

VULCANICITY IN UGANDA

Vulcanicity is the process through which molten magma (solid, liquid and gaseous materials) are either ejected onto the earth's surface or injected into the earth's interior through lines of weakness leading to the formation of extrusive volcanic features such as volcanic cones like Mt. Elgon, volcanic plugs like Tororo plug, calderas like Napak and intrusive features such as sills like the Osukulu hills, batholith of Mubende, dykes, etc.

Far beneath the earth's crust is great heat and pressure resulting into the melting of rocks. The molten rocks below the earth's crust are referred to as Magma. This is caused by radioactivity and geochemical reactions that result into melting of rocks. Due to excessive heat and pressure, the magma is always mobile and looking for an opportunity to escape to the surface of the earth through lines of weakness. Eruption of magma up to the earth's surface may be violent, non-violent and gaseous.

When magma escapes to the surface of the earth, it loses its gases and it is referred to as lava and on reaching the earth's surface, it cools, solidifies to form extrusive landforms.

There are three types of lava which varies considerably in its chemical Composition, particularly in its silica content as seen below:

BASIC LAVA: This is in form of a fluid (non viscous), very mobile and poor in silica but rich in magnesium and iron. It flows over long distances producing cones with gentle slopes. It has low silica content (45 -52 %). It is hot (1,200⁰c). It takes longer to cool and solidify. It retains gas giving its mobility. Eruptions are frequent but relatively gentle. It ejects lava and steam. It results into the formation of low and broad based volcanoes or lava plateaus.

ACIDIC LAVA: It is viscous (sticky) which is cohesive and sticky and therefore unable to spread over long distances. It is immobile and solidifies quickly. It is rich in silica with more than 66% silica content. It is less hot (800⁰c). It leads to the formation of landforms with steep slopes such as composite cones and ash and cinder cones.

INTERMEDIATE LAVA: This has average silica content, fairly viscous, immobile and unable to flow far before solidifying. It has between 52%-65% silica and it is fairly viscous and is able to flow far before solidifying like dykes and sills.

THE EFFECTS OF VOLCANICITY ON RELIEF LANDFORMS IN UGANDA

Extrusive landforms are those which are formed above the Earth's surface as a result of lava being extruded. The nature of the material ejected and form of eruption whether acidic, basic, explosive or quiet has a great bearing on the and size and shape of a volcano. These include:

VOLCANOES

These are hills or mountains formed when magma erupts and piles up around the vent until a cone is formed. These are basically four types of volcanic cones. These are conical or dome

shaped structures/mountains built by emission of lava through the central opening called the vent in the earth's crust.

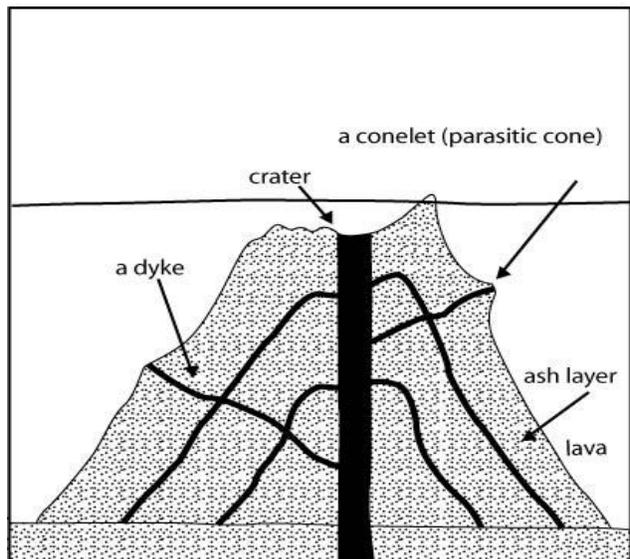
The materials ejected build up around the vent and generally form a cone with a funnel like depression called a crater. If the pressure between is insufficient for the magma to reach the main crater, molten rock may force its way to the surface through side fissures and builds up parasitic or secondary cones on the slopes of the main volcano.

Examples of volcanoes in Uganda include; Mufumbiro volcanoes (4127 M.a.s.l) consisting of three peaks thus Mt. Muhavura, Mgahinga and Sabinyo. Mountain Elgon which forms the highest volcano in Uganda rising to a height of 4321metres a.s.l, Kadam (3070m) Mt.Moroto (3040m) Mt. Morongole (2700m) and Napak (2548m) .

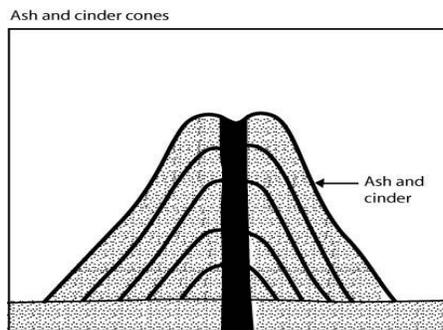
TYPES OF CONES/ VOLCANOES

COMPOSITE/STRATO VOLCANOES: These are volcanoes consisting of alternating layers of ash (tephra) and lava which builds up into a cone shaped feature with a central vent. It begins with great violence and materials are blown to great heights where they break up into fragments of ash falling back around the vent. Some lava escapes from the side vents where it builds up small conelets. This is may be due to the blockage of the main vent. Examples include the Virunga ranges (Mufumbira) on the Uganda–DRC border as seen in figure.

Composite Cones



ASH AND CINDER CONES: These are usually concave shaped or symmetrical cones usually less than 150M in height, with fairly steep slopes. They are formed when acidic and viscous lava is violently and explosively ejected on the earth's surface and blown to great heights, where it breaks up into small fragments of ash. These fall back and accumulate around the vent. Repeated eruptions with accumulations of layers of ash around the vent lead to building of ash and cinder cones. Examples include Mt. Elgon, Mt. Muhavura in Kisoro district (Muganza, Shozi, Sagitwe and Bisalo) as seen in figure



CRATERS AND CALDERAS.

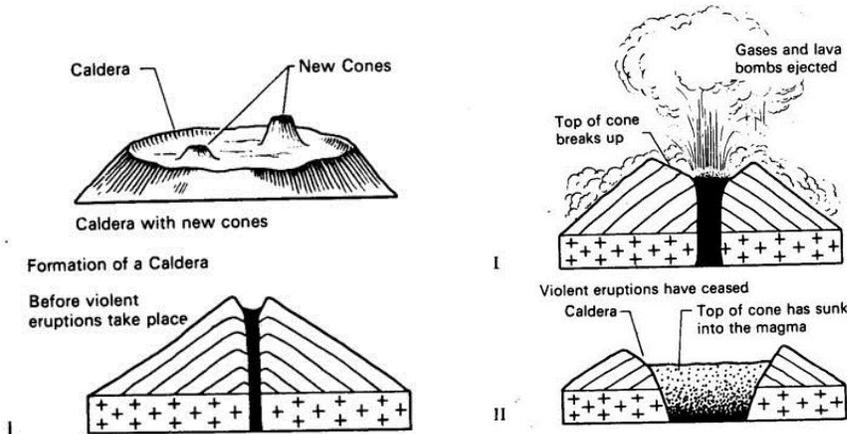
These are funnel shaped depressions found on top of volcanic cones. The main difference between them is that craters are generally smaller in size while calderas are very large sometimes referred to as large craters.

CRATERS: These are shallow depression found on top of volcanic mountains. They are formed when the volcano's top is blown off by explosion gases creating a depression referred to as a crater. Alternatively, craters are formed by subsidence of the volcanic materials that once occupied the vent into the vacated magmatic chamber. This creates a depression on top of the mountain called a crater.

EXPLOSION CRATERS/RING CRATERS: These are shallow flat floored depressions surrounded by a low rim of pyroclasts usually less than 50M high. They are formed in violent eruptions or when the vent is blown through the rock by a series of gas explosions. Examples of explosion craters include: Katwe, Kyamwiga, Mirambi, Nyamunuka, Nyungu, Itunga, Wabikere and Kigere.

CALDERA: It is a large and shallow rounded depression found on top of a volcano covering approximately 10km across such as Napak caldera.

Structure of a Caldera



NB: calderas are formed in 2 main ways i.e.

VIOLENT ERUPTIONS: They form when violent eruptions blow off the top part of a volcanic cone leaving a depression on top. The massive explosion is said to occur when acidic lava solidifies within the vent thereby blocking the vent. Pressure builds at this point where there is a barrier and later is over come by a great force of explosion.

SUBSIDENCE: This involves sinking of the original material which occupies the vent. When the weight of overlying cone becomes too great, faults develop on the now unsupported roof of chamber which slowly sinks under its weight dropping down as a crater or a caldera.

VOLCANIC PLUG/NECK

This is a rocky crag consisting of solidified lava which formerly filled the central opening of a volcano. It is formed when magma rises and solidifies in the vent but after reaching the earth's surface thus lava is viscous when extruded does not flow far or spread but form cylindrical cumulo form plug. Sometimes lava that comes out first may solidify and form a crust on top of the vent such that subsequent lava can not penetrate outside but only forces the outer solidified crust to expand outwards by a process of internal expansion. Erosion removes the surrounding materials leaving the plug exposed. An example is the Tororo plug which is a central plug exposed after the outer rocks were eroded. This is also seen near Lake Katwe in Kasese and Alekilek between Katakwi and Moroto.

LAVA PLAINS/LAVA PLATEAU

Lava plateau refers to upland with a generally leveled summit and is made of successive layers of lava. The great heat melts basic rocks and sets off convective currents. Basic lava rises through numerous vents or fissures following the rising convectioal currents. Lava is mobile (less viscous) and therefore spreads out to cover a wide area before solidifying to form a flat raised landscape (plateau) such as the Kisoro plains.

FORMATION OF VOLCANIC MOUNTAINS

MOUNTAIN ELGON

It is a volcanic mountain formed due to volcanicity. Volcanicity is the total process through which ashes, gases, pyroclasts and molten magma are ejected and deposited on the earth's surface forming extrusive volcanic landforms.

It originates from geochemical and radioactivity reactions in the mantle. These reactions generate intensive heat and pressure which to melting of the rocks into a semi-liquid state called magma. The molten rocks are mobile in form of convective currents and due to intensive pressure erupted through a central vent. The lava piled around the vent, cooled and solidified forming a steep sided volcanic mountain.

Successive eruptions led to cooling and solidification of magma in layers of ash,, lava, cinder and pyroclasts a volcano. When Magma solidified in the central vent, subsequent magma passed through subsidiary vents and formed Parasitic/Secondary cones/Conelets on the sides of the mountain such as Wanale, Namisindwa, Nkokonjeru, Nagudi, etc. Violent eruption blew off the top of the volcano to form a crater. The Volcano was later subjected to denudation processes like erosion, weathering, and masswasting which resulted into its present shape.

EFFECTS OF VOLCANIC MOUNTAINS ON THE CLIMATE OF SURROUNDING AREAS.

They cause rainfall formation on the windward side. This is evident on the western side of Mt. Elgon in areas such as Mbale, Sironko and Manafwa leading to crop growing.

They also lead to aridity especially the areas on the leeward side of volcanic mountains like Amudat and Bukwo district on the East of Mt. Elgon.

The volcanic mountain peaks such as Wagagai on Mt. Elgon are cooler than the foot of the mountains due to variations in altitude.

Volcanic mountains are sources of rivers like river Sironko, river Sipi, Namatala and river Manafwa on Mt.Elgon which have impact on micro climatic influences through evaporation leading to heavy rainfall.

It is associated with relatively warm temperatures of about 20°C and heavy rainfall received through the year at the lower slopes of volcanic mountains in areas like Kabale and Kisoro.

Volcanic mountains influence local winds in form of Anabatic and Katabatic winds. Anabatic winds flow upward during the day while katabatic winds move downwards under the influence of gravity at night in Bududa and Bulambuli around Mt.Elgon.

They experience temperature inversion especially in the valleys in that at night, cool moist heavy air accumulates on the highland such as Mt. Elgon. The air is forced to sink in the valley thus replacing the hot air in the valleys. The hot air in the valley also rises to replace the descending

cool air hence temperature inversion leading to formation of fog and mist in the valleys of Sironko and Manafwa.

The areas at the foot of the volcanic mountains like the Mufumbiro ranges experience high pressure in areas like Kabale and Kisoro. However, the mountain peaks such as Muhavura, Mgahinga, etc have low pressure because of air molecules hence their weight reduces as one ascends.

THE INFLUENCE OF INTRUSIVE VOLCANICITY ON THE DEVELOPMENT OF RELIEF LANDFORMS IN UGANDA

Intrusive vulcanicity refers to the process by which molten magma is injected into the earth's crust from the interior of the earth. This is caused by geo-chemical and radio activity generating intense heat and pressure, melting mantle rocks into molten magma. This rises from the interior towards the surface through lines of weakness within the earth's crust created by tectonic forces of tension and compression. The injected materials solidify within the earth's crust at different levels according to chemical composition, forming different intrusive features such as batholiths, sills, dykes, laccoliths, etc.

These intrusive features have formed relief landforms after a long period of denudation in form of weathering, mass wasting and erosion.

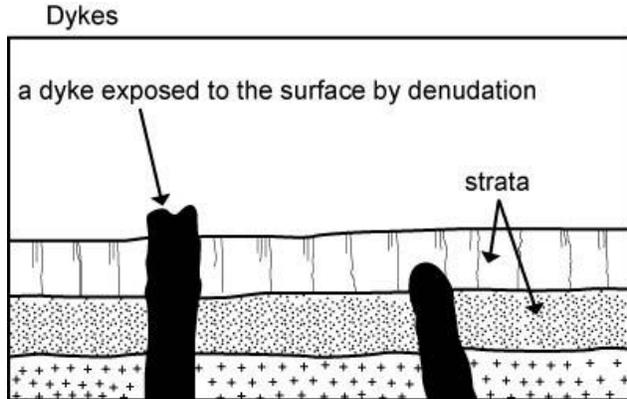
A DYKE

This is a vertical or steeply inclined igneous rock structure, cutting across rock strata. Dykes form when magma flows through either a vertical or inclined fissure in the earth's crust, across the bedding planes of the rocks and finally solidifies before reaching the earth's surface to form a wall like feature. When a dyke is exposed to the earth's surface by denudation, it will affect relief as seen below.

RIDGES/ESCARPMENT/PLUGS: These are formed when the rocks making up the dyke are more resistant to erosion than the surrounding rocks. The soft rocks are eroded much faster leaving a wall like feature such as the Isingiro ridges and wall-like ridges in Busitema in Busia district.

FLAT LANDS: These occur when the rocks are of the same resistance to erosion with the surrounding rocks and therefore the rocks are worn down uniformly.

DEPRESSION/ARENA DYKE/TRENCHES. This is formed when dyke rocks are of less resistance to erosion than the surrounding rocks. They are worn down faster to form a depression.



BATHOLITH

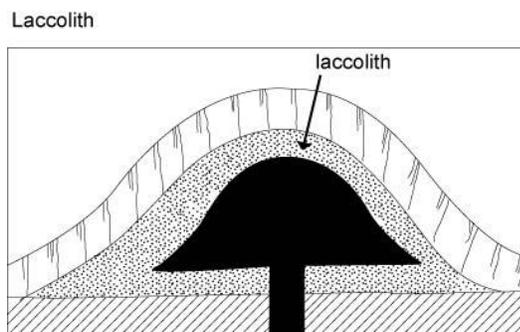
This is a very large dome shaped intrusion made up of large crystalline granite rocks formed at great depth from acidic magma solidifying slowly. They are the largest forms of intrusions and are usually bottomless, forming the roots of mountains. It has a dome or convex shape.

Batholiths form uplands or hills when exposed to the surface by the removal of the over lying rocks by denudation These stand out as inselbergs or residual hills as seen in Mubende along Mityana-Fortportal road, Kyaka in Toro, Singo batholith outcropping between Kikandwa and Kawungera and Nakasongola hills in central Uganda, Kachumbala batholiths in Bukedea. These formed as exposed basements granite rocks, which are resistant to erosion and stand up as coninate hills called inselbergs surrounded by plains, like at Labwor in Kotido and Parabong

Batholiths with a lot of joints accelerate the rate of rock rotting by chemical weathering processes. The rocks therefore become weaker than the surrounding area and thus worn down to form depressions called arenas such as Rubanda arena along Kabale-Kisoro road.

LAPOLITH AND LACCOLITH

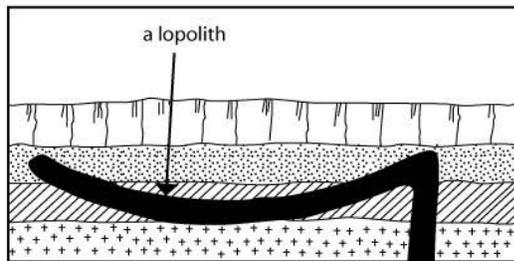
A laccolith is a large dome shaped intrusive igneous rock structure with more or less a flat base/bottom. It was formed as a result of injection of acidic magma into the earth's crust layers thereby accumulating into a large mass. The viscous magma forces the overlying rock strata to arch upwards forming a dome shaped feature as seen if figure 2:.



A lapolith is a large saucer shaped intrusion with in the country rock. It is made up of basic lava which after intrusion, bends down due to the weight of the overlying rocksult of continuous deposition.

Once exposed to erosion, a shallow but a wide saucer shaped depression is formed for instance at Rubanda along Kabale-Kisoro road and many are found in Mubende and Mbarara.

a lapolith

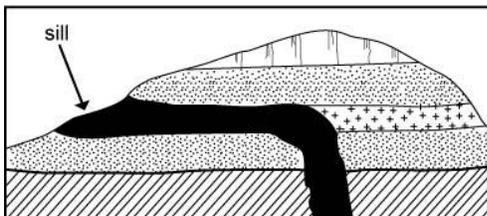


When exposed by denudational forces, Laccolith have formed uplands if the central rocks are harder than the surrounding rocks for example along Lyantonde-Mbarara road,

SILLS

These are horizontal sheets of igneous rock structure, lying between bedding planes of sedimentary rocks. They are formed from basic magma which is able to flow for long distance before solidifying. The magma rises from the interior of the earth and spreads horizontally and solidifies between the bedding planes of rock strata near the surface.

Sills



Sills which are resistant to erosion form flat topped hills with cliffs. When crossed by rivers, waterfalls and rapids are formed for example as seen at Sezibwa Falls in Mukono, Itanda falls in Jinja and Karuma falls along river Nile, Kakinzi falls in Luwero and Sipi falls in Kapchorwa.

CASTLE KOPJES

This is a ridge of large angular boulders formed as a result of chemical weathering of jointed crystalline rocks. The joints are caused by stress and strain during cooling and crystallisation, or pressure release like castle copies in Kachumbala in Bukedea, Nyero rocks in Kumi and Buyende.

TORS:

These are ridges of egg shaped boulders of granite, which have their bases in the bed rock and are surrounded by weathered debris, for example, Tors in Mubende, Buteba and Kachumbala.

THE INFLUENCE OF VULCANICITY ON THE DEVELOPMENT OF DRAINAGE FEATURES IN UGANDA

It led to the formation of explosion craters which were later filled with water to form explosion crater Lakes such as Lake Katwe, Lake Nyungu, Lake Nyamunuka, Lake Kamweru, Lake Katinda and Lake Nkugate.

It led to the formation of lava dammed lakes where the original river courses were blocked or dammed by lava flows which solidified to form a barrier For instance Lake Bunyonyi, Lake Mulehe and Lake Mutanda.

Vulcanicity accounts for the formation of crater lakes on top of volcanic cones. The craters were as a result of violent eruption which blew the top of volcanic mountains or subsidence of the former vent leaving a funnel shaped depression which is later filled with water and formed a crater lake like on Mt.Muhavura.

It also led to the formation of caldera lakes. Calderas are large craters formed as a result of violent eruption and subsidence to form wide depressions called calderas. These are filled with water to form caldera lakes as seen on Mt.Napak.

Volcanic mountains act as catchment area or watershed for numerous flowing rivers for instance Mt. Elgon is a source of rivers like Sironko, Manafwa, Sisiyi, Malaba, Namatala, Sipi, etc

Vulcanicity resulted into the formation of hot springs. The hot waters emerge from underlying rocks. This is as a result of underground, subterranean water coming into contact with underground hot igneous rocks. The water gets heated up and it is ejected to the earth's surface through lines of weakness to form hot springs like Katagata in Sheema, Kibiro, Sempaya, Narok (Karamoja) hotspings.The water that emerge from underlying rocks have a medical effect thus provide treatment for fungal diseases due to sulphide content.

Sills and dykes, when crossed by rivers, form waterfalls like Sezibwa falls along river Sezibwa in Mukono, Kisiizi falls in Rukungiri and Itanda falls along river Nile. These were formed by sills lying across rivers. Others are Sipi falls and Sisiyi on Mt. Elgon.

Porous rocks such as pumice of the volcanic origin have reduced surface drainage in areas like Kisoro For instance Chuho spring sustains water to a stream which flows for only about 30 meters and then disappears due to porosity of the underground soils in Kisoro.

Presence of water falls and rapids leads to the formation of other related land form features such as Plunge pools at the base of Sezibwa and Sipi falls formed by falling water and on softer rocks,

SELF EVALUATION QUESTION 2:

1. Explain the influence of vulcanicity on the development of drainage features in Uganda.

Suggested approach

- ✓ Define the term Vulcanicity
- ✓ Bring out the drainage features due to vulcanicity.

N.B

The drainage should be identified, explained and illustrated with examples

THE SIGNIFICANCE OF VOLCANICITY TO THE DEVELOPMENT OF UGANDA

POSITIVE EFFECTS

Volcanic features have been weathered to form volcanic fertile soils. They also have a cool pleasant climate due to high altitude which has attracted dense settlement in areas of Kabale and Kisoro around Mufumbiro ranges and Mbale and Sironko around Mt. Elgon

The beautiful sceneries created by Vulcanicity in form of mountains like Mt. Elgon and its associated features like Sipi falls, Missi cave and Chebonet cave, Mt. Mufumbiro, Moroto, crater lakes like Katwe, Kigere, Saaka and Nyungu, hot springs such as Kitagata and Sempaya, waterfalls like Sezibwa, Sisiyi, etc. These act as tourist attractions hence earning the country of valuable foreign exchange for economic development. These regions are used for study and research purposes especially by A' level students and those from higher institutions of learning such as Makerere University and scientists from all over the world. They do visit areas such as Tororo plug, Mt. Elgon, Hot springs such as Kibiro, Sempaya, Katagata among others for research and field studies.

Volcanic activities are associated with mineral resources resulting into mining activities. For example Osukulu hills in Tororo are composed of carbonates which resulted into mining of limestone and Phosphates. Minerals such as tin, wolfrum are near Mufumbira ranges. Lake Katwe which is of volcanic origin is a source of edible salt. Also volcanic rocks are quarried to produce concrete and gravel useful in the construction industry in areas around Mt. Elgon like Manafwa, Mbale, Sironko, Busiu, Tororo, etc.

Volcanic mountains like Elgon and Mufumbiro ranges modify the climate of surrounding areas by tapping moisture bearing winds leading to the formation of relief rainfall. This has encouraged agricultural activities. Cool temperatures resulting from increased altitude also favour the growing of wheat, Sorghum and barley in places like Kapchorwa, Kween and Bukwo.

The heavy rainfall received encourages the growth of montane forests such as Mt. Elgon forests, Echuya forests and Mgahinga forests which promote lumbering activities.

Volcanic mountains are sources of watersheds of various rivers and streams which provide water for domestic and industrial use. For instance Mt. Elgon is a catchment area for rivers such as Manafwa, Sironko, Sipi, Simu, Namatala, Sisiyi and Malaba.

Vulcanicity is associated with waterfalls and hot springs which are potential sites for the generation of hydro and geothermal power. For example Sipi falls on Mt. Elgon is a potential area for HEP generation. Hot springs such as Kitagata, Kibiro are potential areas for generation of geothermal energy.

Vulcanicity resulted into the formation of lava dammed lakes such as Lake Bunyonyi, Lake Mulehe and Lake Mutanda. These lakes act as sources of fish hence promoting fishing industries.

The hot springs found in different localities in Uganda have been valued for medicinal purposes. These are believed to be a remedy for some diseases. For example Kitagata hot spring in Bushenyi and Bugusu healing centre.

Mt. Elgon slopes and Kigezi highland are used for grazing of livestock like Beatrice dairy farm in Kabale district.

Volcanic lakes such as Lake Bunyonyi and Lake Mutanda promote water transport thereby connecting people on the Islands to the mainland areas thereby easing communication.

It led to the formation of lava dammed lakes which are sources of fish rich in food protein. For instance Lake Mutanda and Lake Bunyonyi provide small scale stocks of fish to the local population.

Vulcanicity is associated with national parks such as Mt. Elgon national park and Mgahinga national park leading to wild life conservation.

SHORT COMINGS OF VOLCANIC REGIONS IN UGANDA

The steep slopes of volcanic mountains hinder effective development of road transport and communication routes, leading to inaccessibility of many areas in Mbale and Kapchorwa around Mt. Elgon and Kisoro and Kabale around the Mafumbiro ranges.

The steep slopes also hinder the development of agriculture. They limit the available land for agriculture mechanization as well as accelerating soil erosion hence loss of valuable fertile soils in areas of Mbale and Bududa around Mt. Elgon and Kabale around the Virunga ranges.

Volcanic mountains are prone to incidences of landslides causing destruction of property and loss of lives. This is evidenced in areas like Mangiya, Bubutu and Budadiri around Mt. Elgon. For instance the 2010 landslide in Bududa where about 100 people were killed and several people displaced. The 2019 mudslides in the Mt. Elgon region left 10 people dead and about 25,000 people displaced in the districts of Bududa, Sironko, Namisindwa, Mbale and Manafwa.

Some volcanic mountains and highlands are responsible for aridity on the lee ward sides leading to little or no rainfall amounts received because such areas like Amudat, Parts of Katakwi and Nakapiriprit are in the rain shadow on the lee ward side of Mt. Elgon.

Volcanicity resulted into limited surface water due to the porous nature of volcanic rocks and soils as evidenced in Kisiro. They easily allow the water to infiltrate resulting into dryness and therefore water shortage.

Young volcanic soils tend to be very infertile as they have not been exposed for long to the agents of weathering. They are porous and easily eroded once formed. This is evident in Kisoro and Rukungiri.

They are associated with forests such as Mt.Elgon forest, Bwindi impenetrable, Mgahinga and Echuya forests which act as habitats for pests and animals like rats, lions, gorrilla, tsetse flies and mosquitoes. Volcanic lakes like Lake Bunyonyi and Lake Mutanda act as breeding grounds for disease causing vectors like mosquitoes and snails.

They also act as habitats for wrong doers such as the Ntarahamwe rebels in the Mgahinga forest on Mgahinga Mountain on border between Uganda and Rwanda which adversely affected tourism receipts in 1999.

The extreme cold temperature experienced on the upper slopes of volcanic mountains, discourage settlement, forestry and other forms of land use. The high altitude areas of Mt.Elgon have limited settlement and forestry in areas of Sironko, Kween and Kapchorwa.

Some volcanic lakes like Nyamunuka and Katwe explosion Crater Lakes in Kasese lead to pollution of the environment.

Volcanic rivers and lakes flood during wet seasons causing destruction of property and loss of lives For instance river Manafwa and river Namatala which originate from Mt. Elgon.

CHALLENGES/PROBLEMS ASSOCIATED WITH HIGHLAND AREAS.

Highlands have steep slopes which hinder the development of road transport and communication routes, leading to inaccessibility of many areas in Mbale and Kapchorwa around Mt. Elgon and Kisoro, Rubanda and Kabale in the Kigezi highlands.

They limit agriculture mechanisation. They limit the available land for agriculture mechanisation in areas of Mbale and Bududa around Mt.Elgon and Kabale around the Virunga ranges.

Highlands are prone to incidences of landslides/masswasting causing destruction of property and loss of lives. This is evidenced in areas like Mangiya, Bubutu and Budadiri around Mt. Elgon. For instance the 2010 landslide in Bududa where about 100 people were killed and several people displaced. The 2019 mudslides in the Mt. Elgon region left 10 people dead and about 25,000 people displaced in the districts of Bududa, Sironko, Namisindwa, Mbale and Manafwa.

Highlands are responsible for aridity on the lee ward sides leading to little or no rainfall like Kasese around Mt. Rwenzori because it is in the rain shadow.

They are associated with fog and mist which limit visibility in areas like Fortportal, Kasese and Bundibugyo

There is limited land due dense population and land fragmentation in highland areas of Kabale, Bududa and Sironko.

They are associated with forests such as Mt. Elgon forest, Bwindi impenetrable, Mgahinga and Echuya forests which act as habitats for pests like tsetse flies and mosquitoes in areas like Mbale, Manafwa and Namisindwa.

They are associated with dangerous wild animals like leopards in Kasese which are a threat to human lives as well as monkeys in Kabale, Bududa and Sironko leading to destruction of crops.

They act as hide outs for wrong elements and criminals like the ADF rebels caused insecurity in areas like Bundibugyo and Kasese used Mt. Rwenzori as their hiding ground

The extreme cold temperature and the high altitude discourage settlement in areas of Sironko, Kween and Kapchorwa around Mt. Elgon, Bundibugyo, Kasese and Kabarole around Mt. Rwenzori.

It is associated with soil erosion due to steep slopes leading to thinner and rocky soils in areas like Kanungu, Nebbi, Kisoro, Bududa and Bukwo.

They are associated with earthquakes and tremors in areas like Bundibugyo and Kabarole leading to destruction of property.

Highlands are associated with flooding in the lower valleys of Bundibugyo, Bududa, Rukiga and Kasese leading to destruction of property and loss of lives.

SELF EVALUATION QUESTIONS 2:

1. (a) Examine the processes that led to the formation of volcanic mountains in Uganda
- (b) Outline the effects of volcanic mountains on the climate of surrounding areas
2. (a) Account for the formation of Mt.Elgon
- (b) Outline the effects of volcanic mountains on the climate of the surrounding areas.
3. Assess the contribution of tectonic features to the economy of Uganda.
4. Examine the effect of volcanicity on the physical landscape and human activities in Uganda.
5. Assess the contribution of extrusive volcanic land forms to the development of Uganda.
6. Explain the importance of volcanic landforms to the development of

Uganda.

(25 marks)

IMPORTANCE OF VOLCANIC LAKES

Volcanic lakes refer to lakes formed as a result of volcanic activity.

The volcanic lakes include:-

- ✓ Explosion crater lakes such as Lake Katwe, Lake Nyungu, Lake Nyamunuka, Kikorongo and Kyamwiga in Kasese, Lake Nyamusingiri in Rubirizi, Lake Kigere and Lake Wabikere in Kabarole.
- ✓ Mountain Crater lakes like Lake Nkugute/Rutoto in Bunyanguru and a crater lake on Mt. Muhavura in Kisoro.
- ✓ Caldera lakes like seasonal caldera lake on Mt. Napak.
- ✓ Lava dammed lakes such as Lake Bunyonyi in Kabale, Mutanda, Mulehe and Kyahafi in Kisoro.

POSITIVE CONTRIBUTIONS OF VOLCANIC LAKES TO THE DEVELOPMENT OF UGANDA

It has boosted research and tourism activities because volcanic lakes have beautiful sceneries like Islands and beaches such as Harutindo beach on Lake Bunyonyi in Kabale. Lake Munyanyange also attracts tourists because it is a site for flamingos. This has stimulated the generation of foreign exchange for increased economic development.

Volcanic lakes have promoted water transport mainly for inland connection for instance on Lake Bunyonyi boats move from Bushara islands to Bwama Islands.

They are sources of fish rich in food protein leading to improved diet and provision of income to the local people. This is evident on lakes such as Bunyonyi and Mutanda.

Volcanic lakes act as sources of water for domestic and industrial purposes. Lake Bunyonyi is a source of water to Kabale town. Afro-Alpine factory in Kabale uses water from Lake Bunyonyi for processing Artemesia to manufacture drugs for malaria.

They act as sources of valuable minerals like salt extraction from Lake Katwe in Kasese and Lake Bunyampaka near Lake George.

They have encouraged research and education like research on fisheries on Lake Bunyonyi, Lake Mulehe crater lakes like Ngungu, Katinda, Kamweru, Rutoto, Kyamwiga, etc are used for field work study by students and other researchers in the country.

Volcanic lakes act as habitats for wildlife resulting into wild life conservation For instance beautiful birds on Lake Bunyonyi and flamingo on Lake Munyanyange.

They modify the climate of surrounding through a local chilling effect around Lake Mutanda and Lake Mulehe.

They have papyrus swamps on their fringes which serve as raw material for the art and craft industry as seen around Lake Bunyonyi and Lake Mutanda.

They have resulted into the development of landing sites such as Harutindo, Muyera, Kyevu, Buhutu, Bututsi and Heisesero on Lake Bunyonyi in Kabale, Busanza, and Hamushungero on Lake Mutanda.

NEGATIVE CONTRIBUTION OF VOLCANIC LAKES

They act as Breeding grounds for disease causing vectors such as mosquitoes and snails which transmit malaria and bilharzia respectively on Lake Nyungu, lake Wabikere, Lake Nyamusingire, Lake Murambi, Lake Bunyonyi and Lake Lyantonde which limits settlement.

Some volcanic lakes like Lake Katwe and Lake Saaka have saline water which is not suitable for domestic and irrigation use.

They form barriers to development of road transport and communication lines leaving some areas remote. For instance Bushara, Akampane, Hambira and Bwama islands on Lake Bunyonyi cannot be connected by road.

They are associated with flooding during the rainy seasons leading to destruction of property. This is common on islands like Bushara and Bwana on Lake Bunyonyi.

They are associated with fatal accidents due to strong storms and overloading of boats as seen on Lake Bunyonyi in Kabale and Lake Mutanda in Kisoro leading to loss of human lives.

Some of these volcanic lakes like Lake Nyamunuka in Kasese have sulphurous gases such as chloride sulphide which pollute the air with a bad smell.

Lakes such as Bunyonyi, Lake Mutanda and Lake Mulehe are habitats for dangerous animals like snakes and crocodiles which discourages the fishing activities.

SELF EVALUATION EXERCISE 2:

1. Discuss the contribution of volcanic lakes to the development of Uganda

Suggested approach

- ✓ Define volcanic lakes
- ✓ Identify the categories of volcanic lakes and give examples
- ✓ Explain the positive and negative contribution of volcanic lakes to the development of Uganda.

N.B: All points should be illustrated with names of volcanic lakes.