

CHAPTER 12

POWER AND ENERGY SOURCES IN UGANDA.

Current status of power and energy sources in Uganda.

- Energy from biomass is dominant contributing about 92% of the energy used in Uganda.
- Fossil fuel/petroleum accounts for about 6% of the energy used in Uganda.
- Hydroelectric power accounts for about 1% of the energy used in Uganda.
- Other sources of energy account for about 1% of the energy used in Uganda.
- Prepayment arrangements for hydroelectric power has been established in different parts of the country to reduce on the energy thefts.
- There is increased use of solar energy in most parts of the country because of high tariffs of hydroelectric power.
- Hydroelectric power production, distribution and marketing has been privatized
- There is increased production of hydroelectric power by construction of more dams
- Petroleum production is still in infancy stage
- There is increased use of biogas in Uganda
- There is extension of power to rural areas under rural electrification programme.
- Petroleum used in Uganda is mainly imported

Major power and energy sources in Uganda include:

- Hydroelectric power generated at Nalubaale power station and Kiira dam on Victoria Nile at Jinja, Mubuku power I, Mubuku II and Mubuku III stations on River Mubuku in Kasese, Nyagak power station on River Nyagak in Zombo.
- Solar energy is widely used in hospitals, schools, organisations and individual people for example in Mbarara, Kabale, Jinja, Mbale, Kisoro, Bundibugyo and Rukungiri
- Biomass is made up of energy from animal and vegetation matter. For example wood fuel and charcoal from Mabira forest, Budongo forest, Mt. Elgon forest and Mt. Kei forest
- Biogas is generated from plants and animal wastes like cattle dung for example in Mbarara, Kiruhura, Isingiro, Nakasongola, Kaabong, Moroto and Kotido.
- Geothermal energy is generated in hot springs for example Sempaya hot spring in Bundibugyo, Kitagata hot spring in Bushenyi and Kisizi hot spring in Rukungiri
- Thermal energy/petroleum used in Uganda is mainly imported in form of petrol, diesel and Kerosene and is used in many places like Kampala, Jinja, Mbale and Luweero. Mining of petroleum has started on the Albertine region for example in Buliisa and Hoima.
- Wind energy is generated in areas with scanty vegetation cover for example Kaabong, Kotido, Napak and Moroto.

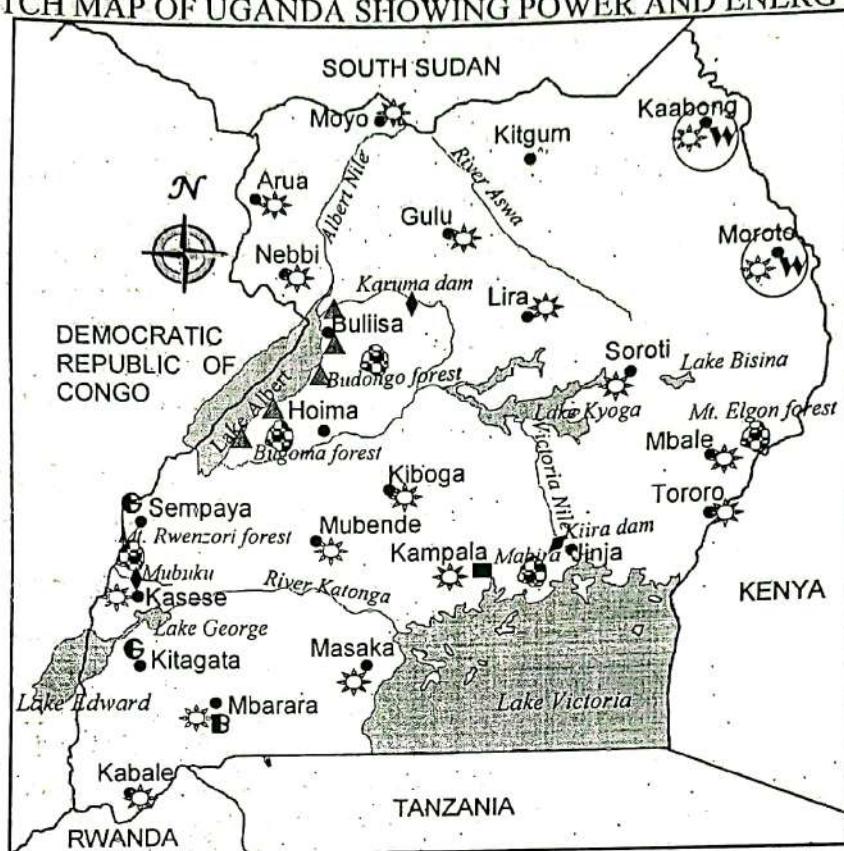
NB. Most of the energy resources are renewable except Petroleum or oil/thermal energy.
Renewable energy resources are those that can replenish naturally after exploitation.

Total numbers of hydroelectricity consumers, 2013-2017

Year	2013	2014	2015	2016	2017
Domestic	540,694	640,025	797,205	910,522	1,058,013
Commercial	52,940	61,518	72,266	85,406	95,704
Industrial	2,528	2,746	3,054	3,146	3,245
Street lights	359	348	311	306	303
Total	596,521	704,637	872,836	999,380	1,157,265

Source: Statistical Abstract; UBOS report 2018 page 207.

A SKETCH MAP OF UGANDA SHOWING POWER AND ENERGY SOURCES



KEY

	Biomass energy		Wind energy
	Petroleum/thermal energy		Biogas energy
	Solar energy		Geothermal energy
	Hydroelectricity power station		Towns

Factors which have favoured the development of power and energy resources in Uganda

Physical factors

1. Presence of forests for generation of biomass from Mabira forest, Ssese island forest, Budongo forest, Katuugo forest and Lendu forest.
2. The presence of numerous rivers with waterfalls used for the construction of dams for generation of hydroelectric power for example Nalubaale power station in Jinja on Victoria Nile, Mubuku power station in Kasese on river Mubuku and Nyagak power station in Zombo on river Nyagak.
3. The presence of hot springs for the generation of geothermal energy for example at Sempaya hot springs in Bundibugyo and Kitagata hot spring in Bushenyi.
4. The presence of petroleum deposits in Buliisa and Hoima and imported petroleum for the generation of petroleum energy in Kampala, Jinja and Mbale.
5. The presence of maximum sunshine due to the location of Uganda astride the equator in the heat belt for maximum solar energy in Kampala, Entebbe, Kasese and Mukono.
6. The scanty vegetation for the occurrence of strong winds for generation of wind energy from Kaabong, Kotido and Moroto.
7. The presence of hard basement rocks for the construction of strong dams for along river Nile for generation of hydroelectricity at Kiira dam and Bujagali power station in Jinja.

8. The presence of abundant animal wastes like cattle dung for the generation of biogas in Mbarara, Kiruhura, Lyantonde, Kaabong, Moroto and Napak.

Human factors

9. Availability of adequate capital invested in buying inputs and construction of dams for generation of hydroelectricity at Nalubaale power station and Kiira dam in Jinja and buying of solar panels for the generation of solar energy in Masaka, Entebbe and Kasese.
10. Availability of skilled labour to work in the generation of power and energy for example in the construction of dams for the generation of hydroelectricity at Nalubaale power station and Kiira dam at Jinja.
11. Improved technology used in the generation of power and energy for example imported technology like turbines used in the generation of hydroelectricity for example at Nyagak power station in Zombo and Nalubaale power station at Jinja.
12. Supportive government policy in terms of soliciting for foreign assistance such as World Bank to tap energy resources for example hydroelectric power from Bujagali power station and Nalubaale power station in Jinja.
13. Availability of large market for energy resources for example biomass from Mabira forest and Katuugo forest and Hydroelectricity from Nalubaale power station used in urban areas like Kampala, Jinja and Mbarara.
14. Availability of well-developed transport network for delivery of power and energy sources to market centres for example biomass from Mabira forest and petroleum from Kampala.
15. The relative political stability has encouraged investment in generation of energy resources like hydroelectric power from Nalubaale power station and Kiira dam at Jinja.
16. Intensive research conducted by the ministry of energy and mineral development concerning sustainable and large scale generation of power and energy for example hydroelectricity generated at Kiira dam and Nalubaale power station in Jinja.
17. Increased industrialisation which has increased the demand for power and energy for example Mukwano industries in Kampala and Uganda breweries at Njeru using hydroelectricity from Kiira dam in Jinja.

Contribution of power and energy sources to the development of Uganda.

Positive contributions

1. Power and energy has encouraged Industrialisation since it is used in running machines, lighting and extraction of raw materials for example steel rolling mills in Jinja and roofings factory in Kampala use hydroelectricity generated from Nalubaale power station and Kiira dam in Jinja.
2. Power and energy has boosted tourism/education and research for students from higher institutions of learning for example those carrying out electrical engineering carry out research on hydroelectricity at Nalubaale power station in Jinja.
3. Source of foreign exchange through exportation of power and energy to foreign countries for example hydroelectricity from Nalubaale power station at Jinja exported to Kenya.
4. Power and energy sector has encouraged economic diversification and reduced overdependence on one sector especially agriculture through generation of income from solar energy in Masaka, hydroelectricity from Nalubaale power station and Kiira dam in Jinja.
5. Source of employment opportunities in terms of engineers and transmitters of hydroelectricity generated from Kiira dam and Nalubaale power station in Jinja like in Umeme which has enabled people to earn income and improve their standard of living.
6. The generation of power and energy has promoted urbanization with its benefits for example Jinja where hydroelectricity is generated from Kiira dam and Nalubaale power station at Jinja and Mubuku due to Mubuku power station in Kasese.

7. Power and energy has promoted international cooperation between Uganda and where it is exported and where technology is imported for example Hydroelectricity from Nalubaale power station at Jinja exported to Kenya.
8. Power and energy has promoted the development of transport and communication for example imported petroleum in Kampala, Jinja and Mbarara in form of petrol and diesel is used by all kinds of vehicles along Kampala – Jinja road and Kampala – Masaka road.
9. Source of government revenue through taxing people and companies engaged in the generation of power and energy for example Umeme for generation of hydroelectricity at Nalubaale power station and Kiira dam at Jinja.
10. It has encouraged the exploitation of natural resources for example mining of Mica Nebbi and lumbering using Petroleum, limestone at Hima and Tororo using hydroelectricity from Nalubaale power station at Jinja.
11. It has encouraged the development of construction sector since it is used to run machines for example in Kampala and Jinja due to the presence of hydroelectricity from Kiira dam and Nalubaale power station at Jinja.
12. It is a source of market for other sectors of the economy for example biomass in form bagasse from sugarcanes at Kakira and biogas from cattle in Mbarara.

Negative effects

1. Power and energy sector has led to profit repatriation by foreign companies engaged in the sector for example Umeme from South Africa for hydro electricity from Nalubaale power station and Kiira dam, Tullow Oil and gas company from UK for petroleum in Hoima and Buliisa.
2. Power and energy sector has resulted into destruction of vegetation cover for example deforestation resulting from exploitation of biomass from Mabira forest and Budongo forest.
3. It has led to environmental pollution for example dangerous fumes released from vehicles using petroleum from Kampala and Jinja.
4. Power and energy is associated with accidents especially electric shock from hydro electricity generated from Nalubaale power station and Kiira dam at Jinja.
5. Power and energy sector has led to urban related problems like rural-urban migration with associated problems in urban centres like Jinja due to hydro electricity generated from Kiira dam and Nalubaale power station, Buliisa due to petroleum energy/oil.
6. It has led to competition for labour and capital from other sectors of the economy leading to their underdevelopment for example hydroelectricity generated from Kiira dam and Nalubaale power station at Jinja and Nyagak power station in Zombo.
7. It leads to regional imbalance in terms of development since areas like Kampala and Jinja with hydroelectricity generated from Kiira dam are more developed than areas without hydroelectricity.
8. It has led to economic dependence because of the loans obtained for constructing dams for hydroelectricity generated at Nyagak power station in Zombo, Kiira dam and Nalubaale power station at Jinja.
9. The extraction of power and energy has led to displacement of many people leaving those homeless for example the extraction of oil and natural gas in Hoima and Buliisa.

Reasons for the low levels of development of power and energy sector in Uganda.

1. Low levels of technological development leading to overdependence on imported technology which is expensive for example extraction of oil and natural gas in Hoima and Buliisa and hydroelectricity generated at Nyagak power station in Zombo, Kiira dam and Nalubaale power station at Jinja.
2. Limited skilled labour to tap the existing power and energy resources leading to dependence on expatriate labour for example hydroelectricity generated at Tullow Oil and Gas Company for

- petroleum in Hoima and Umeme for Hydroelectricity at Kiira dam and Nalubaale power station at Jinja.
- 3. Limited research conducted concerning sustainable exploitation of power and energy resources for example wood fuel from Mabira forest.
- 4. Competition from other land uses for example forestry for environmental protection to generate hydroelectricity at Bujagali power station.
- 5. Depletion of forest resources like Namanve forest, Sango bay forest, Mt. Kadam forest which has reduced on the extraction of wood fuel and charcoal.
- 6. Limited capital to develop the energy sector for example hydroelectricity generated from Kiira dam and Nalubaale power station at Jinja
- 7. Limited market for power and energy due to high prices of power for example for hydroelectricity generated from Kiira dam and Nalubaale power station at Jinja.
- 8. Insecurity in some parts of Uganda has led to low levels of investment necessary for the development of power and energy especially hydroelectricity generated at Nyagak power station in Jinja and biomass from mountain Rwenzori forests.
- 9. Poorly developed transport network for example roads to distribute power and energy sources like petroleum from Kampala to rural areas.
- 10. Corruption and embezzlement of funds meant for the development of the power and energy sector for example for hydroelectricity from Bujagali power station ~~along R.A.P.W~~
- 11. The scattered settlement pattern has hindered government policy of rural electrification in Kiboga, Luweero and Nakasongola for hydroelectricity generated from Nalubaale power station and Kiira dam at Jinja.
- 12. The high level of bureaucracy involved in the development of power and energy for example in the construction of hydroelectric power stations like Bujagali power at Jinja and Nyagak power station in Zombo
- 13. High population growth rate has led to increased competition for the limited power and energy like wood fuel and charcoal from Mabira forest and hydroelectricity from Nalubaale power station and Kiira dam at Jinja.
- 14. Fluctuation in power supply due to natural disasters like cloudy days affected solar energy in Kampala, fluctuating water levels in Lake Victoria affects generation of hydroelectricity at Nalubaale power station and Kiira dam.
- 15. Physical barriers for example steep slopes of mountains hinder the distribution of power and energy in mountainous areas for example hydroelectricity from Nalubaale Kiira dam and Nalubaale power station.
- 16. Profit repatriation by the foreign owned enterprises like Umeme from South Africa has limited the rate of profit plough back for hydroelectric power from Nalubaale power station Kiira dam and Nalubaale power station.
- 17. High wastage and loss of power through illegal connections has led to losses for the generation of hydroelectricity from Kiira dam and Nalubaale power station.
- 18. Limited capital to be invested in the generation of power and energy sources in Uganda for example in buying solar panel for solar energy in Luweero.

Steps being taken to develop the energy sector in Uganda.

1. Setting up more hydroelectricity power station in addition to the existing ones to increase power supply for example Bujagali hydroelectric power station in Jinja and Nyagak hydroelectric power station in Zombo.
2. Construction of thermal plants to supplement hydroelectricity at Kiira dam and Nalubaale power station for example a 50 MW heavy fuel oil thermal plant at Namanve and the use of standby generators in Kampala.

3. Soliciting for funds to develop the energy sector for example Hydroelectricity at Bujagali power station funded by the African Development Bank and the government of Japan.
4. Liberalization and privatization of the economy by attracting foreign investors with capital and skills in the energy development for example Sithe Global power, Japanese International cooperation Agency for hydroelectricity at Bujagali power station, Tullow Oil and gas company for petroleum in Buliisa
5. Promoting the use of prepaid meters by Umeme to reduce power theft for hydroelectricity from Kiira dam and Nalubaale power station at Jinja.
6. Improvement in transport and communication network to distribute power and energy to rural areas for example petroleum from Kampala to Masaka via Kampala-Masaka road.
7. Intensive research is being carried out by the ministry of energy and mineral development concerning energy development and conservation for example biomass from Mabira forest and Budongo forest
8. Encouraging afforestation and re-afforestation programmes to replace the depleted forests and therefore increase on the supply of biomass example from Katuugo forest in Nakasongola and Lendu forest in Nebbi.
9. Encouraging power production from biomass residues for example bagasse from sugar mills at Kakira sugar works and Kinyara sugar factory to save biomass from forests like Mabira.
10. Encouraging the use of energy saving equipment for example UGA stove for saving charcoal from Budongo forest and energy saving bulbs to save hydroelectricity from Nalubaale power station at Jinja.
11. Gazetting forests into forest reserves so as to preserve them for the future generation for biomass from Mabira forest and Budongo forest
12. Education and training of labour to acquire the necessary skills for generation and distribution of hydroelectricity from Nalubaale Kiira dam and Nalubaale power station at Jinja.
13. Establishing support institutions like ministry of energy and mineral development to ensure effective generation of power and energy for example ministry of energy and mineral development for hydroelectricity from Kiira dam and Nalubaale power station at Jinja.
14. Adopting load shedding (power rationing) to effectively utilize the exploitation of Hydroelectricity from Nalubaale power station and Kiira dam at Jinja.
15. Promoting rural electrification to ensure that the rural community can access hydroelectricity to increase the size of the market for hydroelectric power generated from Kiira dam and Nalubaale power station at Jinja.
16. Fighting corruption and embezzlement of funds to reduce mismanagement of funds meant for development of power and energy sources like hydroelectricity generated from Kiira dam and Nalubaale power station at Jinja.
17. Ensuring security in most parts of Uganda to encourage the distribution of energy and power sources like hydroelectricity generated from Kiira dam and Nalubaale power station at Jinja.
18. Fighting illegal connections by Umeme to reduce wastage of power and energy sources like hydroelectricity generated from Kiira dam and Nalubaale power station at Jinja.
19. Importation of modern technology in the country to facilitate the generation of power and energy sources for example solar panels for solar energy in Kampala.
20. Acquisition of loans from financial institutions to facilitate the buying of the necessary equipment for example solar panels and batteries for solar energy in Kampala.

REVISION QUESTIONS

- 1. Explain the factors which have favoured the development of power and energy sources in Uganda.**
 - Give the current status of power and energy sector in Uganda, identify the forms of power and energy and draw a sketch map of Uganda showing energy sources.
 - Explain the factors, giving an example of form of energy and where it is generated.
- 2. Assess the contribution of power and energy sector to the development of Uganda.**
 - Give the current status of power and energy sector in Uganda, identify the forms of power and energy and draw a sketchmap of Uganda showing energy sources.
 - Explain the positive and negative contribution, giving an example of form of energy and where it is generated.
- 3. (a) Explain the problems facing power and energy sector in Uganda.**
 - Give the current status of power and energy sector in Uganda, identify the forms of power and energy and draw a sketchmap of Uganda showing energy sources.
 - Explain the problems, giving an example of form of energy and where it is generated.**(b) Suggest measures taken to improve power and energy sector in Uganda.**
 - Use suggestive language using words like should; may, can etc, giving an example of form of energy and where it is generated.
- 4. Assess the contribution of hydroelectric power to the development of Uganda.**
 - Give the current status of hydroelectricity in Uganda, identify the hydroelectric dams and draw a sketchmap of Uganda showing hydroelectricity dams.
 - Explain the positive and negative contribution of hydroelectricity, giving an example of a dam and the river on which it is found.
- 5. Account for the increased exploitation of renewable energy resources in Uganda.**
 - Define renewable energy resources.
 - Identify and draw a sketch map of Uganda showing renewable energy resources
 - Explain the causes of resources, giving an example of a renewable energy resource and where it is generated.
- 6. To what extent is the power crisis in Uganda a result of government neglect?**
 - Give the current status of power and energy sector in Uganda.
 - Identify the forms of power and draw a sketch map of Uganda showing power sources.
 - Explain the problems, giving an example of form of power and where it is generated.
 - Give the role of government neglect (i.e. all human factors) and then give other factors, giving an example of form of power and where it is generated.
- 7. To what extent have physical factors favoured the development of the energy sector in Uganda?**
 - Give the current status of energy sector in Uganda.
 - Identify and draw a sketchmap of Uganda showing energy sources.
 - Explain the physical factors and then other factors, giving an example of form of energy and where it is generated.
- 8. Account for the poor distribution of hydroelectricity in Uganda.**
 - Give the current status of hydroelectricity in Uganda.
 - Identify and draw a sketchmap of Uganda showing hydroelectric stations/dams.
 - Explain the problems facing the poor distribution of hydroelectricity, giving an example of form of a dam and River.

CHAPTER 16 MINING IN UGANDA

Current status of the mining industry in Uganda.

- New minerals have been discovered like oil around lake Albert, Uranium, gold in Moroto
- Most mining is done by foreign companies for example oil by Tullow Oil and Gas Company and Total SA.
- Mineral prospecting and exploration is still going on like oil around Lake Albert.
- The crude oil pipeline from Kabaale in Hoima to Port Tanga in Tanzania is under construction.
- Some minerals appear in small quantity like Gold in Busia
- Some formerly closed mining centres are being opened for example tin mine in Kisoro, Iron ore at Muko in Kabale
- Copper mining at Kilembe has been revived by Tibet Hima Company.
- Mining contributes about 0.5% of GDP
- Most miners use simple tools/technology for example Gold at Busia and Salt on Lake Katwe
- Most minerals are being exported before being processed for example Gold from Busia
- There is dependence on expatriate labour in the mining sector
- Some minerals are being extracted from waste materials like Cobalt at Kasese.
- Vermiculite and gold are the most valuable minerals mined in Uganda.
- Various industries have been established to process minerals for example Hima and Tororo cement factories for Limestone

Summary of Mineral Statistics by Value (Million Shs), 2008-2012,

	2008	2009	2010	2011	2012
Production	87,349	98	126,190	177,655	207,819
Exports	89,247	27,622	36,486	65,247	69,896
Imports	102,436	27,119	40,843	17,361	31,557

Source: Statistical abstract; UBOS Report 2013.

In Uganda the major minerals include

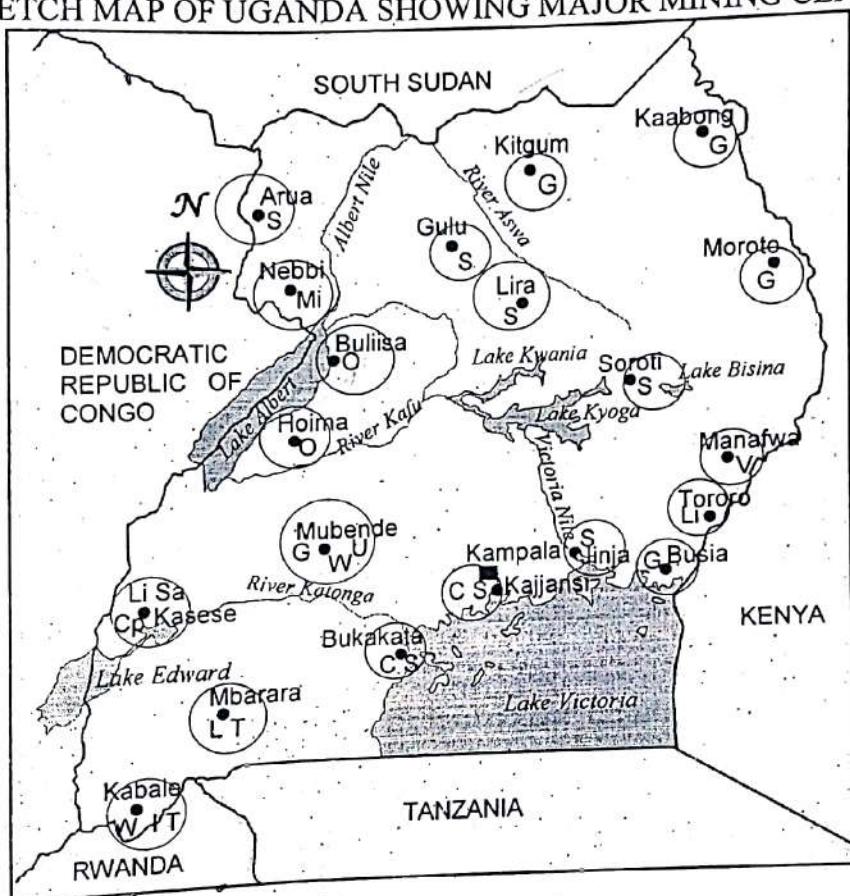
- Gold in Busia, Bushenyi, Mubende, Kotido and Moroto
- Beryllium in Bushenyi, Rukungiri and Mubende
- Iron ore at Muko in Kabale and Kisoro
- Lead in Mbarara
- Tin in Ntungamo, Kisoro and Mbarara.
- Limestone at Tororo and Hima.
- Clay at Kajjansi.
- Sand at Kasenyi, Bukakata and Rakai
- Gypsum in Bundibugyo
- Wolfram at Mutolele in Kisoro
- Oil at Buseruka and Waraga in Buliisa
- Salt from Lake Katwe in Kasese

Annual selected mineral production by quantity (tonnes), 2013 – 2017

Mineral	2013	2014	2015	2016	2017
Limestone	922,372	1,090,240	979,660	1,203,074	1,231,926
Pozollana	623,471	742,423	686,564	846,604	792,564
Vermiculite	2,297	2,661	801	3,295	4,119
Kaolin	43,875	43,286	34,697	45,909	55,317
Iron ore	2,282	41,959	9,000	2,163	2,320

Source: Statistical abstract; UBOS Report 2018 Pg 209.

A SKETCH MAP OF UGANDA SHOWING MAJOR MINING CENTRES



* Lawrence

* Fabir

Kaabong
G

Moroto
G

KEY

C	Clay
G	Gold
I	Iron ore
L	Lead
Li	Limestone

Mi	Mica
O	Oil/Petroleum
S	Sand
Sa	Salt
T.	Tin

U	Uranium
V	Vermiculite
W	Wolfram

Methods of mining in Uganda.

- Open cast method. This involves excavation of the soil covering a mineral which is found near the surface for example in the mining of Sand at Bukakata and Bushenyi, Limestone at Hima and Tororo
- Underground mining. This involves digging of tunnels (in case of adit mining) and shafts to obtain the mineral which is found very deep under the ground for example it was used (in case of shaft mining) for example mining copper and Cobalt mining at Kilembé in Kasese
- Placer or alluvial mining. This involves excavation of loose or alluvial deposits such as sand, gravel, silt or clay, where the valuable mineral is separated from the alluvial deposits through a system of screens for example mining of clay and sand at Kajjansi

- Solution method. This is mainly concerned with mining of soluble salts where salt solution is crystallized into salt for example salt from Lake Katwe.
- Drilling. This involves boring until the mineral is reached and is obtained by pipes for example oil mining in Buliisa district.

Factors which have favoured mining in Uganda.

1. The presence of large valuable mineral deposits which are highly demanded for their products encouraging continuous exploitation of minerals like Clay at Kajjansi, Limestone at Hima and Töroro, and Oil in Buliisa.
2. The gently sloping landscape has encouraged the construction of supportive infrastructures especially roads leading to mining centres for mining of Clay at Kajjansi, Limestone at Hima and Tororo, Oil in Buliisa, Gold in Busia and Kotido
3. Ideal climatic conditions for example the dry and hot conditions of Kasere have encouraged evaporation and crystallization of salt, encouraging salt mining on Lake Katwe.
4. The nature of overlying rock in terms of hard basement rock which reduces the collapsing of open pits and tunnels hence reducing accidents and favouring limestone mining at Hima and Tororo and soft overlying rocks which are easy to be excavated to extract the mineral ore for example Sand at Kasenyi and Lwera.
5. Occurrence of some minerals near the earth's surface making it easy and economical to mine them using open cast method for example Mica in Nebbi and sand at Kasenyi.
6. Existence of water used during mining and processing of minerals such as Gold in Mubende and Clay at Kajjansi.
7. Availability of adequate capital invested in paying labour and construction of supportive infrastructure for Clay at Kajjansi, Limestone at Hima and Tororo, Oil in Buliisa
8. The availability of a large market both at home and abroad for minerals such as Clay at Kajjansi, Limestone at Hima and Töroro, Oil in Buliisa, Gold in Busia and Kotido
9. Supportive government policy like liberalization of the mining sector and construction of supportive infrastructure has encouraged exploitation of Clay at Kajjansi, Limestone at Hima and Tororo, Oil in Buliisa, Gold in Busia and Kotido
10. The relative political stability has encouraged long term investment in mining of Clay at Kajjansi, Limestone at Hima and Tororo, Oil in Buliisa, Gold in Busia and Kotido
11. Intensive research conducted by the ministry of energy and mineral development has encouraged sustainable and quality mining of Clay at Kajjansi and Limestone at Hima
12. Availability of skilled labour provided by both local and foreign labour to work in mining for example as engineers, surveyors and researchers in mining of Clay at Kajjansi, Limestone at Hima and Tororo, Oil in Buliisa, Gold in Busia and Kotido.
13. Availability of improved technology especially imported technology which is efficient for example drillers for oil at Buliisa, excavators for limestone mining at Tororo and Hima
14. Availability of improved transport network for the distribution of minerals to the market centre for example Kampala-Jinja road, Kampala-Gulu road for Clay at Kajjansi and Limestone at Hima and Tororo.
15. The presence of reliable power and energy for example hydro-electric power, wood fuel and petroleum used in running machines during mining of Clay at Kajjansi, Limestone at Hima and Tororo, Oil in Buliisa.
16. The availability of many mineral processing industries has increased demand for the minerals such as Clay at Kajjansi and Limestone at Hima and Töroro.

Contribution of mining to the development of Uganda

Positive contributions

1. Source of employment opportunities where people are employed as geologists, engineers and accountants in mining of Clay at Kajjansi, Limestone at Hima and Tororo.
2. Mining has led to the development of industries since minerals act as raw materials for industries for example limestone at Tororo and Hima for the cement industry, Clay at Kajjansi for the manufacture of bricks and tiles by the Uganda clays at Kajjansi.
3. Source of foreign exchange through exportation of minerals for example Cobalt from Kasese exported to Australia and Japan, Vermiculite from Manafwa exported to USA.
4. Source of revenue to the government through imposing taxes on people employed and companies engaged in mining activities like from Clay at Kajjansi and Limestone at Hima.
5. Mining has led to the development of transport infrastructure especially roads connecting mining centres to processing centres and market centres for example a road from limestone mines at Hima to Hima cement factory, a road from Osukuru limestone mines to Tororo.
6. Mining has led to the development of power and energy to facilitate the mining activities for example copper mining at Kilembe led to the development of Mubuku power station in Kasese.
7. Mining has led to urbanization with its benefits since mining centres attract a large population copper mining at Kilembe led to the growth of Kilembe town, Tororo town due to limestone mining at Tororo, Kajjansi due to clay mining at Kajjansi.
8. Mining has led to creation of international relationship between Uganda and countries where mining companies come from for example Tullow Oil and Gas Company from UK for oil mining in Buliisa.
9. Mining has led to the development of research and education/tourism by for example Geology for Clay at Kajjansi, Limestone at Hima and Tororo and Oil in Buliisa.
10. Mining has led to diversification of the economy and reduce over dependence on agriculture which is highly affected natural factors through generation of alternative income from Clay at Kajjansi, Limestone at Hima and Tororo, Oil in Buliisa.
11. Mining is a source of consumer goods for domestic purposes for example salt from Lake Katwe in Kasese for human and cattle, and sand at Kasenyi for construction of roads and buildings
12. Mining has led to the development of agriculture through provision of market for foodstuffs for example workers in Salt mining from Lake Katwe in Kasese and limestone mining at Tororo and Hima buy foodstuffs in the neighbourhood.
13. Mining has boosted the utilization of natural resources especially the mineral resources which stimulates economic growth for example Oil in Buliisa.
14. Mining has promoted technological development through importation of machines to be used in mineral extraction for example derricks for oil mining in Buliisa.
15. Mining has led to acquisition of skills through job training hence increasing skilled labour for example oil mining in Buliisa; gold mining in Kaabong and limestone mining at Tororo.

Negative contributions

1. Mining has led to environmental pollution resulting from smoke, gases and dust and wastes released to the atmosphere for example fumes from limestone mining at Tororo and Hima.
2. Mining is associated with accidents especially during open cast mining for example iron ore at Muko in Kabale, Limestone mining at Tororo and Hima, Stone quarrying at Matugga.
3. Mining has led to the growth of ghost towns with their associated evils when mining ceases for example Kilembe ghost town after copper mining ceased in Kilembe
4. Mining has led to exhaustion of mineral resources resulting from over exploitation for example limestone mining at Hima and Tororo and Wolfram from Kisoro
5. Mining has led to profit repatriation by foreign mining companies for Example Tullow Oil and Gas company from UK carrying out oil mining at Buliisa

6. Mining has led to displacement of people to establish mines leaving them landless and homeless for example oil mining at Buliisa
7. Mining has led to urban related problems in urban centres which have developed from mining for example prostitution, unemployment etc. at Tororo and Hima limestone mines, Katwe salt mine
8. Mining has led to destruction of vegetation to establish mining centres for example Clay at Kajjansi, Limestone at Hima and Tororo, Oil in Buliisa, Gold in Busia and Kotido
9. Mining has led to creation of pits which are habitats for disease carrying vectors for example clay mining at Kajjansi, Sand mining at Kasenyi have created pits which breeding grounds for mosquitoes
10. Mining has led to land degradation such as large scars and pits left behind after mining for example quarrying of stones at Matugga and Bwebajja, mining of sand at Kasenyi, mining of clay at Kajjansi, mining of limestone at Tororo and Hima
11. Mining has led to withdrawal of labour from other sectors especially agriculture leading to reduction in its productivity by getting better employment opportunities in mining Clay at Kajjansi, Limestone at Hima and Tororo, Oil in Buliisa, Gold in Busia and Kotido
12. Mining has led to increased government expenditure in providing supportive infrastructure like roads for example oil mining in Buliisa.
13. Mining has led to regional imbalance where mining centre have more developed infrastructure leading to problems like rural-urban migration for example oil mining in Buliisa.
14. Mining has led to damaging of buildings through cracks created by blasting of rocks for example limestone mining at Tororo.
15. Mining has led to destruction of soil structure through blasting of rocks which reduces soil productivity for example limestone mining at Tororo.

Problems facing mining in Uganda

1. Inadequate capital to be invested in purchasing machinery, surveying and paying labour has led to low levels of mining of Sand at Kasenyi and Bukakata, Gold in Busia and Kotido
2. Some minerals appear in small quantity and are easily exhausted for example tin in Kikagati in Isingiro, Wolfram in Nyamuliro in Kabale
3. Poor quality of minerals and thus minerals are of limited economic value for example Gold in Busia and Kotido and Cobalt from Kasese
4. Inadequate market/price fluctuation due to low demand for mineral products in the local markets has discouraged investment in copper at Kilembe and Gold in Busia and Kotido
5. Low levels of technology in mining which involve use of inefficient tools like hoes, axes and spades for Gold mining in Busia and Moroto, Salt mining at Lake Katwe in Kasese
6. Limited skilled labourforce to work as engineer, researchers and miners leading to dependence on expatriate labour which is expensive in mining of Oil in Buliisa.
7. Insecurity/hostility in some parts of Uganda which scares away investors for example ADF in western Uganda has caused a threat to oil mining at Buliisa and the hostile Karamojongs have scared away investors in Gold mining in Moroto and Kotido
8. Poorly developed transport network to connect mining centres to market centres and processing centres limiting Gold mining in Moroto and Kotido and Tin in Kanungu
9. Low supply of power and energy supply for mining due to load shedding affecting exploitation of minerals like wolfram in Kabale, limestone at Kaseremu in Kapchorwa.
10. Climatic changes especially heavy rainfall which hinders transportation of minerals to market centres for example iron ore in Kabale and affects salt mining on Lake Katwe in Kasese and too much heat discourages gold mining in Kaabong, Moroto and Kotido
11. Competition from other sectors of the economy for labour for example agriculture and industrial sectors leading to reduction in labourforce employed in mining Clay at Kajjansi, Limestone at Hima and Tororo, Oil in Buliisa, Gold in Busia and Kotido

12. Over exploitation of mineral resources leading to exhaustion for example wolfram from Nyamuriro in Kabale, Tin from Kikagati in Isingiro, Gypsum in Bundibugyo
13. The presence of a hard overlying rock which makes it expensive to blast the rocks and therefore making mining uneconomical for example stone quarrying at Matugga and Bwebajja, oil at the Semliki valley.
14. Profit repatriation by foreign companies which discourages re-investment in the mining sector for example Tullow Oil and gas company from UK engaged in oil mining at Buliisa
15. Smuggling of minerals across borders leading to overexploitation of mineral resources and reduced government revenue for example Gold in Busia, Moroto and Kotido smuggled to Kenya, Mica in Nebbi smuggled to Congo.
16. Corruption and embezzlement of funds has led to mismanagement of funds meant for improving on mining for example oil in Buliisa, copper in Kilembe mines
17. Some minerals are found in remote areas and thus not easily accessible for example Gypsum in Bundibugyo, Gold in Kotido and Moroto
18. Limited research/poor geological survey limiting the discovery of some minerals for Clay at Kajjansi, Limestone at Hima and Tororo, Oil in Buliisa, Gold in Busia and Kotido
19. Absence of clear marketing policy of minerals where individual miners search for market and negotiate prices of minerals leading to price fluctuation of minerals such as Clay at Kajjansi, Limestone at Hima and Tororo, Oil in Buliisa, Gold in Busia and Kotido
20. Territorial conflicts in the mining areas has increased competition and created insecurity limiting mining of copper at Kilembe, Oil on Lake Albert in Buliisa
21. Land conflicts with other landuse types for example wild life conservation at Queen Elizabeth national park versus limestone mining in Kasese, tea growing at Kyamuhunga Versus gold mining in Bushenyi.
22. Break down of machinery and therefore leading to losses for example the breakdown of a salt processing plant has hindered salt mining on Lake Katwe in Kasese.
23. Pests and diseases discourages mining in affected areas for example Ebola discouraging Gypsum mining in Bundibugyo
24. Land encumbrances/wrangles over ownership by government and private individuals for example oil at Buliisa.

Measures being taken to promote mining in Uganda

1. The government is improving on transport network to facilitate the distribution of minerals to market centres for example a road from Kasese to Kampala for limestone at Kasese, a road from Jinja to Mbale for vermiculite in Manafwa.
2. Providing capital in form of loans necessary for mining through financial institutions like Stanbic bank and centenary bank for Clay at Kajjansi, Limestone at Hima and Tororo, Oil in Buliisa, Gold in Busia and Kotido and vermiculite in Manafwa
3. Liberalization of the mining sector to allow private individuals engage in mining without any restriction for example in mining Clay at Kajjansi and Limestone at Hima and Tororo.
4. Privatizing the formerly inefficient state owned mines to ensure quality mineral production for example clay mining at Kajjansi, and copper mining at Kilembe
5. Improving technology to increase on efficiency and effectiveness in mining through importation of technology from Japan, USA and China to promote mining of Clay at Kajjansi, Limestone at Hima and Tororo, Oil in Buliisa.
6. Reduction in smuggling of minerals to neighbouring countries by using strong check points by Uganda Revenue Authority for example at Malaba and Busia to reduce smuggling of Gold at Busia and Vermiculite in Manafwa to Kenya.

7. Expanding the size of the market through economic integration for example the East African Community and COMESA to increase market for minerals such as Clay at Kajjansi, Limestone at Hima and Tororo, and Oil in Buliisa.
8. Promoting political stability in the mining areas by using the national army UPDF to encourage investment in the mining of Clay at Kajjansi and Limestone at Hima and Tororo.
9. Intensive research such as geological research, technological research and market research to improve on mining of Clay at Kajjansi, Limestone at Hima and Tororo and Oil in Buliisa.
10. Education and training through higher institutions of learning with students doing petroleum engineering and geology to provide skilled labour employed in mining of Clay at Kajjansi, Limestone at Hima and Tororo and Oil in Buliisa.
11. Improving on power and energy to run machines used during mining of Limestone at Hima and Tororo, oil in Buliisa and Hoima and wolfram in Kabale.
12. Government involvement in mining to ensure sustainable exploitation minerals for example exploration of oil at Buliisa where the government has been involved in training the required manpower.
13. The government through the Uganda Investment Authority is bidding for mining different minerals to foreign investors with the necessary capital and technology for example oil mining in Buliisa and copper and Kilembe.
14. Setting up mineral processing industries to expand on the size of market for example cement industries for limestone at Tororo and Hima, Uganda clays for clay at Kajjansi.

REVISION QUESTIONS

1. (a) **Describe the state of mining sector in Uganda**
 - Give the current status of the mining sector in Uganda, identify the mining centres and draw sketchmap of Uganda showing mining centres.
- (b) **Explain the challenges facing the mining sector in Uganda.**
 - Explain the challenges facing the mining sector giving an example of a mineral and place name on every point.
2. **Assess the contribution of mining to the development of Uganda**
 - Give the current status of the mining sector in Uganda, identify the mining centres and draw sketchmap of Uganda showing mining centres.
 - Explain the positive and negative contribution of mining to the development of Uganda, giving an example of a mineral and place name on every point.
3. (a) **Draw a sketchmap of Uganda showing the distribution of mineral resources.**
 - Give the current status of the mining sector in Uganda, identify the mining centres and draw sketchmap of Uganda showing mining centres.
- (b) **Explain the measures being taken to improve on the mining industry in Uganda.**
 - Explain the measures in present tense, giving an example of a mineral and place name on every point.
4. **To what extent is low level of technology hindered the exploitation of mineral resources in Uganda?**
 - Give the current status of the mining sector in Uganda, identify the mining centres and draw sketchmap of Uganda showing mining centres.
 - Explain the contribution of low level of technology and then other factors, giving an example of a mineral and place name.

CHAPTER 15

FISHING IN UGANDA

Current status of the fishing industry in Uganda

- Fishing contributes about 1.5% of GDP
- 60% of fish caught is sold while fresh and only 40% is processed.
- The biggest percentage of fish is from Lake Victoria followed by Lake Kyoga.
- The methods of catching fish are both traditional like spearing, baskets and modern like gill netting.
- The methods of preservation of fish are both traditional like smoking and modern like freezing.
- About 1.2 million people depend on the fishing sector.
- Fish export is one of the major foreign exchange earner for Uganda.
- Most fish processing companies are owned by foreigners.
- Many lakes are being restocked with fish for example Lake Victoria.
- Total fish catch has been declining over the years due to over fishing.
- There is increased fish farming in different areas like Kajjansi, Mbale etc. and restocking is being done on some lakes like Lake Victoria.
- The major fish species caught include Nile Perch, Tilapia etc.
- Many industries processing fish have been established to reduce post-harvest losses for example Ngege fish factory at Luzira, Greenfield at Katabi etc.

Major fishing grounds in Uganda.

The major fishing grounds in Uganda include;

1. Lakes such as Lake Victoria; Lake Kyoga, Lake Albert, Lake George, Lake Edward, Lake Kwania, Lake Bisina, Lake Opeta
2. Rivers like Victoria Nile, Albert Nile, River Kafu, River Kagera, River Katonga, River Nkusi, River Mayanja, River Mpologoma
3. The Swamps/wetlands for example Galiraya swamp, Tumba swamp, Lwampanga swamp, Bukungu swamp around Lake Kyoga, Nabugabo swamp, Sango bay swamp, Buyaga bay swamp around Lake Victoria etc.
4. Fish ponds for example at Kajjansi, Kiboga, Mbale, Jinja, Pallisa, Kabale, Mubende, Iganga, Rukungiri etc.

Fish catch by water body (thousand tonnes), 2005-2009

Water body	2005	2006	2007	2008	2009
Lake Victoria	253.3	215.9	223.1	219.5	221.3
Lake Albert	56.4	56.4	56.1	56.5	56.5
Lake Kyoga	68.4	60.0	60.0	60.0	60.0
Lake Edward, George and Kazinga channel	9.6	8.8	8.8	8.8	8.8
Other waters	24.1	21.1	21	20	20
Total	411.8	362.2	369.3	364.8	366.6

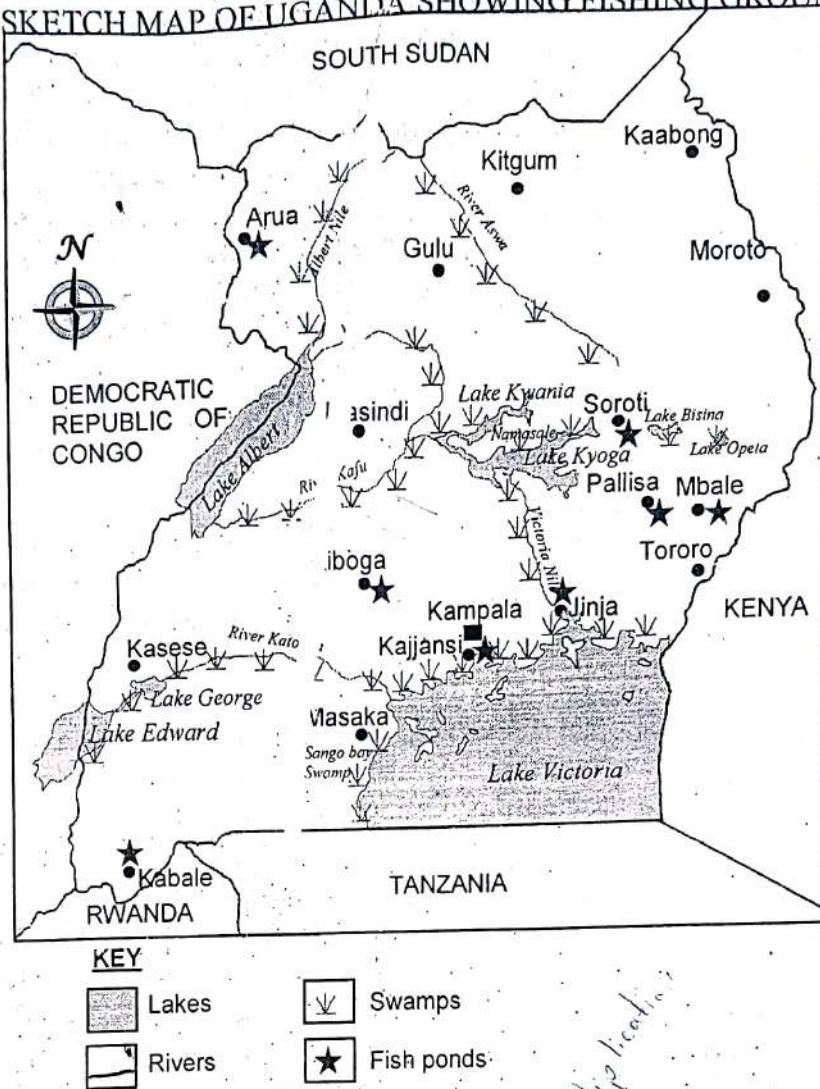
Source: 2010 statistical abstract. Uganda Bureau of Statistics (UBOS) Pg. 157.

Proportion of fish catch by water body, 2012

Water body	Lake Victoria	Lake Albert	Lake Kyoga	Others
Percentage fish catch	45.9	37.8	10.9	5.4

Source: 2013 statistical abstract. Uganda Bureau of Statistics (UBOS) Pg. 41.

A SKETCH MAP OF UGANDA SHOWING FISHING GROUNDS



KEY

	Lakes
	Rivers
	Swamps
	Fish ponds

Major types of fish caught in Uganda:

The major types of fish caught in Uganda include;

Nile Perch (Mputa), Tilapia (Ngege), Silver fish/Rastrineobola (Mukene), Protopterus (Lung fish), Hydrocynus (Tiger fish), Barbus (Semutundu), Barbus (Kisinja), and Haplochromis (Nkejje), Mud fish (Male)

Major fishing methods in Uganda:

The major fishing methods include;

- Traditional methods like; Basket methods, spearing, trapping, fish poisoning, hook/hand line.
- Modern methods include; Gill netting, seining, long lining, Trawling

Methods of preservation of fish.

The major methods of preserving fish in Uganda include

- Traditional methods like smoking, sun drying, salting, etc.
- Modern methods like fish canning, deep freezing etc.

Factors which have favoured fishing in Uganda.

Physical factors

1. The presence of various fishing grounds, which act as fish habitats encouraging the growth and multiplication of fish in Lake Victoria, Lake Kyoga, Lake Albert and Victoria Nile.

- 1. The presence of a variety of commercial fish species which are highly demanded in local and international markets for example Nile Perch and Tilapia in Lake Victoria and Lake Kyoga.
 - 2. The presence of a variety of fish plankton which is food for fish encouraging the growth and maturing of fish in Lake Victoria, Lake Kyoga, Lake Albert and Victoria Nile.
 - 3. The presence of natural forests like Mabira forest, with tree species like Mahogany which provide timber for the manufacture of fishing boats used in Lake Victoria and Lake Kyoga.
 - 4. Nature of water bodies which is conducive for the growth of fish and fishing activities such as
 - (i) The presence of swallow waters in fishing grounds encouraging the growth of plankton on which fish feeds for example in Lake Victoria, Lake Kyoga, Lake Albert and Victoria Nile.
 - (ii) The presence of indented shores on Lakes with numerous inlets and bays which encourage the construction of landing sites like Kasenyi on Lake Victoria and Lalle on Lake Kyoga.
 - 5. The nature of relief of the areas for example basins to contain large volume of water, gentle slopes for construction of supportive infrastructure like roads and the presence of numerous islands which act as stop over places during strong water winds for example on Lake Victoria.
- Presence of fishing villages e.g. Kalangala that carry out fishing as an economic activity.*

Human factors.

7. Availability of adequate capital invested in buying fishing gears and boats used in Lake Victoria, Lake Kyoga, Lake Albert, Victoria Nile, River Kafu and River Katonga.
8. Availability of ready market from local consumers and foreign markets in Kenya, Spain, Belgium for fish in Lake Victoria, Lake Kyoga, Lake Albert, Victoria Nile, River Kafu
9. A relatively stable political atmosphere around the major fishing grounds which encourages investment in fishing in Lake Victoria, Lake Kyoga, Lake Albert and Victoria Nile.
10. Availability of well-developed transport network for fish to market centres for example Masese-Jinja road on Lake Victoria and Tumba-Nakasongola road on Lake Kyoga.
11. Favourable government policy on fishing for example liberalization of the fishing industry leading to increased fishing in Lake Victoria, Lake Kyoga, Lake Albert and Victoria Nile.
12. Introduction of fish farming to supplement to fish from natural fishing grounds like Lake Victoria, Lake Kyoga, Lake Albert by introducing fish ponds at Kajjansi and Mbale.
13. Intensive research conducted by Fisheries Resource Research Institute (FIRRI) in Jinja for sustainable exploitation of fisheries resources in Lake Victoria and Lake Kyoga
14. Availability of skilled and semi-skilled labour in form of fishermen, fish processors, fish mongers to exploit fish from Lake Victoria, Lake Kyoga and Lake Albert, Victoria Nile.
15. The introduction of modern methods of fishing and fish preservation for example use of refrigerated trucks, fish canning for fish from Lake Victoria, Lake Kyoga and Lake Albert.
16. Fish restocking especially on Lake Victoria and Victoria Nile which has increased of fish stock leading to an increase in fish catch.
17. Abundant power sources like HEP for processing of fish from Lake Victoria, Lake Kyoga etc.
18. Establishment of fish processing industries around fishing grounds to reduce post-harvest losses and to add value before exportation for example Ngege fish factory at Luzira and Green field factory at Katabi around Lake Victoria.

CONTRIBUTION OF FISHING TO THE DEVELOPMENT OF UGANDA.

Positive contribution

1. Source of food to the people in form of fish which is rich in proteins for example tilapia and Nile perch from Lake Victoria, Lake Kyoga, Lake Albert and Victoria Nile.
2. Source of foreign exchange through exportation of fish and fish products to foreign countries like Kenya, Rwanda for fish from Lake Victoria, Lake Kyoga and Lake Albert.

3. Source of internal government revenue through taxing people employed in the fishing industry for example fishing companies like Ngege and Gomba around Lake Victoria and Lake Kyoga.
4. Source of employment opportunities where people are employed as fishermen and fish mongers for fish from Lake Victoria, Lake Kyoga, Lake Albert, Victoria Nile.
5. Fishing has led to urbanization with its associated advantages on landing sites like Kasenyi and Masese on Lake Victoria, Lwampanga on Lake Kyoga, and Wanseko on Lake Albert.
6. Fishing has promoted the development of transport infrastructures from landing sites to market centres for example Butiaba-Masindi road on Lake Albert, Masese-Jinja road on Lake Victoria, Lalle-Soroti road on Lake Kyoga
7. Fishing has promoted industrialization/agriculture since fish from Lake Victoria, Lake Kyoga is used as a raw material from the manufacture fertilizers and animal feeds for example NUVITA feeds factory in Jinja.
8. Fishing has promoted international relationship between Uganda and countries where fish from Lake Victoria, Lake Albert and Lake Kyoga are exported for example Belgium, Rwanda, Democratic Republic of Congo
9. Fishing in Lake Victoria, Lake Kyoga, Victoria Nile has encouraged diversification of the economy which has reduced overdependence on agriculture.
10. Fishing has boosted research and education like Zoology, environmental science using fishing grounds like Lake Victoria, Lake Kyoga, Lake Albert, Victoria Nile and River Kafu.

Negative contributions

1. Fishing has led to industrial pollution from fish processing industries like Ngege fish factory at Luzira on Lake Victoria which affects aquatic life and human life.
2. Fishing has led to urban related problems like high rates of crime, shortage of accommodation at Kasenyi on Lake Victoria and Lwampanga on Lake Kyoga.
3. Fishing has led to destruction of forests to acquire timber for the manufacture of boats and firewood for smoking fish from Lake Victoria, Lake Kyoga and Lake Albert
4. Fishing has led to depletion of fisheries resources as a result of over fishing for example on Lake Victoria, Lake Kyoga, Lake Albert, Victoria Nile, River Kafu and River Katonga
5. Fishing has led to profit repatriation by foreign fishing companies like Hwan Sung on Lake Victoria, Lake Kyoga, Victoria Nile.
6. Fishing has led to territorial conflicts between countries sharing fishing grounds with Uganda for example Mijingo Island on Lake Victoria shared by Uganda and Kenya.
7. Fishing has led to loss of lives to fishermen resulting from accidents that result from strong water winds and aquatic animals like crocodiles from Lake Victoria and Lake Kyoga.
8. Fishing has led to competition for labour with other sectors like agriculture hence affecting their growth due to fishing in Lake Victoria, Lake Kyoga, Lake Albert and Victoria Nile.

PROBLEMS FACING FISHING IN UGANDA.

Physical factors.

1. Unfavourable weather changes for example prolonged drought leading to lowering of the water levels in Lake Wamala and Lake Mburo.
2. Rugged relief especially around rift valley lakes which hinder the construction of transport lines from landing sites to market centres for example on Lake Albert with Butiaba escarpment.
3. The presence of water hyacinth, which carries away fishing gears, hinders navigation especially during rainy season affecting fishing on Lake Victoria, Lake Kyoga, Vitoria Nile
4. The presence of floating islands in form of papyrus vegetation during rainy season which carry away and tear fishing gears on Lake Victoria, Lake Kyoga, Victoria Nile etc
5. The occurrence of strong water winds which leads to death of fishermen and tear fishing gears affecting fishing on Lake Victoria, Lake Kyoga, Lake Albert, Victoria Nile

Existence of a small continental shelf which does not permit proper growth of plankton on which fish feeds for example on Lake Albert, Lake Edward and Lake Bunyonyi.

The presence of predators which feed on commercial fish species therefore reducing their number for example Nile Perch and crocodiles feed on tilapia and mud fish from Lake Victoria, Lake Kyoga, Lake Albert, Victoria Nile and River Kafu.

The presence of waterfalls and rapids along rivers hinders navigation on rivers and tear fishing gears like nets for example Sezibwa falls on River Sezibwa, Sipi falls on River Sipi, Bujagali, Karuma and Murchison falls on the River Nile.

The presence of rocks along river channels and in the lakes which cause accidents and tear fishing gears like nets on the Victoria Nile, Lake Victoria and Lake Albert.

The presence of dangerous wild animals which destroy fishing gears and cause accidents to fishermen for example crocodiles on Lake Victoria, Victoria Nile, Lake Kyoga.

The outbreak of diseases due to poor sanitation on various landing sites for example Cholera which affects the health of fishermen at Bukakata on Lake Victoria.

Human factors.

- 1. Underdeveloped methods of fishing for example the use of small boats and small sized nets which are inefficient leading low fish catch in from Lake Victoria and Lake Kyoga.
- 2. Overfishing due to increased demand for fish and indiscriminate fishing leading to depletion of fish species like Tilapia, Nile perch from Lake Victoria and Lake Kyoga.
- 3. Limited capital to be invested in the fishing industry to buy fishing gears and pay labour for fishing from Lake Victoria, Lake Kyoga, Lake Albert, Victoria Nile and River Kafu.
- 4. Shortage of labour/competition for labour from other sectors of the economy like agriculture and mining limiting fishing on Lake Victoria, Lake Kyoga, Lake Albert, Victoria Nile and River Kafu.
- 5. Limited market for fish due to poverty and competition from foreign countries like Sweden, Norway, Liming fishing on Lake Victoria, Lake Kyoga, Lake Albert, Victoria Nile, River Kafu, River Katonga, Sango bay swamp etc.
- 6. Poorly developed transport network to link fishing grounds to market centres for Example Butiaba-Masindi road on Lake Albert, Lwampanga-Nakasongola road on Lake Kyoga, Katosi-Mukono road on Lake Victoria.
- 7. High rates of post-harvest losses/Poor storage and preservation methods for fish for example salting, sun drying and smoking on Lake Victoria, Lake Kyoga, Lake Albert, Victoria Nile, River Kafu, River Katonga, Sango bay swamp etc.
- 8. Insecurity on some fishing grounds which threatens fishing activities to take place for example wrong elements and pirates on Lake Victoria, Lake Kyoga, Lake Albert, Victoria Nile, River Kafu, River Katonga, Sango bay swamp etc.
- 9. Smuggling of fish to neighbouring countries which has hindered sustainable exploitation of the fisheries resources in Lake Victoria, Lake Kyoga, Lake Albert, Victoria Nile, River Kafu, River Katonga, Sango bay swamp etc.
- 10. Reclamation of wetlands/swamps for settlement and agriculture reduces on the breeding grounds for fish for example Murchison bay wetland, Kinawattaka wetland and Sango bay wetland on Lake Victoria, Lwampanga wetlands on Lake Kyoga.
- 11. Pollution from industries bordering lakes which leads to death of fish for example Nile Breweries in Jinja pollutes Lake Victoria and Victoria Nile, Gomba fish factory in Jinja pollutes Lake Victoria.
- 12. Limited research concerning sustainable exploitation of fisheries resources leading to quick depletion of fisheries resources and low quality and quantity of fisheries harvest for example in Lake Victoria, Lake Kyoga and Victoria Nile.

24. Unfavourable government policy like deploying the UPDF soldiers on major fishing grounds with their brutality scaring away the fishermen hence lowering fish catch from Lake Victoria and Lake Kyoga.
25. Limited power supply to be used in fish preservation leading to massive post harvest losses for fish from Lake Victoria and Lake Kyoga.

Steps being taken to improve on fishing in Uganda.

1. Controlled fishing on water bodies through continuous patrol on water bodies to ensure sustainable exploitation of fisheries resources from Lake Victoria, Lake Kyoga, Lake Albert, Victoria Nile, River Katonga and Sango bay swamp etc.
2. Encouraging the use of recommended sizes of nets to reduce indiscriminate fishing for example the use of 4.5 and 5 inch nets on Lake Victoria and Lake Kyoga, the Victoria Nile.
3. Some methods have been declared illegal due to their disastrous effects for example fish poisoning, beach seining (Kokota) on Lake Victoria and Lake Kyoga
4. Enforcement of laws through Beach Management Unit (BMU) to reduce over exploitation of the fisheries resources from Lake Victoria, Lake Kyoga, Lake Albert, Victoria Nile, River Kafu, River Katonga, Sango bay swamp etc.
5. Promotion of aquaculture/fish farming by encouraging the establishment of various fish ponds in the country for example at Kajjansi, Mbale, Kabale, Pallisa etc
6. Restocking of water bodies for example the establishment of Nile Perch on Lake Victoria, Lake Kyoga and Victoria Nile.
7. Improving transport network to encourage the delivery of fish to market centres for example Kasenyi-Kampala road on Lake Victoria, Tumba-Nakasongola-Kampala road on Lake Kyoga, Butiaba-Masindi road on Lake Albert.
8. Improving the methods of processing and preservation of fish for example fish canning at Ggaba, Gomba and Ngege fish factories on Lake Victoria
9. Upgrading fish landing sites to ensure improved fish handling for example at Masese, Ggaba and Kasenyi on Lake Victoria, Tumba and Lwampanga on Lake Kyoga.
10. Training of manpower through education and training to equip labour with the skills necessary for sustainable exploitation of fisheries Resources Lake Victoria, Lake Kyoga, Lake Albert, Victoria Nile, River Kafu, River Katonga, Sango bay swamp etc.
11. Availing capital for fisheries development through provision of credit facilities from banks and other financial institutions that provide loans to fishermen from Lake Victoria, Lake Kyoga, Lake Albert, Victoria Nile, River Kafu, River Katonga, Sango bay swamp etc.
12. Removal of water weeds for example water hyacinth to promote transportation on water bodies like Lake Victoria, Lake Kyoga, Lake Albert and Victoria Nile.
13. Forming of cooperatives to ensure joint investment in fishing for example at Masese, Ggaba and Kasenyi on Lake Victoria.
14. Controlling pollution of water through treating waste products before being discharged in fishing grounds like Lake Victoria, Lake Kyoga, Lake Albert, Victoria Nile, River Kafu, River Katonga, Sango bay swamp etc.
15. Controlling smuggling to encourage sustainable exploitation of fisheries resources from Lake Victoria, Lake Kyoga, Lake Albert, Victoria Nile, River Kafu, River Katonga, Sango bay swamp etc.
16. Promoting security around water bodies by using the national army the UPDF to encourage investment in fishing in water bodies like Lake Victoria, Lake Kyoga, Lake Albert, Victoria Nile, River Kafu, River Katonga, Sango bay swamp etc.
17. Sensitization of fishermen through Beach Management Unit regarding the best methods of sustainable exploitation of fisheries resources from Lake Victoria, Lake Kyoga, Lake Albert, Victoria Nile, River Kafu, River Katonga, Sango bay swamp etc.

18. Widening of the market from local to international markets through regional economic integration like the East African Community in Kenya, Rwanda, COMESA for fish from Lake Victoria, Lake Kyoga, Lake Albert, Victoria Nile, River Kafu, River Katonga
19. Fighting corruption in the fisheries department to ensure effective exploitation of fisheries resources in Lake Victoria, Lake Kyoga, Lake Albert, Victoria Nile, River Kafu, River Katonga, Sango bay swamp etc.
20. Establishment of fisheries institutions mandated to manage the fisheries department for example Fisheries Resource Research Institute (FIRRI) in Jinja, National Environmental Management Authority (NEMA) for fish from Lake Victoria, Lake Kyoga and Lake Albert.
21. Ensuring regional initiative of conservation and sustainable use of water resources for example the Lake Victoria environmental Protection Programme among countries sharing Lake Victoria.

REVISION QUESTIONS

1. (a) Account for the low levels of development of the fishing industry in Uganda.
 - Give the current status of the fishing industry, identify the fishing grounds and draw a sketchmap showing the fishing grounds.
 - Explain the problems facing the fishing industry in Uganda giving an example of a fishing ground on every point.
- (b) What measure are being taken to improve fishing in Uganda
 - Explain the measures being taken in present tense, giving an example of a fishing ground on every point.
2. Explain the factors favouring fishing in Uganda
 - Give the current status of the fishing industry, identify the fishing grounds and draw a sketchmap showing the fishing grounds.
 - Explain the factors favouring fishing in Uganda giving an example of a fishing ground on every point.
3. Assess the contribution of fishing to the development of Uganda.
 - Give the current status of the fishing industry, identify the fishing grounds and draw a sketch map showing the fishing grounds.
 - Explain the positive and negative contributions of fishing in Uganda
4. Account for the variation in fish catch in the various water bodies in Uganda
 - Give the current status of the fishing sector in Uganda
 - Explain the factors for the variation in fish catch showing the idea of variation, giving an example of a fishing ground on every point.
5. (a) Account for the decline in fish stock in Uganda.
 - Give the current status of the fishing sector in Uganda.
 - Identify and draw a sketch map of Uganda showing fishing grounds.
 - Explain the factors for the causes of decline in fish catch, giving an example of a fishing ground on every point.
- (b) Explain the measures being taken to increase fish stock in the various water bodies in Uganda.
 - Measures should be written in present tense, giving an example of a fishing ground on every point.
- To what has the nature of fishing grounds influenced fishing activities in Uganda?
 - Give the current status of the fishing sector in Uganda.
 - Identify and draw a sketch map of Uganda showing fishing grounds.
 - Explain the influence of nature of fishing grounds (size, islands, depth, and shoreline) and other factors, giving an example of a fishing ground on every point.

CHAPTER 9

FORESTRY IN UGANDA

Current status of the forestry industry in Uganda

- Currently, the district with the highest acreage of tropical high forest is Kyenjojo followed by Bushenyi, Mukono, Hoima and Kibaale
- The forest cover currently is about 18.8% of the total land area in Uganda.
- Forestry contribute about 3.5% of GDP
- More forest zones are being gazetted in Uganda.
- There are 698 gazetted forest reserves in Uganda (both local and central).
- The National Forestry Authority manages 1,266,000ha of CFR's, some of which it manages in collaboration with Uganda Wildlife Authority (UWA).
- There is a high rate of deforestation of forests and the average rate of forest destruction is 1.8 per annum for the last 15 years.
- Some forests have been degazetted for example Namanve forest.
- Afforestation and re-afforestation is on the increase in many areas in Uganda.
- Tropical lowland forests in Uganda accounts for about 81.4%
- Tropical highland forests (montane) accounts for about 17.9%
- Planted forests currently cover 0.3% of the total land area in Uganda.
- Agro-forestry is being carried out in many parts of Uganda.
- There is introduction of silvi-culture for carbon trade to mitigate climate.
- Most of the planted forests comprise of pine and eucalyptus trees
- Much of the forest destruction is due to the need for charcoal and firewood (Biomass)
- The government of Uganda has established the National Forestry Authority (NFA) to coordinate the forestry activities
- Use of sustainable exploitation of forests is being emphasized by the government through the use of simple tools like pit saws, axes etc.

Districts with the highest acreage of Tropical High Forests

District	Area 1990 (ha)	Area 2005 (ha)
Kyenjojo	54,242.32	84,676.10
Bushenyi	71,057.23	68,231.03
Mukono	100,626.65	63,977.12
Hoima	75,143.95	58,889.27
Kibaale	114,102.66	58,268.06
Kasese	41,692.26	49,794.47
Bundibugyo	39,452.96	45,611.76
Kabarole	39,611.79	39,177.01
Masindi	36,373.82	31,933.49
Mpigi	40,300.64	27,169.67
Kamwenge	25,412.20	26,768.57

Source: *State of the environment NEMA Report 2008 Pg. 114*

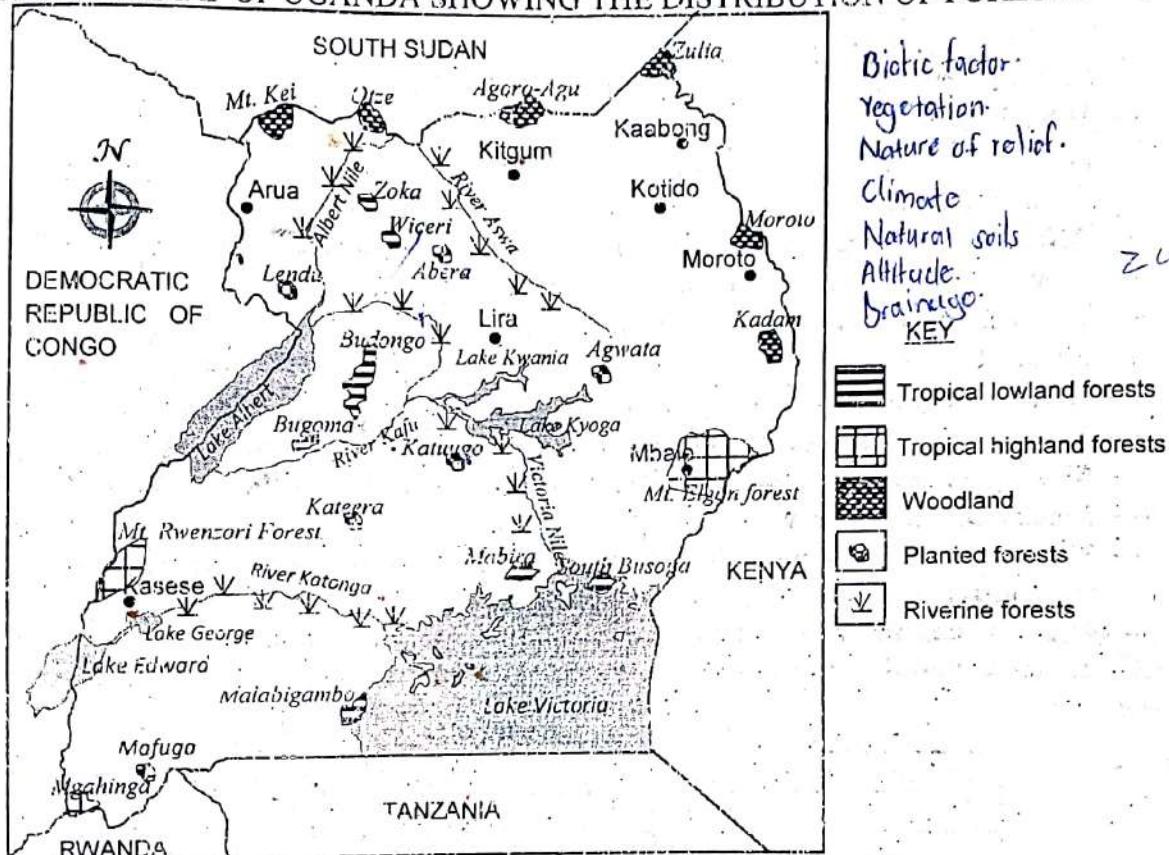
Types of forests in Uganda

The major types of forests in Uganda include:

- Tropical lowland forests like Mabira forest in Buikwe, Budongo forest in Masindi, Bugoma forest in Hoima and South Busoga forest in Mayuge

- Tropical highland forests/montane forests for example mountain Rwenzori forests in Bundibugyo, Mountain Elgon forests in Mbale and Muhavura forests in Kisoro.
- Woodland forests like Otze, Timu and mount Kei forests.
- Riverine forests such as river Katonga forest, Victoria Nile forests, Kafu forests and Mayanja forests
- Planted/artificial forests for example Mafuga forest and Muko forest in Kabale, Abera forest in Gulu, Lendu forest in Nebbi, Katuugo forest in Nakasongola, Kateera forest in Kiboga, Magamaga forest in Jinja, and pingire forest in Serere.

A SKETCHMAP OF UGANDA SHOWING THE DISTRIBUTION OF FORESTS



Factors which have favoured the development of the forestry industry in Uganda

Physical factors

1. The presence of valuable tree species which are highly demanded with hardwood species like Mahogany and Myule in Mabira forest in Buikwe and Budongo forest in Masindi and soft wood tree species like pines in Katuugo forest in Nakasongola.
2. Ideal climatic conditions like heavy rainfall of above 1500mm per annum and hot temperatures of about 21°C encourage the growth of forests like Mabira forest in Buikwe and Budongo forest in Masindi, Mafuga forest and Muko forest in Kabale.
3. The presence of fertile soils encourages the growth of forests like Mabira forest in Buikwe, Budongo forest in Masindi, Mafuga forest and Muko forest in Kabale.
4. The mountainous nature of some parts makes these areas inaccessible leading to the growth of forests like mountain Elgon forests in Mbale, mountain Rwenzori forest in Bundibugyo, Mgahinga forest and Bwindi forests in Kisoro.
5. Altitude, whereby low altitude is responsible for hot temperatures for the growth of tropical lowland forests like mabira forest in Buikwe and high altitude for the growth of tropical highland forests like Mt. Elgon forest in Mbale and Mt. Rwenzori forest in Bundibugyo.

6. Drainage, whereby poorly drained areas experiencing flooding conditions promote the growth of riverine forests like river Katonga forest and River Kafu forest.
7. Presence of vast land has encouraged large scale planting of forests like Katuugo forest in Nakasongola, Kateera forest in Kiboga, Muko forest and Mafuga forest in Kabale.

Human factors

8. Availability of adequate capital to invest in the forestry industry for example in paying labour to exploit forests such as Mafuga and Muko forest in Kabale.
9. The availability of reliable power and energy for example hydro-electric power and petroleum used in running of machines in Katuugo forest in Nakasongola.
10. The availability of abundant supply of cheap labour to work as lumber jacks in Katuugo forest in Nakasongola and Mafuga forest in Kabale.
11. The availability of a large market for the forest products like timber and furniture both at home and abroad for products from Mabira forest in Buikwe and Mafuga forest in Kabale.
12. The availability of numerous processing industries to process forest products for example Nile Ply Wood in Jinja for products from Katuugo forest in Nakasongola.
13. Availability of improved technology in forest exploitation and transportation e.g. power driven saws, tractors and trailers has encouraged exploitation of Muko forest in Kabale, Lendu forest in Nebbi and Katuugo forest in Nakasongola.
14. The favourable government policies of afforestation and re-afforestation and encouraging investors to invest in the forest industry in forests like Mafuga forest and Muko forest in Kabale, Lendu forest in Nebbi, Katuugo forest in Nakasongola.
15. Availability of improved transport network for the delivery of forest products to market centres for example Kampala-Gulu road for Katuugo forest, Kampala-Jinja road for Magamaga forest in Jinja, Muko-Kabale road for Muko forest in Kabale
16. Intensive research conducted by the National Forestry Authority (NFA) and NEMA has encouraged sustainable exploitation of forests such as Mabira forest in Buikwe, Budongo forest in Masindi; Mafuga forest and Muko forest in Kabale.
17. The relative political stability has encouraged investors to invest in the forestry industry for example in planted forests like Katuugo forest in Nakasongola, Mafuga and Muko forest in Kabale and Lendu forest in Nebbi

Contribution of the forestry industry to the development of Uganda

1. Forestry is a source of employment opportunities to people as forest rangers, lumber jacks in the exploitation of Mabira forest in Buikwe, Budongo forest in Masindi, Mafuga forest and Muko forest in Kabale.
2. It is a source of government revenue through imposing taxes on people and companies involved in the exploitation of Mafuga forest in Kabale and Katuugo forest in Nakasongola.
3. Forestry has encouraged urbanization where saw milling centres have developed into prominent towns for example Katuugo on Katuugo forest in Nakasongola and Nyabyeya on Budongo forest in Masindi.
4. Forests have boosted tourism leading to increased foreign exchange for example Mabira forest in Buikwe and Budongo forest in Masindi.
5. Forestry has boosted the development of transport infrastructures especially roads connecting forests to saw mills to market centres for example road from Mbale to Mountain Elgon forests in Mbale, Nyabyeya to Budongo forest in Masindi, Katuugo to Katuugo forests in Nakasongola.
6. Forestry has encouraged diversification of the economy thus reducing overdependence on agriculture by generating some income from Mabira forest in Buikwe and Mafuga forest in Kabale.
7. Forestry is a source of foreign exchange through exportation of forest products like timber from Lendu forest in Nebbi and Katuugo forest in Nakasongola.

8. Forestry has promoted international cooperation between Uganda and her trade partners in forest products from Mafuga forest and Muko forest in Kabale and Lendu forest in Nebbi.
9. Forests are source of medicine and food to cure various diseases for example wild honey from Mabira forest in Buikwe, Budongo forest in Masindi, Mafuga forest and Muko forest in Kabale.
10. Forestry has boosted industrialization by providing raw materials for forest related industries like Nile plywood in Jinja using products from Katuugo forest in Nakasongola.
11. Forests have promoted soil conservation through controlling soil erosion and addition of manure to the soil in forests like Mabira forest in Buikwe and Budongo forest in Masindi.
12. Forests are a source of fuel for domestic and industrial use in form of firewood obtained from Mabira forest in Buikwe, Budongo forest in Masindi, Mafuga forest and Muko forest in Kabale
13. Forests have promoted climatic modification through evapotranspiration which leads to formation of convection rainfall encouraging agriculture for example Mabira forest in Buikwe and Budongo forest in Masindi.
14. Forestry has encouraged wildlife conservation and conservation of biodiversity since forests act as habitats for wild animals for example monkeys and gorillas in Bwindi impenetrable forests and Mgahinga forests in Kisoro
15. Forests help in the purification of the atmosphere by absorbing greenhouse gases like Carbon dioxide and Methane for example Mabira forest in Buikwe and Budongo forest in Masindi.
16. Forests act as water catchment areas for numerous rivers which encourage fishing and other economic activities for example river Sezibwa from Mabira forest in Buikwe, River Sipi and Manafwa from Mountain Elgon forest in Mbale.

Negative effects

1. Forests act as habitats for dangerous wild animals which threaten human life for example lions and leopards from Mabira forest in Buikwe, Budongo forest in Masindi and Mafuga forest in Kabale.
2. Forests are breeding grounds for pests and disease carrying vectors affecting human settlement for example tsetse flies in South Busoga forests in Mayuge and Budongo forests in Masindi.
3. Dense forests hinder the construction of transport and communication network especially roads since they are expensive to clear for example Mabira forest in Buikwe and Budongo forest in Masindi.
4. Forests act as hiding places for rebels and wrong elements who destabilize peace in the country for example ADF rebels in mountain Rwenzori forests in Bundibugyo.
5. Exploitation of forests has led to urbanization with its associated problems like prostitution, unemployment and others for example at Katuugo on Katuugo forest in Nakasongola and Nyabyeya on Budongo forest in Masindi.
6. Exploitation of forests has led to industrial pollution from forest related industries like Nile Plywood in Jinja and furniture making industries for example at Katuugo on Katuugo forest in Nakasongola and Nyabyeya on Budongo forest.
7. Planted forests highly drain the soil making it less productive for agriculture for example Mafuga forest and Muko forest in Kabale and Abera forest in Gulu.
8. Forest exploitation has led to withdrawal of labour from other sectors like agriculture hence limiting their growth for example exploitation of Mabira forest in Buikwe and Lendu forest in Nebbi.
9. Exploitation of forests is associated with accidents leading to loss of lives during felling and loading of logs in Mabira forest in Buikwe, Budongo forest and Katuugo forest in Nakasongola.
10. Conservation of forests has led to displacement of people with its negative effects through eviction of communities in the periphery of forests like Mabira forest in Buikwe, and Budongo forest in masindi.

11. Forest exploitation has led to overexploitation forest resources to meet the increasing demand for the forest products leading to reduced rainfall formation for example Mabira forest in Buikwe, Katuugo forest in Nakasongola and Budongo forest in Masindi.

FOREST DESTRUCTION IN UGANDA

The table below shows forest destruction in Uganda.

Districts with highest deforestation rates

District	1990 (ha)	2005 (ha)	Loss	% Loss
Kibaale	114,102.66	58,268.06	-55,834.60	48.9
Mukono	100,626.65	63,977.12	-36,649.53	36.4
Wakiso	28,461.12	3,781.68	-24,679.44	86.7
Hoima	75,143.95	58,889.27	-16,254.68	21.6
Mayuge	15,162.05	0	-15,162.05	100
Mubende	18,618.86	3,906.65	-14,712.22	79.0
Mpigi	40,300.64	27,169.67	-13,130.98	32.6
Mityana	10,247.86	4,137.66	-6,110.20	59.6
Masindi	36,373.82	31,933.49	-4,440.34	12.2

Source: State of the Environment NEMA Report 2008 Pg. 126

Causes of forest destruction in Uganda.

Physical factors

1. Destruction of forests by herbivorous wild animals especially elephants and giraffes in Parabong forests in Nebbi, Budongo forests in Masindi and Bwindi impenetrable forests in Kisoro
2. Destruction of forests by wildfire caused by lightning for example Katonga forest in Masaka and Sezibwa forest in Kayunga.
3. Destruction of forests by natural calamity for example landslides in Bududa and Bulambuli districts led to the destruction of Mountain Elgon forests in Bududa.
4. Climate changes in Uganda for example prolonged drought affects the growth of trees in forests like Mabira forest in Buikwe and Budongo forest in Masindi, while heavy rainfall triggers off landslides leading to destruction of forests like Mt. Elgon forests in Mbale.
5. Destruction of planted forests by pests and diseases for example wood peckers and aphids destroy planted forests in Muko forest and Mafuga forests in Kabale.
6. The long gestation period of tree species like Mahogany and Mvule has led to quick depletion of forests without replacement for example Mabira forest in Buikwe, Budongo forest in Masindi and South Busoga forest in Mayuge.

Human factors

7. Increased demand for agricultural land especially plantation agriculture has led to destruction of forests like Mabira forest in Buikwe for sugarcane growing by Lugazi sugar plantation, Budongo forests destroyed by Kinyara sugar plantation and Bugala island forest in Kalangala for oil palm plantations.
8. Increased demand for land for settlement due to population pressure in Uganda has led to destruction of Mabira forest in Buikwe and Budongo forest in Masindi.
9. Increased demand for energy in form of firewood from forests like Mabira forest in Buikwe, Budongo forest in Masindi, Mafuga forest and Muko forest in Kabale.
10. Improved technology with its negative effects for example the use of power driven machines has led to massive destruction of forests like Mabira forest in Buikwe, Budongo forest in Masindi, Mafuga forest and Muko forest in Kabale.
11. Land tenure system whereby some forests are owned by private individuals leading to their destruction for example Ngajju forest in Luweero and Katugo forest in Nakasongola.

12. Increased demand for forest products like electric poles, timber for furniture leading to destruction of Mabira forest in Buikwe, Budongo forest in Masindi, Mafuga forest and Muko forest in Kabale.
13. Need to control dangerous pests and diseases that cause diseases for example tsetse flies in South Busoga forest in Mayuge and Budongo forest in Masindi.
14. Bush burning either by hunters to easily obtain wild animals or by pastoralists for example Abera forest and Opit forest in Gulu, Mabira forest in Buikwe and Budongo forest in Masindi.
15. Contradicting government policy for example giving out forests for different landuse activities for example Namanve forest in Wakiso given to Coca cola industry and Bugala island forest in Kalangala given out for oil palm plantations.
16. Industrialization has led to destruction of forests to expand industries and obtain firewood used in industries for example Namanve forest in Wakiso has been destroyed to establish the Century bottling company, Katuugo forest in Nakasongola and Magamaga forests in Jinja destroyed to obtain fire wood.
17. Mining activities have led to destruction of forests to extract the minerals for example gold mining in Kitaka mines led to the destruction of Kitaka forest reserve in Kamwenge, Gold mining in Buhweju led to the destruction of Kyamuhunga forest.
18. Destruction of forests due to political instability to get rid of the hiding places for rebels for example Nyamityobora forest in Mbarara and Namanve forest in Wakiso
19. Need to control dangerous pests and disease carrying vectors which may be harmful to humans for example tsetse flies in South Busoga forest in Mayuge, Mabira forest in Buikwe and Budongo forest in Masindi.
20. Corruption in the forest department which involves illegal sale of timber and collection of bribes leading to destruction of forests like Mabira forest in Buikwe and Budongo forest in Masindi.
21. Construction of transport infrastructure especially roads for example the construction of Kampala-Jinja road led to the destruction of Mabira forest in Buikwe, Mityana-Fort Portal Road led to the destruction of Kibale forest in Kyenjojo
22. Increased herbal collection leading to destruction of trees in forests like Mabira forest in Buikwe and Budongo forest in Masindi.
23. De-gazetting of some forests for either settlement or agriculture for example Bugala island forests in Kalangala for the growing of oil palms and Namanve forest in Wakiso for establishment of century bottling companies and other industries.

Effects of forest destruction

1. It has resulted into desertification with its characteristics like low rainfall amount and hot temperatures due to destruction of forests like Mabira forest in Buikwe, Budongo forest in Masindi, Mafuga forest and Muko forest in Kabale.
2. It has led to destruction of habitats for wildlife hence leading to reduction in Biodiversity for example in Mabira forest in Buikwe, Budongo forest in Masindi.
3. It has led to increased soil erosion due to loss of vegetation cover that would protect the soil for example in Bududa, Bulucheke and Bulambuli due to destruction of Mountain Elgon forests.
4. It has accelerated landslides due to loss of vegetation cover that would protect the soil for example in Bududa, Bulucheke and Bulambuli due to destruction of Mountain Elgon forests.
5. It has led to siltation of rivers leading to flooding since material is eroded from hills and deposited in rivers for example River Nyamwamba due to destruction of Mt. Rwenzori forest in Kasese and River Sipi due to destruction of Mt. Elgon forest in Mbale.
6. It has resulted into reduction in the water levels in lakes and rivers such as Lake Victoria and River Nile due to destruction of Mabira forest in Mbale and Ssese Island forests in Kalangala.

7. It brings people into close contact with dangerous wild animals due to destruction of their habitats leading to loss of life for example people adjacent to forests like Mabira forest in Buikwe and Mt. Elgon forest in Mbale.
8. It has led to lowering of the water table of the adjacent areas due to reduction in rainfall formation in Mukono, Luweero, and Kampala due to destruction of Mabira forest in Buikwe.
9. It has led to shortage of wood in many parts of Uganda due to reduction in forest cover in Mabira forest in Buikwe, Budongo forest in Masindi, Mafuga forest and Muko forest in Kabale.
10. It has led to loss of employment due to destruction of forests which have been providing employment opportunities like Mabira forest in Buikwe, Budongo forest in Masindi and Mafuga forest in Kabale.
11. It has led to loss of revenue due to loss of tax revenue from destroyed forests such as Mafuga forest in Kabale and Opit forest in Gulu.
12. It led to destruction of tourist attractions leading to loss of foreign exchange for example the destruction Mabira forest in Buikwe.
13. It has led to loss of herbal medicine due to destruction of some trees that provide herbal medicine for example in Opit forest in Gulu and Mabira forest in Buikwe.
14. It has led to loss of raw materials for industries due to destruction of forests that produce timber for industries for example Abera forest in Gulu.
15. It has led to reduction in grants from developed countries and donor communities like World Bank on preservation of forests since they are discouraged by massive destruction of Mabira forest in Buikwe and Budongo forest in Masindi.

Problems facing forest exploitation in Uganda.

Physical factors

1. Nature of forest type especially tropical rainforests affects effective utilization in the following ways:
 - (i) Most forests have trees which appear in mixed stands with over 25 tree species growing in one hectare which makes selection of valuable tree species difficult in Mabira forest in Buikwe, Budongo forest in Masindi and South Busoga forest in Mayuge.
 - (ii) The hardwood nature of forest trees which take long to mature and have heavy logs increasing transportation costs in exploitation of Mabira forest in Buikwe, Budongo forest in Masindi and South Busoga forest in Mayuge.
 - (iii) The trees have buttress roots which makes felling difficult since felling require using ladders during felling which leads to accidents in exploiting Mabira forest in Buikwe, Budongo forest in Masindi and South Busoga forest in Mayuge.
 - (iv) The presence of few commercial tree species like mahogany, ebony and mvule surrounded by trees of poor quality timber making felling difficult in Mabira forest in Buikwe and Budongo forest in Masindi.
 - (v) The presence of climbing plants like lianas and epiphytes make felling of trees difficult hindering exploitation of Mabira forest in Buikwe, Budongo forest in Masindi and South Busoga forest in Mayuge.
2. Unfavourable climatic conditions especially during rainy seasons leading to constant boggy conditions and heavy rainfall that affects tree cutting and transportation of timber in Semuliki forest in Bundibugyo, Budongo forest in Masindi and South Busoga forest in Mayuge
3. The presence of pests and disease carrying vectors which scare away lumber jacks and other forest exploiters for example mosquitoes and tsetse flies in Kibale forest in Kabarole, and Budongo forest in Masindi.
4. Uncontrolled wild fires which destroy large areas of forest cover especially riverine forests like River Katonga forests, river Mayanja forests and river Kafu forests.

5. The rugged relief in mountainous areas discourages construction of transport infrastructure in Mountain Rwenzori forest in Kasese, mountain Elgon forest in Mbale, Bwindi forest and Mgahinga forest in Kisoro.
6. Natural Hazards such as flooding, landslides affecting forest activities like tree felling and transportation for example in the Mt. Elgon forests in Bududa, Mt. Rwenzori forest in Bundibugyo.
7. The existence of wild animals like leopards and lions which scare away labour engaged in forest exploitation of Mabira forest in Buikwe, Budongo forest in Masindi and South Busoga forest in Mayuge
8. Poor drainage in some areas affects tree cutting and transportation especially forests in swampy areas and along rivers like River Katonga forest, River Nile forests and River Kafu forest.
9. Nature of the soils especially areas with clay soils which are sticky during rainy season, affects the construction of transport and communication lines for example Mafuga forest, Mt. Elgon forest in Bukwo and Kwen.

Human factors

10. Poorly developed transport network especially roads connecting forest zones to market centres and processing centres leading to delays in delivery of forest products and losses for example on Mabira forest in Buikwe, Budongo forest in Masindi, and South Busoga forest in Mayuge.
11. Over exploitation of forests with valuable tree species leading to exhaustion of forests like Mabira forest in Buikwe and Budongo forest in Masindi.
12. Limited power supply to be used to run the machines in exploitation of Mabira forest in Buikwe, Budongo forest in Masindi, South Busoga forest in Mayuge.
13. Unfavourable government policy of restricting the exploitation through gazetting forests and forest reserves and national parks for example Mabira forest in Buikwe, Budongo forest in Masindi and South Busoga forest in Mayuge.
14. Competition from alternative raw materials especially plastics reduces demand for forest products from Mabira forest in Buikwe and Budongo forest in Masindi.
15. Low level of technology used in forest exploitation for example the use of Pangas, axes and hand saws in felling trees which are inefficient limiting the exploitation of Mabira forest in Buikwe and Budongo forest in Masindi.
16. Inadequate capital to purchase modern power saws and pay labour in exploitation of forests like Mabira forest in Buikwe and Budongo forest in Masindi.
17. Shortage of market due to competition with soft wood trees from Norway and Sweden which reduces demand for forest products from Mabira forest in Buikwe, Budongo forest in Masindi and South Busoga forest in Mayuge.
18. Bush burning by hunters and pastoralists leading to destruction of Mabira forest in Buikwe, Budongo forest in Masindi and South Busoga forest in Mayuge
19. Limited skilled labour to work in the exploitation and protection of forest in terms of forest guards and forest rangers in Mabira forest in Buikwe, Budongo forest in Masindi, South Busoga forest in Mayuge and mountain Rwenzori forest in Kasese
20. Competition with other landuses like agriculture, settlement and industry leading to destruction of forests like Mabira forest in Buikwe destroyed for sugarcane growing by Lugazi SCOUL, Bugala island forest in Kalangala destroyed for Oil palm plantations.
21. Limited research conducted by National Forest Authority (NFA) and NEMA concerning sustainable exploitation of forests like Mabira forest in Buikwe, Budongo forest in Masindi and South Busoga forest in Mayuge
22. Political insecurity in some parts of Uganda which scare away labour from forest exploitation for example ADF in mountain Rwenzori forest in Kasese, armed robbers in Mabira forest in Mabira and Bugoma forests in Hoima

23. Land tenure system/culture where landlords with big chunks of land or where land is communally owned may not allow planting of trees limiting the expansion of Katuugo forest in Nakasongola and Magamaga forest in Jinja and the planting of trees in Moroto, Kotido and Kaabong.
24. Profit repatriation all profits earned by foreign owned forest companies are ploughed back to countries of origin for example planted forest in Kagoma planted by Nile Ply along Kamuli road.
25. Corruption in the forest department involving illegal sale of timber, collection of bribes and smuggling of forest products from Mabira forest in Buikwe, Budongo forest in Masindi and South Busoga forest in Mayuge
26. Accidents during felling and loading of forest products discourages people from carrying out lumbering and other forest related activities in Mabira forest in Buikwe, Budongo forest in Masindi and Katuugo forest in Nakasongola

Measures being taken to conserve forests in Uganda

1. Empowering support institutions to ensure sustainable exploitation of forest resources for example National Forest Authority (NFA) and National Environmental Management Authority (NEMA) to protect forests like Mabira forest in Buikwe, Budongo forest in Masindi and South Busoga forest in Mayuge
2. Regular patrol by the officials in the National Forest Authority (NFA) and National Environmental Management Authority (NEMA) is being done to protect forests like Mabira forest in Buikwe and Budongo forest in Masindi.
3. Limiting exploitation by licensing of exploiters of forests to reduce over exploitation of forests like Mabira forest in Buikwe, Budongo forest in Masindi, South Busoga forest in Mayuge and mountain Rwenzori forest in Kasese
4. Evicting many encroachers of forests to reduce the rate of deforestation in the periphery of forests like Mabira forest in Buikwe and Budongo forest in Masindi.
5. Sensitization of the public about the importance of preserving and conserving forests and the dangers of deforestation to protect Mabira forest in Buikwe, Budongo forest in Masindi, South Busoga forest in Mayuge.
6. Afforestation and re-afforestation programmes are being encouraged to replace the lost forests by planting forests like Katuugo forest in Nakasongola, Muko forest and Mafuga forest in Kabale, Lendu forest in Nebbi.
7. Other sources of power and energy are being developed other than firewood and charcoal for example hydroelectric power and solar energy to save forests like Mabira forest in Buikwe and Budongo forest in Masindi.
8. Agroforestry is being encouraged in which elements of agriculture are combined with forestry to encourage the growth of trees for example at Kalengye and Kachwekano in Kabale, at Kabanyoro and Kawanda to supplement Mabira forest in Buikwe and Budongo forest in Masindi.
9. Gazetting forests as forest reserves and national parks to ensure sustainable exploitation of Mabira forest in Buikwe, Budongo forest in Masindi, South Busoga forest in Mayuge and mountain Rwenzori forest in Kasese
10. Research is being carried out by National Forest Authority (NFA) and National Environmental Management Authority (NEMA) concerning sustainable exploitation of Mabira forest in Buikwe, Budongo forest in Masindi, South Busoga forest in Mayuge and mountain Rwenzori forest in Kasese
11. Political stability is being ensured by the national army (UPDF) and other security organs to ensure security and reduce destruction of forests like Mabira forest in Buikwe, Budongo forest in Masindi and South Busoga forest in Mayuge

12. Promoting ecotourism which involves protecting fauna and flora and preservation of soil for the purpose of promoting tourism in Mabira forest in Buikwe, Budongo forest in Masindi and South Busoga forest in Mayuge
13. Soliciting for foreign donation from donor countries like Norway, European Union to fund sustainable exploitation of Mabira forest in Buikwe, Budongo forest in Masindi and South Busoga forest in Mayuge
14. Encouraging the use of alternative sources of raw materials for example plastics from Nice House of plastics in Kampala, metallic poles from steel rolling mills in Jinja instead of using forest products from Mabira forest in Buikwe, Budongo forest in Masindi and South Busoga forest in Mayuge.
15. Education and training through higher institutions of learning like those doing zoology, botany environmental science from Makerere University to acquire skilled labourforce to protect forests like Mabira forest in Buikwe, Budongo forest in Masindi and South Busoga forest in Mayuge.
16. Cultural initiative to preserve forests for cultural purposes for example Nakayima tree in Mubende, fight against destruction of Mabira forest by the Baganda of Buikwe.
17. Demarcating forest boundaries to reduce encroachment within the periphery for example Mabira forest in Buikwe, Budongo forest in Masindi, South Busoga forest in Mayuge and mountain Rwenzori forest in Kasese
18. Establishing tree nurseries by the forest Department to increase afforestation and agroforestry for example at Namanve National Tree Seed centre for planted forests like Katuugo forest in Nakasongola.
19. The government is encouraging population control through family planning to reduce population pressure and encroachment on forests like Mabira forest in Buikwe, Budongo forest in Masindi and South Busoga forest in Mayuge

REVISION QUESTIONS

- 1. To what extent have physical factors favoured the development of forestry in Uganda?**
 - Introduce by giving the current status of forestry, identify the type of forests with place names and draw a sketchmap of Uganda showing the distribution of forests.
 - Explain the role of physical factors in the development of forestry and then give other factors, giving an example of a forest on every point.
- 2. Assess the contribution of forestry to the development of Uganda.**
 - Introduce by giving the current status of forestry, identify the type of forests with place names and draw a sketch map of Uganda showing the distribution of forests.
 - Explain the positive and then negative contribution of forestry, giving an example of a forest on every point.
- 3. Explain the factors hindering the exploitation of forest resources in Uganda.**
 - Introduce by giving the current status of forestry, identify the type of forests with place names and draw a sketch map of Uganda showing the distribution of forests.
 - Explain the factors, giving an example of a forest on every point.
- 4. Examine the importance of Afforestation in Uganda.**
 - Introduce by Defining afforestation as the planting of trees where they have never existed, identify the planted forests in Uganda and draw a sketch map of Uganda showing planted forests.
 - Explain the positive and then negative importance of afforestation, giving an example of a planted forest on every point.