



Ministry of Education
and Sports

HOME-STUDY LEARNING

SENIOR
5

GEOGRAPHY

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This material has been developed as a home-study intervention for schools during the lockdown caused by the COVID-19 pandemic to support continuity of learning.

Therefore, this material is restricted from being reproduced for any commercial gains.

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FOREWORD

Following the outbreak of the COVID-19 pandemic, government of Uganda closed all schools and other educational institutions to minimize the spread of the coronavirus. This has affected more than 36,314 primary schools, 3129 secondary schools, 430,778 teachers and 12,777,390 learners.

The COVID-19 outbreak and subsequent closure of all has had drastically impacted on learning especially curriculum coverage, loss of interest in education and learner readiness in case schools open. This could result in massive rates of learner dropouts due to unwanted pregnancies and lack of school fees among others.

To mitigate the impact of the pandemic on the education system in Uganda, the Ministry of Education and Sports (MoES) constituted a Sector Response Taskforce (SRT) to strengthen the sector's preparedness and response measures. The SRT and National Curriculum Development Centre developed print home-study materials, radio and television scripts for some selected subjects for all learners from Pre-Primary to Advanced Level. The materials will enhance continued learning and learning for progression during this period of the lockdown, and will still be relevant when schools resume.

The materials focused on critical competences in all subjects in the curricula to enable the learners to achieve without the teachers' guidance. Therefore effort should be made for all learners to access and use these materials during the lockdown. Similarly, teachers are advised to get these materials in order to plan appropriately for further learning when schools resume, while parents/guardians need to ensure that their children access copies of these materials and use them appropriately. I recognise the effort of National Curriculum Development Centre in responding to this emergency through appropriate guidance and the timely development of these home study materials. I recommend them for use by all learners during the lockdown.



Alex Kakooza
Permanent Secretary
Ministry of Education and Sports

ACKNOWLEDGEMENTS

National Curriculum Development Centre (NCDC) would like to express its appreciation to all those who worked tirelessly towards the production of home-study materials for Pre-Primary, Primary and Secondary Levels of Education during the COVID-19 lockdown in Uganda.

The Centre appreciates the contribution from all those who guided the development of these materials to make sure they are of quality; Development partners - SESIL, Save the Children and UNICEF; all the Panel members of the various subjects; sister institutions - UNEB and DES for their valuable contributions.

NCDC takes the responsibility for any shortcomings that might be identified in this publication and welcomes suggestions for improvement. The comments and suggestions may be communicated to NCDC through P.O. Box 7002 Kampala or email admin@ncdc.go.ug or by visiting our website at <http://ncdc.go.ug/node/13>.



Grace K. Baguma
Director,
National Curriculum Development Centre

ABOUT THIS BOOKLET

Dear learner, you are welcome to this home-study package. This content focuses on critical competences in the syllabus.

The content is organised into lesson units. Each unit has lesson activities, summary notes and assessment activities. Some lessons have projects that you need to carry out at home during this period. You are free to use other reference materials to get more information for specific topics.

Seek guidance from people at home who are knowledgeable to clarify in case of a challenge. The knowledge you can acquire from this content can be supplemented with other learning options that may be offered on radio, television, newspaper learning programmes. More learning materials can also be accessed by visiting our website at www.ncdc.go.ug or ncdc-go-ug.digital/. You can access the website using an internet enabled computer or mobile phone.

We encourage you to present your work to your class teacher when schools resume so that your teacher is able to know what you learned during the time you have been away from school. This will form part of your assessment. Your teacher will also assess the assignments you will have done and do corrections where you might not have done it right.

The content has been developed with full awareness of the home learning environment without direct supervision of the teacher. The methods, examples and activities used in the materials have been carefully selected to facilitate continuity of learning.

You are therefore in charge of your own learning. You need to give yourself favourable time for learning. This material can as well be used beyond the home-study situation. Keep it for reference anytime.

Develop your learning timetable to cater for continuity of learning and other responsibilities given to you at home.

Enjoy learning

Topic 1: Position, Administrative Units, Evolution of Borders and Area of Uganda

Instructions:

- You will be studying one lesson each day. Try to do all activities programmed for the day.
- Some activities may take you more than one hour to complete.
- Read the instructions carefully before you begin doing each activity.
- In case you find an activity difficult, ask an older person around you to assist you.
- When schools reopen, hand in all your field study, textbook and Internet research reports to your teachers of Geography for assessment and further assistance.

Lesson 1: Position and Size of Uganda

By the end of this lesson, you should be able to:

- (i) locate Uganda in Africa and in the world.
- (ii) describe the position of Uganda.
- (iii) draw a map to show the position of Uganda.
- (iv) explain the advantages and problems associated with the location of Uganda.

Materials you need

Atlas, map showing the position of Uganda in Africa, a notebook, pen, pencil and a rubber

Introduction

Uganda is not new to you. In O-level you learnt about the countries of East Africa, their positions and sizes. In your notebook, write two paragraphs to describe the position of Uganda on the African continent. One of the paragraphs should describe the position of Uganda in relation to her neighbours and the second should describe the latitudinal and longitudinal position of Uganda. In this lesson, you are going to learn more about the location and area of Uganda.

The Location of Uganda

Activity 1

Look at **Figure 1.1** – maps showing the position of Uganda, and use it to do the tasks that follow:



Figure 1.1: Maps showing the position of Uganda

1. Copy both maps into your notebook.
 2. Write at least one paragraph to describe the position of Uganda in relation to the neighbouring countries.
 3. Describe the location of Uganda using Latitude and Longitude (you may use the estimation method in order to give a more exact position in your description).
 4. In one paragraph, describe the position of Uganda in Africa.

You have probably found it easier to describe the location of Uganda in relation to her neighbours in the north, east, south and west. This is called the relative position of Uganda. However, you might have found it more challenging to describe the position of Uganda using latitude and longitude. If you use the atlas, you will find out that Uganda lies between Latitude 1.5° south and 4.5° north of the equator. This means that Uganda lies astride the equator, i.e. a larger part of the country lies in the northern hemisphere, while a smaller part lies in the southern hemisphere. In terms of Longitude, Uganda lies between 29.5° and 35° east of the Greenwich Median. When you use Latitude and Longitude you come up with the absolute position of Uganda.

The Size of Uganda

Using Figure 1 again, do the following task:

1. Using the skills you got in map reading, calculate the
 - (i) Perimeter and
 - (ii) Area of Uganda
 2. Using the area you have got, decide whether Uganda is a small, moderate, or large country. You may compare it with the sizes of Algeria, Sudan, Niger, Tanzania Brazil, USA, Canada, China, Djibouti, Eswatin (Swaziland), Lesotho, the Gambia, Guinea Bissau, Cambodia, Costa Rica and Panama)
 3. Think of a reason or reasons to support your opinion.

If you travelled round Uganda, say from the north-eastern tip in Karamoja, where longitude 34°E crosses the Uganda-South Sudan border, and follow the country's boundary back to that tip, you will cover a total distance of about 16,630km. This is called the perimeter of Uganda.

The area occupied by Uganda is about 241,500 square km. About 15% of the country's total area is occupied by open water bodies such as lakes Victoria, Kyoga and others, and rivers such as the Nile, Rwizi, Kafu, Kagere and others.

Summary

In this lesson, you have learnt that:

- Uganda is located on the eastern half of the African continent and in the centre of the African plateau. It is one of the six East African states.
- Uganda is a land-locked country surrounded by South Sudan, Kenya, Tanzania, Rwanda and the Democratic Republic of Congo.
- Uganda is crossed by the equator and much of the country lies in the Northern hemisphere.
- Uganda is the smallest of the three East African states; but compared to other countries in the world, it is a country of moderate size, since it is much larger than countries like Djibouti, Eswatini (former Swaziland), Lesotho, the Gambia, Guinea Bissau, Cambodia, Costa Rica, Panama and others.

Follow up Activity

1. Suggest the advantages associated with Uganda's geographical position.
2. Suggest the likely problems Uganda may face as a result of her position.

References

To understand this lesson in greater detail, read about it in the following books:

1. NEMA (1996), State of the environment Report for Uganda
2. Richard White, *Africa in Focus*
3. NEMA (2002), State of the environment Report for Uganda
4. NEMA (2010), State of the environment Report for Uganda
5. MacMillan Uganda (2004), *Secondary School Atlas*

Topic 2: Physical regions and Landforms of Uganda

Lesson 2: Relief or Physiographic regions of Uganda

By the end of this lesson, you should be able to:

- (i) define a relief or physiographic region.
- (ii) identify the relief regions of Uganda on photographs.
- (iii) draw a map to show the relief regions of Uganda.
- (iv) describe the characteristics of the relief regions of Uganda.
- (v) explain land use and development in each relief region.

Materials you need:

Atlas, map showing the relief regions of Uganda, notebook, pen, pencil, rubber and ICT tools

Introduction

In Senior Two, you learnt about the relief and relief regions of East Africa. Which of these regions do you remember? In this lesson, you are going to explore the relief regions of Uganda, their distribution, characteristics and how they affect people's ways of life.

What is a relief region?

Activity 1

1. Move a short distance around your home area and observe the physical features.
2. Make a list of the physical features you see.
3. Describe the physical appearance of the area.
4. Does the appearance you have described extend over a large area?

As you moved around your home area, you have probably seen several physical features which may include hills, valleys, outcrop rocks, flat plains or mountains. These are called relief features and can be used to describe the appearance of the landscape in an area. If you have ever travelled to other parts of Uganda, you might have realized that relief features are not the same everywhere. When similar relief features extend over a reasonably large area, they form a **relief region** or **physiographic region**.

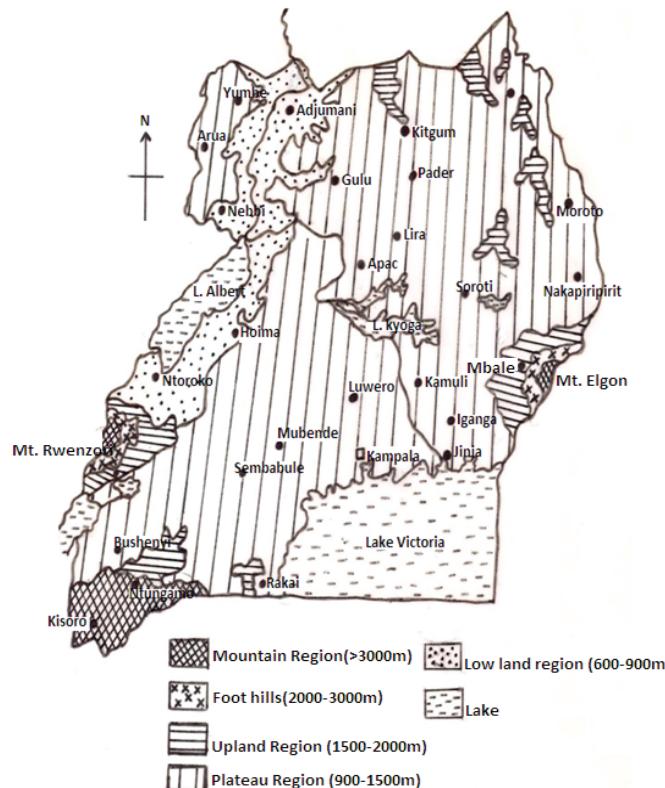


Figure 2.1: Relief regions of Uganda

Activity 2

Look at the map in Figure 2 and do the following tasks:

1. Copy the map into your notebook.
2. Which relief region covers the largest part of Uganda? About what fraction or percentage of the country does the largest relief region cover?
3. Which relief regions are scattered in different parts of the country? Why do you think this is so?
4. Identify the relief region in which your home area is found.

In the above activity, you have found out that Uganda is divided into five relief regions. Each region has certain characteristics which make it different from other regions. You could also have found out that the largest part of Uganda is covered by the **plateau** region. This covers about $\frac{4}{5}$ or 80% of the country. The most important difference between the relief regions lies in the appearance of **landscape** and the height above sea level or **altitude**.

Characteristics of the Relief Regions

Lowland Region

This region is found in the western part of the country, especially in the Albertine Rift Valley. Most of the lowlands extend north of Lake Albert, while a small portion of them extends south and east of the lake. The low lands of Uganda lie between 600 and 900m above sea level. Therefore, the whole of the Albertine Rift Valley is a lowland. Because of this, the lowland region is commonly called the Albert flats. The lowest point in this region lies at 610m.

Some other lowlands occur in the Aswa area in the northern parts of the country. In total, lowlands occupy about 9% of Uganda. They can be classified as the Lake Edward flats, Semuliki flats, Lake Albert flats and the Nile-Aswa lowlands. To understand the lowlands of Uganda better, do the following activity:

Activity3

Carefully look at Figure 3 and do the tasks that follow.

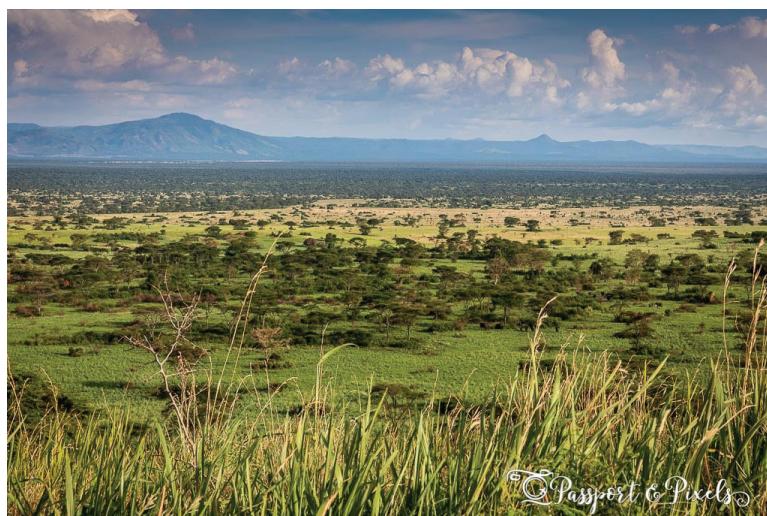


Figure 2.2: The Albert Rift Valley, western Uganda

1. Draw a landscape sketch of Figure 3 in your notebook and on it mark and label the:
 - (i) Rift valley floor
 - (ii) Rift scarp/Escarpment
2. Describe the characteristics of the relief shown in the photograph.
3. Describe the characteristics of climate in the area shown in the photograph. (Use altitude and vegetation to guide you).

The characteristics of relief and climate which you have described in Activity 3 are very similar to those of the lowlands of Uganda. Possibly we may add that the lowland region is generally flat, sunken, hot and dry, and covered by savannah vegetation.

The Influence of Lowlands on development of Uganda

This relief region has a strong influence on the local weather and climate. This, in turn, determines the economic activities people engage in, as well as their ways of life in general. To understand this, do the following activity;

Activity 4

You may need an atlas for this activity.

Look at **Figure 4** which shows some of the activities carried out in the lowland region of Uganda and do the following tasks:

1. In addition to the areas shown on the map in Figure 2, identify other districts found in the lowland region of Uganda.



(a)



(b)

Figure 2.3: Some of the activities carried out in the lowland region

2. Identify the economic activities shown in each of the photographs.
3. Suggest other likely economic activities carried out by the people living in the lowland region of Uganda. Give reasons to support each activity you suggest.
4. Suggest the likely problems facing people living in the lowlands of Uganda.

Summary

In this lesson, you have learnt that

- Uganda is a country with varied relief features, including depressions, outcrop rocks, valleys, plains, hills and mountains.
- Uganda is divided into five relief regions, namely lowlands, plateau, uplands, foothills and mountains. Each of these regions has unique characteristics which

distinguish it from other regions.

- In Uganda, lowlands are found in the Albert Rift Valley and Nile-Aswa areas only.
- The lowlands of Uganda are used for settlement, pastoral farming, wildlife conservation and tourism, geological research and mining.

References

1. Gladys Hickman (1994), *Lands and Peoples of East Africa*
2. Julian Treadaway (1974), *Uganda: Studies in Development*
3. Morgan W.T. (1973), *Geography for Advanced students: East Africa*
4. Colin Buckle (1988), *Landforms in Africa*
5. Bunnet R.B. (1999), *General Geography in Diagrams*
6. Johnson Watson (1992), *Physical Geography for Secondary Schools*

Lesson 3: The Plateau, Uplands and Mountain regions of Uganda

By the end of this lesson, you should be able to:

- (i) distinguish plateau, uplands and mountain regions;
- (ii) identify plateau, uplands and mountain regions relief on photographs;
- (iii) draw a map of Uganda showing plateau, uplands and mountain regions;
- (iv) explain land use and development in each relief region.

Materials you need:

Atlas, map showing the relief regions of Uganda, notebook, pen, pencil, rubber and ICT tools

Introduction

You now know the distribution of relief regions of Uganda. In the previous lesson, you learnt about the characteristics of lowlands and their influence on land use and development. In this lesson, you are going to look at the plateau, upland and mountain regions of Uganda, with special focus on their characteristics and how they affect people's ways of life.

The Plateau region

The plateau region comes next to the lowlands in terms of altitude. It covers land between 900 and 1500metres. However, in the western part of Uganda, the plateau rises to great height with some hills rising well above 2000metres. As you may recall, the plateau region accounts for about 84% of Uganda's total area. It stretches from the southern to the northern parts of the country. Uganda's plateau is lowest in the centre, where it dips into the down warped Kyoga basin. Look at Figure 2 again and identify the districts found in the plateau region. List them in your notebook.

Activity 1

Carefully look at the pictures in Figure 5 and do the tasks that follow.

1. Using all the pictures (a), (b), (c) and (d), describe the characteristics of the plateau region.
2. Look at Figure 2 again and use it to divide the plateau region into the parts listed below and identify the areas or districts found in each part:
 - (i) The West Nile plateau,
 - (ii) The Northern plateau,
 - (iii) The Lake Kyoga plateau,
 - (iv) The central plateau and,
 - (v) The Eastern plateau
3. Explain the influence of the plateau on human activities.



Figure 3.1: Photographs from different parts of the Uganda plateau surface

The characteristics you have described in Activity 5 generally apply to the whole of Uganda's plateau surface. Probably we need to note that whereas the plateau in northern and eastern Uganda is monotonously flat, in the central part it is characterised by flat-topped hills which rise to nearly the same height. These are commonly referred to as the **Buganda hills**. The northern and eastern plateaus are also characterised by isolated rocky hills called **inselbergs**. Can you name some of the inselbergs in these areas?

The Uplands

Activity 2

1. What is meant by uplands?
2. How are the uplands different from hills and mountains?
3. Look at Figure 2 again or search the atlas and identify areas in Uganda where uplands occur.
4. Estimate the proportion of Uganda's total area covered by uplands.

You have probably found out that the uplands of Uganda do not exist as one continuous relief region. Instead, they are scattered in different parts of the country.

They occupy land between 1500 and 2000metres. They cover the smallest area in Uganda. Major examples of uplands include Kitara uplands, Central Bunyoro uplands, Buhweju, and Karamoja- Turkana escarpment.

Mountain regions

Activity 3

1. Name the mountains you know in Uganda. Is any one of the mountains which you have listed near your home area?
2. What types of mountains are found in Uganda?
3. Using the sketch map which you drew in Lesson 2, describe the distribution of mountains in Uganda.
4. Using your knowledge about mountains and the map in Figure 2, explain what is meant by a mountain.

When you look at the map which you drew in Lesson 2, you notice that mountains form the highest region in Uganda. They rise to altitude exceeding 3000m (about 9000 feet). In fact, the highest point in the country is Margherita peak on the Rwenzori Mountains. It rises to about 5029m above the floor of the Semuliki valley. Over the past decades, its height has decreased from about 5111m and it will continue to decrease. Suggest reasons why you think this is happening.

Mountains do not rise abruptly from the surrounding lowlands and plateau. Instead, at their bases they grade into a transition area called **foothills**. The foothills of Uganda lie between 2000 and 300m.

Characteristics and influence of mountain regions on people's ways of life

Activity 4

Look at the pictures in Figure 6 and do the following:

1. Draw a landscape sketch of the photograph shown in Figure 6 and on its mark and name the:
 - (i) Mountains
 - (ii) Foothills
 - (iii) Erosional valleys
 - (iv) Natural vegetation and
 - (v) Land use types.
2. Describe the characteristics of the area shown in the photograph.
3. Explain the influence of relief on land use in the mountain regions of Uganda.
4. Suggest the likely problems facing the people living in the mountainous regions of Uganda.

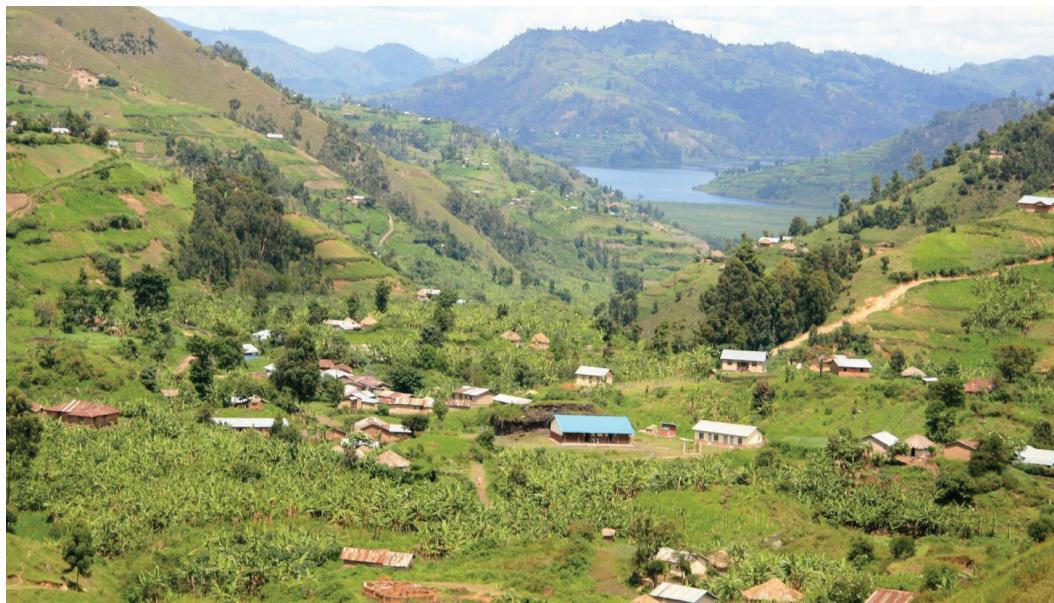


Figure 3.2: A mountain region in Uganda

Summary

In this lesson, you have learnt that:

- The plateau region is the largest single relief region in Uganda. It covers about 84% of the country's area. Thus, like Africa, Uganda is generally a plateau.
- Most economic activities and development in Uganda are found in the plateau region. These include farming, mining, industrial development, communication networks, urban development, fishing and fish farming and forestry.
- In the mountain areas of Uganda, settlement, farming and transport networks are concentrated on the foothills.
- Above 3000m, land is used for nature conservation. People living in the mountain regions are faced with problems like poorly developed transport and communication networks, severe risk of soil erosion, landslides, coldness and a high risk of pneumonia, among others.

Follow-up Activity

Imagine you have been given 200 billion Uganda shillings to start an extensive farm.

In which relief region of Uganda would you acquire land and establish the project? Give reasons to support your choice of the region.

References

1. NARO (200), Agriculture in Uganda, Volume 1, General Information
2. NEMA (2010), State of the environment Report for Uganda
3. Gladys Hickman (1994), *Lands and Peoples of East Africa*
4. Julian Treadaway (1974), *Uganda: Studies in Development*
5. Morgan W.T. (1973), *Geography for Advanced students: East Africa*

Lesson 4: Formation of landforms resulting from Faulting in Uganda

By the end of this lesson, you should be able to:

- (i) describe the origin of faulting;
- (ii) draw diagrams to show features resulting from faulting in Uganda;
- (iii) explain the formation of landforms resulting from faulting;
- (iv) assess the impact of landforms resulting from faulting on the development of Uganda.

Materials you need:

Atlas, Diagrams showing faulted landforms, Map showing the relief features of Uganda, photographs of the rift valley, Block Mountains and atlas, notebook, pen, pencil, rubber and ICT tools

Introduction

Faulting and earth movements in general are not new to you. In O-level, you learnt about the formation of landforms in East Africa and the rest of Africa. You particularly looked at the process of faulting and how it affects landscapes. Do you remember the landforms formed due to faulting? Think about them. In this lesson, you are going to look more at faulting, its origin and influence on the relief and landscape of Uganda. You will also learn about the influence of faulted landforms on human activities.

FAULTING IN UGANDA

What is faulting?

In topic 2 of Physical Geography, you learnt about the layers of the earth. Can you name them from the surface to the interior of the earth? These layers have always been experiencing several instabilities and changes, depending on the amount of heat energy produced by the earth. Over millions of years, the outermost layer of the earth has been experiencing instabilities called **earth movements** or **tectonic movements**. These movements have over time brought about several remarkable changes in the relief and landforms of areas where they have occurred.

In East Africa, earth movements became much stronger during the **Pleistocene period**, i.e. about two million years ago. Before that period, Uganda was almost wholly flat with a slight tilt towards the west. The occurrence of earth movements led to the formation of many landforms resulting from faulting, warping and folding. Earth movements also modified the country's drainage system.

Earth movements are produced when some form of energy stored in the earth's crust is suddenly released within some limited region. The energy released into the rocks of the earth can lead to large scale cracking or fracturing up to the surface of the earth. Such cracking is usually followed by movement of land blocks along the cracks. When this happens, we say that **faulting** has taken place. You will learn more about this process in Topic 9 of physical geography. To understand how faulting has led... Led to what?

Activity 1

1. In your notebook, write down the landforms which were formed as a result of faulting.
2. Briefly explain how each landform was formed.
3. Give at least one example of each landform in Uganda.

You have probably mentioned landforms like rift valleys, fault scarps, horsts or block mountains, and rift valley lake troughs or grabens. In the same way, when the rocks of the earth's crust in Uganda experienced faulting, there was movement and displacement of land blocks along the fault lines. This led to the formation of the Albert rift valley, Butiaba and Kichwamba fault scarps, Lake Albert trough, and the Rwenzori Block Mountains or horsts.

Research so far carried out by scholars suggests that faulted landforms are formed by either tensional or compression forces. To help you understand how these landforms were formed, and their characteristics, do the following activity:

Activity 2: How the Albert rift valley was formed

Look at Figure 7, which shows stages in the formation of the rift valley by tensional forces and do the following tasks:

1. Draw the diagrams in Figure 7 in your notebook.
2. Explain the process going on at each stage and how it affects the original land block.
3. Apart from the earth movements, identify and explain other processes which contribute to the final appearance of the rift valley.
4. Suggest what would happen if the original land block developed more than one pair of parallel cracks or fault lines.

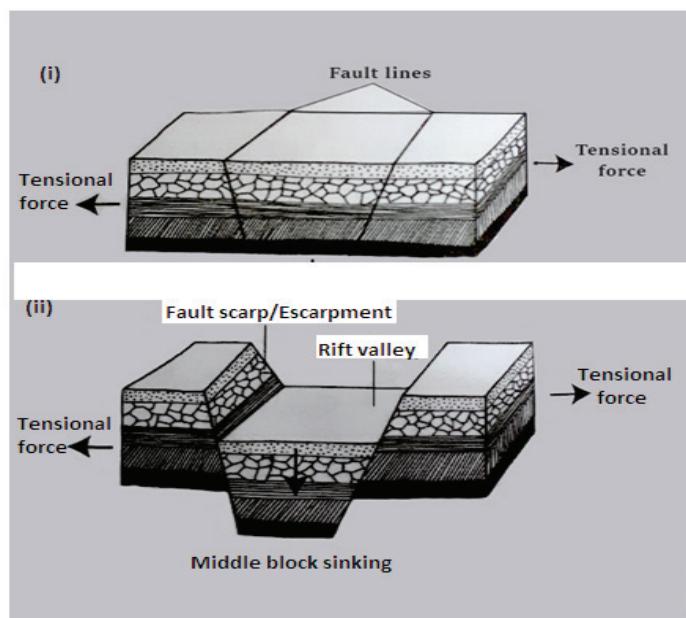


Figure 4.1: Formation of the rift valley by tensional forces

The processes which you have described in the previous activity are similar to those that led to the formation of the Albert Rift Valley in western Uganda. The whole idea of rift valley formation which you have developed from the above diagrams is known as the tensional theory of rift valley formation. The steep walls rising from the rift valley floor on both sides of the rift valley trough are called **fault scarps** or escarpments. I hope you remember the examples of fault scarps which we saw earlier on.

Activity 3

Look at Figure 8 which shows stages in the formation of the rift valley by compressional forces and do the following tasks:

1. Draw the diagrams in Figure 8 in your notebook.
2. Explain the process going on at each stage and how it affects the original land block.
3. Apart from the earth movements, identify and explain other processes which might contribute to the final appearance of the rift valley.

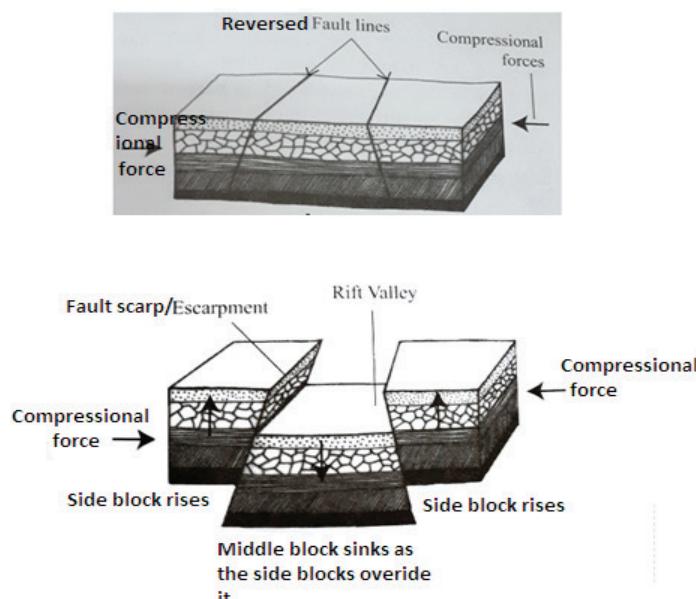


Figure 4.2: Formation of the rift valley by Compressional forces

The whole idea of rift valley formation which you have developed from the above diagrams is known as **the compressional theory** of rift valley formation. You will learn more about the theories of rift valley formation in Topic 9 of physical Geography.

Features of the Albert rift valley

Activity 4

Look at figure 9 and do the tasks that follow.

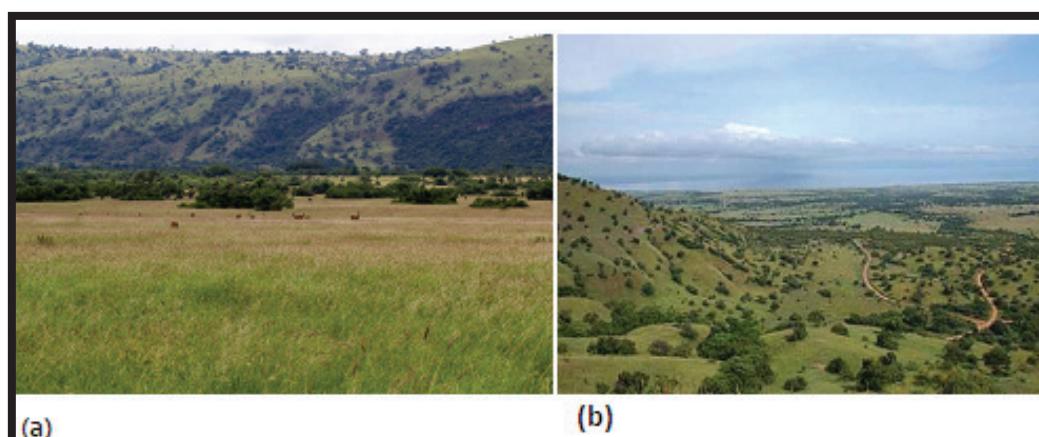


Figure 4.3: Photographs showing the Albert rift valley

1. Draw a landscape sketch of either Photograph (a) or Photograph (b) and on it mark and label the:
 - i. Rift valley floor
 - ii. Fault scarp or rift escarpment
 - iii. Vegetation types
2. Using the two photographs and the sketch which you have drawn, describe the characteristics of the Albert rift valley
3. Explain how the rift valley affects land use and human activities in the area where it is found.

In Activity 4, you have found out the characteristics of the rift valley. Perhaps what you could not have learnt from the photographs is that the rift valley experiences hot temperatures. This is because it lies at a low altitude. What do you remember about the lowland region of Uganda?

How the Rwenzori Mountains were formed

Rwenzori ranges are the only block mountain in Uganda. They sit within the Albert rift valley along the Uganda-DRC border. It is bordered by a fault scarp in the west, which descends into the Semuliki Valley. The eastern fault scarp descends into the Ankole-Lake Victoria plateau. It stands above the surrounding land from which its blocks were raised along fault lines. Its highest peak, Margherita, was uplifted to about 511m above the floor of the Semuliki valley. However, over time, its height has reduced to about 5029m. Why?

To understand how the Rwenzori Mountains were formed, do the following Activity:

Activity 5

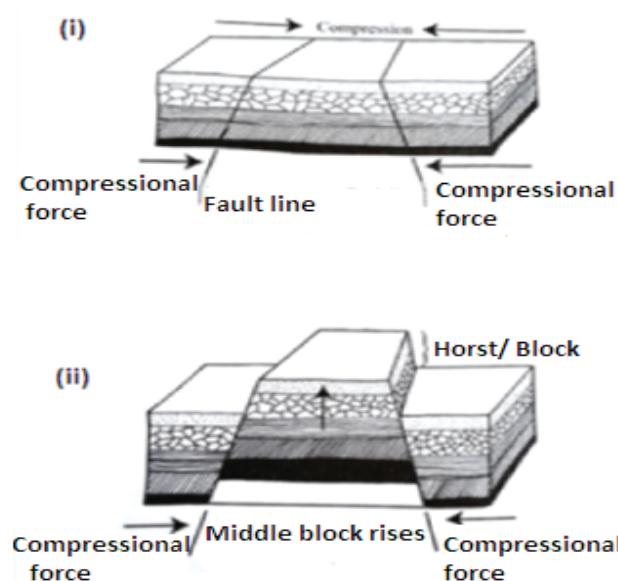


Figure 4.4: Formation of a Block mountain

Carefully look at Figure 10 and do the following tasks:

1. Copy the diagrams in Figure 10 into your notebook.
2. Explain the process going on at each stage and how it affects the original land block.
3. Apart from earth movements, think of other processes which might have acted upon the land blocks to make the Rwenzori Mountains appear as they do today.

Summary

In this lesson, you have learnt that

- The relief and landforms of Uganda have been greatly affected by earth movements, especially faulting. Most of these earth movements took place during the Pleistocene period.
- Faulting is the cracking of the rocks of the earth's crust, followed by displacement of land blocks along the cracks or fault lines.
- In Uganda, faulting has led to the formation of the Albert rift valley, fault scarps or escarpments, Rwenzori Mountains and rift valley lakes. It also led to the formation of the Aswa River valley, which developed along a fault line.
- All relief features which were primarily formed due to faulting have over thousands of years been modified by weathering and erosional processes such as river erosion, mass wasting and glaciation.
- Features formed due to faulting affect human activities and development both positively and negatively.

Follow-up Activity

1. Carry out a textbook or Internet research about secondary faulting and the formation of rift valley lakes.
2. Draw diagrams to illustrate the processes that led to the formation of rift valley lakes.
3. With specific reference to western Uganda, explain the influence of any **one** rift valley lake on the physical environment and human activities.
4. River Aswa in northern Uganda is an example of a fault-guided river valley. Read and make notes about the formation of a fault-guided river valleys.

References

1. Gladys Hickman (1994), *Lands and Peoples of East Africa*
2. Colin Buckle (1988), *Landforms in Africa*
3. Bunnet R.B.(1999), *General Geography in Diagrams*
4. Johnson Watson (1992), *Physical Geography for Secondary schools*

Topic 3: Drainage in Uganda

Lesson 5: The drainage system of Uganda

By the end of this lesson, you should be able to:

1. describe the drainage system of Uganda;
2. draw maps and diagrams to show the drainage of Uganda;
3. analyse the influence of drainage on human activities and ways of life.

Materials you need:

Atlas, map showing the drainage system of Uganda, photographs showing drainage features in Uganda, clip board, notebook, pen, pencil and a rubber

Introduction

Drainage is not something new to you. Your own life depends on drainage every day. In Senior Three, you learnt about the drainage of East Africa. Do you still remember what drainage means and the different drainage features? In this lesson, you are going to explore the drainage system of Uganda, how it came into existence and how we can preserve so that it remains useful to us and the future generations.

What is a drainage system?

In Lesson 1, you learnt that about 15% of Uganda's total area is occupied by open water bodies. These, together with wetlands, collectively form the drainage of Uganda. The distribution or spread out of these features makes up the drainage system of the country. Lake Victoria is Uganda's largest drainage feature. It covers about 70,000 square kilometres in all the three East African countries. It is also the second largest fresh water lake in the world. Which one is the largest fresh water lake in the world?

Besides lakes, Uganda is also drained by rivers and streams. The Nile, which originates in Lake Victoria, is the longest river in the world. It covers a distance of 6,650km. Almost all other rivers in Uganda focus on the Nile. Thus nearly the whole of Uganda is drained by River Nile.

Activity 1

You may need the atlas for this activity.

Look at Figure 11 and do the following:

1. Copy the map into your notebook.
2. On the map you have drawn:
 - (i) Name the lakes marked 1 to 13
 - (ii) Name the rivers marked A to G
 - (iii) Mark and label the major swamps.
3. In about two sentences, explain what you understand by the term drainage.

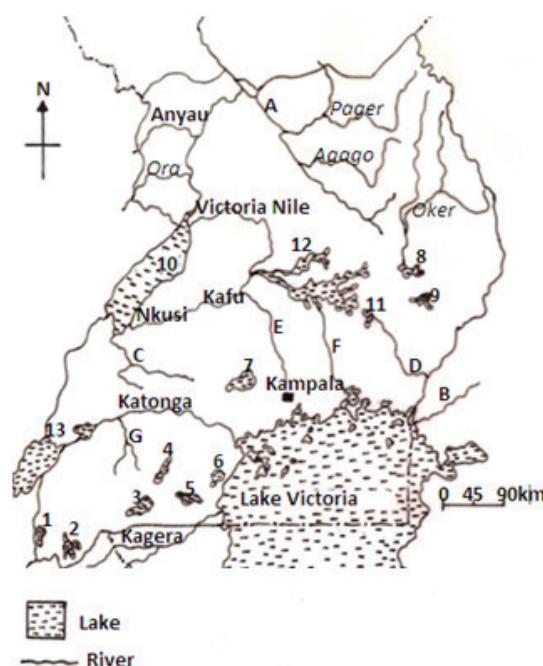


Figure 5.1: The drainage System of Uganda

The major lakes and rivers in Uganda drain large areas. These areas are called **drainage basins** or water **catchments**. There are seven major drainage basins in the country. Each basin is named after the dominant lake or river which drains it. To understand this well, do this Activity.

Activity 2

Look at Figure 12 and do the following tasks:

1. Copy the map into your notebook.
2. On the map you have drawn, suggest the names which can be given to the drainage basins marked 1 to 5.
3. Write each name in the appropriate basin on the map. As a guide, two basins have been named for you.



Figure 5.2: The Drainage basins of Uganda

Influence of Drainage on Our Lives

You now know the drainage system of Uganda. Drainage is a very important resource for Uganda. Our own lives and the lives of domestic and wild animals are dependent on the country's drainage system. For instance, rivers, lakes and swamps are sources of fresh water which we use for a wide range of domestic, industrial and institutional purposes.

Rivers like Ruizi, Katonga, Kibimba; and lakes like Kyoga provide water for agricultural use, such as irrigation and watering domestic animals. Kibimba rice irrigation scheme gets water supply from River Kibimba. Again, rivers like Victoria Nile, Mubuku, Wambabya and Nyangak have waterfalls which have been harnessed to produce hydro-electricity. To help you think further about drainage as an important resource for Uganda, do the following Activity:

Activity 3

1. Visit the drainage feature nearest to your home and find out its influence on:
 - (i) Local climate
 - (ii) Crop cultivation and livestock farming
 - (iii) Settlement,
 - (iv) Vegetation and Wild animals
 - (v) Fishing and Fish farming
 - (vi) Transport and communication
 - (vii) Mining or quarrying and
 - (viii) Local administrative boundaries.
2. Find out the disadvantages and problems associated with the drainage feature.
3. Write a field work report on the feature you have visited.

The influence of drainage on the physical environment and people's lives in your local area is very much similar to the way it influences other areas in Uganda. The problems and disadvantages of drainage in your home area are also similar to those associated with drainage in other areas. So you have learnt why we study the drainage of Uganda.

Summary

In this lesson, you have learnt

- that drainage is the distribution of open water bodies and ground water in an area. Drainage system is the spread out of all the drainage features in an area;
- that drainage system of Uganda comprises streams, rivers, lakes and swamps;
- that each of the major lakes and rivers of Uganda collects its water from a large area known as a drainage basin. There are seven major drainage basins in Uganda;
- Drainage is an important resource for Uganda. It influences our lives both directly and indirectly, as well as positively and negatively.

Follow-up Activity

Conduct a fieldwork study of a swamp or a stream or a lake (other than the one you visited in Activity 3) and:

1. Draw a sketch map to show its location.
2. Find out why it is found where it is.
3. Find out its influence on:
 - (i) Vegetation and animal life
 - (ii) Soils in the area
 - (iii) Local weather and climate and
 - (iv) Human activities and development of the area.
4. Write conclusions to summarise the major geographical aspects related to the drainage feature you have studied.

Topic 4: The Drainage System of Uganda

Lesson 6: The Evolution of the Drainage System of Uganda

By the end of this lesson, you should be able to:

1. explain the evolution of the drainage system of Uganda. and
2. explain the processes which led to the formation of the different types of lakes in Uganda.

Materials you need:

Atlas, map showing the drainage system of Uganda, photographs showing drainage features in Uganda, notebook, pen, pencil and a rubber

Introduction

If you have been keen enough, you should have realised that the streams or rivers in your home area or district flow in a certain direction. You should also have noted that swamps are found in particular places. This becomes clearer if you look at the map in Figure 11 again. There are certain geological events and processes which led to the evolution of this drainage system. In this lesson, you are going to learn about pleicetocene earth movements and how they led to the formation of the drainage system of Uganda as we see it today.

Has the drainage of Uganda always been as it is today?

The answer to this question is a definite NO. Uganda's drainage changed greatly during the pleicetocene period; from the old one to the one we see today. In Lesson 4, you learnt that before the pleicetocene period, Uganda was almost wholly flat with a slight tilt towards the west. You also learnt that the country's relief and drainage were modified by the earth movements which took place during the pleicetocene period. Do you know how long ago that was?

So the drainage system of Uganda as we know it today is the result of the pleicetocene earth movements. These movements include faulting, uplifting and crustal warping. These movements started earlier than the pleicetocene period, during the late Miocene period (about 8-7 million years ago). They only became stronger during Pleicetocene.

Before that period, the highlands of Uganda, notably Mountain Rwenzori, the rift valley escarpment, and the Mufumbiro range did not exist. There were no major lakes either. The country's drainage consisted of slow-flowing small streams which used to originate in a high ground on the Kenya side. These streams were called Proto rivers. To understand this, look at Figure 13.

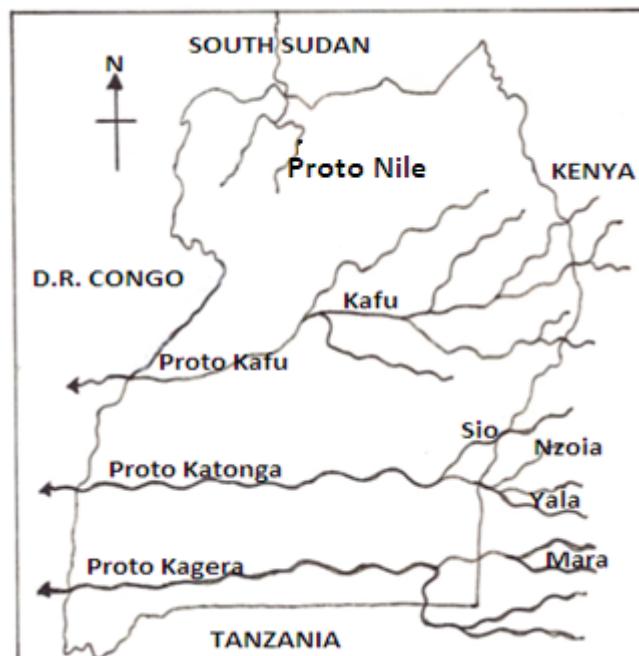


Figure 6.1: Uganda's drainage before stream reversal

Activity 1

1. In which direction were the proto rivers flowing? Why?
2. In the region where the Proto rivers had their sources, write the name of the country followed by the word Dome.
3. Describe Uganda's drainage before stream reversal, as shown on the map.

In the previous activity, you have learnt that before the Pleistocene period all the proto rivers and their tributaries originated in western Kenya and flowed across Uganda; joined the head waters of river Congo and finally reached the Atlantic Ocean.

How earth movements change Uganda's drainage

During the pleistocene period, the whole region where Uganda is found experienced earth movements. These movements were due to **geochemical reactions or radioactive decay** within the interior of the earth. The geochemical reactions generated a lot of heat energy, which led to the melting and boiling of the rocks of the mantle. The boiling rocks formed convective currents and enormous pressure.

The circulation of convective currents in the mantle created tensional and compressional forces; similar to those you saw in faulting. These forces acted upon the brittle rocks of the earth's crust. Continued tension and compression in the crust led to faulting, uplifting, up warping and down warping of the crustal rocks. To help you understand this, do the following Activity:

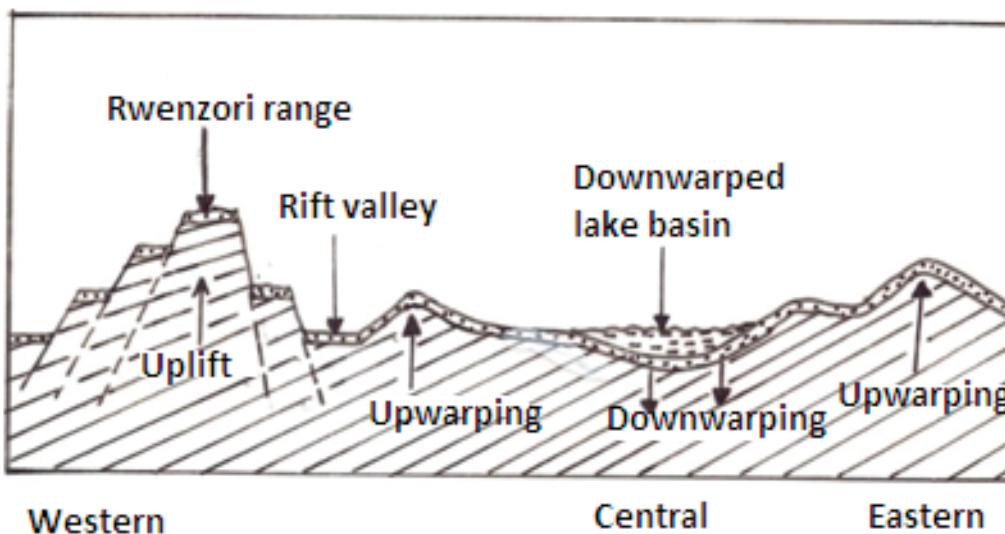


Figure 6.2: Formation of down warped lakes in Uganda

Activity 2

Look at Figure 14 and do the following:

1. In your notebook, write at least three paragraphs to describe the processes that led to the formation of down warped lakes in Uganda. You may categorise them as processes in the:
 - Eastern region
 - Western region, and
 - Central region.

In **Activity 2**, you have learnt how faulting, uplifting and crustal warping affected Uganda's landscape. The major effects of these processes were the formation of the Rwenzori Mountains and the shoulder of the Albert rift Valley in western Uganda. They also created saucer-like depressions in the central parts of the country.

The Rwenzori Mountains and rift valley escarpments were formed across the paths of the proto rivers. This meant that the rivers could not continue flowing westwards across the raised land. Eventually, all proto rivers got reversed to flow back eastwards. The reversed rivers poured their waters into the down warped saucer-like basins to form lakes Victoria and Kyoga. This process is called **stream reversal**. Smaller down warped lakes were also formed. You can understand this better if you do Activity 3.

Activity 3

Look at Figure 13 again, then look at Figure 15 and do the following tasks:

1. Identify the proto rivers which when reversed filled the:
 - (i) Lake Victoria depression, and the
 - (ii) Lake Kyoga depression.
2. Describe the flow of rivers in Uganda after stream reversal.
3. Suggest at least two reasons why the shoreline of Lake Kyoga is more irregular than that of Lake Victoria.
4. Considering the area bound by the axis of up warping and the axis of down warping, name other lakes in Uganda which were formed due to down warping.



Figure 6.3: Uganda's drainage after stream reversal

Over time, the level of water in the Lake Victoria depression rose until it reached the surrounding watersheds. Eventually, the water cut through the rock barrier at Jinja and flowed out as River Nile. The Victoria Nile flowed northwards into the Kyoga basin, which in turn got filled up and flowed out into the Albert rift valley. In the rift valley, the Victoria Nile drained the northern part of Lake Albert, flowed out and linked up with the ancient Nile shown in Figure 13 to form the Albert Nile.

Activity 4

To help you think further about stream reversal and the formation of down warped lakes in Uganda, do the following tasks:

1. Using the atlas map showing the drainage of Uganda, find out the present sources of rivers Kafu, Katonga and Kagera.
2. Suggest how the amount of water in the down warped lake depressions to reach the present levels.

Summary

In this lesson, you have learnt that:

- The drainage system of Uganda as we see it today is the result of the changes brought about by earth movements which occurred several million years ago.
- The formation of the Rwenzori Mountains and the Albert rift valley greatly affected

- the drainage of Uganda.
- Lakes Victoria and Kyoga were formed after the reversal of the proto rivers namele Kagera, Katonga and Kafu.

Follow-up Activity

1. Explain the benefits the people of Uganda get from down warped lakes.
2. Examine the problems associated with down warped lakes in Uganda.
3. Suggest steps which can be taken to ensure sustainable use of Uganda's rivers and lakes.

Topic 5: The Climate of Uganda

Lesson 7: Major types of climate in Uganda

By the end of this lesson, you should be able to:

1. Distinguish weather from climate
2. Draw a map to show the climatic zones of Uganda
3. Describe the characteristics of each type of climate in Uganda.

Materials you need:

Atlas, map showing the types of climate in Uganda, statistical information about the climate of Uganda, notebook, pen, pencil, graph paper and rubber

Introduction

In Senior Two you learnt about the climate of East Africa. Do you still remember its major characteristics? What about the climatic regions of East Africa? Which of those climatic regions are found in Uganda? List them in your notebook. In this lesson, you are going to learn about the climate of Uganda and its main features.

What is climate?

Activity 1

1. Look outside. In about four sentences, describe the weather around your home.
2. Is today's weather different from that of yesterday or the past two days? If yes, describe the differences.
3. In at least two sentences, explain what you understand by weather.
4. Write at least two paragraphs describing the pattern of weather you have observed in your home area for the past two or three years.
5. Suggest a name we can give that weather pattern.

When we talk of weather, we are actually talking about the **conditions of the air** or atmosphere at a certain time. The weather may be sunny or cloudy, rainy, windy and warm at the same time. It may also be hot or cool, humid or misty, calm or any other conditions. Uganda has many different kinds of weather at any one time. You have probably realised that even a small area like the one where you live experiences different weather conditions every day.

In task (4) above, you have probably described the weather pattern in your home area by talking about the times of the year or seasons in which you usually expect heavy rain or drought. Or you may have talked about the months when temperatures become hotter than usual, and the months when winds become stronger. When you describe such a pattern of weather, you are talking about the climate of your area. The kind of weather a place experiences over a long period of time, usually 30 to 45 years, is called its **climate**. The two most important elements of weather used to describe climate are **precipitation** and **temperature**.

Types of Climate in Uganda

Activity 2

1. In your notebook, list any five types of climates you know in East Africa.
2. In which type of climate is your home?
3. Describe any **two** of the climates you listed above.

In task (3) above, you have probably used words like hot, wet and dry to describe the two climates. Describing climate means pointing out its main **characteristics**. It is these characteristics that differentiate one climate from another. You are going to learn

about the characteristics of the main climates or climatic zones in Uganda.

If you have ever travelled to places some 20 to 40 kilometres or more away from your home, you could have noticed that the type of vegetation, crops grown and other economic activities people carry out are different from those in your home area. This is partly because of differences in rainfall amounts and temperature conditions. Therefore, climate is not the same every where. Figure 15 shows the different types of climate in Uganda.

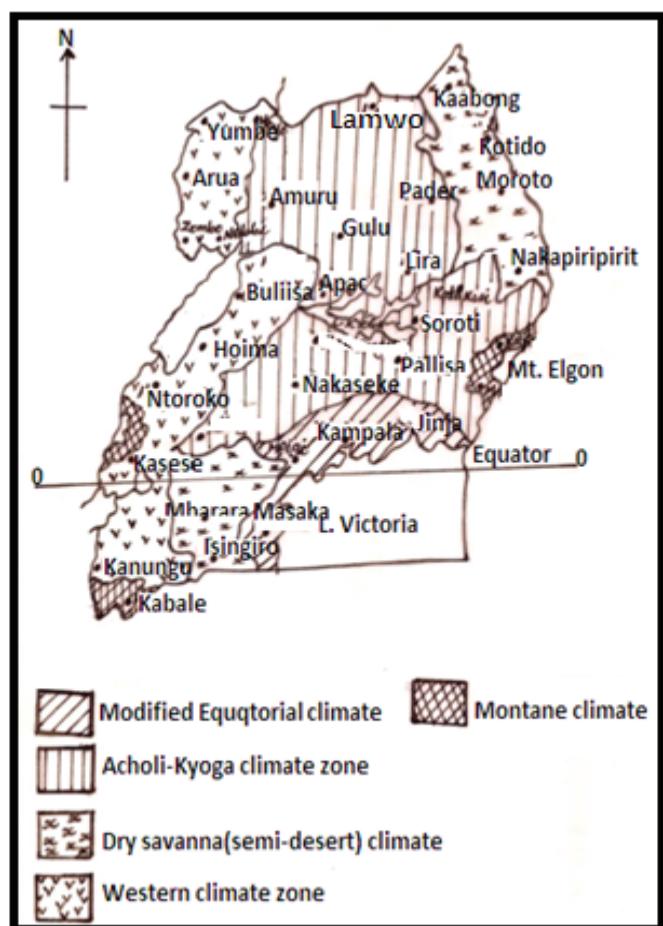


Figure 7.1: Climatic regions of Uganda

Activity 3

- Identify the types of climate shown on the map and list them in your notebook.
- With the help of the atlas, identify the areas covered by each climatic zone.
- Study the tables below, showing the mean monthly temperature and rainfall for two climatic zones/regions in Uganda and do the tasks that follow.

(a) Entebbe - Modified Equatorial Climatic zone

Month	J	F	M	A	M	J	J	A	S	O	N	D
Temp (oC)	27	27	27	26	25	25	25	26	27	27	26	26
Rainfall (mm)	65	85	150	250	225	125	75	75	75	112	125	125

(b)Lira - Acholi-Kyoga (Savanna)Zone

Month	J	F	M	A	M	J	J	A	S	O	N	D
Temp (oC)	27	27	27	26	25	25	25	26	27	27	26	26
Rainfall (mm)	65	85	150	250	225	125	75	75	75	112	125	125

- (i) Calculate the annual range of temperature for each of the two stations.
- (ii) Calculate the mean annual rainfall for each station.
- (iii) Draw a graph to represent the climate of each station.
- (iv) Describe the climate of the climatic zone in which each station is found.

In the previous activity, you have found out the types of climate in Uganda. You have also learnt about the characteristics of the Lake Victoria or Modified Equatorial climatic zone and the Acholi-Lake Kyoga or Savanna climatic zone. Now read the description of the followig zones and chech the description you have made.

Semi-desert (Dry Savanna) climatic zone

It covers Karamoja and Ankole-Masaka dry corridor. It is characterised by hot temperatures of up to 30°C, and generally dry conditons. In this zone, rainfall is low; falling below 750mm a year. Relative humidity is generally low.

Western Uganda climatic zone

This is a narrow zone found along the western boundary of Uganda. It covers ditricts like Koboko, Yumbe, Maracha, Arua, Bullisa, Hoima, Kases, Bushenyi and Mitooma. Within this climatic zone, rainfall varies from place to place. For instance, on the rift valley floor, rainfall ranges between 875-1000mm per year, while the higher plateau receives over 1250mm a year. Temperatures range between 27°C and 30°C.

Activity 4

1. Carry out textbook or Internet reasearch about the Montane climatic zone and write down its characteristics.

Summary

In this lesson, you have learnt;

- that weather is the state of the atmosphere, while climate is the typical weather of a place;
- Uganda experiences different climates; namely modified equatorial, savannah, semi-desert, and montane climates; and
- each type of climate has unique characteristics.

Follow-up Activity

1. Carry out textbook or Internet research about the relationship between climate and human activities in Uganda.
2. Apart from climate, which other factors influence human activities in Uganda?
3. Write a report of your findings.

Lesson 8: Factors influencing the climate of Uganda

By the end of this lesson, you should be able to:

1. Explain the factors influencing the climate of Uganda
2. Analyse the relationship between climate and people's ways of life in Uganda.

Introduction

In Lesson 7, you learnt about the types of climate in Uganda. In this lesson, you are going to learn about the factors affecting the climate of Uganda and how climate affects human activities and lifestyles.

Activity 1

1. Using your Knowledge of the position, drainage, relief, and climatic regions of Uganda, suggest the factors which affect the climate of Uganda.
2. Suggest human factors which might affect the climate of Uganda.

You have probably realised that in Uganda Montane climate occurs in high mountains. These mountains affect both rainfall amounts and temperature conditions. For instance, the high mountains form barriers in the passage of moist winds, force the winds to rise up to the condensation level and eventually fall as orographic or relief rainfall. For example, Mountain Rwenzori forms a barrier to moist Congo air and forms heavy rainfall in the area. To understand this, look at Figure 8.1.

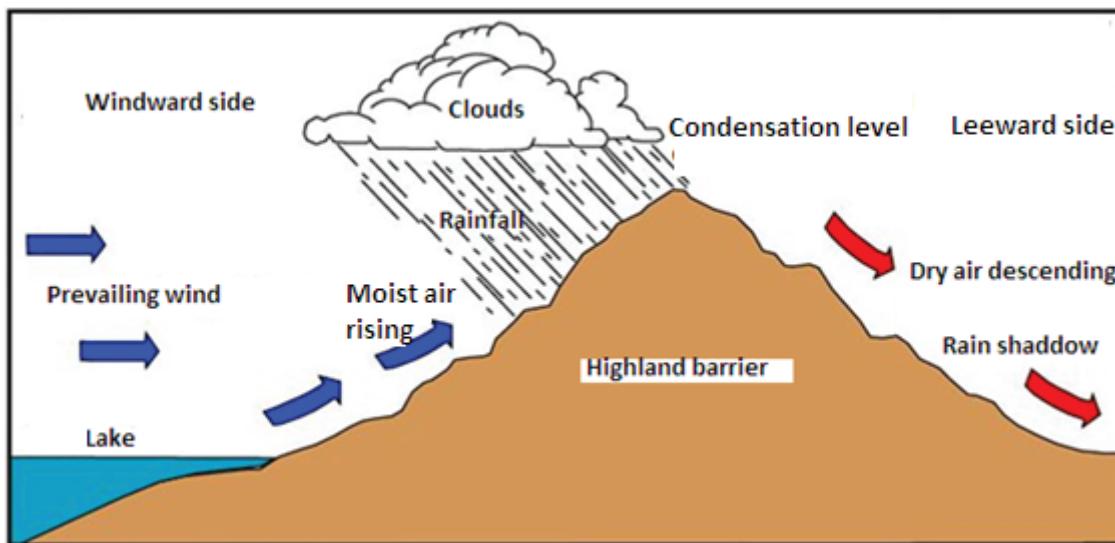


Figure 8.1: Effect of relief on climate

This explains why mountains Elgon, Mufumbira and Rwenzori are among the wettest places in Uganda.

After losing their moisture on the windward side, the winds reach the opposite side of the mountain when they are dry. So they do not cause any rainfall in those areas. Such areas are said to be in a rain shadow.

Again these high mountains modify temperature conditions in areas where they exist. You already know that temperature decreases at a rate of 0.6°C for every 100m of rise; hence the common truism "The higher you go, the cooler it becomes". So the highland areas of Uganda are cooler than the surrounding lowlands. This explains why montane climatic regions of Uganda are cooler than the plateaux and lowlands.

Activity 2

Carry out textbook or Internet research to find out how each of the following factors affects the climate of Uganda:

- (i) Vegetation cover
- (ii) Draining and destruction of swamps
- (iii) Planting of trees and forests.

Summary

In this lesson, you have learnt:

- That the climate of Uganda is affected by several factors which include relief, the distribution of water bodies, latitude or position astride the equator, vegetation cover, wind movement, and human activities.
- In Uganda, rainfall distribution varies from place to place. This has created dry, moderately wet, wet and very wet areas.

Follow-up Activity

Look at Figure 8.2 and do the tasks that follow:

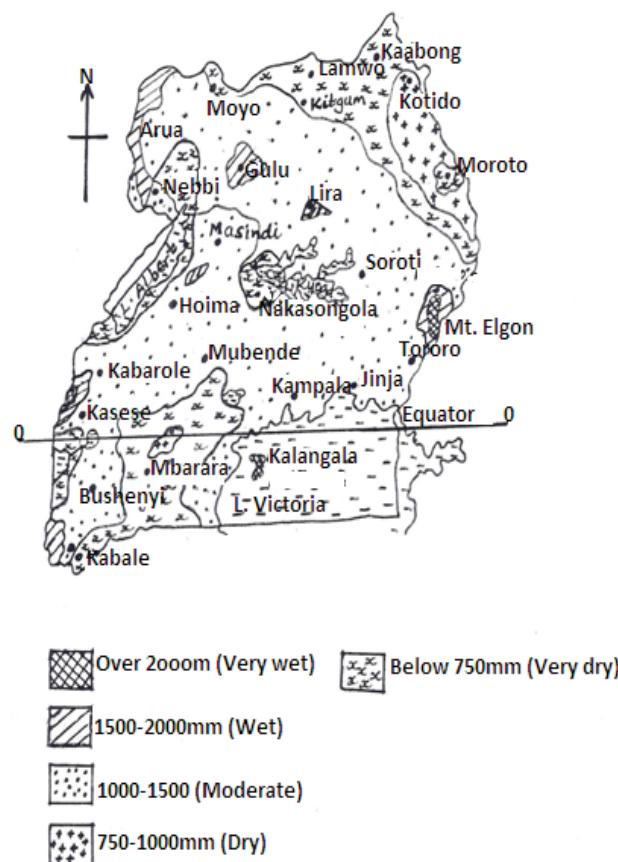


Figure 7.2: Rainfall distribution in Uganda

1. Copy the map into your notebook.
2. Using the information on the map, describe the distribution of rainfall in Uganda.
3. Explain the factors which influence the distribution of rainfall in Uganda.



Ministry of Education
and Sports

HOME-STUDY LEARNING

SENIOR
5

**GEOGRAPHY : STUDIES IN WORLD
PROBLEMS AND DEVELOPMENT**

August 2020

TOPIC: AGRICULTURE**LESSON 1: NOMADIC PASTORAL FARMING (THE FULANI OF WEST AFRICA)**

By the end of lesson, you should be able to:

- i. Explain the meaning of nomadic pastoralism;
- ii. Explain the meaning of transhumance;
- iii. Describe the characteristics of nomadic pastoralism in West Africa;
- iv. Explain the conditions that have favoured the occurrence of nomadic pastoralism in West Africa; and
- v. Describe the problems facing nomadic pastoralists in Africa.

Materials you need

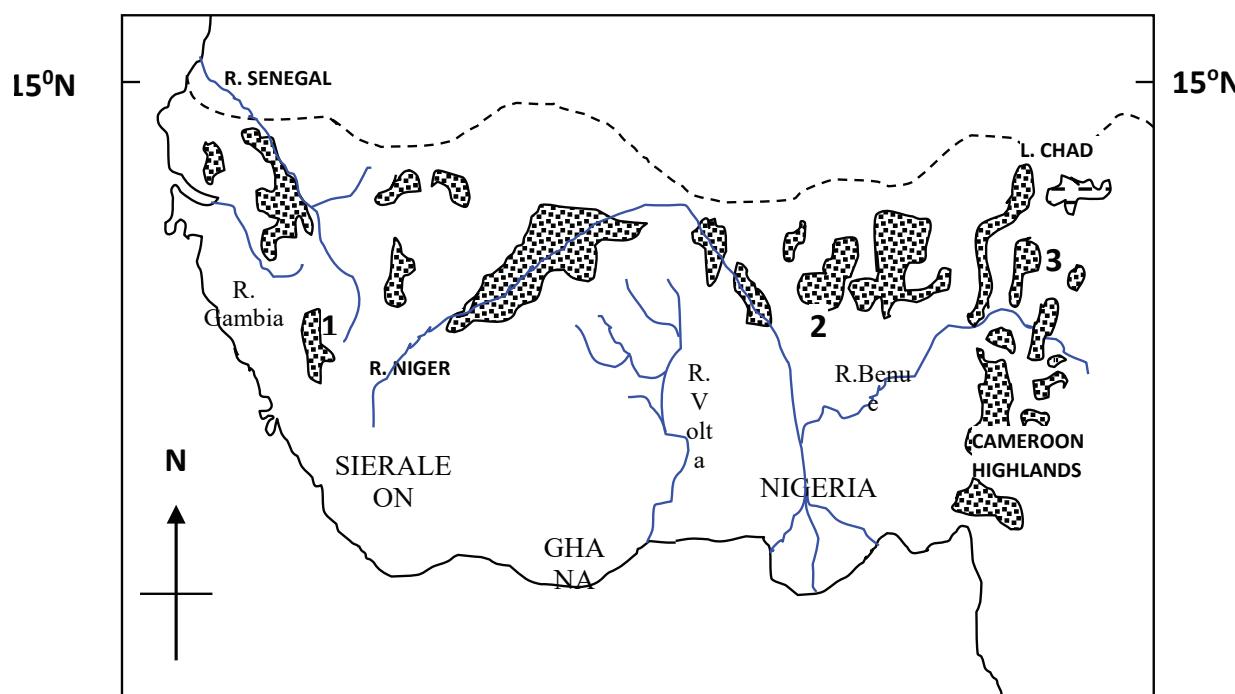
Notebook, ruler, pen, pencil, a map of Africa showing areas occupied by the Fulani, atlas textbook on nomadic pastoralism and ICT tools

Introduction

In Senior Four, you learnt that nomadic pastoralism involves movement of people with livestock, in search of pasture and water. You learnt that true nomads follow an irregular pattern of movement in contrast with transhumance, where there is movement according to seasons. In this lesson you are going to learn more about characteristics of nomadic pastoralism in West Africa; conditions that have favoured nomadic pastoralism in West Africa and problems facing nomadic pastoralist in Africa.

Activity 1

Study Figure 1, showing areas occupied by the Fulani herders of West Africa and do the activities that follow.



KEY

Areas occupied by the Fulani

1. Fouta Djallon
2. Jos Plateau
3. Adamawa

Figure 1.1: The Fulani herders of West Africa

Activity 1

1. Copy the map in Figure 1 into your notebook.
2. With the help of the atlas or a textbook, fill in the map you have drawn, the names of the countries occupied by the Fulani herders.

Activity 2

1. Think of areas in Uganda where nomadic pastoralism is practised. List them in your notebook.
2. Describe the type of climate experienced in those areas.
3. Using your O-level knowledge, describe the characteristics of nomadic pastoralism in Uganda.

Activity 3

Study Figure 2 and do the activities that follow.

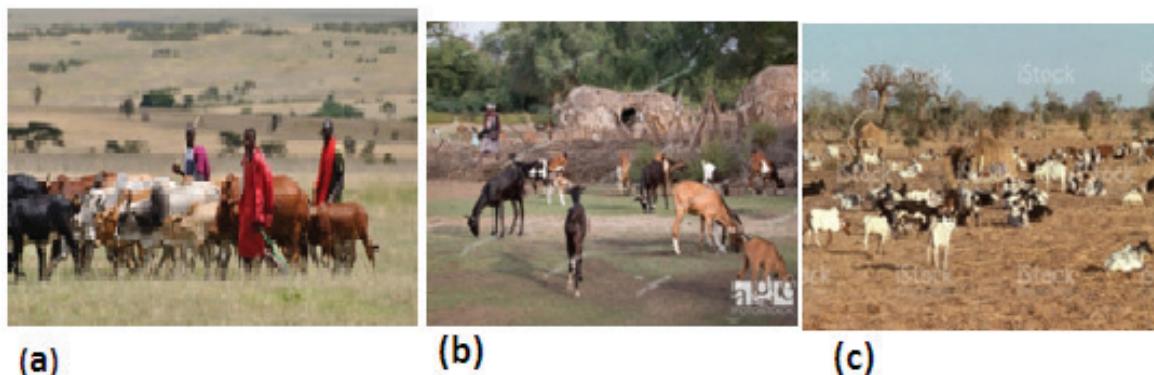


Figure 1.2: Fulani herders

1. Using ideas from Figure 2 and the knowledge you got in O-Level, describe the characteristics of nomadic pastoralism as practised by Fulani herders.

In your description of nomadic pastoralism, you have pointed out the nature of animals kept, pasture land, settlements, duration of staying in one grazing area, type of climate and others. This implies that whereas pastoral farming is an economic activity, nomadism is a way of life largely dictated by the natural environment in which the herders live.

Activity 4

Read the text below and do activities that follow.

Like the Maasai in Kenya and Tanzania, the Fulani do not mind much about political boundaries. They wander across borders from Senegal to Chad and Cameroon as the need for grazing their animals dictates. As long as they meet the strict animal hygiene and dipping requirements and possess the necessary clearance certificate to this effect, the authorities through whose districts they pass do not interfere with their activities. Each group restricts its wanderings within certain flexible limits; otherwise conflicts occur or they may end up in areas affected by instability.

The Fulani live in savanna lands some of which are in almost semi desert areas. Grass is often in short supply, water holes are often few and sometimes there is no rain for seven months. They move long distances in search of pasture and water. This search involves sending men out on horseback, to search far and wide and then return to guide others to new pasture and watering points.

In West Africa, the rain advances northwards and retreats southwards, following the apparent movement of the overhead sun. When dry months set in and the rains retreat southwards, the Fulani also gradually move south, following the rains. They find whatever pasture and water they can but they have to be careful, as the farther south they go, the deeper they get into a permanent tsetse fly country. Their cattle must be kept clear of any woodland because that is where the tsetse flies lurk. So they graze by the roadsides with growing grassland mixed with trees. Some Fulani herders even reach as far south as Niger and Benue rivers. This is transhumance by latitude rather than altitude.

The rains bring back grass to the northlands, where of course there are no tsetse flies. The tsetse fly does in fact advance northwards with the rains but only as far as thick tree or bush cover lasts. The rainy season is the worst time of the year for the Fulani, as they are also most permanently soaked to the skin. There is mud everywhere and hyenas attack the cattle.

The Fulani keep local breeds of cattle which they regard resistant to the harsh conditions of drought and disease. However, these indigenous breeds are not high yielding. The Fulani have a culture of keeping many animals, which leads to overgrazing and poor animal products.

1. Using Figure 1.2 again and the text or any other knowledge you have about nomadic pastoralism, explain why:
 - (i) The system of grazing practised by the Fulani is called transhumance;
 - (ii) The Fulani keep local breeds of animals;
 - (iii) The Fulani have temporary settlements;
 - (iv) The Fulani can move freely from place to place.

Activity 5

Using ideas from Figure 1.2, the text above, and any other knowledge you have about the nomadic pastoralism, in your notebook:

1. Explain how the following conditions have led to nomadic pastoralism among the Fulani of west Africa:
 - harsh climatic conditions
 - keeping large numbers of animals
 - keeping local animal breeds
 - communal ownership of land
 - the culture of the people
 - occurrence of animal pests and diseases
 - presence of many wild animals in the savannah lands
 - poor soils with limited moisture
 - sparse population
 - remoteness of the grazing territory, and
 - Neglect by government.

2. Explain how the following problems might affect the nomadic pastoralists in Africa:
 - shortage of pasture
 - shortage of water
 - poor quality pastures
 - presence of pests and diseases
 - rearing local breeds of animals
 - animal rustling(raiding)
 - political instability
 - limited market for animals and animal products
 - inadequate capital
 - shortage of skilled labour
 - poor storage facilities
 - low levels of technology
 - low levels of education in animal management, and
 - Competition with other land uses.

Summary

In this lesson, you have learnt that:

- Nomadic pastoralism involves movement of people with their livestock in search of pasture and water.
- Transhumance is the practice of moving livestock from one grazing ground to another, according to seasons.
- The characteristics of nomadic pastoralism include moving from place to place in search of pasture and water, keeping local breeds, keeping large number of animals, building temporary settlements, communal grazing of land, burning grass during the dry season, grazing animals on natural pasture, and livestock is mainly kept for subsistence.
- The conditions that have led to nomadic pastoralism include harsh climatic conditions, communal ownership of land, culture, pests and diseases and poor government policies.
- The problems facing nomadic pastoralists in Africa are shortage of pasture, shortage of water, animal rustling, overstocking and overgrazing, remoteness, inadequate market, inappropriate technology and poor government policies.

Follow up Activity

1. Suggest how the problems facing nomadic pastoralists in Africa can be solved.
2. Explain the importance of nomadic pastoralism in Africa.

LESSON 2: PLANTATION AGRICULTURE IN SOUTH AFRICA (NATAL PROVINCE)

By the end of this lesson, you should be able to:

1. Explain the meaning of plantation agriculture
2. Describe the characteristics of plantation agriculture
3. Explain the factors that have favoured the development of sugarcane plantations in Natal province, South Africa.

Materials you need

Notebook, ruler, pen, pencil, atlas, map showing areas of plantation agriculture in Natal, Textbook with plantation agriculture, ICT tools

Introduction

In Senior Four, you learnt about plantation agriculture in Africa. Can you explain what plantation agriculture is? Write a brief explanation in your notebook. You also learnt that the crops which are grown on plantations include sugarcane, rubber, palm oil, coffee and tea. What kind of crops are these? In this lesson, you are going to learn about the characteristics of plantation agriculture and the conditions that have favoured the development of sugarcane plantations in Natal province in South Africa.

Activity 1

1. Think of areas in Uganda where plantation agriculture is carried out and the crops grown on plantations. List both the areas and crops in your notebook.
2. Using any one plantation farm you know in Uganda, describe the characteristics of plantation agriculture.

In your description of plantation agriculture in Uganda, you have probably pointed out the nature of crops grown, the size of the farms, size of labour employed, ownership of the farms, facilities present on the farm and in the farming areas and others. To understand the characteristics of sugarcane plantations in Natal province, do the following activity:

Activity 2

Look at Figure 2.1, showing the growing and harvesting of sugarcane in Natal province and do the tasks that follow



Figure 2.1: Features of Sugarcane plantations in Natal

Activity 2

1. Identify the characteristics of plantation agriculture shown in Figure 2.1.
2. Using your earlier knowledge, explain other characteristics of plantation agriculture which are not shown in Figure 2.1.

Read the text below and look at Figure 2.2, showing sugarcane growing areas in Natal, South Africa and do the activities that follow.

It is a coastal area just outside the Tropic of Capricorn, which at the moment is the most important sugarcane-producing area in Africa. This is Natal, a province in South Africa where sugarcane was first grown in 1851. Natal is farther away from the Equator than is normal for successful sugarcane growth, but the two factors responsible for the success of sugarcane growing are the warm southward flowing Mozambique current and the onshore winds which blow over them. These currents bring warm, moist conditions to the Natal coast.

Most of Natal's sugarcane is grown on the coastal plain between Margate and Lake St. Lucia a distance of some 400km. The sugar belt also extends inland as far as 25km and up to 750 metres altitude, around places like Pietermaritzburg. The soils vary from

fertile alluvial soils of the coastal delta lands, through porous sandy soils to the thin, less fertile soils of the hill and valley sides farther inland. Rainfall in the sugar lands varies a great deal from place to place, ranging from 500-1500 millimetres.

On the coastal plain, temperatures are always warm and often quite hot. Irrigation is necessary. The rivers in the area provide the irrigation water. The South African Association, which is one of the biggest cooperatives in the world, administers the sugarcane industry in Natal. There are very big sugar farms owned by single farmers and at least 25 vast sugar estates owned by big companies. These are found on coastal gentle sloping areas and the broad river valleys of Natal. There are nearly 5000 smaller farmers producing about 10% of the total sugarcane output.

Activity 3

1. Using the text and Figure 2.2, explain in your notebook the physical factors that have favoured sugarcane growing in Natal.
2. Explain how the following human factors have favoured sugarcane growing in Natal: Availability of skilled labour, adequate capital, high levels of technology, efficient transport, large market, extensive research in crop breeding, political stability and positive government policy.
3. Using the knowledge you got in O-level about sugar cane growing in South Africa, draw a map showing the sugar cane growing areas in Natal province.

Summary

In this lesson, you have learnt that:

- Plantation agriculture is the growing of one uniform crop on large scale;
- Plantation agriculture involves the growing of perennial crops like sugarcane, rubber, oil palm, tea and coffee;
- The characteristics of plantation agriculture include specialization in one crop, cultivation being on large scale, labour being intensive, processing is done on plantation, there is use of modern methods of farming, requires a lot of capital, cultivation is mainly for sale, research is done and there are out growers.
- The physical factors favouring plantation agriculture in Natal include conducive climate of moderate-to-heavy rainfall and warm-to-hot temperatures, gentle sloping and lowland relief, fertile alluvial soils, presence of large volumes of water for irrigation provided by rivers, accessibility of sugarcane plantations near the coast and large tracts of land.

- The human factors favouring sugarcane plantation agriculture in Natal like adequate capital, skilled labour, adequate capital, high levels of technology, research, positive government policies, efficient means of transport and political stability.

Follow up Activity

1. Carry out textbook or Internet research about the problems facing sugarcane plantations in Natal Province, South Africa. Write a report of your findings in your notebook.
2. Study Table 1 below showing sugar exports from the Republic of South Africa (1998 – 2003) and answer the questions that follow.

Table 1: Republic of South Africa; Sugar exports (1998 – 2003)

Year	sugar exports (metric tonnes)
1998	1,230,000
1999	1,140,000
2000	1,470,000
2001	1,540,000
2002	1,170,000
2003	1,000,000

Draw a suitable graph to represent the trends in sugar exports from the Republic of South Africa between 1998 and 2003.

- (i) Describe the trend in sugar exports shown on the graph you have drawn in (1) above.



Ministry of Education
and Sports

HOME-STUDY LEARNING

SENIOR
5

PHYSICAL GEOGRAPHY

August 2020

TOPIC: INTRODUCTION TO PHYSICAL GEOGRAPHY**Instructions:**

- You will be studying one lesson each day. Try to do all activities programmed for each day.
- Some activities may take you more than one hour to complete.
- Read the instructions carefully before you begin doing each activity.
- In case you find an activity difficult, ask an older person around you to assist you.

LESSON 1: The Meaning and Nature of Physical Geography

- Learning Outcomes:

By the end of this lesson, you should be able to:

- explain the meaning of physical geography.
- describe the components of physical geography.
- define geomorphology.
- describe the geomorphic processes.

Materials you need:

Notebook/paper, pen, pencil, photographs of the physical environment and ICT tools

Introduction

In O-Level, you learnt about features which exist naturally on the surface of the earth, such as relief features, drainage features, vegetation and many more. You are now going to learn more about these features; how they are formed and their influence on the way of life of people living in the areas where they exist. Can you suggest a name which can be given to the branch of geography that studies the natural features of the earth?

ACTIVITY 1

Take a walk in the area around your home and do the following:

1. Identify and list the natural features in the area.
2. Copy the table below in your notebook and write each feature in the column where it belongs.

Relief features	Drainage features	Vegetation	Atmosphere and weather

The categories above are some of the major features which make up physical geography.

What other things do you think can be studied in physical geography but you have not identified in your home area? You can search for these from textbooks or the Internet.

Relief features are also known as landforms. This is because they determine the natural appearance of landscape in any given area. The branch of physical geography which studies the earth's landforms or relief features is known as ***Geomorphology***.

Activity 2

Study **Figure 1** and do the task that follows:



Figure 1.1: Some of the components of the physical environment

1. Identify the relief features shown in the photograph.
2. Suggest the processes which might have led to the formation of the features you have identified above.

- Besides relief features, identify other physical features shown in the photograph.

The processes responsible for the formation of landforms which you have suggested above are collectively called ***geomorphic processes***. They are called so because they are the ones responsible for shaping the rocks of the earth's crust into landforms. You will learn about other geomorphic processes later in this course.

Geomorphic processes are of two categories, namely:

- Processes which originate from the interior of the earth. These are known as ***Endogenic*** or internal processes.
- Processes which originate from the earth's atmosphere, which are known as external or ***exogenetic*** processes.

Activity 3

- In your notebook, list all the land forming processes you know.
- Copy the table below into your notebook and fill it in to categorise the processes which you have listed above into exogenic and endogenic ones.

Endogenic process (Internal)	Exogenic process (External)

Endogenic processes are also divided further into two categories, namely:

- Earth movements, which are also known as ***diastrophic*** processes. These modify landscapes by moving vertically and horizontally within the earth's crust;
- Vulkanicity, which involves the movement of molten rock material into the rocks of the earth's crust and onto the surface of the earth.

Activity 4

- Using your knowledge of landforms, identify the landforms in East Africa which were formed by earth movements or diastrophic processes.
- Briefly explain how any **two** of the landforms you have identified were formed.

The external processes (exogenic processes) are also divided further into two categories, namely:

- Processes which wear away or destroy the landscape, aided by natural agents such as rivers, sea or lake waves, glaciers and others. These processes are known as denudational or degradational processes.
- Processes that involve laying down of materials produced by denudation. This is also aided by natural agents such as wind, rivers, glaciers etc. These processes are known as depositional or aggradational processes.

Activity 5

- In your notebook, list the landforms which were formed by:
 - Denudational
 - Depositional processes
- Briefly explain how any one feature you have identified in each category was formed.

From **Activity 2 to 5**, you have been looking at geomorphology as a branch of physical geography. As you learnt in Activity 1 of this lesson, physical geography does not study landforms alone. To learn about other aspects studied in physical geography, do the following activity:

Activity 6

Look at **Figure 1.2** and do the tasks that follow.

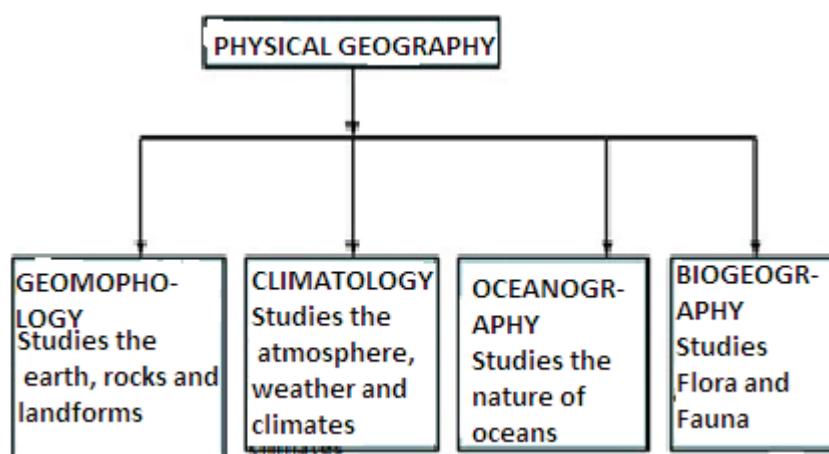


Figure 1.2: Main branches of physical geography

- Copy the diagram into your notebook.
- Identify other branches of physical geography shown in the diagram and the aspects of geography each one deals with.

Summary

In this lesson, you should have learnt that:

- Physical geography involves the study of all the natural features of the earth.
- Physical geography includes studies in landforms, drainage, rocks, soils, climate and vegetation.
- The branch of physical geography which deals with the study of landforms and the processes responsible for their formation is known as geomorphology.
- All processes that lead to formation of landforms are called geomorphic processes.
- Geomorphic processes are both internal (endogenic) and external (exogenic)
- Endogenic processes include earth movements such as faulting, warping and folding and vulcanicity.
- Exogenic processes include deposition and denudation

Follow up:

1. In what ways do you think the study of physical geography might benefit you and your country?
2. Differentiate between degradation and aggradation processes.

References

To understand this topic in greater detail, read about it in the following books:

1. Ayo Charles (1996), *Advanced Level Geography: New Basic Geomorphology of East Africa*
2. Colin Buckle (1988), *Landforms in Africa*
3. Bunnet R.B.(1999), *General Geography in Diagrams*
4. Johnson Watson (1992), *Physical Geography for Secondary Schools*
5. Bunnet R.B. (1999), *Physical Geography in Diagrams for Africa*

TOPIC: THE EARTH

LESSON 2: THE STRUCTURE OF THE EARTH

Learning Outcomes

By the end of this lesson, you should be able to:

- describe the shape of the earth.
- describe the structure of the earth.
- explain the origin of the earth.
- draw diagrams to describe the shape and structure of the earth.

Materials you need:

- notebook, pen, pencil
- globe, avocado, knife
- ICT tools
- diagram showing the structure of the earth

INTRODUCTION

In O' level you learnt about the shape, movements and internal structure of the earth. What things do you remember about the structure of the earth? In this lesson, you are going to learn more about the shape, structure and origin of the earth. This knowledge will form the foundation to help you understand better other topics in physical geography.

Activity 1

Look at Figure 2.1 and do the tasks that follow.



Figure 2.1: The earth as seen from space

1. Describe the shape of the earth as seen from the photograph.
2. What evidence is there to prove the shape of the earth you have described in (1) above?

From **Figure 2.1** we see that the earth is round in shape. However, it is not circular. So you have used other words to describe its real shape. Probably what you have not pointed out is that though the earth somewhat resembles a football, it is not a perfect sphere. So it is said to be a **geoid**. Because it flattens at poles and enlarges at the equator, it is said to be an **oblate spheroid**.

The Structure of the Earth

Did you know that the earth formed about 5 billion years ago? When it had just formed, it had no defined shape. As it cooled to form a solid sphere, the heaviest minerals in it fell to the centre and solidified. Other minerals cooled into different layers, depending on their density. These are the layers of the earth we are looking at now.

From you're O' level Geography, you know the major layers of the earth. How many are they? List them in your notebook. To help you learn the structure of the earth better, do the following Activity:

Activity 2

I hope you have the materials you need for this activity ready with you.

- (i) Using a knife, cut the avocado in a transverse/cross-section.
- (ii) Do you see the skin, flesh and the seed? Suggest the layer of the earth each part of the avocado corresponds with.
- (iii) Now look at **Figure 2.2** and do the task that follows.

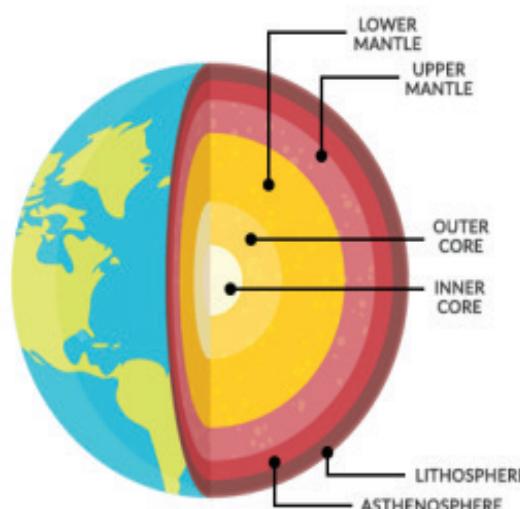


Figure 2.2: Layers of the Earth

(iv) Copy the table below into your notebook and fill it in to match the layers of the earth with those of the avocado fruit.

Layers of the earth	Layers of avocado fruit
1	
2	
3	
4	
5	
6	

(v) Which layers of the earth are not matched with those of the avocado fruit?

The layers which you have found not matching those of the avocado fruit come about when we divide the main layers of the earth into sub-layers. You will understand this better later in this lesson.

Activity 3

- Now that you know the layers of the earth, in your notebook, write at least three sentences about each layer to describe the internal structure of the earth.
- Suggest how each layer might influence the formation of relief features of the earth.

As you learnt a little while ago, each of the major layers of the earth is subdivided into other layers. For instance, the crust is divided into

- The continental crust
- The oceanic crust

The continental crust is the outermost layer made up of lighter granitic rocks rich in silica (Si) and aluminium (Al). Because of the combination of these rocks, it is referred to as the **SIALIC** crust or simply the sial.

Below the continental crust is the oceanic crust, made up of dense rocks with little silica (Si) but rich in magnesium and iron. It is referred to as the **SIMA**.

To understand these layers better, look at Figure 2.3.

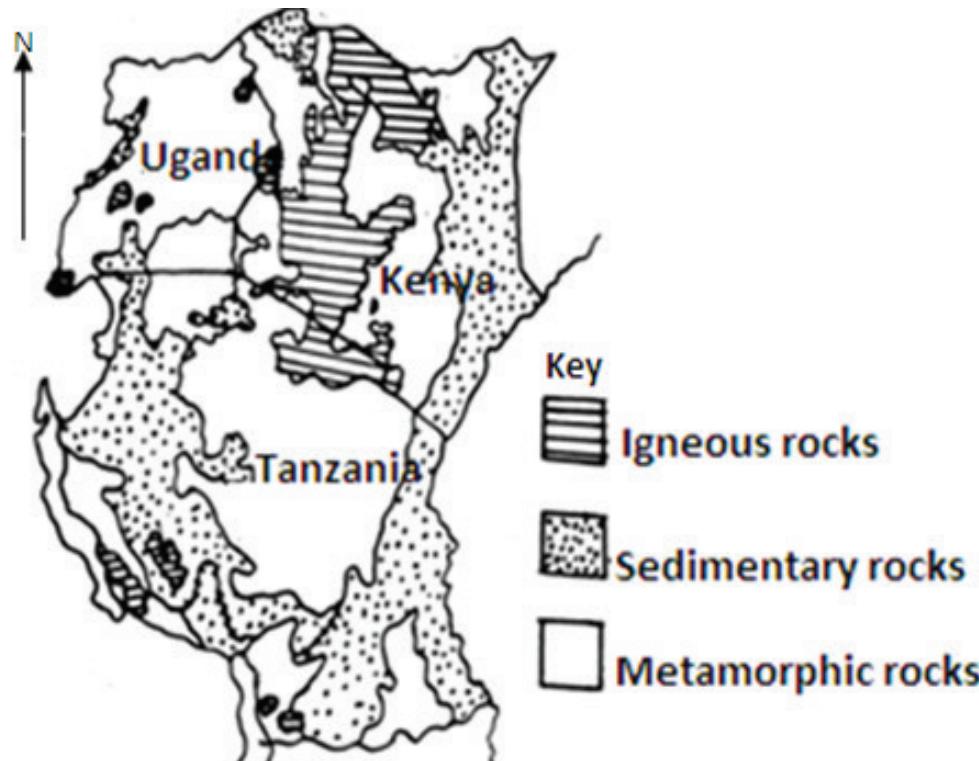


Figure 2.3: A Section through the Earth

Activity 4

Copy Figure 2.3 into your notebook and on it, name the different layers of the earth.

Below the oceanic crust is a boundary layer that separates the crust from the next layer. It is called the **Mohorovicic-discontinuity**; commonly written as the **MOHO-discontinuity**. It was named after the scientist Mohorovicic, who discovered it in 1909.

The second layer is the mantle. It is a thick layer containing rocks rich in silica, magnesium and iron. It is also divided into two layers:

- The upper mantle, which is almost solid. It is called the plastic mantle.
- The lower mantle, which exists in a molten state similar to porridge.

Between these two layers is a boundary layer called the **Asthenosphere**? The hot temperatures in this layer make the rocks to melt. Below the lower mantle is a boundary layer known as **Gutenberg-discontinuity**. It separates the mantle from the core.

The core is the innermost layer of the earth. It is made up of rocks rich in Nickel (Ni) and iron (Fe). It is, therefore, known as **NIFE**. The core is divided into two layers:

- The outer core with molten rocks
- The inner core which is solid.

How did the earth come into existence?

Activity 4

Have you ever wondered how the earth and other planets came into existence?

Scientists have developed several theories to explain the origin of the earth. One example of such theories is the Big Bang theory which was put forward by Belgian astronomer Georges Lamaitre and American scientist Edwin Hubble.

According to this theory, nothing came into existence before the big explosion or big bang. When the big bang took place, sparks or fragments of matter came into existence and scattered. These fragments have been expanding to form the earth and other planets.

Have you heard of any other theories?

Read the Bible book of Genesis chapters 1 and 2 or the Quran and find out more about the origin of the earth.

Summary

In this lesson, you should have learnt that:

- The earth is not perfectly spherical in shape. It is a geoid.
- The earth is divided into 3 major layers, the crust, mantle and core.
- Each of the major layers of the Earth is sub divide into other smaller layers.
- From each major layer to the other there are boundary or transitional zones called discontinuities; the Mohorovicic –discontinuity between the crust and the mantle, and the Guttenberg discontinuity between the mantle and the core.

Follow up Activity

Carry out textbook or Internet research and make notes about:

- (i) The layers of the earth
- (ii) Theories which explain the origin of the earth.

Note: When schools reopen, hand in your research notes to your teacher for further help.

References

To understand this topic in greater detail, read about it in the following books:

1. Colin Buckle (1988), *Landforms in Africa*
2. Bunnet R.B.(1999), *General Geography in Diagrams*
3. Johnson Watson (1992), *Physical Geography for Secondary Schools*
4. Bunnet R.B. (1999), *Physical Geography in Diagrams for Africa*

TOPIC: ROCKS OF THE EARTH'S CRUST

LESSON 3: TYPES OF ROCKS AND HOW THEY ARE FORMED

Learning Outcomes

By the end of this lesson, you should be able to:

- Define what a rock is
- Identify the major rock types and their distribution in East Africa
- Describe the characteristics of igneous rocks
- Explain the formation of igneous rocks

Materials you need

- Notebook, pen, pencil
- The local environment, atlas
- ICT tools, if you have any
- Rock samples

Introduction

In O level you learnt about the different types of rocks. This knowledge will help you understand better the study of rocks in A level.

What is a rock?

Activity 1

1. How would you define a rock basing on the O' Level knowledge you have?
2. Write the definition in your notebook.
3. Write this definition and types of rocks in your notebook.
4. In your notebook, name the three major types of rocks in East Africa.

You have probably defined a rock as an aggregate of minerals and you are right, because different mineral elements combine to form different rock types.

The major types of rocks are:

- Igneous rocks
- Sedimentary rocks
- Metamorphic rocks

Activity 2

Look at figure 2, showing the distribution of the major types of rocks in East Africa and do the tasks that follow:

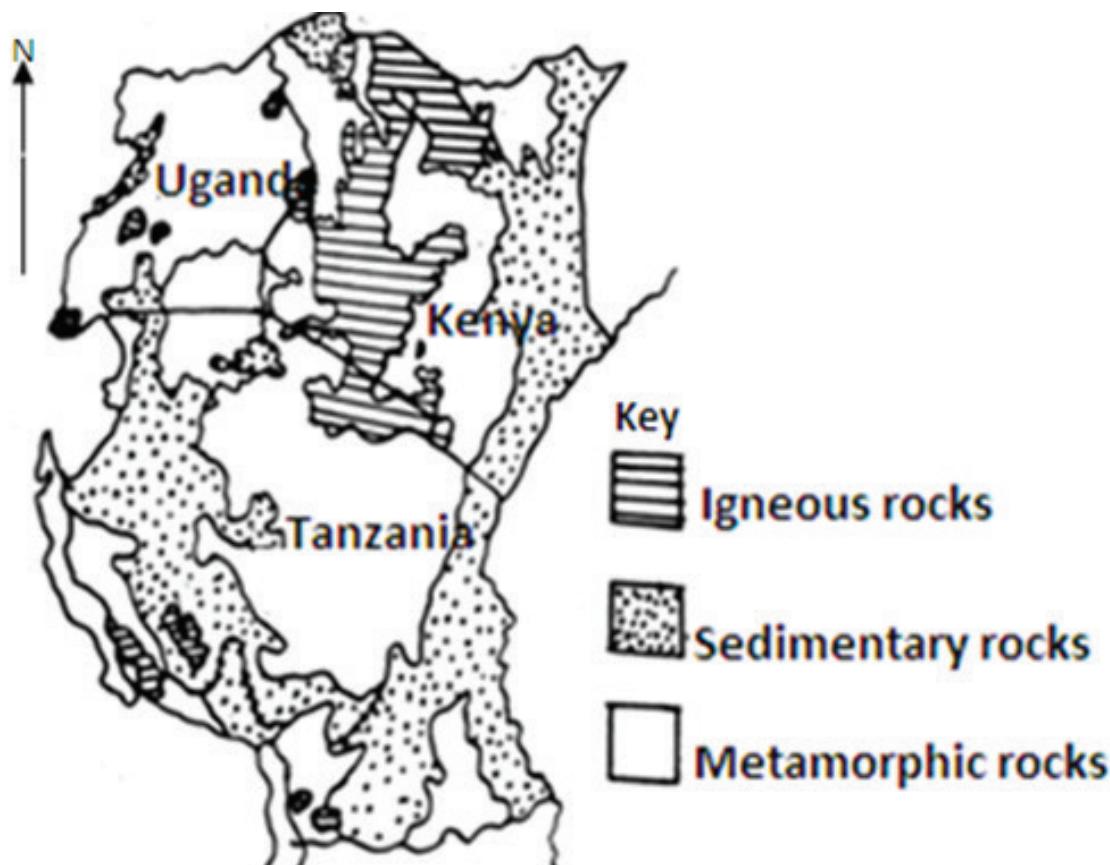


Figure 3.1: Distribution of major rock types in East Africa

1. For each of the major rocks, name two areas where they are found. You can use an atlas to help you.
2. Give reasons why these rocks are located in the areas you have named.
3. Copy the map showing the distribution of the rocks in East Africa in your notebook and, with the help of the atlas, mark and label at least two places in each country where each type of rock occurs.

Igneous Rocks

Activity 3

Look at Figure 3.2 and do the tasks that follow:



Figure 3.2: Formation of Igneous rocks

1. Identify the process taking place in the photograph.
2. Explain how the process you have identified in (a) above leads to the formation of rocks.
3. Name two areas in East Africa where this activity could have taken place.
4. Suggest the type of igneous rock formed due to the process.

You have probably mentioned that the process taking place in Figure 3.2 is a volcanic eruption. Yes, it is. Materials from the interior of the earth are thrown out under high pressure or are pushed into the rocks of the earth's crust. This activity is responsible for the formation of igneous rocks. To help you understand this better, do the following activity:

Activity 4

Read the text below and do the tasks that follow:

Volcanic activity originates from the interior of the earth, where the temperatures are very hot. The hot temperatures melt the rocks to form molten rock, known as magma.

The magma is then forced out under pressure through lines of weakness such as cracks/faults; either to be pushed into the crust or thrown out onto the earth's surface. The molten rock then cools and solidifies to form features with rocks that have crystals.

Igneous rocks have been classified according to:

- a) Rate of cooling and solidification of molten rock
- b) Mineral composition of molten rock.

Types of Igneous rocks according to rate of cooling and solidification of molten rock

When the molten rock is on the earth's surface, it is called lava. It cools rapidly because there is free air circulation. The features formed include volcanic mountains, lava plateaus and others which have rocks that have small crystals such as basalt and obsidian. These types of rocks are called volcanic rocks or extrusive rocks.

When the magma remains inside the crust just below the earth's surface, it forms features such as laccoliths, sills and others. The magma cools and solidifies at a moderate rate and so the crystals are moderate in size. The rocks formed are called intermediate intrusive igneous rocks

or Hypabyssal rocks.

When the magma remains in the deeper layers of the crust, it forms features such as batholiths. The magma cools and solidifies at a slow rate. The rocks formed have large crystals such as granite and gabbro. These types of rocks are called plutonic or abyssal rocks. To understand these rocks, look at Figure 3.3.

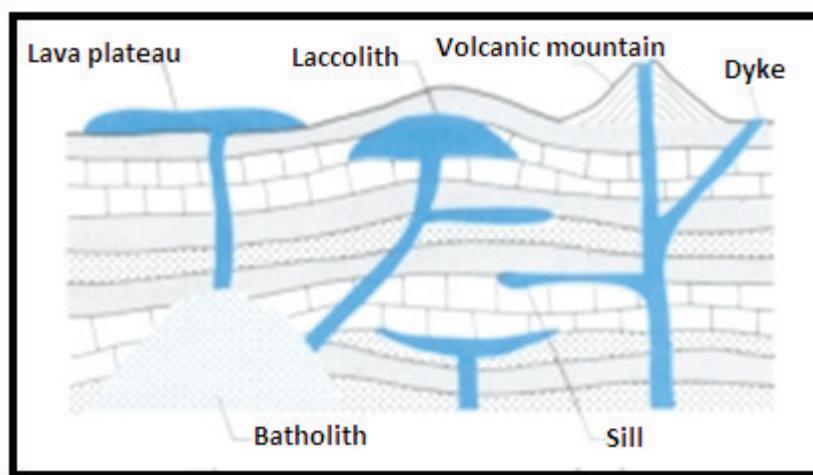


Figure 3.3: Igneous rocks and related features

Types of Igneous rocks according to their mineral composition

In this category, igneous rocks are in two generalised groups:

- Rocks that form from the cooling of molten rock rich in iron and magnesium. These are usually dark coloured and dense. They are called basic or mafic rocks.
- Rocks that form from the cooling and solidification of molten rock rich in silica and feldspar. They are called felsic or acidic rocks and are usually light coloured and less dense.

Activity 5

- In your notebook, copy the table below and complete it by filling in the blank rows.

Types of igneous rocks	Nature of crystals	Features where the rocks are found
Volcanic rocks		
Hypabyssal rocks		
Plutonic rocks		

- Describe the characteristics of igneous rocks.
- Explain the influence of igneous rocks on landform formation.

Summary

In this lesson you have learnt that:

- A rock is an aggregate of minerals
- Major rock types in East Africa are; Igneous rocks, Sedimentary rocks, Metamorphic rocks
- Igneous rocks are as a result of vulcanicity.

LESSON 4: Formation of sedimentary and metamorphic rocks

- Explain the formation of sedimentary and metamorphic rocks
- Describe the characteristics of igneous rocks
- Explain the rock cycle

Materials you need

- Notebook, pen, pencil
- The local environment, atlas
- ICT tools, if you have any
- Empty mineral water bottle/drinking glass, knife or cutting tool, a handful of fine soil/sand, a handful of gravels or small stones, a half litre of clean water.

Introduction

In O' Level you learnt about the formation of sedimentary and metamorphic rocks of rocks. In this topic you are going to learn more about the formation of those two types of rock in great detail. You are also going to look at how the three main types of rock are related.

What are Sedimentary rocks?

Activity 1

Using your knowledge of rocks from O-Level; in your notebook:

1. Write two sentences to explain what is meant by sedimentary rocks.
2. Draw a table with three columns to show the types of sedimentary rocks. Briefly explain how sedimentary rocks are divided into types.
3. Write at least one example of each type of sedimentary rock.

In your explanation of what sedimentary rocks are, you have probably pointed out some of the following ideas. Sedimentary rocks are the youngest rocks. They are formed from the products of weathering. Rocks are disintegrated or decomposed to form debris or sediments. The sediments are either solid or soluble materials produced by chemical weathering. Other materials are from organic matter i.e. the remains of dead plants and animals.

Again in the previous Activity you have explained how we divide sedimentary rocks into types. You have possibly pointed out that the type of sedimentary rock depends on the type of sediments from which the rock was formed. The main types of sedimentary rock include;

1. Mechanically-formed sedimentary rocks
2. Chemically-formed sedimentary rocks
3. Organically-formed sedimentary rocks

Mechanically-formed sedimentary rocks are also known as physically formed sedimentary rocks. They are formed from solid sediments. The solid sediments are in different sizes and when they accumulate and compact, they form different types of rocks; for example

- i) rudaceous rocks are made up of grains of over 2mm e.g. breccias, conglomerate;
- ii) Arenaceous rocks are made up of grain size of between 0.05 - 2mm e.g. sandstone; and
- iii) Argillaceous rocks are made up of fine grains of less than 0.05mm such as mudstone, clay.

The following activity will help you to understand better the formation of mechanically formed sedimentary rocks.

Activity 2

1. Get an empty mineral water bottle, fine soil or sand, small stones or gravels, clean water and a knife or cutting tool.
2. Cut off the top of the mineral water bottle and in it pour the clean water.
3. Mix the fine soil or sand with the stones or gravel.
4. Pour the mixture you have made into the mineral water bottle containing clean water.
5. Observe what happens inside the bottle and record your observations.
6. Using the observations, you have made, summarise the processes responsible for the formation of sedimentary rocks in the order of occurrence.
7. Describe the structure of sedimentary rocks.

In the previous activity, the stones and sand represent the rock sediments produced by **weathering**. These materials vary in size. The rock sediments are **eroded** and **transported** by natural agents like runoff water, rivers, glaciers, wind and lake or sea waves. Eventually, these materials are **deposited** in low lying areas such as lake and ocean basins, flood plains and valleys.

After a long period, several layers of the materials **accumulate**. The layers at the bottom are

compacted due to the weight of the overlying layers.

The compacted layers are then **cemented** together with the help of mineral matter to form a solid rock. The formed rock exists in layers or beds which show the different times when deposition took place. Each layer is called a rock **stratum**; many are called rock **strata**.

Activity 4

Study Figure 4.1 and do the following tasks.

1. Copy this illustration in your notebook.
2. Complete the figure by filling in the processes of formation of sedimentary rocks in sections A, B and C. Briefly explain what each process involves.
3. Do you think there is a possibility of sedimentary rocks forming in your home area? Give reasons for your answer.

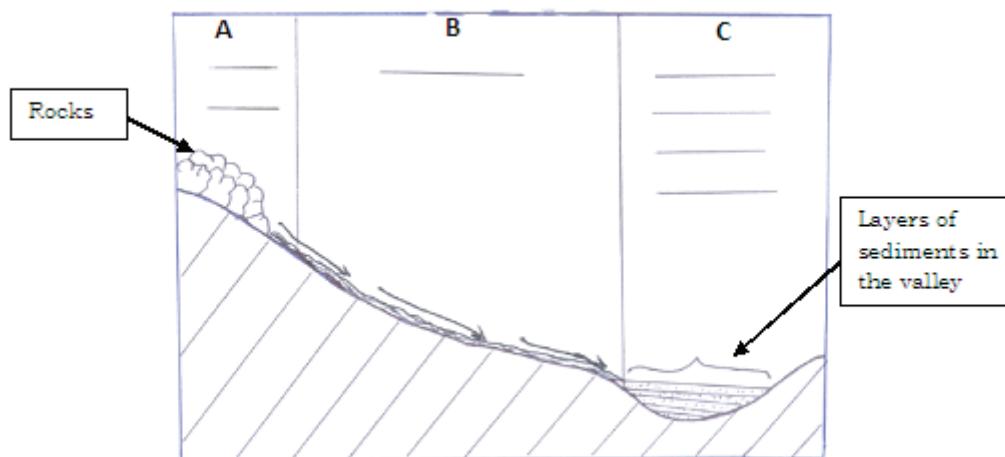


Figure 4.1: Formation of sedimentary rocks

Chemically-formed sedimentary rocks are formed from chemical sediments derived from soluble materials carried in solution by rivers, running water into lakes and seas. These materials then precipitate when the water evaporates to form chemically formed sedimentary rocks.

The type of chemically formed sedimentary rocks depends on the chemical sediments deposited. There are three types of chemically formed sedimentary rocks:

- i) Calcareous sediments form rocks such as limestone and dolomite
- ii) Siliceous sediments form rocks such as flint
- iii) Ferric sediments form rocks such as clay-iron

Other examples include rock-salt and gypsum.

Organically-formed sedimentary rocks are derived from animal and plant remains. Animal remains such as skeletons of organisms like polyps, shells of snails get deposited, accumulate and compact in ocean beds to form organically formed sedimentary rocks like limestone.

Partial decay of large amounts of plant materials buried over a long period of time leads to formation of an organic rock known as coal.

Summary of sedimentary rocks

Activity 5

Draw the table below in your notebook and fill in the examples

Mechanically/physically formed sedimentary rocks	Chemically formed sedimentary rocks	Organically formed sedimentary rocks

Metamorphic rocks

These are changed rocks after the original rock is altered in texture and chemical composition. The agents of change or **metamorphism** include:

1. Heat produced by the hot volcanic rocks intruded into the crust. This is called **thermal or contact metamorphism**.
2. Pressure created during rock movement such as in folding/faulting and by stress during mountain building processes. This is called **regional metamorphism** because a wide area of rocks is affected.
3. Chemically active fluids e.g. ionised water reacts with the rocks to form new minerals.

Activity 6

Look at the table below and do the task that follow:

Original rock	New metamorphic rock	Metamorphic process
Clay	Shale, slate, schist	Regional
Granite	Gneiss	Regional
Sandstone	Quartzite	Regional or contact
Limestone	Marble	Regional or contact

1. Copy the figure in your notebook
2. What is metamorphism?
3. What are the agents of metamorphism?
4. Distinguish between regional and contact metamorphism.

LESSON 5: The rock cycle, and influence of rocks on landforms and human activities

- Explain the rock cycle
- Explain the influence of the nature of rocks on landform formation
- Explain the economic importance of rocks in East Africa

Materials you need

- Notebook, pen, pencil
- The local environment, atlas
- ICT tools, if you have any

Introduction

In lessons 4 and 5, you could have realised that some types of rock are formed from the existing rocks. This shows you that each type of rock is related to the other. In this lesson you are going to learn about that relationship by looking at the rock cycle. You are also going to look at the influence of rocks on landscape and the activities people carry out.

The Rock cycle

It gives the relationship between the three rock types and shows the transformation of one rock type to another, through various processes.

Study the Figure 5.1 and do the tasks that follow.

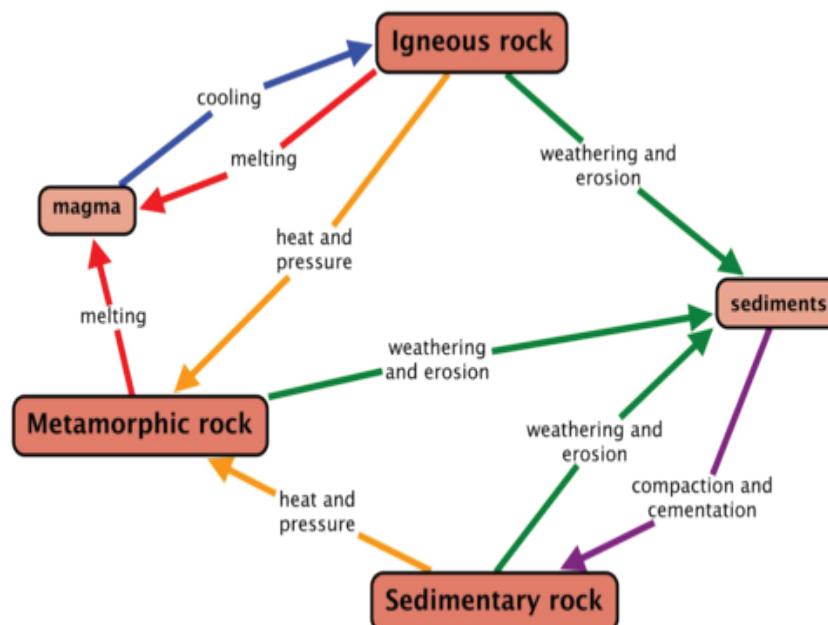


Figure 5.1: The Rock cycle

Activity 1

1. Explain the processes that transform rocks from one type to another
2. Copy the figure in your notebook.

Importance of rocks

Since the Stone Age period, human beings have been using rocks in their day-to-day life. If you look around your village or town, you will realise that people in your area still use rocks in several ways and for several purposes. Great majority of implements you use at home are made from rock minerals such as iron ore, copper, silver and aluminium. To understand this in great detail, do Activity 2.

Activity 2

Look at Figure 5.2 below and the following tasks:

1. Identify the use of rocks shown in each picture.
2. For each of the uses identified in (1) above, explain how it is related to rocks.
3. For each use, suggest the rock that is used to make the item. Give reasons for your answer.



Figure 5.2: Uses of rocks in our lives

Summary

In this lesson, you should have learnt that

- The rock cycle shows the relationship between the different rock types and processes of formation
- Rocks provide raw materials for industrial development, soil formation, tourism, research and study purposes in East Africa.

Follow up Activity

1. Carry our textbook or Internet research about the importance of rocks.
2. Distinguish between igneous rocks and sedimentary rocks.
3. Describe the formation of sedimentary rocks and igneous rocks in Africa.
4. Examine the role of rocks in landform formation in East Africa.

References

To understand this topic in greater detail, read about it in the following books:

1. Colin Buckle (1988), *Landforms in Africa*
2. Bunnet R.B. (1999), *General Geography in Diagrams*
3. Johnson Watson (1992), *Physical Geography for Secondary Schools*
4. Bunnet R.B. (1999), *Physical Geography in Diagrams for Africa*
5. David Waugh (2002), *Geography: An Integrated Approach*
6. Monkhouse F. J. (1971), *Principles of Physical Geography*

Term 2

TOPIC: WEATHERING AND SLOPE DEVELOPMENT

LESSON 6: MEANING AND TYPES OF WEATHERING

Learning Outcomes

By the end of this lesson, you should be able to:

- define weathering.
- identify types of weathering in the field.
- explain processes of weathering.
- explain factors influencing weathering.
- describe formation of landforms due to weathering.
- explain the economic importance of weathering.

Materials you need:

- notebook, pen, pencil
- textbooks, ICT tools

Introduction

In topic 1, you learnt about the processes that wear away the earth's surface. Do you still remember them? What name do we use to collectively refer to those processes? The first process in wearing away the rocks of the earth is weathering, because it provides the materials for other processes such as erosion and mass wasting. In this lesson, you are going to learn about the interaction of rocks with weather elements and living things.

What is weathering?

Activity 1

1. Take a walk around your home area and look for rocks that are exposed.
2. Carefully look at the surface of these rocks.
3. Is it rough or smooth? How about the colour and the size; is it soft or hard?

You have realised that rocks on the earth's surface are continuously being worn away, either physically or chemically. This happens when they are exposed to elements of weather or the activities of living organisms. The breaking or decomposition of rocks into smaller fragments "in-situ", i.e. in the places where they occur, is called weathering. This means that rocks are broken down into small fragments in one place with no movement involved.

Types and Processes of Weathering

Activity 2

In O' level, you learnt about the three types of weathering, namely,

- Physical or mechanical weathering
- Chemical weathering
- Biological weathering.

1. In your notebook, describe each type of weathering named above.
2. Copy the table below and list down the processes by which rocks are broken down by each type of weathering.

Physical weathering	Chemical weathering

3. Explain each process you have identified under each type of weathering.
4. Giving reasons for your answer, suggest areas in East Africa where each type of weathering in the table is common.

Factors Influencing Weathering

Activity 3

Factors influencing weathering exist in the physical environment. Study the photograph below and do the tasks that follow.



Figure 6.1: Tree roots breaking up rocks

1. Identify the type of weathering taking place in the photograph.
2. Identify and explain the factors influencing weathering in Figure 4.1.
3. Basing on your O' level knowledge, explain other factors influencing weathering that are not seen in the photograph.

Landforms Due to Weathering

There are various landforms formed due to weathering. They depend majorly on the nature of the parent rock and the climate of the area.

Activity 4

1. Study Figure 6.2 showing different types of inselbergs.
2. Have you ever seen some of these features in your home district or in the area where you go to school?
3. Suggest the processes of weathering which could have led to the formation of these inselbergs.
4. Explain how these inselbergs might affect human activities in areas where they occur.
5. In your notebook, draw sketches of the pictures shown in Figure 4.2 to illustrate the types of inselbergs.

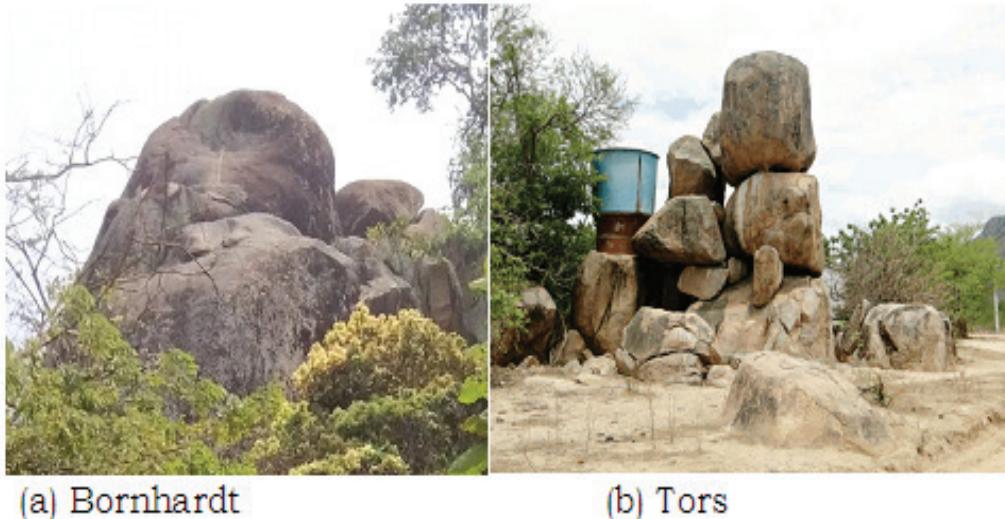


Figure 6.2: Types of Inselbergs

In areas with limestone and chalk rocks, weathering has led to the formation of various features. The presence of limestone rocks rich in calcium carbonate and heavy rainfall encourages chemical weathering. The major processes of weathering in limestone areas are **carbonation** and **solution**. These processes, together with collapse and removal of materials by running water and rivers, have led to formation of several features. To help you understand these features, look at **Figure 6.3**.

Activity 5

Study Figure 6.3 and do the tasks that follow.



Figure 6.3: Effects of weathering in limestone areas

1. Identify the features shown in Figure 6.3
 2. Carry out Internet or textbook research and find out how those features were formed.
 3. Find out where some of these features are found in East Africa.
 4. Draw the illustrations in your notebook.

5. Explain the formation of other landforms due to weathering which are not shown in **Figure 6.3**.

Importance of Weathering

Activity 6

Study Figure 6.4 showing a limestone landscape and do the tasks that follow.

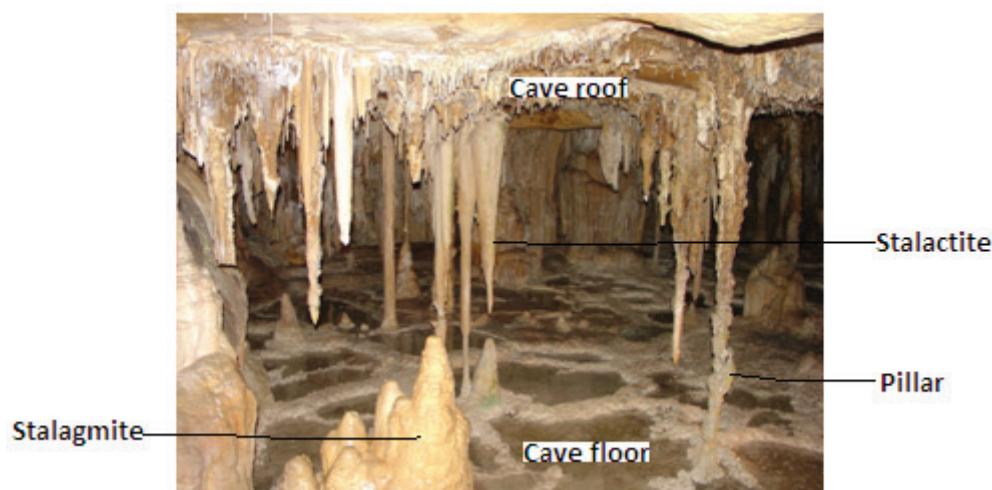


Figure 6.4: Limestone cave and associated features

- Draw a landscape of the photograph and on it mark and name the features formed due to weathering.
- Explain how each of the features you have named was formed.
- Suggest possible economic activities that can be carried out in the area where the photograph was taken.
- In what other ways is weathering important in East Africa?

Summary

In this lesson, you have learnt

- that weathering is the disintegration or decomposition of rocks in-situ.
- Types of weathering include physical, chemical and biological weathering
- Processes of weathering
 - Physical weathering (exfoliation, block disintegration, granular disintegration, frost shattering, pressure release)
 - Chemical weathering (solution, oxidation, reduction, carbonation, hydrolysis, hydration)

- Factors influencing weathering include climate, relief, vegetation, drainage, nature of parent rock, living organisms, time, and human activities.
- Landforms due to weathering include; exfoliation domes, talus or screes, inselbergs, duricrusts and karst landforms
- Economic importance of weathering; tourism, raw materials for industries, landscapes for research and study, rocks weather to form soil for agriculture.

Follow up Activity

1. Distinguish between physical and chemical weathering.
2. Describe the formation of landforms due to chemical weathering

References

1. Colin Buckle (1988), *Landforms in Africa*
2. Bunnet R. B. (1999), *General Geography in Diagrams*
3. Johnson Watson (1992), *Physical Geography for Secondary Schools*
4. David Waugh (2002), *Geography: An Integrated Approach*
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