono thus poorly developed.
- The major crop exports are Arabic coffee from Mbale, tea from Kasaku in Mukono and Mubende and vanilla in Mukono.

AGRARIAN / FARMING/ AGRICULTURAL SYSTEMS IN UGANDA

The major agricultural systems considered in Uganda include the following;

1. **The intensive – banana – coffee – cattle system** is found on lake Victoria crescent in districts of Mukono, Luwero, Mubende, Masaka, Mbarara, Bushenyi, ... The areas have loam clay soils. Bananas and Robusta coffee are the most vital crops grown. Other crops grown include; vegetable, cassava, sweet potatoes, beans and maize. Poultry and dairy farming have also become important.
2. **Northern and Eastern Cereal – cotton - cattle system** is dominant in Kumi, Soroti, Katakwi, Apac, Gulu, Lira, Kitgum, Tororo, Palisa, … The soils are light sandy loam with medium fertility. The main crops grown are millet, cotton, cassava, G. Nuts, Simsim and sweet potatoes. Cattle are traditionally kept which constitute part of the system.
3. **West Nile – Tobacco – cassava – cereal system is** practiced in Nebbi, Arua, Moyo, Adjumani, Gulu, …The major crops grown are tobacco, cotton, bananas, Arabic coffee, millet, sorghum, cowpeas and G. Nuts.
4. **Afro mountain system** is found in Kisoro, Kabale, Mbale, Kapchorwa, Bushenyi, Kabale, Bundibujgyo and some parts of Kasese. The topography is hilly and the soil consists of highly weathered sandy clay loams with volcanic ash. Most important crops grown include Arabic coffee, Banana, Irish potatoes, field peas, tea, wheat, maize and vegetable.
5. **The pastoral - cattle system** is found in Moroto, Kotido, Kaabong, Nakapirititi , Nakasongola, parts of Rakai , Mbarara and parts of Ntungamo. Local breed cattle of Zebu short and Ankole long horned are mainly kept.

SKETCH MAP OF UGANDA SHOWING THE AGRICULTURAL SYSTEMS.

FACTORS INFLUENCING THE AGRICULTURAL SYSTEMS IN UGANDA.

The following factors in combination are entirely responsible for the development of the agrarian systems in Uganda:

ENVIRONMENTAL FACTORS.

1. CLIMATE is the major factor influencing agricultural systems in Uganda. The influence is reflected in the following ways:

In areas with an equatorial climate, rainfall is heavy usually over 1500 mm per annum and well distributed through out the year and temperature generally varies from 25^0C to 27^0C. Such type of climate have favoured the growth of perennial crops such as bananas, coffee and tea around L. Victoria basin e.g. Lugazi plantation, tea growing at Kasaku, Coffee growing in Masaka etc.

In areas with tropical climate, rainfall ranges between 1000 mm and 750mm per annum and temperatures relatively hot about 27^0 C. These areas experience alternate wet and dry seasons giving rise to the growing of seasonal crops like maize, millet and Simsim.

The tropical climate also gives rise to the growth savanna grassland, which has promoted live stock rearing. This has led to the development of Ankole – Masaka ranching scheme in Mbarara and other ranches in other areas like Bunyoro and Toro.

Crops that withstand cold temperatures like 0^0C have been grown in areas with temperate / montane climate. In Uganda, temperate climate is experienced at high altitude areas e.g. wheat growing in Sebei, apples in Kabale and Kisoro, etc.

Nomadic pastoralism is found in areas, which receives rainfall less than 750mm per annum. This rainfall therefore is little and unreliable and with temperature often rise above 29^0C e.g. in Karamoja, parts of Rakai, Kotido, Moroto, Kaabong, Buliisa, Nakasongola, etc, local breed livestock, which withstand such harsh conditions, are kept.

2. EDAPHIC FACTOR concerns with the soil nature and their characteristics. It influences the agricultural systems in the following ways:

The fertile volcanic soils made of ash and cinder in Kigezi and the slopes of Mt. Elgon have favoured the growing of coffee, bananas, sweet potatoes, etc. the Afro – montane system is also favoured by the fertile loam soils on Mt. Slopes of Rwenzori.

Infertile soils such as those found in Buluri and parts of Karamoja discourage the growing of crops and therefore animal rearing dominates.

The poor skeleton laterite soils on the hilltops in most parts of central Uganda discourage the growth of some crops and hence are used for livestock grazing.

Intensive growing of bananas, Robusta coffee and tea in the Lake Victoria basin is favoured by clay loam soils where as the acidic soils in the same basin have led to growth of sugarcanes, yams rice and palm oil trees in Kalangala district.

The cotton – cereal – cattle in many parts of Northern and Eastern Uganda as well as West Nile - tobacco are all supported by soils, which are light sandy loams with low medium fertility.

3. ALTITUDE refers to the height above sea level. Crops, which require cold temperatures such as Arabica coffee, are grown in high altitude areas. Other crops grown in high altitude areas include; wheat and Irish potatoes in Kabale, Mbale, Kapchorwa and on the foothills of Rwenzori Mountain. Crops like Robusta coffee and bananas are grown in low altitude areas such as Lake Victoria basin, Bushenyi, Kiboga, etc because they require hot temperatures.

4. RELIEF refers to the general appearance of the earth's surface. Hilly and mountainous areas have favoured terrace farming as mechanized agriculture has been discouraged because of the steep slope in Kisoro and Kabale.

Valleys have led to the growth of water loving crops like rice, yams and vegetables in Paliisa, Jinja, Iganga, Kabale, … while the flat, gentle and underlating relief in the Eastern, Central and northern Uganda have favoured mechanized farming like in Mukono on Lugazi sugar plantation, in Jinja on Kakira sugar plantation, in Iganga on Kibimba rice scheme, …

5. DRAINAGE plays a very important role in influencing the development of agrarian systems e.g. tea, bananas and coffee have been grown in well drained areas while rice, yams, sugarcanes, … have been grown in poorly drained areas which are waterlogged along river banks and lakeshores. Also poorly drained hilltops and other steep slopes have the favoured the growth of pasture for cattle rearing.

6. NATURE OF VEGETATION. Areas with tropical climate support the growth of savanna grasslands hence giving rise to animal rearing e.g. in Teso, Nakasongola, Buliisa, Northern and Western Uganda. While those with equatorial rainforest and montane vegetation due to their attractive conditions in terms of fertile soils coupled with heavy rains, has favoured the growth of coffee, tea, vanilla and bananas especially in the crescent of Lake Victoria. The swamp vegetation has led to the growth of sugarcane, yams and rice as well as cattle grazing.

7. BIOTIC FACTORS. The spread of pests and diseases affects the development of the agrarian systems. The existence of pests and diseases such as tsetse flies, which cause sleeping sickness among human and Nagana in livestock discourage settlement as well as livestock rearing e.g. in Southern Busoga and parts of Bunyoro. Whilst areas with low incidents of pests and diseases have led to crop growing like in Kigezi, Buganda, and Bugishu.

NON ENVIRONMENTAL FACTORS:

8. LAND TENURE SYSTEM refers to the way of owning land or the way land is owned and distributed among individuals. This has affected agricultural systems differently as follows:

In areas like Kotido, Moroto, Kitgum, Nakapiripiriti there is communal ownership of land which has promoted pastrolism.

The inheritance system in areas such as Kigezi, Kabale and other few districts has resulted into land fragmentation. The land is divided into smaller plots to the sons when the head of the family dies. The individual holidays becomes too small in size over a period of time limiting the use of machines (mechanization)

9. CAPITAL. Agriculture is also influenced by the amount of capital because it determines the level of investments in the agricultural sector. Many farmers in Uganda practice subsistence farming because they lack enough capital to invest in the farming. Whilst large sums of capital are involved in large scale and commercial farming e.g. parts of Mbarara use of large sums of capital to buy exotic animal breeds, fencing, buying animal feeds, pesticides, etc thus ranching.

10. MARKET. The distance from markets such as urban centres and processing centres has also had an effect on agricultural systems. Perishable crops such as tomatoes, cabbages, fruits, vegetables, are often grown near urban centres so that they can be sold before going bad.

11. LABOUR. The availability of cheap labour is a vital factor affecting agricultural systems. Subsistance farming is based mainly on unskilled and family labour thus intensive cultivation. Whilst skilled labour and part of semi skilled is employed on large plantations in form of researchers, mechanics, agricultural efficiencies etc.

12. POPULATION DENSITY . Areas with high population density, pressure on land is high. So the land is over worked and divided into small plots thus permiting intensive growing of bananas, sweet potatoes, cassava, vegetables and legumes while areas with low population density tend to practice pastoralism as large lands is needed for it. E.g. parts of Ankole- Masaka corridor, western Bunyoro and Karamoja.

13. CULTURE AND CUSTOMS. The agricultural practices are also influenced by the culture and customs of the people e.g. in areas like Karamojongs in Karamoja regions, among the Bahima in Ankole, etc took up cattle keeping as part of their life thus pastoral system. On the other hand, crop growing is much emphasized by typical cultivators and mainly depend on solid food for their livelihood e.g. the Buganda (Banana), Busoga (sweet potatoes), northerners and the Bunyoro (millet) as well as Ateso people (millet for food and local beer), Bakiga (Irish potatoes), etc

14. COLONIAL FACTOR. The government policy has facilitated the development of the farming systems e.g. the colonial government led to the growth of cash crops in different regions of Uganda like coffee in Buganda, Bugishu, Kigezi thus banana- coffee system, cotton and tobacco in northern and West Nile respectively thus millet – cotton cattle system and West Nile tobaaco. Further more, the Ugandan government led to the establishment of rice irrigations like Doho, Kibimba, Mubuku as well as vanilla growing in Mukono, sugarcane in Lugazi, Kinyara and Kakira, palm oil tree growing in Kalangala and upland rice in different parts of Uganda.

15. TECHNOLOGY. The level of technology has determined different farming systems in Uganda. The high levels of technology has led to extensive growth of sugarcanes in Lugazi, Kasaku, Kibimba, Doho, …due to access to modern and scientific methods of farming like irrigation facilities and use of machines, artificial fertilizers improved seeds and pesticides while ox ploughing has led to millet- cotton cattle systems in eastern and northern Uganda.

16. EDUCATION. The level of education has influenced the skills and knowledge passed on to the farmers in terms of farming techniques e.g. the pastoralists in Karamoja region have low education levels which has called for the continuous rearing of animals on subsistence basis. This applies to rotational bush fallowing and shifting cultivation among the Baganda, Basoga, Banyoro, …while the attainment of better eduation in farming techniques has led to large scale commercial farming mainly on plantations and estates like at Kasaku tea estate, Rosebud floricultural farm in Entebbe, Nsimbi horticultural farm in Mpigi.

17. **TRANSPORT AND COMMUNICATION** has influenced the agrarian systems in the following ways; the existence of improved transport network to processing plants and market centres for agricultural produce in Buganda, Mbale and Kabale have led to the growth of various like coffee, tea, sugarcane, flowers, fruits and vegetables as well as dairy farming while areas with poor transport network for agricultural yields have disfavoured commercial crop growing especially perishable crops e.g. in Kaabong, Moyo, Kitgum, …

THE ROLE OF THE AGRICULTURAL SECTOR IN UGANDA.

The agricultural sector in Uganda has greatly contributed to its development. The contribution is reflected in the following ways both positive and negative:

Positives.

1. Food supply. Agriculture produce almost all the food required for the population. The food produced includes; potato in Soroti, cassava in Tororo, beans in Masindi, bananas in Masaka, meat and milk in Mbarara plus poultry in Kampala, which provide starch, carbohydrates and proteins. This saves the danger of hunger, malnutrition and expenses of food production.

2. Employment. Agricultural sector has created employment opportunities to over 80% of Uganda's population either directly and indirectly. Many people are self-employed running individual smallholdings. Engineers, researchers, accountants, semi skilled and unskilled labour in form of weeders and harvesters have been employed on plantations e.g. on sugar and tea plantations in the Lake Victoria crescent and others are employed in agro-based industries such as food processing and textile industries.

3. Raw materials. Agricultural out puts form basic raw materials for the growth of agro-based industries. These include; food processing industries, milk processing and meat canning plants, grain millers, textile industries, cigarette making, and cooking oil industries. E.g. Kakira sugar factory, Kasaku tea factory hence agriculture stimulating industrial development.

4. Foreign exchange. Agriculture is the major source of foreign exchange. This foreign exchange is earned from sale of coffee from UGACOF and Kyagalanyi coffee factory, tea from Kasaku, beans, vanilla from Mukono farmers and horticultural products to Japan, Sweden, Sudan, ...

5. **Infrastructural Development.** It has led to the development of infrastructures especially roads (feeder roads), schools, …for example Lugazi sugar plantation developed Lugazi secondary school and roads like Namataba, Nagojja within Lugazi area, which has eased the movement of goods and people. This is so because agriculture is mostly rural based.

6. Source of government revenue. Taxes are imposed on agricultural products which are sold locally have generated revenue e.g. taxes on foods and fruits sold at markets like Nakasero and Owino (St. Balikuddembe market) and even plantations of tea in Kasaku and sugarcanes in Lugazi and Kakira have paid a lot of taxes to government.

7. Market creation for industrial products. Industries, which produce agricultural inputs such as hoes, tractors, wheel barrows, pesticides, animal feeds, etc, have developed because of ready market in agriculture. These include; Tororo phosphates fertilizer plant, Chillington Tool Company in Jinia, Kampala quality chemicals, Formula feeds in Kampala and Tumpeco Ug. Ltd.
8. Agricultural sector has promoted **international relationship** between Uganda and other countries through the exportation of agricultural out puts e.g. coffee and vanilla to the western world and importation of agricultural inputs such as pesticides, fertilizers, improved seeds, etc, from China, Germany, U.S.A. This helps Uganda in the acquisition of aid.
9. Gross Domestic Products (GDP). The sector has contributed about 47% of Uganda's GDP whereby much of its results constitutes production of food crops. A large proportion of GDP consists of subsistence crops, which are principally produced for home consumption.
10. It has led to development of **research and tour studies** as students conduct their fieldwork studies on agricultural farms like Kasaku tea estsate, Kakira sugar plantation, …
11. It has led to **economic diversification** where more than on activity is carried out. For example farm exports have supplemented fish and mineral exports thus increasing on foreign exchange inflow in Uganda.
12. It led to **growth and development of urban centers** due to their concentration and activities in an area like Lugazi town has developed due to existence of Lugazi sugar plantation and Kasaku tea estate.
13. It has led to **acquisition of agro skills and knowledge** through on- job training and learning on large scale farms like Kasaku tea estate, Kinyara sugar plantation and Kibimba rice scheme which has in turn stimulated the small scale farmers / out- growers.
14. Agricultural plantations have promoted **the generation of power** from its wastes like Kakira and Lugazi sugar plantations produce 6Mw of Biogas from sugar cane wastes. Other farm wastes from which the energy resources are got include; rice, coffee and G. nut husks for biomass used in West Nile to cure tobacco, tea and fish; and livestock cow dung for bio gas.
Negatives.
1. **Profit repatriation** by the foreign owners of the major farms in Uganda, which has led to wealth drain like Madhavni of Kakira, Metha of Lugazi and Kasaku have taken a lot of profits back to their Asian countries.
2. Agricultural products such as coffee, tea and vanilla are highly affected by **price fluctuations** on the world market which has led to great loss to the farmers growing them like those in Masaka, Mukono, Mpigi, Mbale, …
3. Agricultural practices such as monoculture, mono cropping and over cultivation on large and small scale farms has led to **loss of soil fertility** thus soil deterioration leading to low productivity like coffee growing in Masaka and Mbale, banana growing in Mbarara and Bushenyi, tea in Mukono, Kabarole and Mubende and sugar cane in Jinja, Mukono and Masindi.
4. Poor farming methods like up and down ploughing in the hilly and mountainous areas of Kigezi, Kasese and Mbale have led to **high soil erosion tendencies** therefore low food productivity.
5. Agricultural farms have led to **encroachment on marginal areas** such as wetland s and forests, which has degraded the environment. For example: Butamira forest in Jinja was cut down to grow sugar cane by Kakira sugar works, Bugala forest on Bugala island in L. Victoria was cut down to grow palm oil trees by BIDCO oil company.
6. Over grazing, over stocking and bush burning by the pastoralists in parts of Ankole- Masaka corridor, Nakasongola western Bunyoro and Karamoja have led to **reduced vegetation** cover mainly grass hence leading to desert conditions

CROP HUSBANDRY
There are mainly two types of agriculture practiced in this category:
1. Subsistence crop farming with shifting cultivation and rotational bush fallowing.
2. Commercial crop farming with intensive and extensive commercial crop farming.

CASH CROP GROWING IN UGANDA
The major cash crops of Uganda are coffee, cotton, tea and tobacco. These have dominated the export sector of Uganda for so long. The non traditional cash crops were recently introduced in 1980's namely; maize, beans, G. Nuts, peas etc in a bid to diversify the sector.

COFFEE GROWNG IN UGANDA
Coffee is a vital cash crop still grown in Uganda though facing great problem of coffee wilt and price fluctuations.
There are 3 types of coffee i.e. Arabica, Robusta and colonal coffee
Arabica coffee is mainly grown along the slopes of Mt. Elgon in Mbale, Bundibugyo, Kabarole, Rukungiri, on the slopes of Mt. Rwenzori, in Rakai, in Nebbi and parts of Mbarara. This is due to fertile well-drained volcanic soils, high altitude, high relief rainfall (2000mm) and generally varying temperatures (17^0 C- 0^0 C) in mountainous areas.
Robusta and colonal coffee are grown along the shores of L. Victoria mainly in Jinja, Masaka, Kampala, Mpigi, Mukono, Luwero, and Mubende and in parts of Mbarara, This is because of fertile well-drained clay loam soils, heavy rainfall, and hot temperature of about 25^0C– 27^0C and generally low altitude on gentle areas.

COTTON GROWING IN UGANDA
Cotton is also another vital traditional cash crop. Before the 1960's, it was the second foreign exchange earner of Uganda. It was / is widely grown in Bunyoro, Acholi, Lango, Teso , Tororo , Buganda and Busoga and had been extended to areas of Western Uganda like Ankole, Toro as well as Kasese. There are two types of cotton grown in Uganda, that is inorganic cotton, which dominates in most parts, and organic cotton produced mainly in central part.
The cotton growth is favoured by the following:

- Moderate rainfall amounts ranging between 500mm -1200mm per annum.
- Hot temperatures of about 27^0C– 29^0C during harvesting period.
- Loam sandy and loam clay soils.
- Relatively flat landscape / gently sloping area.

OTHER IMPORTANT CROPS GROWN IN UGANDA.

Tea: This is majorly grown in areas like Kabalore, Mityana, Mukono, Hoima, Masindi, Masaka and parts of Ankole.
Tobacco: It is mainly grown in areas like West Nile, Masindi, North and central Acholi, North Kigezi, parts of Mubende, ...
Sugarcane: This is mainly grown on plantations and small scale cut growers. Most of the plantations are mainly found at Kakira in Jinja, Lugazi in Mukono, Kinyara in Masindi and Sango bay in Rakai.

SKETCH MAP OF UGANDA SHOWING MAJOR CASH CROPS GROWN

TYPES OF FARMING IN UGANDA

1. Horticulture

This involves growing of flowers, fruits and vegetables. Among the fruits grown include, pineapple, passion fruits, ovacado and desert bananas, flowers include, Roses and other cut flowers produced by different estates e.g. Rosebud flower in Entebbe, Nsimbe horticultural estate in Mpigi, Wagaga flower estate in Kasenyi – Entebbe, Pearl flower estate in Ntungamo, …

2. **Plantation agriculture**

This is the growing of a single crop on a very large scale for commercial purposes using scientific methods of farming and mechanization for increased produce.

In Uganda, plantation farming is practiced at:
Lugazi in Mukono, Kinyara in Masindi, Kakira in Jinja and Sango bay in Rakai with sugarcanes;
Kasaku in Mukono, Mubende and Kabarole with tea;
Kibimba in Iganga, Doho in Tororo, and Olwenyi in Lira with rice; and Sebei, Northeast of Masindi and parts of Kabale.
Palm oil trees on Bugala and Ssese islands in Kalangala.

The characteristics of plantation agriculture in Uganda are:

- The farms concentrate on the production of one crop e.g. sugar cane, tea, rice, etc.
- The farms are very large usually extending to hundreds and thousands of hectares e.g. Doho rice scheme covers 2500 acres of land, etc.
- Crops production is usually for export / commercial purposes e.g. most of the tea in Mukono and Kabarole is exported to the world markets.
- Many workers; skilled, semi skilled and unskilled are employed e.g. Lugazi sugar plantation employs over 7000 people.

- A lot of capital is needed for the running of the plantations in preparing land, buying machines, transport facilities, setting up infrastructures, …
- Many plantations are state owned and others are privately owned by foreigners e.g. Kasaku tea estate is owned by Metha.
- Many plantations increase their out put by buying local produce especially from out growers and local producers e.g. local farmers in Kawolo and Mukono supplement Lugazi sugar farms.
- Plantations are scientifically managed and this involves the use of machines, agro-chemicals, fertilizers for quality out put to meet the demand and standards e.g. research is done to improve seed varieties at Luagzi sugarcane and tea plantations.
- The plantation management provides housing, food and medical facilities and sometimes education to the workers e.g. Lugazi and Kakira plantations operate these facilities to their workers.

FACTORS THAT HAVE FAVOURED PLANTATION FARMING IN UGANDA.

- Heavy rainfall of over 1500mm per annum which is well distributed through out the year.
- Hot temperature of about 25^{o} C – 27^{0}C throughout the year.
- Presence of well-drained and deep fertile soils in area where plantations are located e.g. Kakira sugar plantation located in Jinja, Kasaku tea Estate in Mukono where there are fertile loam clay soils.
- Relatively flat landscapes, which favours mechanization.
- Sparse population hence extensive land is available for establishing plantations.
- Ready market for the crops grown e.g. tea, sugar, etc.
- Availability of adequate capital from Asians and other local investors
- Positive government policy, which favours and encourages plantation agriculture.
- Well-developed transport and communication routes.
- Availability of large supply of water for irrigation to supplement the natural rainfall.
- Advanced technology.
- Modern Research activities
- Adequate cheap skilled and unskilled labour.

MERITS OF PLANTATION AGRICULTURE.

- Plantations create employment opportunities to both skilled, semi skilled labour e.g. Lugazi sugar plantation employs over 7000 people, Kasaku tea estate employs over 4000 workers, …
- Plantation workers are trained while on the job and gain more skills in plantation operations such as repairing and maintenance of farm machinery, use of modern farm techniques, … E.g. Kasaku tea estate trains workers as well as local farmers in Lugazi in modern farming techniques in tea growing and harvesting.
- Plantation Authorities usually engage in research, which results into the breeding of improved varieties hence high production levels e.g. Luagzi sugarcane and tea plantations at Lugazi.
- Plantation organizations ensure no wastage. The waste is used as fertilizers or fuel e.g. wastes of sugarcanes are used as fuel especially for cooking or fertilizers on Lugazi and Kakira sugar farms.
- They generate revenue to the government from the taxes. It levies taxes from industries and from people employed to the plantations e.g. export duties on tea produce and sugar produce and land rates from Kasaku, Kakira, Lugazi and Kinyara.
- The produce exported earns the country foreign exchange. Ugandan tea from Kasaku, Mityana and Kabarole is exported to USA and European Union hence foreign exchange.
- They have stimulated infrastructure growth and development e.g. roads, rail lines were developed to benefit the tea at Kasaku, sugarcane at Kakira, Lugazi and Kinyara. SCOUL maintains Lugazi – Kawolo road and built Lugazi sec. Sch., Kasaku built Kasaku primary school and health center.
- Plantation organization offer social services to their workers and families e.g. health care, education, water, entertainment, power, … like on Kasaku, Kinyara, Kibimbi, ….
- It has encouraged the development of monetary trade and transaction unlike the peasant subsistence farming where the families consume most of the produce. This has led to the out growers near these plantations who sell their produce to the plantation authorities.
- Plantations have led to the development of industries e.g. Kakira and Lugazi sugar work, Kasaku tea factory, etc. They process the farm produce to finished goods like sugar and tea beverages.
- They have encouraged economic independence as Uganda sustains herself in terms of foodstuffs. E.g. less rice and sugar are imported because they are produced locally at Doho, Olwenyi, Kibimbi, Kinyara, Lugazi and Kakira.
- Plantations have promoted the generation of power from their wastes like Kakira and Lugazi sugar plantations produce18mw and 6Mw of Biogas from sugar cane wastes and mini hydros respectively.
- They have provided quality produce to the natives like cooking oil from palm oil trees in Kalangala.

DEMERITS OF PLANTATION AGRICULTURE

- Plantations concentrate on the production of one crop (monoculture). This has resulted into soil exhaustion hence soil erosion.
- Plantation agriculture is more vulnerable to unfavourable natural hazards such as out break of diseases and pests, prolonged drought, hailstorms. Like at Victoria flowers at Entebbe were destroyed by heavy rains in 2005.

- Plantations have led to food shortage since the energetic young men are absorbed by the plantations from rural areas e.g. Paliisa, Kumi, Moyo,… thus neglecting the production of different food varieties which has led to famine.
- In some cases, conflicts between the plantation owners and the people living nearby have emerged. This is more so where the plantation owners are not nationals.
- Plantation agriculture has led to displacement of people as it requires large land areas e.g. Olwenyi rice irrigation project displaced over 500 families in Lira, Victoria flower estate in Entebbe resettled families.
- Since many plantations are owned by foreigners, they repatriated profits to their home countries especially in Asia leading to wealth loss to Uganda.
- Plantation organizations have used much capital tied up in labour, machinery, marketing facilities and in other farm inputs while their farm produce suffers to sudden price fluctuations on world market which results to great losses when prices to their produce fall.
- Since there are few plantation farms, they have exploited the consumers through charging higher prices on sugar from Kinyara, Kakira and Lugazi and rice form Kibimbi, Doho and Olwenyi due to the monopoly tendencies.
- Plantation farms have led to encroachment on marginal areas such as wetlands and forests, which has degraded the environment. For example: Butamira forest in Jinja was cut down to grow sugar cane by Kakira sugar works, Bugala forest on Bugala island in L. Victoria was cut down to grow palm oil trees by BIDCO oil company and Mabira forest in Mukono was cut down by Lugazi sugar works.

ANIMAL HUSBANDRY (LIVESTOCK FARMING) IN UGANDA

This sector is an important sub sector of the agricultural sector. In Uganda, cattle, goats, sheep, pigs, poultry, rabbits, and others are reared on various scales in this sector. The sector is further categorized under the following major groups:

1. Zero grazing is practiced in the mountainous areas like Mbale, Bududa along the slopes of Mt. Elgon, Kasese along the solpes of Mt. Rwenzori and in other areas on small scale throughout the country like in Luwero, Soroti, Masindi, Hoima, …
2. Ranching is second to the Pastoralism as a component of the sector. It is characterized by cross breeding, huge sums of investment, milk cooling facilities, use of paddocks, cattle dips, … It is at Mbarara, Mpigi, Sembabule, Rukungiri, Bushenyi, Soroti, Nakasongola, … Major ranches are Maruzi in Amoro, Aswa ranch in Kitgum, Kigumba ranch, Jesa farm in Mityana, Singo ranch, Ankole- Masaka ranch, Kisozi ranch in Gomba, Afoyo ranch in West Nile, Nyabushozi, ….
3. Pastoralism is the major one in this sector and a tradition method of herding livestock. Large numbers of cattle are kept of Zebu and Ankole long horned breeds by the Karamajongs in Moroto, Kaabong, Kotido and Nakapiripit; Atesos in Soroti and Katakwi; Bahima and Balaalo in Mbarara, Isingiro, Rakai, Buliisa, and Nakasongola as well as Basongora in Kasese.
4. Dairy farming is practiced in Central Uganda at Mityana, Wakiso, Mpigi, Mbarara, … Exotic cattle breeds are mostly kept like the Fresians, Jersey and cross breeds.

SKETCH OF UGANDA SHOWING THE MAJOR LIVESTOCK REARING AREAS

NOMADIC PASTORALISM

This is a form of subsistence farming which involves the movement of pastoralists with their herds of livestock from place to place in search of water and pasture.

The system is practiced by the Karamajong in Kaabong, Moroto, Kotido and Nakapiripiriti; the Atesos in Soroti, Katakwi and Amuria; the Bahima in Ankole – Masaka corridor, Balaalo in Nakasongola, Apac, Rukungiri, Kiboga and Buliisa; the Basongora in Kasese, Bushenyi, Bundibugyo: …

CHARACTERISTICS OF NOMADIC PASTORALISM

- It is practiced in areas with little rainfall ranging between 350 – 750 mm p.a. and very hot temperature over 30^0C. This leads to low supply of water and pasture hence continuous movements.
- Large numbers of livestock of low quality are kept. This is because the cattle keepers prefer quantity to quality.
- The most valued animals are the cattle which provide food in form of meat, milk and blood. However, other animals e.g. goats, sheep, etc are also kept.
- It is practiced in areas of low population density e.g. Moroto, Kotido, Mbarara, Nakasongola, Kasese, Buliisa, etc which have a population density of less than 20 people per square kilometer.
- Pastoralists move long distances in search for pasture and water e.g. in Kibale, Kyenjojo, Mubende and others to look for water and pasture.
- The nomads have no permanent settlements. Their seasonal movements depend on climatic conditions.
- Indigenous (local breeds) are kept e.g. Zebu which is short horned (Northern Uganda) and Ankole long horned cattle, which take long to mature.
- The livestock depend on natural pasture which consists of coarse grasses, thorny bushes, semi desert vegetation and other types of vegetation, which are non nutritious.
- The livestock is mainly kept for subsistence purposes.
- There is no use of modern scientific methods of rearing livestock such as cross breeding, vaccination, artificial insemination, paddocking, etc.
- Bush burning during the dry season is the common phenomenon. This is to ensure the growth of fresh pastures at the on set of the wet season.
- Overgrazing is a common habit due to overstocking of animals.
- Cattle raiding / rustling is their hobby from the neighbours.
- Pastoralists are war like and hostile especially the Karamajong.

FACTORS THAT HAVE FAVOURED NOMADIC PASTROLISM IN UGANDA

- The little and unreliable rainfall less than 750 mm, hot temperatures over 30˚ C and infertile soils, which limit arable farming hence livestock rearing becomes the alternative economic activity.
- The little and unreliable rainfall results into shortage of water for the livestock. The pastoralists are therefore forced to move in different areas in search for water and pasture.
- Presence of natural grassland vegetation which is used to feed the livestock and sometimes scattered.
- Availability of large expanse of land and vacant which is communal owned, so movement from one place to another is easy.
- Existence of native breeds which are resistance to harsh environmental conditions found in pastoral areas.
- Presence of low population densities which has led to the existence of large expanses / areas of land of nomadic pastoralism.
- Culture of the people who look at nomadism as a traditional way of life.
- Remoteness of the areas which limits development in term of infrastructures.
- Government neglect to support them.

ROLE OF NOMADIC PASTORALISM TO RURAL ECONOMY IN UGANDA

Nomadic pastoralism has played a variety of roles to the economy of where it is practiced and these are;

Positive roles:

- In Soroti, Kotido and Moroto districts, the Karamojong and Iteso contribute to food supply in the area. Cattle are a source of meat, milk, cheese and blood which are supplemented with growing crops like millet and sorghum. The Karamajong in Kotido barter trade dairy products for grain food stuffs such as sorghum, millet and maize and any other vital commercial items such as salt, sugar, guns with subsistence farmers in slightly wetter areas like around Dopeth, Okok and Okerere rivers which has enabled the prosperity of the rural economy.
- Pastoralists provide labour in Kotido and Kaabong. The Karamojong use bulls for ploughing the fields. Iteso pastoralists usually engage in small scale-cultivation of seasonal crops such as millet and sorghum especially during the wet season by ox - ploughing.
- The Karamajong pastoralists use their cattle to provide transport in Kaabong and Moroto. Bulls are used to pull carts in the transport of property especially during seasons of migration. They also carry cheese, blood and meat for barter trade purposes.
- In the pastoral areas like Kaabong, Kotido and Moroto, cowdung and bones from cattle are the main source of heat and light energy. In Tesoland, dried bones and cowdung are burnt to produce heat energy for both warming and cooking purposes. During night the cow dung is burnt to provide light in the Manyattas (huts).
- Pastoralists provide clothing facilities in the rural economies e.g. in Kotido and Kotido districts, cattle hides are wrapped around people as a basic form of clothing.
- Karamojong and Iteso pastoralists provide housing facilities in their rural areas. In the few developed towns in the area like Kaabong, Koputh, Apoko and Opotipot, cowdung is mixed with soil and used to smoothen the floors and walls of the simple houses and huts constructed. On the other hand, hides and skins are used as improvised materials used in the construction of tents. The

Iteso and Karamojong pastoralists have reared a lot of cattle which is essential for most of the cultural rituals within the rural economy and African society in general e.g. in Karamoja, Teso and Ankole, it is used for bride price.

- Pastoralism is a commercial bank in the economies of Buliisa, Kasese, Nakasongola, Kotido, Moroto and Isingiro. People in these regions store wealth in form of cattle. In Kotido and Mbarara, the more the herds of cattle a person possess, the more he is regarded as economically strong. When there is need to obtain an essential commodity such as salt, clothing, the pastoralists barter trade their cattle in exchange for it.
- In the rural economies where pastoralism is practiced such as Karamoga region and Ankole, social status, esteem and prestige is only obtained after possessing several herds of cattle. In such instances, nomadic pastoralism is the way to social, economic status, esteem and prestige. Karamojong pastoralists in Kaabong, Moroto and Kotido have preserved their "primitive" culture of rearing livestock thereby promoting eco-tourism.

Negative roles:

- Overstocking and overgrazing by Karamojong in Kaabong and Moroto, Bahima in Isingiro and Mbarara have led to soil erosion, land degradation and scarcity of underground water.
- Hostility of Karamojong pastoralists in Kaabong and Kotido districts has promoted ideological and social backwardness of those districts.
- Pastoral tribes like Basongora in Kasese and Karamojong in Kaabong have encroached on Rwenzori National park and Kidepo valley national park respectively.
- Constant movement of pastoralists like Karamojong from Kaabong to Kotido and Moroto has encouraged the spread pests and diseases like foot and mouth disease and ticks.
- Bush and grass burning in Nakasongola, Kaabong and Isingiro by Baruri, Karamojong and Bahima pastoralists respectively have led to global warming, soil erosion and atmospheric pollution.
- Cattle raiding and rustling between Karamojong and Iteso have led to loss of lives and cattle to both sides.
- Grazing of livestock in Timu, Moroto and Morongole forests by the Karamojong pastoralists have led to deforeststion hence causing desertification and soil erosion.

DAIRY FARMING IN UGANDA

Milk is the major dairy produce in Uganda. It's majorly obtained from Dairy farms such as Jessa dairy farm in Mityana belonging to Mr. Mulwana, Beatrice farm formerly Batuma farm in Kabale belonging to the late Dr. Canon Batuma, Bugerere modern dairy farm belonging to Hajji Katongole of UTODA, Kisozi ranch in Mpigi and Rwakitura ranch in Mbarara which belong to the president of Uganda his excellency Kaguta Yoweri Museven, Ankole -Masaka ranch, Kazo Dairy farmers association in Mbarara and many other dairy farms in Nyabushozi, Rukungiri, etc.

Milk is also collected from individuals who carry out Zero grazing in Mbarara, Ntungamo, Mbale, Soroti, Wakiso, etc.

The other dairy products are Cheese produced by Liberty, Maddo dairies, Paramount dairies in Mbarara, Dairy Corporation in Kampala. Butter, Yoghurt, Ghee produced by GBK, and Alpha dairies in Mbarara, Sameer Agriculture and Livestock (Former Uganda Dairy Corporation) in Kampala at Bugoloobi, etc.

STATUS OF MILK PRODUCTION

- Milk has increased tremendously since 1990 as follows; in 1994, Uganda produced 446,000,000 litres; in 1995, Uganda produced 487,000,000 litres; in 1996, Uganda produced 540,000,000; in 1997, Uganda produced 584,000,000; in 1998, Uganda produced 619,000,000; in 1999, Uganda produced 718,000,000; and in 2001, Uganda produced 800,000,000.
- The overall milk production increased from 700 million litres in 2000 to 1.4 billion litres by 2006 which is an annual growth of 8-10 per cent and the milk processing capacity will increase from 463,000 litres to 710,000 litres per day.
- Sameer Agriculture and livestock has increased milk processing from 35,000 litres since the 1960s to 73 million litres per annum.
- There is still low milk consumption in the country estimated at 50 litres per person per year as compared to the 200 litres per year recommended by the World health organisation.
- Raw milk collection by Sameer Agriculture and livestock has increased from 40,000 litres per day to 140,000 litres and is expected to increase to 400,000 litres by 2009.
- There have been low levels of milk processing with the first milk powder factory in the country being Sameer Agriculture and Livestock plant in Kampala industrial area at Bugoloobi opened up in 2008 and now at Jessa dairies in Mityana.
- Only 20% of the milk produced is processed by the informal sector.

FACTORS LIMITING THE DEVELOPMENT OF LIVESTOCK INDUSTRY IN UGANDA

The following are the factors responsible for low level of development of the live stock industry;

- Harsh climate of little and unreliable rainfall, hot temperatures in Kotido, Moroto and Masindi have limited pastures and water for livestock which has led to poor quality livestock due to poor feeding and limited water.
- Poor and low quality indigenous cattle breeds like the Ankole long horn cattle in Mbarara and Isingiro and Zebu cattle in Kotido, Kaabong and Moroto dominate the livestock industry which naturally yield less milk and low quality beef.
- Pests like ticks and tsetse flies and diseases like East coast fever, rinder pest and foot and mouth disease have killed many cattle and stunted animal quality in Mbarara, Kotido and Moroto.
- Lack of ready market for livestock products like milk and beef in Karamajong, Buliisa, Nakasongola and Soroti since they are in remote areas have limited the development of livestock industry. E.g. a cup of milk is sold at 600/= in Kampala, in Mbarara a litre is sold at 300/= and still there is no market in some pastoral distri cts.
- Political instability since 1980, have affected the livestock sector in Luwero, Aswa ranch in Kitgum, Maruzi ranch in Gulu and many others. During war cattle are stolen by soldiers and local village thieves.
- Cattle rustling and raiding among the Karamojong and Iteso has led to loss of cattle and lives on both sides leading to low level of development of the livestock industry.
- Inadequate veterinary services due to limited extension staff to advice farmers about modern farming has led to death of livestock in Kotido, Moroto, Buliisa and Nakasongola.
- Lack of skilled labour in form of veterinary doctors, cattle attendants and hardsmen on ranches like Maruzi, Kisozi, Singo, Kigumba in Masindi and Nyabushozi has led to the low level development of the 'livestock industry.
- Competition with imported dairy and beef products from Kenya, Denmark, Netherlands, France and Britain has limited development of the livestock industry e.g. Jesa, GBK and Alpha dairy products.
- Communal ownership of land and communal grazing in Mbarara, Kotido and Mororto have led to led to easy spread of diseases like foot and mouth disease, Brucellus which have

killed cattle.

- Lack of enough capital to purchase drugs, exotic breeds, dairy processing technology and milking machines on large dairies like Jesa farm, aluminium milk containers, and milk coolers in Kiruhura, Mbarara, Mpigi, Nakasongola and Buliisa has led to low level development of livestock industry.
- Mountainous areas like slopes of Mt. Rwenzori, Mt. Mufumbiro and Mt. Elgon discourage animal keeping where by friesians and jersey exotic cattle find it difficult in staying along steep and high slopes.
- Limited electricity has affected milk storage and processing in Kampala, Mbarara, Isingiro and Soroti.
- Shortage of land in some areas like Kabale, Mbale and Kampala has affected livestock farming. E.g. in Kampala, Mbarara and Mbale, the city council abolished livestock rearing in the city.
- Existence of poor and non nutritious pastures in Kotido, Buliisa, Nakasongola, Mbarara and Moroto e.g. spear and coach grass cannot support qualitative livestock farming.
- Negative government policies e.g. ban on use of polythene bags, use of aluminium cans to transport milk has driven out people from the livestock sector in Mbarara, Kampala, Nakasongola, Isingiro, Bushenyi, Mpigi, Wakiso, Soroti, etc.
- Cultural beliefs (cattle mania) have led to pastoralists like the Bahima, Iteso and Karamajong to keep large numbers of cattle for subsistence purposes at the expense of quality on ranches.

STEPS BEING TAKEN TO IMPROVE THE LIVESTOCK INDUSTRY

- The Ministry of agriculture has imported high quality dairy and beef cattle like the Friesians from India, Jersey from Britain and Germany which yield more milk per day and have more quality and quantity in terms of beef.
- Cross breeding between the local breeds and exotic breeds is carried out on many ranches like Maruzi, Nyabushozi and Ankole - Masaka ranch to improve the quality and quantity of milk and beef.
- The government has trained more veterinary doctors at Makerere University, Kabanyolo and Kawanda Research centers as well as Serere in Soroti to treat livestock. Veterinary doctors are being deployed in pastoral regions to teach better farming techniques.
- The ministry of works transport and communication has up-graded and constructed feeder roads in pastoral areas like Nyabushozi, Soroti, Moroto to create access for livestock products like milk e.g. the Kampala - Mbarara road, Mbale - Soroti road, etc.
- Government of Uganda has constructed valley dams, boreholes in Kotido, Moroto, Nakapiripirit, Mbarara and Nakasongola to provide water for livestock all times.
- Government has established demonstration ranches in pastoral and livestock areas to teach better farming practices to farmers e.g. Ankole - Masaka ranch, Maruzi ranch Aswa ranch, Kawanda and Kabanyolo research centres.
- Ministry of Agriculture has constructed dipping and spraying centers in Mbarara, Moroto, Kumi, Soroti and Kotido to control pests and diseases such as ticks.
- There has been development of meat and dairy processing industries to create demand for livestock products e.g. Top cuts and Quality cuts in Kampala for beef, Uganda Dairy Corporation for milk (Sameer agric and livestock), Alpha and G.B.K dairies in Mbarara process and pack milk for the local market.
- The government has provided security in pastoral areas to control insecurity and cattle rustling by deploying the UPDF and Arrow boys local security groups in Soroti as well as in Kotido and Moroto, there is disarmament of the Karamojong pastoralists by UPDF.
- The Ministry of agriculture has introduced nutritious livestock feeds such as alfa-alfa, maize brand, cattle cakes and cattle salt which are widely used in Mbarara, Ntungamo, Mpigi and Mityana. Formula feeds in Kampala, NUVITA in Jinja and UGACHICK in Wakiso also process livestock feeds.
- There has been diversification of livestock in Mbarara, Rukungiri, Mpigi, Soroti, Nakasongola and Moroto whereby goats, sheep, pigs, rabbits and poultry are reared along side cattle to increase chances of profit maximization as well as minimization of losses.
- In Mbarara, Mpigi and Masaka, there has been promotion of Zero grazing and rotational grazing to solve the problem of land scarcity and over grazing as well as in Kampala cattle are kept. They are fed on banana, sweet potato and cassava peels collected from markets like Kalerwe, Wandegeya and hotels like Africana, etc.
- There has been extension of credit facilities to farmers by the government and non government organizations through micro - finance institutions like FOCUS, CERUDEB, Send a cow, Heifer international in Mbarara, Mpigi, Mukono, Pallisa, Kayunga, Kampala, etc.
- The Ministry of agriculture, animal industry and fisheries has embarked on restocking of livestock in Sironko, Lango, Teso and Sembabule which are of hyrid breeds.
- At Serere, Kabanyoro, Kawanda and Namulonge research institutes, there has been research and development of scientific methods of livestock rearing such as artificial insemination, training of staff and offering extension services to farmers in Soroti, Nakasongola, Mbarara, Mpigi, Wakiso, etc.
- Mixed farming has been adapted in Soroti, Kasese, Mbarara, Mityana and Rukungiri where animals are kept at the same time crops are grown. Crops provide feeds to livestock while animals provide manure to plants.
- The government has set hygiene standards for the Dairy sector. Aluminium transportation cans have been adopted in Mbarara and Wakiso and all milk producing regions to improve the quality of milk.
- Non government organisation from Denmark such as DANIDA has given dairy farmers in Mbarara, Ntungamo, Kiruhura and Lyantonde milk processing facilities such as milk coolers to reduce loss of milk due to poor storage facilities.
- External market for dairy products like cheese, milk, butter and beef have been sought by dairy farmers and dairy processing industries like Paramount cheese, Alpha dairies, GBK from COMESA, as well as PTA countries.
- The government through Agrekko has generated more electricity at Lugogo in Kampala and Kiira at Jinja to enable milk preservation and milk processing.
- Sameer Agriculture and livestock in Kampala, Jessa in Mityana, Alpha dairies and GBK in Mbarara have processed milk into butter, cheese, skimmed milk and powdered milk to reduce losses and add value to livestock products.

GENERAL PROBLEMS FACING AGRICULTURAL SECTOR IN UGANDA

The following are the problems affecting the agriculture;

- Fluctuating agricultural crop prices especially coffee, Vanilla, Moringa, and tea which have affected the farmers in Mukono, Masaka, Rukungiri as well exporting companies like Kyagalanyi coffee, UGACOF, etc.
- Pests and diseases e.g. the coffee wilt disease, Banana wilt disease in Masaka, Cassava mosaic in Soroti, rinder pest and Nagana in Hoima and Sembabule, cotton boll weevil in Lira and

Kamuli have affected crops and animals leading to losses to the farmers and pastoralists.

- Weather vagaries such as prolonged drought in Nakasongola, Kitgum, Kotido and Mbarara, Hailstorms and Flooding after El-Nino in Masaka, Kiboga and Soroti have led to death of cattle and crop failure thus escalating poverty.
- Low yielding varieties of crops e.g. maize in Soroti, bananas in Mpigi, the Ankole and Karamojong long horn cattle which yield poor crop, beef and low quantity of milk.
- Steep and rugged relief in Kigezi, Bundibujyo, Mbale and Nyabirongo limit mechanized agriculture and transportation of agricultural commodities.
- Soils of low productivity in Karamoja, parts of Soroti and the porous soils of Tororo, Fortportal and some parts of Kigezi region limit the agricultural productivity.
- High post harvest losses due to poor storage facilities. A lot of milk in Mbarara, Nakasongola, Kotido, Soroti and Moroto is lost due to lack of modern milk storing facilities, bananas in Mbale and Mbarara are also lost due to poor transport and poor storage conditions.
- Political instability in Kasese, Lira, Gulu, Apac and West Nile has affected the growth and harvest of cotton, tobacco, millet and Sorghum. During the 1980 - 86 wars in Luwero triangle, a lot of cattle were stolen by rebels while Kony rebels have also stolen alot of cattle in Pader, Moyo and Kitgum districts.
- Cattle rustling is a challenge facing the Iteso and Karamojong pastoralists while cattle raids from the Pokot of Kenya have led to loss of both cattle and lives between them and Karamojongs in Kotido and Moroto districts.
- Low level of technology used in farming such as hand hoes, pangas, sticks, hands and sickles in banana, cotton, sorghum and cattle farms in Soroti, Masaka and Lira implies low yields which cannot support a big market and commercial farming.
- Poor accessibility to rich agricultural areas like Kiboga, Kabale, Nyabirongo, Nebbi and Mbale has affected the agricultural sector. Such areas have fertile soils but have proper transport routes to access urban markets in Kampala and Jinja.
- Corruption and mismanagement of funds meant to develop the agricultural sector is another problem facing agriculture. Money meant for construction of valley dams and purchase of drugs was embezzled between 2001 and 2004 by the ministry of agriculture officials.
- Limited research.
- Limited capital.
- Shortage of ready market.

AGRICULTURAL MODERNISATION

Agricultural modernization refers to the use of scientific methods of crop and animal husbandry such as agro - chemicals and machinery in an attempt to increase production and productivity.
In Uganda, agricultural modernization has been undertaken in various areas. These are:

- There has been attempts to improve the quality and quantity of crops grown along Ongom citrus farm, Doho in Tororo, Kibimba in Bugiri and Olwenyi rice scheme in Lira, Mulwana farm (Nsimbe farm) in Mpigi, Mubuku irrigation scheme in Kasese, Kakira in Jinja, Lugazi in Mukono and Kinyara sugar works in Masindi, Colonal coffee estates in Mukono and Wakiso, Masindi seed project, Lugazi, Mityana and Toro tea estates, etc.
- Attempts have also been under taken to improve the quality and quantity of animals, especially cattle along the Ankole - Masaka ranching schemes in Mbarara, Batiima farm in Kabale, Njeru stock farm in Mukono, Jesa dairy farm in Mityana, Maruzi farm in Gulu, Nyabushozi ranch in Kiruhura, Kisozi ranch in Mpigi, etc.
- Demonstration and research stations have been established with an aim of improving the quality and quantity of animals and crops e.g. the Kawanda research station in Wakiso, Namulonge research station in Wakiso, Mukono district farm institute, Serere research station in Soroti, etc.

FACTORS LIMITING AGRICULTURAL MODERNIZATION IN UGANDA

The following are factors limiting agricultural modernization:

- The nature of relief in hilly areas like Mt. Elgon in Mbale and Kapchorwa, Kigezi highlands and others discourage mechanization hence low land productivity. Steep slopes have thin soils and are susceptible to erosion under the influence of gravity and running water e.g. soil erosion is a serious problem in Kigezi highlands.
- Wet lowland plains like Kiruruma swamp and valleys in Kigezi, Buganda, Nakasongola, Lumbuye and Naigombwa in Iganga and others have poorly drained soils, which make them unsuitable for agriculture. Such low lands and valleys are subjected to floods, which destroy crops, animals and discourage human settlement.
- High altitude areas such as mountains of Rwenzori, Mufumbiro and Elgon, temperatures are too cold for agricultural modernization. Many crops and cattle except the exotic breeds cannot flourish there. This limits average land which would be under agriculture.
- Pests and diseases have limited agricultural modernization e.g. the coffee wilt disease affects the production and quality of coffee, East-coast fever, Brucellus, foot and mouth disease affect cattle along the Kabale farm and the Ankole - Masaka ranching schemes, etc. Tsetsefly infestation in Bunyoro and Busoga limits human settlement and agricultural production as they cause sleeping sickness to man and Nagana to cattle. Periodic invasion of locusts and armyworms especially in the North and Eastern Uganda destroy crops and pastures.
- Poor nature of the soils have limited agricultural modernization e.g. in Buganda, the lateritic soils have been heavily leached and therefore hinder farming. In some parts of Northwest Uganda like Atiak, Eastern Kotido, there are Regosol soils and these are poorly developed soils from loose materials such as sand as well as Lithosol soils and these are shallow soils too stony for agriculture.
- Natural hazards like hailstorms in Ntungamo and Kayunga, prolonged drought in Kitgum and Katatwi and landslides in Mbale and Kabarole have limited agricultural modernization. In Northern Uganda, the unreliability of rainfall seriously affects cotton production in Gulu, Lira and Dokolo. Landslides in Kigezi and Mbale destroy crops and farmlands. In Kararnoja, prolonged drought has led to scarcity of pastures for cattle leading to death and low quality thin cattle.
- The attitudes of people have in some ways limited agriculture modernization e.g. in Buganda, Bugisu and Busoga, the existing customs and traditions have promoted subsistence agriculture other than plantation agriculture. E.g. in Karamoja and Teso, the customs and traditions promote pastoralism and more emphasis is put on increasing quantity rather than quality of the livestock.
- The high costs of agricultural modernization as compared to the cheap human labour. In Mpigi, Nakasongola, and others, there is lack of enough capital to purchase fertilizers, herbicides, pesticides, spraying machines, tractors, modem storage facilities, etc.
- Land tenure system has in many cases limited agriculture modernization e.g. the Mailo land system in Buganda like Mukono, Wakiso and Masaka has left some people landless while a few others have large pieces of land some of which is left unutilised. This affects the size of farms and ease of transferability.
- In Kigezi and Mbale, the inheritance system has led to land fragmentation. This system limits use of farm machinery and increases soil deterioration due to continuous use without fallow periods and is wasteful in terms of time spent between widely spread farm holdings.

- The free and communal land ownership especially in pastoral areas like Kotido and parts of Soroti, Moroto and Kaabong has led to irresponsible use of land, as farmers know that they can easily move to other places since land is free. There has been bush burning, overstocking, hence offsetting soil deterioration and affecting land productivity.
- Nature of crops has also limited agricultural modernization e.g. perennial crops such as bananas, tea, coffee and others are more labour intensive technology orientated. The use of machines on coffee and Banana plantations in Masaka and Mbale is restricted which as well limits out put.
- Low level of education and awareness on modernization technique is one of the most limiting factors to agricultural modernization e.g. the Bahima and Karamojongs are not educated enough thus continuation of nomadic pastoralism as well as other natives in different of Uganda to practice shift cultivation and bush fallowing.
- Linkages between productive areas and market have limited agricultural modernization. Poor transport facilities limits market for rural agricultural products especially the highly perishable ones like milk and vegetable. E.g. milk from Ankole, Kotido and Bullisa end up spoilt due to poor road networks.
- The existing low level of technology has restricted agricultural out put in many parts of Uganda like in Kigezi, Mbale, West Nile, Soroti and others. Simple tools like hoes, pangas and slashes are used for agriculture. In some parts like along the shores of Lake Kyoga in Kumi and Soroti, cattle are used in ploughing land but even then, their productivity is not compared to machines like tractors, etc.
- The high population in Kigezi, Bugisu, Kibale and along the shores of L. Victoria in Mukono, Kampala and Jinja has limited expansion of agricultural activities. It has led to land use conflicts among farmers hence limiting agricultural modernization.
- The dispersal or scattered settlement patterns, which characterize most parts of Uganda like Rukungiri, Mbarara, Soroti, Bushenyi, Karamoja region and others, have encouraged individual holdings. Therefore individual farmers work alone which inhibits the rapid spread of ideas, farming techniques, and frustrates government's efforts to provide agricultural assistance and advice.
- Political instability particularly in Gulu, Lira, Kitgum and Kasese did not enable farmers to concentrate on their farms. At time bandits and rebels steal cattle and crops hence limiting agricultural modernization. In Luwero triangle, the 1980 -1985 guerilla war necessitated the farmers to abandon their farms and more than 10,000 heads of cattle were eaten by bandits and rebels.
- Inadequate markets, low prices and delays in payments to farmers have limited production of crops like Coffee, Cotton, beans and dairy products. The fluctuating prices of agricultural products like vanilla in Mukono and Kayunga and coffee in Masaka and Mbale reduce the farmer's efforts and confidence in the system.
- Lack of adequate skilled labour to direct farm operations, maintain and operate farm machines. The biggest percentage of the available labourforce is unskilled and therefore of less productivity. Rural-urban migration of the young able-bodied youths has created scarcity of labour in rural areas of Mbale, Mbarara, Rukungiri, Kabale, Bushenyi, and others.
- International events pose limitations to agricultural modernization e.g. international prices of major export crops like coffee, cotton and tea are usually low and subjected to sudden fluctuations. Specific quantities quotas to be exported on the world market are set and therefore Uganda cannot produce and export more than that which has discouraged the expansion of agricultural activities.
- There is lack of adequate research facilities to control diseases and introduce high yielding exotic breeds, and hybrid seeds through genetic engineering. There are few research enters in the country and these include Kawanda research station, Namulonge research institute, Mukono district demonstration farms, etc. This has therefore promoted over dependence on the indigenous low quality seeds and animal breeds e.g. the Ankole long horn and Karamojong Zebu cattle characterized by low productivity.
- Embezzlement of agricultural funds, pesticides, farm implements, drugs and other facilities by government officials in the ministry of agriculture has denied farmers the opportunity to undertake agricultural modernization.

SOLUTIONS TO THE AGRICULTURAL PROBLEMS IN UGANDA

The following are the steps being taken to improve the agricultural sector;

- The Ministry of agriculture under NARO and NAADS has embarked on increased agricultural education through seminars and workshops as well as the development of demonstration farms such as Aswa ranch in Kitgum and Ankole - Masaka ranch.
- The government has backed an Agricultural credit facility (ACF) with Shs 90 billion as per 2010/11 Financial year to be accessed by farmers at an interest rate of 12% per annum from the participating commercial banks.
- The Ministry of defence is improving security in Soroti, Katakwi, and Kasese through the UPDF, Arrow boys and the local defense forces. In the north LRA rebels have been driven out to southern Sudan by the UPDF in 2006.
- Mechanization of agriculture for great output is done at Kasaku in Mukono, Mityana, and Toro tea estates; Kinyara, Lugazi and Kakira Sugar cane estates.
- Ugandan government has liberalised the economy and attracted the foreign investors for adoption and encouragement of the large scale agriculture and production for commercial basis. For example BIDCO oil palm foreign farmers on Bugala Islands of L. Victoria, Madhvani group in Jinja, Metha group in Lugazi, Mukwano sun flower and cotton farmers in Lira and Masindi and Rosebud flower farmers in Entebbe have been attracted.
- The ministry of agriculture has embarked on agricultural diversification through the introduction of non - traditional crops e.g. Vanilla is now grown in Mukono and Kayunga, flowers at Entebbe by Victoria flowers, Waggagi and Rosebud as well as Pearl flowers in Ntungamo, Moringa in Wakiso and Colonal coffee as away to control price fluctuations and reduce competition on the world market.
- Cooperative farming is being encouraged e.g. through the "send a cow "programme in Kampala. High quality livestock are given to local groups emphasizing the increase of quality and quantity in Kayunga, Mukono, Wakiso, Mbarara and Kiruhura through NAADS.
- The Ministry of agriculture is providing incentives to farmers e.g. seedlings of upland rice in Kakiri in Wakiso district, Cassava planting stems in Teso, Tea seedling in Lugazi and Toro for increased productivity.
- The Ministry of Agriculture has introduced fish farming of Tilapia and catfish at Kajjansi, Kiboga, Nakasongola, Mbale, Pallisa, Rukungiri, Lugazi, and Entebbe to boast crop and animal farming as an alternative.
- The Ministry of Agriculture has intensified research through NARO (National Agricultural research organization) and NAADS (National Agricultural Advisory services) so as to improve on both crop varieties and livestock breeds as well as marketing in Mukono, Ntenjeru, Mbarara, Mbale, Mpigi and Kalangala.
- Improved storage facilities e.g. milk dairy factories for cooling and processing such as Alpha in Mbarara, Jesa in Mityana and GBK in Mbarara have been adopted. Milk cooling containers have also been imported and used in all major towns like Kampala, Mbarara, Soroti, Nakasongola, Wakiso and Masaka to preserve.
- Soil erosion and fertility control measures have been adopted in Kigezi, Mbale and Bundibugyo where terracing, mulching and crop rotation are encouraged. Both artificial and organic manure like cow dung are applied to reinstate soil fertility in Mbarara, Mbale, Masaka and Wakiso.

Spraying and use of pesticides to control pests like ticks is done in Ankole - Masaka, Nakasongola, Buliisa, Karamoja and Teso. Cattle are also dipped in specially treated water to kill pests in the pastoral corridor.

FAMINE

Famine refers to an acute shortage of food. It is a situation, which arises when the available food resources are no longer satisfying the available population food requirements.

Famine results into starvation, mal and undernourishment, and drastic fall in the living standards, mass exodus of people diseases and even death.

Famine disasters have occurred from time to time over years.

In Uganda, areas that are affected by famine are Karamoja region in districts of Kaabong, Moroto, Kotido and Nakapiripirit; Ankole – Masaka corridor in Mbarara, Isingiro, Kiruhura and Sembabule; L. Albert flatlands in Buliisa, Kagadi, Ntoroko and Semliki; some parts of Kasese, Nakasongola, Katakwi and Kitgum; and others that suffer from natural disasters like landslides, hailstorms, diseases, floods, drought and pests.

CAUSES OF FAMINE IN UGANDA

Famine results from many factors that are categorized into two namely; physical factors and other factors;

Physical factors leading to famine:

1. Climate leads to famine in several ways:

a) **Drought (la Nina)** refers to an abnormal shortage of water below the usual requirements for food production. This drought kills off livestock and destroys crops hence causing food shortages and famine. In most parts of Uganda in the early 1980s, many people were left starving because of food shortages and famine.

b) **Floods** result from heavy torrential rains (El-Nino) leading to the destruction of crops and livestock. In 1997 – 1998, floods left many people having less crop yields and live stock dead in districts on shores of L. Victoria like in Kayunga, Mukono and Bugiri while that of 2007 affected the same in Teso lands in Soroti, Kum and Katakwi leading to famine in those areas.

c) **Little rainfall and its unreliability** are a major climatic limitation to food production. This is particularly the case in Kaabong, Kotido and Nakasongola where most of the land surface is classified as semi arid conditions which lead to late planting and crops failures after planting hence food shortages and famine.

2. The nature of soils especially the sandy and infertile of about 30% of Uganda's total land area are of low productivity which support the growth of thin or no vegetation to cover the land against the agents of erosion. So, as a result such areas with those soils like Rakai, Nakasongola and Kaabong are environmentally degraded and they therefore support less and less crops and yet the population demands hence food shortage and famine are the results.

3 Clearance of forests in most parts of the Uganda such as Luwero, Mpigi and Nakasongola as the main source of energy in form of wood fuel, has resulted into their depletion, reduced rainfall and desertification thus leading to less crop yields and food scarcity.

4 The Ozone Layer has been destroyed**, u**nfortunately reducing in thickness due to the pollution of the atmosphere by industries, factories, homes, car exhaust fume and air crafts. The environmental impact of the reduction in the ozone layer has increased evaporation rates, increased drought and desertification thus seriously affecting food production and leading to food shortages.

5 Insects, pests and diseases limit food production in several ways:-

a) Swollen shoot disease in cocoa, cassava mosaic in cassava, rust disease in rice and stalk bearer in maize are examples of destructive diseases to food in Uganda especially in Mpigi, Kayunga and Masindi.

b) Pests such as locusts and armyworms destroy crops in the field. Locusts are particularly common in Yumbe Adjumani and Moyo while armyworms are common in Kaabong, Kitgum and Kotido.

c) Furthermore, tsetse flies cause sleeping sickness in humans and nagana in livestock and therefore discouraging settlement for crop cultivation like in Buvuma islands, Mayuge and Masindi.

6 Relief (nature of the landscape) and altitude limit crop production in several ways:-

a) High altitude areas like on the slopes of Mt. Rwenzori in Kabarole and Kasese limit crop production due to both cold temperatures and thin soils,

b) Steep slopes as in Kapachorwa, Bududa and Bukwa on the Mt. Elgon limit agricultural mechanisation thus limit crop yields in large quantities.

c) Low lands such as Walugogo in Iganga, Lwera in Masaka and Ruizi in Mbarara are mainly occupied by swamps and therefore have poorly clay drained soils, which make them unsuitable for food crop production.

7. Population Pressure particularly in Kisoro and Kabale of Kigezi region and Mbale and Bududa of Gishu region has resulted into shortage of land for farming and even more land for food production has been reclaimed from swamps, yet they deteriorate after a few years of use and support less and fewer crops yields mainly yams thus food shortage.

Other factors causing famine

1 Political and prolonged wars as in Kitgum, Pader, Lira and Gulu of Northern Uganda has resulted into less or no crop cultivation as people are ever on the move to escape the war. In Uganda, wars have had a very devastating effect on growing of food crops and rearing of livestock between 1981 – 1986 in Luwero triangle by NRA and 1986 – 2006 in Northern Uganda by LRA hence famine.

2 Land Tenure System in Uganda like in Buganda of central, Kigezi of S.W, Bugishu and Tesoland of eastern are many and some of them discourage crop production in the following ways:-

a) The **communal land ownership system** like Soroti, Moroto and Amuria has denied one exclusive rights over the piece of land he/she uses which has not only resulted into irresponsible use of land but also discouraged any initiative to introduce the use of modern farming techniques such as use of machines, application of fertilizers and manure which are imperative for a higher crop out put per unit area.

b) The **mailo system** in the Buganda region of central Uganda has left some people landless whereas other few individuals mainly the local chiefs have a lot of land most of which is left unutilized thus discouraging crop production leading to food shortage.
c) The **inheritance system** in Ibanda, Kisoro and Kabale of Kigezi has led to land fragmentation as land is divided up amongst all the sons after the father's death which has made the size of individual land holdings therefore small and increasingly diminishing in size for food output because they limit the economic use of farm machinery.
3. In most parts of Uganda, **storage facilities** are largely inadequate. During bumper harvests especially the grains / cereals like Millet in Masindi and Kasese, Maize in Pallisa, Kumi and Mayuge, there is a lot of wastage of food because most of it is not adequately stored thus leading to shortage of food in times of natural disasters such as drought.
4 Marketing facilities and arrangements for most food crops in Uganda are inadequate, poor and are not yet fully developed whereby transportation of food crops from areas of surplus like maize in Mubende and Milk in Mbarara to areas of deficit like Kaabong and Abim are impossible which therefore leads to famine in those areas of deficit.
5 Poor state of transport routes has led to market inaccessibility which has greatly affected the increased production of particular crops especially those that are perishable such as vegetables and fruits in Kabale and Kabarole and crops such as bananas in Bushenyi, Masaka and Mbale. And even production is made low as the surplus output is not easily marketed.
6Emphasis on production of cash and export Crops such as coffee in Mbale and Masaka, cotton in Lira and Gulu, tea in Kabarole and Mubende and tobacco in Nebbi and Arua by the British colonial agricultural policies gave undue prominence in Uganda at the expense of food crop production which consequently made plenty of land to be devoted to the cultivation of cash crop leaving very little land for cultivation of food crops thus food shortages.
7. In Uganda, the **nature of agricultural production** is on a subsistence basis like in Mpigi among the cassava farmers, Soroti among the millet and ground nut growers and Lira among the sorghum farmers under shifting cultivation and bush fallowing where production is mainly for home consumption and little if any is sold which has limited food production resulting in food shortages and famine.
8 Low levels of technology limit large scale food production. In Uganda, areas prone to drought such as Nakasongola, Kaabong and Katakwi and others have failed to apply the advance technology to eliminate water shortages by either cloud seeding, rain making or sprinkling irrigation to increase food production thus famine. And even such technology in Uganda is limit
9 Many Ugandan towns such as Mbarara, Mbale, Fort Portal, Kampala, Jinja and others are growing rapidly due to **rural urban migration** which has made the young able-bodied people to seek better paying jobs and excitement in the towns leaving crop production to the old flock who are less effective hence low food production in villages of those town districts.
10 Capital or finance for the purchase of machinery, fertilizers, improved seed varieties, setting up irrigation schemes and other farm items is inadequate in Uganda as most farmers rely on Credit institutions such as commercial banks like CERUDEB and co-operatives like SACCO's to fund their operations, yet they lack security attached to required loans which prevents them from rescuing them and this therefore limits farming resulting into low yields and food shortages for the growing population.
11. **National food policy** by Ministry 0f Agriculture has failed to meet the country's ever increasing demand for food caused by rapid population growth which adds on 1 million every year as the food programmes which are drawn up, are never implemented fully especially during the periods of crop failure like in Sembabule, Katakwi and Nakasongola thus making the problem of food shortage recurrent.
12Limited research to develop high yielding food varieties because of inadequate capital and shortage of skilled manpower in many districts of Uganda like Rakai, Buliisa, Kaabong and Amuria has led to food shortages as the farmers depend on use of natural varieties, which are slow growing, prone to pests and diseases, and yields low out put.
13. Low levels of education among the peasant farmers in Soroti, Nakapiripirit and Nakasongola have made it difficult for them to adopt modern farming techniques like irrigation, ranching and soil conservation measures even with the assistance of extension workers spearheaded by NAADS thus low food production leading to famine.

SOLUTIONS TO THE FOOD CRISIS IN UGANDA
1.The Ministry of Agriculture through NAADS in conjunction with the Office of the Prime Ministry has set up a **national food policy** aimed at encouraging and increasing the domestic food production at all times including periods of crops failure to meet adequately the ever-rising demand caused by the rapid population. Further more, the office of the Vice President headed Prof. Gilbert Bukenya encouraged the growing upland rice in Mpigi, Masaka, Kalangala and Wakiso.
2. Intensive and increased **research** in traditional food crops has been conducted which is aimed at developing high yielding disease resistant varieties on research institutions. For example maize and cassava as important staple foods in Kasese, Masindi and Soroti have hybrid seed varieties from Kawanda in Wakiso and Serere in Soroti. In addition to the above, increased research on pests and diseases control has been carried out by NARO in Entebbe especially against cassava mosaic, banana wilt and seasonal caterpillars and locusts.
3. Improved **farmer education** and extension services have been made which are serviced by Ministry of Agriculture and offered by NAAD officers and assistants who move from one place to another like Masaka, Mbale, Moroto and Kumi, advising farmers on modern and improved methods of crops cultivation. In addition to the above, farmer's Training Centers have been set up almost in every district of the country at sub county level.
4 **Irrigation schemes,** both on small and large scale such as Mubuku rice in Kasese, Owenyi rice in Lira and Kibimbi rice in Bugiri, have been established to reduce the effect of prolonged drought and food shortages and to enable the cultivation of crops all the year round.
5 Agricultural Services and farm inputs have been availed, accessed and provided to the farmers easier by NAADS freely and by private companies on subsided costs like Quality chemicals Ltd at Katwe in Kampala and BMK enterprises in Kampala with sprays, improved seeds, ploughs, fertilizers, insecticides, tractors and carts.
6Land Consolidation, which is a solution to the traditional practice of land fragmentation has been encourage to the farmers through cooperatives to promote commercial farming like among the Bakiga in Kisoro and Kabale and Bagisu in Mbale and Bududa which has then resulted into easier mechanisation, increased output and more food stocks on a single piece of land by a single farmer.

7. Today, the Ugandan government has realised the need to increase **food crop production against production of cash crops** in those affected areas like in Masindi and Mubende, maize production is emphasized at the expense of sugarcane growing at Kinyara, tea growing respectively while in Mukono, Kayunga, Jinja and Buyikwe, the same is done.

8. The Ministry of Agriculture together with the office of the Prime Minister has continuously encouraged the farmers to properly store the food especially the cereals and drying cassava and matooke during bumper harvest in raised stores against weevils, rats and other pests. This calls for to be erected. In Jinja, large **proper storage facilities** have been erected capable of storing large quantities of grains safely.

9. The Ministry of transport and works through UNRA and Local government in every district has improved and rehabilitated **the transport network** especially the truck roads connecting to the feeder roads in the rural areas such that production of food crops and their marketing is made easy such as Lira – Dokolo – Soroti – Kumi – Mbale – Tororo road.

10. The Ministry of defense and that of security has improved **security and restored political stability** in the war-torn and insecure areas like in Gulu, Pader, Soroti, Katakwi, and Kasese through use of the UPDF, Arrow boys, the local defense forces and the help of peace talks. For example in the north, LRA rebels were driven out to southern Sudan by the UPDF in 2006.

11. The government through the Ministry of finance and non government organizations through micro - finance institutions like FINCA, FOCUS, CERUDEB, Send a cow, Heifer international and SACCO in Sembubule, Mpigi, Kasese, Pallisa, Kayunga, Soroti, etc have extended **credit facilities** to farmers at an interest rate which reasonable to produce adequate food.

12. Rich nations like North America and Europe have on many occasions come to the aid of the poor nations including Uganda in terms of **food aid**. For example northern and north eastern Uganda in Abim, Pader, Kitgum, Moroto, Kaabong and Nakapiripirit have been always aided with corn floor and beans by WFP and Red Cross.

13. The government through Ministry of Agriculture has improved the **marketing arrangements** of crops grown by subsistence farmers in Iganga, Mubende, Hoima and Soroti through the constructing and upgrading of rural access roads, constant price reviews of major food crops like beans, maize, millet and G.nuts and the establishment of farmer Cooperatives (SACCO groups) amongst subsistence farmers.

Sample questions:

1. Assess the relative importance of coffee production in the economic development of the regions.
2. To what extent has climate / soil types influenced agricultural practices / systems in Uganda?
3. Discuss the problems facing the agricultural sectors in Uganda.
4. Suggest ways in which the agricultural sector's problems in Uganda can be over come.
5. Discuss the role played by Nomadic pastoralism in the rural economy of where it is practiced in Uganda.
6. (a) Account for the success/ expansion or increased dairy production in Uganda since 1990.
   (b) Describe the challenges/ problems or limitations faced by the dairy sector in Uganda.

7a) Account for the low level of development of the livestock sector in Uganda.
 b) Explain the steps being taken to improve the livestock sector.

8. To what extent have rainfall totals influenced the farming practices in Uganda?

9a) Examine the problems faced by the agricultural sector in Uganda
 b) Outline the steps being taken to improve the agricultural sector in Uganda.

10. To what extent are Poor farming methods responsible for the low level of agricultural productivity in Uganda?
11. Examine the factors limiting agricultural modernization in Uganda
12. Assess the economic value of plantation farming in Uganda.
13. (a) With reference to specific areas in Uganda; i) Discuss the causes of land fragmentation
    ii) Examine the effects of land fragmentation
    (b) Suggest solutions to the problem of land fragmentation
14. Assess the role of agriculture to the economic development of Uganda
15. "Shortage of water is a major challenge to the pastoralists" Discuss.
16. Account for persistence of nomadic pastoralism in Uganda
17. a) Account for the decline in cotton production in Uganda
    b) Discuss the measures being taken to promote cotton growing in Uganda
18. To what extent are the problems of pastoralists of their own making in Uganda?
19. Giving specific examples, discuss the causes of famine in some parts of Uganda.
20. "Just as little rainfall is not the single and direct cause of drought, drought is not the single and direct cause of famine" (A. Wijkman and L. Timberlake). To what extent is the above statement a true reflection of the conditions in the famine affected areas in Uganda?
21. With reference to specific examples, examine the extent to which the physical factors are responsible for the problem of famine in Uganda.

SAMPLE APPROACH:

INTRODUCTION

- You are expected to define the keyword(s) i.e. agriculture, agrarian / farming systems, farming practices, plantation farming, livestock farming, nomadic pastoralism, land fragmentation, agricultural modernization, etc.
- You are expected to bring out the status / stand / trend (unique features) in relation to the keyword(s).

Any 4 Points

- You are expected to identify, describe and locate the areas in relation to the keyword(s).
- You are expected to draw a sketch map to show the identified and located areas with names of places.

BODY

- You are expected to cite out, explain and illustrate the points (factors / reasons / conditions) in relation the demands of the command word in the question and the keyword(s).

Any 18 well explained and illustrated points unless otherwise.

FISHING IN UGANDA

Fishing is the extraction of water resources mainly fish.

STATUS / TREND OF FISHING INDUSTRY IN UGANDA

Generally, fishing industry currently has the following status or trend in Uganda;

~ Fishing sector is one of the leading foreign exchange earner of Uganda.
~ The sector contributes about 2.2% of GDP
~ Commercial fishing started in the early 1990's after the introduction of the gill nets.
~ 18% of the total land area of Uganda is covered by open water and swamps for fish production.
~ Today, the fish products are widely consumed by Ugandans and in outside markets such as South Sudan, Kenya, Sweden, ….
~ Major commercial fish species in Uganda are Nile perch, tilapia and silver fish from L. Victoria, Kyoga and Albert.
~ Commonest method of catching fish in Uganda is gill netting at …….. on ……
~ Commonest modern method of preserving is icing / refrigerating like at Masese landing site on L. Victoria in Jinja.
~ Commonest traditional method of preserving fish is smoking like at Ssese islands in Kalangala.

~ The largest fish catch is from Lake Victoria followed by L. Kyoga and the rest.
~ Over 1.2 million people of Uganda's population directly and indirectly depend on fishing industry.
~ Fish caging is being done on some lakes like L. Victoria
~ Fish farming is on increase in different parts of Uganda like Kajjansi in Wakiso
~ Some lakes are being restocked with young fish like in Lake Victoria.
~ 58% of fish caught is from L. Victoria, 16% from Kyoga and 26% from the remaining lakes and rivers in 2006.
~ 60% of the total fish catch is sold fresh and 40% is processed.
~ Much of the fish caught is consumed locally especially Nile perch and tilapia from L. Victoria and Kyoga although the fish export market is expanding very fast.
~ Some fish landing sites especially on L. Victoria are being closed by UPDF fish taskforce.
~ There has been an increase in the volume of fish exports between 2002 and 2006 export by 82.5%.
~ Fish production has been declining over years due to over fishing and use of illegal fish net.
~ The numbers of fish processing plants have risen to over 17 in the past 10 years up to 2008 such as Gomba fisheries in Jinja, …
~ Fish factories are majorly owned by foreigners and fish export mainly done by foreigners by Hwan Sung in Kampala.
~ More fish processing companies has been built to reduce on post-harvest fish loss such as Greenfield Ltd at Entebbe in Wakiso, Uganda fish packers at Nakawa in Kampala, Hwan Sung company in Kampala, Ngege Ltd in Kampala, Infra limited former Uganda Marine products along Gayaza road in Kampala, …
~ Fishery stakeholders of the sector are Ministry of fisheries, Lake Victoria fisheries organization (LVFO), Beach management units (BMUs), Fisher communities Association of lake users of Uganda (AFALU), etc operating mainly on L. Victoria.

The major fishing grounds in Uganda are;
1. Lakes such as Lake Victoria, the biggest with many landing sites such as Kasenyi in Entebbe, Masese in Jinja, Bukakata in Masaka, Port Bell and Gaba in Kampala, Katosi in Mukono, Lugala and Majanji in Busia, Kasensero in Rakai.
Lake Kyoga with landings sites like Lwampanga in Nakasongola, Bukungu and Kidera in Budiope (Kamuli), Lale, Kagwara and Bugondo in Serere, Namasale in Amolatar, Nabyeso in Apac, Galiraya in Kayunga, etc.
Lake Albert with landing sites like Butiaba and Wanseko in Buliisa, Buhuka, Tonya and Kibiro in Hoima, Ntoroko in Ntoroko, etc;
Other lakes are Edward, George and Kazinga channel in Bushenyi and Kasese, Kwania in Apac, Wamala in Mubende, Nabugabo in Masaka, Bunyonyi in Kabale, Mutanda in Kisoro, Opeta in Katakwi, Bisina in Kumi and Mburo in Kiruhura.
2. Rivers such as Victoria Nile in Kayunga and Kamuli, Albert Nile in Nebbi and Amuru, Ssezibwa in Kayunga and Mukono, Manafwa in Mbale and Manafwa, Achwa in Gulu and Kitgum, Katonga in Masaka and Kiruhura, Kafu in Hoima and Masindi, Mayanja in Kiboga and Mityana, Mpologoma in Paliisa and Budaka, Kagera in Rakai, etc.
3. Swamps such as those around Lake Kyoga in Serere and Amolatar and Lake Victoria shorelines in Masaka, Mukono and Jinja, along Albert Nile in Nebbi and Amuru, Victoria Nile in Kayunga and Kamuli, Katonga in Masaka and Kiruhura, Kafu in Hoima and Masindi, and other wetlands.
4. Fish Ponds such as Nkoma in Mbale, Kajjansi and Namulanda in Wakiso, Lugazi in Buyikwe, Pallisa, Kabarole, Gulu, Jinja, Iganga, Kabale, Mubende, Kiboga, Lira, Mpigi, Rukungiri, Nakasongola, etc.

DISTRIBUTION OF FISH
The distribution of fish is how fish is transported to the consumption areas and this mainly depends on the mode of transport to be used and in which state is the fish. There are four modes of transport used namely;
1) Road transport is the most efficient method used in distributing fresh fish in Uganda.
2) Water transport is used mainly for transporting both fresh and smoked fish from the Islands to the main land or from one landing site to another landing site.
3) Air transport, though expensive, is used for exporting frozen fish and transporting fish to local distant markets.
4) Railway transport is only used to transport the already preserved fish like dried and smoked fish from Lake George - Edward region to distant markets.

MARKETING OF FISH
In Uganda, fish is marketed in three places namely;
a) Landing sites: Fresh fish is mainly sold in areas of the landing sites on a particular fishing ground.
b) Urban centres: Large quantities of fish are sold in urban centres especially those near the landing sites and the fishing grounds. Some of them are 30km away from the fishing grounds.
c) Foreign markets: Fish is also exported to the neighboring countries of Uganda and those far away especially frozen fish fillets.

A SKETCH MAP OF UGANDA SHOWING THE MAJOR FISHING GROUNDS

FULL PAGE

FACTORS THAT FACILITATES FISHING INDUSTRY IN UGANDA
Fishing in Uganda has been encouraged by both physical and human factors:
Physical factors:

- Uganda has got several fishing grounds rich with fish species ranging from lakes , rivers, swamps and ponds which have enabled commercial fishing e.g. Victoria, Edward, R. Kafu, Katonga, Koga swamp in Mbarara, Kitangaala fish ponds at Nakasongola, Nkoma ponds at Mbale, ...
- There are a wide variety of commercial fish species in the fishing grounds of Uganda. Nile perch is the most important, Tilapia, Silver fish, cat fish, mud fish, etc.
- The Ugandan waters are blessed with abundant planktons which are the food for fish to enable them multiple and promote commercial fishing.
- The fishing grounds of Uganda have oxygenated waters to allow the breathing of the fish so as to grow as well as to help the growth of the planktons.
- Since Uganda is astride the equator, its temperatures are warm and hot around 26^0C which help the fish metabolism (fish breeding) as well as useful in preservation of fish.
- Most of the Ugandan water bodies have adequate shallow waters like Victoria and Kyoga which have enabled the easy penetration of the sun rays / light because of a rich continental shelf to allow photosynthesis to occur for the plankton growth.
- The physical make up of lake shorelines like on L. Victoria and Kyoga are in the indented form which has enabled the existence of well sheltered harbors, an excellent fish breeding zones thus the set up of the landing sites for commercial fishing.
- The fishing ground waters have less acidity in them i.e. the Alkaline content is low which has enabled both the breeding of fish and growth as well as the growth of planktons.
- Since Uganda is blessed with natural forests like Mabira, Bugala islands and Ssese islands forests which helped to provide timber both for boat making and fish smoking especially on Lake Victoria.
- Presence of large salt deposits in Lake Katwe and along Lake Kyoga has helped in preservation of fish caught.
- Existence of many islands in Lakes has provided an excellent place for fish landing sites like Victoria has Ssese, Bugala, Bubeke, Lulamba and Buvuma islands and Lake Albert has Rukwanzi island, …

Human factors:

- Availability of large sum of capital from both local investors in Uganda and those abroad like from China, Japan, Britain, Sweden, Germany, Middle East, etc has encouraged fishing development. The capitalizing of fishing in Uganda has improved fish catching, fish processing, preserving and fish transportation.
- Uganda locally has got large fish market since it is a source of proteins to the population especially in Kampala, Masaka, Wakiso, ... This market has been supplemented by the regional markets of East Africa and on international market to countries like Britain, USA, and Sweden, etc mainly for tilapia and Nile perch.
- Relatively, many parts of Uganda are politically stable especially around the fishing grounds e.g. on Victoria and Kyoga, along Victoria Nile, Albert Nile which has engineered the fishing activities ranging from catching fish, processing and transportation to market areas. This has been ensured by UPDF, Marine Police, …
- Uganda has fairly developed transport and communication systems by road like the Ggaba Road, Nabagereka road, Katosi road and Masese road, all linking to Lake Victoria; water and air transport at Entebbe Air port in addition to the telephone services offered by companies like MTN, Celtel, WARID and UTL to easy the accessibility of fish to the consumption areas.
- Fisheries institutes have been set up in Uganda to improve and encourage fishing by training the local population on the skills and knowledge related to fishing. Such fishing Institutes include; Entebbe fish Institute, Makerere University, ...
- Ugandan government has encouraged both private (local people) and foreign investment by issuing licenses to them, exempting them from taxes and giving them financial assistance so as to make the fishing industry boom e.g. Masese fish packers, Hwan Sung company, Ngege Ltd, ...
- The Ugandan government, local people and foreigners have started fish farms to encourage fishing in Uganda by rearing fish in ponds to meet the market demands like those at Kajjansi fish pond in Wakiso, Nkoma ponds in Mbale,
- Through organizations such as NARO and NEMA, research activities on fish have been carried out intensively on different fishing grounds in Uganda so as to help in the quick maturing of fish, fight against the unwanted fish nets and others so as to avoid fish extinction but rather to encourage it.
- The fishing industry has been encouraged by the improved and modern preservation facilities such as refrigerated trucks, deep freezing and icing done by different fish factories like at Kasenyi, Uganda marine products, Kilimanjaro ice in Bugolobi, …
- The fishing industry in Uganda has also been encouraged and developed by the availability of adequate skilled, semi skilled and manual human labour that carry out the different fishing activities helped by the machines like fishing its self, transportation of fish, processing and preservation of fish.
- The technology of fishing used in Uganda has relatively been modern hence encouraging the fishermen to catch large numbers of fish besides the primitive methods of catching fish, this has been possible by the modern fishing gears e.g. gill net, trawlers and motor boats are used on Victoria, Kyoga, Albert, …
- Fish processing facilities in factories like Masese, Ngege, Hwan Sung, Gomba, … have facilitated the development of fishing industry where fish is packed under international standards and exported abroad.

IMPORTANCE OF THE FISHING INDUSTRY

Fishing industry is of great importance to Ugandans in many ways and these are:

Positive ways:

- The fishing industry is most important to Ugandans in a way that it provides food which is fish especially Tilapia and Nile Perch and it acts as a source of proteins to combat deficiency to people at Kasenyi, Kalangala, Masese and other towns.

- The fishing industry has earned valuable foreign exchange necessary for development to Uganda where fish is exported to both the neighboring countries like Kenya, Tanzania, Sudan and D.R.Congo and to far market like UK, Belgium, Netherlands, Spain, Germany, Hong Kong and Asian countries. In 2006, over 145 millions US $ was earned from fish exports of about 35,000 tonnes while in 2007, it was 124 millions US $ from 32,000 tonnes.
- It has promoted co-operation internationally with countries Uganda exports fish fillets like UK, China, USA, Japan Sweden, etc thus obtaining developmental grants and ideas in return.
- It has led to capital accumulation from incoming foreign investors leading to development of other sector of the economy like Hwan Sung from Korean.
- It has generated employment opportunities to Ugandans directly or indirectly like fishermen, mongers, fish traders, transporters, processors, boat builders, etc at fish landing sites and fish processing plants. In 1988, it employed over 20,223 fishermen and 514 boat builders and now (2009), it has over 400,000 workers as direct and over 1.5 millions as indirect.
- Fishing towns and trading centers plus fishing villages have grown and developed as result of fishing and other fishing related activities leading to the concentration of different economic activities and population densities e.g. Kasenyi, Masese, Bukakata and Katosi landing sites on Lake Victoria; Lwampanga, Nabyeso, Lale sites on Kyoga; Katwe on L.Edward; Kasenyi on L. George; Butiaba, Wanseko on L.Albert, ..
- Fishing industry has led to acquisition of skills and knowledge to the fishing organization and personnel in the fields of fishing, marketing, processing, packaging, preservation, … mainly at Entebbe fisheries institute in Entebbe and Tropical fisheries in Kampala.
- It has been source of income to Ugandan locals of Ssese islands, Kasenyi, Katosi, Masese, Wanseko, Lwampanga, those along Albert Nile, those along R. Katonga, etc who are either directly or indirectly own landing sites and fishing boats thus improved standards of living because they have access to better houses, better medical facilities and better schools.
- Government revenue has been generated as a result of the fishing industry through imposed taxes on fish sales and offered licenses to permit fishing activities by URA to the different fish processing plants.
- It has led to infrastructural development in terms of roads leading to the landing sites and to the market centres and other economic structures like banks, Petrol stations, Health centres and others e.g. Mukono - Katosi road to Katosi site, Nabagereke road to Kasenyi site, Gaba road to Gaba site, all on L. Victoria, etc.
- Fishing industry has contributed to economic diversification whereby over dependency on the unpredictable agricultural activity is lessened in terms of Uganda's revenue, foreign exchange, employment, etc.
- The fishing activity has become an alternative economic activity in areas where agriculture is impossible e.g. around Lake Albert, Edward as well as George which all lie in the rain shadow area of the western Rift valley of Uganda thus economic diversification.
- It has promoted the agriculture sector especially the animal husbandry and poultry through using fish bi-products in the production animal and chicken feeds e.g. Ugachick Industries, Formula feeds, Kagodo Chicken feeds, Nuvita, Bulemezi farm, etc manufacture these feeds using fish and snail shells got from Victoria, Kyoga, Edward, George, ...
- Fishing has promoted industrialization especially industries dealing in the processing of fish and other fish related products like nets and boats , those making animal and chicken feeds e.g. Masese processing industry, Gaba fish processing industry, Tropical industries, Uganda Marine products, etc process fish for export, Masese Boat workshop, Kampala Gillnets manufacturers, …
- Game fishing has also become an important tourism activity in Uganda's fishing industry which in turn has earned it foreign exchange. This is always done by foreign holiday makers who came when it is a winter season in their countries like USA, UK, etc.
- It has been used for both study and research purposes for students who carry out fieldwork at various education levels e.g. the Entebbe fisheries institute' students and from other schools visit Kasenyi, Masese, Butiaba, Katwe, Lwampanga, ... to study about fishing.
- It led to development of fish research centres to discover and invent new fish species and to assist fish metabolism outside natural fisheries like Kajjansi aqua fish farm in Wakiso.
- It led to technological advancement in fishing activities from primitive and traditional methods of catching and preserving fish like basketing and smoking to modern ones like gill netting and icing /refrigerating like at Kasenyi on L. Victorioa in Wakiso.
- It has facilitated the exploitation of other natural resources like Mabira and Ssese forests as well as those along the shore of Victoria and Kyoga have been exploited to provide timber for boat and canoe making, land like that in Masaka, Rakai, Kalangala, Kaberamaido, Lira, etc near to the fishing grounds has been cultivated to provide to fishermen and fishing.

Negative ways:

- The fish processing industries have polluted the environment through smoke and carbon dioxide gas which goes up in the atmosphere leading to green house effect thus global warming and also causing health problems like lung cancer to people as well as dumping of toxic wastes into water and on land like Masese fish packers at Jinja on the shores of L. Victoria dumps its wastes into the lake causing water degradation, contamination and pollution.
- Fishing has led to massive destruction of forests to get firewood for smoking fish and wood and timber for making boats and canoes like Ssese forests on Ssese Islands on Lake Victoria, Mabira, Bugoma, etc have all been cleared to provide firewood and timber required.
- The fish processing industries like Uganda marine products along Gayaza road and Masese fish packers at Jinja have led to limited fish available on local market especially Nile perch and tilapia extracted from L. Victoria and L. Kyoga for the population and even more expensive for the locals to afford since much of it is exported.
- Fishing being an employer of many people and quick money maker, it has attracted much of the labour from other economic activities especially agriculture which in turn has affected the agricultural productivity thus food shortages. E.g. areas around L.Kyoga such as Lwampanga and Lale as well as on Ssese Islands of L. Victoria, fishing is the main activity despite the fertile alluvial soils for agriculture.

- Due to poor and crude methods of fishing used like beach seining, over exploitation of fish has taken place on the fishing grounds of Lake Victoria, L. Albert and L. Kyoga especially Nile perch and tilapia which has caused fish depletion, imbalances in the aquatic bio-diversity and other ecological problems.
- Since the fishing industry is more managed by foreign investors like Hwan Sung at Ntinda and Greenfield at Entebbe, has led to profit repatriation to their mother countries leaving Uganda exploited of its resources and wealth.
- Due to improved and modern fishing technology like gill netting, trawling, purse seining and motorized boats, employment opportunities have reduced and thus unemployment to some Ugandan locals mainly on Lake Victoria at Kasenyi, Masese, Bukakata as well as Ssese islands.
- Due to the growth and development of trading and urban centres on the fishing villages such as Kasenyi, Katosi, Masese along L. Victoria, Kalangala and Bugala islands has caused several urban related evils and crimes e.g. poor sanitation, poor housing, robbery, immorality, prostitution and slum development.
- Fishing has exposed fishermen to a lot of pests and diseases as well as dangerous wild animals like crocodiles, hippopotamus and snakes e.g. L. Albert is infested with Tsetse flies, which have transmitted sleeping sickness to fishermen, L. Kyoga and L. Mburo are homes to Snails, which have caused bilharzias to fishermen, …
- Fishing is a risky activity as it has involved loss of human lives through drowning of capsized boats and canoes e.g. about 20 fishermen drown in L. Albert per year, leading to loss of health labour force.
- Fish poisoning as a crude method of fishing has led to water contamination on L. Kyoga, L. Albert, L. Victoria, and others which has in turn created health hazards to people in Jinja, Mukono, Masaka, Kampala, etc such as nausea, diarrhea and vomiting.
- The industry has accelerated tax evasion through fish smuggling leading to loss of government revenue e.g. on L. George, L. Edward and L. Albert, fish is smuggled to DRC as well as on L. Victoria, it is taken to Kenya and T.Z.
- The fishing industry introduced some inappropriate fish species mainly Nile perch in 1950', in Ugandan fishing grounds which eats small fish species to extinction like tilapia in L. Kyoga and L. Victoria is declining in number because of that.
- Fishing has encouraged illiteracy among people especially the school going youth, on different fish landing sites of L. Victoria , L. Albert, L. Kyoga, … since fishing requires little education, few go to school and majority to fishing activities.
- Fish transportation and marketing especially along Lwampanga - Kampala road and Katosi-Mukono and other water routes on L. Victoria from Ssese islands to Kasenyi, Masese, Gaba landing sites, … has involved a lot of accidents which have claimed many lives of fish transporters because of over speeding to reach the markets centres before fish is spoilt.

PROBLEMS FACING FISHING INDUSTRY IN UGANDA

The problems limiting the development of fishing in Uganda are categorized into two: i.e. environmental and non environmental and these are:

Environmental problems:

- Climate has hindered fishing in different ways;

Since Uganda is crossed by the Equator, the temperatures are always hot ranging between 25^0C - 27^0C almost throughout the year which causes fish to get spoilt faster and even hindering favorable growth of planktons especially on L. Victoria and L. Kyoga.

The abnormal shortage of rainfall during the dry season i.e. drought, has led to the lowering of the water level in the lakes and rivers making them to be highly seasonal e.g. R. Okok and R. Okerere in N.E Uganda, Lake Wamala in Mubende are not reliable in fishing during the drought period thus reducing the total amount of fish catch.

During the moon light especially when it is so bright, fish can identify the gill nets and dodge them around, resulting into a low fish catch.

In times of El-Niño i.e. continuous heavy rainfall over a long period has led to an increase in the water level of lakes especially on Lake Kyoga which in the end has hindered the fishing activities like transportation of fish on the roads as they become impassable, muddy and sticky.

- Some lakes are located in areas which are inaccessible with steep relief which has hindered fishing as well as transportation from the fishing grounds to the market centres hence hindering fishing activity e.g. Lake Albert is located within the western rift valley bordered by steep scarps like Butiaba escarpments which has made transporting fish to main markets of Masindi, Buliisa and Hoima difficult.
- Presence of thick water hyacinth which was established on Lake Victoria, Kyoga, Albert and along Victoria Nile has had a serious impact on the fishing industry. This has affected fishing in the following ways:

It eats up the space which would have been for oxygen required by the fish which makes fish to suffocate to death.

The fishing gears are stopped as the weed enters them and even the fishing nets are driven away as it is blown by wind.

The weed blocks off fish landing sites as some lakes are fully covered up by the weed mat hence low fishing activities.

Water hyacinth stops the movements (navigation) on the water bodies by small boats and canoes. This has caused the fishermen to delay in their fishing activities in the due course of paving the way.

The water hyacinth also blocks off light penetration into the waters hence planktons do not grow well.

- Ugandan fishing grounds have a few and limited fish species of high commercial value on international market. There is only tilapia and Nile perch but the rest have a low demand on world market.
- Floating islands in form of swamp vegetation seen along lake shores of Victoria and Kyoga, floating especially during the heavy rains and strong winds. As a result of strong winds accompanied by heavy rain pours has made the waters so turbulent that the papyrus vegetation breaks away from the shores and starts floating. They then stick into nets and carried them away over long distances hence no fish catch.
- During certain seasons, strong winds and waves are experienced on water bodies especially on Lake Victoria which has resulted into nets being carried away and torn, boats capsizing and fishermen drowning and delay in navigation to the fish landing sites which has affected fish quality.
- Most shorelines of the Ugandan water bodies have a small and limited continental shelf extending less kilometers from the shore line which has distracted fish since there are lees planktons as food for fish. E.g. L. Albert and L. Victoria have the bigger parts which are deep thus with less fish food as well as fish itself.

- The nature / way some lakes were formed like Lake Kyoga and Kwania, gave them an irregular shape with so many inlets and narrow indents which do not allow large vessels to anchor thus limiting commercial fishing.
- Most Ugandan rivers like Victoria Nile and Ssezibwa river have water falls and rapids which hinder fishing along them and transportation like Victoria Nile has Owen falls, Bujagali falls, Karuma falls and Murchison falls.
- Rocks found in lakes and along rivers like at Kasenyi on Lake Victoria, around Ssese islands and Buvuma Island , along Victoria Nile, R. Manafwa, and R. Kafu have disrupted the fishing activities as they trap the nets, block the sailing boats and even cause accidents to the fishermen.
- Agricultural resources such as the heavy reliable rainfall and fertile alluvial soils have attracted people to rely on land for survival other than water hence neglect of fishing especially along Albert in West Nile for tobacco growing, around L. Kyoga for sim sim and millet growing, L. Victoria for coffee banana growing and Ssese islands for palm oil growing.
- Due to the presence of fish predators like hippos, crocodiles and Nile perch in the water resources, there has been a remarkable reduction in the quantities of fish caught. For instance Nile perch, which was introduced in 1950s in L. Victoria, L. Albert and L. Kyoga, feeds on Tilapia and other small fish species thus decline in their numbers.
- Ugandan water bodies have dangerous wild animals which are a menace to fishing activities because they destroy the fish nets and even feed on the human beings e.g. crocodiles in Lake Victoria and Kyoga and Hippos in Lake Edward and George make fishing difficult in Mayuge, Busia and Kasese respectively.
- The water flow in Uganda's rivers such as Victoria Nile and Manafwa is too fast and rapid making fish metabolism as well as the lay of fish nets and traps in the speedy water difficult.
- The adjacent swamp and bog drainage along rivers and Lakes such as those along L. Victoria and Kyoga, R. Kafu, R. Katonga and Victoria Nile has made the set up of fish landing sites and their facilities difficult.
- The presence of harmful pests and diseases along the lakeshores and riverbanks has affected the fishermen e.g. tsetse flies and Mosquitoes in South Busoga, Nakasongola, Kiboga, Masindi and Buliisa on L. Victoria, Kyoga and Albert; snails on L. Mburo, have transmitted sleeping sickness, malaria and bilhazia respectively. Blackflies on fast flowing rivers such as Victoria Nile, Mpologoma and Manafwa have transmitted river blindness to fishermen. Fishermen on Ssese islands, Bugala Island and Buvuma Island on L. Victoria have been affected by AIDS.
- Most fishing grounds such as L. Kyoga, Albert, Edward, Bunyonyi, Mutanda, R. Okerere in Karamoja, and others are found in remote and inaccessible areas making them to have less fishing activities and even fish distribution to the market centres hard.

Non environmental factors:

- The fish demand has increased both at home and abroad, which has led to more fish to be caught in the lakes whereas the fish population do not match with the demand and thus high levels of over fishing. E.g. on L. Albert, L. George, L. Kyoga and L. Victoria, tilapia stocks have reduced due to over fishing.
- Most of the gillnets currently used by the fishermen on L. Kyoga and Victoria are of illegal sizes coupled with crude methods of fishing like beach seining (Kokota) have all led to fish depletion as these ways of catching are not selective to fish type and size i.e. young and old fish are caught.
- The fishing methods used on most Ugandan fishing grounds are poor and primitive. E.g. use of baskets, spears and hooks on L. Kyoga, Victoria and Albert are inefficient in catching a large amount of fish for commercial purposes. The use of poisonous chemicals have not been of good use but rather dangerous to the fishing industry as well as water quality.
- The fishing industry of Uganda faces stiff competition from frozen and tined fish from overseas countries like Peru, Vietnam, British Columbia, Sweden, Norway, Japan and also with certain food stuffs with proteins such as meat, chicken, and beans which even reduce the demand for fish.
- Large scale economic fishing on Ugandan lakes and rivers has been hindered by limited capital by the local fishermen on L. Victoria, George, Albert and Kyoga to buy modern fishing equipments motor boat engines, spare parts, refrigerated vans, purse seining nets, etc. This has been worsened by the wide spread of poverty among Ugandans, limited loan facilities and lack of co-operative societies among fishermen.
- Some people's culture and norms have led to less consumption of fish especially among the Banyankole and other pastoral tribes which consider fish as a taboo thus against their culture.
- Fish smuggling is also a problem to the industry where large quantities of fish caught from L. George, Edward, Albert and Victoria are illegal taken to neighbouring countries like Rwanda, DRC, Kenya and Tanzania which has retarded the ability of the fishery department to manage its resources sustainably.
- The industry gets little financial and material support as well as less trade protection from the top government where other sectors of the economy like agriculture and defense are prioritized.
- Uganda revenue authority and fisheries department impose high and heavy taxes on the fishermen at the different levels like extracting, processing and marketing which discourage those engaged. E.g. in 2008, it was proposed that each fishing boat on L. Victoria is to pay 150,000 Shs as a license fee per year for operating in the fishing activities which is too much for the fishermen to afford.
- Fishing has also been hindered by the political instabilities and wars around as well as territorial conflicts along the fishing grounds. E.g. Lake Albert, George and Edward are insecure because of the ADF rebel operations which have similarly happened on Lake Kyoga and River Aswa because of LRA rebel operations.
- Chemicals, oils and industrial wastes dumped in water bodies i.e. lakes, swamps and rivers have led to water pollution which have in turn killed fish. E.g. in Jinja, wastes from Nile breweries, Southern Nyanza Textiles, Vita foams, Masese fish packers, BIDCO oil industries and Kakira and Lugazi sugar industries are all dumped L. Victoria. This similarly happens in Kampala from Uganda breweries and other industries in Murchison bay waters at Luzira on L. Victoria shores.

- Some fishing grounds are poorly linked with roads and railway lines and others with nothing which has made transportation of fish very difficult, since it is perishable goods which get spoilt so quickly. Lake Albert found within the Western Rift Valley has hindered transport construction to the fish landing sites while Lake Kyoga has been hindered by the swamp and marsh vegetation surrounding it.
- In Uganda, there are few modern storage facilities i.e. only icing and deep freezing for the fish caught that it doesn't encourage the fishermen to fish much, since they have nowhere to preserve and store the surplus. Further more, the major preservation methods used like salting, sun drying and smoking are insufficient and improper that the preserved fish can't be exported for failure to meet international standards.
- Swamps are also fishing grounds in Uganda but due to increased population and increased demand for land , swamps and other marsh vegetation around lakes like Victoria and Kyoga as well as along rivers like Victoria Nile, Kafu and Katonga have been destroyed / reclaimed by man and grazing livestock thus reducing the fishing grounds for extracting fish.
- Majority of Ugandans are low income earners and therefore they are poor like the residents of Hoima, Buliisa, Nakasongola, etc which made them to have a low purchasing power for fish hence limited fish market.
- On the fishing grounds mainly those which are shared by two neighboring countries e.g. L. Victoria, Edward and Albert, there is too much theft of fish and fishing gears including the nets especially during very dark nights. Some times there is also deliberate damage of the fishing nets.
- Many water bodies experience silting because of massive destruction of trees, swamps and cultivation along the shores of the lakes and river banks. The deposited materials into the water bodies encourage the growing of plants which are dangerous to the life of fish e.g. along Victoria Nile and Lake Victoria, there is sugarcane growing at Lugazi and Kakira.
- Most fish ponds such as Kajjansi, Paliisa and Kiboga have gone out of use / closed because of mismanagement, poor maintenance, limited fish feeds, low rates of fish fertility and lack of knowledge regarding fish farming.

SOLUTIONS TO THE PROBLEMS FACING THE FISHING INDUSTRY

Even though there are various problems facing the fishing industry in Uganda, measures have been put in place to overcome them and these include:-

- The water hyacinth problem has been solved in the following ways;

Mechanically, weed harvesters have been introduced to remove the weed from the waters like at Kiyira and Nalubaale fall dams in Jinja and at Port Bell near Luzira on L. Victoria.

Manually, the weed has been removed by groups of people using their physical hands and then burnt especially on the shores of Lake Victoria in Wakiso district, Mpigi and at Luzira in Kampala using prisoners.

Biologically, the weed on Lake Victoria and Kyoga has been destroyed by use of weevils and pests introduced to eat it away.

Mechanical barriers / blocks have been put in place to deter/ stop the movement of the weed downstream of Victoria Nile and where R. Kagera joins Lake Victoria.

- Indiscriminate fishing has been solved by the use of standard gill net sizes of about 4 inches and above as recommended and authorized by the fisheries department law to avoid catching young and immature fish on L. Victoria and others. Furthermore, poor fishing methods have been banned and burnt like at Katosi on L. Victoria and Bugala islands e.g. use of baskets, poison, small sized fish nets and beach seining. Sometimes the immature fish species caught are destroyed / burnt.
- Over fishing has been controlled through issuing licenses to fishermen; patrolling regularly by the fisheries department, Beach management Unit, Marine Police and Maritime Security to control fishing activities, pirates, smuggling and even stop foreigners from fishing in Ugandan waters along borders especially along Lake Victoria. Furthermore fishing protected areas have been created so that fishing is done in some parts and other areas are left for breeding to take place. In other fishing grounds like L. Victoria, Kyoga, Edward and others, restocking with hi breed fish species of Nile perch and tilapia from Kajjansi research centre has been done so that fish quantity increases.
- Fishermen have been trained at Tropical fisheries in fish farming and other fishing related activities to improve on fishing as well as providing qualified fisheries personnel. There has also been the set up of a fishing Institute at Entebbe near L. Victoria to increase on the knowledge of fishing, preservation and processing.
- Research activities have been carried out by Lake Victoria Fisheries Research Organisation in the fishing technologies and other fishing related activities like fish farming and quick maturing fish species such as Tilapia and Nile perch at research centres like at Makerere University, Jinja, Kajjansi Aquaculture Technology Demonstration centre, etc.
- The government as well as the private investors have established fish ponds at Kajjansi, Nkoma, Paliisa, Kabalore, Nakasongola, Kiboga, and others in which fish farming has been promoted to meet the increasing demand for fish . The common fish species farmed are Nile perch and tilapia got from research centres.
- Better and modern fish preservation methods and storage facilities have been established and introduced like use of refrigerated trucks, icing and modern Kilns on fish landing sites to enable fish reach distant markets while still fresh. Refrigerated trucks, icing and Kilns are at Masese and Kasenyi landing sites on L. Victoria; at Kagwara landing site on L. Kyoga in Soroti which are to preserve fish effectively for commercial purposes.
- Feeder roads leading to the landing sites on fishing grounds have been constructed and rehabilitated by the government e.g. Ggaba-Kampala road was tarmacadamised, Katosi-Mukono road was rehabilitated, Nabagereka road from Kasenyi to Entebbe and Kampala fish markets was also rehabilitated, Masese road to Jinja fish market was up graded, Lwampanga- Nakasongola- Kampala has also been up graded, etc.
- Fishing facilities such as motor boats, freezers, ice machines, nets, motor engines and other spare parts have been imported from Japan, India and China by fishing companies like Hwan Sung, Gomba, Ngege Ltd, Uganda Marine products, … Motor boats are used to access fish from the distant Islands of Buvuma, Ssese, Bugala, etc of Lake Victoria to the landing site markets. In Kampala and Jinja, fish net manufacturing industries have been set up to make net and sell them to fishermen at lower costs.
- In case of political instabilities in areas with fishing grounds like in western and northern Uganda, security has been granted by the UPDF deployment to quell the ADF and LRA rebels so as to ensure smooth running of the fishing industry on L. Kyoga, Albert, George and Edward.

- Fish farmers like in Nakasongola and Kiboga as well as fishermen and women groups at Lambu, Bukakata, Kasenyi, Majanji and Masese landing sites on L. Victoria have joined hands to access credit / loan facilities from micro finance institutions like Pride Uganda, FAULU, FINCA, CERUDEB, etc to improve on their fishing activities. This has enabled them purchase better fishing gears, refrigerated trucks, construction of fishing ponds etc. Even the government has earmarked about Shs 200 – 400 millions each quarter of the year to enforce the new licensing measures.
- An anti smuggling unit has been established to stop the smuggling of fish across lakes of Victoria, George, Edward and Albert to Kenya, T.Z and DRC to detect the moving vessels at night and all the time. This is done by the Save Samaki program, Marine Police, Maritime Security and Beach Management Unit, all under the fisheries department.
- The government has turned to the policy of privatisation and liberalisation of the economy which has led to the coming up of foreign investors, commercial fish farming and fish exporting companies like Hwan Sung fish co. at Ntinda owned by Koreans, Green fields at Entebbe, Gomba Ltd owned by Indians, etc.
- Fish processing industries near fishing grounds have been set up so as to add value on fish before being exported like Masese Fish plant in Jinja, Uganda marine products along Gayaza road, Hwan Sung fish in Ntinda, … which are all near L.Victoria.
- Mass education and sensitization has been carried out through news papers like New Vision, seminars, Radios, local council meetings , workshops , televisions, schools, etc on the importance of forests and swamps along fishing grounds, about proper fishing methods and need for fish consumption among the local people especially among the pastoral tribes. E.g. public rallies are always held by NEMA, SSP, BMU and L. Victoria Environment Management Project on Ssese islands, on Landing sites of Kasenyi, Majanji, … on L. Victoria; Lwampanga, Lale, … on L. Kyoga; and others concerning the above.
- Sewage and industrial wastes have been purified and treated before being let into the fishing grounds. E.g. National water and Sewage Corporation at Bugolobi has done its part in Kampala before discharge into Lake Victoria to reduce the pollutants which are harmful to both people and fish.
- Non government organizations have also come up to support the fishing industry in Uganda. E.g. CARE International funded by Denmark in the Queen Elizabeth National Park has been helped in using Park's national resources sustainably mainly L. Edward and L. George as well as restocking them.
- Fish by product industries have been developed to increase fish market locally. E.g. Ugachick Industries, Formula feeds, Kagodo Chicken feeds, NUVITA, Bulemezi farm enterprises and others, use silver fish (Mukene) in the manufacture of Chicken and livestock feeds.
- The government has adopted on quality control methods such as Operation Clean Water so as to meet international fish quality standards required by European Union through establishment of Entebbe fish laboratory.
- The government has discouraged importation of fish products especially by World Food Program and other importing agencies through levying high taxes so as to reduce competition and provide market to local fish industries.

SAMPLE QUESTIONS:

1. Assess the economic importance of the fishing industry to Uganda.
2. How far are the physical factors responsible for the development of fishing in Uganda?
3. Discuss the problems facing the marketing and distribution of fish in Uganda.
4. Examine the extent to which the physical factors are limiting the development of fishing sector in Uganda
5. Discuss the measures being taken to curb the fishing problems in Uganda.
6. Explain the steps being taken to modernize and expand the fishing sector in Uganda.
7. Discuss the problems facing fishing industry on either Lake Victoria or Albert or Kyoga.
8. Explain the benefit of the fishing industry to the fishermen on Lake Kyoga and the neighbouring areas.
9. Account for the increased fish farming in Uganda

SAMPLE APPROACHES:

Candidates are expected to;

How far are the physical factors responsible for the development of fishing in Uganda?

- Define the concept/ key word (s) in the question.
- Cite out the status / stand/ situation (+ve) of the fishing sector.
- Identify, describe and locate the different fishing grounds with landing sites in Uganda.
- Draw a sketch map showing the identified fishing grounds with landing sites with name of places.
- State, explain and then illustrate the how far are the physical factors responsible for the development of fishing in Uganda.
- Finally state, explain and then illustrate the however side of the other factors responsible for the development of fishing in Uganda besides physical factors.

Explain the benefit of the fishing industry to the fishermen on Lake Kyoga and the neighbouring areas.

- Define the concept / key word (s) in the question.
- Cite out the status / stand/ situation (+ve & -ve) of fishing on L.Kyoga.
- Describe the location of L.Kyoga with its fish landing sites and surrounding districts.
- Then draw a proper sketch map to show the location of L.Kyoga with its fish landing sites and surrounding districts
- State, explain and then illustrate the benefit of the fishing industry to the fishermen on Lake Kyoga and the neighbouring areas (both positive and negative contribution).

Examine the problems facing the marketing and distribution of fish in Uganda.

- Define the concept / key word (s) in the question.
- Cite out the status / stand/ situation (-ve) of the marketing and distribution of fish.
- Identify, describe and locate the different fishing grounds with landing sites, fish market centres and fish distribution modes in Uganda.
- Draw a sketch map showing the identified fishing grounds with landing sites, fish market centres and fish distribution modes in Uganda with name of places.
- State, explain and then illustrate the problems facing the marketing and distribution of fish in Uganda both physical and human (each point in connection to the key words).

Examine the extent to which the physical factors are limiting the development of fishing sector in Uganda

- Define the concept /key word (s) in the question.
- Cite out the status / stand/ situation (-ve) of the fishing sector.
- Identify, describe and locate the different fishing grounds with landing sites in Uganda.
- Draw a sketch map showing the identified fishing grounds with landing sites with name of places.
- State, explain and then illustrate the extent to which the physical factors are limiting the development of fishing sector in Uganda.
- Finally state, explain and then illustrate the however side of the other factors limiting the development of fishing sector in Uganda besides physical factors.

Explain the steps being taken to modernize and expand the fishing sector in Uganda

- Define the concept / key word (s) in the question.
- Cite out the status / stand/ situation (improving manner) of the sector.
- Identify, describe and locate the different fishing grounds with landing sites in Uganda.
- Draw a sketch map showing the identified fishing grounds with landing sites with name of places.
- State, explain and then illustrate the steps being taken to modernize and expand the fishing sector.

INDUSTRIALISATION IN UGANDA

Manufacturing industries are firms which process and transform organic and inorganic substances or raw materials either chemically or mechanically into new and finished goods / products whether by machines or hands.

GENERAL TREND AND STATUS OF THE INDUSTRIAL SECTOR IN UGANDA

Generally, industrial sector in Uganda currently has the following status or trend;

~ Uganda had a fairly strong and steadily expanding manufacturing industrial sector during 1960s though on a narrow basis producing consumer goods like sugar, edible oil, textile, etc.

~ By 1970, the manufacturing sector contributed about 12.4% of the country's GDP because of capital investment from Asians.

~ But by 1981, it declined to 6.5% due to economic mismanagement of 1970's by Idi Amin, political wars and expulsion of Asians.

~ From 1987 to update, various measures like political stability, privatization and liberalization were / have been taken to develop the manufacturing industrial sector, that is, the industry is still and gradually growing and developing.

~ Today the industrial sector contributes about 15 - 21% of GDP while breweries contribute the majority of GDP, over 40% of the total industrial contribution to Uganda's economy.

~ Today, most industries are agro - based like UGACOF for coffee in Kampala and Kasaku tea factory in Mukono.

~ Many industries have / are developed in major towns / urban centres like Kampala, Buyikwe, Jinja, and Mbarara

~ Most industries are owned by foreigners like SCOUL for Mehta and Hwan Sung fish and furniture co. for Koreans

~ Most industries are processing rather than manufacturing like Lira spinning and Kyagalanyi coffee factory in Kampala and Mbale.

~ Most industries operate on small scale or on cottage basis like Smart Curry powder industry at Kanyanya, Mutima chick and animal feeds at Nateete and Samona beauty products at Nateete, all in Kampala.

~ Most industries are light weighted like Movit cosmetics for herbal jelly at Namasuba and Hariss (Riham) int. Ltd at Kawempe in Kampala.

~ New industrial parks are being allocated and designated by the government like Namanve and Mbalala in Mukono, Kapeke in Luweero, etc.

~ Great effort of attracting foreign investors towards industrial development by government like Chinese of Goodwill tiles in Luweero.
~ Most industrial goods are for domestic market / consumed locally especially agro – products.
~ Most industries are concentrated in traditional urban centres such as Jinja and Kampala.
~ Most industries use imported technology.
~ Most industries use HEP.

TYPES OF MANUFACTURING INDUSTRIES IN UGANDA

The following are the three main types of manufacturing industries found in Uganda;

~ Agricultural food processing and manufacturing industries such as Grain milling like Uganda grain milling company in Jinja, Diary industries like GBK in Mbarara, Brewing and soft drinks industries like Uganda breweries in Kampala, crown bottlers in Kampala, etc; beverages like Lugazi sugar works in Kampala, Kasaku tea factory in Mukono, etc; Bakeries like Britannia in Kampala, etc; Meat processors and packers like Kampala meat packers, Soroti meat packers, etc; fish processors like Uganda fisheries Ltd in Ntinda - Kampala, Ngege fisheries in Luzira, etc; Vegetable and fruit processing like delight industries of cheers in Kampala, etc.

~ Agricultural non - food manufacturing industries such as Leather and foot wear industries like Baata Uganda limited in Kampala; Tobacco industries like Super match in Kampala; textile and cloth making industries like Southern Nyanza garment limited in Buyikwe and Phoenix logistics in Kampala; publishing and printing industries like New Vision in Kampala, etc.

~ Non - agricultural manufacturing industries such as chemical industries like Quality chemicals in Kampala, Mukwano industries in Kampala, Nice house of plastics in Kampala, Vita foam in Buyikwe and Peacock paints in Kampala; mineral processing industries like cement making industries at Tororo and Hima in Kasese, Uganda clays at Kajjansi in Wakiso; iron and steel industries like Casements Uganda Ltd, Roofings Uganda, Uganda Baati, Royal sheets in Kampala and Steel rolling in Jinja; engineering industries like Spear motors for vehicle assembling, etc.

DISTRIBUTION OF INDUSTRIES IN UGANDA

The major industrial centres / the heartlands of industries in Uganda are;

~ Kampala is a major industrial centre with food processing such as Hot loaf, Textiles such as Pheonix logistics, Steel mills such as Roofings Ltd, Breweries like Uganda breweries, soft drinks like Crown bottlers, Mattress industries such as Crest foam, chemical industries like Mukwano detergents and plastics industries, etc.

~ Jinja is the second industrial centre with Steel mills like E.A steel corp., Foot wear, food processing like Masese fish packers, ship building, chemical industries like BIDCO oil; machinery like Chillington tools Ltd; printing and publishing industries like Papco printing and publishing, wood industries like Nile Plywood Ltd, etc.

~ Mukono / Buyikwe with Breweries like Nile Breweries, textiles like Southern Range Nyanza Garments, mattresses like Vita foams, food processing such as Kasaku tea factory, Century bottlers, etc.
~ Mbarara with Steel mills, Century bottlers, GBK and Alpha dairies, etc.
~ Bushenyi with food processing like Kyamuhunga and Igara tea factory, Bricks and tiles, etc.
~ Kabale with Coffee processors, timber and saw mills, Distillers, Honey processors, etc.
~ Kasese with Hima Lime and Cement factory, Cobalt processors, Paints, Breweries, mattresses like Reco, distillers, etc.
~ Tororo with cement factory, Food processors, chemical industries, Steel works, fertilizer industry, etc.
~ Mbale with food processing like Kyagalanyi coffee factory, textiles like African textile mills, chemical industries like Mbale soap works, paper printing and publishing, etc.
~ Soroti with Meat packing, Carpentry and furniture workshops, etc.
~ Arua with distillers like Seven hills bond distillers, Honey packers, Foam Mattress, Carpentry and Furniture work shops, etc.
~ Gulu with Foam mattress, Waragi distillers, etc.
~ Lira with Spinning mill, Honey processors, Foam mattress, distillers like Adriko distillers, etc,.

SKETCH MAP SHOWING THE DISTRIBUTION OF INDUSTRIAL CENTRES WITH INDUSTRIES IN UGANDA

FULL PAGE FOR A MAP

FACTORS THAT HAVE INFLUENCED THE LOCATION OF INDUSTRIES IN UGANDA

These factors are the advantages an area offers for the location of industries, in that the greater the advantages an area has, the greater the attraction of industries in that particular area.

In Uganda, manufacturing industries are located in few urban areas due to the advantages in them. The factors that explain the location of these industries are not isolated from each other but in a complex system of interrelatedness. These factors are:

- Raw materials influence the location industries in several ways;

Industries which use large quantities of bulky raw materials have been located at the source of raw materials so as to reduce on the transport and production costs such as cement industries at Tororo and Hima in Kasese due to presence of limestone deposits.

Industries which use perishable raw materials are always located near the raw material source such as the sugar industries at Kakira in Jinja and Kinyara in Masindi, since the raw materials are needed a few hours after produced / harvested from Kakira and Kinyara sugar cane plantations respectively.

Industries which use light and imported raw materials are always located in delivery centres and transport terminals such as the chemical industries like Quality Chemicals at Luzira in Kampala and Peacock paints at Nalukolongo in Kampala, since the raw materials are easily and cost friendly transported from areas of extraction like China and India.

While those raw materials which are widely distributed and scattered have caused the industries to be in a disperse such as the coffee factories in Wakiso, Mbale, Mubende and Jinja because coffee is grown in many parts of Uganda.

- Market also influences the location of industries in the following ways;

Industries which manufacture and produce heavy and bulky final products / goods are located near the market centres like the furniture making industries like Hwan Sung furniture at Nakawa and those at Kireka, Makerere – Kivulu and Nakulabye as well as the metal fabricating industries located at Katwe and Kisenyi were located in Kampala so as to reduce transport costs of the bulky commodities.

Industries that produce perishable products which are liable to getting spoilt first are also located near the market centres like Hot loaf bakery and Maganjo bakery for breads, cookies and cakes are in Kampala where the market is assured 24/7.

Industries that produce breakable goods are always located near the markets since there is difficulty in transporting them like the Nile breweries for beers at Njeru in Buyikwe near Jinja market centre, Crown Bottlers at Nakawa and Uganda breweries at Luzira are all near Kampala market centre.

- Transport is also an important factor in influencing the location of industries as follows:

Industries are located along well developed transport systems due to easy acquisition and marketing / distribution of the manufactured goods like Malaba - Tororo – Iganga - Jinja - Kampala road as well as Tororo – Kampala railway line for cement, sugar, beer and sodas to the main market centres from Tororo cement factory, Kakira and Lugazi sugar works, Nile Breweries and Century bottlers respectively.

Industries using perishable raw materials as well as producing perishable goods are located near the major transport networks to access them easily for deliveries such as the Dairy industries / milk processors in and near Kampala due to major links within like Kampala - Masaka road.

Industries are located around / near transport nodal points which have various transport routes conveying on them which have delivered different raw materials from the different parts like cotton from Lira for the Phoenix logistics at Bugoloobi in Kampala via Lira – Soroti – Mbale – Jinja - Kampala road.

Industries are located along well developed transport routes because of eased exploitation of raw materials like limestone mining at Hima in Kasese is possible due to Kampala – Kasese road for set up of Hima cement plant.

Industries are located along modern transport routes because of saved time and reduced transport costs on labour like skilled and semi skilled man power from Kawempe and Kawanda use Kampala – Bombo road to Mukwano industries and Harris international Ltd in Kampala for work.

Industries are located around / near transport nodal points because of attraction of both local and foreign investors as well as auxiliary services which have eased industrial processing in term of investment and service delivery of banking and ware housing such as the Tororo - Kampala railway line and Tororo - Kampala road and Jinja (Masese) - Bukoba lake port for Kakira sugar works in Jinja and Nile breweries at Njeru in Buyikwe by Madvani.

- Labour is also important in the location of industries as it is mobile as follows;

Most industries are located in the towns due to the existence of a large, cheap and experienced labour force in industrial conditions and machine operations like Spear Motors and Hwan Sung industries at Nakawa are located in Kampala due to large population which offers small human investment and craftsmanship.

- Industrial inertia (link) / enjoying the economies of scale such as power, water, road, railway, specialists, organized markets, brokers, joint research, are vital in location of industries as industries are located where other industries have already been established as one industry uses the other's outputs as its inputs (raw materials) like Uganda grain millers in Jinja was located near Tiptop bread Ltd as the latter uses the flour from the former.
- The source of water is essential in location of some industries due to the fact that they use abundant supply of it as a raw material, coolant of machines, cleaner / detergent, runner of machines and even in other processes like Southern range Nyanza garments and Nile Breweries at Njeru in Buyikwe are near the Victoria Nile because of adequate supply of water.
- Socio - economic infrastructures as well as commercial services are responsible for location of industries as most industries are located in urban centres where there have already been developed and established to facilitate industrial activities like banks, ware houses, security organizations, roads, railways, hospitals, recreational grounds, telecommunications, power supply, etc like in Kampala with major roads, UTL services, postal services like DHL services, Mulago hospital, Lugogo thermal power station, Stanbic bank, NIC, UBC advertisements, etc is the major industrial town with Mukwano industries and Hariss international.
- Land is a strong factor in influencing industrial location due to the fact that industries use extensive land now and in future in case of expansion like the location of Kakira sugar works in Jinja and Lugazi sugar works in Mukono was due to the abundant and cheap land available.
- Entrepreneur's interests and personal consideration is a factor influencing the location of some industries in different parts of Uganda which are mainly small scale industries and widely distributed because of reasonable sums of capital used such as Tuf mattresses at Ntinda in Kampala and Vita foam at Njeru in Buyikwe.
- Government policy plays a big part in locating industries because of promoting regional development and encouraging export promotion and import substitution industries so as to reduce importation and also earn more foreign exchange like the government's positive plan to start Century bottlers in Kampala and Mbarara is for regional development as well as allocation and preservation of specific areas as industrial parks for manufacturing industries such as Namanve in Kampala; Mbalala in Mukono and Walukuba in Jinja.
- Power adequacy also plays a part in industrial location as presence of reliable hydro electricity power supply at Bujjagali and Kiira power dams in Jinja led to set up of E.A steel mills and BIDCO industries; and Mubuku power station in Kasese for Hima cement processing at Kasese.
- Capital availability is a major factor for industrial location as most industries are in urban centres because of the availability of large sums of capital for investment and other industrial inputs like Kampala have different prosperous businessmen with huge capital like late Dr. James Mulwana started Uganda blankets and Nice house of plastics at Nakawa and Sir Gordon Wavamuno for Spear motors for vehicle assembling in Kampala.

- Political security is also a major factor in influencing the location of industries in that areas such as Jinja with Kakira sugar works and Cilllington tools and Mbarara with Century bottlers and GBK dairies attracted many industries because safety, peace and stable for long term investment in industries and other infrastructural developments.

FACTORS THAT HAVE FAVOURED INDUSTRIAL DEVELOPMENT IN UGANDA

The factors that have led to growth and development of industries in Uganda are as follows;

- Uganda is endowed with a number of agricultural and other raw materials which have been processed to produce consumer and capital goods e.g. fish from L. Victoria is a raw material for Uganda fish factory at Nakawa in Kampala.
- Existence of adequate capital from both local and foreign investors to afford the best industrial machinery and other industrial requirements like late Dr. James Mulwana funded Nice house of plastics and Uganda batteries at Bugoloobi in Kampala while the Multi - National corporations based in USA funds Century bottlers in Mukono and Mbarara.
- Presence of relative and tight political security which has attracted both the local and foreign investors for smooth industrialization and long term investment in the industrial sector like Mbale with Mbale soap Industry and Jinja with BIDCO industry because they are relatively secure and peaceful.
- Existence of positive government policies of privatization and liberalisation has led to efficiency in industrial production like former NYTIL was sold to South African investors to become Southern range Nyanza textile at Njeru in Buyikwe; protection of infant industries from imported goods such as cement, paints, edible oil and packed milk similarly produced at home from Hima cement factories in Kasese; opening doors for both local and foreign investors; building an image campaign through Uganda investment authority; tax exemption from prosperous investors like BIDCO investors in Jinja and other incentives.
- Presence of various sources of energy / power like hydro electricity power which is the chief, petroleum, bio gas, bio mass, solar energy and firewood that are all helpful in running and lighting the industrial operation and activities like H.E.P at Kiira and Bujjagali power dams in Jinja is used in Southern range Nyanza Garments and Nile breweries at Njeru in Buyikwe.
- Availability of skilled and semi- skilled labour force such as engineers, managers, and technicians, chemists, etc from the higher institutes of learning and abroad, which are / were used in operating and handling industrial works and activities such as Uganda breweries at Luzira, Shumuk Aluminum at Nakawa, Ntake bakeries at Nalukolongo, etc are in Kampala because of their high degree of craftsmanship, abundant semi skilled labour and cheap casual man power by its population of about 2 million.
- Presence of medium sized market though on increase due to rapid population growth of about 40 million for the manufactured and processed goods especially bread from Tiptop bread in Jinja and Hot loaf Bakeries in Kampala, Plastic utensils from GM Tumpeco at Nakawa and Nice house of Plastics at Nakawa in Kampala
- Existence of friendly and good international relationship with other countries of Ugandan government for widening industrial market as well as attracting industrial investors like joining regional trade bodies such as EACO, COMESA, PTA and World Trade Organization increased on the market base for her manufactured goods like cement from Tororo cement works in Tororo and Mattresses from Royal foams in Kampala.
- Presence of informative and persuasive advertisement by the government and individual industrialists of manufactured and processed goods so as to extend their markets locally and internationally through news papers, magazines, radios, televisions like on Bukedde TV with Riham products of Hariss int. Ltd, bill boards like at Bwayise with cement from Tororo cement works and annual organizations of trade shows by UMA at Lugogo in Kampala.
- There has been / is a great need to develop industrial sector as an economic diversification and to add value on raw products by government so as to fetch more foreign exchange on the exports as well as to reduce over dependence on the unpredictable agricultural products such as Jesa dairies in Wakiso and BIDCO oil industry at Masese in Jinja.
- Existence of relatively developed transport and communication network which have eased movement of raw materials to industries and manufactured goods from industries like Nile breweries in Buyikwe, Lugazi sugar works in Buyikwe, Century bottlers in Mukono are along Kampala – Jinja road for transport reasons and due to standardized communication system of MTN, Airtel, UTL and Smart as well as postal services of DHL and Post Uganda for effective commercial transactions.
- Presence of modern technological inventions and innovations among local people and foreigners that used in processing and producing high and competitive industrial goods like furniture in Hwan Sung wood industry in Kampala, confectioneries in Aya grain mills at Kawempe in Kampala, cosmetics in Samona industry at Nateete in Kampala.
- Existence of abundant land for establishing small and large industrial structures as well as for future use during expansion like BIDCO oil industry at Masese in Jinja, Century bottlers at Namanve in Mukono, Southern range Nyanza garments at Njeru in Buyikwe, etc.
- Existence of developed auxiliary services like financial, commercial, ware housing, advertising, insurance and banking services which aid and ease industrial activities and operations for providing excellent aids to trade services like Kampala attracted Mukwano industries, Aya bakeries and Crown bottlers because of their developed services of Stanbic bank, NIC insurance and advertising agencies of UBC and NBS.
- Presence of local and foreign entrepreneur's interests and investor's choice for setting up mainly small scale industries in different parts of Uganda such as Shumuk aluminum and kitchen at Nakawa, Masters clays at Banda and Samona cosmetics at Nateete in Kampala.
- Availability of large amount of water from rivers, swamps and lakes for processing as a raw input, cooling machines, cleaning and running machines like Southern range Nyanza garments and Nile Breweries at Njeru in Buyikwe were set up near the Victoria Nile to ensure adequate supply of water.
- Existence of powerful industrial inertia for setting up new industries to enjoy the external economies of scale such as power, water, road, railway, specialists, organized markets, brokers and joint research in already established industrial centres like in Jinja, Kakira sugar factory is near sweet factories and BIDCO oil industry is near E.A steel mills Corporation.

- Existence of stiff and internal competition among the industries within Uganda for springing out new industries for quality and competitive products like Maganjo grain millers along Kampala - Bombo road led to set up of Aya grain miller on the same road, Uganda Baati led to establishment of Roofings steel mills in Kampala.
- Presence of early Asian settlement and historical incidences led to the set up mainly processing industries in administrative towns during the colonial era and have continued to exist due to the huge capital, home land interests, skilled and expertise man power like Nile breweries at Njeru, Kasaku tea factories at Lugazi and Lugazi sugar works, all of Mehta in Buyikwe and Kakira sugar works of Madhvani in Jinja.

THE IMPORTANCE OF MANUFACTURING INDUSTRIES TO THE UGANDAN ECONOMY

The contributions of manufacturing industries towards development of Uganda are both positive and negative;

- Manufacturing industries have provided a variety of home consumer and capital goods for local consumption at lower and affordable prices so as to save valuable foreign exchange leading to better standards of living such as soap and cooking oil from Mukwano industries in Kampala and BIDCO oil co. in Jinja.
- They have earned the government valuable foreign exchange through the exportation of manufactured goods like maize, mattresses and beers from Uganda grain mills in Jinja, Royal foam and Uganda breweries in Kampala respectively to Kenya, Rwanda, DRC, and South Sudan leading to importation of basic goods like drugs and computers as well as setting up infrastructures.
- Manufacturing industries have generated revenue to the government from imposed taxes and levied licenses on the industries, industrial related activities and on the worker's incomes, which is then used to develop other economic sectors such as agriculture and setting up socio - economic amenities like E.A steel rolling in Jinja, Tororo cement factory and Roofings industry at Lubowa in Wakiso.
- Industrial growth has created various employment opportunities to many groups of people like engineers, casual workers, chemists, sales representatives, accountants, technicians, clerical staff, consultants, managers, etc by engaging in the industrial activities and operations which earn them income leading to improved standards of living like Kakira sugar works in Jinja employs over 7000 people while Mukwano industries in Kampala employ over 3000 workers.
- They have created and provided ready market for raw materials produced from other economic sectors of the Uganda by buying them as industrial inputs like agro based industries such as Mukwano oil industries use simsim and cotton seeds from farmers in Lira, Kasese and Bushenyi; etc which has led to increased productivity and efficiency in agriculture and other sectors.
- Industrial development like Kakira sugar works in Jinja and Hima Cement Company in Kasese has promoted economic diversification by reducing over dependency on the limited number of primary and extractive exports especially from agriculture which has resulted into increased revenue, foreign exchange and jobs.
- Industries have stimulated infrastructural development in industrial areas in terms of transport and communication systems, power sub-stations, banks, residential units, water supply pumps and recreational grounds like roads and railway lines extended to the industrial regions of Kampala like Luzira, Ntinda, Nakawa and Bugoloobi and thermal power generated at Lugogo near Bugoloobi and Nakawa industrial complexes which have eventually provided basic socio – economic services.
- Industries such as Uganda breweries in Kampala and Lugazi sugar works in Buyikwe have led to the acquisition of industrial skills like managerial, technical and engineering by the workers through informal and on - job training which has resulted into increased productivity and production as well as setting up their own industries.
- Industrialization has encouraged proper utilization and exploitation of the - would be idle and unutilized resources Industries like Land, which is unproductive, is being used for setting up industries such as arid land in Hoima, an oil refinery company is to set up by Tullow oil Ltd (Irish based firm).
- The concentration of industries has led to the growth and development of a once small and rural area into an urban centre (urbanisation) due to increased working population and the set up of improved infrastructures which has resulted into promotion of trade and commerce as well as provision of services like Kampala with Mukwano industries and Tororo with Tororo cement works.
- It has led to capital accumulation through the inflow of many foreign investors as well as local investors which has in turn promoted the general economic development by investment like Madhvani, besides his capital investment in Kakira sugar works in Jinja, he has also invested in Mweya safari lodge in Kasese and Kakiri primary and secondary schools in Jinja.
- Industries have promoted international relationships and cooperation through external trade in the manufactured goods with other nations which has eventually attracted more investors like Asians e.g. Koreans of Hwan Sung companies in Kampala as well as foreign aid or grants from China and Japan for economic development of Uganda.
- Industries themselves have promoted tourism as they act as tourist attractions to both local and foreign visitors due to their complicated activities and beautiful scenery as leisure makers, students and pupils visit them which led to earning of foreign exchange for other economic developments such as Century bottlers in Mukono and Southern Range Garment Nyanzi Ltd at Njeru in Buyikwe for adventure and curiosity.
- Manufacturing industries have stimulated high level of production and increased productivity in other sectors due to production of capital and consumer goods which are their inputs for further production like Chillington tools in Jinja provides agricultural tools such as hoes, pangas and slashers and Kampala to farmers.
- Industries have facilitated the set up of research centres regarding industrial inventions and innovations due to competitive markets which have led to improvements in production and high quality goods such as Spear motor engineering workshop at Nakawa, Makerere University technological Institute and Uganda Industrial Research Institute at Nakawa in Kampala.
- Industries have promoted education and research as they act as field study areas for students and researchers both local and foreign due to their complicated activities which have led to acquiring more skills and knowledge like Lugazi sugar works and Southern Range Garment Nyanzi Ltd at Njeru in Buyikwe.

- Industries have promoted self sufficiency in essential capital and consumer goods rather than dependence on foreign aid due to local production on small and large scale like blankets from Uganda Blankets in Kampala and sugar from Kinyara sugar works in Jinja which has reduced importation of industrial goods and reliance on foreign nations' aid.
- Industrialization has stimulated the growth and evolution of other sectors in Uganda' economy due to need for spare parts, repairs and ware modifications in the established industrial machinery as well as construction of industrial structures which has led to industrial progress and modernity like Musa body work shop at Katwe in Kampala have grown because of Mukwano industries and Uganda breweries.

PROBLEM RESULTING FROM THE MANUFACTURING INDUSTRIES IN UGANDA (NEGATIVE SIDE)

- Industries have led to environmental pollution of water, air and land from industrial toxic wastes, noise, dust and liquid like South range Nyanza textiles and Nile breweries at Njeru in Buyikwe have polluted Victoria Nile waters which led to killing fish and contaminating water.
- Industrial sector has led to detruction of forests due to clearance for construction and expansion which has resulted into forest depletion and desertification like Namanve forest in Mukono has been cleared to set up a Century bottling plant.
- Industries have led to the clearing of swamps through reclaiming them for industrial contruction and expansion which has caused climatic changes, flooding and migration of wild game like swampy areas of Nakawa – Kyambogo and Nakawa – Ntinda in Kamapala have been reclaimed to set up Shumuk aluminum mill and GM Tumpeco.
- Industrial sector have led to shortage of food as many people are attracted to the industrial regions for jobs and other social amenities such as Lugazi with Lugazi sugar works in Buyikwe which has resulted into spending Uganda' valuable foreign exchange.
- Manufacturing industries they have repatriated all the profits to their home countries leaving Uganda drained of its wealth as most are owned by foreigners which has left Uganda poor and backward industrically like Mehta, an Indian own Lugazi sugar works in Buyikwe and repatriate much of the profits back to India.
- Industries have led to the displacement of people in process of either constructing or expanding an industry which has led to poor standards of living and development of shanty houses like in Kampala at Kibuli, people were displaced in order to expand Mukwano industries.
- Industrialization has left dependent and neo dependent on foreign investors and countries due to huge amount of capital required from donor countries and bodies like European Union, IMF and World bank as well as foreign entrepreneurs which undermined Uganda's political, economic and social independence through strings attached on the extended loans and aid like Mehta of Lugazi sugar works in Buyikwe had suggested to be given part of Mabira forest for sugar cane growing.
- Industries have led to social urban evils like prostitution, diseases, robbery, moral decay, alcoholism, poor sanitation, crime rate explosion and street beggars due to increased number of people who come in search for jobs and unemployment which has caused insecurity and urban violence e.g. Kampala and Mbarara industrial centres are with high urban crime rate.
- Industries have led regional imbalance as more industries are concentrated in some areas than others which left the less industrial areas economically backward like Kampala in central region is the major industrial centre while Kotido, N. Eastern is less developed with limited industries.
- Industrialization has led to high rate of unemployment in the industrialized regions due to highly modernized technology used in the industrial production and increased numbers of people as a result of RUM which has resulted into high crime rate like Roofings steel mills at Lubowa in Wakiso and Century bottlers at Namanve in Mukono have left natives jobless.
- Industrial development has led to high government expenditure due to fulfilment of industrial strategies such as setting up roads, sewage systems, power and water systems which resulted into balance of payment deficit as well as neglect of other sectors e.g. URA and UIA are to spend 80 billion shillings to develop 415ha of Namanve industrial park in Mukono near Kampala.
- Industries have led to limited land in the industrialized regions due to concentrated industries and increased number of people like in Kawempe, Bugoloobi and Nakawa in Kampala industrial area which has later caused slum development, encroachment on marginalized lands, inadequate social services, poor santiation and floods during the wet season.
- Industries have led to loss of valuable government revenue through tax holidays and subsides levied as a strategy for industrialization which has lowered national gross income e.g. BIDCO industries in Jinja and Kalangala was a tax holiday for 25 years by UIA.
- Industries have led to provision of low quality products to locals due to limited competition from imports banned by protection policies which have led to cheating and exploitation of masses e.g. Batteries from Uganda batteries in Kampala last for about 1 year as compared to those from Germany which last for over 3 years.
- Manufacturing industries have made local consumers to pay much more for local products / goods which are very expensive than the imported ones due to high cost of industrial production which have lowered people's power to save like garments from Phoenix logistics in Kampala and Southern range Nyanza Ltd in Buyikwe are costly for many poor locals to afford.
- Industrialization has led to negligence of other sectors of the Uganda's economy such as tourism, forestry and agriculture due to heavy capital pre – requisite which has led to too much strain on little foreign exchange savings e.g. raising capital for starting Tri star apparels in Kampala led to the borrowing from government consolidated funds in Bank of Uganda.
- Industries have led to the production of poisonous and fake products on market due to limited industrial inspection by UNBS which have exposed health problems to people as well as claiming their lives e.g. some spirits and waragi like Empire have led to death of people due to use of toxic chemicals and improper mixtures.

CASE STUDY:

INDUSTRIAL DEVELOPMENT IN KAMPALA CITY

Kampala is the Capital city, major administrative centre, largest urban centre, densely populated and most industrialized town in Uganda with various industries which are concentrated in six major zones namely;

- Ntinda industrial area with industries like Crest foams and tanks, GM Tumpeco, Oscar industries, ...

- Nakawa industrial area with industries like Crown bottlers, Hwan Sung industries, Shumuk aluminum, …
- Kawempe industrial area with industries like Maganjo grain millers, Aya grain mills, Tuf foam mattress, Karesh juice, Hariss(Riham) industries, Tausi oil, Delight industries, ZBR concrete, ...
- Central industrial area with industries like Mukwawo industries, grain mills at Kisenyi – Mengo, Picfare industries, …
- Bugoloobi industrial area with industries like Kyagulanyi coffee factory, Uganda baati, Uganda batteries, Phoenix logistics, Nice house of plastics, Kilimanjaro ice, Bandag tyre retread, Casement metal and aluminium (U) Ltd, Rhino footwear Ltd, …
- Nalukolongo industrial area with industries like Poly fibres Ltd, Peacock paints, Ntake bakery, …

FACTORS THAT HAVE FAVOURED THE LOCATION OF INDUSTRIES IN KAMPALA

The reasons for the concentration of industries in Kampala are;

- Kampala is located on the shores of Lake Victoria which has provided large amounts of fresh water for industrial use in making beer, soda, juices and even in running as well as cooling the machines.
- Kampala's relief is hilly and separated by flat broad valleys which becomes relatively flat making industrial construction easy and possible e.g. Lugogo valley - Nakawa valley - Kyambogo valley, Nalukolongo valley, Kawempe valley, etc
- Kampala has plenty of land for constructing industries and supporting industrial expansion like Namanve forest reserve, Busega swamp, Kireka – Banda swamp, Lubowa along Entebbe road, etc.
- Availability of large and ready market for the goods produced since Kampala has a large population of over 2 m people.
- Kampala is strategically located in rich and productive hinterland which is a source of raw materials for the industries e.g. fish from lake Victoria; maize and coffee from Mpigi and Mubende; hides and skins for foot ware industries and meat for meat packers from Mbarara and others.
- Availability of varied power sources especially HEP got from Bujjagali power dam, thermal generators at Lugogo, biogas and solar energy.
- Kampala has a large population of over 2 m people of which both skilled and semi - skilled labour force is got and ready market is provided.
- Availability of adequate capital for investment from both local and foreign investors like Wavamuno, A.K Mukwano, Nsamba, Karim Hirji, etc.
- Kampala has a variety of modern auxiliary services which have attracted various industrialists like banking, advertisements, security, Insurance, ware housing, etc.
- Existence of many financial institutions in Kampala for offering credit facilities to the industrialists like Crane bank, Stanbic, Baroda, Barclays, Standard chartered, CERUBED, etc.
- Presence of fairly developed transport and communication system in Kampala for easing the movement of raw materials to and manufactured goods from the industries.
- Existence of positive government policy of liberalization and privatization of industrial sector in Kampala as well as allocating of certain areas for industries like Aya grain mills at Kawempe, Tri star apparels at Bugoloobi, …
- Kampala is relatively stable politically which has geared towards the concentration of industries in it.
- Availability of local and foreign entrepreneurship consideration for industrial growth in Kampala especially the small scaled industries like Avis cosmetics at Bwayise, Katumba furniture at Lugogo and Bwayise, Hariss (Riham) industries at Kawempe, Kampala pharmaceutical Industry at Ntinda, …
- Presence of powerful industrial inertia and inter industrial linkages for industrial concentration in Kampala like Rwenzori beverage and Nice house of plastics, and Maganjo grain millers and Maganjo bakery

PROBLEMS HINDERING THE DEVELOPMENT OF MANUFACTURING INDUSTRIES IN UGANDA

Although manufacturing industrial sector is mushrooming day by day in Uganda, there are factors still limiting its prosperity and progress and these are:

- There is still / was British government and colonial industrial policies of processing and producing raw materials for industries in UK rather than manufacturing right from the beginning that has hindered the industrial take off in Uganda leading to production of semi finished and low quality goods e.g. the copper smelters in Jinja and coffee processing factories in Mubende and Mbale.
- There are / have been a series of political insurgencies / insecurities and civil wars over decades which led to demolishing and perishing of several industrial structures and socio – economic amenities leading to standstill and closure of industries as well as scaring investors e.g. in parts of Kasese and Bundibugyo where fears are still caused by the ADF rebels and tribal clashes among the Bamba and Bakonjos.
- There is negative government policies of nationalization of industries in 1970's, heavy taxes imposed on local industrialists, limited protection from foreign competition, free entry of foreigners and little funding which have placed the sector in hands of incompetent Ugandans and low local and foreign investment resulting into low production as well as mismanagement of public companies e.g. 1970, government during Idi Amin, nationalized most of the industries that belonged to Madhvani and Mehta like Kakira sugar factory in Jinja and Kasaku tea factory in Mukono.
- There is narrow and unreliable Ugandan market for manufactured goods because the countries to which Uganda would have sold them like Kenya, Tanzania and Rwanda produces more or less the same goods like soap from Mukwano industries in Kampala and milk from GBK dairy in Mbarara and more still Ugandans from rural areas of Pallisa and Mayuge are poor leading to low demand for manufactured goods and losses to industrialists.
- There is stiff competition of Ugandan industrial products with those from the developed countries on international level because they are tend to be poor quality, low durabilty and expensive like cement from Tororo factory in Tororo and clothes from Phoenix logistics in Kampala which has led to low profits and low prices on World market.

- There is limited capital due to the fact that majority of the Ugandans are too poor to raise it which ha failed them to buy machinery and raw materials, build industrial structures, pay labour force and service the machinery leading to decline and collapse of some industries like Avis comestics and Sembule steel mills in Kampala.
- There is shortage of skilled and semi skilled as a large proportion of skilled labour has migrated to other countries for better paying jobs which has left most industries like Katwe salt plants in Kasese and Tri star apparels in Kampala in incapable hands leading to inefficiency and incompetent work in industries.
- There is shortage and exhaustion of essential raw materials such as iron ore, tin, aluminum and soft wood due overuse and small quantities which has standstill and shut down of industries like Roofings Ltd in Wakiso and Shumuk Aluminum rolling mill in Kampala
industries like Vita foam in Buyikwe, Reco foam and Royal foam in Kampala.
- There is limited research in the industrial sector concerning better methods of production, quality inputs and raw materials due to the fact that the low capital base and limited skilled manpower which has eventually led to inefficiency in production process and poor quality goods like Riham sodas of Hariss International in Kampala and Plastic products of GM Tumpeco in Kampala.
- There are high transport costs of importation of raw materials, machinery and other industrial inputs as well as exportation of industrial commodities because Uganda is far away from the export sea port / land - lockedness which has made Uganda out competed by its neighbours like Kenya and Tanzania and her goods expensive like Coke products of Century bottlers in Kampala and Mbarara.
- There are frequent power cuts (load shedding), fluctuating power supplies and inadequacy in supply due to less capacity output from main power supply in Jinja which have lowered and slowed production in heavy industries like Uganda Baati in Kampala and E.A steel mills in Jinja.
Lugazi sugar works in Buyikwe and maize flour from Aya grain mills in Kampala.
- There is corruption and fund embezzlement by officials in various industrial organizations and parastatals of the government due to use of incompetent and unqualified personnel which have led to mismanagement and closure of industries such as Tri star apparels and Uganda grain mills in Kampala and Katwe salt plant in Kasese and even the would-be foreign investors are scared away by corruption tendencies involved in acquiring the licenses, industrial sites, communication services and power connections like in Namanve industrial park in Mukono.
- There are poorly developed transport routes and in poor state due to heavy rains and poor technological facilities used which has limited and slowed the acquisition of raw materials in time and distribution of finished products to consumers e.g. Tororo cement works incur high transport costs due to poor state of roads in the eastern parts of Uganda.
- There is low level of technology in the industrial sector because of being out dated and inadequacy of spare parts which has led to slow industrial operations, low and poor quality output like Lugazi sugar works in Buyikwe produces below the required capacity and Katwe Salt plant in Kasese closed due to poor processing machines.
- There is over dependence on foreign capital and loans from banks for industrialization which are paid back at high interest rates in foreign currency due to high levels of poverty and low foreign exchange earnings which has resulted into production of expensive goods, low profits and closure of industries. E.g. Sembule steel mills in Kampala failed due to payment of loans back at high interest rates.
- There is stiff competition with well developed countries due to production of better quality goods and relatively cheaper price which has left many goods unsold and of low prices e.g. garments imported from USA are sold cheaply in St. Balikuddembe Market in Kampala leading to low produce in the local textile industries such as Phoenix logistics in Kampala and Southern Range Nyanza textiles in Buyikwe.
- There is a negative attitude among the Ugandan people towards the locally manufactured goods in Uganda because of being poor quality, low durability and even expensive in preference to the foreign manufactured goods with better quality like vehicle drivers prefer tyres of Michelin and Pirelli imported from France, Japan and USA to those of Sameer Africa of Yana tyres in Kampala.
- There is massive profit repatriation by the foreign investors due to their dominance in the industrial sector which has limited further industrial development like Sudhir, Madhvani and Mehta, all groups of companies in Kampala, Buyikwe and Jinja respectively have drained Uganda's wealth back to their home country, India.
- There are low prices and price fluctuations fetched locally and abroad by agro-based industries like Kasaku tea in Buyikwe and Kyagalanyi coffee in Kampala due to fall in prices of tea and coffee on World market which has led to a lot of losses to the industrialists during certain periods.
- There was the collapse and closure of the East Africa regional Cooperation in 1970's due to political instabilities by that time which resulted into reduced capital accumulation and market potential for industrialization as well as working below the capacity levels like EAC like EA steel mills, EA bank, EA insurance and EA railways ceased operation at regional level.

STEPS TAKEN TO UPLIFT THE INDUSTRIAL SECTOR IN UGANDA

Since 1980's, many measures have been taken by the government in a comprehensive strategy and plan to encourage and reactivate industrial growth and development in Uganda and these efforts are:

- The Ministry of Trade and Industry has protected local industries after foreign industries through imposing higher import duties (tariffs and taxes) on imported goods like clothes similar to those produced at home such as Phoenix logistics in Kampala and S.R.N.T. in Buyikwe so as to increase the prices of imported goods and limit their demand in Uganda.
- Ugandan government through Ministry of Trade and Industry has put a total ban on the importation of similarly produced goods in Uganda such as Safari cigarettes from Kenya and Bamburi cement which has permitted infant industries like Kireka safari cigarettes in Wakiso and Hima cement works in Kasese in order for them to produce at maximum and enjoy high profits.
- Ministry of internal affairs, Justice and local governments have promoted and enforced good governance through regular and contested elections at all levels of government and many responsibilities are decentralized from the central government to local government for improved and peaceful political climate so as to attract more industrial investors and ensure smooth running of industries like Aya group of Companies in Kampala and BIDOC industries in Jinja.

- Ministry of Defense and Security has deployed the Uganda People's Defense force (UPDF), Uganda Police and Crime prevention personnel to restore and enforce peace and stability coupled with the peace negotiations for so attracting more industrial investors and ensuring long term investment in industries like Gulu and Lira for Honey processing and Lira spinning mill.
- The government has sold off its formally owned industries to the private investors for fundamental changes in financial, technological and operational performance so as to ensure efficiency in industrial production and management like Uganda grain millers at Kawempe in Kampala to Aya group of companies and Uganda Dairy Corporation at Bugolobi in Kampala to Sameer Ltd from Egypt.
- The Ugandan government through Uganda Revenue Authority (URA) and Uganda Investment Authority (UIA) has opened doors / liberalized industrial sector for both local and foreigner investors who have come along with huge capital, modern technology, skilled labour and basic raw materials in order to set up large scale industries like Century bottlers in Mbarara from USA and Sameer ltd from Egypt in Kampala.
- The Uganda government in conjunction with industrialists has exported the industrial products in an effort to create and expand the market not only in Uganda but also in other countries like in Japan, USA, Canada, Sri Lanka and, Syria, etc like for powdered milk from Jesa dairies in Wakiso and Sameer Livestock ltd in Kampala.
- The Uganda government has joined regional and international trade bodies like E. African community, PTA, world trade organization and COMESA in order to increase and expand the industrial market of iron sheets from Roofings Ltd in Wakiso and Mattresses from Royal foam in Kampala.
- The Uganda government through the Ministry of trade and industry has created industrial organs like Uganda Investment Authority (UIA) to attract all categories of investors as well as guiding them in viable industrial ventures e.g. Aya group of companies at Kawempe in Kampala and BIDCO industries at Masese in Jinja were given tax holiday's concessions and grace periods as a way of attracting foreign industrial investors for about 25 years.
- The industrialists have formulated industrial body known as Uganda Manufactures' Association (UMA) at Lugogo in Kampala for promoting the interests of the industrialists through negotiating for fair basic production costs, organizing annual trade exhibitions at Lugogo in Kampala and at Kimaka in Jinja, seeking financial aid and paying less tax.
- The Ugandan government has carried out comprehensive policy reforms in order to promote industrialization such as avoiding heavy taxes to encourage prosperous investors, reduction on import duties especially on the industrial spare parts as well as raw materials and even offering tax holidays to those producing basic needs e.g. Jinja has been revived as industrial area with new industries being built such as BIDCO plant at Masese.
- The government through Ministry of Energy has constructed and rehabilitated more power dams so as to produce adequate power in the industries as well as extending it to other parts of Uganda for setting up small scale industries. E.g. Bujagali power project in Jinja was completed in 2012 for more electricity supply to Century bottlers in Kamapla and Tororo cement works.
- The government through Ministry of Education has trained the necessary skilled man power from various institutes of learning like Makerere University, Kyambogo University, MUST and Directorate of industrial training centre at Lugogo for formal and informal industrial operations as well as sponsoring some students overseas to acquire industrial skills like in Japan and India for industries such as Mukwano industries and Nice house of plastics in Kampala.
- Industrialists have directly trained and re-freshened their own workers through on – job training for competency at work and increased efficiency in production such as Lugazi sugar works and Nile Breweries in Buyikwe
- The government through Ministry of Works has been constructed new and rehabilitated existing transport and communication systems to ease movement of industrial inputs and outputs as well as other auxiliary amenities to smoothen the industrial related activities. Different roads have been rehabilitated such as Kampala – Jinja – Mbale road has been rehabilitated for Tororo cement plant, E.A steels in Jinja and Century bottlers in Mukono and foreign communication firms such as MTN and Airtel have been put in place to improve on telecommunication.
- Industrialists like Mukwano industries, Royal industries and Spear motors in Kampala have adopted aggressive and persuasive advertisement strategies to attract market for their products on FM radio and T.V stations such as CBS, Simba, Capital, Radio One, NBS, BBS, NTV and on billboards along roadside in Kampala and Jinja.
- Industrial standard organ known as Uganda National Bureau of Standards (UNBS) have encouraged Industrialists to produce standardized and high quality goods, which are monitored and authorized with organ stamped logo so as to compete favorably on the world market like textiles for Phoenix logistics in Kampala, Fish fillets from Masese fish Packers in Jinja and Powder milk and ghee from Sameer milk plant in Kampala.
- The Ugandan government has encouraged and invited the Asians to return and manage their initial owned industries for effective productive and efficiency through de-nationalization like SCOUL and Kasaku tea factory in Buyikwe were given back to Metha and Kakira sugar works in Jinja back to Madvani.
- The Ugandan government has set up anti corruption organs like Auditor General, the IGG, commercial and anti corruption court and anti smuggling units to fight against corruption and smuggling practices towards industrial development e.g. at Busia and Malaba on Uganda - Kenya border, an anti smuggling point has been installed to stopping of Bamburi cement and safari cigarettes from Kenya.
- The Ministry of Trade and Industry through UIA has deliberately allocated and gazetted industrial parks for developing and establishing large industries such as Namanve forest reserve in Mukono for Century bottlers and Masese swamp in Jinja for BIDCO industries.
- The government through Ministry of Trade and Industry has rehabilitated and revived the existing industries and once closed industries so as to resume the industrial production more effectively like Tororo fertilizer industry, vermiculite plant in Manafwa, Uganda grain millers, E.A steel corp. and PAPCO paper industry in Jinja.

Revision questions:

1. Examine the reasons for developing the manufacturing industries in Uganda.

2. Account for the development of either Jinja or Kampala as an industrial centre in Uganda.
3. Examine the factors that contributed to the industrial decline in Jinja.
4. To what extent has transport influenced the location of industries in Uganda?
5. Assess the extent to which the availability of either raw materials or market has influenced the distribution of manufacturing industries in Uganda.
6. Account for the growth and development of manufacturing industries in Uganda.
7. Account for the distribution of manufacturing industries in Uganda.
8. Assess the significance of the industrial sector to the economic development of Uganda.
9. Account for the low level of industrial establishment in Uganda.
10. Explain the steps being taken to revive the industrial establishment in Uganda.

Sample Approach:

Candidates are expected to;

- Define the key word (s) in the question.
- Cite out the status / stand/ situation (+ve / -ve) of the major sector.
- Identify, describe and locate of the sub – sectors of the major sector in Uganda.
- Draw a sketch map showing the sub – sectors of the major sector with name of places.
- State, explain and then illustrate the how far (the extent to which) are the physical factors responsible for in relation to the sub – sectors of the major sector.
- Finally state, explain and then illustrate the however side of the other factors responsible for in relation to the sub – sectors of the major sector in Uganda besides physical factors.

OR

- State, explain and then illustrate the points (both positive and negative contribution / physical and human factors) in relation to the sub – sectors of the major sector in Uganda.

TOURISM AND WILD LIFE

Tourism is a re-creative and lucrative invisible economic activity which deals in traveling of people from one place / country to another with the purpose of visiting places of pleasure, studying, leisure, curiosity and interest

While wild life refers to fauna (animal life) and flora (plant cover) in their natural habitats.

STATUS AND TREND OF TOURISM INDUSTRY IN UGANDA

Generally, tourism industry in Uganda has the following status or trend;

~ It was a major foreign exchange earner in 1960s as it ranked as the 3rd foreign exchange earner after coffee and cotton.

~ In 1970s due to political instabilities, poor management and other poorly facilitated infrastructures, tourism declined.

~ From 1986 – 2007, tourism is booming at high rate due to the positive policies such as infrastructural development, political stability, liberalization and privatization.

~ **Currently** it is among the leading foreign exchange earner contributing about 25% of export earnings of over US $ 320 million per annum.

~ Uganda is one of the leading important tourist destinations in the World, being ranked as the 4th in the whole world and 1st in Africa according to National budget 2017 /2018.
~ Gorilla tourism is the leading attraction and alone employs about 5,000 people in tours and travel.
~ Wildlife is the major tourist attractions in Uganda.
~ The tourist industry is one of the fast growing and developing sector in Uganda.
~ Most of the Uganda's tourists are foreign from Europe, North America, Asia and some few from African countries like South Africa, Egypt.
~ The numbers of foreign tourist arrivals are increasingly rising over years that the sector receives 1 million visitors per the year.
~ Gorilla tourism accounts 50.4% of revenue generated for the Uganda Wildlife Authority.
~ Some tourist sites are rehabilitated and renovated like Kasubi Tombs in Kampala and Namugongo Martyrs' shrines.
~ Man made tourist attractions are poorly managed like Fort Lugard and Uganda Museum in Kampala.
~ New tourism products / sites have been launched and promoted like Rolex chapatti, Kampala–Entebbe Expressway in Kampala, Source of the Nile in Jinja, Miss Curvy pagenat, etc.
~ Tourism sector is under the management of Uganda Tourism Board and Uganda Wildlife Authority.
~ More national parks and wildlife reserves have been gazetted up to over 22 in total such as Kibale N.P in Kamwenge, Semliki N.P and Toro N.P in Bundibugyo, etc.
~ Great efforts are being done to protect and preserve the rare endangered wildlife species such as Chimpanzees on Ngamba Island in L.Victoria in Mukono, White rhinos at Ziwa ranch in Nakasongola.
~ Modern accommodation facilities like lodges and hotels for tourists have increased in number and rehabilitated from 1200 by 2004 to 4500 by 2008 such as Simba Safari lodge in Kasese, Serena hotel, Hilton and Speke resort Munyonyo in Kampala.
~ More private travel and tour agencies have been started / brought on broad such as Great Lakes safaris in Kampala, etc.
~ The number of people employed in the sector has increased over years to about 7.4% of the total number of Uganda's population and the Uganda Wildlife Authority spends about 10.5 billion shillings on salaries.

TOURISM ATTRACTIONS AND POTENTIALS IN UGANDA

The following are the major tourist attractions that make Uganda, a holiday paradise for the tourists;

~ **Wild animals (Fauna)** in national parks, wildlife reserves, sanctuaries and the wild life educational centre at Entebbe like elephants in Murchison falls, antelopes in Lake Mburo in Kiruhura, gorillas in Bwindi impenetrable in Kanungu, chimpanzees in Mgahinga in Kisoro, etc.
~ **Relief features** such as mountains like Mt. Rwenzori, snow capped horst in Kasese, Mufumbiro in Kisoro; Western Rift Valley in western border; craters like Wagagai on top of volcanoes of Mt. Elgon in Mbale, and Lake Katwe in Kasese; etc
~ **Drainage features** such as Waterfalls and rapids like Bujagali falls in Jinja, Karuma falls in Kiryadongo and Murchison falls in Buliisa all along Victoria Nile; Kisizi falls in Rukungiri; Sippi falls in Kapchorwa and Ssezibwa falls in Mukono; hot springs like Kitagata in Bushenyi, Sempaya in Bundibugyo, Kichumbi in Kabale, Kisizi in Rukungiri and Kibiro in Hoima; beaches like resort beach Entebbe in Wakiso, K.K beach at Ggaba in Kampala, imperial resort beach and Lutembe beach on shores of lake Victoria in Wakiso, etc; lakes like Mutanda in Kisoro, Bunyonyi in Kabale, Katwe in Kasese, etc and rivers like Victoria Nile in Jinja, Albert Nile in Arua, Ssezibwa in Kayunga, Kazinga channel in Kasese, …
~ **Vegetation / Flora** such as forests like Budongo in Masindi, Bugoma in Hoima, Kibaale in Kamwenge, Semliki in Bundibugyo, Mabira in Buyikwe, Mt. Elgon in Mbale, Mt. Rwenzori in Kabarole; dry savanna in Queen Elizabeth in Kasese etc.
~ **Historical sites** such as Speke memorial in Jinja, Bigobyomugenyi in Masaka, Baker's Fort in Gulu, Namugongo martyrs shrine in Kampala, Kasubi tombs in Kampala, Uganda museum in Kampala, Nyero rock paintings in Kumi, Fort Lugard at Old Kampala, Nommo Gallery in Kampala, etc.
~ **Traditional culture** such as Kasubi tomb in Kampala for the Kabakas in Buganda, male circumcision / Imbalu among the Bagishu in Mbale, Nkokonjeru tombs in Mbarara, etc.
~ **Hotels and lodges / accommodation centres** such as Sheraton, Imperial, Equatorial, Serena and Triangle in Kampala; Mweya safari in Kasese, etc.
~ **Political climate** such as the areas affected by the political instabilities / war – torn areas like Northern areas in Gulu, Pader, etc.
~ **Tropical climate** of hot and warm conditions in Kampala, Entebbe, etc
~ **Transport network** such as Entebbe international airport in Wakiso, Source of Nile Bridge in Jinja, Kampala-Entebbe Expressway and Northern by pass in Kampala.
~ **Urban centres / towns** such as Kampala, Mbale, Busia, Jinja, Mbarara, etc.
~ **Equator** as an imaginary line at Kayabwe near Masaka and at Bwera in Kasese.
~ **New and recent developments** such as Albertine oil wells in Buliisa, Industrial parks at Namanve in Kampala, Source of Nile Bridge in Jinja, Kampala-Entebbe Expressway, etc.
~ **Etc.**

MAJOR ALLOCATED AREAS FOR WILDLIFE

The following are the major allocated areas for wildlife in Uganda;

National park is an area gazetted for the preservation of wild animals (fauna) and vegetation (flora) for public pleasure as well as for scientific and historical significance and covering a total area of 11,023 km^2. These are Murchison falls national park (Kabalega) in Masindi, Amuru and Buliisa; Queen Elizabeth national park in Kasese and Bushenyi; Mt. Rwenzori forest national park in Kasese; Semliki forest national park in Bundibugyo;

Kidepo national park in Kaabong; Mt. Elgon national park in Mbale, Sironko, Manafwa, Bududa and Kapchorwa; Kibaale national park in Kabarole and Kamwenge; Lake Mburo national park in Kiruhura; Mgahinga national park in Kisoro; Bwindi impenetrable forest national park in Kanungu; etc.

Wildlife reserve is an area of wild life put aside for future expansion into a national park, administration and research and they cover about a total area of 9,282 km^2. These are Toro game reserve in Bundibuygo, Bokora corridor game reserve in Moroto, Kigezi game reserve in Bushenyi and Rukungiri, Katonga game reserve in Kyenjojo and Kamwenge, Kyambura game reserve in Bushenyi, Pian -Upe game reserve in Nakapiripirit, Kibaale forest corridor in Kamwenge, Karuma game reserve in Masindi, Matheniko game reserve in Moroto, Kitagati game reserve in Bushenyi, Kikagata game reserve in Ntungamo, Ajai game reserve in Arua, Bugungu game reserve in Buliisa, Semliki game reserve in Bundibugyo, etc.

Community wildlife area is a place where animals are kept for public viewing and hunting is allowed by special permits from the authorities and they cover a total area of about 35,143 km^2. These are Katonga in Kyenjojo, East Madi in Moyo, West Madi in Yumbe, Sebei in Kapchorwa, Semliki in Bundibugyo, South Karamoja in Nakapiripirit, North Karamoja in Moroto, Buhaka in Hoima, Napak in Moroto, etc.

Wildlife sanctuary is an area gazetted by the state in order to preserve, conserve and protect animals and birds as well as plants which are nearing depletion or extinction and they cover a total area of about 966 km^2 such as White Rhinos in Mountain Kei in Yumbe and Otze forests in Moyo (West Nile) and Chimpanzees and Mountain gorillas on Ngamba Island in L.Victoria in Mukono, Mount Mgahinga in Kisoro and in Bwindi impenetrable forests in Kanungu and other sanctuaries are Entebbe, Jinja, Malaba, Kazinga and Zoko forest.

Wildlife ranches mainly for white rhinos such as Ziwa Rhino ranch in Nakasongola

A SKETCH MAP OF UGANDA SHOWING WILDLIFE CENTRES AND OTHER TOURIST ATTRACTIONS

Full page

FACTORS THAT FAVOURED THE DEVELOPMENT OF THE TOURISM INDUSTRY IN UGANDA

- Uganda is endowed with variety of faunas (wild animals) like elephants, zebras, antelopes, lions, hyenas, cheetahs, leopards, snakes, lizards, crocodiles, hippopotamus, fish, ostriches, woodpeckers, vultures, crested cranes, gray parrots and others found in the national parks, game reserves, sanctuaries and zoos such as Kidepo, Mgahinga, Murchison, Lake Mburo, Entebbe Wildlife centre, etc.
- Uganda has a beautiful scenery composed of relief features both volcanic and block mountains like Elgon and Rwenzori; drainage features like lake Victoria as biggest in Africa, Katwe, Mutanda, and Albert, and Victoria Nile river Sezibwa and Katongo, Ggaba beach, Lido beach and Garuga golf course; Western rift valley, Butiaba escarpment and Kichwamba escarpment; glaciated features like Lau du Speke on Mt. Rwenzori; etc are all great tourist attraction for Uganda's tourism sector.
- Uganda is with varied floras / vegetation types found in different parts of Uganda which have offered a natural beauty over the landscape. For instance equatorial rainforests like Mabira, Budongo, Malabigambo, Ssese islands; montane forests like Mt. Elgon, Rwenzori, Muhavura; dry golden savanna at Muhokya in Kasese, Mburo and Murchison and swamps like Nabajuzi, Mpologoma, etc have attracted tourists for different pleasure activities such as camping, filming, adventure and ecological studies.
- Existence of the unique traditional norms, cultures and black races have the favoured the tourism sector. Uganda has various cultures due to the variety of tribes e.g. Gishu, Ganda, Toro and Lango, etc. Tourists come and view the Ugandan cultural dressings, entertainment, rituals and human colour which are quite different from those of the Americans, Asians and Europeans. Some tribal societies are still primitive and even walk naked like the Konjo and Karamojong which offer chances for eco – tourism.
- Uganda is experienced with equatorial warm and hot climate is around L. Victoria areas; tropical in Soroti, Lira, Gulu and Rakai; semi arid is in Karamoja region and Kasese and varied montane climate on mountains of Rwenzori and Elgon which is a unique feature not found in every country. More to that, most parts of Uganda receive adequate sunshine at all times of the year because they are crossed through by the equator which all have attracted people from temperate countries like Britain, Iceland, Russia, USA, Canada and Finland to enjoy sun bathing and other adventures.
- Presence of important historical sites and forts such as Nyero rock paintings in Kumi, Pakuba in Gulu, Walasi in Mbale, Tanda in Mpigi, Sanga hills stone age site in Masaka Kagadi in Bundibugyo, Parajok and Padibek in Kitgum, Kasubi tombs Namugongo Martyrs shrines and Fort Lugard in Kampala have all attracted various tourists because of their historical and cultural significance.
- Uganda, since 1986 has been stabilized in most parts of Uganda thus calling for many tourists. Most of the parks and reserves like Murchison falls and Lake Mburo are in politically stable areas of Masindi and Mbarara respectively. Those which are insecure like Kibaale, Kidepo and Bwindi peace is always ensured by UPDF and game rangers.
- Well developed accommodation facilities have been put in place in different parts of Uganda to provide the necessary services to the tourists e.g. Grand Imperial hotel in Kampala, Kampala Sheraton, Mwea lodge in Kasese, Imperial Hotel at Entebbe, Mountain Elgon hotel in Mbale, White horse inn in Kabale and Speke Hotel in Kampala, Apoka lodge in Kidepo valley, Clouds lodge in Bwindi have been set up to offer excellent tourist services.
- Welcoming attitude and good hospitality among the Ugandans such as Baganda, Basoga, Bakonjo and Japhadhola as they willing receive, guide and serve the tourists has also played a big part in attracting the tourists in the places like in Kampala at Kasubi tombs, Namugongo shrines and Uganda Museum; in Jinja at the Source of Nile and Bujagali falls; Mt. Rwenzori and Tororo hill rocks respectively.

- Existence of fairly developed transport and communication systems in areas where the tourists attractions are e.g. roads from Kampala to different parts of Uganda like Kabale (Mgahinga and Bwindi), Mbale (Mt. Elgon, Sippi falls and Nyero rock), Kasese (Queen Elizabeth, Katwe and Toro kingdom), Gulu (Baker' Fort and R. Aswa), etc have been rehabilitated and constructed. Entebbe international air port has been renovated to the expected standards and other air strips such as Gulu, Arua, Kasese and Soroti for easy transport in Uganda have been developed and reactivated. The communication companies are also up to date by use of mobile phones for easy communication services in case of booking like MTN, Smart, Warid, Orange and UTL.
- The tourism industry through Uganda Tourism Board and Uganda Wildlife Authority have taken an initiative of intensively advertising Uganda's tourist attractions both at local and international level in form of short films, embassies, brochures, newspapers like New Vision, magazines, booklets, trade fairs, road side posters on Entebbe road, radio and television like CNN (Gifted by nature), WBS (Pearl of Uganda), Record (Pearl adventure) and NTV (Sights and Sounds) to improve the tourism image and attract more tourists to Uganda.
- Presence of trained and skilled man power to serve and manage the tourism industry in different related activities possible because of the tourism training courses offered at Makerere University and at Institute of tourism in Jinja. Serena, Africana and Sheraton international hotel also equip their staff in customer care services for quality services to tourists.
- There are easy entry requirements for tourists from countries where tourists come from. The Ugandan government has eased visa requirements for tourists from different countries which are major tourist donors at embassy headquarters in countries such as USA, Canada, UK, Sweden, Germany and Asian countries.
- The tour operation services have been revised and privatized to improve on the movement packages of the tourists to the various tourism centres. These tour agencies have organized tourist packages and movements at attractive prices such as Rwenzori travel and Tour agency in Kampala, Uganda Safari Company, Back packers in Kampala, Crescent Tour and Travel ltd, in Kampala, etc.
- Ugandan government through its policies of liberalization and privatization has attracted both local and foreign investors in the tourism industry by exempting them from taxes, giving them incentives to carry out their businesses e.g. Sarova hotel in the Murchison falls national park is operated by Madhvan, Speke resort Munyonyo is managed by Sudhir group of Companies, etc.
- Mass sensitization and education has been implemented to the Ugandans to have interest, positive attitude and appreciate the value of tourist attractions such as forest reserves, fauna and swamps and the tourism industry as a whole through seminars, workshops, radios like CBS and televisions like UBC, NTV and WBS spearheaded by UWA and NEMA.
- Presence of initial capital to invest and develop tourism industry from Ugandan government, local investors and foreign donors such as the European Union and World Bank to put up infrastructures like roads , air crafts, education centres, hotels, training man power, etc. For instance NRM government funded the renovation of Entebbe airport into an international one, upgrading of Ggaba road to Speke hotel Munyonyo, Entebbe road from the airport and to Entebbe wildlife centre and renovating Nile hotel into Serena Hotel. (in the budget for the sector in the 2010/11 financial year was about Shs 2.1 billion ($900,000)
- Through government policy, the government organs such as NEMA, NFA and UWA as well as the parliament have gazetted more national parks, game reserves, sanctuaries and other tourist centres in its way of promoting tourism like Semliki N.P, Kibale N.P and Elgon N.P. More still, the ministry of education, courses related to tourism have been put in place such as bachelor of tourism, bachelor of leisure and hospitality, bachelor of hotel and catering offered at MUK and MUBS to uplift the tourism services.
- Preservation and conservation of endangered or extincting plants found in forest reserves like Mabira, Bwindi, Kibale, etc and animal species such as Mt. Gorillas in Bwindi, Chimpanzees in Mgahinga forests, White rhinos in L. Mburo, Mt Kei and Otze and giraffes in Kidepo N.P. as well as in Entebbe Wildlife centre for development of tourism industry.

ECONOMIC IMPORTANCE OF TOURISM IN UGANDA

- Tourism is an important economic activity because it directly brings in foreign exchange to Uganda. It is estimated that about $450m in are added to national income through tourism as tourists come in and spent a lot of money in form of accommodation, transport and entrance fees payable in game parks like Murchison falls, hotel bookings in Sheraton, Mweya safari lodge, Sarova hence foreign exchange, which is used to develop roads, hospitals & schools. In 1991, more than US$ 20m was obtained from tourism and more than $30m was earned in 1993. In 1995, total receipts from tourism were $90.1 million. Currently it contributes approximately 25% to GDP.
- Tourism has generated employment opportunities to many Ugandans in different categories. It is estimated that the industry employs over 70,000 people either directly or indirectly in Hotels like Speke resort hotel, lodges, game rangers and tour guides, game parks like Rwenzori Game Park, transporters like tour and travels, and those who carry the luggage of mountain climbers on Rwenzori and Muhauvra mounts and those in top offices in UWA and UTB. The tourism industry provides employment opportunities to many people in Hotels like Speke resort hotel, lodges, game rangers and tour guides game parks like Rwenzori Game Park, transporters etc. These employees are paid income to improve on their standards of living.
- The tourism industry has helped in diversifying the Ugandan economy which has been predominantly on agricultural country which is an unpredictable sector usually hit by low prices on the world market or climatic and biotic hazards. For instance Rwenzori, L. Mburo and Kidepo national parks provide side income to tourist guides who double as farmers and pastoralists at the same time. Therefore the government earns from tourism, agriculture and manufacturing industry.
- Tourism has stimulated the growth of local art and handcraft industry where foreign visitors buy large amounts of local handcraft items like wood curvings, textile weavings, backcloth painting, drums, clay curving, etc. In Jinja, Kampala and Entebbe Wood curvings, art pieces, baskets, mats, and grass hats are crafted and sold at the source of the Nile, Bujagali falls; along Buganda road, National Threate and Entebbe wildlife centre respectively.
- The industry has helped much in facilitating the conservation and maintenance of the wildlife reserves as it is the biggest tourist attraction. This has been possible by the entry fees paid by the visitors to view the wildlife in different game parks, game reserves and at the Wildlife centre at Entebbe is used to buy meat and other animal feeds in the park or wild life centre.
- It has promoted urbanisation / the growth of urban centres especially in areas where there are tourist attractions and sites e.g. Jinja town is near source of Nile and Bujagali falls, Kampala is near Namugongo shrines, Fort Lugard and Uganda Museum, Entebbe is near several beaches like Lido

and Lutembe and Entebbe wildlife, Kaabong is near Kidepo valley N.P, Kayabwe along Masaka road and Kakorongo in Queen Elizabeth Park are near Equator.

- The tourism industry has helped in training of necessary skilled manpower especially in the field related to tourism e.g. tour guides, Linguistics, receptionists, guards, managers, game rangers in Rwenzori and Murchison falls national parks as well as in hotels such as Serena, Sheraton, etc. Tourism courses have been introduced at Makerere University and Jinja tourism institute.
- Major transport facilities like Kampala to Entebbe road, Kampala to Jinja road, etc have been renovated and rehabilitated as they lead to major tourist centres like Entebbe wildlife centre and source of Nile, Bujagali falls, etc. Hotels and lodges have been updated to reach the international standard for better services to tourists like White horse in Kabale, Crested Crane in Jinja, Mweya Safari lodge in Kasese, Grand Imperial and Serena in Kampala, etc all as result of tourism.
- Tourism has promoted research and education among students of higher institutions of learning like universities and various secondary schools. Students research on animal behavior and botany from national parks and game reserves like students of Institute of ecology located at Mwea in Queen Elizabeth national park and those of Makerere University use Kibale forest reserve and Bwindi for research purposes.
- Tourism has put to use the land that could otherwise be left idle and unutilized. Such area include those that receive low and un reliable rainfall, those areas with infertile soils and those infested with tsetse flies e.g. Kidepo, Murchison falls and lake Mburo areas were inhabitable but have been put into economic use by gazatting them as national parks.
- National parks and game reserves have helped in the protection, preservation and conservation of the environment and Eco-system generally like forests which are not tempered with because they reduce soil erosion, land slides on mountain slopes and climatic changes. The gazatted forests such as Mabira and Semliki have also protected the water catchment areas since forests owe origins of some rivers such as R. Musamya and R. Semliki respectively. Chimpanzees and mount Gorillas are conserved in Mgahinga and Bwindi national parks.
- Tourism in Uganda in particular has created friendship among the nations from which the tourists come from which has later attracted foreign aid and grants necessary for economic developments. Most of the non-governmental organisations such as DANIDA from Denmark came after touring the country and witnessing the low level of economic development in that they are now here to assist the country in constructing schools, hospitals and many others.
- Tourism has maintained the wildlife reserves in that the entry fees paid by visitors to view the wildlife in the game parks, game reserves and at the Wildlife centre at Entebbe is used to buy meat and other animal feeds in the park or wild life centre.
- Tourism has promoted the agricultural sector through offering market to the agricultural goods especially food stuffs which is consumed in hotels such as Mweya Safari lodge in Kasese, Grand Imperial and Serena in Kampala, etc. The industrial sector has also been boomed by tourism through increased demand for the industrial products, photographs and other industrial related goods for example photo films and papers from Fotogenix limited in Kampala and Mosquito nets and Curtains from Quality Chemicals at Luzira.
- Tourism has offered Uganda as a country a good image as well as international recognition as tourists inform others about what Uganda can offer as a way of advertising her natural resource endowments like petroleum deposits along the Western Rift valley of Uganda, etc.
- Tourism has promoted the growth and development of the filming and photography industry. In Mgahinga, Bwindi, Rwenzori and Kazinga channel game parks, the conserved endangered animal species such as chimpanzees, gorillas, Elephants, Lions, Cheetahs, Buffaloes and birds like crested cranes and parrots are photographed for magazines and filmed for commercial purposes.
- Tourism has helped in the preservation and conservation of African culture and traditional customs which act as tourist attractions e.g. circumcision among the Bagisu, traditional dances of Baganda and Banyoro, coronations of kingdom kings and burial ceremonies. In the Uganda museum at Kampala, a variety of ancient cultural norms and pieces such as dress code, cosmetics are conserved for viewing by both local and foreign tourists. This helps transmitting the local culture to the next generation and abroad.
- Tourism played a role in balancing the economic development in the country. Since all corners of Uganda have tourist assets e.g. in the West Nile and North, there is Albert Nile, Fort Baker, Aswa river, etc, in the North East, there is Kidepo National Game Park, in the East, there is Pian-Upe, Bakora corridor, Sipi falls, etc in the West, there is Semliki National Park, Mt. Rwenzori game reserve and in the south west, there is Mufumbiro Mountains, Bwindi forests, etc. Such a balanced distribution of economic assets has led to a more relatively equal income distribution, which enable the country to develop as a whole.

NEGATIVE EFFECTS OF THE TOURISM INDUSTRY IN UGANDA

The following are the side effects of the tourism activities in the areas they are carried out or Uganda as a whole;

- Large pieces of land have been set aside for wild life conservation in terms of game parks, sanctuaries and game reserves which is an obstacle or a hinderance to other land uses. For example, the Murchison falls, Sippi and Bujjagali falls, would provide hydro electricity than conserving them for tourism. Vast areas of land gazetted for game parks like Murchison falls National Park would encourage extensive crop cultivation and pastoralism, mountain Elgon forest national park led to the displacement of people, etc.
- Wild animals in national parks and other tourist centres are a danger to human lives and people's property especially those living the tourist centres with forests. Animals destroy crops, eat the domestic animals as well as feasting on people. For example in 2005, the crocodiles in lake Victoria feasted on approximately 80 human beings in Bugiri and Mayuge districts on the shores of lake Victoria, elephants from Kibale forest destroy crop farms in Kibale district, etc.
- Some national parks and game reserves are densely populated with animals which are destructive to the environment. A large number of hippos in Lake Edward - George region and gazelles in L. Mburo N.P have led to over grazing thus severe soil erosion in the area. Trees are cut down to construct temporary accommodation structures and fuel wood for camp fire at night has forest depletion hence environmental degradation.
- Wildlife conservation areas such as Queen Elizabeth, Bunya forest reserve, Murchison falls national park are breeding areas for pests like tsetse flies, mosquitoes, ticks, Marburg virus, Bird flue, etc have threatened and scared the population around tourist centres which would have been labour force as the above pests cause diseases to them and their animals e.g. Nagana, sleeping sickness, Malaria, etc.
- Since Uganda's tourist industry is driven and being invested in by foreign investors, much of the profits earned from the tourists are being

repatriated to their mother countries leaving Uganda drained and undeveloped. For example Madhvani group of companies who invested in Mweya safari lodge have profit repatriated to Asia.

- Tourism industry is seasonal, unpredictable and very delicate industry, so it is unwise for Uganda to depend on it much because it may disappear almost overnight as a result of political instability, disease outbreak, natural disaster and economic depression in the economy. For example the killing of tourists in Bwindi national park in 1990's, the constant outbreak of cholera in Kampala, Ebola in Gulu and presence of Aids in Uganda is a threat and has reduced the number of tourists. This has caused gross loses by the government and people who invest in the industry.
- Ugandan tourists are much foreign who come only during certain seasons when it is winter in their countries especially in Europe and North America. This increases the cost of operation of the tourist facilities in the months when the tourists are not in Uganda such as hotels are underutilized and this leads to high costs of operation of hotels like Africana in Kampala, Palm resort beach hotel in Entebbe, etc.
- The industry has led to an increase of prices of certain commodities and services where tourist attractions are found like arts and crafts, food stuffs, crafts, drinks and other attractive goods are sold expensively. For example food stuffs in Entebbe areas, arts and crafts at Buganda road in Kampala and Hotel accommodation facilities like in Sheraton and Grand imperial hotel are at high prices.
- The tourism growth in Uganda is coupled with the promotion of bad behaviors from different tourists with different life styles, so the Ugandan traditional values, culture and ways of living are likely to die out. For example, it has brought in the undesirable western ways of living like prostitution, clothing, religion, drug addiction, commercial Child sex, homosexuality and smoking in small towns like Kabalagala, Kayabwe along Masaka road and Nakasero in Kampala.
- Tourism in Uganda has encouraged the smuggling out of some rare wild life species world wide e.g. it is reported that through Entebbe international Airport, gorrilas, Chimps, Monkeys and beautiful birds like parrots from south Busoga forests, Bwindi forests and Malabigambo forest are smuggled. This threatens sustenance of the industry ecological balance.
- Tourism put pressure on all local resources such as energy, water and food. For example mushrooming hotels to support tourism like Serena, Sheraton, Golf course, Speke resort hotel have led to inadequate HEP supply leading to load shedding.
- It has also led to environmental pollution e.g. mountain climbers usually abandon polythene bags and oxygen containers on Mount Rwenzori and Elgon, different hotels release kitchen gases and wastes, etc.
- Some wrong elements pretend as tourists and cause damage in the country. Some of them are spies or even thieves who may cause danger to National security. Terrorism in Kampala in 1990,s such as bombs in Bars was suspected to be an act of some tourists.
- Some tourists are suspected to spread diseases to wildlife. For example the death of hippos in large numbers in Lake Edward – George - Kazinga channel complex in 2001 was suspected to be a human disease from tourists.

PROBLEMS FACING TOURISM INDUSTRY IN UGANDA

There are many problems limiting the development of tourism industry in Uganda despite some of the developments the industry has reached at. These problems are:

- In Uganda tourism is suffering a stiff competition with other land users as the population increases more land is needed for both agriculture and settlement that why many national parks, game reserves and forest reserves are suffering from population encroachment due to lack of land for expansion e.g. Kibale national park by the Bakiga migrants from Kigezi, the Karamojong graze their cattle in the Kidepo valley National park while Basongora herdsmen have encroached upon Queen Elizabeth national park, Mabira forest reserveis encroached by SCOUL, etc.
- The tourism industry in Uganda is faced by stiff competition from its neighbouring countries especially Kenya and Tanzania and even those countries beyond like Namibia, Switzerland, South Africa, Zimbabwe, etc. For example the biggest number of wild animals like wild beasts, giraffes and buffaloes are found along the Serengeti plains in Tanzania, the number of lions in Tsavo Park of Kenya out numbers those in Queen Elizabeth National Park. Kenya and Tanzania are on the coast with better beaches, harbours and hotels. On the other hand, Uganda has the same species with her neighbours. Tourists therefore are more attracted to Uganda's neighbouring countries.
- Every year many wild animals are killed from national parks, game reserves and sanctuaries either for food, hides, and other purposes which has led to the disappearance of valuable animal and bird species such as the white Rhinos, Cheetahs, Parrots, Crested Cranes, Peacocks etc. E.g. buffaloes, Zebras and Antelopes from the Queen Elizabeth are hunted for food, Elephants are killed to provide Ivory in L. Mburo and Kibale, Lions and Leopards in Kidepo national park are killed for their precious hides and skins as well as cultural and Vodoo practices among witch doctors.
- Since security is an important and ideal atmosphere for any development, tourism in Uganda experiences insecurity / security conflicts which scare away the incoming tourists and end up in Kenya and Tanzania which are relatively stable. For example some local tourists from Jimmy Ssekasi institute of catering were killed in Murchison falls national park between 1999 and 2000 by LRA rebels scared off others, the 1971-1985 political instability prevented long term investment in the tourism industry. Many tourists' assets such as the Nile hotel, Imperial and others were used to serve as torture chambers. Many areas with tourists' attractions such as Rwenzori, Kidepo national parks, Mt Kei and Otze sanctuaries are insecure and tourists don't go there easily.
- The tourism industry in Uganda is also faced with a problem that most of the people living near tourist attractions like near Kidepo, Kibale, Bwindi, Karuma falls, Elgon and Rwenzori national park are low income earners therefore they look at tourism as a luxury and instead they spend their low incomes on the basic necessities like food, clothing, shelter, etc which leaves the industry less used by its own people and it depends on the foreign tourists (external tourists).
- The coming of tourists to Uganda from Europe and North America is unstable. In some seasons, the inflow is great and in others it is very limited. Therefore in some months, there are high costs of operation in the tourist industry like at the Entebbe wildlife centre and Murchison falls N.P. This has generally undermined comprehensive planning of the tourism industry hence an obstacle to its development.
- Some tourist gazetted areas are not visited due to the fact that they are in remote areas with poorly developed transport routes thus being inaccessible. Transport facilities leading to these tourist centres, such as the Ssese islands in Lake Victoria, Semliki national park on Western border, Kidepo in extreme north east, Bwindi impenetrable in terms of roads, railways, air and water routes, are poorly developed.

- Generally Uganda has inadequate skilled labour to handle and manage the tourism industry. This is evidenced by the poor quality services rendered to the tourists in game parks like Kidepo, L.Mburo and hotels like Speke Resort in Munyonyo, Ssese camping sites and other tourist centres which force them to go to other countries such as Kenya and Tanzania with better skilled personnel and good services. More on that the tour packages are also organized on low levels.
- The Ugandan government faces capital shortage to invest in the tourist facilities like roads, hotels, lodges, game parks and wildlife management centres on international standards. Many of the national parks such as the Kidepo valley, Kigezi, Elgon, Rwenzori and Bwindi forest are in remote areas without an air strip for high class tourists. They also have poor tourist services, which has reduced the number of tourists to those areas.
- The tourism industry in Uganda is poorly advertised both internally and internationally which has made the tourists unaware of the existing parks like Bwindi, reserves like Toro and sanctuaries like Mt. Kei and their associated flora and fauna thus Uganda missing the revenue from the tourists because of its failure to publish what it can offer / provide.
- In Uganda, there are a number of diseases which scare away the tourists e.g. the waters of some lakes like Lake Mburo are contaminated with bilharzias, most of the game parks and reserves like Kidepo valley, Murchison falls, Mt. Rwenzori are infested with tsetse flies, malaria and the outbreak of epidemics like cholera in Kampala, Ebola in Gulu and the presence of AIDS, Marburg virus (Hemorrhage fever), etc all scares away tourists. These diseases have also claimed lives of many animal species in national parks e.g. in the Queen Elizabeth, many hippos died of anthrax in 2005.
- Changes in the economic trend in the countries where the tourists come from affects Uganda's tourism industry e.g. an economic depression (credit crunch) which started in 2008 up-to-2009 in Europe, USA and Asia has automatically affected the tourism sector in Uganda because it is where most tourists come from. Therefore few tourists are coming hence low foreign exchange earned.
- Poor hospitality in some areas with tourist attraction is an obstacle to development of tourism. For example some tribes in Uganda like the Karamajongs are hostile to strangers who scare away the tourists, local guides and game rangers. Even hostilities usually break up between the Karamajong warriors and the game wardens of Kidepo national Game Park and Bokora corridor game reserve usually resulting into loss of lives.
- Uganda is a land locked country which is cut off from the sea coast. As a result Uganda is out competed by Kenya and Tanzania which have a coast line because more tourists prefer coastal sceneries with better beaches, harbours and hotels and more so they reduce on the expenses to be incurred on transport to Uganda which has the same wildlife species with her neighbours.
- Uganda as a country is far and isolated from the potential tourists from Europe, Asia, North America and Australia where that in the end it receives fewer tourists hence low revenue.
- Most of the important tourist sites have been poorly maintained and even neglected due to factors ranging from political, social, cultural and economic like limited capital inaccessibility, cultural attachments, etc. E.g. Kasubi tombs in Kampala was maliciously burnt by unknown person in march 2010 while Bigobyamugenyi near Masaka, Omugabe's Palace in Mbarara and Samuel Baker's port in Gulu have been ignored by the government.
- The tourism industry of Uganda has also been faced with a problem of language barrier which has limited tourists from non - English speaking countries to come to Uganda as few local people can interact with them. For example tourists from China, Japan, Korea India and Spain face communication problems in Mweya safari lodge Queen Elizabeth and Elgon national parks because the local population does not speak Chinese, Japanese, Indian and Spanish languages.
- There have been also some cases of environmental pollution in some national parks which is a problem to the animal and plant life e.g. copper and cobalt mining at Kilembe near mountain Rwenzori national park as well as Limestone mining at Hima in Queen Elizabeth have polluted water, land and atmosphere which is harmful to game life leading to their death.
- Fire out breaks destroy tourist attractions both the fauna and the flora. Forest fires destroy all the vegetation cover including the wild animals in that forest reserve. For example Aber and Opit forests near Gulu in 1982 as well as Mount Mgahinga in Kabale in July 2009 were destroyed by fires clearing the wildlife habitant.
- Some national parks and game reserves in Uganda face the problem of soil erosion due to the existence of a large number of animals resulting into congestion. These animals will feed on grass, trees and their leaves thus over grazing hence exposing the soils to the agents e.g. erosion like running water and wind. In a course of the time, the area is turning into a desert like L. Mburo N.P with many grazing antelopes.
- The local natives are non-interested and non-appreciative of tourist attractions. Wildlife is seen as a danger to the local people and much of wild life is destroyed. For example Leopards, Hyenas and lions from Queen Elizabeth national park are poisoned and killed by hunters and farmers. Stray gorillas and chimps from Bwindi and Mgahinga forest reserves are usually killed by the Bakiga because they destroy their crops.

SOLUTIONS TO SOLVE THE ABOVE TOURISM PROBLEMS

The following are the measures being taken solve the problems facing the tourism industry or the measures taken to develop the industry:

- The government of Uganda is acquiring capital through borrowing internally from Bank of Uganda and externally from World Bank, IMF and donor countries like USA, UK and others to set up tourist facilities such as play grounds like Mandela stadium funded by China, roads like Entebbe and Ggaba roads, hotels like Serena and Speke Resort Munyonyo and air strips like Entebbe international air port. This is because these facilities are also tourist attractions themselves.
- There is eradication of poaching and uncontrolled game cropping through establishment of strong anti -poaching laws, regular patrol by a well equipped anti poaching squad in national parks and reserves such as Kidepo, L.Mburo and Queen Elizabeth national park of mainly elephants and antelopes. This has ensured that the population of animals multiplies hence attracting more tourists.
- The government is diversifying for other economic activities avoid problem of seasonality of the tourism industry. For example it has embarked on Cobalt recycling at Kasese and tourism in Queen Elizabeth; forestry, oil mining and tourism in Semliki valley, etc to ensure economic diversity.
- Training and retraining of workers in the tourism industry is being done to improve on the skills of the tourist attendants hence better services for the tourists. For example tourism courses are offered at Makerere University, Institute of tourism in Jinja and hotels such as Serena, Africana and Sheraton also equip their staff in customer care services for quality tourist services.

- Spraying of national parks and game reserves is being undertaken by pest control department on behalf of UWA in order to eradicate pests such as tsetse flies in infested parks like Murchison, South Busoga forests and L.Mburo which cause nagana to wild animals like elephants, zebras and antelope families.
- There is construction of pipes to direct pollutants under ground from Kasese cobalt factory and Hima cement factory in order to solve the problem of environmental pollution in Rwenzori and Queen Elizabeth N.Ps instead of being pushed in the atmosphere.
- Uganda wildlife Authority is educating people the values of wildlife conservation and preservation as well as hospitality among the people through seminars, workshops and mass media organized near game parks like Bwindi, Rwenzori, Mbarara near L. Mburo, Kidepo national park and Entebbe wildlife centre. This is because the success of tourism partly depends upon the moral, spiritual and economic support of the people.
- The government is ensuring a stable political climate which is conducive for tourists. This has been through promoting democracy and training and creation of a strong army, police force and local defense personnel. E.g. the UPDF is restoring security in Kasese through fighting the ADF rebels in Rwenzori and Mgahinga national parks, in the north Kony (LRA) have been wiped out from most areas like Pader, Kitgum, Kilak, Otze and Mt.Kei sanctuaries making them now accessible and Karamojong warriors have been disarmied for accessibility to Bokora Koridor game reserve and Kidepo valley.
- The Uganda tourism board and UWA is intensifying and increasing the level of advertisement both locally and internationally. It prints brochures, T-shirts, magazines and stickers to be used for advertisement. Local wildlife films are broadcasted on local like UBC and international television channels such as the Cable News Network (CNN), Skynet, and Discovery channel so as to attract more tourists.
- The government is attracting private investment both local and foreign to put up and manage tourist facilities such as Hotels, Lodges, Restaurants and others through sounding economic policies like tax concessions, holiday, loans etc. For example the Mweya safari lodge has been taken over by foreigners for better management, Nile hotel was taken over by Serena hotels for better management and handling of tourists during the CHOGM summit, Speke resort Munyonyo is co owned by the government and Sudhir, etc.
- The Ugandan government is promoting through adverts the country as a destination for bird viewing at L. Mburo and on Ssese islands since it is rich in bird species, water rafting along Victoria Nile and sport fishing on L. Victoria beaches like in Entebbe Wildlife centres. These and other tourist attractions have been of interest to special groups of tourists like the ecologists and the botanists.
- Ministry of transport and communication is improving accessibility to areas of tourist attractions. Kampala – Masaka - Mbarara road and Kampala – Kasese – Fort Portal road are always upgraded to maintain access to L. Mburo and Queen Elizabeth national parks. An air strip was constructed in Kasese to transport tourists in the area to Mt. Rwenzori and Rwenzori national park, another at Jinja to create access to Bujagali falls and the source of the Nile and Entebbe airport has been upgraded to international standards.
- Uganda's government is waiving the visa requirements for foreign visitors from over 30 countries such as India, China, Sweden, Denmark, UK, USA, Canada, etc which are the major tourist market source so as to increase on the number of tourists in the Kidepo, Bwindi, Elgon, Queeen Elizabeth, and other gazetted areas which in turn has increased on the foreign exchange.
- Uganda wildlife Authority is preventing settlement and agricultural encroachment in the game parks and reserves. For example the Bakiga who settled in the Kibale forest reserve have been resettled elsewhere and the area is now gazetted as a National park, the encroachment on Mt. Elgon National park in Bududa was followed by eviction done by Uganda Wildlife Authority, cattle keepers from Buliisa stopped from invading on Murchison falls N.P, …
- The government of Uganda through Uganda wildlife Authority (UWA) is encouraging local Ugandans to visit the tourist attractions throughout the year. This is done through giving them subsides such as less payment on entry to game parks and wildlife centres like Entebbe wildlife centre so as to increase on the number of tourists in times when the foreigners are not here.
- The government is privatizing former state hotels such as Nile hotel, Grand imperial hotel and Equatorial hotel for better management of tourist accommodation. Private tour and travel companies for tourists have also come up to transport tourists at attractive and negotiable prices such as Rwenzori tour and travel in Kampala, Uganda Safari Company, Back packers in Kampala and many others.
- The ministry of tourism and ministry of Education through UWA is setting up wildlife clubs in schools and Universities such as Makerere, Mbarara, Uganda Martyrs and Nkumba universities as well as wildlife education centres at Entebbe to increase wildlife conservation awareness among youngsters.
- Many foreign languages are now being taught in schools, colleges and higher institutes of learning like Makerere and Kyambogo Universities e.g. German, French, Latin, Kiswahili, Chinese, Spanish, Japanese, etc so as to produce translators and tour guides who can deal with tourists from non English speaking countries such as Japan, Korea, India, China, France,...
- Modern accommodation facilities in form of lodges are being established in game parks. For example Uganda Safari Company runs the Semliki lodge in Semliki valley, Apoka lodge in Kidepo valley N .Park, Clouds lodge in Bwindi impenetrable forest N.P, Land mark in Soroti and Kampala and Triangle hotel in Kampala.
- Game hunting sports have been adopted to attract tourists. For example the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) granted the Uganda Wildlife Authority permission to allow tourists hunt Leopards. A maximum of 28 leopards are killed annually. Each trophy hunter (tourist) pays US $ 50,000 (83 M) per leopard killed.
- Uganda wildlife Authority and the parliament have gazetted more National parks and game reserves so as to increase the number of parks and game reserves. For example they recently gazetted Mgahinga for Chimps, Kibale and Rwenzori as N.Ps as a positive attitude and policy towards the conservation of wildlife which are the tourist attractions.
- Uganda wildlife Authority (UWA) is driving stray animals like elephants in Luwero, Kibale and Nakasongola back to game reserves and National parks. Endangered animal species are kept at Entebbe wildlife centre and given treatment. And of recent in April 2009, UWA bought two lionesses which kept at Entebbe centre for multiplication with a lion there.
- The government is creating a number of bodies related to tourism e.g. Uganda Tourism board , Uganda wildlife authority, NEMA, NFA, etc to ensure the smooth running of the industry as well as effective conservation and preservation of wildlife.

Sample Questions:

1. To what extent is it justifiable to allocate such large land areas to National parks and Wildlife reserves in Uganda?
2. Discuss the contribution of game parks and game reserves to the economic development of Uganda
3. Giving specific examples, discuss the obstacles, which have hindered the development of the tourism industry in Uganda.
4. Explain the measures being taken to address the tourism obstacles.
5. "Uganda's tourist industry is not only based on tourist attractions"

Discuss.

6. To what extent have physical factors led to the development of the tourism industry in Uganda?
7. "Uganda's paradise combines all the most understanding attractions of the great African continent" (Source: welcome to Uganda: the land of sunshine! Tours and travel Ltd). With reference to specific examples, justify this statement.
8. To what extent has wildlife provided a basis for the tourism Industry?
9. To what extent has scenic beauty favoured the development of the tourism industry in Uganda?
10. Assess the impact of wildlife conservation to the economy of uganda

Sample Approach:

Candidates are expected to;

- Define the key word (s) in the question.
- Cite out the status / stand/ situation (+ve / -ve) of the major sector.
- Identify, describe and locate of the sub – sectors of the major sector in Uganda.
- Draw a sketch map showing the sub – sectors of the major sector with name of places.
- State, explain and then illustrate the how far (the extent to which) are the physical factors responsible for in relation to the sub – sectors of the major sector.
- Finally state, explain and then illustrate the however side of the other factors responsible for in relation to the sub – sectors of the major sector in Uganda besides physical factors.

OR

- State, explain and then illustrate the points (both positive and negative contribution / physical and human factors) in relation to the sub – sectors of the major sector in Uganda

TRANSPORT AND COMMUNICATION IN UGANDA

Transport refers to the process whereby passengers and goods are moved or carried from one place to another, while communication is the process of moving information or message from one place to another.

The elements that make up transport and communication are; mass media i.e. radios, television sets, news papers, telegrams, magazines, telephones, a fax machines, etc; postal services involving sending information, messages, parcels, letters, etc; and major types of transport like roads, railways, air and water transport.

GENERAL STATUS OF TRANSPORT AND COMMUNICATION

The following is general status of transport and communication sector in Uganda;

~ Distribution of transport routes in Uganda is uneven. Some areas like Buganda in Kampala and Busoga in Jinja have many while others like Kotido and Pakwach have a few.

Air transport:

~ Entebbe airport is the major and the only international air port in Uganda.

~ Entebbe airport is under management of Civil Aviation Authority. There are some small air strips such as Kimaka air strip at Jinja, Kololo air strip in Kampala, Kasese air strip, Arua, Moroto, Tororo, Pakwach air strips, Mbarara, Kanungu and many others.

~ Air transport is poorly developed with Uganda having no national airline.

~ Airline industry is dominated by foreign air companies such as Kenya airways, British airways, Brussels airways, Emirates air, Egypt air, Ethiopian airline, Air Rwanda, etc.

~ Air transport is characterized by low traffic and few internal and international flights.

~ Air transport has only one an aero - pilot training school in Soroti.

~ Constructional plans are underway to expand Entebbe international airport in Wakiso.

~ Plans are also underway to reinstate the National airline in partnership with Chinese government.

Water transport:

~ Port bell in Kampala and Jinja port are the main water ports on the L. Victoria to Kenya and Tanzania.

~ Lake Victoria is the most important inland water transport route and shared by Uganda, Kenya and Tanzania.

~ Most water transport takes place on lakes and few rivers.
~ Water transport is poorly developed with mainly use of canoes on L. Kyoga and Albert.
~ Water transport carries considerably a small number of passengers.
~ Water transport is mostly used by peasants such as fishermen on L Victoria in Kalangala.
~ There are very few modern vessels such as ships and steamers and they belong to the government like MV Kalangala ship at Kigungu in Entebbe and MV Pearl ferry at Bukakata in Masaka on L. Victoria.
~ Water transport is characterized by poorly equipped port facilities such as Port bell in Kampala and Jinja on L. Victoria, Masindi on Victoria Nile and Butiaba in Buliisa on L. Albert, etc.
~ Water accidents are still very common mainly on L. Victoria and L. Albert.
~ Most of the water transport operations are mainly done by private owners of boats.
~ Water transport is the cheapest mode of transport.

Road transport:

~ Uganda has many roads distributed throughout Uganda.
~ Road transport is the most dominant, important and developed type of transport in Uganda with 99% passenger traffic and 90% of Cargo.
~ Trunk (tarmac) roads and of high quality are constructed and maintained by the Ministry of works transport and communication under Uganda National Road Authority such as Kampala - Bombo road and Jinja – Iganga road.
~ Rural feeder roads are constructed and maintained by the local government at LC 3 and 5.
~ Public movement on roads under private individuals such as UTODA (Uganda Taxi Operators and Drivers Association) in Kampala and Wakiso as well as Pioneer bus co. in Kampala city.
~Many of the Murram roads have been up graded to tarmac roads like Soroti – Lira road and Katosi – Mukono road.
~ Many of the roads that were under local government have been taken over by the central government under UNRA like in Kampala city.
~ Rehabilitation of major high ways is being done like Kampala-Masaka - Mbarara high way and Kampala – Hoima road.
~ Almost all the major roads in Uganda originate and radiate from Kampala outwards in all directions like Gulu, Jinja, Kabale, Port Fortal, Entebbe roads, etc.
~ A Great North road passes Uganda from South Sudan through Nimule to Gulu to Soroti to Mbale and to Kenya through Tororo.
~ Major highways are complete and others under construction such as Northern Bypass, Kampala – Entebbe expressway, etc.
~ There is a rapid increase in vehicle and motorcycle population.
~ New bridge across the Victoria Nile was complete and named the Source of Nile Bridge.

Rail transport:

~ Most of the major rail routes are no longer operational except the Tororo - Kampala and Kampala - Port Bell route.
~Railway transport is the cheapest means for bulk transportation.
~ At the moment railway transport operates at its minimum handling between 30% and 40% of Uganda's bulky cargo to and from Mombasa and Dar es Salaam port.
~ Since 2006, the passenger train was non operational in other parts of Uganda except in Kampala to Namboole Stadium.
~ The railway transport is now under the management of the Uganda Railways corporation
~ The western route from Kampala - Kasese is no longer functioning.
~ Plans are underway to construct the Standard Gauge Railway to connect to Kenya
~ In 2007, railway transport was transporting approximately 70 containers of cargo from Mombasa far below the daily capacity of 160 containers.

DISTRIBUTION OF TRANSPORT ROUTES IN UGANDA

The distribution of transport routes in Uganda is;

Roads are distributed throughout the country and these are;

~ Kampala - Jinja – Tororo – Mbale - Soroti – Moroto road,
~ Kampala – Masaka – Mbarara – Kabale - Kisoro road,
~ Kampala - Kigumba - Lira – Kitgum road,
~ Kampala – Nakasongola – Kamdini - Gulu - Moyo road,
~ Kabarole - Kasese - Bushenyi – Mbarara road,
~ Kampala – Kiboga – Hoima road, etc.

The railway network routes are;

~ Eastern lines consist of Tororo – Iganga - Jinja - Kampala rail line and Jinja - Kamuli routes
~ Northern line consists of Tororo – Soroti and Soroti - Lira - Gulu - Pakwach route.
~ Western line consists of Kampala - Kasese route.
~ Central line consists of Kampala – Port Bell route.

Uganda has a number of domestic airfields with number of internal and international flight routes in Uganda and these are;

Domestic air transport routes are;

~ Entebbe – Gulu - Arua – Moyo route,

~ Entebbe - Mbarara – Kasese route,
~ Entebbe –Soroti route,
~ Entebbe – Lira route, etc.

The major international flights are;
~ Entebbe - Dubai - Jeddah – Sharjah flight,
~ Entebbe – Nairobi – Mombasa flight,
~ Entebbe - Addis Ababa flight,
~ Entebbe – Brussels - Cologne - London – Rome flight,
~ Entebbe – Juba – Cairo flight,
~ Entebbe – Mwanza – Arusha – Dar-es-Salaam - Johannesburg flight,
~ Entebbe – Kigali – Bujumbura flight, etc.

Water transport routes in Uganda are:
On Lake Victoria are;
~ Portbell –Bukoba,
~ Portbell - Jinja – Buvuma,
~ Nakiwogo / Entebbe – Kalangala (Ssese islands),
~ Lambu - Buvuma islands,
~ Portbell - Kisumu - Musoma - Mwanza via Lake Victoria, etc.

On Lake George and Edward are;
~ Kazinga Channel - Rwenshama – Katwe in Kasese,
~ Kasenyi – Katwe in Kasese,
~ Rwenshama in Rukungiri - Kavinionge in DR.Congo, etc.

On Lake Albert transport routes are;
~ Butiaba – Wanseko in Buliisa,
~ Butiaba in Buliisa – Muhangi in DR.Congo,
~ Ntoroko in Ntoroko - Kasenyi in DR.Congo, etc.

On Lake Kyoga are;
~ Lwampanga in Nakasongola – Galiraya in Kayunga,
~ Lwampanga – Nabyeso in Apac,
~ Kachung - Kagwara in Serere, etc.

Victoria and Albert Nile have transport routes such as;
~ Mahagi – Pakwach in Nebbi – Nimule along Albert Nile,
~ Masindi port along Victoria Nile - Lwampanga on Lake Kyoga,
~ Obongi – Lorapi along Albert Nile in Moyo,
~ Pakuba – Pakwach along Albert Nile in Nebbi, etc.

SKETCH MAP OF UGANDA SHOWING DISTRIBUTION OF TRANSPORT ROUTES

FULL PAGE FOR A MAP

FACTORS RESPONSIBLE FOR THE DISTRIBUTION OF TRANSPORT ROUTES IN UGANDA

From the sketch map drawn, it is observed that the south half of Uganda has more developed transport routes than the northern part and this is attributed to several factors as discussed below which are historical, physical and economical:

Physical factors:

- Relief has influenced the development of transport routes in that gentle slopes and relative flatlands make the construction of roads, railway routes and others easy like Buganda undulating low lying hills in Kampala and Wakiso have facilitated development of roads and railways such as Kampala - Bombo road and Kampala – Luzira railway.

  While on the other hand, with steeper slopes, fault scarps and high lands make the development of transport routes complicated like Sebei steep relief in Kapchorwa have few and poorly developed roads and railway lines.
- Drainage has also influenced the development of transport routes in that areas with rivers, swamps and lakes such as Lake Kyoga basin in Serere make the development of roads and railways expensive and difficult because of the poor and impeded drainage as involves construction of bridges, use of hard core stones and a lot of laterite soils.

And the rapidly flowing rivers like Victoria Nile in Jinja have hindered the development of inland water transport.

While the reverse is true with well drained areas and large lakes and rivers, the development of inland water transport and other routes have been possible like Port Bell – Katosi water route on Lake Victoria.

- Climate is also a major factor responsible for the distribution of transport routes in that murram roads are mainly damaged by too much rainfall making it hard to construct and maintain them during the rainy seasons like the poorly developed transport network and even few roads in Kisoro and Kabale are because of heavy rainfall as the running water usually washes away the murram soils and to create potholes in the roads and landslides usually block the Kisoro - Rubanda road and other feeder roads.

While the reverse is true with areas of little and moderate rainfall in Kaabong with Kaabong – Moroto road , Gulu with Gulu – Kitgum murram road.

- Pests and diseases are also responsible for the distribution of transport routes in that areas infested with tsetse flies like Hoima and Masindi and Bugiri and Mayuge generally have few transport network systems because for a long time, being a danger to the lives of people as they cause sleeping sickness as well as livestock with nagana.

While the reverse is true with pest - free areas like Kampala with Kampala – Masaka road and Jinja with Jinja – Kamuli road.

- Vegetation is also a major factor responsible for the distribution of transport routes in that areas with thick forests such as South Busoga (Bunya) forests in Maguye and papyrus swamps on Lake Kyoga shores in Kayunge make the development of roads, railways, water and air strips expensive and difficult because it involves clearance of the vegetation, use of hard core stones and a lot of laterite soils thus such areas have few or no transport routes.

While the reverse is true wood and grasslands like Kampala – Wakiso road and Tororo – Mbale road.

Historical factors:

- During the colonialism, British government influenced the development of transport routes in that roads were constructed in the established territories connecting the areas of the administrative centres like territories of Buganda in Kampala such as Kampala - Jinja road

While other areas like Kotido had limited road infrastructures because the colonialists never settled there first and never had administrative work there.

- Kingship system influenced the development of transport routes whereby areas with well organized monarchy leaderships developed important roads and bridges across rivers by the use of mobilized labour headed by the local chiefs and kings like Buganda government at Mengo in Kampala had the Kabaka constructed the Old Mengo - Old Kampala road to link to the palace at Mengo.

While on the other hand, areas without organized, strong and clear leaderships developed a few or limited transport routes like West Nile in Moyo and Karamoja in Moroto.

- Arab influence is also responsible for the development of transport routes whereby areas with early contacts of the Arabs from both the East African coast and Egypt helped in the development of roads which the caravans used when trading from Bagamoyo at the Tanzania coast into the interior regions of Buganda in Kampala and Busoga in Jinja and even also Arab slave traders and Merchandise traders from Malindi and Mombasa used that road route via Malaba and Busia.

While the reverse is true with Kotido that had no contacts.

- The coming of missionaries influenced the distribution of transport routes in that they opened up various roads which were used to spread religion, carry out monetary trade and abolish slavery like White fathers occupied Busoga in Jinja – Iganga road, Buganda in Kampala – Masaka road and Teso in Mbale – Soroti road.

While areas like Pakwach in Nebbi and Karamoja in Kaabong where they never occupied, had no chance to be allocated with improved transport routes.

Economic factors:

In Uganda today transport routes have been constructed to link areas with natural resources and probably finished goods to areas of consumption or need. The following are considered:

- Industrialization has influenced the distribution of transport routes in that most industrial centres have developed roads and railway transport routes linking them to the market for the finished products and to the areas where raw materials are like in Jinja, there are the Jinja - Masese road and Jinja port – Kisumu water route which were constructed to ease movements of labour, machinery, finished goods, and raw materials within the area.

While the reverse is true with less industrialized areas like Kitgum.

- Tourist potentials have influenced the distribution of transport routes in that areas with tourist attractions have promoted the development of transport routes like water transport on L. Victoria with Port Bell - Ssese islands and Kampala – Kasese road and Entebbe - Kasese air route were set up to access to Queen Elizabeth National parks and Mt. Rwenzori in Kasese.

While the reverse is true with areas of limited tourist potentials like Abim.

- Agricultural resources have influenced the distribution of transport routes in that areas with food resources or agricultural products and fertile soils have facilitated the development of transport routes like the railway line extension of Jinja – Mbale – Lira – Gulu – Pakwach was to ease the marketing of coffee, cotton, maize, millet, simsim and tobacco from Mbale, Soroti, Gulu, Lira and Nebbi.

While few roads were established in the Karamoja pastoral areas of Kotido and Moroto because these areas reared livestock for subsistence purposes as well as were infertile.

- Water resources have influenced the distribution of transport routes in that areas with lakes and rivers facilitated the development of water transport routes within the lake shore lines like Port bell – Kalangala water route on L. Victoria developed as a major internal port to handle sand, fish and timber from Ssese islands and others.

While the reverse is true with lakes and rivers of limited resources like Moroto.

- Mineral deposits have influenced the distribution of transport routes in that railways and roads have also been constructed in areas with mineral resources to link the market and processing centres like the extension of the Kampala – Kasese railway line was mainly due to copper mining at Kilembe so as to be transported copper to Jinja for smelting.

While the reverse is true with areas of few and limited mineral resources like Kitgum.

- Government policy is also a major factor responsible for the distribution of transport routes in that government has embarked on constructing transport routes through UNRA so as to stimulate economic growth and to provide an equal opportunity economic development like Masindi – Buliisa road due to oil deposit exploration.

While there are few roads are being developed and constructed in remote areas of Yumbe and Kitgum due to few economic opportunities.

- Forest resources have influenced the distribution of transport routes in that areas with timber resources have also been linked to by transport routes to facilitate the development of forestry like Budongo forests in Masindi have been exploited by set up of Kampala - Masindi road route.

While the reverse is true with areas of limited timber resources like Sembabule.

- Fisheries have influenced the distribution of transport routes in that areas with fishery resources have also been linked to by transport routes to facilitate the development of fishing sector like the fisheries of L. Victoria is linked by water routes from Ssese islands - Buvuma to Masese – Jinja road, etc for ferrying smoked and fresh fish.

While the reverse is true with areas with limited fishery resources like Ntoroko.

ROLE OF TRANSPORT ROUTES IN THE ECONOMIC DEVELOPMENT OF UGANDA

Generally the transport sector has played a crucial role in the economic development of Uganda in the following ways;

Positive importance

- Transport routes has facilitated both import and export trade (external trade) within Uganda through distributing and marketing goods which eventually brings in foreign exchange like coffee from Bushenyi is collected and then transported to Mombasa by Kampala - Mombasa road for export, similarly, heavy industrial machinery and petroleum products are transported by Kenya - Uganda railway line and Tororo - Jinja - Kampala road.
- It has promoted industrial growth through accessibility to essential raw materials and finished goods e.g. Water transport on Lake Victoria transports cotton seeds as raw materials from Bukoba port - Port bell in Kampala.
- Transport routes have facilitated the agricultural modernization due to easy distributing and marketing produce and farm inputs for increased production e.g. the Kampala - Mbarara road markets bananas and milk from Masaka, Mbarara and Bushenyi.
- Transport routes have facilitated domestic trade (internal trade) by linking the producers to the consumers leading to local revenue. For example industrial manufactured goods from Kampala and Jinja are transported to Kasese and Kabarole by Kasese – Kampala road.
- Transport routes have facilitated the exploitation of forest resources by accessing forests for felling and production of timber in remote areas. For example timber from Budongo forests in Masindi is being exploited using Masindi - Kampala road
- Transport routes have facilitated the development of mining activities by accessing minerals for extraction and processing like Limestone in Tororo is mined and transported to Kampala along Tororo - Kampala road.
- Transport routes have stimulated the growth of urban centers, ports and landing sites due to increased working population for socio – economic services like education, health services, banking services, security as well as trade and commerce. For example Wandegeya suburb, Makerere University and Mulago Referral hospital in Kampala are located along Kampala -Bombo road due to skilled manpower.
- Transport routes have promoted regional understanding as communities / people of different localities interact with each other through the spread of new ideas and technology. E.g. many schools are along Kampala – Mpigi - Masaka - Mbarara road such as Trinity College Nabingo, St. Lawrence Citizens' high School, King's College Buddo, Masaka Secondary school, St. Charles Kasasa and many others due to easy accessibility for educational skills.
- Transport has promoted tourism along water bodies, roads and by air by easily accessing tourist attractions in their localities for pleasure and curosity. E.g. on Lake Victoria, boats and ships carry tourists via PortBell - Ssese Islands in Kalangala to watch wild life and enjoy Lake breezes.
- Transport routes have promoted international mutual understanding and cooperation between Uganda and her neighbours particularly Kenya and Tanzania and Rwanda due to link ups for foreign assistance and trade. E.g. Port Bell – Kisumu water route on L.Victoria, the Mombasa – Kisumu – Tororo rail route and Mombasa – Nairobi – Tororo road between Uganda and Kenya.
- Transport sector has created employment opportunities to the local people through transport operations which make them to earn income leading to improved standards of living like captains, along Nakiwogo - Kalangala water route on L. Victoria.
- Transport sector has generated revenue to government through levying taxes and issuing operating licenses resulting into setting up socio – economic infrastructures like Pioneer buses on Kampala – Port Bell road and Friendship taxis on Kampala – Entebbe road.
- Transport sector has earned foreign exchange to Ugandan government through incoming foreign goods and custom duties leading to provision of socio – economic services like via Nairobi - Malaba and Busia road points from Kenya and via UAE - Entebbe international air route from China and Japan.
- Transport sector has encouraged diversification of Uganda's economy rather than reliance on agriculture only for more jobs and revenue like at Malaba and Busia border along Nairobi – Kampala road and Kasenyi - Kalangala water route in Entebbe on L. Victoria.
- Transport sector has led to opening up of remote areas by linking them up urban areas for development of trade and commerce like Ssese Islands in Kalangala on L. Victoria using Port Bell - Kalangala water route to Kampala city.
- Transport routes have helped in labour mobility from one area to another leading to provision of cheap skilled and semi skilled man power in different sectors leading to increased efficiency like Jinja – Kampala road from Mukono to Nakawa industrial area.
- Transport routes have led to the development of research and technological advancement by importing computer technology and vehicles leading to increased productivity and efficiency like smart phones and computers via U.S.A and China - Entebbe international air route.
- Transport routes have stimulated building and construction sector through constructing transport routes leading to infrastructural development like Ziwa construction on Kibuye – Nateete road, and Egyptian ship co. in Jinja for Masese – Buvuma Islands water way on L. Victoria.

- Transport routes have led to growth of roadside businesses like floriculture, petroleum stations, welding, washing bays, lodges, motor garages and food markets which have created more job opportunities to locals resulting into more incomes like Bwayise motor garages and Kawempe market in Kampala along Kampala – Bombo road.

Negative importance

- Transport routes have led to displacement of people due to construction and expansion from their land with little or no compensation leading to poor standards of living and homeless like Kampala Northern by-pass road at Bweyogerere, Bwayise and Kawaala in Kampala.
- Transport routes have led to cutting down of some parts of forests during construction and expansion leading to reduced rainfall / desertification like construction of Kampala - Jinja road led to clearance of part of Mabira forest in Buyikwe.
- Transport routes have led to high Government expenditure as construction and maintenance is costly and expensive resulting into strain on the National budget. For example a Kilometre tarmac road from Kibuye to Nateete road in Kampala was worth 1.5 billion shs.
- Transport routes have led to flooding due to use of tarmac in road construction leading to death of some people and slow down in traffic causing delays during the rainy season like Kampala Northern by-pass has increased flooding at Bwaise and Kalerwe in Kampala.
- Transport routes have led to destruction of wetlands and habitant for wild animals during construction and expansion leading to ecological problems and death of wild game like Kampala - Masaka road led to destruction of Busega in Kampala and Nabuguzi wetlands in Masaka.
- Transport routes are associated with atmospheric pollution in form of air, noise, land, dust and water due to smoke from locomotives, sound from automobiles, oil spills and motor scraps, loose surface and murram roads leading to acidic rains, global warming, hearing defects, low soil productivity, respiratory diseases and death to aquatic life. For example Nabagereka loose surface road in Entebbe with dust whenever vehicles use it.
- Transport routes are associated with accidents due to careless driving and dangerous mechanical conditions which have led to loss of lives and property or permanent impairment like along Kampala - Jinja road, accidents are common in Buyikwe.
- Transport routes have led to the spread of urban associated social evils due to over population and high rate of unemployment leading to insecurity such as prostitution, robbery, slum development, congestion and immorality like on Nakiwogo – Ssese Isands water routes on L. Victoria and at Bwayise along Kampala – Bombo road in Kampala.
- Transport facilities has facilitated smuggling of valuable goods to her neighbouring countries of Kenya, T.Z and DRC as well as overseas leading to loss of revenue got from taxes like fish, sand and timber are smuggled to Tanzania and Kenya through Ssese Islands - Port Bukoba and Kisumu port on Lake Victoria in Kalangala.
- Transport routes have led to regional imbalance due to their over concentration in certain areas than others resulting into backwardness and less development like Kampala with Port Bell – Buvuma Islands water route, than Kayunge and Nakasongola with less.

ROAD AND RAILWAY TRANSPORT SECTOR

PROBLEMS FACING THE DEVELOPMENT OF ROAD AND RAILWAY TRANSPORT

The problems limiting the development of road and railway transport in Uganda are;

- There is inadequate capital which has led to low investment in construction and maintenance of various transport routes and facilities. For example the cost of constructing a kilometer of tarmac road is high resulting into slow down in completion of Entebbe - Kampala Expressway.
- There is irrelevant local technology used in the construction and maintenance of transport routes which has led to the poor quality transport network and use of expensive foreign technology from foreign companies from China, Yugoslavia and Nigeria like Kampala - Jinja road.
- There is inadequate knowledge and educational skills / limited skilled labour about construction of standard roads and railway lines which has resulted into short lasting roads and railway lines as well as poor maintenance and repairment of railway engines and traffic lights like Kampala – Port Bell rail line.
- There are political insurgences, insecurities and conflicts which have prevented the application of long term planning and investment as well as leading to destruction of existence of transport routes. For example the LRA rebel activities from 1986 – 2006 paralyzed the Kumi - Lira - Gulu - Pakwach rail line and maintenance of Gulu – Lira - Soroti road.
- There are thick papyruses and forests that have made development of roads and railways lines costly and expensive leading to remoteness like Kampala – Entebbe Expressway has been constructed through Busega swamps with soft landscape and thick papyrus.
- There was the collapse of East African railway cooperation which reduced Uganda's ability to maintain railway transport as she was benefiting from the unified railway transport system because there were lower costs of maintenance, experienced engineers, and adequate wagons for transport purposes within East Africa via Mombasa – Tororo rail line.
- There is negative attitude by the local people and negligent by the previous regimes towards construction and rehabilitation transport routes which has led to low investment and poor maintenance like Soroti - Moroto – Kaabong road is in murram nature than tarmac as well as Kampala – Kasese rail line due to negligence by the NRA and NRM governments.
- There are steep slopes in the highland regions which have hindered the development of roads and railway lines as it's too expensive and costly to construct a road and practically impossible to construct a railway like Kabale - Katuna road in Kabale and Kasese – Fort Portal railway in Kasese were very hard and expensive because of the of Kigezi and Rwenzori steep slopes respectively.
- There are very heavy rains accompanied by high rate of erosion and flooding have led to destruction of roads and railways. For example heavy rainfalls with flooding destroy and block Mbale – Soroti road and Kampala – Luzira road.
- There are poorly drained and impeded drainage areas along river banks, lakeshores and swamps that have made development of roads and railways difficult and costly e.g. areas around L. Kyoga have few transport routes like Kayunga – Mukono road and Lwampanga – Nakasongola road.
- There are pests and diseases which have also hindered the development of the transport sector leading to inaccessibility like Masindi - Hoima road is poor state partly because the area is infested with tsetse flies.

- There is limited local cooperation in some areas which has limited construction and renovation of the roads and railways. For example Kaabong – Mororto road constructions is threatened by hostilities from the Karamajong warriors, theft and vandalisation of Kampala - Nalukolongo railway slippers in Kampala have limited railway transport.
- There are limited relevant spare parts of transport vessels for repairing and modifications like cars, lorries, buses, rail wagons and others. For example, the defunct Uganda Transport Company (UTC) failed to operate efficiently due to lack of spare parts to maintain the buses which later led to closure of the company.
- There is continuous embezzlement and mismanagement of government funds and public transport services which has limited development of road and railway transport. For example Mukono – Katosi road delayed in construction because of corruption and embezzlement of funds by Ministry officials
- There are constantly rising fuel costs which have limited use of road and railway transport leading to exploitation of passengers. E.g. drivers on Kampala - Jinja road and Kampala - Masaka - Mbarara road almost charge any transport fares depending on the fuel costs.
- There is massive bribery cases by the traffic police and forgery of driving licenses in URA departments which has led to careless driving and an increase in road accidents on Kampala – Jinja road and Kampala - Masaka road.
- There is shortage of genuine materials like presence of counterfeit bitumen on the market used in road construction which has led to poor road construction and short lived roads like Kampala – Fort Portal road, Kampala – Masaka road and many others.
- There was closure of the Kilembe copper mines which left little economic activities to be transported along the western Kampala - Kasese rail line and also decline of cotton production due to closure of the Lira spinning mill left the northern Jinja – Soroti – Lira – Gulu - Pakwach rail route idle which has limited effective use of railway transport.
- Railway transport is suffering from stiff competition of faster, convenient, reliable and more flexible means of transport especially road which has retarded its development like many traders of Kampala and Jinja prefer using the Mombasa - Kampala road other than the slow and inconvenient Mombasa - Kampala railway line.

STEPS BEING TAKEN TO DEVELOP ROAD AND RAILWAY TRANSPORT

The following are the measures being taken to develop road and railway transport in Uganda;

- The Ministry of Works, Transport and Communication under Uganda National Roads Authority (UNRA) is constructing more roads as well as maintaining the existing ones like gravel roads have been upgraded to tarmac such as Soroti – Lira road and Tororo - Mbale by UNRA as well as a Standard Gauge Railway is underway.
- The government is constructing more sub - roads, by - passes and high - ways to reduce traffic and remoteness like Kampala – Entebbe high ways, Kampala Northern by-pass road from Bweyogerere to Busega and others.
- The government is attracting foreign firms to invest in the transport network construction so as to improve the quality and durability like Energo project from Yugoslavia has constructed Kampala – Gayaza and Reynolds construction Ltd from Nigeria is constructing Kampala - Masaka – Mbarara road.
- The Ministry of Works is widening truck roads especially along black spots of road corners to reduce on road accidents like along Kampala - Jinja road in Mabira forests, Kampala - Masaka road in Lwera swamp, etc.
- The government is encouraging local construction companies into road construction to reduce on traffic jam like Zzimwe Construction Company was tendered to construct Kampala – Nateete sub road in Kampala.
- The government is privatizing and liberalising the transport industry through selling government transport companies such as Uganda Transport Company to encourage private bus companies such as Link, Trinity and Global coaches that run the bus business along Kampala – Kabale road and Kampala – Kasese road.
- There is training of more skilled manpower in form of civil engineers from Makerere University, China, Korea, Italy and Japan to construct and maintain durable and quality roads like Kampala – Mityana road, Kampala – Entebbe high way and others.
- The Ministry of Works, Transport and communication is providing graders and bulldozers to all local governments in every district to repair, maintain and construct feeder roads like Kampala Capital City Authority upgrades and rehabilitates roads in Kampala district such as Rubaga and Namirembe road.
- The central government is acquiring and borrowing capital in form of loans from the World Bank, African Development Bank and international agencies to construct and upgrade roads and rail lines e.g. the funds that constructed the Kampala Northern by pass were got from the European Union.
- The Ministry of Works is constructing humps, climbing lanes and speed signs along truck roads so as to prevent road accidents like UNRA constructed humps at Nsangi and climbing lanes at Nabbingo and Nsangi corners along Kampala - Masaka road and humps along Kampala - Nateete road.
- The Uganda police are providing more traffic police officers and deployed them on main roads to reduce road accidents, remove vehicles in poor mechanical conditions on the road like along Kampala - Masaka road, Kampala – Jinja.
- MOW in conjunction with UPF is managing vehicle mechanical conditions so as to assess the conditions before allowed on roads for instance Nagulu Motor Assessment Centre in Kampala where vehicles are checked before being used on roads like on Kampala - Jinja road.
- The Ministry of Works is setting up an independent department to process and issue computerized driving permit in every region of Uganda like at Kyambogo in Kampala and other parts of the country.
- The Ministry of Works is contracting a private company known as Safe Drive Uganda (SDU) to inspect and test the mechanical conditions of all vehicles with inspection centres at Nabbingo along Kampala – Masaka road, at Kawanda along Kampala – Bombo road, at Namanve along Kamplala – Jinja road, at Namulanda along Kampala – Entebbe road and others in Mbale, Gulu and Mbarara.
- The government is fighting against political insurgencies and highway robbery through deploying the UDPF army in war tone zones to ensure the safety of the passengers and goods like Mt. Rwenzori region in Kasese and police patrol vehicles along high ways like Kampala - Gulu road and Kasese - Bundibugyo road
- Uganda Police traffic department is installing police check points on every main track road to control high way robbery, verify valid driving permits, arresting and penalizing drinking and over speeding drivers like along Kampala - Jinja road, Kampala – Mbarara road and Kampala – Bombo road
- The MOW is importing modern technology such as graders, caterpillars and bulldozers from Japan and China to construct, maintain and repair roads like Kampala - Masaka road, Jinja – Iganga road, etc.

- The government is attracting both foreigners and local investors to exploit transport resources that are used for road and railway construction like on Kampala Northern Bypass. For example limestone at Tororo and Sironko is mined by Indians (Tororo Cement Company); granites at Mukono, Kawempe and Mbarara are quarried by ROKO Construction Company, Sterling and local investors such as Mukalazi works.
- Urban authorities like Kampala Capital City Authority, Mbale and Wakiso town councils are giving out taxi park tenders to Taxi operators like UTODA and Pioneer to manage small passenger vans or taxis within districts and outside which distribute taxi services on every road for effective transportation of passengers such as Kampala – Port Bell road.
- Ministry of works and urban authorities are turning some roads as one way routes in central business centres so as to reduce congestion like Kampala Capital City Authority turned Nkurumah and Nasser roads.
- Ministry of works and urban authorities are installing street lights and traffic lights along major roads and junctions to control traffic for better use of the roads like along Kampala – Jinja road and Kampala – Entebbe road.
- Government in joint venture with other East African countries is agreeing to revive and rebuild the East African railway as Standard Gauge Railway from Mombasa via Uganda to Rwanda and South Sudan to ease internal and external trade.

WATER TRANSPORT

REASONS WHY WATER TRANSPORT IS NOT WELL DEVELOPED IN UGANDA

The following are the reasons that have limited water transport in Uganda:

Physical factors:

- Presence of dense water hyacinth which has limited use of weak boats such as Canoes as they create a barrier across like on Lake Victoria at Port Bell in Kampala and Kyoga at Lwampanga in Nakasongola.
- Existence of dense papyrus and marsh swamp vegetation along the river courses and around shores of major lakes has limited accessibility to water bodies as well as development of landing sites like at Ggaba and Munyonyo Swamps in Kampala limit easy access to Lake Victoria.
- Presence of sharp waterfalls and rapids along major rivers which have made boats and ships enable to cross those points difficult like on Victoria Nile with Bujagali in Jinja and Murchison falls in Buliisa
- Some Lakes are experience strong winds that cause strong waves and consequently accidents, which claim people's lives and destroy property like Lake Kyoga is affected by the North and the South East Trade winds which are more dangerous via Lwampanga – Masindi port.
- Existence of large out crop rocks and stumps have limited development of water transport as these rocks submerge leading to accidents once they are knocked by boats and ships like Lake Victoria around Ssese islands in Kalangala and at Kasenyi landing site in Wakiso.
- Some lakes are home of large harmful wild animals like hippos, crocodiles and snakes that are a major threat to sailing passengers like on L. Edward – George and Kazinga channel in Rubirizi and Kasese and on L. Victoria in Mayuge and Bugiri.
- Some Lakes and rivers are very shallow which disable sailing of big and heavy boats / ships like L. Kyoga is approximately 8 -16 metres deep, Lake George is 3 metres deep, River Ssezibwa and Mayanja are also shallow, etc.
- Some rivers are very narrow and therefore have failed for use of vibrant water transport such as River Katonga in Masaka and some sections of the Victoria Nile in Jinja and Kayunga.
- Occurrence of prolonged drought due to climatic changes which has led to the reduction in water levels of some lakes and rivers thereby limiting water transport like Lake Wamala in Mubende and Bisina in Kumi are innavigable and unsafe during periods of drought.
- Some rivers have strong currents, fast and speedy flow of waters which makes boarding and stopping of boats difficult like on Victoria Nile via Jinja - Kayunga to Lake Kyoga.
- Some river banks and lake shores have steep landscape which limit the navigation and construction of landing ports / sites for water transport like Lake Albert within the Western rift valley in Buliisa and Hoima.
- Existence of dangerous pests on the river banks and lake shoes has scared use for water transport like R. Manafwa in Mbale with black flies for river blindness and L. Victoria on Buvuma islands with tsetse flies for sleeping sickness to humans.
- Presence of floating swamp vegetation (sudds) on and across rivers and lakes cover navigable parts as well as limit sailing of boats such as L. Kyoga in Serere and Opeta in Kumi
- Some rivers and lakes are faced with frequent silting due to erosion during the rainy seasons which makes the waters shallow limit sailing and anchoring like Albert Nile in Nebbi and Moyo and L. Victoria at Masese in Jinja.
- Some water bodies are located in remote and inaccessible areas with limited human population and economic activities which has therefore made them rarely used for navigation like Lake Bunyonyi in Kabale, Wamala in Mubende and Mutanda in Kisoro

Other factors:

- There are poorly developed transport links to connect water bodies which limit their navigability like Mpologoma river in Bugiri flows through a vast wetland where there are no roads linking to it.
- There is limited capital which has limited the purchase of modern water transport vessels such as motor boats, ships, engines, life saver jackets leading to use of the slow canoes powered by human energy like via Lwampanga - Bugondo route on Lake Kyoga and via Kasenyi – Ggaba route on L. Victoria.
- There are political insurgencies and insecurity caused by civil war in South Sudan, hostility in Karamoja and ADF rebels in DRC which has limited use of water transport like along the Albert Nile in Moyo, R. Okere in Moroto and L. Albert near Rukwanzi Island in Hoima.
- There is poor state of landing sites as well as poorly equipped port facilities where passengers have to step in water that have limited effective use of water transport like at Kasensero in Rakai and Masese in Jinja on L. Victoria; and Wanseko and Butiaba in Buliisa on L. Albert.
- There is stiff competition from other forms of relatively safer and quick transport means like road which has limited development of water transport like Port Bell – Kisumu water route is outcompeted by Kampala – Busia - Mombasa road.

- There is inadequate skilled man power in form of trained captains, engineers and life savers which has led to inefficiency in handling water transport like Kabalega ship collided with Kaawa ship on Lake Victoria in 2005 because of semi-skilled Captains where Kabalega sank along with its cargo.
- There is continuous construction of dams across rivers which blocks water sailing like Bujjagali in Jinja and Karuma power dam in Kiryandongo along Victoria Nile.
- There are low levels of technology and limited spare parts for making as well as repairing modern ships and boats which has led to usage of poor conditioned vessels and wooded boats like Kasenyi - Ssese islands in Kalangala on L. Victoria.
- There is massive encroachment on swamps, rivers and lakes for farming, settlement and other infrastructures which have reduced water surface for navigable like on L. Victoria at Munyunyo in Kampala.
- There is negative government policy of allocating little funds in water transport sector as L. Victoria has only one major ship, MV Kalangala ship for Kigungu (Nakiwoko port) – Ssese Islands water route.
- Water transport is risky and characterized by terrific accidents which make one hardly to survive leading to low traffic and fear like on Lake Victoria and Lake Albert.

STEPS TAKEN TO DEVELOP WATER TRANSPORT IN UGANDA

Several measures have been put in place to develop water transport in Uganda as follows:

- The Ministry of Works, Transport and Communication has put in place and commissioned ferries which transports people and goods at very low or zero cost like MV Pearl ferry from Bukakata in Masaka - Ssese islands in Kalangala, etc.
- The Ministry of Transport has modernised and expanded ports and piers to avoid people from stepping in water as well as easing the anchoring like Portbell and Ggaba – Buvuma routes in Kampala on L. Victoria, etc.
- The National Environment management Authority (NEMA) and the Ministry of Works have removed the water hyacinth from water bodies using prisoners and other people so as to enable boats use the lakes and rivers effectively for navigation like on Lake Victoria at Portbell and Ggaba in Kampala – Mwanza and Bukoba water routes.
- Fisheries Development Project aided by the African Development Bank has renovated and developed more landing sites and ports along lakeshores and rivers to facilitate water transport like on Lake Kyoga, via Lwampanga – Bukungu water route.
- The Uganda People's Defence Force (UPDF), Marine Police and Maritime Security have provided tight security along water bodies and on every landing site and ports through regular patrols to fight political insurgencies, theft and smuggling like on Lake Victoria, via Kasenyi – Kome Islands water way.
- The Ministry of Transport has constructed new roads and rehabilitated existed linking roads that lead to landing sites and ports so as to create accessibility to water transport like Mukono – Katosi road has been upgrade to tarmac to Katosi landing site – Buvuma Islands way on L. Victoria.
- The Ministry of Works and local traders have imported modern motor boats, engines and spare parts from Japan for better water transport facilities and services which are used on L. Victoria, via Ggaba – Port Bell route.
- There has been construction and building of local wooded boats using local timber on which imported engines are fixed for cheaper sailing locally like via Bukakata landing sites in Masaka – Ssese Islands on L. Victoria.
- The Ministry of Works and Marine police have enforced the use of life saver jackets so as to minimise accidents of drowning after boat and ship capsizing like on Lake Albert, via Wanseko in Buliisa – Muhagi water way.
- The Ministry of Works in conjunction with Ministry of Education has trained manpower through scholarships in oversea countries and locally as marine navigators and marine life savers or water divers so as to control their ferries and ships as well as saving passengers' lives in case of drowning like Port Bell – Ssese Islands water route on Lake Victoria.
- The Ministry of Works has imported more ships and ferries for commercial water transport to the business class like MV Kalangala via Nakiwoko – Ssese Islands on Lake Victoria.
- The government has attracted foreign investors to invest in water transport to overcome capital inadequacy by building and maintaining modern boats and ships like an Egyptian ship workshop at Masese – Kome Islands way on L. Victoria.
- Ministry of Works together with Marine officials are putting in place water signs of danger to avoid rock outcrops, shallow waters and stumps while sailing like via Kasenyi in Wakiso – Buvuma Islands route on L. Victoria.
- Ministry of Works together with Wild Life Authority are allocating wild animals from navigable waters to gazetted areas to overcome the fear and panic of sailors like on L. Edward, via Katwe – Rwenshama water route.

AIR TRANSPORT

Air transport is largely used to carry local passengers, visitors, highly valued goods and urgently needed goods like drugs, flowers, etc within the country and overseas.

However, air transport is still in its infant stages of development due to the fact that it has one international airport at Entebbe.

Besides it, there are several small air strips located in strategic areas handling domestic flights such as Soroti, Kimaka in Jinja, Kololo in Kampala, Kasese, Arua, Moroto, Tororo, Pakwach, Kaunugu and many others.

REASONS FOR THE DECLINE OF AIR TRANSPORT

The following are the factors that have limited the development of air transport in Uganda;

- There was liquidification of Ugandan airlines which was managing air transport on behalf of the government due to limited capital that hindered both domestic and foreign flights like Entebbe – UK and Kasese air routes.
- There is limited capital which has hindered the purchase of aircrafts, the maintain airstrips and the construction of new airports like Entebbe – Ssese Islands air route.

- Air transport particularly Uganda airlines had limited skilled labour in form of pilots, aero - mechanics, accountants and vibrant administrators which limited the running of the air industry thus its collapse for Entebbe – USA air route.
- There is insecurity which scare passengers for flight leading to the decline of air transport like LRA rebel activities stopped Gulu – Entebbe flights and the Karamojong warriors limit Entebbe - Kaabong, Moroto and Kotido air routes.
- There are bilateral restrictions to free market access have led to the decline of air transport like Britain, Kenya, Germany and others tends to restrict aero planes via Entebbe – UK and Germany air routes.
- There is limited market in term of low passenger traffic using air transport which makes the travel and maintainence cost high like Entebbe - Kenya air flight.
- There is poorly developed infrastructure in form of airstrips, airports, run ways and gadgets like radars that limit the detection and monitoring air transport leading to accidents like Entebbe - Kimaka, Moroto, Gulu and Kasese air routes.
- There is stiff competition internally and externally from alternative and cheaper means of transport mainly road that led to low air travels like Entebbe - Kenya air flights are out competed by Kampala – Busia – Nairobi - Mombasa road.
- There is operating old and poor conditioned aircrafts that are noisy and prone to make accidents like Uganda police and the Air force (UPDF) are operating old aircrafts for Entebbe - Somali air routes.
- There is total lack of spare parts which has led to failure for aircraft repairing and maintaining leading to cancelation of flights for Entebbe – Kigali air routes.
- There is serious corruption and embezzlement by the managers, procurement committees, etc of the funds allocated to management of air transport which has limited air flights like Gulu – Kajjansi air routes.
- There is a lot of bureaucracy involved in air travels like getting passport , air ticketing, bookings by foreign companies as well as visa aquisition to certain countires have discouraged people to use air transport like Entebbe – USA and Britian air routes.
- There was general loss of confidence and trust by the public in the sector due to accident leading to reduction of air passenger traffic like Entebbe – Rome air route accident by the Uganda airlines in 1970s.
- There is ever- rising fuel costs on Ugandan fuel market and whole world which has made air transport very expensive and to have small traffic like Entebbe – Juba and Kigali air routes.

STEPS BEING TAKEN TO DEVELOP AIR TRANSPORT IN UGANDA

The following are the measures being taken to develop air transport in Uganda;

- The government of Uganda has liberalised the sector to foreign and local air companies so as to operate air transport for effective air services such as Kenya airways for Entebbe – Nairobi and Mombasa air flights and Eagle airways for Kajjansi – Gulu air routes
- Soroti aero - pilot training school has reinforced to train more pilots and aero – engineers to solve the manpower gap for effective air services for Entebbe – Dodom and Arusha air flights.
- New training craft facilities have been bought for Soroti aero - pilot training school to equip the areo- pilots and aero – engineers more air piloting and mechanical aero skills and knowledge so as to ensure efficiency in air travels like Entebbe – UK air routes
- MOT, MOE together with the UPDF as well as private airlines have sent competent candidates to Kenya, USA, Cuba and Russia for advanced training in air piloting and mechanical aero skills for effective air services like for Entebbe – Cairo and Johannesburg air flights.
- New airstrips have been constructed and developed near urban centres and in resource potential areas to ease air transport like Kajjansi air strip near Kampala for internal travel such as Kajjansi – Kanungu air routes and many others.
- The government through MOW has formed a private body, Civil Aviation Authority (CAA) based at Entebbe international airport, to monitor, regulate, recruit and also train labour locally to handle both internal and external air flights like Entebbe – London and Dubai air routes.
- The MOW and CAA have rehabilitated the old airport at Entebbe as well as built and expanded Entebbe international airport to more international standards for high passenger traffic and larger cargo like Entebbe – Somali and Dar – es – Salaam air routes.
- CAA has improved cargo and passenger handling through forming ENHAS (Entebbe handling services) at Entebbe airport which handles and stores cargo both imports and exports via Entebbe – Nairobi and Dubai air travels.
- The government through UPDF with help of local trained security personnel has tried to improve political stability in different parts of the country by fighting rebels as well as ensuring security at air strips in those areas for Entebbe – Kasese and Gulu air travels.
- Private aircraft companies like British airways, Brussels airways, Ethiopian airline and Emirates airlines have hired foreign skilled manpower from Germany, USA, UK, South Africa, Kenya and other countries to run the air services in Uganda for excellent air travels like Entebbe – Britain and UAE air flights.
- Private aircraft companies have purchased and imported smaller and less expensive aircrafts which mainly operate on domestic flights in Uganda for easy and quick movements such as Eagle airlines at Kajjansi for Kajjansi – Lira and Soroti air routes.
- The government in parthership with the Chinese government has underplans to import on loan new 4 aircrafts for both passenger and cargo flights mainly on international level so as to revive the national airlines like Entebbe – Shangai, Tokyo and Dubai air travels.
- Etc.

Sample Questions:

1. With reference to specific examples account for the distribution of transport routes in Uganda.
2. To what extent have the distribution of the road transport network been influenced by physical factors?
3. Discuss the role of transport routes in the economic development of Uganda.
4. Examine the problems facing the development of road and railway transport in Uganda.
5. Explain the steps being taken to develop the road and railway transport in Uganda.
6. Account for the low level of development of air transport in Uganda.
7. To what extent have physical factors limited the development of water transport in Uganda?

8. Discuss the role of external trade /internal trade/ economic integration in the economic development of Uganda.
9. Account for the growth and development of external trade /internal trade/ economic integration in Uganda.

Sample Approaches:

Candidates are expected to;

- Define the key word (s) in the question.
- Cite out the status / stand/ situation (+ve / -ve) of the major sector.
- Identify, describe and locate of the sub – sectors of the major sector in Uganda.
- Draw a sketch map showing the sub – sectors of the major sector with name of places.
- State, explain and then illustrate the how far (the extent to which) are the physical factors responsible for in relation to the sub – sectors of the major sector.
- Finally state, explain and then illustrate the however side of the other factors responsible for in relation to the sub – sectors of the major sector in Uganda besides physical factors.

OR

- State, explain and then illustrate the points (both positive and negative contribution / physical and human factors) in relation to the sub – sectors of the major sector in Uganda.

ENERGY AND POWER RESOURCES IN UGANDA

Energy resources are the resources, which are used to provide heat, light and motion power such as running water, biogas, petroleum, wind, natural gas, sunshine (solar), firewood, etc.

STATUS OF THE ENERGY SECTOR IN UGANDA

The following is the status of the energy (power) sector in Uganda;

~It's poorly developed with bio mass like fuel wood and charcoal, etc being the most widely used form of energy constituting over 92% of total energy needs.
~Petroleum energy is the second most important source of energy making about 6%.
~H.E.P constitutes 1%.
~And other energy sources like solar, biogas, etc contributes to 1%.
~Petroleum energy is characterized by frequent scarcity leading to high price fluctuation.
~Less hydro electricity is generated at Nalubaale and Kiira power stations in Jinja.
~New power station has been completed at Bujjagali power station in Jinja for 250MW capacity.
~New proposal for the set up of Karuma power dam in Kiryandondo for 600MW capacity is done and construction is on and Isimba power dam in Kayunga.
~Hydro electricity is mostly urban centre based with few rural areas utilizing it.
~Hydro electricity is characterized by load shedding in major towns like Kampala, Jinja, etc.
~Rural electrification is increasingly being done by the government.
~Other forms of energy being developed are still at a low stage and these are solar, liquid gas petroleum, biogas and others.
~Out of a total population of 35 million only 4.5 million people have access to hydro electricity by UMEME.
~Largest solar energy plant in Soroti producing 2 Mw capacity.
~New solar plant in Gomba at Kabulasoke for 20 MG.

THE MAJOR FORMS OF ENERGY RESOURCES

The major forms of energy used in Uganda are as follows;

~Fuel wood and charcoal from forests like Mabira in Buyikwe, Budongo in Masindi, Ssese islands in Kalangala, etc.
~Hydro electric power generated from Bujjagali, Nalubaale and Kiira power stations at Jinja and sold by UMEME Ltd, Mubuku in Kasese, Nyagak in Zombo, etc.
~Petroleum energy still imported is widely in Kampala, Jinja, Mbarara, etc.
~Petroleum deposits and natural gas around L. Albertine basin in Buliisa and Hoima, Semliki basin in Ntoroto, Rhino camp Valley in Amuru, etc.
~Thermal energy generated at Lugogo in Kampala and Jinja by Agrekko power Generation Company.
~Biogas energy from cow dung in Pastoral areas like Mbarara, Soroti, etc.
~ Abundant Solar energy from sunshine mostly used in Kampala, Wakiso, etc.
~Liquid petroleum gas (LPG) delivered by Shell, Caltex Total and Kobil petrol stations such as Kampala, Jinja, Mbarara, etc..
~Potential geo - thermal energy from hot springs and geysers at Sempaya and Rwangimba in Bundibugyo, and at Kitagati in Bushenyi, Kibiro in Hoima, etc.
~Biomas energy from agricultural husks such as coffee in Mbale and Wakiso; G.nuts in Soroti and Arua; rice in Dokolo (Lira); wood in Kampala, Mbale and Kasese, etc.
~Wind energy from N.E trade winds in Kaabong, Moroto, Kitgum, etc.

A SKETCH MAP OF UGANDA SHOWING THE DISTRIBUTION OF ENERGY RESOURCES.

FULL PAGE

A. HYDRO ELECTRICITY POWER

Uganda's hydro electricity power potential exists at Owen falls dam and Bujagaali falls in Jinja along Victoria Nile; Murchison falls and Karuma falls in Masindi along Victoria Nile; Sippi falls in Kapchorwa along R. Sippi; Maziba in Kabale; Sebwe and Nyamwamba rivers from Mt. Rwenzori; and others.

1. Owen Falls Dam Power Station (Nalubaale).

It was the first and most important power scheme in Uganda. It was started in 1943 and came into operation in 1954. Its initial cost, worth 260 million, was contributed by Britain and other European countries and repayment has been done over years. Its development was in phases until 1968 when all the ten generating sets were operational each producing 15 mega watts, a total of 150 mega watts. However, the station has capacity of generating up to 21OMW of electricity

In the recent years, attempts have been made to expand the capacity of this scheme to 180 MW. Another power station (2012) has been constructed north of the Owen falls dam at Bujagali falls to produce a capacity of 250MW.

The Owen falls dam was not only favoured by the physical factors for its development but also other factors like the great demand for electricity in Uganda.

These factors are:

- Presence of the steep river bank which resulted from either river rejuvenation or formation of a gorge where L.Victoria was captured from the north thus an outlet called Victoria Nile.
- The presence of the water falls and rapids along Victoria Nile which formed a band of resistance rocks suitable for dam construction.
- The availability of constant supply of water from L. Victoria which acts as a natural reservoir for the construction of dam.
- Owen falls was located in an equatorial climatic region which receives heavy rainfall of over 1500mm which is an important pre-liquisite in power generation.
- The presence of a band of hard resistant rocks in the river which made it easy for the construction of the dam due to the strong and firm foundation.
- Availability of well developed transport network of a railway line from Mombasa - Jinja and the improved road network which all eased the movement of construction machinery and materials to the site.
- Presence of skilled labour force which was imported from UK because of the influence of the British colonial government.
- The availability of adequate capital also from the colonial government of worth £260 million.
- Great demand of power for industrialization, urbanization, natural resource exploitation, domestic use, environment protection, etc.

VALUES OF THE OWEN FALLS DAM POWER STATION

Positive value:

- After its completion, it facilitated the growth and development of industries. The first industries such as copper smelters, Southern range Nyanza textiles, steel rolling mills, Chillington Company, etc in Uganda were established at Jinja due to presence of hydroelectricity. Other industries developed in other towns like Mbale, Kampala, Tororo, etc.
- The development of Owen falls dam saved Uganda's valuable foreign exchange which was used to import large quantities of petroleum products and even pay the importation bills of power consumed without HEP in homes, industries like Uganda Baati steel rolling mill and thermal power stations in Arua. It's estimated that one turbine alternator saves over 400 tons of oil per year.
- The HEP at Owen falls dam is also exported to the neighboring countries e.g. Kenya and Rwanda which has earned Uganda valuable foreign exchange.
- The process of exportation of power to Tanzania, Kenya and Rwanda has promoted regional understanding between Uganda and her neighbours as well as promoting international relations with other countries such as Britain, Denmark, USA, which funded the construction work.
- The generation of HEP at Owen falls dam has indirectly reduced on environmental degradation where the demand for charcoal and firewood in urban and rural areas from Mabira forests, South Busoga forests and others has continually reduced.
- The station has provided cheap power to many Ugandans which is used in lighting, cooking, refrigeration and other domestic use in towns of Jinja, Kampala, Mukono, etc. E.g. in Kampala, its used in lighting homes in Kololo, Nateete, street lights on Kampala road, heating, medical operations in Mulago hospital, academic operations like computers and photocopiers at City house, etc.
- The Owen falls dam project has in turn acted as a tourist attraction to students from secondary schools and higher institutes of learning for geographical and research studies.
- The construction of the Owen falls dam facilitated the construction of a road to join Njeru and Jinja which formally never existed.
- It provided employement opportunities to many people such as the skilled foreigners from Britian and Israel and the unskilled who were the local people forn Jinja.
- It facilitated the growth of towns mainly Jinja and Njeru towns. For example Njeru town and Mbikko trading centre as well as Jinja town have grown up just next to the Nalubaale power station by providing accommodation facilities to passengers, tourists and promote trade and commerce.
- The Nalubaale power station opened up a new chapter for comprehensive planning and long - term investment in Uganda. Tertiary industries for example Vermiculite mining in Mbale was only possible due to presence of electricity from the power station in Jinja.

Some shortcomings are:

- Disturbance of wildlife and destruction of scenic beauty along the Ripon falls where the power station was constructed. Aquatic life such as fish, hippos, and crocodiles cannot pass via the turbines to cross to the other end of the river. The Rapids and Ripon falls got submerged when the dam was constructed.
- Uganda entered a contract to supply electricity to Kenya for 50 years as a way of servicing the loan which was used to construct the power station. However, the electricity is supplied at a price only favourable to Kenya than to Ugandans. Changes in the foreign currency exchange rate seriously affect the contract and Uganda is always losing, because the initial fixed price is always considered.
- Generally, less revenue is obtained from the sale of electricity in the country. Tariffs were imposed on power as a way of attracting foreign investors in order to stimulate industrial growth. For example in 1966, small non-industrial consumers used 19% of the total units generated and yet their payment amounted to 52% of the total revenue collection.
- There has been frequent rising of electricity tariffs leading to consumer exploitation. For example by 2001 tariffs for large industries were Shs 104 per unit and rose to Shs 187 by 2007; for small industries have shot up to Shs 369.8 from 171.6 while domestic users pay the more. Their tariffs rose from Shs 189.8 in 2001 to Shs 426 per unit by 2007. Hence small consumers in towns like Kampala pay much money than big ones.
- The electricity generated from the power station has not directly benefited most of the indigenous Ugandans. Only about 10% have access to the electricity because the majorityare poor and cannot afford to get connected and pay the electricity bills. Even in Jinja where power is generated, there are people who have never used electricity.
- The UMEME, which is in charge of collecting revenue from power consumers is incompetent to collect adequate revenue from the electricity sales.There are many defaulters in Seeta, Mengo - Kisenyi, Katwe suburbs, Masaka, etc. which has led to loss of government revenue.
- There are many illegal consumers and besides some of the UMEME officials are corrupt and facilitate illegal electric connections in Mengo, Katwe, etc. The power station is therefore contributing less to the National economy.
- Electricity generated from the power station is risky and has led to loss of man's life in Kampala and Jinja. The hanging live and exposed transmission lines usually break due to short circuits or great tension, fall and electrocute the surrounding animal life to death. Flying birds and mammals such as Marabou storks and bats in Kampala are usually electrocuted to death once they step on the live wires.

- There has been limited spare parts and inadequate maintenance due to lack of skilled personnel to operate the power station which has led to a decrease in power output. Most of the alternating turbines had stopped operating due to lack of appropriate spare parts in the country.
- Nalubaale power station is a drain to the national budget. Large sums of capital have to be spent on maintenance of Owen falls dam and expansion of it to set up Kiira power station yet the power output has kept on decreasing.
- Regional imbalance in out of reach in electricity transmission and connections like Kaabong
- Displacement of people in Jinja near Bujjagali power dam and in Kiryandongo near Karuma falls
- Profit repatriation by UMEME to South Africa

OTHER HYDRO ELECTRICITY POWER STATION IN UGANDA

2.Mubuku power station; this was constructed as part of Kilembe copper miner to supply power to the mines and the neigbouring regions like Hima cement factory. It's located on R. Mubuku (Sebwe) on the foot hills of Mt. Rwenzori generating a capacity of 5-6 mega watts. Currently, a second HEP station (Mubuku II) was built to generate 10 mw by Kasese cobalt industry.

3.Bujjagali on Victoria Nile in Jinja

4. Nyagak in Zombo

5. Kabalega in Hoima

6. Mpanga in Kamwenga

7. Karuma power dam in Kiryandongo and Isimba power dam in Kayunga (under construction).

B. SOLAR ENERGY

One of the most potential sources of energy in Uganda is sun, since Ugandan lies astride the equator. It receives large and steady amounts of solar energy throughout the years. There is a great potential for harvesting solar energy for Photo Voltaic Thermal Applications producing power in areas located off the national electric power grid and other uses.

The main users of solar energy in Uganda are; health centres for lightening and vaccine refrigeration, Uganda Railway Corporation, Uganda Telecommunications Ltd and other Non Governmental Organisations. It is also used in the tourism industries in and around national parks and game reserves for Photo voltaic systems as well as few homesteads.

C. WOOD AND CHARCOAL FUEL

In Uganda, fire wood and charcoal represents the widest form of energy used especially in rural areas. They constitute 95% of the total energy consumed in Uganda. Forests and woodlands are the main sources of wood and charcoal. Fire wood is mainly used in rural areas while charcoal in urban areas. Charcoal industries are increasingly developing to meet the domestic and industrial demands.

D. BIO -GAS

Although on a small scale, a number of private owned bio gas plants are in existence which is based in the cattle rearing areas of Uganda where cow dung is used as the raw material like in Mbarara, Kampala, Soroti, etc.

E. BIO - MASS

In Uganda, this form of energy has developed in the tobacco growing areas with the assistance of BAT Co. it is derived from coffee husks, G. nut husks, wood saw dust, rice husks, tobacco wastes and plant wastes. Bio mass is used in drying fish on fishing grounds like Ssese islands, burning tiles and bricks at Kajjansi clay factories, drying tea leaves in tea factories like at Kasaku in Mukono and Toro region, drying toboacco leaves in West Nile as well as in households on improved saver stoves.

F. GEO THERMAL ENERGY

Geo thermal energy is continuously being generated. It is created by the flow of heat from the earth's core. It is associated with areas of earth quarreled and volcanic activities. It is seen in the natural hot water of hot springs and the geysers of Uganda especially in south western Uganda. The most outstanding areas with geo thermal energy are at Sempaya and Rwagimba in Toro region, Kibiro near Lake Albert, Kitagata in Bushenyi, Kisizi in Rukungiri, Kihangoro and Buranga in Kasese and other minor areas in Kigezi, Bunyoro, Toro and West Nile. It is estimated that their energy potential is 450 Mega watts.

G. PETROLEUM

All the natural petroleum requirements of Uganda are just imported, petroleum accounts for about 70% of the commercial energy supply. It is used in industries, agriculture, transport and domestic uses like cooking, lighting, refrigeration, heating, etc. Towns of Uganda with no HEP, have their own diesel generator stations e.g. Moroto, Arua, Kotido, and Kapchorwa. Of recent Kampala district and its neighbors have also got diesel generator stationed at Lugogo and Nalukolongo.

The presence of large amounts of oil deposits in Semliki valley, Lake Albert basin, Rhino camp basin along Albert Nile and other areas in Western rift valley have been revealed by the Tullow oil Co. from UK, Neptune Petroleum Co. from London, Dominion petroleum from UK and others ensures that in few years Uganda will be producing its own petroleum.

H. WIND ENERGY

Uganda has a high potential of generating wind energy. Wind energy can only be generated on a fairly flat landscape with strong winds. Districts like Kaabong, Moroto, Kotido, Nakapiripiriti, Kitgum and Katakwi are with these conditions. This energy can be used in pumping water and milling grains. In Karamoja, wind mills were installed for pumping water but out of the 12 only 6 are still in operation.

REASONS FOR THE LOW DEVELOPMENT OF ENERGY RESOURCES IN UGANDA

Although Uganda has a great potential of energy resources from her natural resources like waterfalls, forests, plenty of sunshine, oil deposits, wind, and others; low levels of exploitation have been attained. This has been attributed to;

- Uganda is as an agricultural state that is unable to raise adequate money needed to build dams, buy turbines, power generators, building transmission stations and other expenses of exploitation of energy resources. Furthermore the shortage of capital in Uganda is seen through government attracting private foreign investors to engage in power generation e.g. the UMEME Power Company from South Africa is running former Uganda Electricity Board, etc and even the few dams and power stations in Uganda such as the Owen falls dam and Mubuku and Kikagati power stations were constructed by the British government as foreign Aid which have all led to low development of energy in Uganda.
- Uganda lacks adequate skilled labour needed in the development of energy resources in form of engineers, technicians, builders, astrologists and others. This can be evidenced when the government attracts the ESCOM in the rehabilitation of the Owen fall dam and construction of Kiira power dam and even the construction of Kiira dam parallel to Nalubaale dam was not practical thus leading to reduction of water level in lake Victoria. There is also limited skilled labour to plan and install new forms of energy such as solar, nuclear, and geo thermal.
- Uganda lacks modern technology and technical knowledge to develop its energy resources, HEP and solar energy depend on technological advancements which are brought from the developed countries such as USA, China, Britain, etc. More still the oil drilling in Semliki valley and L. Albert basin was been delayed due to lack of oil drilling machinery in Uganda. Most of the energy tools and equipment such as bulbs, sockets, plugs, wires, etc are still imported and at a high cost from countries like Britain, Hong Kong, China, etc. Resistance of environmental

conservationists has also led to the low levels of development of energy resources.

- The conservationists since 1970's refused the establishment of an HEP power station on Murchison and Karuma falls that the wildlife and beautiful scenery in the Murchison falls National Park will be affected and other reasons. More still in early 2000's, there was also a resistance from Busoga cultural leaders and the tourist industry to the construction of HEP scheme at Bujagaali falls in Jinja that will destroy the scenic beauty, disturb wildlife and the local cultural spirits of the Basoga community.
- Uganda is still in its young stages of industrialization and most of the industries are concentrated in Kampala, Jinja and other few towns which need little power supply, so the low levels of industrialization in Uganda have attributed to the low levels of energy resources since the demand for power is low and in few industrial areas and majority of Ugandans live below the poverty line especially in rural areas which explains that the demands for expensive energy sources like solar energy and HEP is low in most areas of Eastern, Northern, North eastern Uganda, and others. Therefore, the drive to develop energy resources becomes limited.
- The most widely used energy resources in Uganda mainly in rural areas is wood fuel so despite the fact that there has been high rates of the exploitation of forests and woodlands without putting into account the conservation measures, the natural forests are rapidly getting depleted. E.g. in Luwero, Masaka and Jinja, scarcity of fuel wood energy has been due to cutting down of forests like River Mayanja forest in Luwero woodlands, Mabira forest in Jinja, Rwooho forest in Isingiro, Bugamba forest in Mbarara and others.
- Uganda has for long experienced political instabilities especially between 1970s and 1980s which prevented long term plans and investments in the development of energy resources instead funds were channeled in purchasing fighting equipments especially during Idi Amin's reign. Also political instability in Iraq has led to reduction of petroleum on the world market which has led to an increase in price of petrol, diesel and paraffin in Uganda. Consequently many rural areas in Kiboga, Nabilatuk in Moroto cannot afford petroleum fuel and even industries in Kampala and Jinja which use a lot of diesel like Mukwano oil industries and Nile Breweries have reduced their production.
- Transmission of hydro-electricity involves high costs because transmission lines have to cross forests, plantations, swamps; at times peoples' crops are cut down and therefore have to be compensated, patrols have to be made to replace the broken lines and blown transformers; and in some regions of Uganda in the North and North-East, the settlement patterns are widely scattered which makes it hard and costly to connect new customers to the power lines of HEP.
- There is limited research which has been carried out in Uganda to discover the energy potentials and even exploit them which has been worsened by lack of the researchers themselves and the capital to employ them.
- Limited public awareness about the presence of energy resources in Uganda is another factor responsible for the low development of energy. Most of the local people know Hydro-electricity, charcoal, wood fuel and petroleum as the only sources of energy. They therefore neglect the rest such as bio mass, wind, bio gas and solar energy.
- Wastage of energy and power in form of lighting during day, water heating in bathrooms throughout the day, switching on television sets and radios even when nobody is utilizing them in towns like Kampala, Mbarara, Mbale, Entebbe has led to low development of the power and energy sector.
- Use of high energy consumption gadgets such as 100 watts bulbs, old computers, coil cookers and old freezers in big towns like Jinja, Kampala and Entebbe has left little electricity to be used in other sectors like industrialization and service sector like banking and health centres.
- High population growth rate and an increase in the number of new connections to UMEME in rapidly expanding cities like Kampala, Jinja and Mbarara have affected the supply of hydro electricity in Uganda. Such big numbers require a constant increase in the amount of mega watts which can't be generated from Jinja at Nalubaale power station.
- Uganda is rapidly developing her industrial sector in a few towns such as Kampala and her suburbs like Namanve, Kawempe, Nalukolongo, Nakawa, Kyambogo, Luzira, Bugoloobi which have high energy consuming machines for example Roofings steel mills along Entebbe road, Uganda Baati steel mills at Bugoloobi, etc that has led to scarcity of hydro electricity in the country.
- Decreasing level of water in Lake Victoria due to drought and poor engineering has led to reduction in the total amount of Mega watts generated from Nalubaale power station. For example Kiira and Nalubaale dams produce 145 Mw from 380 Mw installed capacity due to low water level in Lake Victoria which has led to load shedding so as to share power among different districts and localities.
- Frequent breakdown of the Mombasa - Kisumu oil pipeline has often led to scarcity of petroleum products like petrol and diesel in Kampala, Jinja and Uganda at large which has affected development of the power and energy sector in Uganda.
- Frequent break down of electricity transformers, electricity poles and overhead transmission power lines either due to falling trees during heavy rains, lightening or motor accidents in big cities like Kampala and Jinja has affected the power transmission and contributing to high maintenance costs.
- A lot of bureaucracies have hindered development of the power and energy sector. For example before any major hydro electricity power dam is constructed, an environmental assessment should be done and the World Bank has to approve the project which may take over three - five years. This was one of the problems which had failed commissioning of the Bujagaali power project along Victoria Nile at Jinja.
- High rates of power stealing in form of illegal connections and electricity defaulters especially in Kampala, Entebbe, Masaka and Jinja have limited development of the energy sector. Many people don't pay for the energy they consume hence failing management of the electricity sector.
- Thefty of transmission wires and transformers to make clothing hungers, TV antennas, forge coins, power inverters, etc in Masaka, Kampala and Jinja limits the development of power sector,
- Age of the Nalubaale power dam has exceeded its life expectancy of 50 years and therefore its now weak, with cracks and less efficient leading to power failure and shortages in the country.

STEPS TAKEN TO DEVELOP THE ENERGY AND POWER SECTOR

The following are the measures or steps being taken to develop the energy and power sector in Uganda;

- Ministry of energy and power has obtained approval and sought total funds of US $ 772 Million from the World Bank, US $ 370 M from Agha Khan and his partner Sithe Global for the construction of a 250 MW hydro power power station at Bujagali. Karuma falls in Kiryadongo are also under exploited, as well as the Ayago North and Ayago south and Isimba sites in Kayunga. Mini hydro stations are also to be built like Nyagak in Zombo for 3.5MW and Musizi hydros. The target is to produce the capacity of 20,000 Mega watts by the year 2025.
- UMEME has adopted a national campaign to reduce power wastage by saving over 40 MW in 2006 and 2007 which was done by supplying at least three energy saving power bulbs per home starting with Kampala district nearby areas with a target of 800.000 bulbs to be given out so as to save 40 MW. Such bulbs were given free of charge at Seeta, Bwaise, Kanyanya, Banda and other areas.
- Government has attracted foreign investors to generate thermal power so as to supplement hydro power from Jinja. Currently Agrekko Power Company produces 50 MW from their plant at Lugogo and 50 MW at Jinja. 50 MW are to be generated from Mutundwe and another 50 megawatts are to be generated from Namanve thermal power station if all plans are finalized. The government has signed a deal with Kenya to import and purchase 20 Mega watts of electricity from Kenya which has meant to address the shortages in the short run mainly in eastern parts like Busia and Tororo.
- UMEME and Uganda Electricity distribution company have adopted power rationing known as load shedding especially during peak hours which has been done to save power for priority areas like Mulago Hospital, Makerere University, major industries in Jinja and Kampala, etc.
- Alternative forms of energy have been adopted and exploited to add on the hydro power. For example Liquid petroleum gas (LPG) for cooking purposes is imported by Shell, Caltex. Total

and Kobil; solar energy is being developed and supplied by several private companies such as solar energy Uganda Ltd in Kampala which belong to Col Elly Kayanja.

- UMEME has done public training, sensitising and awareness campaigns on radios like CBS and Radio One; T.Vs like WBSand UBC televisions; News Papers like Monitor newspaper by advising people to save energy by switching off unnecessary lights, televisions, electric appliances when not in use and energy conserving measures. Such campaigns are done in Masaka, Mbarara, Kampala, Jinja and Mbale.
- The National Forestry Authority has gazetted more forests such as Kibale Forest reserve, Mabira forest reserve, Moroto forest reserve, Mpanga forest in Mpigi and others for future fuel wood use as well as environmental protection.
- The National Forestry Authority has planted forestry boundaries of eucalyptus trees along major forests like along Mt. Elgon forest in Mbale, Rwenzori forest in Kabarole, Semliki and Kalinzu forest for the purposes of supplying fuel wood energy in rural areas. It has also encouraged use of efficient charcoal or wood saving stoves made at Katwe in Kampala, Mbale, Masaka and Mukono to reduce on excessive use of fuel wood from remaining forests and woodlands.
- Government has begun exploiting petroleum resources from Wanseko - Semliki basin and Rhino camp basin. Drilling of Oil is taking place at Hoima and Buliisa districts done by Heritage oil and gas limited and Hardman, Tullow oils Ltd. Such oil is supplement fuel and energy requirements come a few years from now.
- Government has waived taxes from heavy industrial oil used in the generation of thermal electricity in big industries such as Mukwano oil industries and Uganda Baati steel industries in Kampala. Taxes on electricity generators were also removed to increase energy generation in Kampala, Jinja and other industrial areas.
- A pragmatic water release regime has been introduced at Owen falls dam in Jinja where water discharged is reduced to a minimum between mid night and 6 am in the morning when people are less active so that the water saved is used for slightly more electric generation during the working hours of the day and early hours of the night.
- Long term plans have been drafted by the Ministry of energy resources to exploit geothermal reserves in the western arm of the Great African rift valley. Effort is focused on the Kibiro east of L. Albert, Sempaya and Rwagimba geo thermal in Toro region at respective hot springs.
- Private developers such as Kampala city council and Multiplex Ltd are negotiating for biomass based electricity generation using purposely grown trees and other agricultural products as well as converting domestic, public and other wastes from big cities like Kampala and others, into power.
- The government has aided micro power generation schemes to increase electricity in the country. For example it aided the Kakira sugar works in Jinja to generate 22 MW of electricity from sugarcane wastes of which 18 Mw were generated before the end of 2007; and Lugazi sugar works has also invested US $ 10 Million (shs 16.5billion) to co-generate about 6 MW from sugarcane wastes.
- Operations have been adopted by UMEME to reduce the number of illegal electricity consumers and power defaulters through use of operation SIGMA and electricity amnesty in Kampala, Jinja, Entebbe, Mukono, Masaka and other major towns in Uganda.
- The government has made 2011 proposals for the reconstruction works of the Owen falls dam (Nalubaale power dam) which are to last for 4 years beginning August 2012 and ending in August 2016 and its works are to be funded jointly by Japanese Agency for International Cooperation (JICA) providing Shs 238 b ($100m) and government of Uganda providing Shs 85 b ($345.4m) totaling to $ 135.4m.
- Anti corruption organs have been set up to fight corruption tendencies like Auditor General, PAC and the IGG, anti corruption courts and anti smuggling units and laws
- Solar power has been promoted, distributed and installed by private investors like solar Uganda in Kampala
- MOW has renovated and rehabilitating the existing transport routes as well as constructing new ones leading to energy potential areas like Hoima and Buliisa with oil and Kasese and Kabarole with hot springs.
- The government has been in the process of constructing an oil reserve at Hoima as well as rehabilitating and restocking the oil reserves in Jinja
- Rural electrification programme in Luwero, Kamuli and Kibale has been underway and extended by Ministry of energy
- Economic integration has been revived and implemented for joint plans and ventures to construct an oil pipe line from Eldoret to Uganda and open up more power plants like Isimba power dam in Kayunga by Uganda and other countries like EAC
- Power suppliers like UMEME have computerized the power supply and consumption.
- Government has liberalized the sector for effective power supply to private investors like Mubuku and Nyagak power plants
- Government through MOE has trained more skilled man power locally and abroad
- Government has encouraged and intensified research to identify, explore / invent and develop new and alternative energy resources / sites like Solar and biogas.
- Government has stabilized the political climate through deployment of UPDF and holding peace talks with rebels to attract power investors like Agakan in West Nile

Sample Questions:

1. a) Account for the low level of development of the power and energy sector in Uganda.
   b) Examine the measures being taken to develop the power and energy sector.
2. It is lack of energy resources that is primarily responsible for the low development of energy in Uganda. Discuss.
3. Assess the importance of the Nalubaale and Kiira power station.
4. Explain the role of power to the economic development of Uganda.
5. Account for the increased use of charcoal and firewood in Uganda and assess the implication for the popular use of fuel wood as a power source in Uganda.

Sample Approach:

Candidates are expected to;

- Define the key word (s) in the question.
- Cite out the status / stand/ situation / state (+ve / -ve) of the major sector.
- Identify, describe and locate of the sub – sectors of the major sector in Uganda.
- Draw a sketch map showing the sub – sectors of the major sector with name of places.
- State, explain and then illustrate the how far (the extent to which) are the physical factors responsible for in relation to the sub – sectors of the major sector.

- Finally state, explain and then illustrate the however side of the other factors responsible for in relation to the sub – sectors of the major sector in Uganda besides physical factors.

OR State, explain and then illustrate the points (both positive and negative contribution / physical and human factors) in relation to the sub – sectors of the major sector in Uganda.

URBANIZATION IN UGANDA

Urbanization is a process whereby an increased proportion of the total population of the country concentrates in a particular area to become urban centre coupled with increased socio – economic infrastructural development (town, city and conurbation) or refers to the increase in the number of people living in a given town.

While an urban centre is technically defined as an area with increased population size and density, legal administrative, social, economic and cultural functions as well as infrastructural developments.

STATUS OF URBANIZATION IN UGANDA

- In Uganda, less than 16 % of the total population lives in urban centres which is approximately equivalent to 7.4 million people in 2016 from 1.6 m in 1991 according to National Population and Housing Census 2014 while the rest (84%) live in countryside.
- Generally the rate of urbanization in Uganda is 5.3% per annum according to National Development Plan II.
- Uganda's urbanization level is still very low on global trends of 54%
- The highest rate of urbanization is in the north.
- The most urbanized region is the central with about 54% of the urban population, followed by the West with 17%, then the North with 14% and lastly the East with 13%.
- The trend of urbanization is on the increase.
- Kampala is the Capital city and only city with over one million people in Uganda
- More urban centres are being formed as municipalities like Makindye
- Nine towns are being proposed to be turned into cites such as Fort Portal, Mbale, Entebbe, etc.

THE MAJOR URBAN CENTRES IN UGANDA

There are 259 urban centres (2016) and of these; 1 (one) city, 33 municipalities, 163 town councils and 62 town boards and some of these major urban centres in Uganda are:

- City such as Kampala city
- Municipalities such as Gulu, Kitgum, Soroti, Entebbi, Mbarara, Mukono, etc.
- Town councils such as Lukwaya, Mpigi, Wakiso, etc.
- Town boards such as Kyengera, Bulenga, Bwera, etc.

SKETCH MAP OF UGANDA SHOWING THE MAJOR URBAN CENTRES

FULL PAGE

FACTORS THAT CONTRIBUTE TO THE GROWTH OF URBAN CENTERS IN UGANDA

- Natural increase in population sizes i.e. increased birthrates, reduced death rates and immigrations which attract socio – economic services.
- Suitable sites of hard and strong basement rocks especially on hill tops for location, growth and expansion of urban centres
- Rural - urban migration coupled with all its causes like unemployment, better facilities, population pressure, insecurity, social misfit, nature of education, cultural obligations, etc.
- Abundant, clean and fresh water for domestic and industrial use
- Preference of immigrants of living in towns like Somalis and Sudanese in Kampala.
- Vast and extensive land for expansion and establishment of the towns
- Attraction of new investments due to ready market.
- Socio – economic infrastructural developments and establishments such as roads and power stations which attract people like Jinja.
- Administrative work and services like Police service and public service in Kampala.
- Social amenities and services like banks and banking, health centres and medical care as well as school and education which attract people at their disposal
- Natural resource endowments like minerals in Kasese and Tororo
- Supportive government decisions and plans (policy) of granting urban status, planning and providing fund for development.
- Major flourishing economic activities in the area such as industrialization, mining and fishing which attract trade, settlement, offer jobs and urban

functions.

- Easy accessibility of the area from all corners of the country like Kampala.
- Relatively flat / undulating / gently sloping landscape for easy settlement and setting up structures.
- Strategic location at the port and road junction for trade and transport
- Tight security / relative political stability for peaceful settlement
- Constant supply of power for use in home, town and industries
- Adequate raw materials for constructing urban facilities
- Well developed market centres and trade points for selling produce and buying goods
- Rich, wide and productive hinterlands which provides goods for trade, raw materials for industries, food for the population and cheap manual labour.
- Suitable and conducive cool climate in highland areas like Mbale and Kabale for easy settlement.
- Historical incidence / factors of Europeans and early settlement of whites especially Arabs attracted large population for camping like Tororo
- Adequate capital for urban investment in infrastructures and services
- Skilled and semi skilled man power for building urban structures and offering services
- Local and foreign entrepreneurs that provide technical and economic skills for innovation, businesses and trade.
- Modern and sophisticated technology to construct and renovate urban structures and facilities

FACTORS WHICH INFLUENCE TOWN SITING IN UGANDA

A site of town is a ground on which the town stands (town site). A town site is an area occupied by a town.

There are a number of factors, which influenced the siting of town in Uganda. These factors are as below;

- Water; towns tend to be located where water for daily use is obtained easily and adequately. Most favorable sites therefore have been near water sources like lakes and rivers e.g. Jinja and Kampala are partly located near Lake Victoria because of the large volume of water.
- Defense; some towns are located with a factor of defense in consideration. Towns are located in strategic positions to be able to defend against the incoming enemies e.g. Kampala was located initially on the seven hills to be able to defend against the incoming invaders like the Bunyoro and the foreigners like Arabs.
- Historical incidence; other towns were sited simply where a great chief happened to live / stay or on the earlier colonial administrative centres. E.g. Mbale was sited and developed by the British administrator Semi Kakungulu while Kampala was an administrative centre for the British colonial protectorate and Mengo, a seat of the Kabaka of Baganda.
- Transport routes; some towns were located where main transport and communication routes met which in turn become market centres and transport terminals e.g. Tororo is a junction of Kampala -Mombasa railway and a centre of roads to Mbale, Jinja and Kenya.
- Mining; some towns were sited near mining places either to handle or process the mineral ores or to provide residence for the workers in the mines. E.g. Kilembe town started as a residential centre for the workers in Kilembe copper mines in Kasese while Tororo started as a centre for the discovery of limestone and phosphates from Sukulu hills.
- Rich hinterland; other towns were located in areas, which proved able to provide food and other raw products. E.g. around Jinja, food crop supplies of banana, sweet potatoes and maize are easy from the nearby areas of Iganga and Kamuli.
- Trade; some towns were located where different people could exchange and transact the different commodities. E.g. Kigumba town in Kiryandongo was / is dealing in the exchange of maize from Banyoro with millet, simsim and groundnuts from Langi and Acholi and milk from Bululi.
- Navigability; some towns were sited near large and big water bodies for easy navigation. E.g. the location of Port Bell as a port in Kampala was favoured by the presence of Lake Victoria.
- Bridge point; some towns were located as bridge points for settlement and link up. E.g. after bridging the Victoria Nile with Owen falls dam, Jinja proved to be an important town as well as Njeru town.

FUNCTIONS OF URBAN CENTRES IN UGANDA

The following are the services and duties carried out in urban centres or towns of Uganda;

- Administrative functions with managerial services and policy making services which are not only in the capital city of Kampala and district headquarters but also in other administrative divisions, sub counties, and parishes like Fort portal, Hoima, Jinja, Mbale and others.
- Commercial functions with the role of collection and distribution of goods as traders attracted to carry out their business transactions in them. E.g. Kabale, Gulu and Jinja are important trading areas for agricultural produce while Kampala and Jinja are the largest commercially oriented centres in Uganda.
- Industrial functions with the role of processing and manufacturing raw materials into finished goods. E.g. the major industrial centres are Jinja, Kampala, Tororo, Mbarara, Kasese, etc with industries providing consumer and capital goods like sugar, soft drinks, cigarettes, etc for the population within.
- Mining functions with role of handling mining activities where most people are involved as workers in the mines. E.g. Kilembe town in Kasese started as a mining centre and Tororo handles limestone and phosphates.
- Transport and communication functions with major transport and communication routes and lines for easy delivery and distribution of goods and services e.g. Entebbe town is a radiating point for both international and national air flights and Kampala is also a focal point of railway to Kasese and Jinja, a lake port at Port Bell, a road centre to Jinja, Hoima, Masaka, Entebbe, etc and all towns are served with postal services, newspapers, telecommunication services such as MTN, UTL, AIRTEL - WARID, Africell, etc.
- Residential functions with housing facilities and residential areas for the concentrated population in them e.g. Kilembe and Tororo started as residential areas for the mineworkers and Lugazi town started as a residential area for the Lugazi sugarcane plantation workers.

- Resort / recreational functions with the role of catering for the resort and recreational needs of people within their environments such as health giving waters, lakeside resorts, theatres, animal and bird watching, night clubs, play grounds and other sport facilities in towns like Entebbe, Mbale, Kasese and Mbarara.
- Cultural functions with the role of providing cultural and custom roots and heritage in schools, hospitals, churches, Uganda Museum, historical sites and art galleries. E.g. Kampala has universities like Makerere, many primary and secondary schools like Mengo S.S, modern hospitals like Mulago and other religious institutions like at Lubaga, Namirembe and Kibuli.
- Tourist functions with the role of providing tourist services to visitors either within Uganda or from abroad. E.g. Fort Portal and Kasese are near/ in Queen Elizabeth and Mt. Rwenzori national parks and Kaabong town is near Kidepo valley national park, etc.
- Defensive functions with the role of maintaining and providing security facilities by the army, the navy police, air force and the crime prevention. E.g. Kampala has Kibuli police training school, Mbuya barracks, Kololo barracks and Makindye barracks and Nakasongala has a barrack and ammunition industry.
- Banking / financial functions with the role of foreign exchanging, loaning and money safety by banks, Insurance companies and foreign bureaus such as Bank of Uganda, Stanbic and CERUDEB in Entebbe, Kampala and Jinja.

PROBLEMS ASSOCIATED WITH THE GROWTH OF URBAN CENTRES IN UGANDA

Globally, urbanization is seen as an indicator of economic development but it possesses serious social, religious, political, cultural, economic and environmental problems, which are associated with physical expansion of the urban centres and increased population. These associated problems are:-

- There is high rate of unemployment and under employment as the population grows but never matches with the rate of job creation and illiteracy among the urban population, which resulted into increased poverty, idleness and high crime rate in Kampala, Masaka, Tororo and Jinja.
- There is high rate of crimes such as murder, theft, pick pocketing, prostitution, human sacrifice, gambling, etc in all urban centres due to the unemployment problems as people find alternative ways to adopt the urban lifestyle of survival which has resulted into insecurity of life and property on streets of Jinja, Kampala, Masaka and Mbale.
- There are inadequate accommodation facilities / poor housing facilities due to thousands of immigrants which has resulted into development of slums on unoccupied land of the nearby town like the shanty areas of Kisenyi, Katanga, Makerere - Kivulu, Kamwokya, Kifumbira in Kampala, Makenke in Jinja, Nkoma and Doko in Mbale, Agururu in Tororo, etc.
- There is inadequacy in the provision of / strain on social and economic amenities like transport facilities, water, power, sewage disposal, health services, education, etc for the growing population which has led to poor service delivery. E.g. in Kampala and Jinja, there is poor water and sewage facilities in most hospitals and shopping mails due to inadequacy of facilities.
- There is traffic congestion in Kampala city and suburbs, in Jinja town, etc mainly in the morning hours, lunch hours and in the evening which has caused delays to many workers, deliverance of goods and other inconveniences due to many vehicles and motorcycles.
- There is an environmental pollution in form air, noise, water and land caused by release of carbon monoxide fumes from many vehicles or locomotives and smoke from industries and houses in the atmosphere leading to respiratory problems and global warming; noise from heavy vehicles and heavy industries leading communication and hearing difficulty; toxic wastes from industries, sewage, garbage and other wastes in rivers, lakes and swamps leading contamination of water and death of aquatic resources; the oil spills from vehicles / detergents, human beings and other solid wastes dumped on land leading to low soil productivity in towns of Kampala, Jinja, Mbale, Mbarara, etc.
- There is increased cost of goods and services due to the high demand pressurized by the ever-increasing number of people especially in Kampala and Entebbe which has resulted into high cost of living where by the poor have failed to compete with the rich in buying food, renting houses and accessing other essentials.
- There is inadequacy in food provision demanded by the urban population due to increased number of strong young men and women leaving rural areas to urban for white collar jobs while the old and the elderly left in the rural areas who have failed to provide the manual agricultural work resulting into starvation and death in Soroti and Mpigi.
- There is low level of income due to the big number of the unemployed among the town dwellers in Kampala and Jinja which has made people to have poor standards of living in terms of housing, health, education, nutrition and feeding and generally living below poverty levels.
- There is improper urban management in the major towns because many people flock in towns with different backgrounds which has resulted into loss of cultural / kinship ties, increased political violence, tribal and cultural conflicts and income inequalities like Kasese and Kampala.
- There is shortage of land / space for the expansion of the town as it continues to expand geographically as the nearby agricultural land has been lessened in need for more land for town expansion which has in turn possessed a threat to agricultural development like in Kampala and Mbarara
- There is high government expenditure on provision of / high cost of urban maintenance and repair of socio – economic facilities and services due to increased urban dwellers and such as medical care, electricity, water, transport routes, sewage and garbage disposal which has led to poor standards of living like Kampala and Iganga.

There is poor sanitation due to dumping of town wastes anyhow and carelessly leading to easy spread of diseases such as cholera and typhoid in Kasese and Mbale.

There is continuous encroachment on marginalised lands such as forests and swamps due to limited space and congestion like Murchison bay Wetland (Luzira) and Bugolobi wetlands in Kampala, Walugogo wetlands in Iganga and Kamokoli swamps and Mt. Elgon forests in Mbale which has resulted in environmental degradation and climatic change.

THE GROWTH AND DEVELOPMENT OF TOWNS IN UGANDA
CASE STUDIES: KAMPALA CITY AND JINJA TOWN

THE GROWTH AND DEVELOPMENT OF KAMPALA CITY

Kampala is the largest urban centre and Capital city of Uganda as well as major industrial area and major administrative centre in Uganda.

Originally, it was built on seven hills and on 8km^2 but later expanded to cover over 28 hills namely; Kololo, Muyenga, Kibuli, Namirembe, Nagguru, Makerere, Mengo, Lubaga, etc.

Kampala's name was derived from a Luganda word "Impala" and it was Captain Lugard Fredrick, a British colonial administrator in 1870 who founded Kampala.

It then became the Capital city when Uganda attained its independence in 1962 but before it was Entebbe.

Kampala city is divided into five administrative divisions namely; Central, Makindye, Nakawa, Lubaga and Kawempe, which are headed by division mayors and the overall the Lord Mayor and the Executive director.

Today, Kampala occupies an area of 195 km squared with a population of 1.5 million people as per in 2014 population census.

Kampala is located near the shores of L .Victoria, 10 km south east of Port Bell, 80 km west of Jinja town, 40km north of Entebbe town and 126 km north east of Masaka.

SKETCH MAP OF KAMPALA SHOWING CENTRAL BUSINESS DISTRICT AND INDUSTRIAL ZONES

Full page

REASONS / FACTORS FOR ITS GROWTH AND DEVELOPMENT

The growth and development of Kampala has been due to physical, economic and political factors. These are;

Physical Factors that have led to growth of Kampala are:

- Kampala is made up of gentle sloping relief and flat topped hills such as Nakasero gentle sloping e hill which made it possible and easy to set up infrastructures like Bank of Uganda and Kampala - Jinja road.
- Kampala experiences an equatorial type of climate of heavy rainfall of about 1500mm and hot temperatures ranging between 25° C and 27° C per annum which attracted human settlement for crop farming and water availability for other activities like domestic and industrial use.
- Kampala is strategically located in the centre of Uganda which makes it accessible by all corners from different parts of the Uganda and even located initially on the seven hills to defend against the incoming invaders like the Bunyoro and Arabs.
- Kampala has broad and relatively flat valleys which were suitable and easy for the construction of industries such as Uganda Batteries Ltd and Sameer Agriculture and Livestock Ltd industries (Uganda Diary Corporation) were established in Bugoloobi broad valley.
- Kampala is well drained area with adequate water for domestic and industrial use which is obtained from L.Victoria via Ggaba Water Pumping station as well as abundant underground water in form of spring wells all over Kibuye, Kawempe, Kansanga, Mengo and Rubaga.
- Kampala is an area with different types of soils which were / are still used for construction and building purposes like sand for house building were / are obtained at the shores of L.Victoria in Luzira; lateritic soils for road construction from Kanyanya; clay soils for bricks and tiles from Kajjansi and processed into bricks by Uganda clays Ltd; and granite rocks obtained from Bukasa quarries on Muyenga hills.
- Kampala is an area with adequate varieties of vegetation like swamps at Mengo and Lubigi which have provided the poles and papyrus materials and timber from Mabira forest used in the construction of buildings such as Makerere University.
- Kampala is / was pest free conditions which attracted human settlements at several hills like Mengo, Kawempe, Kololo, Makerere, Namirembe, Kibuli and Rubaga hills leading to its growth as a city.
- Kampala is located in or near a rich and wide hinterland which is agriculturally productive such as different food crops like banana, maize to support the population in Kampala from Wakiso, Mukono, Kayunga districts and Mpigi and abundance in minerals like sand from Kajjansi, granite rocks from Muyenga and Water from L. Victoria at Ggaba.

Other factors that have influenced the growth of Kampala are:

- Existence of European colonialists from Britain such as Captain Fredrick Lugard who established his Fort at Old Kampala hill which attracted people for security reasons.
- Existence of Buganda Kingdom as Buganda kings established their palaces near Kampala at Mengo and Banda which attracted people to settle for security and administrative purposes.
- Existence of Asian traders and merchants such as the A.K Company (Mukwano) has established most of the Mukwano buildings and Mukwano industries in Kampala; Sudhir Ruperila started Crane Bank at Crane cambers; and Spear house along Kampala - Jinja road was developed by Madhvani.
- Availability of skilled and semi skilled manpower which was / is used in designing and building Kampala in form of engineers, builders and architects from Britain, India, Israel and China who built buildings like Charm Towers, Entebbe airport, Bank of Uganda, Buganda road courts of law and Kampala Northern By-pass.
- Presence of reliable supply of power in form of electricity and from Jinja at Owen falls dam was transmitted to Kampala at an early stage and now from Bujjagali power dam which attracted development of industries like Mukwano Industries at Kibuli and Uganda Diary Corporation currently Sameer Agriculture and livestock Ltd industries in Bugoloobi and later attracted dense settlements.
- Availability of adequate capital to develop Kampala provided by the Colonial Government from Britain which was used to construct the Mombasa – Kampala road; and Amber house on Kampala road, Makerere University and Entebbe Air port were built by Israel

during Amin's regime.

- Presence of various transport routes leading to and fro Kampala for promoting trade and commerce as well as other economic activities like Jinja - Kampala road, near Entebbe Air port, Tororo - Kampala and Kampala - Kasese railway line and water transport at Port Bell, etc.
- Existence of positive government policy for developing Kampala to what it is up to date such as Kampala road, Nasser road, Kafumbe - Mukasa road, Lubiri ring road and others have been constructed and maintained by the Ministry of works through Kampala Capital City Authority and UNRA.
- Existence of increased rate of rural-urban migration since 1980's, due to political insurgencies in the Luwero triangle which sparked off many migrations coming to the city leading to rapid growth in population thereby expanding from 7 hills to occupy 28 hills such as Kiwaatule, Buziga, Kansanga and Naguru.
- Existence of coming of Missionaries (the White fathers and CMS) as they established Nsambya Hospital and Nsambya girls' school, Mengo Hospital, Rubaga girls' school, Rubaga church and many others on Kampala hills for provision of social services to the people.
- Existence of current local entrepreneurs who have constructed magnificent buildings and hotels in Kampala leading to its growth and development such as Karim Hirji like Grand Imperial, BMK like Africana hotel, Mutaasa Kafeero like Mutaasa Kafeero shopping plaza and Kirumira and Kirumira towers.
- Presence of welcoming hospitality among the Baganda and Buganda kingdom which has attracted people from all over Uganda to settle in Kampala leading to its rapid population and expansion of the city.

FUNCTIONS OF KAMPALA CITY

- Kampala serves as the major administrative centre and capital city of Uganda with high Court, Parliament, Police and several ministry headquarters like Courts of Justice at Buganda road, Kampala central Police station, Parliament house and State House along Nakasero hill.
- Kampala is currently the major industrial town in Uganda with industries like Uganda Breweries at Luzira; Uganda Batteries, Uganda Baati, Nice plastics at Bugoloobi; Tuf-Foam Mattresses, and Karesh Beverages at Kawempe; which produce consumer and durable goods for the local population, pay taxes to the government and provide employment to people.
- Kampala serves as an education centre in an effort to promote the development of skilled labour in Uganda such as universities like Makerere University, Secondary schools like St. Peter's Nsambya and others.
- Kampala serves as a commercial centre such that it promotes trade and commerce with modern shopping malls like Garden city, Markets like St. Balikuddembe, etc which have provided food stuffs, electronics, clothings and other social requirements for people in Uganda.
- Kampala serves as the major financial centre with banks such as Central bank (Bank of Uganda) on Nakasero hill, Barclays, Equity, CERUDEB, Stanbic, Crane bank, Cario, Bank of Africa and several foreign bureaus which have offered loans to promote trade as well as financial custody in form of cash deposits and exchange to the people.
- Kampala is a major accommodation centre with modern residential houses at Kololo, Nakasero, Naguru, Bukoto, Buziga, Muyenga, Naalya, Kyambogo; and modern hotels as well as apartments such as Africana, Serena, Triangle and Sheraton Hotel are in Kampala city to provide accommodation to tourists as well as catering services to the local population.
- Kampala serves as a cultural centre with Uganda Museum at Kiira road, Kasubi tombs and Namugongo shrine; the headquarters of all religions in Uganda like Catholic and Anglican Christians at Rubaga and Namirembe respectively while Muslims at Old Kampala Hill as well as Bahai at Kanyanya.
- Kampala is the major health centre with Mulago Hospital as the biggest hospital in Uganda and the major referral hospital, Nsambya, Kololo International hospital, Rubaga and Kibuli hospital which have promoted health care in Uganda through immunization, maternal services and others.
- Kampala is a major tourist centre in Uganda with cultural and historical sites such as Kasubi tomb, Namugongo shrine, Uganda Museum at Kitante, Fort Lugard at Old Kampala and Mengo (Lubiri Palace) which are the major attractions.
- Kampala is a recreational centre for recreational and leisure activities in Nakivubo stadium, club silk, Cineplex at Garden city cinema halls, theatre La Bonita, etc
- Kampala is a research center at Makerere University, AIDS information center at Mengo, etc for discoveries and innovations in Uganda as a whole.

PROBLEMS FACING KAMPALA CITY

The following are problems resulting from urbanization at Kampala are:

- Inappropriate accommodation facilities for the urbanites due to over concentration leading to the growth of slums like at Namuwongo, Nsambya, Katanga, Kifumbira, Kamwokya, Kalerwe and Makerere - Kivulu.
- Over population due to urbanization has led to limited land in Ntinda, Bukoto, Muyenga, Kawempe, Naguru and Ggaba leading to squatter settlements in the generally cheaper areas like Nabweru and Nansana.
- Rapid spread of diseases like Cholera, dysentery and AIDS at Kamwokya, Kyebando and Bwaise in Kampala due to many people living together and poor hygiene resulting into poor health conditions and death.
- High crime rate such as gambling, robbery, murder, drunkenness and pick pocketing idlers due to high rate of joblessness around St. Balikuddembe market (Owino), Old tax park, Ben Kiwanuka Street and in the suburbs of Bweyogerere, Namasuba, Nakulabye and Ntinda leading to insecurity.
- Too much strain / pressure on social services and facilities due to over crowding like in Mulago hospital is flooded with patients, congestion of Makarere University with students, traffic congestion on Bombo road from Wandegeya to Bwaise, Kampala - Jinja road from Kitgum house -Nakawa - Banda -

Kireka trading centers resuling into poor standards of living.

- Continuous encroachment on marginalised lands such as forests and swamps due to limited land like the Golf course and centenary park in Kitante wetlands and trees along Yusuf Lule road in Kampala have been encroached upon by Garden City hotels and shopping mall as well as Bwayise and Kalerwe swamps which has resulted into flooding and desertification.
- Rising level of unemployment as many immigrants have failed to get gainful employment due to over population like at St. Balikuddembe market, Katwe, Katanga, Bwaise and Nakulabya leading to increased crime rate.
- Rising level of environmental pollution like accumulation of garbage at Nakasero, Kalerwe and St. Balikuddembe markets, around the Old taxi park; and garbage disposal in Murchison bay and Wakaliga wetlands and Nakivubo channel leading to environmental damage.
- Loss of traditional values and ties by the urban dwellers due to de-culturalisation, indecent dressing, smoking opium, cigarette and disrespect of elders on the rise in Kampala suburbs like Bwaise, Ntinda, Kalerwe, and Namuwongo in the disguise of modernization leading to cultural erosion and moral decay.
- Over exploitation of land resources to create land for settlement leading to disfiguration of the beautiful scenery of the landscape due to high demand at Mbuya, Kireka, Muyenga, Kanyanya and Naguru.
- High costs of living are incurred in Kampala in form of accommodation, feeding, transport, security and clothing especially in Ntinda, Bukoto, Muyenga, Ggaba and Kansanga suburbs due to poverty and high rate of joblessness leading to poor standards of living.
- High government expenditure on socio – economic amenities such as medical, education and transport facilities due to over population leading to poor service delivery like in Bwayise and Mengo – Kisenyi.
- Massive traffic congestion during the rush hours of the day due to many people and vehicles leading to delay in distribution of goods and services like at Nakawa, Kibuye, Nantete and Kawempe.

STEPS BEING TAKEN TO SOLVE THE PROBLEMS

- Setting up small scale industries / businesses to provide employment opportunities by attracting foreign investors (Shop rite, UCHUMI).
- Providing soft loans in SACCO Groups through Micro finance banks like CERUDEB to start up income generating projects like in Wandegeya market.
- Preventing and stopping crime by use of police and Crime prevention units / LDUs like at Jinja road police station, Kira, Kibuli, etc.
- Setting up better and planned accommodation facilities and housing estates by National Housing Corporation and private property agencies like Zion and Jomayi.
- Issuing out building survey plans for proper housing and city planning by KCCA to avoid shanty houses like Kalerwe
- Traffic control by the using one way system and road widening plus street parking under multiplex company, traffic lights and policemen like at Kitgum house and Queen's way and setting up by- passes like Kampala Northern road and Kampala – Entebbe high way.
- Pollution control by using containers for garbage disposal by KCCA, Nabugabo deals, NEMA restrictions, ...
- Land expansion through swamp reclaiming and forest utilization like Namanve swamp and forest for sustainable development.
- Street child control by arresting and housing them in rehabilitation centres like Naguru teenage centre.
- Flood control by building and widening drainage channel like Bwayise and Nakivubo channels.
- Corruption control through commissioning anti- corruption bodies like IGG, CID at Kabuli and Anti – corruption court at Kololo
- Seeking foreign aid and grants in form of road construction, garbage collection facilities and traffic lights like Wandegeya traffic lights by Japanese government.
- Setting up and deploying city law enforcement unit to monitor and implement the city policies and laws like KCCA law enforcers

GROWTH AND DEVELOPMENT OF JINJA TOWN

Jinja is the second largest town and one of the leading industrial centers in Uganda.

It's situated on the northern shores of L. Victoria at the main bridging point of Victoria Nile.

Its growth started in early 20th century when the early settlers in Jinja lived near the Ripon falls where the travellers used to cross Victoria Nile.

With time, Jinja started becoming a place of importance and interesting for trade, industrialization, tourism, settlement and power transmission.

Jinja occupies an area of 677 km squared and by 2002; had a permanently residential population of 75000 people. However, it had a total daily population of 200,000 people considering the soldiers in barracks and daily visitors such as tourists, workers and other travelers.

SKETCH MAP SHOWING THE SITE OF JINJA TOWN.

Full page

FACTORS FOR ITS GROWTH AND DEVELOPMENT

The following are the physical factors that led to the growth of Jinja as a town:

- The presence of the Rippons falls near Jinja which resulted into construction of the Nalubaale and Kiira power stations producing electricity for domestic and industrial use such as the Nile breweries, chillington for hoes, copper smelter and Southern range Nyanza textiles (NYTIL) were opened up in Mukono (at Njeru) and Jinja.
- Jinja is located near L. Victoria with large amount of water for domestic and industrial use like the East African steel corporation, Masese fish packers, BIDCO Oil Ltd and Uganda Grain Milling Company.
- Presence of large quantities of clay, sand deposits which were obtained from Victoria Nile crescent and Kirinya wetlands; and granite

rocks from Walukuba quarries near Masese as well as Lateritic soils from Mpumudde and Kimaka used in the building and constructing structures like the Nalufenya Road, Walukuba Road and Jinja main Street.

- Existence of gentle sloping landscape eased and facilitated the construction of transport routes, commercial, residential and administrative structures like Kimaka flat landscape led to the construction of Kimaka air strip and Jinja – Kamuli road.
- Jinja is geographically located along L. Victoria shores and proximity to Kenya and Tanzania which has accelerated the growth of trade and commerce as well as water transport like Uganda's exports and imports such as Tea, oil, fish, fruits and others are transported to neighbouring countries via Port Jinja on L. Victoria.
- Jinja is blessed as a rich hinterland with fertile soils like at Maggwa, Kimaka, Mpumudde, Walukuba and the neighbouring districts of Mayuge, Bugiri, Kamuli and Iganga which produce adequate food stuffs like sugar cane, sweet potatoes, ground nuts, rice and maize necessary to feed the urban population.
- Presence of magnificent and different tourist attractions and sites such as the source of the Nile, Rippon and Bujagali falls, Jinja wildlife sanctuary and the Victoria Nile which have attracted tourists leading to development of markets, hotels, resorts and modern transport routes bringing in foreign exchange.
- Jinja is a pest free conditioned area like at Nalufenya, Mpumudde and Maggwa and there was also eradication of black flies along Victoria Nile which caused river blindness which attracted settlements.

Other factors that favoured the growth and development of Jinja as a town are:

- Availability of huge investments done by the Uganda Development Corporation for establishing industries such as the Southern Range Nyanza Textiles Industries Ltd (NYTIL), Chillington for hoes, East African Steel Corporation, Uganda grain milling, PAPCO and MUL Box.
- Presence of both foreign and local investors such as Madhvan and Mehta who developed Jinja by constructing industries such as Nile breweries and Kakira Sugar works; schools like Kakira primary and secondary schools and Health centres like Kakira Hospital
- Jinja has modern transport network linking to different and important towns like Kimaka air strip, Kampala - Jinja road, Jinja - Kampala railways, and Jinja inland port which connects to Kisumu in Kenya, Musoma, Mwanza and Bukoba in Tanzania to facilitate tourism, trade, commerce and industrial sector.
- Jinja has a big population of the Basoga from districts of Mukono, Mayuge, Kamuli, Bugiri and Iganga which provides both local market for industrial goods and cheap skilled and semi - skilled labour for industries such as BIDCO, PAPCO, Southern range Nyanza textiles and town businesses.
- Jinja is a politically stable area due to the existence of the Gaddafi barracks, Kimaka Cadet Officers training school, Uganda Police, local defense personnel and private security groups like Saracen, Securiko and Delta force which provide security required for the growth and development of the town.
- Existence of positive government policy of Britain colonial government that declared Jinja as an administrative center in 1901 and made the administrative Headquarter of Busoga region.
- Existence of Busoga Kingdom as Busoga kings established their palace near Jinja at Bugemba which attracted people to settle for security and administrative purposes under an organized leadership of the Kyabazinga.

FUNCTIONS OF JINJA TOWN

- It is a commercial center with the biggest market at Nalufenya.
- It's an important transport center with water, railway and road terminals and an air strip at Kimaka.
- It's the major power generation center with both the Kiira and Nalubaale power stations and a thermal power plant.
- It's the second largest industrial town with industries such as Chillington for hoes, East African Steel Corporation, ...
- Etc.

PROBLEMS ASSOCIATED

- Unemployment and under employment
- High crime rates
- Slum development
- Traffic congestion
- Environmental pollution
- High cost of living in terms of housing and feeding
- Shortage of food
- Urban violence due to different ethnic groups
- Shortage of land expansion
- High government expenditure
- Inadequate social services
- Poor sanitation and hygiene
- Easy spread of diseases

Sample Questions:

1.(a) Account for the growth and development of Kampala as a city, (b) Outline the functions of Kampala as a city

2.Examine the causes of urbanization in different parts of Uganda

3. To what extent have physical factors favoured the growth and development of Jinja as a town?

4.With reference to any one of the urban centers in Uganda, Examine the problems resulting from urbanization.
5. Examine the effects of urbanization on the environment in Uganda.

Sample Approach:

Candidates are expected to;

- Define the key word (s) in the question.
- Cite out the status / trend / situation (+ve / -ve) of the major sector.
- Identify, describe and locate of the sub – sectors of the major sector in Uganda.
- Draw a sketch map showing the sub – sectors of the major sector with name of places.
- State, explain and then illustrate the how far (the extent to which) are the physical factors responsible for in relation to the sub – sectors of the major sector.
- Finally state, explain and then illustrate the however side of the other factors responsible for in relation to the sub – sectors of the major sector in Uganda besides physical factors.

OR

State, explain and then illustrate the points (both positive and negative contribution / physical and human factors) in relation to the sub – sectors of the major sector in Uganda

ENVIRONMENTAL DEGRADATION IN UGANDA

Environmental degradation refers to the decline in the productive value of man's surroundings (environment) comprising lithosphere which is the landscape, the hydrosphere (water), atmosphere (envelop of air) and biosphere (plants and animals).

In other words, it is the deterioration of the available renewable and non renewable resources which leads to loss of the initial attribute of resources and a reflection of loss of quality and quantity of the resources.

STATUS OF ENVIRONMENTAL DEGRADATION IN UGANDA

- By 2001, 4%-12% of the GDP of Uganda was lost due to degradation and 85% of GDP is due to soil erosion.
- By 2004, the rate of biodiversity loss was calculated to be 10% - 11% per decade.
- Rhinos, cheetahs, Oryx were extirpated between 1970 -1990.
- Most degraded areas are the forested areas such as ……; swampy areas such as ……; and mountainous areas such as …… .

AREAS ENVIRONMENTALLY DEGRADED / FORMS OF ENVIRONMENTAL DEGRADATION IN UGANDA

- Soil erosion and landslide affected mainly on mountain areas like Rwenzori steep slopes in Bundibugyo and Kasese, Elgon steep slopes in Kapchorwa and Bududa, Kigezi highlands in Kabale and Kisoro, etc.
- Overgrazed and over stocked pastoral areas such as Kaabong, Kiruhura, Kotido, Buliisa, and Nakasongola districts.
- Land pollution from industrial effluents and poor urban waste management in urban and industrial centres like Kampala, Jinja, Mbale, Mbarara, Kasese and others.
- Water pollution along water bodies such as L. Victoria at Masese in Jinja, Luzira in Kampala, L. Albert at Butiaba in Hoima, etc.
- Tsetse flies infected areas such as Western region like Bundibugyo, Muhokya, Kanungu; Bunyoro areas in Masindi and Kiryandongo and South Busoga in Mayuge, etc.
- Over mined and quarried areas such as Kilembe copper and cobalt mines in Kasese, Tororo limestone quarries, Namekhala Vermiculite mines in Manafwa, and Gold mines in Busia and Mubende, Muyenga granitic quarries in Kampala, etc.
- Deforested areas like at Mabira in Buikwe (Mukono), Ssese in Kalangala, Kibale in Kabarole and Kamwenge, and Bunya forests in Mayuge.
- Over and indiscriminated fished areas like in L. Victoria, L. Wamala, L. Kyoga, L. Albert, etc.
- Artificial fertilized, irrigated and mono cropped agricultural areas (over cultivated / soil exhausted / over farmed areas) such as Kibimba rice scheme in Bugiri, Lugazi sugar plantation in Mukono, Nsimbe horticultural farm in Mpigi, Toro tea estates in Kabarole, etc.
- Overpopulated areas such as Kigezi region in Kabale and Kisoro, Buganda region in Mukono, Wakiso, Masaka and Kampala and Gishu region in Mbale and Manafwa.
- Wetland destructed areas such as Lwera swamp in Kalungu, Luzira swamp in Kampala, etc.

A SKETCH MAP OF UGANDA SHOWING ENVIRONMENTALLY DEGRADED AREAS / FORMS OF ENVIRONMENTAL DEGRADATION

FULL PAGE

CAUSES OF ENVIRONMENTAL DEGRADATION IN UGANDA

It is resulting from manmade causes and natural causes though man dominates. These causes are as follows:

Activities of man responsible for environmental degradation in Uganda

• Overgrazing happens in pastoral areas of Kaaboog, Mbarara, Luwero, Kasese, Buliisa and Nakasongola where pastoralists graze their animals beyond the capacity of the available pasture which leads to exposal of the soils to agents of erosion like wind and running water hence making the soil loses its fertility and eventually drought sets in.

• Communal grazing by the pastoral tribes like the Karamojong in Moroto and Bahima in Kiruhura is poor soil management practice where by each pastoral family has many animals and uses the carelessly which damages on the land thus causing several risks of soil erosion.

• The burning practice of the dead grasses and bushes during the end of the dry season by both pastoralists in Kotido and Sembabule in hope of fresh pasture and crop farmers in Kumi, Luwero and Rakai in preparation of the land for cultivation have left land bare and exposed to water and wind erosion.

• Usage of heavy farm machines like tractors and combined harvesters in Jinja, Kalangala, Masindi and Kasese and ox - ploughing practice in Katakwi, Lira and Soroti have made the once one solid compact rock of land broken down and loose during the farm operations either directly or indirectly which exposes it to soil erosion.

• Extensive draining and reclamation of seasonal and permanent swamps / wet lands in Iganga and Bugiri for rice growing; in Mukono and Wakiso for extracting sand and clay; Masaka and Rakai on the shores of Lake Victoria for wood, firewood and hand craft products and in Jinja for sugarcane growing have all led to the shortage of water, loss of fishing grounds, non-productive, loss of bird and animal habitants and in such areas floods are common.

• Over cultivation of the same types of crops on the same piece of land over a long period of time (monoculture) has led to the soils lose their structure; fertility and compactness thus soil erosion and to soil deterioration in areas with commercialized agriculture were crops are grown perennially like sugar cane growing at Kakira in Jinja, tea growing at Kasaku in Mukono and growing bananas and coffee in Masaka and Mbale.

• Forests and woodlands are rapidly being cleared up to provide fuel wood, timber and land for both cultivation and settlement in Sironko and Kapchorwa on Mt. Elgon forests, Kisoro and Kabale on Mt. Mgahinga forests and in Lake Victoria basin with forests like Mpanga forests in Mpigi and Mabira forest in Buyikwe (Mukono) which has then resulted into reduced amount of rainfall, severe soil erosion on the steeper slopes, silting of rivers and lakes, large amount of carbon dioxide in the atmosphere and shortage of firewood.

• Pollution involves water, noise, air and land degradation which takes various forms as follows:

Industrial wastes and spills dumped into lakes and rivers which have damaged the aquatic life and the cleanliness of water for example in Mbarara, Alpha diary industry releases untreated industrial wastes into river Ruizi and sugar factory at Lugazi in Mukono and Kakira in Jinja in Lake Victoria and the Victoria Nile.

Industries and car exhausts release large amount of carbon dioxide into the atmosphere which have led to increased temperatures and respiratory diseases like in Kampala city and Tororo.

Car wash at swamps, river banks and lake shores let various detergents into water bodies which have contaminated the water and killed fish like at the shores of Lake Victoria near Entebbe road and on Hoima road near Kampala.

Dumping of polythene bags ad bottles as well as constructional materials like broken glasses, tiles and packing tins have led land pollution in Masaka and Mbarara as they take very long to decay and therefore deteriorate the soil structure like the Century bottlers and Crown bottlers in Kampala are responsible for poor bottle disposal leading to low productivity of land.

Accumulated gases of chloroform, nitrogen-oxide, hydrocarbon, carbon dioxide, lead and carbon monoxide in the atmosphere from reconditioned domestic refrigerators, computers, deep freezers, vehicles and the spray of perfumes as well as chemicals used in mattresses and cushion manufacturing have all led to an increase in global temperatures and ultra violent radiation thus upsetting the environment. E.g. the Lugazi cable corporation in Mukono releases a lot of carbon dioxide gas while the Mukwano edible oil and soap industries in Kampala emit methane and carbon gases.

The use of agro chemicals like fertilizers, pesticides, herbicides and insecticides has in the long run led to lowering the soil productivty in Masaka, Mbale, Jinja and Mbarara as they destroy the bacteria and earth worms which are responsible for soil formation and fertility.

• The rapid population density in Mbale, Kampala and Kisoro has led to the land fragmentation which resulted into over use of land and eventually soil erosion as well as cultivation on very steep hilly slopes which has resulted into accelerated severe soil erosion and land slides in Kapchorwa and Kabale.

• Tapping of water from the underground like construction of shallow wells, protected springs, bore holes and valley dams in parts of Masindi, Kiboga and Nakasongola has made the water level low and plant growth difficult which led to desertification conditions and water scarcity.

• Setting up of many irrigation schemes like Mubuku rice scheme in Kasese, Doho rice scheme in Tororo and Kibimba rice scheme in Bugiri, have held back the water in the reservoirs which then have become breeding sites for pests and diseases such as mosquitoes for malaria, snails for bilharzias, etc as well as reducing water in the river channels and increased the salinity of the soils.

• Mining and quarrying of mineral resources like limestone at Hima in Kasese and at Sukulu hill in Tororo, copper and cobalt at Kilembe in Kasese, granite stones at Muyenga in Kampala have destroyed land beauty leading soil erosion, reduced land for agriculture leading famine and created breeding places for mosquitoes and snails transmiting malaria and bilharzias respectively.

• Cattle rustling as an insecurity act by the Karamajongs and Pokots in Katakwi, Kotido and Moroto has claimed people's lives and loss of livestock while insecurity caused by tribal conflicts and clashes in Kasese and Bundibugyo has resulted into internal displacement of people to live in protected camps which has led to high population concentration and its side effects of deforestation as well as killing of innocent people and animals in the process.

- Negative government policy of putting more emphasis on other economic sectors in terms of funding and planning like defense, industry, tourism and agriculture at the expense of the environmental conservation and protection like the give away of Namanve forests and swamp in Mukono to Century bottlers and Ssese (Bugala) forests to BIDCO oil company in Kalangala.
- Growing of less protective and non - cover crops such as sorghum, g. nuts, cotton, pyrethrum and cassava against soil erosion in Kumi, Soroti, Paliisa and Kabale have promoted rill and sheet erosion which has led to low soil fertility.
- Different land tenure systems like the customary, Mailo, freehold and lease hold among Baganda in Wakiso and Masaka has exposed large pieces of land to environmental risks of soil erosion as the landlords and tenants have little responsibility over land while the communal ownership of land among the Karamajongs in Kaabong and Itesots in Soroti has led to wasteful use of land as the individual pastoralists move freely using the land carelessly for grazing cattle as it belongs to the community as whole as resulting into severe soil erosion.
- Infrastructural construction like the Kampala - Kabale road and Kampala Northern bypass has led to excavation of the landscape which has accelerated soil erosion and landslides, the creation of holes for breeding of mosquitoes, destruction of land for farming and forests and swamps have been cleared thus limited rains and prolonged drought.
- Poor fishing practices and gears such as over fishing, fish poisoning and small sized nets on L. Victoria, L. Kyoga and L. Albert have led to depletion of the aquatic life and contamination of waters which has led to human poisoning and transmission of diseases in Kampala City, Jinja, Soroti and Hoima.

Other factors (Natural causes) responsible for environmental degradation

- Dangerous / deadly diseases, pests and weeds are the biological problems which have caused a threat to man, food production and environment at large in the following ways:

Plant diseases like coffee wilt and rust and banana wilt in Mbale and Masaka; cassava mosaic in Tororo and Masindi; and cotton stains in Gulu and Kumi are hindering food and cash crop production as the crops are destroyed which have led to food scarcity and poverty.

Animal diseases like nagana caused by tsetse flies and sleeping sickness, rinderpest, East Coast fever, foot and mouth disease and brucellosis are crippling the livestock production in Soroti, Buliisa, Nakasongola and Luwero which has led to the gradually decrease the quality and quantity of livestock and even kill their livestock.

The pests like caterpillars, locusts, amphids and army worms in Kayunge, Lira, and Masaka are destroying large quantities of crops and livestock on farms hence reducing crop and animal productivity while the rats and weevils in Gulu and Mpigi destroy crop produce in the stores thus food shortages and locusts periodically invade West Nile in Arua and Moyo destroying the whole vegetation thus less pasture for animals and destroy crops grown resulting into shortages in production.

The wide spread of human diseases have weakened and claimed the lives of the would be labourers to produce food which have led to famine such as AIDS in Masaka and Rakai in 1990s, cholera in Kampala and Mbale, Ebola in Gulu, malaria, measles and cancer where by most of these people are frustrated, sickly, and weak and their total economic productivity is limited and low.

Weeds such as water hyacinth are killing fish by reducing breathing space and distracting light from reaching the bottom of the water body for growth of plankton so the fish dies of hunger on L. Kyoga and L. Victoria.

pests in Kaberamaido which disrupt both livestock and human settlement.

- Climatic changes are responsible for environment degradation in following ways:

The heavy prolonged rains (El - Nino) cause floods which destroy crop lands in Iganga and Kayunga, lives and property around Kalerwe and Bwaise in Kampala hence resulting into less crop yields, homeless people, spread of cholera and live stock dead.

The heavy rainfalls with hailstorms have destroyed crops like cotton in Lira and Gulu, tea, bananas and beans in Mukono and Ntungamo; coffee, vegetables and Irish potatoes in Kabale which has led to food shortage and famine as well as poverty due to low cash crop exports of cotton, tea and coffee.

The abnormal insufficiency of water (drought / La - Nina) has limited crop cultivation, animal rearing, irrigation, domestic and industrial use as the animals die, crops stunt and even people starve because of food shortages and famine in Kotido, Palisa, Rakai, Mbarara, Luwero, Lira, Mpigi, Kayunga and Soroti.

In Kitgum, Nebbi and Kumi, aquifer drought, caused by porous rocks which absorb all the water leaving the surface dry and hard, have led water shortage while in Kisoro and Kasese, "run off drought" because the rainfall runs into rivers and streams as surface water rather than being absorbed by the soil has also led to water scarcity.

The dry and hot North East trade winds in Kaabong and Kitgum have led to little and unreliable rainfall which has led to crop failure and poor pasture growth for livestock as well as accelerated wind erosion which results into low productivity.

- About 30% of the Uganda's total land area is covered by soils of low productivity which are infertile to support the growth of vegetation to cover the land against the agents of erosion like in Rakai, Nakasongola and Kotido hence food scarcity.
- Geological and Geomorphic disasters like volcanic eruptions and earth quakes have also led to environmental degradation as in Kabarole, Kasese and Bundibugyo, earthquakes have destroyed agricultural land, houses and have killed some people as well as animals which have undermined long term investment due to fear of an economic loss in case it strikes again.

Volcanicity emitted/s dangerous gases such as carbon-dioxide and sulphur dioxide which polluted the atmosphere leading to increased temperatures and even the hot molten magma released destroyed crops, livestock, fauna and flora in areas of Kabale and Kisoro near / on Mt. Mufumbiro ranges

The steep slopes on highlands and mountains have promoted soil erosion, mass wasting and land slides which have loss of soil fertility, buried and destroyed a variety of flora and fauna as well as farmland and human lives in Sironko, Kapachorwa and Mbale around Mt. Elgon and Bundibugyo along the Rwenzori Mountains.

- Natural wild fires during the dry seasons have destroyed forests, woodlands, grasslands and papyrus swamps which led to migration of wild game, accelerated soil erosion and global warming as well as desertification like Lwera swamps in Masaka.
- Wild animals

STEPS BEING TAKEN TO REDUCE THE ENVIRONMENTAL DEGRADATION IN UGANDA

The following are the steps being taken to combat environmental degradation problem:

- The Ministry of Health and Agriculture are committed to control disease and pest outbreak through spraying, immunization and other pest control measures like tsetse flies in Mbarara, Kasese and Hoima are controlled through spraying and laying tsetse control traps (T.C.T), DDT and treated mosquito nets is being used to control malaria and Anti Retroviral (ARVs) doses are being given the AIDS (HIV) patients in Kampala, Masaka and Mbale.
- Afforestation and re-afforestation programmes are being adopted by the National Forestry Authority (NFA) and individuals to provide fuel wood and charcoal, control soil erosion and modify the climate as well as ensuring a reliable water supply like in Nebbi, Lendu forest was planted, in Kiboga, Kateera forest and even Rwooho forest in Isingiro and Bugamba forest in Mbarara are under re- afforestation with Pinus Caribbean tree species imported from Caribbea and South Africa.
- Deforestation is being discouraged by the NFA, NEMA and environmentally concerned citizens like the government was denied permission to cut down Mabira forest for sugar cane plantation in Mukono.
- In Mbarara, Masaka and Kisoro, proper farming methods such as mixed cropping, crop rotation, mulching, strip cropping, terracing, and application of appropriate fertilizers and pesticides are being adopted so as to control soil deterioration.
- Better farming practices such as ranching in Mbarara like Ankole - Masaka ranch, rotational grazing in Nakasongola and Hoima are being adopted to control overgrazing and overstocking which cause soil erosion and aridity.
- The government is setting up a National environment monitoring Network called (NEMA) National Environment Management Authority for environmental degradation causes and effects such as wetland reclamation, deforestation and release of carbon monoxide and hydrocarbon in the atmosphere. E.g. Kampala Capital City Council and NEMA are evicting people from wetlands like at Banda, Luzira, Ntinda, Kansanga and Bugoloobi wetlands in Kampala to enable wetlands perform their natural functions before being released to Lake Victoria.
- The mass media like Newspapers, televisions and radios, T- shirts, workshops and seminars are being intensified to increase public awareness about environmental education. E.g. National Forestry Authority on CBS radio station, WBS TV and public rallies holds near Mabira forest at Nagojje, Namawojjolo and Najjembe trading centres in Buyikwe so as to limit deforestation.
- Environmental courses/ programs are being introduced and implemented at Makerere University in Kampala and Busitema University for increased awareness and knowledge about environment and provision of skilled personnel to work in environmental officies .
- The government is reducing excessive population pressure on land through establishment of settlement and resettlement schemes like many Bakiga were resettled in Kibale away from the forest; use of contraceptives like providing free condoms in Kampala and Mbarara as well as developing other sectors like mining of vermiculite in Manafwa and tourism in Bwindi National Park in Kanungu and on Ssese islands in Kalangala to absorb and employ the excess population on land.
- National Environmental Management Authority is issuing environment alerts and warnings to the public especially where air and water pollution are a menace like on safety assessment of Lake Victoria in Kampala and Wakiso so as to reduce pollution levels and industries such as Uganda breweries in Kampala are warned against polluting Lake Victoria.
- The government is tarmacadamised urban roads and other main roads such as Mukono - Katosi road, Tororo - Mbale road, and Kampala – Ggaba road so as to reduce air, dust and noise pollution bas well as soil erosion in urban centres.
- Parliament is enacting environmental acts and laws like clean air such that higher standards are applied to industrial fumes and towns. E.g. industrialists like Mukwano industries and UGACOF coffee industries in Kampala are compelled to use clean flue technology to clean up their emissions before they leave the chimneys.
- The government is doubling its fund for carrying out more research in crop husbandry, soil management and animal husbandry through use of the National Agricultural Research Organization (NARO). This research is being carried out at Kawanda and Namulonge on how to improve animal and crop varieties as well as control erosion.
- Burning of grass and bushes especially in the pastoral areas like Lyantonde and Kiruhura is being discouraged so as to reduce the levels of carbon gases in the atmosphere and the soils are left to regain its structure in Luwero and Mpigi.
- Petroleum companies such as Shell, Caltex and Total in Kampala and Mbale are introducing environmentally friendly petroleum fuels such as unleaded and platinum petrol and diesel fuels to reduce air and noise pollution in the exhaust systems as well as to convert them into harmless water and Nitrogen.
- The National Water and Sewerage Corporation is treating sewage water at Bugoloobi and Lubigi in Kampala before it's discharged into Lake Victoria at Luzira where the toxins are removed while the bi-products are being used as fertilizers in the agriculture sector.
- Private companies are recycling plastic kitchen items and bottlers and polythene bags for re-use and manufacturing other plastic products such as Nice house of plastics at Bugoloobi in Kampala, Nile plastics in Jinja and Moniko steel rolling industries at Lugazi in Mukono so as to control land contamination and pollution.
- Urban centre authorities such as Kampala Capital City Council and NEMA are emphasizing proper disposal of industrial and urban wastes in clearly demarcated dumping grounds at Kiteezi in Kampala along Gayaza road and also garbage containers are being placed at strategic locations in Kampala like at Kalerwe and Nakivubo to collect garbage and control urban degradation.
- Environmental organs like the Lake Victoria Environmental Management Project (LVEMP) are controlling environmental destruction of Lake Victoria through removal of the water hyacinth, control of over fishing and fish poisoning as well as control of wetland clearance at Masese in Jinja, Bukakata in Masaka and Munyonyo at Kampala.
- The government through Uganda Wildlife Authority (UWA) and Uganda Tourism Board (UTB) is controlling the killing and poaching of wild

animals by gazetting wildlife centers like at Entebbe and Ngamba island for gorillas in Mukono as well as prohibiting the poaching habit of antelopes and elephants in all National Parks like Kidepo National park in Kaabong and Queen Elizabeth National Park in Kasese as away to conserve wild game.

- The Ministry of Energy, Uganda Electricity Transmission Company and UMEME are embarking on generation of more electricity through introduction and installation of thermal energy generated at Lugogo in Kampala, Jinja and at Namanve as well as construction of more power dams like at Karuma falls in Kiryandongo and Isimba falls in Kayunga so as to reduce deforestation for fuel wood and charcoal.
- The government is evicting many encroachers on natural forests to reduce massive deforestation, for example many Bakiga have been evicted from Kibaale forest reserve in Kibaale district.
- There is filling of mining depressions and pits with lateritic soils and other rock wastes after mining and excavation so as to control flooding pest breeding like Namekhala vermiculite mines in Manafwa and Lweza and Kajjansi clay pits in Wakiso.
- Modern fuel wood saving stoves are being manufactured, built and produced in major towns of Kampala, Mbale, Mbarara and Mukono through use of vermiculite stoves which are energy - saving so as to reduce on depletion of forests.
- The government through Uganda Investment Authority is gazetting and allocating specific areas such Namanve industrial park in Kampala, Makenke in Mbarara and Kamokoli in Mbale for industrial development so as to control wetlands and forests against clearance for industries.
- Other measures are quoted from other previous related human topics to environmental protection and conservation.

EFFECTS OF ENVIRONMENTAL DEGRADATION IN UGANDA

The effects of environmental degradation are as follows;

- There is massive siltation of water bodies such as streams, rivers and lakes by soils washed away from the steep slopes and hilly areas due to heavy down pour which has led to water contamination and damage of aquatic life like Lake Victoria, Edward and Bunyonyi as wll as River Birira, Manafwa and Nyamwambwa.
- There is drying up of streams, rivers and wells in Iganga, Kabale and Kasese due to extensive swamp and wetland reclamation which resulted into lowered water table hence limited domestic water.
- There are unproductive and arid land like Kiboga, Soroti and Luwero due to massive swamp draining, bush burning and deforestation which has led to the wide spread of desertification and late and low rain fall totals.
- There is reduction of soil productivity due to soil erosion, leaching, gulley development, over cultivation and overgrazing which has led to deterioration of the soil structure hence low output of cabbages in Kabale, Arabica coffee in Mbale, and maize in Kasese.
- There are frequent communication damages and blocks as the landslides and mass wasting block roads making them impassible and difficult like the Kisoro - Kabale, Kabarole – Bundibugyo and Mbale – Kapchorwa roads especially during season of heavy rains.
- There is occurrence of famine and food shortage in Kabale, Mpigi and Kasese because of rain scarcity, low soil productivity and loss of soil fertility which led to human starvation and death.
- There are increased health hazards such as heart diseases and high blood pressure due to pollutant gases like carbon monoxide, lead, ozone and hydrocarbons from vehicles and industrial fumes which have led to loss of people's lives in Kampala, Jinja, Mbarara and Mukono.
- There is loss, migration and reduction of wild animals like Lions, antelopes, monkeys, chimpanzees and gorillas in Kabale and Kasese due to swamp destruction, deforestation and bush burning which have crippled the tourism and ecosystem.
- There is increased spread of environmental diseases like malaria transmitted by mosquitoes, bilharzias by snails and cholera by contaminated waters due to created breeding grounds, silting, pollution and flooding in the mining areas like in Kasese, Tororo and Kajjansi in Wakiso.
- There is contamination of the water quality in wetlands, rivers and lakes especially near the industrial centres like Namanve wetlands near Kampala(in Wakiso), Njeru wetlands at the source of the Nile in Buyikwe and Luzira wetlands on L. Victoria in Kampala which is unfit for human consumption due to water pollution.
- Etc.

Sample questions:

1. "The activities of man are responsible for environmental degradation in Uganda" using relevant examples.
a) Justify the view expressed in the statement above.
b) Explain the steps being taken to combat environmental degradation in Uganda.
2. To what extent have industrialization led to environmental degradation in Uganda?
3. Examine the causes and effects of environmental degradation in any one highland area in Uganda.

SAMPLE APPROACH:

Candidates are expected to;

- Define the key word (s) in the question.
- Cite out the status / stand/ situation (+ve / -ve) of the major sector.
- Identify, describe and locate of the sub – sectors of the major sector in Uganda.
- Draw a sketch map showing the sub – sectors of the major sector with name of places.
- State, explain and then illustrate the how far (the extent to which) are the physical factors responsible for in relation to the sub – sectors of the major sector.
- Finally state, explain and then illustrate the however side of the other factors responsible for in relation to the sub – sectors of the major sector in Uganda besides physical factors.

OR

- State, explain and then illustrate the points (both positive and negative contribution / physical and human factors) in relation to the sub – sectors of the major sector in Uganda.