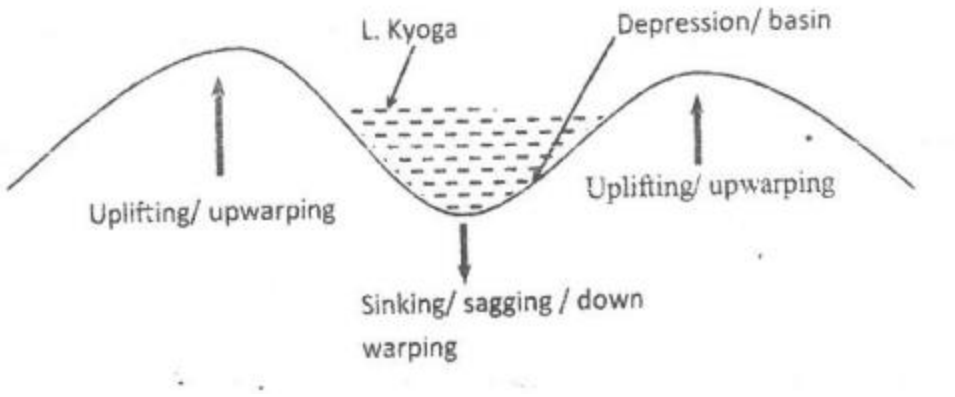
UACE Geography paper 3: Physical geography of Uganda

1. (a) Account for the formation of either Lake Kyoga or lake Katwe (15marks)

Candidates are expected to choose one lake and explain the process which lead to its formation. E.g. Lake Kyoga

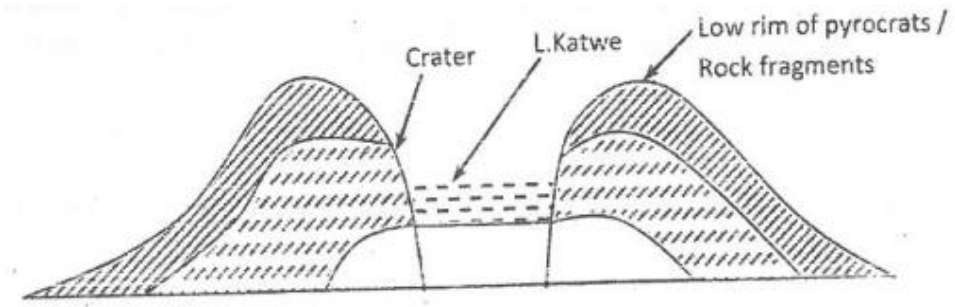
- This lake was formed by warping associated with the formation of the East African rift valley.
- During the formation of East African rift valley, the Eastern and western Uganda up lifted/rising/up warped.
- This was followed by down warping/sagging/sinking of the central part of Uganda creating a basin/depression which was then filled with water from River Kafu which was reversed and the other rivers like Nile, Mpologoma etc. and other water source like rain creating L. Kyoga



Or

Lake Katwe

- This is an explosion creater lake that was formed due to the violet volcanic eruption where the to part of the earth's crust was blown off hence spliting it. This created a depression/crater which was later filled with water from river like Nambahu, Kyabamba, Katido etc. and other sources like rain to form a crater lake



(b) Explain the contribution of lakes to development of Uganda (10marks)

Candiates are expected to come up with hoth positive and negative contributions which are illustrate with examples

- Evaporations from lakes lead to the formation of convection rainfall in areas around them such as Mukono, Kampala around Lake Victoria.
- Lakes allow transport and goods and services
- Lakes like Lake victoria are source of fish for food and income for people around the lakes.
- Lakes like Lake victoria are sources of domestic water for Kampala, Wakiso and Mukono etc.
- Lakes provide water for irrigation
- Lakes are used for sport/recreation such as boat riding.
- Lakes have promoted hydroelectricity power production because they act as reservoirs for water e.g. L. Victoria provides water to R. Nile which has Owen Falls Dam for generationg HEP.
- Lakes provide raw materials for art and crafts such as Papyrus.
- Lakes control flooding since they provide basins into wgich riversdischarge their water. For example Lake Victoria controls flooding in places like Mukono, Jinja etc.
- Lakes have promoted wild life conservation through provision of habitats for aquatic life.
- Lakes promote growth of Urban centers at the landing sites and ports
- Lakes have promoted international cooperation among countries that share lakes. For example Lake Victoria is shared among Uganda, Kenya and Tanzania.

Negative contribution

- Lakes often cause seasonal flooding especially during seasons of heavy rains for example Amolata around L. Kyoga
- Lakes shared by countries often lead to conflicts over boundaries for example the Bugingo incidence on L. Victoria.
- Lakes are associated with accidents which often lead to loss of life and property.
- Lakes promote spread of water borne diseases such as Bilharzia
-

- Lakes are sources of atmospheric pollution, especially lakes that produce bad smeel for example L. Nyamunuka that has a bad smell.
- Lakes hinder the construction of roads and other infrastructures for example Kalangala on L. Victoria.
- Lakes encourage smuggling since is is difficult to monitor movements across borders on lakes like L. Albert, L. Victoria
- Lakes havepromoted piracy/insecurity
- Lakes encourage urbanization and related side effects such as poor hygiene.

2. Explain the importance of glaciation in the development of Uganda (25 marks)

Candidates are expected to define glaciations and explain the formation of a glacier. They are expected to identify glacial erosional and depositinal features.

Glaciation is the overall effect of a glacier on the landscape resulting into both erosional and deposition features.

Often temperature falls below 0^0C, snown is formed and falls and accumulates to form ice. As the bulkness of the ice increases, it moves/flows down slopes on the sides of mountains as glacier.

As the glacier moves down slopes, it erodes the mountain sides and deposits the roded materials in the valleys. This eventually leads to the formation of both erosional and deposition features. In Uganda glaciation occurs on Mt. Rwenzori 4800m above sea level.

Examples of erosional features include

Cirques/corries e.g. Lac-du Speke bansins, Lac du Catherine's basin etc.

Tarns e.g. Lac du Speke, Lac du Catherine

Aretes e.g. one which extends from Mt. Baker to Bajuki valley

Pyramidal peaks/horns e.g. Margherita, stanely, Speke etc.

U-shaped valleys/gllacial troughs e.g. Bujuki Valley, Mubuku, Mugusu, Kamusoso and Lusilube valley

Hnaging valleys e.g. Lac vert valley that joins Kamusoso vallye to Speke valley

Rock steps e.g. found in Mubuku valleys areas

Rock basins e.g. lac du vert basin in Kamusos valley and Lake Bujuku basin in Mobuku valley

Rochhe Montane e.g. found on the floor of upper Mobuku Valley, etc.

Examples of glacial deposition features include

- Moraines found in Mubuku, Kamusoso and Lusilube valley
- Till plains e.g. on the floor of Mubuku and Bujuku valleys
- Kettle lakes e.g. L.Mohoma
- Erratics e.g. Kamusoso and Bujuku valleys
- Out wash plains e.g. in Mubuku
- Kames e.g. in moore valley
- Kamea terraces e.g. in the Kamusoso and Mubuku valleys

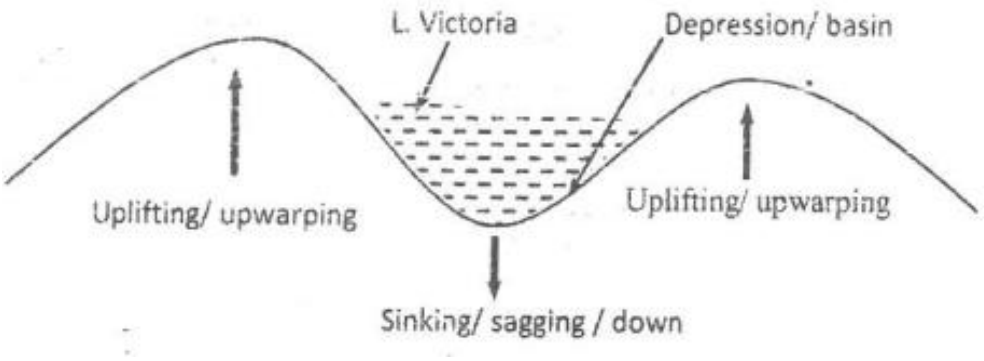
Candidates are expected to bring out both positive and negative importance of glaciations in the development of Uganda

- Claciated land forms are important tourist attractions e.g. Ice capped pyramidal peaks such as Margherita
- The hanging valleys are potential for HEP production e.g. Lac du vert valley that joins Kamusoso valley.
- Glaciersand glacial lakes are sources of rivers that provide water for irrigation e.g. sebwe which provides waterfor Mobuku irrigation schemes.
- The glacial lakes and rivers that flow from the glacier provide waterfor irrigation and industrial use e.g. R. Mobuku.
- The boulders, sand and gravel deposits provide building materials e.g. Boulders, sand and gravel found in Nyamwamba valley
- Glaceirs modify the clamate by providing a cooling effect on the surrounding areas. This has supported the growth of alpine vegetation on the slopes of Margherita, Stanely, speke etc. forests.
- The broad valleys have encouraged crop growing and animal grazing e.g. in Bujuku valley
- The broad glacial trough have provided sites for settlement e.g. Bujuku and Mobuku valleys

Negative importance

- Galciation may lead to landslides causing loss of life and properties e.g. upper areas of Nyamwamba valley
- Rugged relief hinders development of transport and communication network.
- Water from melting Ice may lead to flooring on the slopes of MT. Rwenzori e.g. R. Nyamwamba.
- Glaciers lead to extreme cold temperature thatdiscourage settlement e.g. on Margherita peaks
- Glacier encourgage soil erosion which removes the top fertile soils.

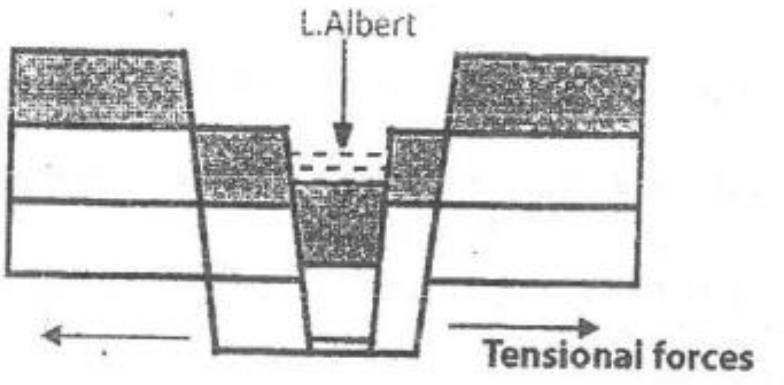
3. (a) Describe the prosesses responsible for formation of either Lake Victoria or Lake Albert (10mrks)
   Candidates are expected to choose one lake and explain the process which lead to its formation. E.g. Lake Victoria
   - This lake was formed by warping associated with the formation of the East African rift valley.
   - During the formation of East African rift valley, the Eastern and western Uganda up lifted/rising/up warped.
   - This was followed by down warping/sagging/sinking of the central part of Uganda creating a basin/depression which was then filled with water from River Katonga and R. Kagera which reversed their flow. Rivers such as Nzoia and Mara continued to flow westwards in the depression/basin forming L. Victoria



Or

Lake Albet

- Lake Albert was formed as a result of faulting
- According to the tensional theory, Lake Albert was formed as a result of tensional forces which pulled the crustal rocks from either sides resulting in the formation of normal faults.
- This resulted into sinking/subsidence of the central block hence forming a rift valley.
- Due to secondary faulting, a smaller depression was formed within the main rift valley.
- The depression was filled with water from R. Nkusi, R. Semuliki, Victoria Nile, rain to form L. Albert.



(b) Asses the contribution of lakes to the development of Uganda (15marks)

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4. Explain the influence of faulting on the development of relief landforms in Uganda (25marks)
   Faulting is the fracturing/ breaking/ rapturing/cracking of rocks due to strain and stress which subsequently leads to the dislocation and displacement of rock strata.

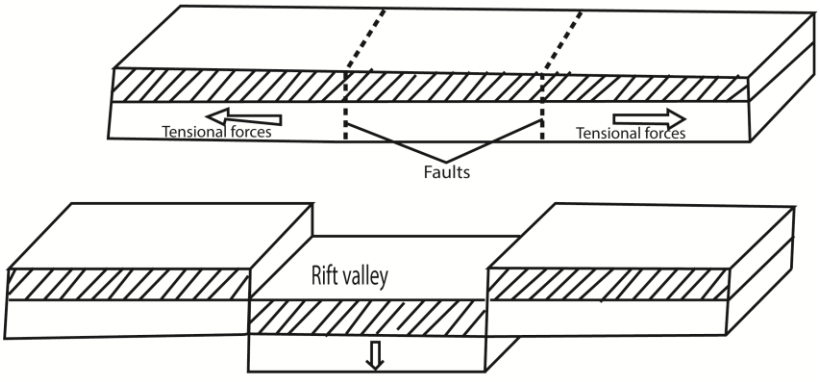
   Faulting has resulted in the formation of the following relief land forms
   (a) Rift valley

   Theories explaining the formation of the rift valley

- The Tension force theory by Gregory
- The compression force by Wayland
- Vertical displacement theory by Dixey

Tension theory by J. W. Gregory

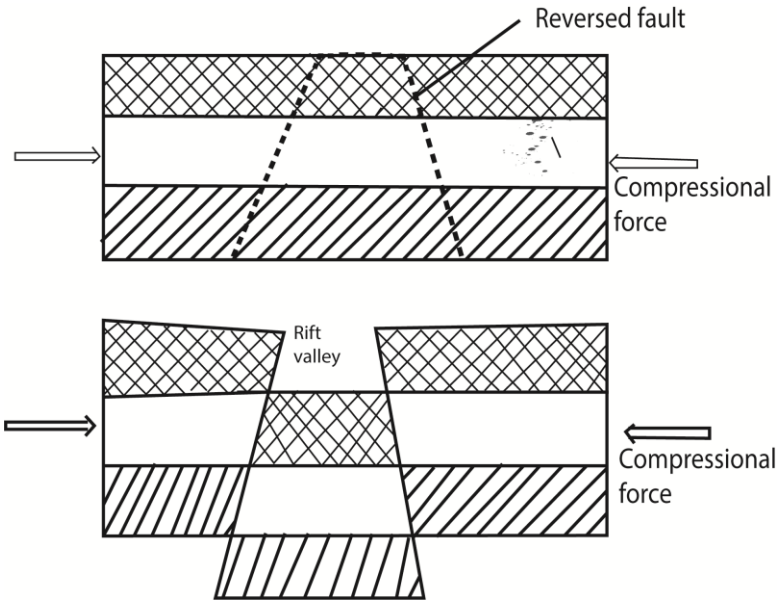
- The radio-active and convective currents produced tension forces within the earth crust.
- Tension forces acted/ pulled apart/ in opposite directions.
- Normal faults were produced, displacing rock strata.
- Side blocks were separated from the middle block, which later lowered/ sunk under its own weight forming a rift valley with gentle slopes.
- Erosion and mass wasting modified the slopes.
- The theory is more applicable to the Eastern Kenya Rift valley (Gregory Rift).



Compression force theory by E. J. Wayland

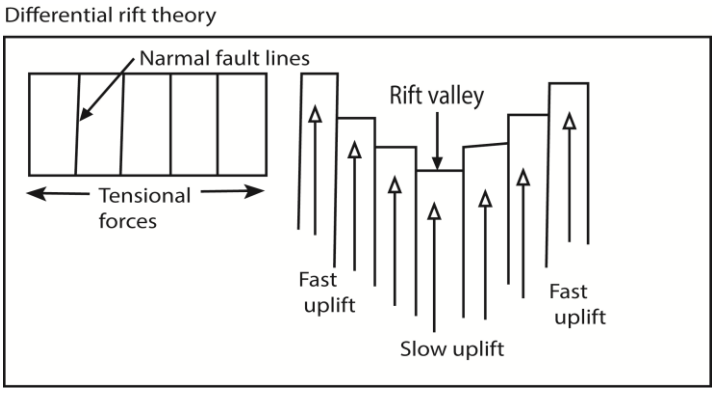
- That strain developed in the East Africa crust as compressional forces pushed/moved in the same directions (convergent).

- Reversed faults were produced.
- The side blocks were forced to over-ride (up thrust), hanging above the central block. The central block thus formed rift valley with steep/ sharp edges.
- The sharp edges were later modified by erosion and mass wasting.
- The theory is more relevant to Western arm of the East African Rift Valley, especially the Albertine Rift valley.



Differential uplift theory

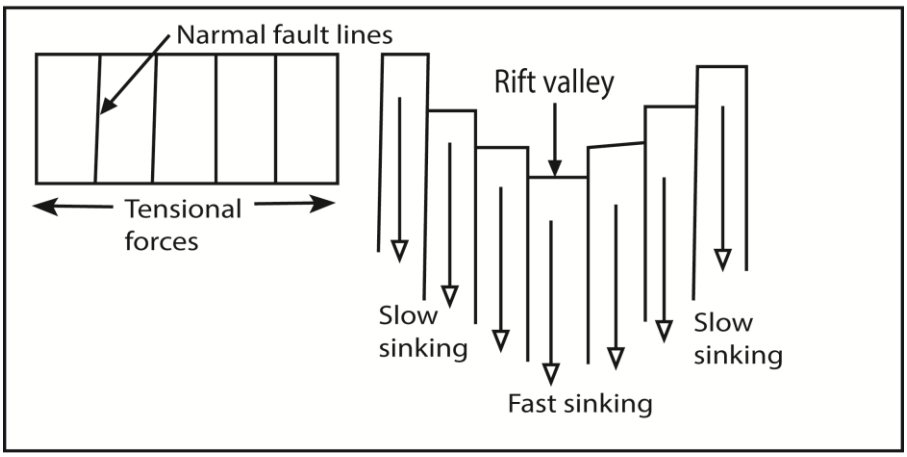
- That there was a period of general uplift of part of the East African Crust.
- It led to the formation of several parallel fault-lines.
- Blocks on either side of the central block rose faster as the middle lagged behind in stages.
- At each stage, a mass or block formed a terrace·
- The gaps in the middle of terraces formed the rift valley.
- Diagrammatic illustration of differential uplift



Relative Sinking (subsidence theory)

- Just like in differential uplift theory, there was extensive faulting in East Africa which created multiple parallel faults.
- Within the mantle / interior of the earth, there is intense heat originating from radioactivity and geochemical reactions.
- The heat melts down the interior rocks and they begin to move in form of convective currents upwards towards the crustal plates.
- When they become colder and therefore heavy, they sink or flow back down in the mantle and as they do so they exert a drag force which pull the crustal blocks downwards thus sagging of crustal blocks along each fault.
- The central blocks sagged more than those on the extreme ends to form a step or terraced rift valley

Relative sinking theory



(b) **Block Mountain or horst**

A block mountain is an upland bordered by fault scarps on either side. Examples of the Block Mountains are Rwenzori ranges in Uganda.

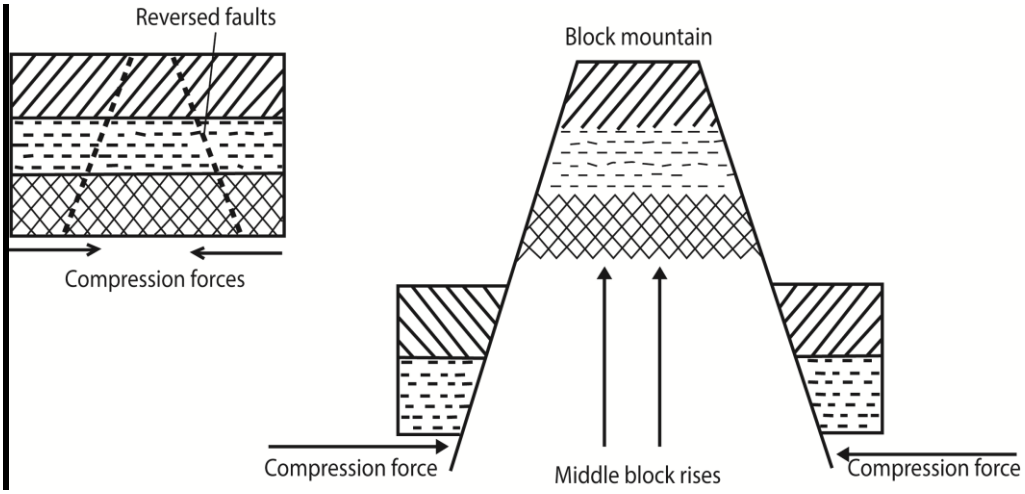
The formation of Block Mountains is explained by three theories:

- The compression force theory by Wayland
- The Tension force theory by Gregory
- Vertical displacement theory by Dixey

Formation of a block mountain by compression forces

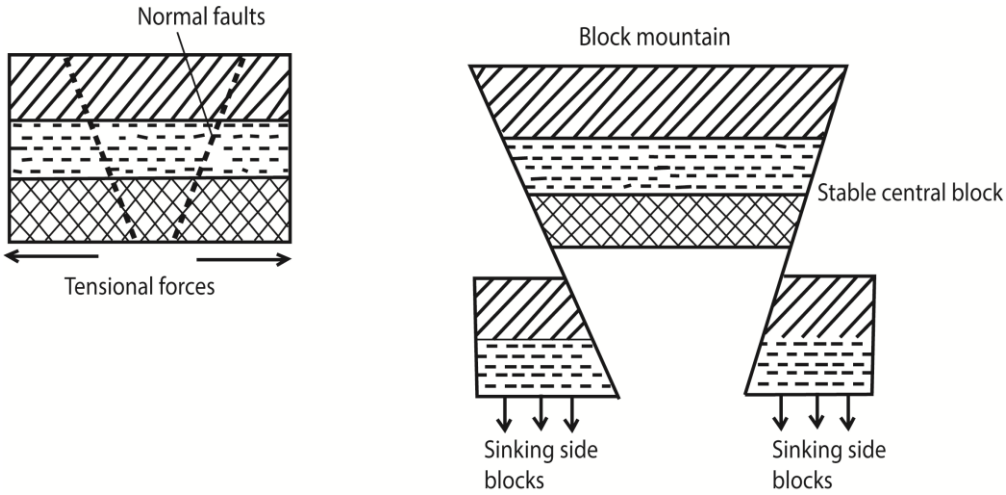
- Compression forces pushed a crystal block of land on either sides resulting into stressing hence the development of reversed fault lines.
- The fault lines divided the crystal block into three parts.
- As the action of compression forces continued the middle/ central block was thrust upwards above the two adjacent blocks/ surrounding blocks to form a block mountain.

- This is illustrated as shown below:



Formation of a block mountain by tension forces

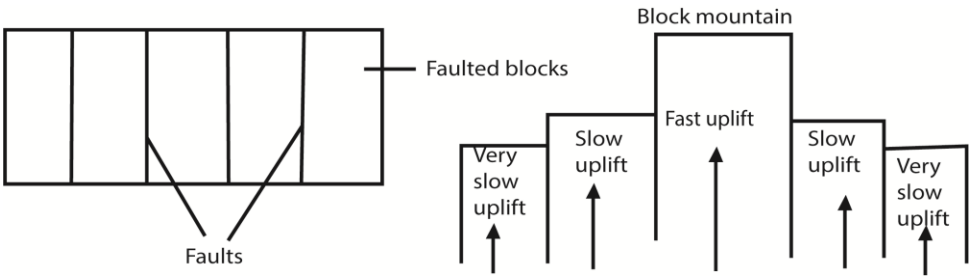
- Tension forces act on the earth's crust by pulling in opposite direction from each other.
- This is when convectional currents move horizontally in different directions hence the development of parallel normal faults in the crust.
- The faults divide the crust into three parts.
- The continued tension forces lead to the subsidence (sinking) of the side blocks.
- The middle block remained stable high above the side blocks to form a block mountain.



Formation of a block mountain by differential uplift theory;

- Multiple faulting formed a series of crystal blocks of varying sizes and densities.
- Then the forces of uplift acted on the crystal blocks with varying strength.
- Uplift force was strongest on the central blocks; they were forced to rise higher to form peaks of the horst.

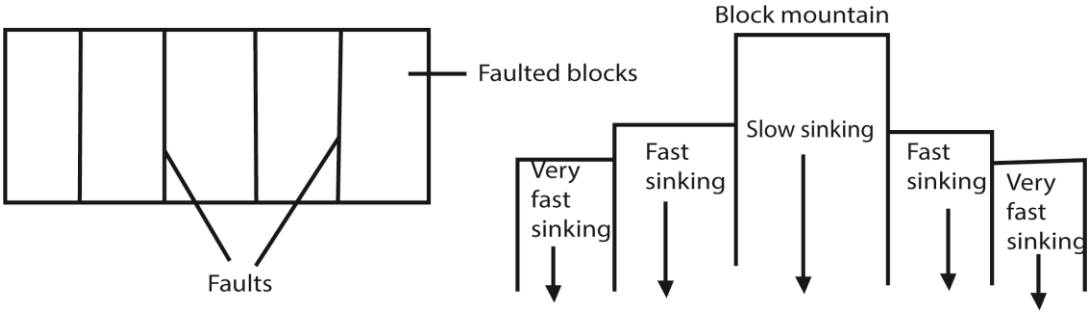
- The side blocks did not rise high enough but formed the sides of the horst in stages as illustrated below;



Formation by relative sinking

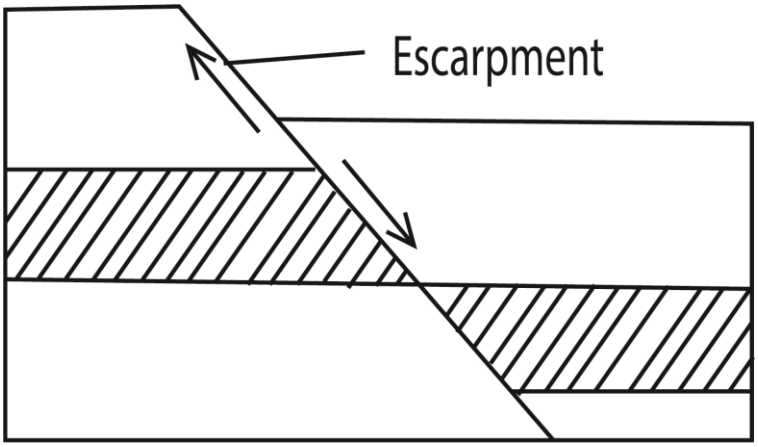
- Multiple faulting formed a series of crystal blocks of varying sizes and densities.

- Then faulted blocks experienced sinking which was not uniform. The side blocks sank faster than the central block.
- The central block remained relatively higher to form the peak of the horn as illustrated below;



Fault scarps/ fault escarpments.

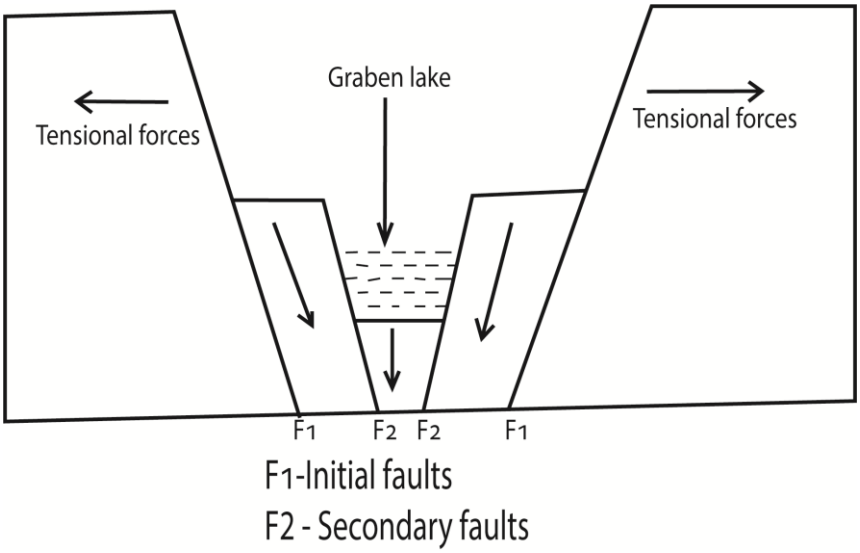
It's a steep slope along a fault formed when one block along the fault line was thrown up above the other. e.g. Butiaba, Kicwamba in Uganda.



Grabens

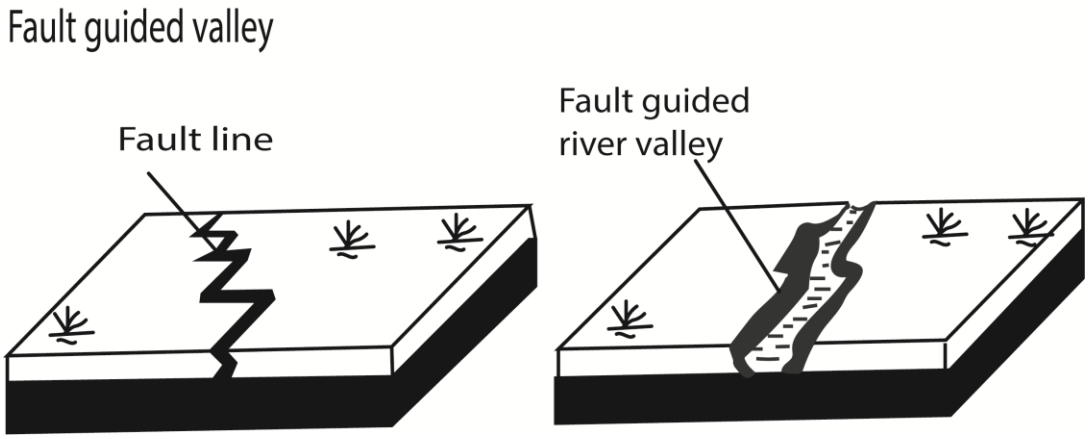
These are narrow, regular shaped and deep depressions on the floor of the rift valley formed as a result of secondary faulting.

Secondary faulting led to the formation of secondary normal faults and subsequent displacement of rock blocks to the formation of Grabens e.g. Grabens occupied by Albert, Edward etc.



Fault guided valleys

Fault guided valleys were formed along single fault where the fault zone was crushed and to exposed weathering and erosion.



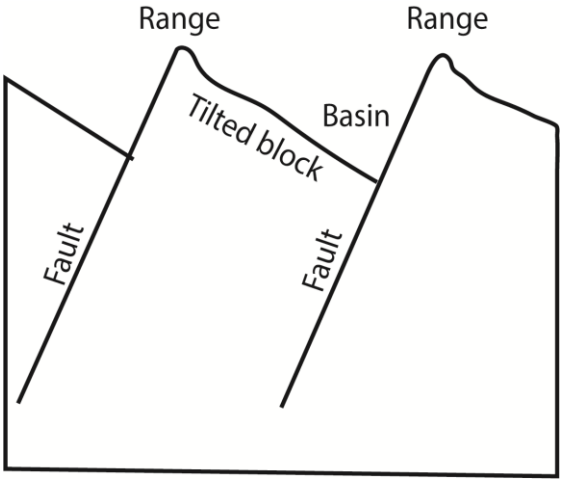
Examples of fault guided valleys are River Aswa in Nonhem Uganda, Kerio Valley between Eigeyo Escarpment.

Tilt block land scape

This is upland of inclined crustal block

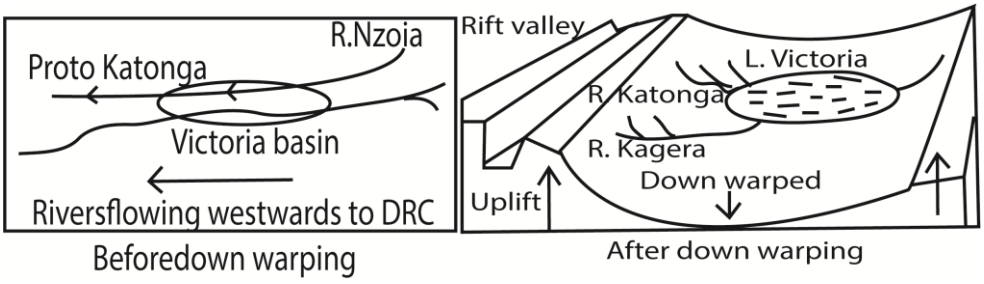
It has angular inclined ridges and depressions formed by multiple faulting and vertical movements which displaced the faulted crustal blocks at different rates to form a series of tilted faulted blocks.

Examples are Kichwamba in Uganda etc.



Crustal warping
The extensive downward and upward movement of the crust led to formation of depressions and uplands.

Down warping occurred in central and South Eastern Uganda to form depressions occupied by lakes Victoria, Kyoga, Wamala and Nakivale.
• Before warping took place, land in central Uganda was sloping to the West and rivers like Katonga, Kagera, Rwizi, Kafu were flowing to the west.
• During warping, Eastern and Western Uganda were up warped while central Uganda down warped forming basins.
• After warping, rivers reversed their flow eastwards; emptying their waters into the basins to form lakes Victoria and Kyoga.
Diagram(s) to illustrate river flows



• The formed lakes are shallow in depth, having fresh water, irregular outlines/shore lines and extensive swamps around them bays/headland.

5. Explain the influence of tectonism on the formation of lakes in Uganda. (25marks)

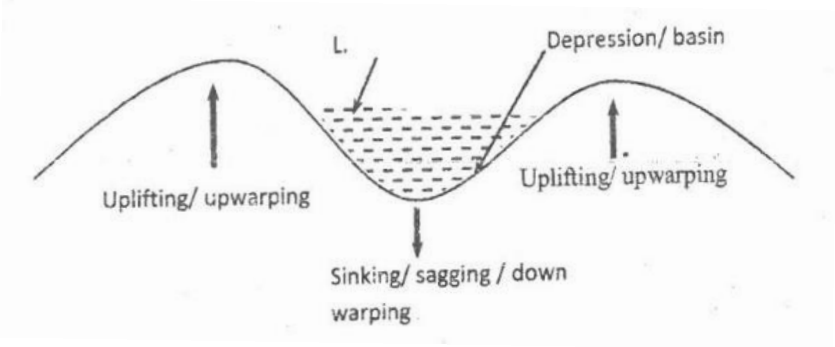
   Candidates are expected to define the term tectonism as

   All crustal disturbances (earth movements) of endogonic/internal origin arising from geochemical reactions: includes processes of faulting, warping, volcanicity, earthquakes, folding etc. these processes have resulted in the formation of different types of lakes.

   Such processes include

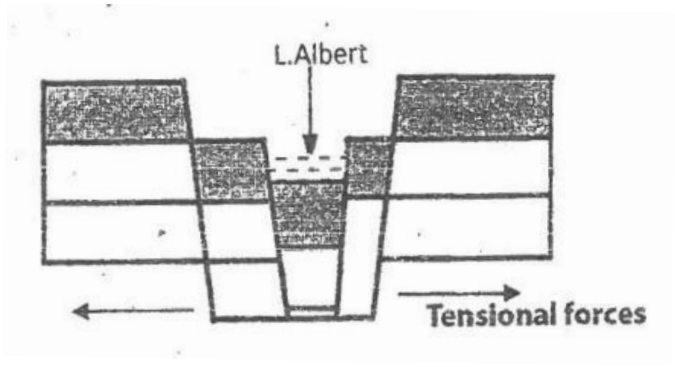
   Warping

   Uplift of the eastern and western Uganda and slow local sagging/down warping of central Uganda led to creation os shallow depression/basin which filled with water from reversal of streams and other sources leading to formation of down warped lakes e.g. Lake Victoria, Lake Kyoga, Lake Kwanika, Lake Wamala and Lake Mburo.



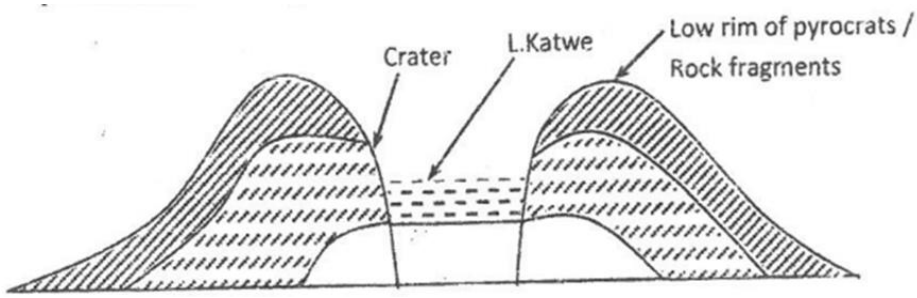
   Faulting

   - Compressional/tensional forces lead to the formation of the lift valley
   - Secondary faulting within the rift valley resulted into the formation of a graben
   - This was then filled with water forming a graben lake e.g. Lake Albert, Lake George and Lake Edward etc.



Volcanicity

Explosive/violent eruption on the earth's surface led to the formation of shallow depression which were filled with water to form explosion crater lakes e.g. Lake Katwe.



Or

Lava flow from volcanic cone blocked a river valley leading to ponding of water which resulted into the formation of a lava-dammed lake e.g. Lake MUtanda, Bunyonyi and Kayumba.

Or

Magma was extruded onto the earth's surface, it piled around the vent and cooled forming a cone/amountain with a depression/cater on top. This was filled with water to form a crater lake Lfor example on top of Muhavura.

6. (a) Describe the processes responsible for the formation of Mt. Rwenzori (10marks)

Candidates are expected to describe a block mountain or horst and identify its location. Describe the process responsible for the formation of the Rwenzori horsts. Relevant diagrams should be drawn for illustration. Positive and negative importances with local examples around the mountain should be given inform of village names.

The Rwenzori is a system of horst or block mountain peakes. It is located in south western Uganda and rests right in the western arm of the East African Rift Valley, the Albert rift. A block mountain/horst is an

upland bordered by fault scarps on two or more sides. It stnds above the surrounding land from which it was raised or tilted up along fault lanes. The Rwenzori mountains are bordered by a faultscarp which falls into the Ssemuliki valley in the west. To the east the escaarpment descends to the lake Victoria plateau.

Cnadidates are expected to describe the processes of formation using one theory e.g.

The formation of Block Mountains is explained by three theories:

- The compression force theory by Wayland
- The Tension force theory by Gregory
- Vertical displacement theory by Dixey

Formation of a block mountain by compression forces

- Compression forces pushed a crystal block of land on either sides resulting into stressing hence the development of reversed fault lines.
- The fault lines divided the crystal block into three parts.
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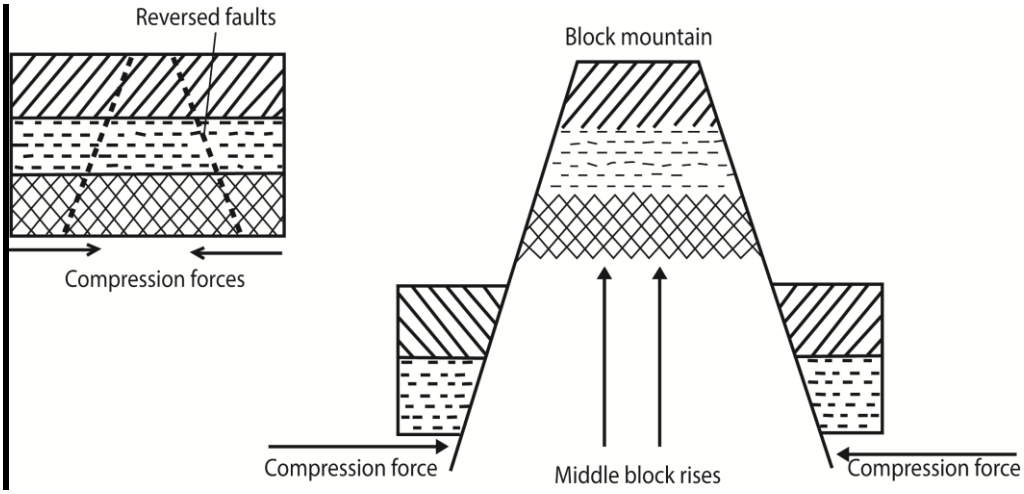
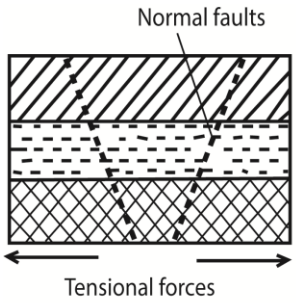
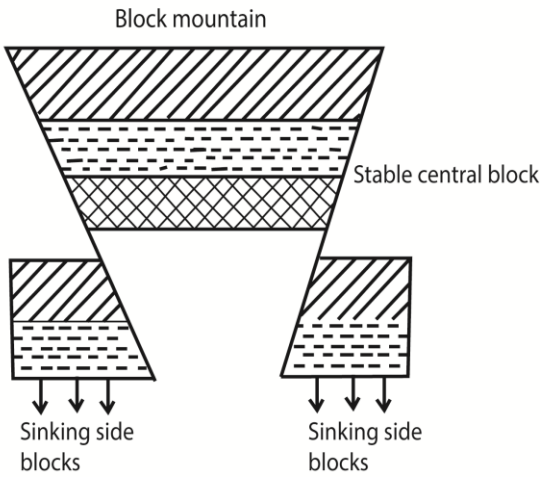
- This is illustrated as shown below:



Formation of a block mountain by tension forces

- Tension forces act on the earth's crust by pulling in opposite direction from each other.
- This is when convectional currents move horizontally in different directions hence the development of parallel normal faults in the crust.
- The faults divide the crust into three parts.
- The continued tension forces lead to the subsidence (sinking) of the side blocks.
- The middle block remained stable high above the side blocks to form a block mountain.





Formation of a block mountain by differential uplift theory;

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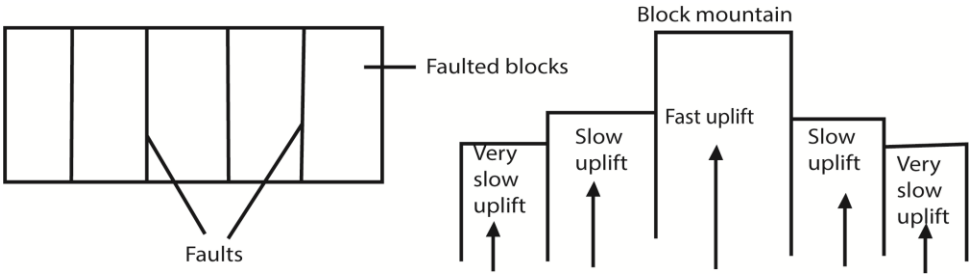
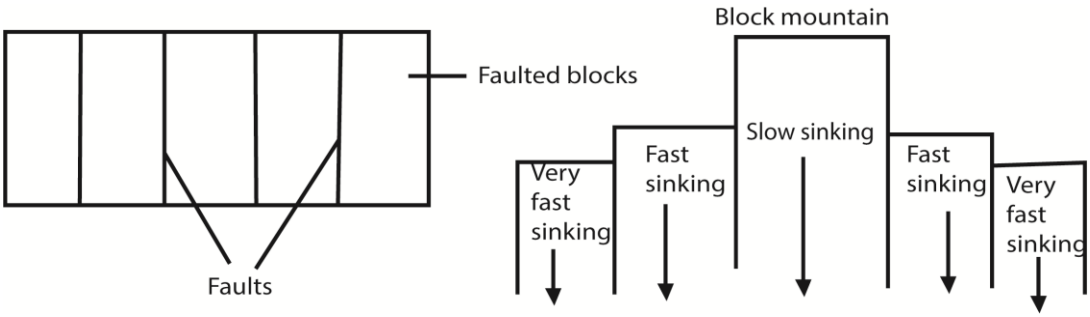
- Then the forces of uplift acted on the crystal blocks with varying strength.
- Uplift force was strongest on the central blocks; they were forced to rise higher to form peaks of the horst.
- The side blocks did not rise high enough but formed the sides of the horst in stages as illustrated below;



Formation by relative sinking

- Multiple faulting formed a series of crystal blocks of varying sizes and densities.

- Then faulted blocks experienced sinking which was not uniform. The side blocks sank faster than the central block.
- The central block remained relatively higher to form the peak of the horn as illustrated below;



(b) Assess the impact of Mt. Rwenzorion human activities in surrounding areas. (15mrks)

Candidates should bring out the impact of Mt. Rwenzori on human activities

Positive impacts

- It influences the formation of orographic rainfall at Nyabirango, Muhokya and Bwera leading to the growth of coffee, bananas etc.
- Mt Rwenzori's beautiful scenery such as Margherita peak attracts tourists who bring foreign exchange.
- Mt. Rwenzori provides a home for wild animals such as monkeys etc
- Mount rwenzori contains trees used for construction of houses
- Mt. Rwenzori is sources of rivers such as Semuliki that are sources of domestic water.
- Mt Rwenzori contains mineral such cobalt that are source of foreign exchange.
- Mt. Rwenzori is used for defensive settlement by some tribes pron to insecurity e.f. the Bakonjo and Bamba.
- The lower slopes of Mt. Rwenzori such as Kilembe, Mobku are used for crop cultivation such cotton, yams etc.
- Source of honey and fruits for local people.
- Source of stones for building and decoration
- For research and study purpose such as in geophysics.

Negative impact

- Mt. Rwenzori has created a rain shadow in Kasese which discourage farming.
- Mt. Rwenzori slopes are prone to landslide, stone fall, soil erosion a danger to settlement.
- It encourage political istability due to many hiding places on the mountain
- It is a habitat to dangerous animals and vermines such as tsetse flies that transmit Nagana and sleeding sickness.
- Lower parts of the mountain experience seasonal flooding leading to loss of properties e.g. Nyabirango
- Rugged slopes limit development of transport and communication networks.

- Tourists have lead to acquisition of social evils such prostitution.

7. Assess the contrubution of volcanic lakes to the development of uganda.

   Candidates are expected to define volcanic lakes as lakes formed by the process of volcanity.

   Candididates are expected to identify the different types of volcanic lakes in Uganda.

   - Explosion crater lakes e.g. Lake Katwe, Lake Nyungu, Lake Kyamwaga etc. in Kasese, Nyamusingiri in Bushenyi, Nyabikere, Wabigere, Saaka in Kabarole.
   - Crater lakes e.g. crate lake on Mt. Elgon, Lake Nkugute/Rutoto in Bushenyi and crater lake on Mt. Muhavura in Kisoro.
   - Caldera lakes e.g. seasonal caldera Lakeon Mt. Napale in Moroto
   - Lava dammed lakes e.g. Lake Bunyonyi in Kabale, Lake Mutanda in Kisoro etc.

   Candidates should bring out the positive and negative contributions of volcanic lakes to the development of Uganda

   Positive contribution

   - They re used for tourist attraction such as the beautiful Lake Bunyonyi.
   - They are used for transport of goods and serveces.
   - Source of fish for people
   - Source of domestic and industrial water
   - Source of minerals e.g. Lake Katwe is source of salt
   - Habitat for wild animals such as birds
   - These lakes have encourages research and education e.g. research on fisheries on lake Bunyonyi and field study toursby different institutions
   - They modify climate through local chilling effect
   - Lakes have papyrus swamps that are source of local materials for local crafts.
   - Landing sites on these lakes have developed into urban centers.

   Negative contribution

   - Habitat for dangerous animals like snakes on Lake Bunyonyi.
   - Spread of diseases such as bilhazia
   - Form barriers to the development of transport and communication lines
   - Associated with fatal accidents
   - Some lakes like Nyamunuka pollute the air with their evil gases

8. Explain the influence of volcanicity on the development of drainage features in Uganda

Candidates are expected to define the term volcanicityas:

Volcnicity is the process through which molten rock/magma gase and liquids are either **ejected** on to the earth's surface or **injected** into the earth's crust through **lines of weakness** leading to formation of **extrusive volcanic features** such as volconic cones of Mt. Elgon, volcanic plug e.g. toror rock, caldera e.g Napak, lava plateau e.g. Kisoro plains etc. and **intrusive volcanic features** such as stills e.g. Sukulu hills, Batholiths e.g. Mubende rocks, dykes etc. respectively.

NB. The blodened words are very important in the definition of vulcanicity.

Candidates are expected to bring out the influence of vulcanicity on drainage features

- Vulcanicity led to the formation of lava dammed lakes as L. Mutanda, chahafi, Muhehe and L. Bunyonyi. Such lakes were formed when lava flew from adjacent volcanic eruptions (Birunga volcanoes) overflew and solidified in former tiver courses thereby forming a series of lakes.
- Vulcanicity lead to formation of explosion crater which later filled with water to form crater lakes such as L. Katwe. They were formed when violent volcanic eruption chiefly composed of gases and gaseouswater vapour blow up the country rock into small fragments which rise high and later fall and accumulate around the hole forming a raised rim around depression. When these depressions are filled with water say from rain crater lakes are formed.
- Vulcanicity also formed crate lakes on the top of volcanic cones such as Mt. Elgon and Muhavura. Such crate lakes are formed when seconndary violent eruption blows on the top of volcanic cones leaving behind a funnel shaped depression. The depressions were filled with water to form crater lakes.
- Volcanicity also formed Caldera lakesfor example on top of Napaka mountain. A Caldera is a wide crate that exceeds 1km in diameter. There are two ways through which calderas could be formed. In the first place, it can be formed by a process called cauldron subsidence or basal wreck. During eruption, a lot of magma is poured out due to high pressure such that there is a big empty space (chasm) left unfillled under the volcano. The weight of the overlying volcanic top becoms great and therefore it collapses into the space/chasm nelow leaving a wide depression.
  Alternatively, calderas are formed when a violent eruption blow off the top of the volcano leaving a wide depression which is filled with water e.g.Napak caldera lake
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- It formed volcanic mountains such as Mt. Elgon is a watershed for numerous rivers flowing on either direction to form a radial drainage pattern such as R. sironko, Namatala, Sisiyi and R. Manafwa.
- Vulcanicity also formed hot springs at Norot in Karamoja, Kitagat Sempay, Rwagimba in western Uganda. A hot spring involves the natural flow of hot water from the rocks of the ground.
- A sill is an intrusive vulcanic features that influence development of drainage feature in Uganda by obstructing river flow leading to the formation of water falls along R. Nile and R. Sezibwa.

On the other hand, vulcanicity has negatively affected development of drainage because in some cases it formed porous soils such as pumice which have reduced surface drainage in Kisoro districts. For example Chuho springs sustains water to a stream which flows only for 30 meters and then disappears due to porosity of the under ground soils.