



Dr. Blossa Science

Sponsored by
The Science Foundation College
Uganda East Africa
Senior one to senior six
+256 778 633 682, 753 802709
Based On, best for science

digitalteachers.co.ug



Geography paper 3: Climate in Uganda

1. (a) Differentiate between mean annual temperature and annual range of temperature

A candidate is expected to differentiate between mean annual temperature and annual range of temperature as follows

Mean annual temperature refers to the average monthly temperature in a year.

Mathematically,

Mean annual temperature = sum of mean monthly temperature in a year/12 months

Whereas

Annual range of temperature refers to the difference between the hottest mean monthly temperature and the coldest mean monthly temperature

Mathematically it is obtained by subtracting the coldest/lowest mean monthly temperature from the hottest/highest mean monthly temperature in a year.

- (b) Account for the variation in mean annual temperature in Uganda

A candidate is expected to explain the factors responsible for the variation of the mean annual temperature in Uganda as follows

- Latitudinal location: this refers to the angular distance of a place from the equator. It influences temperature of a place through the apparent movement of the sun. therefore, places that lie along or near the equator are hot throughout the year because the sun is overhead there twice. For example, Maska, Kampala, Mpigi, Jinja whereas areas relatively far north from the equator such as Arua, Gulu, Moroto, Moyo are hot between April and August because the sun is overhead in the Northern Hemisphere and warm from October to February when the sun is in the southern Hemisphere.
- Variation in altitude: Altitude refers to the height above sea level. High altitude areas as on the top of mountains e.g. Mt. Elgon and Mt. Rwenzori experience cool and cold mean annual

temperature because temperature drop by 6°C for every 1000m of ascent whereas the areas that lie at low latitude such as Kasese, Parts of Hoima, Bulisa experience a hot mean annual temperature because temperature increase by 6°C for every 1000m of descent.

- Presence of large water bodies: Areas that are near large water bodies experience relatively warm mean annual temperature because water vapour that rises from water bodies tends to moderate the temperatures of the surrounding areas e.g. areas around L. Victorialike Mpigi, Warkiso, Mukono, Jinja whereas areas without large water bodies such as Moroto, Kotido, Kaabong etc experience hot mean annual temperature because there is low water vapour to moderate the temperature of such area.
- Vegetation cover: this refers to green cover in an area. The densely forested area and the surrounding area such as Mabira, Budongo, Kibale etc are relatively cool because the vegetation cover release moisture through evaporation/transpiration and this moderate the temperature in such areas. Whereas area without dense vegetation cover such as Kaabongo, Moroto are hot due to absence of atmospheric moisture from plants.
- Nature of relief: Relief is the general appearance of landscape. Places that are located on the windward side of the mountains experience warm annual temperature due to the blowing warm and moist winds e.g. the western slopes of Mt Rwenzori like Bundibugyo. Whereas the places on the leeward side experience hot temperatures because the descending wind get warmed, e.g. Hoima, Ibanda and Kasese.
- Prevailing winds: prevailing winds refer to moving air that blow from a particular direction throughout the year. Winds transfer characteristics from their origin e.g. south-East trade winds from the Indian Ocean and the Westerlies from DRC bring warm and moist conditions to places such as Jinja, Mukono, Kampala Wakiso (South- East trade winds), Fort Portal, Arua (for Westerlies) whereas the
- **Human activities** e.g. deforestation, industrialization, bush burning etc. leading to increase in temperatures. On the other hand afforestation reduces carbon concentration in the atmosphere since plants absorb carbon dioxide leading to moderate temperatures.

2. (a) Differentiate between climatic characteristics of Lake Victoria Zone and Karamoja zone (10marks)

Candidates are expected to identify the type of climate experienced in Lake Victoria zone and Karamoja zone.

Lake Victoria zone experiences equatorial type of climate and Karamoja zone experiences semi arid climate.

Candidates are expected to identify the location of Lake Victoria zone and Karamoja zone.

Lake Victoria zone is found around Lake Victoria covering areas of Jinja, Mukono, Kampala, Wakiso, Mpigi, Masaka while Karamoja zone is found in North-East Uganda covering areas of Kaabongo, Kotido, Moroto, Napak, Nakapiripirit, etc.

A SKETCH MAP OF UGANDA SHOWING THE LOCATIONS OF LAKE VICTORIA AND KARAMOJO ZONES



Lake Victoria zone experiences the following climatic characteristics

- Wet throughout the year with rainfall about 1500mm and above
- Experiences double maxima (two rainfall peaks) in March to June and September to November
- Rainfall received is convectional in nature
- Temperatures are generally hot above 20°C throughout the year
- Diurnal temperature range is small due to dense cloud cover
- Humidity is relatively high throughout the year
- There is dense cloud cover most of the year due to high rate of evaporation and transpiration
- Low wind speed of about 160km per day

Whereas Karamoja zone experiences climate with characteristics such as

- Dry most of the year
- Temperatures are generally hot rising to 30°C and over
- Low rainfall of less than 500mm
- Single maxima (monomodal) rainfall from April to August
- Clear skies most of the time
- High evaporation rates
- High temperatures are generally low due to absence of insulating cloud cover
- Relatively low humidity
- There are strong winds associated with the North-East trade wind
- High wind speed due to the relatively flat landscape and lack of vegetation

Or

The candidate may compare by paragraphs e.g.

- L. Victoria zone receives heavy rainfall of 1500mm or more whereas Karamoja zone receives low rainfall of less than 50mm
- L. Victoria zone experience double maxima rainfall whereas Karamoja zone experiences monomodal rainfall.
- L. Victoria zone experiences small diurnal temperature range while Karamoja zone experiences big diurnal temperature range

Or

The candidate may compare by use of a table

L. Victoria zone	Karamoja zone
Heavy rainfall of 1500mm and above	Low rainfall of less than 500mm
Double maxima rainfall	Monomodal rainfall
Small diurnal temperature range	Big diurnal temperature range
Dense cloud cover most of the year	Clear skies most of the year

(b) Examine the influence of climate on economic activities in Uganda. (15 marks)

Candidates are expected to explain the influence of climate on economic activities positively using phrases like favored, encouraged, promoted etc.

This is based on climatic conditions favoring different economic activities in different climatic areas e.g.

- Heavy reliable rainfall favors the growing of perennial crops/plantations farming e.g. coffee growing in Masaka, Mukono, forestry in Buikwe, fishing in Wakiso because the heavy rainfall supply abundant water for those activities
- Moderate and seasonal rainfall promote growth of annual crops such as simsim in Soroti, Lira, Gulu, and so on
- Moderate and seasonal rainfall promote pastoralism and Tourism in Kasese because rain comes seasonally
- Low amount of rainfall have attracted nomadic pastoralists e.g. in Moroto and Kotido, tourism in Kidepo etc, apiculture in Kasese
- The hot temperatures have encouraged mining e.g. salt mining in Kasese because it promotes evaporation and silting of the salt layers, nomadic pastoralism because the hot temperatures destroy the grass and farmers are forced to move
- Tourism and wildlife conservation because these areas develop grasslands which attract wild animals
- The warm temperatures promote annual crop growing because they promote ripening of such crops, wildlife conservation and tourism e.g. in Kasese because they promote growth of pasture.

- The cool temperatures promote dairy farming e.g. in Kabale because dairy animals require cool temperatures, wildlife conservation e.g. on slopes of Mt. Rwenzori because there are wild plants that can only survive at such temperatures, forestry e.g. on Mt Rwenzori slopes because cool temperature promotes growth of some tree species.
- Cool temperatures promote tourism because they promote the formation of ice and glaciated scenery which attract tourists e.g. Bujuku valley on Mt. Rwenzori.
- Strong winds favor the generation of wind energy for running mills and pumping water e.g. in Moroto and Kotido
- Strong sunshine favour annual crop growing because it facilitate ripening and drying e.g. cotton growing in Gulu, drying of maize and coffee in central region of Uganda
- High humidity favors crop farming, forestry, fishing, tourism because it sustains fresh plants, prevents high rates of evaporation e.g. in Kalangala.

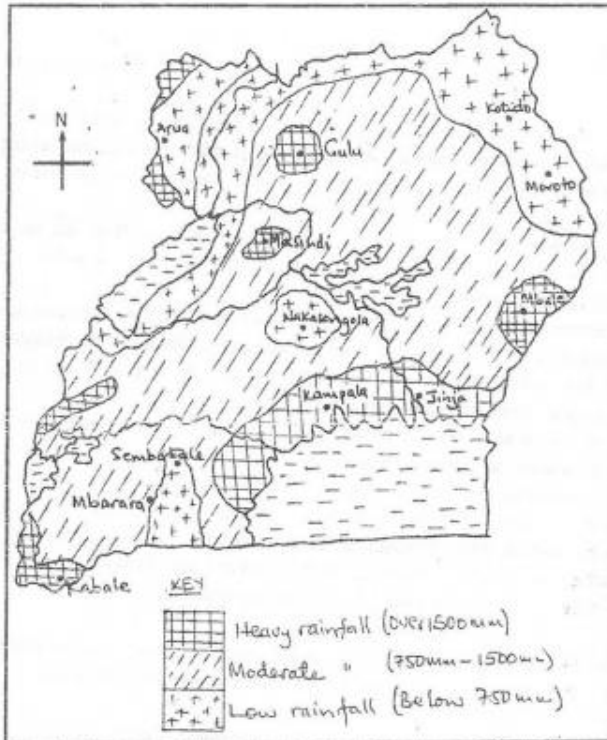
3. To what extent has relief influenced rainfall distribution in Uganda

Candidates are expected to define rainfall distribution as the spread out of rainfall amounts over different areas in a given period of time

Candidates are expected to draw the map of Uganda showing rainfall distribution (each rainfall zone should have a place name and density should be used) e.g.

- Areas of over 1500mm p.a./areas with heavy rainfall include; areas around Mt. Elgon, Bududa, Manafwa, Mabale, Sironko, Kapchora etc, Kigezi highlands, Kabale, Kisoro, Rukungiri, Lake Victoria basin (Wakiso, Mukono, Jinja, Kampala, Masaka, Jinja)
- Areas of 750 – 1500mm of rainfall per year/areas with moderate rainfall in Uganda include:
 - Northern Uganda; Gulu, Lira, Arua, Nebbi etc.
 - Western Uganda; Masindi, Hoima, Kibale etc.
 - Central Uganda excluding Nakasongola, Luwero, Mubende
- Areas of low rainfall below 750mm per year
 - North-Eastern Uganda; Nakapiripiti, Kotido, Abim, Kaabong
 - Ankole – Masaka corridor; Sembabule, Rakai, Kiruhura, Lyantonde etc
 - Nakasongola
 - Lake Albert flats; Bulisa, Ntoroko

THE MAP OF UGANDA SHOWING RAINFALL DISTRIBUTION



Mountainous/highlands/upland areas receive heavy rainfall amounts on the windward sides. This is due to their ability to disrupt moist wind, forcing them to rise, condense and form relief rainfall which is mainly received on the windward sides. Such Areas include Western slopes of Mt. Elgon, Rwenzori and Mufumbiro ranges which receive heavy rainfall (1600 – 2000mm)

On the other hand the leewards sides of these highlands receive low rainfall because the descending air is dry. For example Moroto, Nakapiripiriti, Kotido in the North-Eastern Uganda is dry because it is the leeward side of the Ethiopian highlands. The Semuliki basin in Bundibugyo is the leeward side of Mt. Rwenzori and receive little rainfall.

Plateau areas such as Luwero, Isingiro, Gulu, Apach, Arua, Masindi receive moderate amounts of rainfall because they are relatively flat and do not significantly disrupt moisture bearing winds.

Lowlands especially the rift valley floor such as Bulisa, Ntoroko, part of Kasese receive low rainfall amounts because they lack highlands to trap moist winds.

Candidates are expected to bring out other factors which have influenced rainfall distribution such as

- Presence of water bodies such as lakes: these result into the formation of convectional rainfall when moist air rises and condenses into rainfall.
- I.T.C.Z (inter tropical convergence zone)/latitudinal location: the movement of the sun across the tropics results into the creation of low pressure belts. At such points winds converge and such areas receive heavy rainfall for example when the sun is in the northern hemisphere, areas like Gulu, Nebbi, Arua receive heavy rainfall.
- Vegetation cover: areas with thick vegetation cover like forrests of Mabira experience heavy rainfall since the leaves transpire. This vapour rises, condenses and result in convectional rainfall in places like mukono.
- Man's activities: such deforestation in Nakasongola result in decreased rainfall while afforestation and reafforestation result in increased rainfall.
- Global warming/Climatic change: the planetary/global winds carry moisture from the melting ice sheets of the Polar regions to the low latitudes where Uganda lies. They drop it as heavy rainfall resulting into El-Nino and La-Nino (periods of long drought) e.g. Kampala
- Prevailing winds also influence the distribution of rainfall in areas they blow. The moist south-east trade winds which blow over Lake Victoria heavy rainfall amount (1500mm) to the immediate area north of the lake e.g. at Jinja and Lugazi but after crossing the equator they are deflected to the right leaving much of the western parts like Sembabule, Isingiro and Mbarara dry (the Ankole Masaka corridor) or with low rainfall amounts not exceeding 750mm. Similarly the Zaire air stream bring heavy rainfall amounts to Kisoro and Kabale region.
- Coriolis force also explain rainfall distribution in Uganda. According to Ferrel's law, any loose object flowing in the Northern Hemisphere is deflected to the right of its path. This deflection is thought to be brought about by the earth's rotation. When the south east trade winds cross the equator, they are deflected to their right hence bringing heavy rainfall amounts (1500mm) to the eastern side of Lake Victoria e.g. Iganga, Kamuli while the western part i.e. Ankole-Masaka corridor is deprived of rain.

4. Account for the variation in rainfall distribution in Uganda.

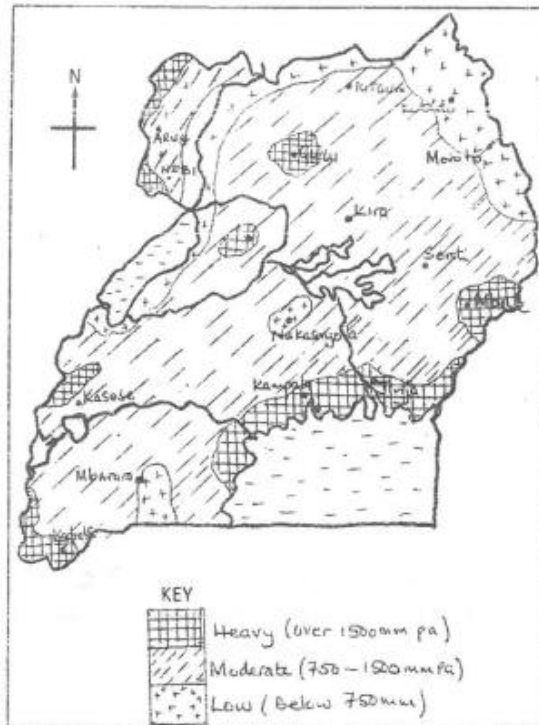
Candidates are expected to define the term rainfall distribution

This is the spread out of rainfall amounts over different areas in a given period of time.

Candidates are expected to describe the distribution of rainfall in Uganda. In this they should state the rainfall zones/places names and attach figures. The terms to use include

- Very wet/very heavy – 2000mm and above p.a.
- Wet/heavy – 1500 < 2000mm p.a
- Moderate/medium – 750 < 1500mm p.a.
- Dry/low – less than 750mm p.a.

A SKETCH MAP OF UGANDA SHOWING RAINFALL DISTRIBUTION IN UGANDA



Candidates are expected to bring out factors which have led to variation in rainfall distribution such as

- Relief: the mountainous area in Uganda receives heavy rainfall of about 1500mm p.a. this is because they trap moisture bearing winds, force them to rise, condense and form rainfall on the windward side of mountains such as Bundibugyo, Kabarole etc on mountain Rwenzori.
- Vegetation: the areas with dense forests receive heavy rainfall (1500mm) due to the high evaporation/transpiration levels resulting into convectional rainfall; for example Mabira in Mukono, Budongo forest, Kibale forest. Areas with light vegetation cover receive low rainfall amounts of less than 750mm p.a. Moroto, Rakai etc.
- Drainage/water bodies. The areas near water bodies with large surface areas receive heavy rainfall of 1500mm and above due to high evaporation levels resulting into convectional rainfall. They also experience lake and land breezes such as Kampala, Wakiso and Entebbe near Lake Victoria. The areas with no or small water bodies receive low rainfall amounts such as Kotido and Moroto.
- Latitudinal influence/I.T.C.Z; a low pressure belt where various winds meet resulting into heavy thunderstorms and rainfall around lake Victoria region in districts like Kamuli, Iganga, Kampala where heavy of about 1500mm p.a is received.
- Wind system: The N.E trade winds bring in dry conditions because they originate from the Arabian Desert. This has resulted into low rainfall amounts (less than 750mm) in Kotido and Moroto. The S.E winds from Indian Ocean carry moisture which they drop on the slopes of Elgon resulting into heavy rainfall (1500mm) in Mbale, Sironko, Manafwa. The westerly winds come in

with moisture from the Congo Basin and result into heavy rainfall in the Rwenzori ranges (1500mm and above) in areas like Bundibugyo, Kabarole and others.

- Destruction of vegetation cover. In area where vegetation has been destroyed the rainfall amounts have reduced for example in Nakasongola with less than 750mm p.a.
- Afforestation and re-afforestation. In area where trees have been planted, the rainfall amounts have increased such as Kabale where there is Mafuga forest, Mubende, Mt. Elgon slopes and Bugamba in Mbarara.
- Swamp drainage/reclamation. In area where swamps have been destroyed the rainfall amounts have reduced because of reduced evaporation for example in Kumi, Soroti, Bugiri and other.
- Man made lakes/valley dams/ponds. When these are constructed they increase the evaporation levels and therefore result into increased rainfall amounts such as Kibimba.

-