

# **Geography**

For Rwandan Schools

**Senior 4**

**Teacher's Guide**

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# FOREWORD

Dear teacher,

Rwanda Education Board is honoured to present Senior Four geography teacher`s guide which serves as a guide to competence-based teaching and learning to ensure consistency and coherence in the learning of the geography subject. The Rwandan educational philosophy is to ensure that learners achieve full potential at every level of education which will prepare them to be well integrated in society and exploit employment opportunities.

In line with efforts to improve the quality of education, the government of Rwanda emphasizes the importance of aligning teaching and learning materials with the syllabus to facilitate their learning process. Many factors influence what they learn, how well they learn and the competences they acquire. Those factors include the relevance of the specific content, the quality of teachers` pedagogical approaches, the assessment strategies and the instructional materials available. We paid special attention to the activities that facilitate the learning process in which learners can develop ideas and make new discoveries during concrete activities carried out individually or with peers. With the help of the teachers, learners will gain appropriate skills and be able to apply what they have learnt in real life situations. Hence, they will be able to develop certain values and attitudes allowing them to make a difference not only to their own life but also to the nation.

This is in contrast to traditional learning theories which view learning mainly as a process of acquiring knowledge from the more knowledgeable who is mostly the teacher. In competence-based curriculum, learning is considered as a process of active building and developing of knowledge and understanding, skills and values and attitude by the learner where concepts are mainly introduced by an activity, situation or scenario that helps the learner to construct knowledge, develop skills and acquire positive attitudes and values.

In addition, such active learning engages learners in doing things and thinking about the things they are doing and they are encouraged to bring their own real experiences and knowledge into the learning processes. In view of this, your role is to:

- Plan your lessons and prepare appropriate teaching materials.
- Organize group discussions for learners considering the importance of social constructivism suggesting that learning occurs more effectively when the

learner works collaboratively with more knowledgeable and experienced people.

- Engage learners through active learning methods such as inquiry methods, group discussions, research, investigative activities and group and individual work activities.
- Provide supervised opportunities for learners to develop different competences by giving tasks which enhance critical thinking, problem solving, research, creativity and innovation, communication and cooperation.
- Support and facilitate the learning process by valuing learners' contributions in the class activities.
- Guide learners towards the harmonization of their findings.
- Encourage individual, peer and group evaluation of the work done in the classroom and use appropriate competence-based assessment approaches and methods.

To facilitate you in your teaching activities, the content of this teacher's guide is self-explanatory so that you can easily use it. Even though this teacher's guide contains the answers for all activities given in the learner's book, you are requested to work through each question and activity before judging learner's findings.

I wish to sincerely extend my appreciation to REB staff who organized the editing process of this teacher's guide. Special gratitude also goes to lecturers, teachers, illustrators and designers who supported the exercise throughout. Any comment or contribution would be welcome to the improvement of this textbook for the next edition.

**Dr. NDAYAMBAJE Irénée**  
**Director General, REB**

# ACKNOWLEDGEMENT

I wish to express my appreciation to all the people who played a major role in editing process of this Geography teacher`s guide for Senior Four. It would not have been successful without their active participation.

Special thanks are given to those who gave their time to read and refine this textbook to meet the needs of competence based curriculum. I owe gratitude to different Universities and schools in Rwanda that allowed their staff to work with REB to edit this book. I therefore, wish to extend my sincere gratitude to lecturers, teachers, illustrators, designers and all other individuals whose efforts in one way or the other contributed to the success of this edition.

Finally, my word of gratitude goes to the Rwanda Education Board staff particularly those from Curriculum, Teaching and Learning Resources Department who were involved in the whole process of editorial work.

**Joan Murungi,  
Head of CTRLD**

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# Introduction

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This Teacher's Guide aims at guiding the teacher on how best he or she can use the Geography Senior 4 Student's Book for Rwandan Secondary Schools.

This Teacher's Guide is divided into two parts. The first part takes the facilitator or the teacher through the professional information that he or she needs to know. This information is used during the teaching and learning process. It is based on the competence based curriculum.

This guide is not a stand-alone textbook. It has to be used hand in hand with the Student's Book. You are advised to plan for the lesson basing on the content under a given unit and the time allocated in the syllabus. It is important to note that the schemes of work have been changed into unit plans and the lesson plan completely changed. These two documents are not related to the previously used formats.

You will also note that the time allocated to each unit is sufficient. The activities included in the Student's Book are also sufficient for the mastery of the required content. It is therefore imperative that as a teacher, you plan well to complete the required content in time. Some of the activities can be given to learners in the form of assignments and research work. This will demand that they can

be done outside the normal allocated classroom time.

Both the Student's Book and this guide have been written basing on competence based principles. This guide is meant to assist you in facilitating the learners to play a greater part in the learning situation. You should guide them to find solutions and answers to the tasks given as you inculcate in them critical thinking and problem solving skills among other competences.

The cardinal purpose of this guide book is to provide fundamental guidance on how you can handle the Senior 4 Geography content basing on the learner centred principles and practices.

The rationale of teaching and learning Geography is to assist the learners to undertake and understand the dynamics of their surroundings, hence being able to use the knowledge of Geography, skills, values and attitudes developed to utilise the environment they live in sustainably. This creates a basis for the occurrence of unified diversity.

The new Geography competence based curriculum advocates for continuity of the content across all levels of the lower and upper secondary. This implies that, the teacher will find a continuation of given units taught in lower classes in

Senior 4 (in the Student's Book) in a much more detailed form. This is due to the need to create a continuous understanding of the geographical aspects of the country. Most of the content in Senior 4 deals with the Human and Economic Geography with specific reference to Rwanda. Much of the work in the Student's Book intends to provide the learners with knowledge, skills, values and attitudes on specific areas so that eventually they understand Geography as a subject and the physical and social environments as the places they live in.

The teacher is therefore required to guide the learners to learn Geography with the aim of making sure that it is reflected in their lives. This is possible when various activities included in the Student's Book are done and the teacher guides the learners to find solutions and answers on their own. This will make the content in the Senior 4 Geography Student's Book functional and relevant in the day to day living of the learners.

The Student's Book for which this guide is written has been written in a way that will enable the learners to develop various competences, skills, values and positive attitudes such as critical thinking, problem solving, communication and cooperation among others. This enables the learners to develop higher order thinking that will empower them to contribute towards the development of their country. This will assist learners to build the capacity to address challenges that for

many years have been burdensome to the society. These challenges refer to environmental destruction and overpopulation.

### **1.1 Background to the Geography syllabus review**

As Rwanda moves towards Universal Secondary Education and 12 years of basic education, it is imperative that those graduating from secondary schools are equipped with competences to ensure that they can be productive after graduation. It is on the basis of this, that a careful review of the secondary school Geography syllabus was carried out to ensure that the key transferable soft skills that employers need are provided to all secondary graduates, academic skills as well as communication and teamwork skills.

The competences taught are influenced by factors that include relevance of the curriculum, the appropriate pedagogical approach by teachers, assessment strategies and the necessary and sufficient instructional materials.

A Geography competence based curriculum guides the development of competences, associated with methodologies and assessment strategies that specify the outcomes which are consistent with personal, community and the labour market needs. The Student's Book is written basing on the syllabus which offers learners the opportunity to apply what they have learned to real life situations and to make a difference



in their own life. This is done with the help of teachers whose role is central to the success of the curriculum delivery. This Senior 4 Geography competence based syllabus, therefore, intends to equip learners with a combination of knowledge, skills, attitudes and values that they must demonstrate during and after each learning process. This enables them to accomplish tasks satisfactorily cognisant of personal characteristics such as motivation, self-confidence and willpower.

## **1.2 Rationale of teaching and learning Geography**

Geography is the study of the earth including all the phenomena which make up the physical and human environment. Geography helps the learners to understand the physical and social environment in order to build unity in diversity.

This teaching syllabus is intended to promote uniformity and continuity of content coverage for advanced level Geography. Geography is one of the disciplines that are concerned with the real world in which the learners live. It is capable of solving problems and developing knowledge, skills, attitudes and values which are relevant to their present and future lives.

The Geography competence based curriculum motivates learners to find out about the real world and to recognise the importance of sustainable development for the future of mankind.

It also enables learners to develop

generic competence skills, literacy and numerical skills to interpret human and physical phenomena, maps, photographs and diagrams.

## **1.3 Broad Geography objectives and competences**

The overall goal of Geography is to give learners the attitudes, knowledge and skills to act in a geographical way. During and at the end of the upper secondary level, learners taking Geography as a subject should be able to:

- Demonstrate a greater understanding of the basic concepts in physical and human geography.
- Categorise different physical geographical phenomena and their impact on sustainable development.
- Appreciate the relationship between physical and human aspects in the world and acquire a commitment to sustainable development.
- Explain the correlation between the physical environment and man's modifications to it.
- Demonstrate an understanding of global sustainable growth, conservation, reconstruction and development of the country in the regional and global context.
- Evaluate accurately the socio economic problems of the world and how to solve them.
- Enable learners to gain a more

concrete understanding of challenges to the development of Rwanda and other countries.

- Demonstrate a range of skills and techniques necessary to carry out geographical research and interpretation of geographical data and information.
- Read and interpret maps and photographs using appropriate geographical techniques.
- Use fieldwork procedures and methods in collecting geographical data.
- Develop a variety of other skills including those of problem solving, critical thinking, communication and co-operation, investigation and how to present their conclusions in the most appropriate way.

#### **1.4 Specific competences and objectives**

At the end of Senior 4, the learner should be able to:

- Explain different physical geographical phenomena and their impact on the sustainable development in Rwanda.
- Explain different problems associated with the physical, human and economic environment of Rwanda and suggest solutions.
- Evaluate the major challenges related to overpopulation and environmental degradation in Rwanda.
- Use appropriate fieldwork techniques to observe, collect, record and analyse geographical data.
- Differentiate among the types of cartographic projections and categories of maps.

#### **1.5 The structure of the subject and format of the examination**

There are two sections of Geography in Upper Secondary which take 3 hours each.

##### **Section I includes:**

- Practical geography: Map reading and photographic interpretation and Fieldwork
- Physical geography of Rwanda and General physical Geography

The topics here include the following in S4:

Topic area	Subtopic area	Unit	Number of periods
<b>Physical Geography and Practical Geography</b>	<b>Fieldwork</b>	Unit 1. Fieldwork techniques	20
	<b>Map work interpretation</b>	Unit 2. Map and Cartographic projections	14
	<b>Landform evolution and Processes</b>	Unit 3. Formation of relief features in Rwanda	28
	<b>Rocks and Minerals</b>	Unit 4. Rocks and minerals in Rwanda	5
	<b>Soils</b>	Unit 5. Soils in Rwanda	8
	<b>Weather and Climate</b>	Unit 6. Climate in Rwanda	10
	<b>Vegetation</b>	Unit 7. Vegetation in Rwanda	8
	<b>Drainage</b>	Unit 8. Drainage in Rwanda	10
<b>Total periods for Practical and Physical geography</b>			103

**Section II includes:**

- Statistics in geography
- Human and economic geography of Rwanda
- Human and economic geography of the world.

The topics here include the following in S4:

Topic area	Subtopic area	Unit	Number of periods
<b>Practical Geography (Statistics)</b>  <b>and</b>  <b>Human and Economic Geography</b>	<b>Population</b>	Unit 9. Population in Rwanda	14
	<b>Settlement and Urbanization</b>	Unit 10. Rural and Urban settlement in Rwanda	26
	<b>Economic activities</b>	Unit 11. Agriculture in Rwanda	28
	<b>Economic activities</b>	Unit 12. Forestry in Rwanda	14
	<b>Economic activities</b>	Unit 13. Fishing in Rwanda	10
	<b>Economic activities</b>	Unit 14. Mining in Rwanda	7
	<b>Economic activities</b>	Unit 15. Power and Energy in Rwanda	12
	<b>Economic activities</b>	Unit 16. Industry in Rwanda	14
	<b>Economic activities</b>	Unit 17. Transport, Communication and Trade in Rwanda.	14
	<b>Economic activities</b>	Unit 18. Environmental Conservation in Rwanda and Tourism	10
<b>Total periods for Practical and Physical geography</b>			149

Topics on human and economic geography cover 61.1% of the content in Senior 4.

Therefore, Senior Four Geography has 252 periods as per the new competence based curriculum.

The content in the Student's Book has been written to suit the level of the learners who are progressing into upper secondary. The content is simplified. You are requested to use the methods that can make the content even simpler.

You should know that the basis of this content was formed in the lower secondary classes. This should help the learners understand the content in Senior 5 and 6 better.

The Geography teacher handling Senior 4 should be aware that the content in this class forms the foundation for further studies in Geography in Senior 5 and 6. Learners should then be properly guided so that all the competences required for the subject are registered. This will be practically possible once all the activities designed for every unit are done by the learners.

You are requested to prepare and use the samples of the professional documents especially the lesson and unit plans provided below to teach. You will notice that there are new changes that have been implemented in the design and format of the unit plan/ scheme of work and the lesson plan. The changes were brought about by the introduction of the competence based

### **1.6 Documents to be used in the teaching and learning of Geography**

For successful teaching and learning of geography to take place, the teacher should have the necessary professional documents which include the following:

1. A copy of the competence based curriculum framework.
2. A copy of the competence based Geography syllabus.
3. Senior Four Geography Student's Book.
4. Senior Four Geography Teacher's Guide.
5. The Geography content map.
6. Geography unit plans.
7. Geography lesson plans.

# Template of a competence - based lesson plan

School name: Maranyundo Girls Academy

Teacher's name: Mrs Kamugisha

Term	Date	Subject	Class	Unit N°	Lesson N°	Duration	Class size
1	05/02/ 2016	Geography	Senior 4	1	3 of 20	40 minutes	30
<b>Type of Special Educational Needs and number of learners</b>							
Learners with speech and communication difficulties:2 Learners with physical disabilities (On a wheelchair):1							
<b>Topic area:</b>							
Practical Geography							
<b>Sub-topic area:</b>							
Fieldwork and statistics							
<b>Unit title</b>							
Fieldwork techniques							
<b>Key unit competence:</b>							
To be able to use appropriate fieldwork techniques to collect, record and analyse geographical data.							
<b>Title of the lesson</b>							
Fieldwork methods							
<b>Instructional objective</b>							
Learners should be able to use the fieldwork study experience to correctly identify the various methods of data collection during fieldwork.							
<b>Plan for this class (location: in / outside)</b>							
Inside the classroom							
<b>Learning materials (for all learners)</b>							
Geographical documents, maps, cameras, radio recorder, photographs, local environment, tape measures, GPS, talking and tactile materials, objects and internet.							
<b>References</b>							
Senior 4 Geography Student's Book							

Timing for each step	Description of teaching and learning activity		Generic competences and cross-cutting issues to be addressed
	Teacher activities	Learner activities	
Introduction 6 mins	<p>-Ask a group of learners to give an overview of the previous lesson.</p> <p>-Weigh the answers given by the learners and give the appropriate lesson title.</p>	<p>-Answering the questions asked by the teacher</p> <p>-Learners take notes</p> <p>-Predict the day's lesson</p>	<p>-Critical thinking and problem solving skills (answering, questioning, manipulating.)</p> <p>-Cooperation (through group work.)</p> <p>-Communication skills including listening; (discussion, brainstorming, class presentations.)</p>
Development of the lesson 30 mins	<p>-Put the learners in pairs based on the requirements of inclusive education and guide them to read the case study on page 3 of the Student's Book.</p> <p>-Make printouts of the case study and give them to the learners to use first before reading from the textbook.</p> <p>-Allow them time to do the activity.</p> <p>-After the activity, allow the members of the class to make brief presentations on their findings in class.</p> <p>-Allow other members to comment on the other presentations.</p> <p>-In groups of three, guide the learners to research on the Internet and other geographical sources on the methods of data collection.</p> <p>-Allow the learners time to make presentations of their findings in a question and answer session.</p> <p><b>Special Education Needs Cases (SEN)</b></p> <p>-Work closely with groups which contain the SEN cases and guide them towards finding answers to the questions on their own.</p>	<p>-Listening</p> <p>-Taking notes</p> <p>- Answering and questioning</p> <p><b>Special Education Needs (SEN)</b></p> <p>-Ask questions in a language that is best understood by the learners with speech and communication difficulties.</p> <p>-Ask their group members for clarification on concepts that they might not have well understood.</p> <p>-The group with the learners with the physical disabilities should be placed at the front of the class.</p>	<p>-Critical thinking and problem solving skills (answering and questioning.)</p> <p>-Cooperation (through group work.)</p> <p>-Communication skills including listening; (discussion, class presentation, debating.)</p> <p>-Environment, climate change and sustainability (through observing the geographical aspects that need to be conserved and protected.)</p>

<p><b>Conclusion</b> 4 mins</p>	<p>-Summarise the lesson on the definition of fieldwork and the methods used in data collection. -Ask the learners to prepare for the next lesson on the new method of data collection.</p>	<p>-Noting down the main points of the lesson. -Cleaning and rearranging the classroom.</p>	<p>-Communication skills. (through questioning and answering.) -Cooperation (through teamwork.)</p>
<p><b>Teacher self-evaluation</b></p>	<p>Basing on the answers provided by the learners during the course of the lesson, the objectives of the lesson were achieved. Therefore, the lesson was well taught.</p>		



## 1.6 Competence-based assessment

This is an assessment process in which a learner is confronted with a complex situation relevant to his or her everyday life and asked to look for a solution by applying the competences that have been learned in class. The competences learnt include knowledge, skills, values and attitudes. Evidence of learning is then collected and used as the basis on which judgments are made concerning the learners' progress against a fixed performance criteria.

### 1.6.1 When to assess

During the teaching and learning of Geography, assessment should be clearly visible in the lesson, unit, term and yearly plans. Competence based assessments in Geography can be as follows:

- **Before learning (diagnostic):** These are administered at the beginning of a new section of work. These questions are meant to find out what the learners already know and can do. They are also meant to check whether the learners are at the same level of understanding.

You can either use:

- (i) Probing questions when a unit or topic is being introduced for the first time. For example; What do you understand by fieldwork?
- (ii) Recall questions about the previous lesson. For example; Do you remember the meaning of climate?

- **During learning (formative or continuous):** These questions are used when learners appear to be having difficulties with some of the work. They are also used to gauge the level of understanding of the learners as they go on with the topic of study. They are presented as continuous assessment tests. The assessment aims at giving learners support, reinforcement and feedback. For example: In pairs, discuss the types of soils that are found in Rwanda.
- **After learning (summative):** This assessment is administered at the end of a section of work or a learning unit. The teacher has to assess after the learning. This is also known as Assessment of Learning to establish and record the overall progress of learners.

For example: **End of unit revision task**

1. With specific examples, describe the distribution of soils in Rwanda.
2. Assess the effects of soil erosion on the socio-economic development of Rwanda.
3. Account for the severe soil erosion in the northern parts of Rwanda.

### 1.6.2 What to assess in Geography

#### (a) *Knowledge and understanding*

This assessment should focus on correctness of answers, coherence of ideas, logical reasoning and

understanding. The teacher should use high order thinking verbs like: identify, explain, indicate, discuss, predict, estimate and judge to test the learners' level of understanding.

#### *(b) Practical skills*

In this assessment, learners should show evidence of the ability to perform and accomplish a given task through aptitude and the use practical tests and evaluation of the final outcome of learning. The assessment should focus on accuracy, quality products, correctness, speed, efficiency, teamwork and coherence.

For example in Unit 4:

#### **Activity 4.3**

*Work in groups of three.*

- (i) Collect clay and mould blocks of bricks from it.
- (ii) Air the bricks for a while and put them in fire where you will monitor the clay.
- (iii) After the bricks turn red, remove them from the fire and let them cool.
- (iv) Observe the clay and compare it with the clay before putting them in fire.
- (v) Record your observations and discuss your findings in class.

#### *(c) Attitude and values*

This assessment should focus on the learner's approach to a situation, appreciation of the task given, impression of a situation, manipulation, reasoning, persistence and tolerance.

#### *(d) Generic competencies*

This assessment tests the judgment capacity. It uses verbs like; arrange, develop, subdivide, point out, design, produce, organise, develop, integrate, apply, discover, survey, and produce depending on the generic competence assessed.

The knowledge, skills, attitudes and generic competences are not assessed independent of each other. It is important to set tasks which give evidence of the key aspects of topic or unit.

The lesson, unit or subject concept is the major focus of study. However, the style of assessment especially through questioning shows the components that are assessed. It is possible that one question can cover the concept, all or part of generic competences, attitude and practical skills.

One must ensure that the verbs used in the formulation of questions do not require memorisation or recall answers only but also test on skills and attitudes as well as generic competences as stated in the syllabus (e.g. arrange, point out, design, draw, organize, tabulate, develop, integrate, apply, discover, survey, produce, examine, discuss, analyse, justify, create, perform, conduct, prepare, differentiate, relate, compare and contrast, suggest, comment on, show and match).

### 1.6.3 Instruments of assessment in Geography

Instruments of assessment are the tools used to establish whether learning has taken place. These can be used before, during and after learning. The teacher can select the appropriate instruments to use in assessment. The following are some of the instruments that can be used in assessment of Geography.

#### (a) *Observation*

This is where the teacher gathers information by watching learners interacting, conversing, working or playing. A teacher can use observation to collect data on behaviours that are difficult to assess by other methods such as attitudes, values, generic competences and intellectual skills. Observation is a very important tool because it can be used before the lesson begins and also throughout the lesson since the teacher has to continue observing each and every activity.

#### (b) *Questioning*

- (i) **Oral questioning:** This is a process which requires a learner to respond verbally to questions.
- (ii) **Class exercises:** These are tasks that are given during the learning and teaching processes.
- (iii) **Quizzes:** These are short and informal questions usually asked during a lesson.
- (iv) **Homework and assignments:** These are tasks that are assigned to learners to be completed outside the lesson. These may

include some reading, writing, problems to be solved, a school project to be built for display, drawing or other skills to be practiced.

A good question item in Geography should be:

- clear, simple and straight forward
- short and precise
- free of bias
- readable
- original
- indicate marks for each question
- follow order of difficulty (Blooms taxonomy)
- contain a variety of verbs

#### (c) *Portfolio*

Learners' portfolios are a collection of evidence, prepared by the learners and evaluated by the teacher to demonstrate mastery, comprehension, application, and synthesis of a given set of concepts.

#### (d) *Project work*

A product which requires a learner to plan, carry-out and make a project presentation which is then assessed by the teacher or by peers.

#### (e) *Interview*

A process where a learner is expected to respond to questions concerning his or her learning.

#### (f) *Role play*

A performance which requires a

learner to act out roles of other people in society in order to learn from their experiences. For example learners may dramatise the banking process showing the roles of various people and documents used.

(g) *Debate:*

A performance which puts one learner or team of learners, against each other so that they logically argue issues.

### 1.6.4 How to plan an assessment in Geography

The process of planning an assessment involves a number of steps depending on the type of assessment. The steps include the following:

- Design tasks, set criteria, design rubrics and prepare appropriate questions beforehand. After this then decide how and when they are to be administered.
- Choose an appropriate method and technique to use either by observation, dialogue and interactions with learners, organising practical investigations, presentations and discussions, oral questioning or written quizzes, exercises and tests.
- Make provision for the learners' roles in self-assessment and peer assessment.
- Develop assessment schemes for written work and products such as artworks, case studies, reports or project work presentations.

### 1.6.5 How to develop tasks in Geography

Use observable action verbs consistent with the level of learning expected. Consider all the low, medium and higher order thinking skills and competencies.

Examples of verbs used in setting tasks and criteria include the following:

- (a) **Low order** (knowledge and understanding): define, name, list, identify, label, match and outline. For example: – Name the elements of a good map.  
– Outline the factors that influence rainfall formation.
- (b) **Medium order**: explain, describe, examine, classify, express, summarise, compute, relate, show, solve and use. For example: – Using specific examples, examine the influence of rainfall distribution and availability on the economic development of the country.
- (c) **Higher order**: compare, analyse, illustrate, differentiate, compose, construct, design, formulate, evaluate, justify, and interpret. For example:
  - Differentiate between tropical cyclones and local winds.
  - Analyse the effects of a high population on the social and the physical environment.
  - Design a project that will assist in solving an environmental degradation problem in your school.

## 1.7 Developing competences

A competence is a combination of knowledge, skills, attitude and values that a learner must demonstrate during and after each level of the learning process. Competencies enable the learners to accomplish tasks satisfactorily.

**Basic competencies:** These are addressed in the stated broad subject competences and in the objectives highlighted on a yearly basis as well as in the units of learning.

**Generic competencies:** These are basic competences that must be emphasised and reflected in the learning process. Teachers should ensure that learners are exposed to tasks that help the learners acquire the skills for example entrepreneurship. They are briefly described below.

### 1.7.1 Generic competencies

#### **(a) Critical and problem solving skills:**

The acquisition of such skills will help learners to think imaginatively, innovatively and broadly to evaluate and find solutions to problems encountered in their surrounding and everyday life. For example, Activity 3.24 in Unit 3.

#### **(b) Creativity and innovation:**

The acquisition of such skills will help learners to take initiative and use their imagination beyond the knowledge provided in the classroom to generate new ideas and construct new concepts. For example Activity 3.22 in Unit 3

enables individual learners to develop their creativity and innovation.

#### **(c) Research:**

This will help learners to find answers to questions based on existing information and concepts. Learners can then be able to explain phenomena from the information that they have gathered. For example, Activity 3.6 in Unit 3.

#### **(d) Communication skills:**

All teachers will ensure the proper use of language in the process of learning. The teachers should communicate clearly and confidently and convey ideas effectively through both spoken and written language. They should apply appropriate language and relevant vocabulary when teaching. For example, there are written passages in the Student's Book that are meant to assist in the development of communication skills such as reading, listening and giving feedback. The teacher is encouraged to engage the learners to tell their own stories in the proper and official language. For example the case study on page 3 of the Senior 4 Geography Student's Book, is meant to test for comprehension of concepts learnt in the unit.

#### **(e) Cooperation, inter personal management and life skills**

This will help the learner to cooperate as a team member in whatever task that he or she has been assigned. Learners will also practice positive ethical and

moral values while respecting rights, feelings and views of others. They will perform practical activities related to environmental conservation and protection and respond creatively to a variety of challenges encountered in life.

**(f) Lifelong learning**

The acquisition of this skill will help learners to update their knowledge and skills with minimum external support. The learners will be able to cope with the evolution of knowledge advances for personal fulfillment in areas that are relevant to their own improvement and development.

Competences are acquired over time through the cumulative effect of a competence approach to learning. It should be noted that competences are rarely developed in isolation. They are interconnected and developed simultaneously.

Developing all competences in Geography requires teachers to adopt approaches that encourage and enable learners to think critically, to carry out research, to solve problems, to be creative and innovative, to communicate and to cooperate. It requires setting learning activities that will develop knowledge, skills and values as well as generic competencies by adopting approaches that encourage and enable learners to engage in active learning.

**1.7.2 The role of teachers in developing competences in Geography**

Teachers are advised not to teach the way they were taught. They must embrace the new approaches with the aim of developing competences in the learners. This requires them to shift from teacher-centred to learner-centred methods of teaching. The following are important points to consider while implementing the competence-based curriculum:

- From the syllabus units, the teacher identifies different competences to be developed by the learners which are fostered by engaging learners through inquiry methods, group discussions, research, investigative activities and group and individual work and activities.
- The teacher focuses on observation of evidence on what learners can do and then identifies any difficulties encountered by them so that appropriate strategies can be developed for those with special needs (slow learners, learners with disabilities, talented and gifted learners).
- The teacher should take into account different cross-cutting issues and integrate them in the learning activities where applicable. In this case, in Geography environment and sustainability is closely related to this subject.

- The teacher should encourage individual, peer and group evaluation of the work done in the classroom. The teacher must also use appropriate competence-based assessment approaches and methods.
  - The teacher is a facilitator and a guide in the learning process. He or she must provide supervised opportunities for learners to develop different competences by giving tasks which enhance critical thinking, problem solving, research, creativity and innovation, communication and cooperation.
  - The teacher is an advisor and provides guidance and counselling for learners. The teacher supports and comforts learners by valuing their contributions in the class activities.
  - The teacher acts as a parent and has to ensure discipline, follow up learners' behaviour, and communicate with parents about the learners' performance at school.
- Learners are active participants and take some responsibility for their own learning.
  - Learners develop knowledge and skills in active ways.
  - Learners carry out research and investigation, consulting print and online documents as well as resourceful people and present their findings in class.
  - During the assigned tasks, learners ensure the effective contribution of each group member, through clear explanations and arguments, critical thinking, responsibility and confidence in public speaking.

### Note

The teacher should ensure that during the teaching and learning process, learners communicate and share relevant information with other learners through presentations, discussions, group work and other learner centred activities (role play, case studies, project work, research and investigation).

**1.7.3 Strategies to develop the competence according to the domains of learning in Geography**

<b>Domain of learning</b>	<b>What teachers can do</b>	<b>Examples of learning activities</b>
<b>Psychomotor domain</b>	<ul style="list-style-type: none"> <li>- Allow the learner to practice for a while and then ask for a demonstration of the skill.</li> <li>- Set up models or create a simulation exercise in the practical school garden or geographical demonstration garden where learners can have repeated practice of skills with peers under the teacher’s supervision.</li> <li>- Arrange for sufficient practical experiences requiring skill performance under direct supervision.</li> <li>- Create a valid and reliable assessment tool for use in determining competence in skill demonstration.</li> </ul>	<ul style="list-style-type: none"> <li>- Observe a skill and attempt to repeat it or see a finished geographical project and attempt to replicate it (imitate) such as an environmental conservation club in another school.</li> <li>- Produce the product or the project by following general instructions rather than observation (manipulate).</li> <li>- Performing individual or group practical work to demonstrate particular skills under direct supervision of the teacher (manipulate).</li> <li>- Making models or designs related to the broad competence or specific learning outcomes with accuracy (precision).</li> <li>- Make accurate observations and draw appropriate conclusions from practical demonstrations of a task by a teacher or fellow learners (manipulating with precision).</li> <li>- Studying situations through field visits and case studies.</li> </ul>



<b>Cognitive domain</b>	<ul style="list-style-type: none"> <li>- Develop case studies requiring discovery or problem-based learning to determine the most appropriate evidence based example.</li> <li>- Structure debates that require the learner to provide reasons for their responses.</li> <li>- Avoid the temptation to answer every learner's question, especially when the learner knows or should know the answer.</li> <li>- Set self-study modules with suggested learning activities that the learners can complete on their own prior to interaction with fellow learners and teachers.</li> <li>- Provide ample time for discussion and clarification of concepts to be learned.</li> <li>- Help learners to use their own knowledge and ideas to find possible solutions to situations.</li> <li>- Guide learners to discover how to proceed or act through higher order questioning (Socratic questioning).</li> </ul>	<ul style="list-style-type: none"> <li>- Self-directed reading and completion of suggested activities that will add to learners' knowledge and experience base.</li> <li>- Active participation in learning and taking responsibility for their own learning.</li> <li>- Discovering the best solution to a given need or problem in both theoretical and practical work.</li> <li>- Retrieving and retaining knowledge and applying it in practice.</li> <li>- Learning activities structured for groups of learners working together, self-directed using the World Wide Web or Internet for resources related to topics being learned.</li> <li>- Preparing for discussions and debates.</li> </ul>
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<b>Affective domain (Attitudes and values)</b>	<ul style="list-style-type: none"> <li>- Create an environment for learners to do exercises on positive and negative personal and peer values.</li> <li>- Provide a framework for a written analysis of attitudes, values and behaviour .</li> <li>- Structure opportunities for role play requiring recognition of differing values and behaviour.</li> <li>- Join with learners groups to discuss different values and beliefs especially those related to learning styles and interpersonal relationships.</li> </ul>	<ul style="list-style-type: none"> <li>- Respond willingly and positively when asked or directed to do something.</li> <li>- Comply with given expectations by attending or reacting to stimuli in an agreeable manner.</li> <li>- Display behaviour consistent with attitudes and behaviour that is acceptable in different situations.</li> <li>- Listen to others and pay attention to any guidance and advice given by mentors.</li> <li>- Reflect on how personal values promote or inhibit their ability to learn better and to fit in society.</li> </ul>
<b>Affective domain (Attitudes and values)</b>	<ul style="list-style-type: none"> <li>- Create a valid and reliable assessment tool for use in determining positive attitude demonstration.</li> </ul>	<ul style="list-style-type: none"> <li>- Identifying role models in the school system and in the community and listing the qualities they admire.</li> </ul>

#### **1.7.4 Techniques of developing competences in Geography**

The teacher can use the following techniques while teaching Geography that support the development of competences:

Techniques/ Strategies	Description
<b>Roundtable</b>	<p>This is a form of cooperative learning. A question is posed by the teacher to groups of learners. Each person in the group writes one answer on a paper and passes it to the next team member. The group looks at each answer and decides which one to present to the class. Each group shares or presents their answer to the entire class. The suggestions are discussed by the class and conclusions drawn.</p>

<p><b>Outdoor activities and field visits</b></p>	<p>In field visits, learners go outside the classroom to observe specific geographical aspects or phenomena or to hear information from experts.</p> <p>Before the visit, the teacher and learners do the following:</p> <ul style="list-style-type: none"> <li>- select the topic of study</li> <li>- agree on aims and objectives</li> <li>- gather relevant information prior to the visit</li> <li>- brainstorm on key questions and share responsibilities</li> <li>- discuss materials needed and other logistical issues</li> <li>- discuss and agree on accepted behaviour during the visit.</li> </ul> <p>After the visit:</p> <ul style="list-style-type: none"> <li>- de-brief and discussion of what was learned and observed</li> <li>- evaluation of all aspects of the visit reports and presentations prepared by learners.</li> </ul>
<p><b>Project work</b></p>	<p>Learners in groups or individually, are engaged in a self-directed work for an extended period of time. This is usually meant to investigate and respond to a complex question, problem or challenge. The work is presented to classmates and other people beyond the school. Projects are based on real-world problems that capture the learners' interest. This technique develops higher order thinking as the learners acquire and apply new knowledge in a problem-solving context.</p> <p>The teacher plays the role of facilitator by:</p> <ul style="list-style-type: none"> <li>- working with learners to frame worthwhile questions</li> <li>- setting relevant and meaningful tasks</li> <li>- availing the resources needed</li> <li>- coaching both knowledge and skills development assessing carefully what learners produced based on defined criteria</li> </ul>

<b>Group work</b>	<p>This is a form of peer, cooperative or collaborative learning that values learner to learner interaction. It is mutually beneficial and involves the sharing of knowledge, ideas and experiences between learners. It offers learners the opportunity to learn from each other.</p> <p>To be effective, teams should be heterogeneous in terms of ability levels, made of 3-4 learners in most tasks. Team members are assigned specific roles which are rotated. For elaborated work, assessment should be two-fold; based on both the collective and individual work.</p>
<b>Role play</b>	<p>Role play is a special kind of case study in which there is an explicit situation established with learners playing specific roles. The case study differs from the role play because in the case study, learners read about situations and characters. In the role play, they find themselves what to say, how to play and the materials to use. For example, acting as a REMA officer who is faced with challenges of population encroachment on the buffer zones of Nyungwe National Park.</p>
<b>Case study</b>	<p>Case study as a learning technique is a story that is either based on real events or from a construction of events which could take place. It involves issues or conflicts which need to be resolved. The information contained in a case study can be complex or simple.</p>
<b>Case study</b>	<p>The teacher presents a problem situation and indicates how to proceed.</p>
<b>Brainstorming</b>	<p>This is a technique used for creative exploration of options and solutions in an environment free of criticism. It encourages creativity and a large number of ideas.</p> <p>Among ground rules there are: active participation by all members; no discussions, criticisms, compliments or other comments during the brainstorming stage. The teacher starts by reviewing the rules, sets a time limit; states and explains the question; collects and displays ideas; eliminates duplications and guides learners to draw a conclusion.</p>

<b>A learning centre/corner</b>	<p>This is a space set aside in the classroom that allows easy access to a variety of learning materials in an interesting and productive manner. Learners can work by themselves or with others in self- directed activities on content related to the curriculum or on different content that is related to the subject.</p> <p>These centres allow learners to deepen their understanding of subjects, apply their learning in a stimulating learning environment and engage in meaningful discoveries that match their individual interests. They provide learners with hands-on experiences that they can pursue at their own pace and level of curiosity.</p>
<b>Games/play</b>	<p>Games are used to help learners to learn faster and better and in enjoyable manner. Games/plays help to create a classroom experience that actively engages learners. They develop communication and other important skills such as social skills, critical thinking, problem-solving, numeracy and literacy skills in different subjects.</p>
<b>Research work</b>	<p>Each learner or group of learners is given a research topic. They have to gather information or ask experienced people and later present the results in a class discussion.</p>
<b>Practical work</b>	<p>Individually or in teams, learners are assigned practical tasks. To be effective, a task needs; a clear purpose with strong links and relevance to the curriculum; quality materials; learners' engagement; time for preparation and carrying out the work and support from the teacher or other experts. Such activities encourage deeper understanding of phenomena and developing skills such as observation, practical work, planning and reporting.</p>

## 1.8 Resources

Learning/teaching materials/resources refer to a variety of educational materials that teachers and learners use in the classroom to support specific learning objectives. The learner-centred approach in the Geography syllabus delivery emphasises the need to use a variety of teaching and learning resources including those improvised or

collected by the teacher and the learners from the surrounding environment.

### 1.8.1 Identifying resources

Before planning and delivering a lesson, resources should be identified at school or in the surrounding environment according to the lesson. Examples of resources a teacher can use in the teaching/learning of Geography may include the following:

- Library: textbooks, dictionaries, reading books, reference books, newspapers, maps, atlases, charts and globes.
- ICT equipment (laptop and desktop computers, projectors, mobile devices, Interactive White Board (IWB), television, radios, smart boards, smart phones, mobile phones, CD-ROMs, flash disks, digital cameras etc.)
- Digital (electronic) materials: audio, video, interactive, simulators, animations, digital images, Internet content, software, Powerful Presentation Techniques (PPT), DOC, etc.
- Real objects: fruits, plants, sticks, rocks, clothing, food packaging, and plastic bottles etc.
- Materials from the environment such as soil, vegetables, animals, home/domestic objects.
- Human resources: learners and people in the local community who include parents, local leaders, role models and workers within the school.
- Physical, human and economic wall maps of Rwanda, the different continents and the world .
- Photographs (ground, aerial and oblique).
- Models from the local environment such as rocks, minerals, soils samples, etc.
- Ordinary survey maps (O.S.M).
- Measuring instruments: rain gauge, thermometer, barometer, hygrometer, wind vane, anemometer, compass, clinometers and GPS.
- Stationery: manilla papers, flip charts, etc.
- Adaptive materials: tactile and talking materials like talking globes, tactile maps, tactile illustrations and braille equipment and materials.
- Prepared stories about geographical phenomena such as companies and farmers that have been successful – case studies.
- Prepared content for learners to role play.

From the available resources, a teacher has to select materials considered to be the best and most suitable for the particular learning activity and reject what is inappropriate or unsuitable.

### **1.8.2 Opportunities for sharing resources**

- Sharing among teachers within a school and across schools.
- Borrowing or consulting from other institutions and the community.
- Inviting guest speakers, parents or anyone with expertise.
- Conducting site visits to different locations or tourist attractions within the community.
- Sharing resources using ICT (soft copies, Internet, telephone etc.)

### Note:

Teachers are encouraged to be creative and innovative and to use the available resources in their environment, be it in the classroom, at school or within the community. Geography can be best learnt from the environment or using the locally available resources so that learners see it functional and relevant in their lives. Between a teacher who uses a globe and the one who uses a pumpkin to demonstrate the shape of the Earth, the one who uses a pumpkin makes Geography real and connects it with the life of learners.

## 1.9 Inclusiveness in the class

### 1.9.1 Inclusive education

Inclusion is based on the right of all learners learning together for a quality and equitable education that meets their basic learning needs and understands the diversity of backgrounds and abilities. All learners have the right to access education regardless of their different impairments. This implies that all citizens benefit the same menu of education programs.

It is therefore, very important for the teacher of Geography to have an inclusive Geography class and design activities, revision tasks and exercises that will allow all the learners to participate and benefit equally.

### 1.9.2 Special educational needs

Special educational need(s) refers to the needs of learners who have learning

difficulties or disabilities which make it harder for children to learn in the same way as their peers of the same age.

Categories of special educational needs that are likely to be met in a Geography class include the following:

#### (a) *Visual impairment (low vision, totally blind):*

These learners are unable to see the blackboard and cannot move around the school environment without mobility and orientation skills. They also cannot read print textbooks and cannot write in notebooks.

#### (b) *Hearing impairment:*

These learners cannot hear completely or can only hear only when one shouts.

#### (c) *Physical impairment (wheel chair users, crutch users)*

These are learners who are unable to move around the school. They may have difficulties getting to school; may not easily participate in games with other children and may not access school infrastructure such as playgrounds, toilets, classrooms and classroom furniture.

#### (d) *Intellectual impairment (slow learners, autism, and dyslexia)*

These learners may not be able to understand the teacher; may not be able to socialise with other children; may not be able to access the curriculum easily and may need more time to accomplish class work.

### **(e) Gifted and talented learners**

These learners have higher abstract thinking. They are often bored in class after finishing tasks quickly. They may not achieve their full potential as the teacher doesn't cater for their needs. They may not be understood by the teacher and may have a specific talent or could be gifted in a specific area.

The teacher may use any of the following strategies to cater for the students with special needs during the teaching and learning of Geography.

- Use cooperative learning for instance through group work and discussions.
- Mix students with special needs with the rest so that they may be helped.
- Tape-record portions that students can listen (with earphones) to an oral presentation of the necessary materials.
- Provide written and pictorial directions to those with hearing problems.
- Develop special programs and follow up to keep track of their learning.
- Carry out frequent progress checks to students with special needs.
- Use concrete objects such as models, diagrams and samples to those with hearing problems so as to demonstrate what you are saying by using items you can touch.

- For gifted and talented learners, have them assist other learners or give them activities that are more complex than what the rest do.
- Facing the learner while you speak might help learners with hearing impairment.
- Use large writings on the blackboard and on visual aids.
- Try to understand the specific talents of the learners and develop them.
- Break the task down into small steps or learning objectives. Ensure learners start with what they can do and then move on to a new harder task.
- Give the learners lots of practice and time. This helps to ensure the learners have mastered a skill.

### **1.10 Cross-cutting issues**

The competence-based curriculum reflects the significance of connections between different subject areas, integrating them across years and cycles. Cross-cutting issues are integrated across learning areas appropriately. They are all important for learners to learn about but they are not confined to one subject.

Cross-cutting issues are not stand-alone subjects. They are issues which cut across the entire curriculum. There are eight (8) cross-cutting issues:

- **Peace and values education:** This cross cutting issue shows how education can simultaneously cultivate values and attitudes which will encourage individual



and social action for building more peaceful families, communities, societies, nations and ultimately a more peaceful world.

- **Genocide studies:** This issue helps learners to comprehend the role of every individual in ensuring that the genocide never happens again.
- **Gender education:** This issue teaches learners that the sex of a person is biologically determined, while the gender of a person is learned. Gender is socially constructed, reinforced, maintained and reconstructed over time through social and cultural practices.
- **Inclusive education:** This issue handles learning needs that are to be considered and accommodated when teaching in order to meet the learning expectations of each learner.
- **Comprehensive sexuality education:** This issue equips children, adolescents and young people with the knowledge, skills and values in a culturally and gender sensitive manner to enable them to make responsible choices about their sexual and social relationships. It explains and clarifies feelings, values and attitudes as well as promotes and sustains risk-reducing behaviour.
- **Financial education:** This issue builds a strong foundation for responsible and wise financial management in the learners. It

does this by developing good planning and saving habits to prepare the learners for financial responsibilities later in life.

- **Environment, climate change and sustainability:** It is important for the learners to realise that humans enjoy a unique position in nature due to their exceptional ability to influence and mould the environment. Learners should be taught the importance of the environment and how to utilise it in a sustainable manner.
- **Standardisation and culture:** This prepares the learners for future responsibilities as adults to contribute to important issues such as improvements in health, economic growth, industrialisation, trade and general welfare of the country.

Some of the cross-cutting issues appear in Geography as stand-alone units while others have been integrated into other units. It is therefore the role of the teacher to include them in his or her teaching. In Senior 4, the Student's Book is written in a way that the cross cutting issues are integrated in the content and activities. This curriculum is also aimed at developing the learners' critical thinking minds that will enable them to participate in the development of their country and to face major challenges like environmental degradation and overpopulation.

# PART 2: Unit Planning

## Topic area: Practical Geography

### Sub topic area: Fieldwork and statistics

UNIT

# 1

## Fieldwork techniques

**Key unit competence:** By the end of this unit, the learners should be able to use appropriate fieldwork techniques to collect, record and analyse geographical data.

### Unit objectives

*In this unit, the learner should be able to:*

1. Define the concept of fieldwork.
2. Identify the various methods used in data collection during fieldwork.
3. State the advantages and disadvantages of each method of fieldwork.
4. State the work procedures from the first day to the last day of fieldwork.

## Content map

Unit 1: Fieldwork techniques	
Number of periods	20
Introduction	Asking the learners to define fieldwork and name some of the activities undertaken during fieldwork.
Classroom organisation	Whole class orientation followed by group work , pair work and individual work.
Equipment required	Internet, paper, pens, projector, laptop, pictures.
Activities	<ul style="list-style-type: none"> <li>• Defining terminologies about fieldwork.</li> <li>• Interpreting photographs.</li> <li>• Discussions on fieldwork techniques.</li> <li>• Class presentations on group findings.</li> <li>• Field study.</li> <li>• Drawing relevant conclusions from fieldwork studies.</li> </ul>
Competences practiced	<ul style="list-style-type: none"> <li>• Teamwork</li> <li>• Presentation of findings</li> <li>• Interpretation</li> <li>• Communication</li> <li>• Literacy</li> </ul>
Language	<ul style="list-style-type: none"> <li>• Discussions in groups, written assignments and presentations of class findings</li> </ul>
Vocabulary acquisition	<ul style="list-style-type: none"> <li>• Terminologies related to fieldwork</li> </ul>

Study skills	<ul style="list-style-type: none"> <li>• Writing notes</li> <li>• Organising ideas for presentation</li> <li>• Explaining the concept of fieldwork</li> <li>• Analysing fieldwork techniques</li> </ul>
Revision	<ul style="list-style-type: none"> <li>• Revision exercises provided.</li> </ul>
Assessment	<ul style="list-style-type: none"> <li>• Ability to work in groups and communicate ideas with others</li> <li>• Ability to correctly answer the revision exercises and tasks provided</li> </ul>
Learning outcomes	<ul style="list-style-type: none"> <li>• To define fieldwork</li> <li>• To identify fieldwork methods</li> <li>• To state the advantages and disadvantages of each fieldwork method</li> <li>• To outline the fieldwork procedures</li> <li>• To know how to formulate and present fieldwork findings</li> </ul>

## Notes for the teacher

Clearly define the concept of fieldwork. Emphasise that it involves learning that takes place outside the classroom. Distinguish between the types of fieldwork namely field excursion, field research and field study. Guide the students to clearly distinguish between the methods of data collection and methods of recording data. For each method of data collection, the advantages and disadvantages should be clearly outlined. The learners should be guided on the steps that are followed while undertaking fieldwork. Emphasis should be laid on the importance of each stage.

You should organise for a field study so that the learners can have the opportunity to put into practice the concepts and fieldwork procedures. Guide the learners on how to write a report based on field work and to make conclusions.

### Teaching steps

- Divide the learners into mixed ability groups of three and ask them to do Activity 1.1 in the Student’s Book. This is an activity that introduces the learners to fieldwork.
- Listen to the learners’ answers and discussions as you affirm and correct them where necessary.
- Briefly introduce fieldwork as part of practical Geography. Refer to the text of the Student’s Book as you define and explain the importance of fieldwork.
- Provide the learners with lesson notes on the same.
- Ask the learners to be in pairs preferably a boy and a girl and ask them to read the case study of the Student’s Book. They should then answer the questions asked.
- Give them time to present their findings.
- Introduce the fieldwork methods by asking the learners to do Activity 1.2 in the Student’s Book. The learners should be grouped into three as they answer the questions asked.
- Allow them time to present their findings in class.
- Briefly give an introduction to fieldwork methods by referring to the Student’s Book. Discuss the two main types of fieldwork methods.
- Ask the learners to divide themselves up in pairs and do Activity 1.3 in the Student’s Book. This is an outdoor activity that will require much more time.
- Allow them time to do the activity and to present their findings.
- Discuss the observation method and analyse its advantages and disadvantages. As you discuss make reference to the text in the Student’s Book.
- Give the learners lesson notes on the same.

- Introduce the questionnaire method by asking the learners to individually do Activity 1.4 in the Student Book. They should correctly fill in the sample questionnaire provided.
- Discuss the questionnaire method and its use by referring to the notes in the Student’s Book.
- Emphasise on the types of questionnaires and the characteristics of a good questionnaire.
- Discuss the advantages and disadvantages of using questionnaires for data collection.
- Give the learners lesson notes and allow for learner participation as you teach.
- Ask the learners to individually do the revision Task 1.1 in the Student’s Book.
- Mark their work and revise with them.
- Introduce the interview method by asking the learners to individually study the case study in the Student’s Book and answer the questions that follow it.
- Discuss the interview method referring in the Student’s Book.
- Refer to Fig 1.1 of the Student’s Book on how to conduct an interview. Study the conditions that favour interviews.
- Discuss the advantages and disadvantages of interviews as outlined in the Student’s Book.
- Ask the learners to pair up and role play the interview session that is outlined in the Student’s Book. This is Activity 1.5.
- Ask the other class members to assess the success of the interview session role played by each pair that will present.
- As a take away assignment, ask the learners in pairs to prepare an interview guide on the topic of their choice.
- Discuss extracting data from records as a method of data collection with its advantages and disadvantages. Emphasise on the types of questionnaires and the characteristics of a good questionnaire.
- Discuss the text in the Student’s Book on extracting data from records and the advantages and disadvantages of extracting data from records.
- Ask the learners to do Activity 1.6 in the Student’s Book as a way of introduction to the sampling method of data collection.
- Discuss sampling and types of sampling.
- Go through the text in the Student’s Book as you discuss the advantages and disadvantages.
- Give the learners lesson notes on the same.
- Introduce the measurement method by asking the learners to divide themselves into groups of three and do Activity 1.7 in the Student’s Book.
- Discuss the measurement method by referring to the text in the Student’s Book.

- Provide them with lesson notes.
- Ask the learners to do Activity 1.8 in the Student’s Book in groups of three. Give them time to discuss and to present their findings in class.
- Divide the learners into mixed ability groups of five. Ask them to do Activity 1.9 in the Student’s Book. This should be a take away assignment. They should present and discuss the findings of each group in the next lesson.
- Assign individual learners Task 1.2 in the Student’s Book. They should do the assignment as homework and present their work for marking.
- Introduce fieldwork procedures by asking the learners to do Activity 1. 10 in of the Student’s Book.
- After the presentation on the fieldwork procedures, discuss the content by referring to the text in the Student’s Book.
- Discuss each step in the procedures outlined one by one. Engage the learners in Activities 1.10 to 1.16 and the case studies in to reinforce the steps involved in the procedures. Some of the activities could be conducted as takeaway assignments.
- Discuss each procedure in detail as you give the learners lesson notes on them.
- The procedures are outlined in the Student’s Book.
- Discuss the stages involved in fieldwork as you refer to the text in the Student’s Book.
- Ask the learners in groups of two to read the case study in the student’s Book and to answer the questions that follow.
- Ask the learners to do Activities 1.17 and 1.18 in groups.
- Discuss the fieldwork types and techniques as outlined in the Student’s Book.
- Guide the leaners in doing Activity 1.20 in groups.
- Discuss the problems affecting the implementation of field as discussed in the Student’s Book.
- Guide the learners in doing Activity 1.20 in the Student’s Book.
- Wrap up the topic by discussing the interesting facts presented in the Did you know? section in the Student’s Book.
- Ask the learners to individually do the End of unit revision task in the Student’s Book as homework that they will present for marking.

### **Diagnostic questions**

1. Differentiate between qualitative and quantitative research methods.
2. Mention and explain 3 data analysis methods that can be used to analyse geographical data collected in the field.
3. In what instances do you think fieldwork is necessary in the learning of Geography?

### Note:

- Give the learners lesson notes to either write during the lesson or during remedial time. This will depend on your convenience.
- Remember to actively include the special education needs learners in all the learning activities. Give them extra attention to ensure that they catch up with the rest of the learners.
- Schedule for remedial lessons to ensure that the slow learners catch up with the work provided.
- Provide extra and more challenging tasks to the bright and talented learners.
- Give emphasis on the need to protect the environment for future use as a cross-cutting issue for more fieldwork studies to be carried out.
- Mark the activities according to how well the learners do them. Some of them might have different outcomes in the different groups or pairs that the learners work in. Remember to check out the specific skill and attitude that an activity is required to bring out in the learners.

### Suggested answers to Task 1.1

1. A questionnaire is a set of logically set questions used by the researcher in the field to gather information.

2.
  - When a researcher and intended respondents are far from each other in terms of physical location.
  - When the respondent is too busy and cannot find time for a face-to-face interaction.
  - When the required information is to be attained from high profile respondents who might not be easily available for face-to-face interviews.
  - When the researcher is dealing with a large population.
  - When one of the parties involved in the study is dumb but able to read and write.
3. **Advantages**
  - (i) All the respondents are asked similar questions. This makes it possible for the researcher to compare answers.
  - (ii) It is convenient to the researcher.
  - (iii) The questionnaire when well designed enables the researcher to gather a lot of information since it can be administered to a wide range of the respondents.
  - (iv) The questionnaire method provides the researcher with first-hand information.
  - (v) The method enables the researcher to save time.



- (vi) Accept other correct advantages.
- (v) The method enables the respondents to have ample time to think critically before answering.
- (vi) The method provides the researcher with a chance of storing the primary data contained in the questionnaires.

#### **Disadvantages**

- (i) Some of the respondents have poor handwritings that the researcher cannot read.
  - (ii) Other respondents give answers in an unclear manner that the researcher may fail to extract important information from it.
  - (iii) The method is associated with rigidity and lacks flexibility. The information given can hardly be altered by the researcher without the consent of the respondent.
  - (iv) The researcher may not be able to obtain the needed information in time.
  - (v) The questionnaire method can only be applied to literate people who know how to write and read.
  - (vi) Accept other correct disadvantages.
4. (a) Open-ended questionnaires: These are questionnaires that have questions which do not limit the respondents' answers. The respondent

is free to give as much information as possible.

- (b) Closed ended questionnaires - These are questionnaires that give possible answers that a respondent can choose from.
5. (a) The questions should be short and precise.
- (b) The questions should be non-provocative. They should respect the values of a respondent.
  - (c) The questions used in a questionnaire should not be subjective or show any bias.
  - (d) All the questions used in the questionnaire should be strictly related to the topic of Study.
  - (e) The questions should be designed using the appropriate language for easy understanding and interpretation by the respondent.
  - (f) The questionnaires should be prepared in the language understood by the respondent.

#### **Suggested answers to Task 1.2**

1. (a) Fieldwork refers to all learning undertakings or activities that are done outside the classroom to gather new information practically. It involves observing, collecting, recording, presenting and interpreting geographical data.

- (b) (i) Observation – The observation method involves seeing and interpreting geographical phenomena in relation to the topic of study. Through observation, the researcher is able to identify and note down the relationship existing between various geographical aspects. This method is best for collecting information on topics such as vegetation, climate, external landforms and relief features, rocks and wildlife. The method gives reliable and accurate data.
- (ii) Sampling – This is a data collection method used when the area of study is wide and involves large population. A representation function is chosen, and the findings are generalised to the entire population.  
(Accept other correct answers)
2. (a) Accept correct answers from the students.  
(b) (i) Accept correct answers.  
(ii) Mark correct answers.

### **Suggested answers to the end of unit revision task**

1. (a) Fieldwork therefore refers to all learning undertakings or activities that are done outside the classroom. It is practical work that is done outside the classroom to gather new information. It involves observing, collecting, recording, presenting and interpreting geographical data.
- (b) (i) Field study – This type entails field teaching. The teacher and the learners get involved in closely examining, describing and analysing a selected environment. The environment shows one or more aspects of geographical phenomena. Specific objectives are set to guide in seeking information. It mostly occurs in open air. Most activities are directed by the teacher who explains what is observed and also directs questions to the learners.

- (ii) Field excursions – This is a short trip usually made within or not far from the school locality. It involves students seeing geographical features around them and receiving lectures from officers in charge of the areas they visit. The objectives are usually general.
- (iii) Fieldwork research – This is a type of fieldwork that involves the search for knowledge through experimenting or testing geographical hypotheses. It is therefore a problem solving oriented study. This study is sometimes referred to as corrective research.
2. (a) Geographical phenomena – Geographical facts, occurrences or circumstances observed or observable within nature.
  - (b) Fieldwork research – This is a type of fieldwork that involves the search for knowledge through experimenting or testing geographical hypotheses. It involves, data collection, study and analysis.
  - (c) Environment – The surroundings in which a person, an animal or a plant lives.
  - (d) Field study – A type of research that involves collecting data in the field. This type of data collection is most often done in natural settings or environments and can be done in a variety of ways for various disciplines
3. Mark correct answers according to the students' descriptions.
  4. (a) Fieldwork is a type of research that involves the search for knowledge through experimenting or testing geographical hypotheses while field study involves guided research where students are guided by the teacher in closely examining, describing and analysing a selected environment for study.
  - (b) Fieldwork research is a type of fieldwork that entails search for knowledge through experimenting or testing geographical hypotheses while a field excursion is a type of research that entails going for a short trip usually made within or not far from the school locality to study geographical phenomena.
  - (c) Observation is a type of data collection method that involves seeing and interpreting geographical phenomena in relation to the topic of study

while extracting data from records is a data collection method where data is collected from information recorded in materials such as books, statistical abstracts, census reports, journals and magazines.

5. a, b and c – Mark correctly written topics of study, formulated objectives and selected methods of data collection.
6. Mark correctly outlined field preparation activities as indicated of the Student's Book.
7. Mark correctly formulated objectives, methods of recording the data collected, the anticipated challenges and instruments.
8. Mark correctly written topics, well formulated objectives and appropriate methods of data collection.
9. a and b, Mark correct descriptions of each of the highlighted methods and their advantages and disadvantages. Make reference to of the Student's Book.

# Topic area: Practical Geography

## Sub topic area: Map work interpretation

UNIT

# 2 Maps and cartographic projections

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**Key unit competence:** By the end of this unit, the learners should be able to differentiate types of cartographic projections and categories of maps.

### Unit objectives

*In this unit, the learner should be able to:*

1. Recall the elements of a good map.
2. Identify different types of maps.
3. Outline the categories of maps.
4. State the different cartographic projections.
5. Recall the grid reference systems (coordinates) on a map.

## Content map

Unit 2: Maps and cartographic projections	
Number of periods	14
Introduction	Asking learners to recall and mention the elements of a good map.
Classroom organisation	Whole class orientation, individual work, pair work and group work.
Equipment required	Topographic map extracts
Activities	<ul style="list-style-type: none"> <li>• Interpreting topographic maps.</li> <li>• Describing how to locate phenomena on topographic maps using four and six figure grid reference.</li> <li>• Identifying the different cartographic projections.</li> </ul>
Competences practiced	<ul style="list-style-type: none"> <li>• Teamwork</li> <li>• Presentation of findings</li> <li>• Interpretation</li> <li>• Communication</li> <li>• Literacy</li> <li>• Numeracy</li> </ul>
Language	<ul style="list-style-type: none"> <li>• Discussion in groups, written assignments and presentations of class findings</li> </ul>
Vocabulary acquisition	<ul style="list-style-type: none"> <li>• Terminologies related to maps and cartographic projections</li> </ul>

Study skills	<ul style="list-style-type: none"> <li>• Writing notes</li> <li>• Locating phenomena on topographic maps using four figure and six figure grid reference systems</li> <li>• Studying the different types of cartographic projections</li> <li>• Revision exercises provided</li> </ul>
Revision	<ul style="list-style-type: none"> <li>• Ability to work in groups and communicate ideas with others</li> <li>• Ability to locate phenomena on topographic maps using four figure and six figure grid reference systems</li> <li>• Ability to identify the different types of cartographic projections on maps</li> <li>• Ability to correctly answer the questions provide in the revision tasks</li> </ul>
Learning outcomes	<ul style="list-style-type: none"> <li>• To define maps</li> <li>• To identify elements of a good map</li> <li>• To identify different types of maps</li> <li>• To outline the categories of maps</li> <li>• To state different cartographic projections</li> <li>• To locate phenomena on topographic maps using four figure and six figure grid reference systems</li> </ul>
Learning outcomes	<ul style="list-style-type: none"> <li>• To outline the categories of maps</li> <li>• To state different cartographic projections</li> <li>• To locate phenomena on topographic maps using four figure and six figure grid reference systems</li> </ul>

## Notes for the teacher

The learners should be fully engaged when teaching map work since the topic is practical in nature. You should use both the classroom and the environment outside the class when teaching the topic so that there can be a better understanding of the concepts in map work.

Start the lesson by asking the learners to define a map. Provide the learners with copies of topographical maps and ask them to identify the elements of a good map. Guide them in pointing out the elements of a good map from their responses.

The use of the different types of maps and knowledge on cartographic projections will enable the learners to have a clear understanding of maps. The atlas is useful for learning this topic. It is helpful in the identification of the different types of scales used to draw maps. A field study in the local environment will help the learners to conceptualise the point on scales.

Guide the learners by explaining the meaning of the grid reference systems. Involve them in giving the location of phenomena on topographic maps using the system. Distinguish between the four figure and six figure grid reference systems. Emphasise on accuracy when giving the location of phenomena using the six figure grid reference.

## Teaching steps

- Begin the lesson by reminding the learners about the definition of maps in map work. This is a topic that they learnt in Senior 1. Ask them to find out if they recall the elements of a good map.
- Give them time to give their responses on the definition of a map and the elements of a good map.
- Ask the learners in pairs to attempt Activity 2.1 in the Student's Book. Approve their answers and briefly discuss maps as outlined on the same page of the Student's Book.
- Ask the learners to individually do Activity 2.2 in the Student's Book. Appraise the maps that the learners draw and hang them on the notice board.
- After Activity 2.2, ask the learners to go onto Activity 2.3 and individually answer the questions asked. They should provide the importance of all the five elements of a good map.
- Introduce the learners to the types of maps by asking them to do Activity 2.4 in pairs.
- Briefly discuss the maps.
- Begin the discussion by defining topographic maps. Ask the learners to do Activity 2.5 in pairs. Discuss their characteristics by referring to the text on page 36 of the Student's Book.
- Ask the learners to do Activity 2.6. They should be able to interpret the topographic maps shown and



- to answer the questions that have been asked about the map.
- Discuss thematic maps by asking the learners to do Activity 2.7 in the Student’s Book in pairs. Briefly discuss their characteristics while referring to the text on the same page.
- Discuss the world map by making reference to the text on page 39 of the Student’s Book. Ask the learners to study the sample world map provided on Fig 2.5.
- Discuss the globe map as you refer to the text on page 40 of the Student’s Book. Ask the learners to study Fig 2.6 which is an example of a globe map.
- Ask the learners to do Activity 2.8 in pairs. This activity introduces sheet maps. Listen to their responses and briefly discuss them while making reference to the text in the Student’s Book.
- Discuss regional, marine, socio-economic, political, vegetation and climate maps as types of maps. While discussing them, refer to the text in the Student’s Book.
- Ask the learners to do Activity 2.9 in pairs. They should be able to interpret a topographical map by describing the relief features of the country and of the district in which their school is located in.
- Ask the learners to individually answer the questions in Task 2.1 of the Student’s Book. They should present their work for marking.
- Introduce the classification of maps into different categories. Ask the learners to do Activity 2.10 in the Student’s Book in pairs. This activity introduces the learners to the different categories of maps.
- Referring to the text in the Student’s Book, discuss small scale maps, medium scale maps and large scale maps.
- Ask the learners to do Activity 2.11 on page 46 of the Student’s Book in groups of three. This activity introduces plans as categories of maps. Briefly discuss the plan while referring to the text of the Student’s Book. Ask the learners to study Figure 2.16 that shows the plan of Nairobi City.
- After the lesson on maps, in pairs ask the learners to use their atlases to do Activity 2.12. They should be able to classify the maps into the categories learnt.
- Introduce the learners to cartographic projections. This might be a new concept for them but they should be able to build up on what they had learnt earlier on map work.
- Begin the subtopic by asking the learners to individually do Activity 2.13. Discuss the meaning of cartographic projections by making reference to the text in the Student’s Book.
- Discuss the different types of cartographic projections. Begin with the azimuthal projection.

- Ask the learners to individually do Activity 2.14 in the Student’s Book. Discuss the azimuthal projection with its characteristics as outlined in the Student’s Book. Together with the learners, study Fig 2.17 that shows the azimuthal cartographic projection.
- Discuss conical cartographic projections by asking the learners to do Activity 2.15 of the Student’s Book. Referring to the text, discuss the conical cartographic projection with its characteristics. Together with the learners, study Fig 2.18 in the Student’s Book.
- Discuss the cylindrical cartographic projection by asking the learners to do Activity 2.16 in the Student’s Book. Referring to the text, discuss it with its characteristics.
- Discuss the classification of distortion properties of a map by referring to the text in the Student’s Book.
- Ask the learners to do Activity 2.17 in pairs using their atlases.
- Give them Activity 2.18 in the Student’s Book to be done in groups of three as a takeaway assignment.
- Introduce the subtopic on the location of areas on topographical maps using the grid reference system.
- Begin by asking the learners to do Activity 2.19 in pairs. This is a reminder of what they had learnt in Senior 1. Referring to the text of the Student’s Book, discuss the use of the four and six grid reference systems in the location of areas.
- Ask the learners to do Activity 2.20 in groups of three. They should be able to locate places on the map using both the four and six grid reference systems.
- Go through the fun facts in the Did you know? section in the Student’s Book.
- Ask the learners to individually answer the questions in the end of unit revision task of the Student’s Book.

- Give the learners lesson notes to either write during the lesson or during remedial time. This will depend on your convenience.
- Remember to actively include the special education needs learners in all the learning activities. Give them extra attention to ensure that they catch up with the rest of the learners.
- Schedule for remedial lessons to ensure that the slow learners catch up with the work provided.
- Provide extra and more challenging tasks to the bright and talented learners.
- Give emphasis to the environment as a cross-cutting issue in this unit.
- Mark the activities according to how well the learners do them. Some of them might have different outcomes in the different groups or pairs that

the learners work in. Remember to check out the specific skill and attitude that an activity is required to bring out in the learners.

### Suggested answers to Task 2.1

1. (a) General reference map – These are maps that show landforms, political boundaries, water and the locations of cities. They are mostly topographic in nature. These are the most commonly used maps.
- (b) Thematic map – show different but very specific topics.
2. Thematic maps are important since they discuss topics that are specific to a country, region or continent.
3. (i) Title of a map – It shows the information that is contained in a map.
- (ii) The scale of a map – This is the ratio of the size of a map to the ground area represented on it.
- (iii) The compass – It shows the direction of various features and places represented on a map.
- (iv) The frame of a map – It shows the limitations of a map.
- (v) The key – This is a tool that

is used in maps. It helps a map reader to understand the symbols, colours and signs used.

4. Topographic maps show the physical and human features that are found on the surface of the earth. (Mark other correct answers.)

### Suggested answers to end unit assessment

1. (a) A map is as a representation of the features of an area of the earth on a flat surface. The area could be on land or sea.
- (b) (i) Title of a map- It shows the information that is contained in a map.
- (ii) The scale of a map–This is the ratio of the size of a map to the ground area represented on it.
- (iii) The compass – It shows the direction of various features and places represented on a map.
- (iv) The frame of a map – It shows the limitations of a map.
- (v) The key – This is tool that is used in maps. It helps a map reader to understand the symbols, colours and signs used.

2. (a) Types of maps;
- (i) **Topographic maps-** These are maps whose purpose is to show or represent both physical and human features found in an area.
  - (ii) **Thematic maps-** These maps are specially designed to show a particular theme connected to a specific geographical area. They can portray physical, social, political, cultural, economic, sociological, agricultural or any other aspects of a city, state, region, nation or continent. They show aspects like elements of weather, population distribution, political, cultural or agricultural features of an area.
  - (iii) **World map-** This is a map that represents the whole surface of the world. A world map may be thematic or general reference map depending on the intentions of the cartographer.
  - (iv) **Globe map-** This is a map drawn to represent the world. It reflects the shape of the planet Earth; it is spherical in nature.
  - (v) **Regional maps-** Regional maps may include several states, counties, zip codes or addresses. They could also include areas that are defined by sales territories, natural landforms, demographics or any other natural, statistical or subjective criteria. Often a region may cross a state, provincial or country borders.
  - (vi) **Marine maps –** These are maps drawn to represent the hydrological part of the world especially oceans and major seas.
  - (vii) **Socio-economic maps –** These show maps that represent information on ; crops, livestock, mining, transport or urbanisation.
  - (viii) **Political maps –** These maps represent:

- Geo-political units of a given area such as in Rwanda.
  - Political, local, regional or administrative boundaries.
  - Population
  - Settlements and international boundaries
- (ix) **Vegetation maps** – These maps show data on the distribution of different types of natural plant cover (vegetation).
- (x) **Climate maps** – These show the general distribution of rainfall, temperature, pressure belts or barometric pressure, movement of winds and solar radiation.
- (b) Categories of maps;
- (i) **Small-scale maps** – Small-scale refers to maps of large regions such as continents or large nations that show large areas of land on a small space. They are called small scale because the scales used are relatively small. A small scale map shows large territories but with less details. An example of a small scale used on a map would be 1:5 000 000.
- (ii) **Medium-scale maps** – A map having a scale larger than 1:600,000 and smaller than 1:75,000 is referred to as a medium scale map.
- (iii) **Large-scale maps** – These maps represent large areas and at the same time indicate more details. These maps are commonly used in secondary schools. Topographical maps also fall under this category. An example of a large scale used on a map would be 1:20 000.
- (iv) **A plan** – This is a large-scale map of a small area that includes details. The common examples include plans of cities such as Kigali and other urban areas. Plans can be created on scale of 1:50000.
3. (a) A cartographic projection is a mathematical technique used by cartographers while representing the curved globe surfaces onto a plane of a flat map. They are used to transform the curved surfaces of the earth onto flat map surfaces.

(b) Characteristics of map projections.

(i) **Azimuthal projection**

- Lines of latitude and longitude intersect at  $90^\circ$ .
- Longitudes are straight lines.
- Latitudes are concentric circles.
- The scale near the centre is true.
- The pole is represented as a point.
- It can have the properties of equidistance, conformality or equal area.
- They are mostly used on maps that represent the polar zones.

(ii) **Conical cartographic projection**

- Lines of latitude and longitude intersect at  $90^\circ$ .
  - Longitudes are straight lines.
  - Latitudes are concentric circular arcs.
  - The scale along the standard latitude(s) is true.
  - It can have the properties of equidistance, conformality or equal area.
- They are mostly used on maps that represent temperate zones.

(iii) **Cylindrical cartographic projection**

- Lines of latitude and longitude are perpendicular and intersect at  $90^\circ$ .
- Longitudes are equidistant.
- It forms a rectangular map.
- The scale along the equator or standard latitudes is true.

- It can have properties of equidistance, conformality or equal area.
- The poles are represented as lines.
- This projection is mostly used on maps that represent tropical regions or zones.

(c) Distortion properties of maps;

#### **Equidistant property**

The equidistant projection shows all points on the map are at proportionately correct distances from the centre. All points on the map are at the correct direction from the centre point. Distances and directions to all places are true only from the centre point of projection.

#### **Conformal property**

In the conformal projection, correct shapes of small areas are preserved. Graticule lines intersect at 90-degree angles, and at any point on the map the scale is the same in all directions. A conformal projection maintains all angles at each point,

including those between the intersections of arcs. Therefore, the size of areas enclosed by many arcs may be greatly distorted.

#### **Equal area property**

In the equal area property, the projection is undistorted along the equator which is the standard latitude. However, distortion increases rapidly towards the poles.

Latitudes are stretched increasingly away from the equator. The poles mount up to endless distortion, becoming lines instead of points.

(d) Cartographic projections are important because they help cartographers to represent the curved globe surfaces onto a plane of a flat map. Cartographic projections are ways used to transform the curved surfaces of the earth onto flat map surfaces.

4. (a) (i) Rwanda – Cylindrical cartographic projection.
- (ii) Alaska in the USA – Conical cartographic projection
- (iii) Greenland – Azimuthal cartographic projection.

- (b) Angles, shapes, distance, areas and lengths of areas on the earth's surface.
- 5.
- (a) Grid references define locations on maps using the cartesian coordinates maps. Grid lines on maps define the coordinate system, and are numbered to provide a unique reference to features.
  - (b) Using latitudes and longitudes and using the grid reference system.
  - (c) The grid numbers on the east-west (horizontal) axis are called eastings. The numbering of the eastings increases towards the East while the grid numbers on the north-south (vertical) axis are called northings. The northings have their names because of the northward numbering order. Their numbering increases towards the North.
- (d) A four-figure grid reference refers to where the grid reference numbers used to locate a given feature or an area on a map is made up of four digits such as 4767, while the six figure grid reference refers to where the grid reference numbers used are made up of six digits. The squares are partitioned into imaginary tenths between the Eastings and the Northings. The purpose of this division of squares is to get the exact point of location for the area or feature identified.
6. (a),(b)and (c),(d),(e) – Mark correct answers as you ask each of the learners to participate in the map work. This is a very crucial question testing on map interpretation.



# Topic area: Physical Geography

## Sub-topic area: Landform evolution and processes

UNIT

# 3

## Formation of relief features in Rwanda

**Key unit competence:** By the end of this unit, the learners should be able to investigate the formation of major relief regions of Rwanda and evaluate their effects on human activities.

### Unit objectives

*In this unit, a learner should be able to:*

1. Locate Rwanda in Africa.
2. State the area of Rwanda in terms of land and water surface area.
3. Describe the population and administrative divisions of Rwanda.
4. Locate the major relief regions of Rwanda.
5. Identify the major relief features of Rwanda using a map.
6. Outline the endogenic processes leading to the formation of different relief features of Rwanda.
7. Give the importance of the relief features of Rwanda.
8. Identify the problems related to the relief features of Rwanda.
9. Outline the exogenic processes leading to the formation of different relief features of Rwanda.

## Content map

Unit 3: Formation of relief features in Rwanda	
Number of periods	28
Introduction	Asking the learners to define relief and give examples of relief features in their local environment and in the country.
Classroom organisation	Whole class orientation, pair work, group work, project work and individual work.
Equipment required	Pictures, maps, Internet.
Activities	<ul style="list-style-type: none"> <li>• Identifying the location of Rwanda using geographical coordinates, determining its size, administrative divisions, and population.</li> <li>• Drawing sketch maps of Rwanda.</li> <li>• Locating major relief regions of Rwanda.</li> <li>• Identifying major relief features of Rwanda using a map.</li> <li>• Describing the processes leading to the formation of different relief features of Rwanda.</li> <li>• Discussing the importance of the relief features of Rwanda.</li> <li>• Identifying the problems related to the relief features of Rwanda.</li> <li>• Interpreting maps and diagrams.</li> <li>• Writing notes.</li> </ul>
Competences practiced	<ul style="list-style-type: none"> <li>• Teamwork</li> <li>• Presentation of findings</li> <li>• Interpretation</li> <li>• Communication</li> <li>• Literacy</li> <li>• Discussion</li> </ul>

Language	<ul style="list-style-type: none"> <li>• Discussion in pairs and groups</li> <li>• Written assignments</li> </ul>
Vocabulary acquisition	<ul style="list-style-type: none"> <li>• Terminologies related to relief features</li> </ul>
Study skills	<ul style="list-style-type: none"> <li>• Writing notes</li> <li>• Locating features formed by the different processes-both endogenic and exogenic on the map of Rwanda</li> <li>• Listening</li> <li>• Reading</li> </ul>
Revision	<ul style="list-style-type: none"> <li>• Revision exercises provided.</li> </ul>
Assessment	<ul style="list-style-type: none"> <li>• Ability to work in groups and to present findings</li> <li>• Individual work in answering questions in the revision tasks provided</li> </ul>
Learning outcomes	<ul style="list-style-type: none"> <li>• To locate Rwanda using geographical coordinates</li> <li>• To determine its size-both land and water surface</li> <li>• To identify Rwanda's administrative divisions</li> <li>• To Describe the population of Rwanda</li> <li>• To define relief</li> <li>• To identify the relief regions of Rwanda</li> <li>• To describe the processes of formation of the relief features</li> <li>• To locate and outline the features formed by endogenic and exogenic processes</li> <li>• To give the importance of relief features of Rwanda</li> <li>• To identify the problems related to the relief features of Rwanda</li> </ul>

## Notes for the teacher

Rwanda is a landlocked country located in east-central Africa. Explain the meaning of a landlocked country to the learners. They should also be able to identify countries that neighbour Rwanda. Outline the effects of Rwanda's location to its economy.

Make use of the map of Rwanda and Africa to teach on the size and the administrative divisions of the country. As you do this, keep in mind that the names of some districts have been changed. Update yourself and the learners on the same since this affects the administrative divisions of the country. This will help the learners to make a comparison between Rwanda and other countries in Africa and in the world.

Use the field and other visual resources like photographs, sketches and videos to discuss the relief of Rwanda. It is important that the learners are able to identify the unique relief features found in each relief region. Clearly outline the effects of the relief features on the human activities such as population distribution and on economic activities.

The relief features are formed by the geomorphological processes. The new terminologies should be clearly defined and correctly spelled. Classify the processes into endogenic and exogenic processes. Describe how these processes led to the formation of relief features. The learners should be able to relate the geomorphological processes to the relief features found in

Rwanda. Make sure that the learners are able to give examples of the relief features in each relief region. Clearly discuss the positive and negative effects of the relief features in Rwanda. Use examples from the local environment to clarify the concepts that you teach. Define denudation and discuss its effects on the relief features in Rwanda.

## Teaching steps

- Begin the lesson by asking the learners to do Activity 3.1 of the Student's Book on the location of Rwanda on the map of Africa. This is an activity that each learner should do individually.
- Briefly discuss the geographical coordinates that define the location of Rwanda and move on to the size of the country.
- Ask the learners to pair up and do Activity 3.2. Allow them some time to do the activity and to present their findings.
- Discuss the size of Rwanda considering both the surface area of the land surface and water surface.
- Ask the learners to do Activity 3.3 of the Student's Book. This activity is to be done in pairs and can be done as a takeaway assignment.
- Discuss the administrative divisions of Rwanda by asking the learners to do Activity 3.4 of the Student's Book in pairs.
- Referring to the text the Student's Book, discuss the provinces, districts and sectors in Rwanda. Remember to use the updated

- names of the provinces and districts as they are in the current administration. Refer to Table 3.1 on the provinces, districts and sectors. The learners should also study Fig 3.3 attentively to identify the districts and current provinces of Rwanda.
- Give the learners Activity 3.5 as a takeaway assignment.
  - Discuss the population of Rwanda by asking the learners to do Activity 3.6 of the Student’s Book. This activity should be done in pairs.
  - Referring to the text of the Student’s Book, discuss the population of Rwanda using updated statistics. Discuss how this affects the economy of the country and why it is necessary for the country’s population growth to be contained.
  - Owing to the population in the country, discuss its relationship with the standard of living of the people. Ask the learners to do Activity 3.7 in pairs to assess the standard of living of the people of Rwanda.
  - Referring to the text of the Student’s Book, discuss the standards of living of the people of Rwanda. Give the learners Activity 3.8 as a takeaway assignment that is to be done as project work. This project should be done in groups of five.
  - Introduce the relief regions of Rwanda by asking the learners in pairs to do Activity 3.9. The learners should be able to describe the relief of Rwanda using the photograph shown and their local environments.
  - Begin the discussion by a general description of the relief of Rwanda as is discussed in the text of the Student’s Book.
  - Describe the climate of Rwanda and its relationship with the relief of the country. Ask the learners to do Activity 3.10 and to refer to the text of the Student’s Book on the climate and relief of the country.
  - Referring to the text of the Student’s Book, introduce and discuss the divisions that make up the relief regions of the country. Discuss each one of them one by one.
  - Identify the regions from the map shown on Fig 3.7 of the Student’s Book.
  - Discuss the Eastern plain, the central plateau, the volcanic region, the Congo–Nile crest, the Rusizi region and the slopes and borders of Lake Kivu. Refer to the text and to Activities 3.11, 3.12, 3.13 and 3.14 that the learners should do after discussing each of the relief regions. Depending on the time allocated to the specific periods, some of the activities can be done as takeaway assignments while others can be done in class.

- Activity 3.14 is a fieldwork study that will mean teaching the lesson outdoors. Prepare well for this and let the learners see how they can utilise the knowledge and skills learnt in Fieldwork studies in this activity.
- Individually ask the learners to answer the questions asked in Task 3.1 of the Student’s Book. They should later present their work for marking.
- Ask the learners to do Task 3.2 of the Student’s Book.
- Introduce the geomorphological processes by first defining geomorphology to the learners. As you define, refer to the text of the Student’s Book.
- Ask them to do Activity 3.15 of the Student’s Book. Begin by defining endogenic processes. Define what endogenic processes mean and refer the learners to the text of the Student’s Book.
- Discuss folding, faulting, vulcanicity and warping as some of the endogenic processes responsible for the formation of relief features in Rwanda. Refer to the text and explanations of the Student’s Book. While discussing, ensure the learners do Activities 3.16,3.17 and 3.18. Some of the activities can be done as takeaway assignments while some can be done during the lessons in the classroom.
- Together with the learners, examine the importance of the relief features of Rwanda. Begin this by asking the learners in groups of three to do Activity 3.19. Refer to the text as you discuss.
- Ask the learners to do Activity 3.20 in pairs as a takeaway assignment.
- Discuss the problems associated with the relief features of Rwanda. Ask the learners to do Activity 3.21 in pairs and carry on the discussion by making reference to the text of the Student’s Book.
- Ask each of the learners to individually answer the questions in Task 3.3 and to present their work for marking.
- Discuss the exogenic processes of the formation of relief features. Begin by asking the learners to do Activity 3.22 of the Student’s Book individually. Define the meaning of exogenic processes and the features formed by each of the processes that include weathering and its resultant features, erosion and deposition by running water, river erosion and deposition, wave erosion and deposition and mines and quarries. Refer to the text of the Student’s Book and to Activities 3.23, 3.24, 3.25,3.26, 3.27 and 3.28.
- Discuss the effects of weathering and erosion on the relief features of Rwanda. Begin this by asking the learners to do Activity 3.29 of the Student’s Book. Referring to the text, discuss the effects.
- Ask the learners to do Activity 3.30 which is project work that should be done in groups of five. This should be a takeaway assignment.
- In pairs, ask the learners to do Activity 3.31 and to present the

- essay of their findings in a class discussion.
- Together with the learners, go through the Did you know? section that presents some interesting facts about the size, location, population, administrative divisions and the physical features of Rwanda.
  - Ask the learners to individually answer the questions in the End of unit revision task and to present them for marking.

### Diagnostic questions

1. Discuss the problems that Rwanda faces due to its landlocked state.
2. Suggest solutions to the problems highlighted.
3. Explain why it is important to contain the population of Rwanda in relation to its size.
4. Giving examples, discuss the benefits of some of the relief features of Rwanda that have been formed due to exogenic processes.

#### Note:

- Give the learners lesson notes to either write during the lesson or during remedial time. This will depend on your convenience.
- Remember to actively include the special education needs learners in all the learning activities. Give them extra attention to ensure that they catch up with the rest of the learners.

- Schedule for remedial lessons to ensure that the slow learners catch up with the work provided.
- Provide extra and more challenging tasks to the bright and talented learners.
- Give emphasis to environmental conservation as a cross-cutting issue addressed in this unit.
- Mark the activities according to how well the learners do them. Some of them might have different outcomes in the different groups or pairs that the learners work in. Remember to check out the specific skill and attitude that an activity is required to bring out in the learners.

### Suggested answers to Task 3.1

1. Elevation – height above sea level..
2. – The Volcanic region.  
– Congo-Nile Crest  
(Accept other correct answers.)
3. – Mt. Muhabura  
– Mt.Gahinga  
– Mt .Sabyinyo  
– Mt .Bisoke  
– Mt. Karisimbi
4. – Tourist attraction  
– Attract rainfall  
– protects the communities etc.

## Suggested answers to Task 3.2

1. Relief refers to the nature of the landscape or the topographical set up of an area.
2.
  - (i) The Eastern Plain – This region covers areas that neighbour the Central Plateau. Parts of this region include Bugesera and Umutara. The lowland areas found in this part possess marshy areas, rivers and lakes. They include Lakes Cyohoha, Sake, Mugesera and Muhazi among others. Rivers include, Rivers Akagera and Nyabarongo and their tributaries. The altitude of this area is between 1000 and 1500 metres above sea level. It is made up of plateaus that are put apart from each other.
  - (ii) The Central Plateau – This region begins from southern Musanze moving towards Burundi. It also moves from the eastern slope of the Congo-Nile crest up to the border of Kigali. In this region, the landscape is characterised by flat topped hills that are separated from each other by a wide range of river valleys. These river valleys are rich with alluvial deposits. These region cover areas such as; Muhanga, Ruhango, Nyanza, Bugesera, Huye, Gisagara and Kigali. The average elevation of this relief region ranges between 1500 and 2000 metres high. This area dominates a wide area of the country. It is from this region that Rwanda is referred to as the land of thousand hills.
  - (iii) The Volcanic region – This is the relief region of Rwanda that is associated with the presence of volcanic ranges, hence the name volcanic region. Locally, the region is known as the Birunga region. This region covers about 90 kilometres from north to west. Volcanic activity shaped the landscape of this area, completely setting up its distinct features of volcanic mountains that include Mts. Karisimbi, Sabyinyo, Muhabura, Gahinga and Bisoke.
  - (iv) The Congo-Nile Crest/ watershed – This region is described by the highlands of the western part that compose the divide of River Nile and River Congo. The length of this relief region is approximately 160 kilometres from North to South. It has a width of between 20 and 50 kilometres. In this region,



the highest elevation point is found at Mt. Muhungwe which is 3000 metres high. However, the average altitude is 2500m.

(v) The Rift Valley – The western bloc of the Great Rift Valley that forms the East African Rift Valley passes through Rwanda. It is edged by some of the highest mountains in the region. This includes the Birunga Mountain ranges. Much of the Rift Valley lies within the boundaries of Volcanoes National Park in Rwanda. The formation of the Rift Valley is responsible for the creation of the mountains, valleys and lakes found in the country just like it is in the other East African countries.

(vi) The Rusizi region – This is the lowest region in Rwanda and the hottest part of the country. It is located in the south-western part of the country close to the borders with Burundi and the Democratic Republic of Congo. It is an extension of Imbo plain in Burundi. Its elevation is 900 metres above sea level. This region is drained by River Rusizi.

(vii) The slopes and borders of Lake Kivu- This relief region is located along the shores of Lake Kivu. The average altitude ranges

between 1460 and 3000 metres above sea level. The landscape of this area was greatly formed by tectonic forces. The region has steep escarpments that have been severely eroded.

3. Mts. Sabyinyo, Karisimbi, Gahinga and Bisoke. (Accept other correct answers.)
4. Mts. Nyiragongo, Nyamuragira and Murara found in the Democratic Republic of Congo which neighbours Rwanda to the west.
5. The Rusizi region also known as the Bugarama plains.

### **Suggested answers to Task 3.3**

1. These are land forming processes whose operations begin from the interior of the earth.
2. (a) Vulcanicity – This is a process through which hot semi solid, gaseous and liquid materials called molten erupt from the interior parts of the earth (the mantle). The materials pass through fault lines which are lines of weaknesses and reach the earth's surface. When they cool, they lead to the formation of physical features. Examples include the lava plateaus in the Rubavu and Musanze regions, and composite volcanoes in Rubavu district. (Accept correct examples)

(b) Folding – This refers to the bending of crustal rocks of the earth’s crust after being subjected to compressional forces within the interior of the earth. Folding takes place on young rocks of sedimentary deposits. Folding may take place slowly over several years resulting to the formation of monoclines, synclines and anticlines. Synclines are plains or basins while anticlines are hills or mountains. Examples include the flat topped hills of Central and Eastern Rwanda.

(c) Faulting – This refers to the cracking or breaking up of rocks of the earth’s crust. The cracking is caused by tectonic forces of compression and tension that are active within the earth’s crust. Faulting can result in mountain building. The movement of the plates within the earth’s crust can cause rocks to break and be displaced. Features in Rwanda formed as a result of faulting include the Congo-Nile Crest and the western arm of the Rift Valley.

3. (a) Rubavu district
- (b) Musanze district
- (c) Rubavu and Musanze districts.
- (d) Hot springs.
- (e) Burera district.

### **Suggested answers to the end of unit revision task**

1. Mark correct answers showing the correct sketch map of Rwanda, the correct geographical coordinates that identify the location of Rwanda, the correct positions of the countries that neighbour Rwanda and the benefits that Rwanda gets from each of her neighbours.
2. (a) A landlocked country is one that is surrounded by land and has no coastline nor sea port.  
(b)
  - It has to rely on other countries for transport and importation of goods.
  - It is subject to taxes and laws of other countries in regards to transportation of imported goods.
  - The government spends a lot of money to facilitate the transportation of goods across other countries hurting the economy.
  - Frequent interruption of the transport routes and civil wars delay the delivery of goods to the country.

(Accept other correct answers.)

- (c)
  - The Government of Rwanda has partnered with other neighbouring countries such as Kenya in trade agreements

to waive some of the taxes imposed on imported goods that pass through the port of Mombasa.

- The government has plans to build a railway line in the country.
  - The country has joined the East African Community regional bloc so as to benefit from tax and tariff waivers that other member countries enjoy etc.
  - Accept other correct answers.
3. (a) The relief of Rwanda is described by the rolling hills and mountainous appearances. The altitude decreases from west to east. Rwanda is a mountainous country. The highest point on the land of Rwanda is situated on a volcanic mountain known as Mt. Karisimbi at an altitude of 4507 metres above sea level. The lowest point is found in the area drained by River Rusizi at 950 metres above sea level. The upcountry areas of Rwanda are characterised by grasslands and relatively small sized farmlands that occupy the slopes of the rolling hills. However, the relief of the country is dominantly mountainous stretching from the Northern Province to the Western Province.
4. (a) Mark correctly drawn sketch maps and correctly indicated relief regions.
- (b) (i) The Central Plateau has influenced farming activities in the area and is also responsible for the climate of the country which is generally tropical highland climate.
- (ii) The Eastern Plain has affected the climate of the region which is drier compared to the other parts of the country.
- (iii) Accept other correct answers.
5. (a) Exogenic processes – These are land forming processes that take place on the surface of the earth. The forces that are responsible for the exogenic processes are commonly referred to as denudation forces.
- (b) Endogenic processes – These are land forming processes that take place in the interior of the earth. They include processes such as faulting, folding, vulcanicity and warping.
- (c) Denudation processes – These are processes that cause the wearing away of

the earth's surface leading to a reduction in elevation of relief and other landforms and landscapes.

6. Mark correct explanations and examples of the relief features discussed.
7. Relief, human activities and the presence of vegetation and water bodies to determine the climate of Rwanda.(Mark correct explanations of the discussions of the mentioned points.)
8. The volcanic mountains cover a large part of Rwanda especially the Northern and Western Provinces. This greatly describes the relief of the country.(Mark correct explanations and expounding of the mentioned point)
9. Folding refers to the bending of crustal rocks of the Earth's crust after being subjected to compressional forces within the interior of the earth while faulting refers to the cracking or breaking up of rocks of the earth's crust. The cracking is caused by tectonic forces of compression and tension that are active within the earth's crust.
  - (Accept correct answers)
10. (a) (i) The plateaus and basins formed by folding have enabled the growth of crops, human settlement and the construction of transport and communication networks.  
(ii) The highlands

formed by folding have influenced the climate of the areas where they are found especially rainfall formation.

- (iii) The formation of lakes in valleys has encouraged fishing and sand harvesting.
  - (iv) Folding leads to the formation of hills which are tourist attraction sites. Tourists contribute to the economy of the country by bringing in foreign exchange that supports other sectors of the economy.
  - (v) Landforms formed through faulting like the Great Rift Valley are important tourist attraction sites.
  - (vi) Accept other correct answers.
  - (vii) Lava from volcanic eruptions block the flow of rivers leading to the formation of lava dammed lakes such as Lakes Burera and Ruhondo. The lakes provide water for use and can be used for fishing and transport.
- Accept other correct answers.
- (b) (i) Faulting discourages

transport.  
The features formed such as the rift valleys act as barriers to transport and communication.

- (ii) Where high mountains are formed, it is difficult to practice agriculture.
- (iii) Faulting causes volcanic eruptions which are destructive. The molten lava destroys farmlands, leads to loss of lives of humans and animals and affects settlements. For example, in the year 2002, the volcanic eruption at Goma left many people

homeless.

- (iv) Vulcanicity may cause violent earthquakes. For example, in 2002, houses were destroyed in Rubavu by earthquakes when Mt. Nyiragongo erupted. The earthquakes are as a result of the instability within the earth's crust.
- (v) The earthquakes are sometimes responsible for landslides which are destructive to life and property.
  - Accept correct discussions.

# Topic area: Physical Geography

## Sub-topic area: Rocks and minerals

UNIT

# 4 Rocks and minerals in Rwanda

**Key unit competence:** By the end of this unit, learners should be able to compare different types of rocks and minerals in Rwanda and evaluate their importance.

### Unit objectives

*By the end of this unit, a learner should be able to:*

1. Identify the different types of minerals and rocks in Rwanda.
2. Locate the major minerals and rocks in Rwanda.
3. Recall the economic importance of rocks and minerals.

## Content map

Unit 4: Rocks and minerals in Rwanda	
Number of periods	5
Introduction	Asking the learners to name the main types of rocks and minerals in Rwanda and identify features formed by rocks.
Classroom organisation	Whole class orientation, pair work, group work and individual work.
Equipment required	Maps, Internet, textbooks, pens and paper.
Activities	<ul style="list-style-type: none"> <li>• Discussion</li> <li>• Drawing maps</li> <li>• Studying the local environment</li> <li>• Locating areas with rocks and minerals</li> <li>• Interpreting photographs</li> </ul>
Competences practiced	<ul style="list-style-type: none"> <li>• Teamwork</li> <li>• Interpretation</li> <li>• Analysing photographs</li> <li>• Communication</li> <li>• Literacy</li> <li>• Drawing maps</li> <li>• Explaining concepts about rocks</li> </ul>
Language	<ul style="list-style-type: none"> <li>• Discussion in groups</li> <li>• Written assignments</li> </ul>
Vocabulary acquisition	<ul style="list-style-type: none"> <li>• Terminologies related to rocks and minerals</li> </ul>

Study skills	<ul style="list-style-type: none"> <li>• Writing notes.</li> <li>• Locating minerals and rocks on the map of Rwanda.</li> <li>• Organising ideas for presentation.</li> <li>• Ability to work in groups and communicate ideas with others.</li> </ul>
Assessment	<ul style="list-style-type: none"> <li>• Ability to work in groups and to communicate ideas with others</li> <li>• Ability to correctly answer questions asked in the various revision tasks</li> </ul>
Learning outcomes	<ul style="list-style-type: none"> <li>• Classify rocks and minerals in Rwanda</li> <li>• Outline characteristics of rocks and minerals</li> <li>• Locate main rocks and minerals on the map of Rwanda</li> <li>• Explain the economic importance of rocks and minerals in Rwanda</li> </ul>



## Notes for the teacher

Ensure that the learners get the spellings and meanings of the new terminologies correctly. There are a variety of rocks and minerals. They might encounter names of rocks and minerals that they might not have learnt about before. You can take the learners to the field for some lessons or you can collect samples of rocks and minerals to use when discussing the types of rocks and minerals in Rwanda. Involve the learners in describing the characteristics of rocks and in giving examples.

Make use of the map of Rwanda to give the location of the different rocks and minerals. Involve the learners in describing the economic importance of rocks and minerals. Make sure that the learners understand the meaning of economic importance. During the discussions, the learners should be able to give local examples.

## Teaching steps

- Begin the lesson by reminding the learners that they had learnt about rocks in Senior 1. Ask them to use the knowledge that they acquired about rocks to do Activity 4.1 in groups of three. This activity requires that the learners classify the rock samples collected correctly.
- Referring to the text of the Student's Book, introduce the classification of the rocks found in Rwanda by way of discussion.
- Begin with the igneous rocks. This is a classification of rocks that they had learnt in Senior 1. Ask the learners to do Activity 4.1 of the Student's Book in pairs. After the activity, briefly refer to the text on the same page to discuss igneous rocks in summary.
- Ask each individual learner to answer the questions in Task 4.1 of the Student's Book.
- Discuss metamorphic rocks by asking the learners to do Activity 4.3 of the Student's Book in groups of three. After the activity briefly refer to the text on the same page to discuss igneous rocks in summary. This is also a reminder of what they had learnt in Senior 1.
- Ask each learner to individually answer the questions in Task 4.2 of the Student's Book.
- Discuss sedimentary rocks by asking the learners to do Activity 4.4 of the Student's Book in pairs. After the activity briefly refer to the text to discuss sedimentary rocks in summary. This is also a reminder of what they had learnt in Senior 1.
- Ask the learners to answer the questions in Task 4.3 of the Student's Book.
- Introduce the characteristics of rocks and minerals by asking the learners to do Activity 4.5 of the Student's Book in pairs.
- Step by step, while referring to the text the Student's Book, discuss the characteristics of the different types of rocks.

- After discussing the characteristics, individually ask the learners to answer the questions in Task 4.4 of the Student’s Book.
- Discuss the distribution of the major minerals and rocks in Rwanda. Ask the learners to each do Activity 4.6 of the Student’s Book as a way of introduction to this subtopic.
- Referring to the text on page 89 of the Student’s Book and to the examples listed in Tables 4.1, 4.2 and 4.3, discuss the distribution of the different types of rocks in the country.
- Discuss the distribution of the major minerals in the country by asking the learners to do Activity 4.7 of the Student’s Book. The activity is to be done individually.
- Referring to the text and to Table 4.4 of the Student’s Book. Guide the learners in discussing the distribution of the major minerals found in Rwanda.
- Summarise this subtopic by asking the learners to do Activity 4.8 of the Student’s Book.
- Introduce the importance of the rocks and minerals by asking the learners to do Activities 4.9 and 4.10 of the Student’s Book. These activities test on the importance of rocks and minerals in Rwanda and are to be done in groups of three.
- Together with the learners while making reference to the text of the Student’s Book, go through the importance of rocks and minerals.
- Using the case study of the Student’s Book, discuss the negative contribution of rocks. Refer to the text as you discuss.
- Go over the Did you know? section of the Student’s Book. This section contains interesting facts about rocks.
- Ask each of the learners to individually answer the questions in the End of unit revision task of the Student’s Book. This is an assignment that they should later bring to you for marking.
- Together with the learners, go through the End of unit glossary that provides the hard words used in the topic and their meanings.

#### **Diagnostic questions**

1. Describe the dominant types of rocks found in Rwanda and give the locations where the rocks are found.
2. Discuss the challenges that Rwanda faces that hinder the extraction of rocks and minerals.
3. Identify the uses of rocks and minerals within your school environment.
4. Explain how the extraction of rocks and minerals affects the environment.

### Note:

- Give the learners lesson notes to either write during the lesson or during remedial time. This will depend on your convenience.
- Remember to actively include the special education needs learners in all the learning activities. Give them extra attention to ensure that they catch up with the rest of the learners.
- Schedule for remedial lessons to ensure that the slow learners catch up with the work provided.
- Provide extra and more challenging tasks to the bright and talented learners.
- Give emphasis to environmental conservation as a cross-cutting issue to be addressed in this unit.
- Mark the activities according to how well the learners do them. Some of them might have different outcomes in the different groups or pairs that the learners work in. Remember to check out the specific skill and attitude that an activity is required to bring out in the learners.

#### Suggested answers to Task 4.1

1. Mark correctly filled locations of where the rocks are found. Here, the learners should use knowledge from previous classes.

#### Suggested answers to Task 4.2

1. Metamorphic rocks are rocks that form when pre-existing rocks are subjected to great heat and pressure.

2. Examples of metamorphic rocks include; slate, marble, schist, quartzite etc.

Accept other correct answers.

#### Suggested answers to Task 4.3

1. Sedimentary rocks are formed from the weathered and eroded materials of the already existing rocks. The weathered materials are compacted in layers. The sediments are transported by wind, water or glaciers. They are then deposited in layers known as strata. These rocks are formed from rocks that were originally igneous or metamorphic.
2. Examples of metamorphic rocks include sandstone, limestone, peat, coal, gritstone, conglomerate, claystone etc.  
-Accept other correct answers.
3. Rubavu district, Nyamasheke district, Burera district, Rusizi district etc.  
-Accept other correct answers.

#### Suggested answers to Task 4.4

1. (a) – They are formed after the cooling and solidification of molten material.  
– They have a crystal appearance after cooling and solidification.  
– They do not have strata or layers.  
– They have no faults.
- (b) – They have fossils.  
– They have both inorganic and organic materials.

- They have no crystalline look because they do not form under the influence of heat.
  - They have rock layers known as strata as a result of the different and successive deposition of sediments at different intervals.
- (c) They are harder and more compact than primary pre-existing rocks.
- The minerals in these rocks are re-crystallised

**Suggested answers to the End of unit revision task**

1. (a) A rock is a naturally occurring solid that is made up of one or more minerals.
- (b) Igneous rocks, sedimentary rocks and metamorphic rocks.
2. (a),(b),(c) and (d)  
- Accept well written explanations.
3. (a) *Characteristics of igneous rocks;*
- They are formed after the cooling and solidification of molten material.
  - They have a crystal appearance after cooling and solidification.
  - They do not have strata or layers.
  - They have no fossils.
- Characteristics of

metamorphic rocks

- They are harder and more compact than primary pre-existing rocks.
  - The minerals in these rocks are recrystallised.
- Characteristics of sedimentary rocks;*
- They have fossils.
- Accept other correct answers.
- (b) Economic importance of rocks;
- Formation of soils.
  - Extraction of minerals
  - Source of construction materials for both buildings and roads.
  - They are used for study and research purposes.
  - They are a source of water.
  - They are a source of energy.
- Accept other correct answers.
4. (a) (i) Basalt – igneous  
(ii) Gneiss – metamorphic  
(iii) Pumice – igneous  
(iv) Shale – sedimentary  
(v) Granite – igneous  
(vi) Schist – metamorphic  
(vii) Conglomerate – sedimentary
- (b) (i) Burundian rocks – These are metamorphic rocks that date to about 1050-980 million years.

- (ii) Rusizian rocks- These are metamorphic rocks that date to 2100-1650 million years.
- (iii) Young volcanic rocks- These are igneous rocks that cover most of the Northern and Western Provinces that have volcanic mountains and activities.
5. Mark the importance and negative contributions of rocks as discussed in the topic.
6. (a) A rock is a naturally occurring solid made up of one or more minerals while a mineral is a natural inorganic substance possessing a definite chemical composition.
- (b) Minerals found in Rwanda;
- (i) Cassiterite found in areas such as Mugesera, Bugesera, Rutsiro, Karongi etc. Accept other correctly named places.
- (ii) Colombo tantalite found in areas such as Nyagatare, Bugesera, Rusizi, Karongi etc. Accept other correctly named places.
- (iii) Wolframite found in areas such as Rutsiro, Rubavu, Kibuye etc. Accept other correctly named places.
- (iv) Thorium and uranium found in areas such as Nshili in Nyarunguru district.
- (v) Gold found in areas such as Rusizi district, Nyamasheke district, Nyungwe Forest etc. Accept other correctly named places.
- Accept other correctly named places.
- (c) Mark correctly explained uses or importance of each of the minerals named.
7. (i) Cassiterite – Mugesera, Bugesera, Rutsiro, Karongi etc. Accept other correctly named places.
- (ii) Colombo tantalite found in areas such as Nyagatare, Bugesera, Rusizi, Karongi etc. Accept other correctly named places.
- (iii) Wolframite found in areas such as Rutsiro, Rubavu etc. Accept other correctly named places.
- (iv) Peat coal found in areas such as Rugezi in Burera district, south-east of Rusizi, Akanyaru in Gisagara district etc. Accept other correctly named places.

# Topic area: Physical Geography

## Sub-topic area: Soils

UNIT

# 5

## Soils in Rwanda

**Key unit competence:** By the end of this unit, the learners should be able to compare different soil types and assess their importance in Rwanda.

### Unit objectives

*By the end of this unit, a learner should be able to:*

1. State the different types of soil in Rwanda.
2. Identify the causes and effects of soil erosion in Rwanda.
3. Identify the importance of soils in Rwanda.

## Content map

Unit 5: Soils in Rwanda	
Number of periods	8
Introduction	Asking the learners to define soils and give main types of soils found in Rwanda
Classroom organisation	Whole class orientation followed by pair work, group work and individual work.
Equipment required	Photographs, maps, Internet, Atlas, local environment.
Activities	<ul style="list-style-type: none"> <li>• Defining terms</li> <li>• Identifying the different types of soils</li> <li>• Discussing soil erosion</li> <li>• Interpretation</li> <li>• Locating areas affected by soil erosion on the map of Rwanda</li> <li>• Explaining the causes and effects of soil erosion</li> <li>• Discussing the importance of soil in Rwanda</li> </ul>
Competences practiced	<ul style="list-style-type: none"> <li>• Teamwork</li> <li>• Presentation of findings</li> <li>• Interpretation</li> <li>• Communication</li> <li>• Literacy</li> </ul>
Language	<ul style="list-style-type: none"> <li>• Discussion in groups</li> <li>• Written assignments</li> </ul>

Vocabulary acquisition	<ul style="list-style-type: none"> <li>• Terminologies related to soil erosion</li> </ul>
Study skills	<ul style="list-style-type: none"> <li>• Writing notes.</li> <li>• Locating areas affected by soil erosion on the map of Rwanda.</li> <li>• Interpretation of photographs.</li> <li>• Organising ideas for presentation.</li> <li>• Listening to the teacher.</li> </ul>
Revision	<ul style="list-style-type: none"> <li>• Revision exercises provided</li> </ul>
Assessment	<ul style="list-style-type: none"> <li>• Ability to work in groups and communicate ideas with others</li> <li>• Ability to correctly answer questions in the written assessments</li> </ul>
Learning outcomes	<ul style="list-style-type: none"> <li>• To define soil</li> <li>• To identify types of soils</li> <li>• To explain causes of soil erosion</li> <li>• To explain effects of soil erosion</li> <li>• To explain the importance of soils in Rwanda</li> </ul>



## Notes for the teacher

Soil plays a very important role in our environment. The learners should clearly get the definitions and spellings correctly. Involve the learners in a field study where they can study the various types of soils. The learners should be engaged in giving the characteristics of the different types of soil. Use the map of Rwanda to give the location of the various soils.

Use the local environment to discuss the causes and effects of soil erosion. Through a field study, learners should be exposed to areas that have experienced soil erosion and areas where soil erosion control and conservation measures have been put in place. Stress on the importance of soil in the physical and human environment.

Guide the learners in explaining the measures that are being put in place in Rwanda to manage and conserve soils.

### Teaching steps

- Begin the unit by revising the lesson on soils that the learners had learnt in Senior 1. Ask them recall questions on the unit.
- Ask the learners to do Activity 5.1 of the Student’s Book. They should do it in pairs.
- Briefly define soil and go through its composition by referring to the text of the Student’s Book.
- Discuss the types of soils and the places where they are found in Rwanda. Ask the learners to do Activity 5.2 to introduce the sub topic on types of soils and the

places where they are found in Rwanda.

- Together with the learners, study Table 5.1 of the Student’s Book that shows the different types of soils and their locations in Rwanda.
- Referring to Table 5.2 of the Student’s Books, study the classification of soils in Rwanda and the places where they are found.
- Discuss the soils and the map showing the soils that is in the Student’s Book.
- In groups of three, ask the learners to do Activity 5.3 and to present their findings in a class discussion.
- Ask the learners to do Activity 5.4 as a takeaway assignment. The assignment is an individual task that should be done and the findings presented in a class discussion in the following lesson.
- Ask each student to individually answer the questions in Task 5.1 of the Student’s Book. They should present their work for marking.
- Discuss soil erosion in Rwanda. Begin this by asking the learners to do Activity 5.5 of the Student’s Book. This is an activity that should be done individually. In pairs, ask the learners to do Activity 5.6 and in groups of three Activity 5.7 of the Student’s Book. All these activities test on the different aspects of soil.
- Referring to the text to 106 of the Student’s Book, define soil erosion and examine the types of soil erosion that occur in Rwanda.

- Referring to the text of the Student’s Book, discuss sheet erosion, rill erosion, gully erosion and splash erosion. As you discuss, ask the learners to do Activities 5.8, 5.9, 5.10, 5.11 and 5.12. These activities test on the various types of soil erosion.
- After the discussion, ask the learners to individually answer the questions in Task 5.2 of the Student’s Book.
- Discuss the causes of soil erosion in Rwanda. Refer to the case study of the Student’s Book and to the text provided in the Student’s Book on the causes of soil erosion in Rwanda.
- Give the learners Activity 5.13 as a takeaway assignment in pairs. Individually ask the learners to answer the questions in Task 5.3 of the Student’s Book.
- Discuss the effects of soil erosion in Rwanda. Ask the learners to read through the short passage in the case study provided in the Student’s Book.
- Refer to the text of the Student’s Book on the effects of erosion. Wrap up the sub topic by asking the learners to do Activity 5.14 and the case study of the Student’s Book.
- Discuss soil conservation and management measures in Rwanda. Refer to the text of the Student’s Book on the soil conservation and management measures taken by Rwanda to conserve and manage soils. Ask the learners to do Activities 5.15, 5.16 and 5.17. These activities test on conservation measures.
- Discuss the importance of soils in Rwanda by referring to the text of the Student’s Book. Ask the learners to go through the case study of the Student’s Book and Activity 5.18 of the Student’s Book.
- Go through the Did you know? section of the Student’s Book. This section has interesting facts about soils in Rwanda.
- Ask each learner to individually answer the questions in the End of unit revision task that is in the Student’s Book.

### **Diagnostic questions**

1. Classify the soil types found in Rwanda and give the names of the places where they occur.
2. The soils of Rwanda have been greatly influenced by the relief of the country. Discuss.
3. Name the land forming and denudation processes that are responsible for the formation of soils in Rwanda.

### Note:

- Give the learners lesson notes to either write during the lesson or during remedial time. This will depend on your convenience.
- Remember to actively include the special education needs learners in all the learning activities. Give them extra attention to ensure that they catch up with the rest of the learners.
- Schedule for remedial lessons to ensure that the slow learners catch up with the work provided.
- Provide extra and more challenging tasks to the bright and talented learners.
- Give emphasis to environmental conservation as a cross-cutting issue to be addressed in this unit.
- Mark the activities according to how well the learners do them. Some of them might have different outcomes in the different groups or pairs that the learners work in. Remember to check out the specific skill and attitude that an activity is required to bring out in the learners.

### Suggested answers to Task 5.1

1. (a) Mark a correctly drawn sketch map of Rwanda.  
(b) Mark correct characteristics of the soils that each of the learners might have marked on the sketch map that they have drawn.

2. – Mark factors such as relief, erosion and volcanicity that are responsible for the different soil types found in Rwanda. Most of the soils as a result of physical and chemical alteration of the rocks that are found.  
– Mark correct answers and explanations that the learners give.
3. (a) Loam soils;
  - These are fertile soils that have the ability to support crops.
  - They have a high content of humus, salt and sand and sometimes clay.
  - They are well drained and are rarely waterlogged.
  - They have a high content of moisture which is maintained for long periods of time.
  - They are found in the Northern and Western Provinces of Rwanda.(b) Clay soils;
  - They have limited humus.
  - They have large quantities of nutrients.
  - They have the ability to retain water for a long time.

- They have a high acidic level and only support some types of crops.
  - They do not have bacteria.
- (c) Sandy soils;
- They have large particles that allow huge pore spaces.
  - They have a high level of percolation.
  - They are common in Umutara, Bugesera, Kayonza and Gatsibo areas.

## Suggested answers to Task 5.2

1. Soil erosion refers to the wearing away of the topsoil from a specific place to another by water, wind, ice and gravity.
2.
  - Water
  - Wind
  - Ice
  - Gravity
3. (a) Sheet erosion – This is a type of soil erosion where the top soils are washed by the running water such as surface runoff uniformly. This occurs mainly along slopes or on steep pieces of land that have little or no vegetation cover.
- (b) Rill erosion – This type of soil erosion occurs when several tiny channels, measuring a few centimetres deep are

created by water on a piece of land. The tiny channels are referred to as rills. The rills in rill erosion usually take a linear pattern.

- (c) Gulley erosion – Gulley erosion occurs when big depressions are created by the heavy runoff that occupies narrow rills. This water widens and deepens the rills to form gulleys. The rills created in rill erosion turn out into gullies after heavy downpours of rainfall.
- (d) Splash erosion – Splash erosion is caused by the force of pounding raindrops that hit the upper layer of soils detaching small soil particles from the unconsolidated soils.
- (e) Wind erosion – This type of soil erosion is caused by wind. Wind blows away the top soils.
4. Effects of soil erosion;
    - Low soil productivity.
    - Low soil moisture.
    - Destruction of crops.
    - It affects underground water.
    - It affects transport systems.
    - It lowers the water table.

Accept other correct answers

Measures to mitigate the effects

    - Afforestation
    - Agroforestry

- Terracing
- Contour ploughing
- Mulching
- Strip cultivation
- Crop rotation

Accept other correct answers.

### Suggested answers to Task 5.3

1. – Relief  
– Climate  
– Vegetation  
– Poor farming methods  
– Soil erodibility  
– Mining and quarrying  
– Overgrazing  
– Bush burning  
– Population pressure  
– C o n s t r u c t i o n o f infrastructure  
– Accept correct explanations of the points listed.
2. • Need for more land for settlement  
• Need for land for agriculture-both farming and livestock keeping.  
• Accept other correct explanations.

### Suggested answers to End of unit revision task

1. • Agriculture  
• Housing  
• Industrialisation  
Mark correctly described places and measures put in

2. (a) place.  
– Soil conservation refers to the prevention of soils from erosion, degradation or loss of fertility due to a number of factors. The factors include poor farming methods and soil pollution among others.

- (b) • Agro-forestry  
• Afforestation  
• Reforestation  
• Terracing  
• Mulching  
• Contour ploughing  
• Strip cultivation  
• Land rotation  
• Application of artificial and organic fertilisers  
• Reducing the number of livestock

3. (a) Climate leads to the formation of agents of erosion such as the runoff, moving glaciers and wind. In Rwanda, rainfall is the most active agent of erosion. In areas where heavy rainfall is received, the surface runoff present washes away large quantities of the top soils. On the other hand, areas such as some parts of Bugesera and the Eastern Province in general, wind erosion is dominant. When it rains,

splash erosion becomes evident.

There is also seasonal glacial erosion on the summit of Mt. Karisimbi especially during the wet season.

- (b) – The northern side has a lot of rainfall. The slopes are prone to erosion since the water from the rains easily washes away the top soils on the slopes.

Accept other correct answers and explanations.

4. Mark correctly drawn sketch maps and correctly marked soil types on the maps.

5. (a) Soil erosion refers to the wearing away of the top soil from a specific place to another by water, wind, ice and gravity.

(b) (i) Sheet erosion – This is a type of soil erosion where the top soils are washed by the running water such as surface runoff uniformly. This occurs mainly along slopes or on steep pieces of land that have little or no vegetation cover.

(ii) Rill erosion – This type of soil erosion occurs when several tiny channels, measuring

a few centimetres deep are created by water on a piece of land. The tiny channels are referred to as rills. The rills in rill erosion usually take a linear pattern.

(iii) Gully erosion – Gully erosion occurs when big depressions are created by the heavy runoff that occupies narrow rills. This water widens and deepens the rills to form gulleys. The rills created in rill erosion turn out into gullies after heavy down pours of rainfall.

(iv) Splash erosion – Splash erosion is caused by the force of pounding raindrops that hit the upper layer of soils detaching small soil particles from the unconsolidated soils.

(v) Wind erosion – This type of soil erosion is caused by wind. Wind blows away the top soils.

(c) Effects of erosion on the environment;

- Low soil productivity.
- Low soil moisture.

- Destruction of crops.
  - It affects underground water.
  - It lowers the water table.
  - It causes flooding.
  - It causes silting.
- 6.
- It affects transport systems
  - It causes flooding that is expensive to manage
  - Mark correct explanations.

Accept correct explanations from the learners.

7. (a) – Splash erosion – Splash erosion is caused by the force of pounding raindrops that hit the upper layer of soils detaching small soil particles from the unconsolidated soils.

- Rill erosion – This type of soil erosion occurs when several tiny channels, measuring a few centimetres deep are created by water on a piece of land. The tiny channels are referred to as rills. The rills in rill erosion usually take a linear pattern.
- Accept correct explanations in the context of Rwanda with the mention of specific areas where the two types of erosion occurs.

- (b) Mark correctly named and explained causes according to the different places named.

# Topic area: Physical Geography

## Sub-topic area: Weather and climate

UNIT

# 6

## Climate in Rwanda

**Key unit competence:** By the end of this unit, the learners should be able to investigate the climate and seasons of Rwanda and explain their impact on human activities.

### Unit objectives

*By the end of this unit, the learners should be able to:*

1. Recall the definition of climate.
2. Identify the various climatic zones and their characteristics in Rwanda.
3. State the factors influencing climate in Rwanda.
4. State the relationship between climate and human activities in Rwanda.



## Content map

Unit 6: Climate in Rwanda	
Number of periods	10
Introduction	Asking learners to define weather and climate and account for the climate of Rwanda. Identify the climatic zones on the map of Rwanda.
Classroom organisation	Whole class orientation followed by pair work, group work and individual work.
Equipment required	Internet access, maps, paper, pens.
Activities	<ul style="list-style-type: none"> <li>• Defining terminologies.</li> <li>• Analysing maps.</li> <li>• Describing characteristics of the climate of Rwanda.</li> <li>• Drawing maps.</li> </ul>
Competences practiced	<ul style="list-style-type: none"> <li>• Teamwork</li> <li>• Presenting findings</li> <li>• Communication</li> <li>• Critical thinking</li> <li>• Creative thinking</li> </ul>
Language	<ul style="list-style-type: none"> <li>• Discussion in groups</li> <li>• Written assignments</li> </ul>
Vocabulary acquisition	<ul style="list-style-type: none"> <li>• Terminologies related to climate</li> </ul>

Study skills	<ul style="list-style-type: none"> <li>• Writing notes</li> <li>• Drawing maps</li> <li>• Locating climatic zones on maps.</li> <li>• Organising ideas for presentation.</li> </ul>
Revision	<ul style="list-style-type: none"> <li>• Revision exercises provided</li> </ul>
Assessment	<ul style="list-style-type: none"> <li>• Ability to work in groups and communicate ideas with others</li> <li>• Ability to correctly answer the questions in the written exercises</li> </ul>
Learning outcomes	<ul style="list-style-type: none"> <li>• To define climate</li> <li>• To identify the climatic zones of Rwanda</li> <li>• To describe the climatic characteristics of the climatic zones of Rwanda</li> <li>• To state the factors that influence climate in Rwanda</li> <li>• To state the relationship between climate and human activities in Rwanda</li> </ul>

## Notes for the teacher

Guide the learners to recall the definition of weather and climate and to state the elements of weather. The climate of Rwanda is temperate. This is in spite of the country being located near the equator. Explain the factors that are responsible for the modification of the climate to become modified equatorial temperate climate. Use the map of Rwanda to identify the various climatic zones. The factors influencing climate should be clearly discussed for the learners to have a clear understanding.

Guide the learners to have a clear understanding of the factors that influence the climate of Rwanda. Use your personal experience and that of the learners to explain the climatic seasons experienced in Rwanda.

Climate and human activities are interrelated. Involve the learners in explaining the effects of the Rwandan climate on human activities. Human activities also have an effect on climate. Emphasise on the fact that the interrelationship between climate and human activities makes it necessary for human beings to utilise the environment sustainably.

### Teaching steps

- Begin the unit by asking the learners recall questions on the definition of climate. They had learnt about the climate of the world in Senior 1.
- Ask the learners to do Activity 6.1 of the Student's Book in pairs.

- Revise the definition of climate by referring to the text of the Student's Book and to the case study on the same page.
- Ask the learners to answer the questions asked after the case study.
- Describe the climate of Rwanda by making reference to the text and to the case study on the same page of the Student's Book. Ask the students to do Activity 6.2 of the Student's Book.
- Discuss the climatic zones of Rwanda by asking the learners to do Activity 6.3 of the Student's Book.
- Name the zones and study the map on Fig 6.1 of the Student's Book. The map shows the climatic zones of the country.
- Step by the step, go through the climatic zones beginning with the lowlands of Eastern Province, the Central plateau, the highlands of Gicumbi, the Congo-Nile Crest and the Birunga region, the plains of Bugarama and the Lake Kivu surroundings.
- Refer to the text of the Student's Book as you do the explanations. Remember to ask the learners to do Activities 6.4 and 6.5.
- Analyse the factors that influence the climate of Rwanda. Ask the learners to do Activities 6.6 and 6.7.
- Referring to the text of the Student's Book, go through the factors that influence or determine the climate of Rwanda.

- Ask the learners to do Activity 6.8 of the Student’s Book as a takeaway assignment. The Activity is to be done in pairs.
  - Discuss the seasons in Rwanda by asking the learners to do Activities 6.9 and 6.10. Activity 6.10 can be done as a takeaway assignment. They should name the wet and dry seasons of Rwanda and the activities that take place during the seasons.
  - Refer to the text of the Student’s Book on the climatic seasons of Rwanda.
  - Ask the learners to individually answer the questions in Task 6.1 of the Student’s Book.
  - Discuss the relationship between climate and human activities. Ask the learners to read the case study of the Student’s Book. Discuss the main points highlighted on the relationship between climate and human activities.
  - Ask the learners to do Activity 6.11 of the Student’s Book in pairs. They should then present their findings in a class discussion.
  - Go through the Did you know ? section of the Student’s Book. This section highlights interesting facts about the climate of Rwanda.
  - Ask the learners to individually answer the questions in the End of unit revision task of the Student’s Book.
2. Discuss the human activities that take place during the dry and wet seasons in Rwanda.
  3. Discuss the role of relief in determining the climate of Rwanda.

**Note:**

- Give the learners lesson notes to either write during the lesson or during remedial time. This will depend on your convenience.
- Remember to actively include the special education needs learners in all the learning activities. Give them extra attention to ensure that they catch up with the rest of the learners.
- Schedule for remedial lessons to ensure that the slow learners catch up with the work provided.
- Provide extra and more challenging tasks to the bright and talented learners.
- Give emphasis to environmental conservation as a cross-cutting issue to be addressed in this unit.
- Mark the activities according to how well the learners do them. Some of them might have different outcomes in the different groups or pairs that the learners work in. Remember to check out the specific skill and attitude that an activity is required to bring out in the learners.

**Diagnostic questions**

1. Give reasons why the climate of Rwanda is temperate yet Rwanda lies close to the equator.

## Suggested answers to Task

### 6.1

1. Mark answers where the learners have discussed the relief of the different climatic regions of Rwanda and explain the relationship between the relief and the micro-climates of the specific regions. This justifies the reason why Rwanda does not have a uniform type of climate.
2.
  - The lowlands of Eastern Province
  - The Central Plateau
  - The highlands of Gicumbi
  - The Congo-Nile Crest
  - The Birunga region
  - The Plains of Bugarama
  - The Lake Kivu surroundings.
3.
  - Altitude
  - Latitude
  - Vegetation
  - Presence of water bodies
  - Influence of winds
  - Human activity

## Suggested answers to the End unit assessment

1. (a) Most of Rwanda is of a high altitude. The altitude of the country ranges from between 1000-4500m above sea level. This high altitude is caused by the mountainous terrain of the country. The high altitudes of the mountains and hills of the country

greatly influence the climate of the country. They are responsible for the temperate climate adopted by the country. The country largely experiences relief rainfall in areas such as the Congo Nile crest, north-west and Birunga regions. These areas are on the windward side that receives heavy rainfall throughout the year. The amount of rainfall reduces with decrease in altitude and vice versa. (Accept correct explanations)

2.
  - The Congo-Nile Crest, the volcanoes and highland areas of Gicumbi, are the coldest areas in Rwanda. The mean annual temperatures here range between 15°C and 18°C.

In the north-west areas where the Birunga Mountains are found, the mean annual temperature falls to 12°C.

- The Eastern lowland area is one of the hottest areas in Rwanda. It has a mean annual temperature that ranges between 21°C and 24°C. The precipitation received in this area ranges between 800-1000mm. However, in some seasons, some parts of this region

receive rainfall that is below 800 mm. The high temperatures are mainly due to the absence of dense vegetation due to unreliable rainfall and dry winds.

(Accept correct explanations.)

3. The climate has influenced farming activities due to the adequate and reliable rainfall as well as the good fertile soils. This encourages the growth of vegetation such as forests that encourage tourism in the area.

(Accept correct answers.)

4.
  - The relief of Rwanda is dominantly hilly, mountains and with plateaus. These features have had a direct influence on the temperatures and amount of rainfall received in the country. The nature of the country's relief is responsible for the temperate type of climate. A good example is the areas in the northern and western parts of the country.
  - The prevailing winds that blow towards the country carry little or no moisture. This mostly affects parts of the Eastern Province.

The south-east trade winds carry a lot of moisture from the Indian Ocean. The moisture is then dropped in the southern highland areas of Tanzania. By the time the winds reach the Eastern region of Rwanda, they are completely dry hence the semi-arid conditions in the area.

- Rwanda has inadequate forests. The presence of forests assists in keeping the climate equatorial. The absence of dense vegetation in some areas such as in Bugesera has disrupted the hydrological cycle leading to the creation of semi-arid climatic conditions in the area thus receiving unreliable rainfall. However, the government's intervention of preserving and planting more trees has assisted in reversing this trend. The efforts are still work in progress.
- Human activities are also directly responsible for the absence of a true equatorial type of climate in Rwanda. These activities include poor farming methods, deforestation, mining and construction and the establishment of settlements due to the

- increasing population. This has caused great pressure on the land leading to the destruction of vegetation.
- Rwanda has few wetlands and large water bodies which would be supportive to the occurrence of an equatorial type of climate through the hydrological cycle. The absence of such water bodies has limited the humid conditions that are associated with the equatorial climate.
5. – Lack of vegetation.
- Lack of wetlands.
  - Prevailing winds.
  - (Mark correct explanations)
6. – Human activities such as agriculture depend on a good climate. A favourable climate has adequate and reliable rainfall and conducive temperatures. Crops need reliable and well distributed rainfall and ideal temperatures. This is the reason why in places where rainfall is low, farming as a human activity is challenging. On the other hand, poor farming methods such as monoculture and overgrazing that affect the environment also affect the climate of an area. The state of the environment and climate are directly linked.
- An activity like fishing is directly influenced by climate. The continued existence of wetlands and other water bodies is supported by the availability of rainfall. The presence of rainfall in a region is also supported by the presence of water bodies in the area. Aquatic animals also need conducive temperatures for their existence. On the other hand, the reclamation of wetlands and swamps by humans in search of land for fish farming and the draining of these areas interrupt the hydrological cycle. Eventually, these activities affect the climate.
  - Favourable climates have led to the occurrence and presence of many features such as forests, grasslands, wetlands and water bodies. These features form tourist attraction sites. Humans have immensely invested in tourism as a result of favourable climatic conditions. This mostly happens in areas where the temperatures and sunshine favour sunbathing. On the flip side, tourists who

camp in forested areas and in savannahs contribute to the destruction of the environment. Camp fires pollute the air and sometimes are a cause of wildfires. The degraded environment eventually affects the climate of an area.

- A good climate with reliable rainfall supports mining especially of alluvial mineral deposits. These deposits occur in alluvial soils which come into existence due to the presence of rivers and lakes. However, the mining of minerals such as micro-diamonds leave the environment degraded. This allows global warming a condition that affects the climate.
  - Industrialisation as a human activity is also affected by and affects climate. Some industries such as agro and water bottling industries depend on a good climate with reliable rainfall. The industries get raw materials from agriculture and water bodies which also directly depend on climate. The
- industries have to be established in areas that have favourable climate characterised by reliable rainfall. On other hand, such industries pollute the atmosphere in the areas where they are located. This increases the threat of global warming and its ill-effects.
- Settlements of all kinds both in rural and urban areas are influenced by climate. Many people prefer staying in areas with favourable climates. This increase in population puts pressure on the resources in the environment. Vices such as deforestation and pollution increase where there is a high population. These pose a serious climatic challenge.
7. Mark correct answers on the ways in which the environment can be conserved.
  8. Mark correctly drawn sketch maps of Rwanda and well described climatic zones.



# Topic area: Physical Geography

## Sub-topic area: Vegetation

UNIT

# 7

# Vegetation in Rwanda

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**Key unit competence:** By the end of this unit, the learners should be able to explain the importance of different vegetation types and evaluate methods of conservation in Rwanda.

### Unit objectives

*By the end of this unit, a learner should be able to:*

1. Give the meaning of vegetation.
2. Name the types of vegetation.
3. Give the importance of vegetation.
4. Identify the factors influencing vegetation.
5. Identify the causes of destruction of vegetation.
6. Identify measures of conserving vegetation.

## Content map

Unit 7: Vegetation in Rwanda	
Number of periods	8
Introduction	Asking learners to define vegetation and name the types of vegetation.
Classroom organisation	Group work to be conducted in field excursions, pair work, whole class orientation and individual work.
Equipment required	Cameras, note books, pens.
Activities	<ul style="list-style-type: none"> <li>• Taking photographs</li> <li>• Writing notes</li> <li>• Discussion</li> <li>• Identifying vegetation</li> <li>• Describing the importance of vegetation</li> <li>• Making a class presentation</li> </ul>
Competencies practiced	<ul style="list-style-type: none"> <li>• Teamwork</li> <li>• Application</li> <li>• Communication</li> <li>• Interpretation</li> <li>• Literacy</li> </ul>
Language	<ul style="list-style-type: none"> <li>• Discussion in groups</li> <li>• Written assignments</li> </ul>

Vocabulary acquisition	<ul style="list-style-type: none"> <li>• Terminologies related to vegetation</li> </ul>
Study skills	<ul style="list-style-type: none"> <li>• Explaining the importance of vegetation</li> <li>• Writing notes</li> <li>• Presentation of findings</li> </ul>
Revision	<ul style="list-style-type: none"> <li>• Revision exercises provided.</li> </ul>
Assessment	<ul style="list-style-type: none"> <li>• Ability to work in groups and communicate ideas with others</li> <li>• Ability to correctly answer the questions in the revision tasks</li> </ul>
Learning outcomes	<ul style="list-style-type: none"> <li>• To define vegetation</li> <li>• To identify the types of vegetation in Rwanda</li> <li>• To explain the importance of vegetation</li> <li>• To identify the factors influencing vegetation</li> <li>• To identify the causes of destruction of vegetation</li> <li>• To identify the measures of conserving vegetation</li> <li>• To appreciate the need to manage and conserve vegetation</li> </ul>

## Notes for the teacher

Recall the unit covered in Senior 1 by defining vegetation. Using the local environment, engage learners in discussing the types and importance of vegetation. A field study will be necessary to enable the learners to get first hand information on vegetation. The negative effects of vegetation should also be discussed.

Carefully explain the factors influencing the types of vegetation in Rwanda. Make use of local examples to enable the learners to have a clear understanding of the same.

Destruction of vegetation and conservation are important current issues on the environment that must be emphasised. Involve the learners in discussing the causes of destruction of vegetation and measures that are being put in place to conserve the environment. Organise for a field study in areas where destruction of vegetation and conservation are done. This will enable the learners to appreciate the importance of vegetation and the need to manage and conserve it.

## Teaching steps

- Begin the unit by defining vegetation and reminding the learners about vegetation that is the unit that they had learnt in Senior 1.
- Ask the learners to go through the case study that is in the Student's Book.

- Discuss the types of vegetation. Begin by first asking the learners to do Activity 7.1 in pairs.
- Discuss the vegetation types as you refer to the text of the Student's Book.
- Discuss the importance of vegetation in Rwanda as discussed of the Student's Book. Ask the learners to do Activity 7.2 on the importance of vegetation.
- Ask the learners to do Activity 7.3 of the Student's Book as a takeaway assignment.
- Discuss the negative effects of vegetation. Ask the learners to do Activity 7.4 in pairs. Refer to the text of the Student's Book.
- Ask the learners to individually answer the questions in Task 7.1 of the Student's Book.
- Discuss the factors that influence the types of vegetation found in Rwanda. Ask the learners to do Activity 7.5 individually. As you do the discussion, refer to the text of the Student's Book.
- Examine the causes of destruction of vegetation in Rwanda. Begin by asking the learners to do Activity 7.6 of the Student's Book. As you discuss, refer to the text of the Student's Book.
- Discuss the conservation measures put in place to protect vegetation. Begin by asking the learners to do Activity 7.8 individually and 7.9 in groups of three. Activity 7.9 is an outdoor activity that will require the learners to go outside

the classroom. Guide them in the activity.

- Referring to the text of the Student’s Book, discuss the conservation measures.
- Together with the learners, go through the Did you know? section of the Student’s Book. This section has interesting facts about the vegetation in Rwanda.
- Ask the learners to individually answer the questions in the End of unit revision task of the Student’s Book.

**Together with the learners, go through the End of unit glossary that has words that could be new to them. Diagnostic questions**

1. Discuss the vegetation patterns in Rwanda.
2. Relate the vegetation of Rwanda with the climatic zones of the country.
3. Relate the vegetation of the country to human activities.

**Note:**

- Give the learners lesson notes to either write during the lesson or during remedial time. This will depend on your convenience.

- Remember to actively include the special education needs learners in all the learning activities. Give them extra attention to ensure that they catch up with the rest of the learners.
- Schedule for remedial lessons to ensure that the slow learners catch up with the work provided.
- Provide extra and more challenging tasks to the bright and talented learners.
- Emphasise on the need to protect the environment as a cross-cutting issue in this unit.
- Mark the activities according to how well the learners do them. Some of them might have different outcomes in the different groups or pairs that the learners work in. Remember to check out the specific skill and attitude that an activity is required to bring out in the learners.

**Suggested answers to Task 7.1**

1. Vegetation refers to all the plant cover growing in a particular area.
2. – Natural vegetation.  
– Artificial vegetation.
3. Mark correctly drawn sketch maps and well marked vegetation areas showing the distribution of vegetation in the country.
4. – Source of raw materials

- Source of cheap and easily available fuel
- Source of food
- Modification of climate
- Conservation of soils
- Source of medicine
- Employment opportunities

(Mark other correctly explained answers.)

5. Negative contribution of vegetation;

- Difficulties in the establishment of infrastructure
- Pests and diseases
- Species of low economical value
- Obstacles to settlements
- Harmful wild animals
- Hideouts for thugs and smuggled goods
- Socio-economic barriers

6. Mark correct discussions from the different learners.

**Suggested answers to End of unit revision task**

1. Mark correctly drawn sketch maps and correctly marked vegetation zones.

2. Drainage

- Climate
- Altitude
- Soils
- Human activities
- Biotic factors
- Slope aspect
- Accept other correctly described factors.

3.

- Source of raw materials
- Source of cheap and easily available fuel
- Source of food
- Modification of climate
- Conservation of soil
- Source of medicine

(Mark other correctly explained answers.)

4.

- Harsh climatic conditions
- High population
- Improper farming methods
- Natural causes
- Lumbering
- Urbanisation

(Mark other correctly explained answers.)

5.

- Afforestation, reforestation, strict laws, agroforestry, forest reserves, mass education, terracing, introduction of improved plant species and green belts in urban centres.

6. Natural vegetation – This is the vegetation that grows on its own without human aid while artificial vegetation is vegetation that is planted by human beings.
7. Accept correct discussions.

# Topic area: Physical Geography

## Sub-topic area: Drainage system in Rwanda

UNIT

# 8

## Drainage system in Rwanda

**Key unit competence:** By the end of this unit, learners should be able to describe the drainage system of Rwanda and explain its relationship with human activities.

### Unit objectives

*By the end of this unit, a learner should be able to:*

1. Describe the drainage of Rwanda.
2. List the major rivers, lakes and swamps in Rwanda.
3. Describe the relationship between drainage and human activities.



## Content map

Unit 8: Drainage systems in Rwanda	
Number of periods	10
Introduction	Asking learners to define drainage and identify forms of drainage in their local environment.
Classroom organisation	Whole class orientation followed by pair work, group work and individual work.
Equipment required	Internet access, maps, photographs, atlas, paper, pens.
Activities	<ul style="list-style-type: none"> <li>• Identifying main drainage basins and features.</li> <li>• Drawing maps.</li> <li>• Locating drainage basins and features on the maps.</li> <li>• Defining terminologies.</li> <li>• Displaying maps.</li> <li>• Explaining the relationship between drainage and human activities.</li> </ul>
Competences practiced	<ul style="list-style-type: none"> <li>• Teamwork</li> <li>• Drawing</li> <li>• Communication</li> <li>• Presentation of findings</li> </ul>
Language	<ul style="list-style-type: none"> <li>• Discussion in groups</li> <li>• Presentation of findings</li> <li>• Written assignments</li> </ul>

Vocabulary acquisition	<ul style="list-style-type: none"> <li>• Terminologies related to drainage</li> </ul>
Study skills	<ul style="list-style-type: none"> <li>• Locating drainage basins and features on a map.</li> <li>• Classifying drainage basins and features based on their mode of formation.</li> <li>• Writing notes.</li> <li>• Organising ideas for presentation.</li> </ul>
Revision	<ul style="list-style-type: none"> <li>• Revision exercises provided</li> </ul>
Assessment	<ul style="list-style-type: none"> <li>• Ability to work in groups and communicate ideas with others.</li> <li>• Ability to correctly answer questions in the revision tasks provided.</li> </ul>
Learning outcomes	<ul style="list-style-type: none"> <li>• To distinguish between drainage and drainage basin</li> <li>• To identify and locate the main drainage basins and features on a map of Rwanda</li> <li>• Classify lakes in Rwanda based on their mode of formation</li> <li>• Identify the importance of wetlands</li> <li>• State the ways in which wetlands are destroyed in Rwanda</li> <li>• Identify ways that put in place to promote sustainable use of wetlands in Rwanda</li> <li>• Explain the relationship between the drainage system and human activities in Rwanda</li> </ul>

## Notes for the teacher

The definition of drainage systems and drainage basins should be clearly discussed for the learners to be able to get the correct meanings. Guide the learners in understanding the formation of the Congo and Nile drainage basins. Use the map of Rwanda to aid the learners in identifying the rivers, lakes and swamps of Rwanda.

A field visit to some of these drainage systems will enable the learners to get firsthand information about them. Photographs and videos will help to supplement the field visit. Involve the learners in identifying the sources of the rivers and classifying lakes based on their mode of formation.

Discuss the meaning, importance, challenges and ways of ensuring sustainable use of the wetlands in Rwanda.

Guide the learners to understand and appreciate the relationship between the drainage systems and human activities.

## Teaching steps

- Begin the unit on drainage by reminding the learners that this is a unit that they learnt in Senior 1. Define drainage and revise the features that make up the drainage of a country.
- Ask the learners to do Activity 8.1 of the Student’s Book individually as a way of introduction to the drainage system in Rwanda.
- Referring to the text of the Student’s Book, revise the meanings of some of the terminologies used in discussing drainage.
- Discuss the drainage of Rwanda by referring to the text of the Student’s Book and to Figure 8.1.
- Discuss the major lakes, swamps and rivers of Rwanda by referring to the text. Begin this by asking the learners to do Activity 8.2 of the Student’s Book.
- Ask the learners to individually answer the questions in Task 8.1 of the Student’s Book.
- Discuss the major rivers and drainage basins of Rwanda by referring to the text of the Student’s Book. Begin this by asking the learners to do Activity 8.3 and 8.4 of the Student’s Book in pairs.
- Study Table 8.1 and the text of the Student’s Book.
- Give the learners Activity 8.5 of the Student’s Book as a takeaway assignment.
- Discuss the major lakes and mode of formation. Refer to the text of the Student’s Book. Begin this by asking the learners to do Activity 8.6 of the Student’s Book.
- Discuss the mode of formation of the lakes by asking the learners to do Activity 8.7 of the Student’s Book. Study Table 8.2 of the Student’s Book.
- Ask the learners to individually answer the questions asked in Task 8.2 of the Student’s Book.

- List the major wetlands in Rwanda. Begin by asking the learners to do Activity 8.8 of the Student’s Book. Refer to the text on the same page.
- Discuss the importance of wetlands to the development of Rwanda. Ask the learners to do Activity 8.9 individually. As you discuss, refer to the text of the Student’s Book on the importance of wetlands.
- Discuss wetland destruction by referring to the text of the Student’s Book. Begin by asking the learners to do Activity 8.10.
- Identify the measures to promote the sustainable use of wetlands in the Student’s Book. Begin this subtopic by asking the learners to read through the case study provided in the Student’s Book.
- Ask the learners to individually answer the questions asked in Task 8.3 of the Student’s Book.
- Discuss the relationship between the drainage system of the country and the human activities that take place in the country. Make reference to the text of the Student’s Book and to Activity 8.11.
- Ask the learners to do Activity 8.12 of the Student’s Book as a takeaway assignment.
- Together with the learners, go through the Did you know? section of the Student’s Book. This section contains interesting facts about the drainage system of Rwanda.
- Ask the learners to individually answer the questions in the End of unit revision task of the Student’s Book.

### Diagnostic questions

1. Relate the drainage system of Rwanda to the climatic zones of the country.
2. Discuss how the drainage system of the country influences vegetation distribution in the country.
3. Explain the reversal of the Akagera River.

### Note:

- Give the learners lesson notes to either write during the lesson or during remedial time. This will depend on your convenience.
- Remember to actively include the special education needs learners in all the learning activities. Give them extra attention to ensure that they catch up with the rest of the learners.
- Schedule for remedial lessons to ensure that the slow learners catch up with the work provided.

- Provide extra and more challenging tasks to the bright and talented learners.
- Give emphasis on environmental conservation as a cross-cutting issue in this unit.
- Mark the activities according to how well the learners do them. Some of them might have different outcomes in the different groups or pairs that the learners work in. Remember to check out the specific skill and attitude that an activity is required to bring out in the learners.

### Suggested answers to Task 8.1

- Drainage – This refers to the distribution of water on the surface of the earth.
  - Drainage basin – This is an area of land drained by a river and its tributaries.
- Lakes - Lakes Kivu, Burera, Ruhondo, Muhazi, Mugesera, Sake, Rweru, Cyohoha, Ihema, Nasho, Hago etc.
  - Rivers – Rivers Nyabarongo, Akagera, Pfunda, Sebeya, Koko, Karundura and Rusizi among others.
  - Swamps – Rugezi swamp, Kamiranzovu, along Rivers Akanyaru, Akagera and Nyabarongo.

### Suggested answers to Task 8.2

- Drainage basins of Rwanda – The Congo and the Nile basins (Mark correct explanations and examples provided.)
- Mode of formation of various lakes of Rwanda
  - Rift valley lakes e.g Lake Kivu, Volcanic lakes e.g Lakes Burera and Ruhondo.
  - Alluvial deposition lakes e.g Lakes Ihema, Nasho, Rweru etc.
  - Depression lakes e.g Lakes Sake, Mugesera, Muhazi etc.
  - Man made lakes e.g Lakes Rwagitima, Rugeramigozi, Cyabayaga etc.

### Suggested answers to Task 8.3

- Wetlands in Rwanda – Rugezi swamp, Pfunda swamp, Kamiranzovu swamp, swamps of Akagera, Akanyaru and Nyabarongo.
- Importance of wetlands in Rwanda;
  - Source of water
  - Offers natural water purification system
  - Home to fish
  - Home to different flora and fauna
  - Source of raw materials
  - Source of food
  - Source of clay etc.

Accept other correct answers.

3. (a) 3 causes of wetland destruction in Rwanda;

- Need for more land for settlement and for agricultural activities.
- Pollution.
- Demand for wetland resources.
- Development of infrastructure.
- Water reservoirs etc.
- Accept other correct answers.

(b) Ways to promote sustainable use of wetlands in Rwanda;

- The Rwandan population should be made aware of the need to conserve and protect the wetlands.
- The government agencies involved in the conservation and protection of wetlands such as REMA and other organisations should conduct research studies so as to come up with workable solutions on the proper use, conservation and management of wetlands.
- New guidelines on the proper use, conservation and management of wetlands should be

formulated to guide the local populations.

- The government through parliament should enact new laws that clearly and specifically deal with wetlands.
- There should be compulsory eviction of people who have settled on wetland areas or those who use the wetlands without authorisation from the relevant authorities.

-Accept other correct answers

### **Suggested answers to the End of unit revision task**

1. (a) River basin – This is the land that water flows across or under on its way to a river. A river basin sends all of the water falling within it to a central river and out to an estuary or to the ocean.  
(b) There are two main drainage basins in Rwanda namely the Congo and Nile basins.
  - (i) Congo basin;
    - The main lake is Lake Kivu, rivers include; Rusizi, Sebeya, Kirimbi, Matovu, Kanundura and Kamiranzovu.

- (ii) Nile basin;
- Main rivers are Akagera and Nyabarongo.
  - Tributaries of River Akagera are Rivers Base, Bakokwe, Nyabugogo and Akanyaru.
  - Tributaries of River Nyabarongo are Rivers Rukarara, Mbirurume, Kinyango and Satinsi.

2. (a) List four rivers of Rwanda and state their sources.

River	Source
Rusizi	Lake Kivu
Sebeya	Gishwati Forest
Kirimbi	Nyungwe Forest
Matovu	Nyungwe Forest
Karundura	Nyungwe Forest
Kamiranzovu	Nyungwe Forest
Nyabarongo	Congo-Nile Crest
Akagera	Lake Rweru.

Mark any of the shown rivers.

(b) Examine the importance of rivers and lakes to the socio-economic development of Rwanda.

- Rivers and lakes are sources of water for domestic/industrial use.
- Rivers contain water which is used for irrigation.

- Rivers and lakes contain fish which is extracted and used for food.
- Some rivers contain valuable minerals such as gold which is mined.
- Some rivers have been dammed and their water is used to generate hydro-electric power e.g. River Nyabarongo.
- Some rivers have beautiful features which attract tourists.

-Accept other correct answers.

3. The drainage system is at the centre of economic development of Rwanda. Discuss.

- Drainage systems provide water which is used for irrigation to grow both food and cash crops.
- Some rivers which are navigable and lakes provide cheap means of transport for people and goods.
- Some rivers provide water that is used to generate hydro-electric power which encourages industrialisation and mining.
- Some rivers have features that attract tourists.

- Drainage system form habitats for fish leading to development of the fishing industry.

Accept other correct answers

4. (a) Analyse causes of wetland destruction in Rwanda.

- Drainage of wetlands to create more land for agriculture and settlement.
- Poor disposal of domestic and industrial wastes pollutes the wetlands.
- High demand for wetland resources such as sand and swamp vegetation for roofing has led to over-exploitation.
- The creation of dams along the rivers reduces the water supply to the wetlands.
- Accidental fire outbreaks destroy swamp vegetation.

-Accept other correct answers

(b) Explain the measures put in place to ensure sustainable utilisation of wetlands in Rwanda.

- Creation of public awareness through the mass media on the importance

of protection and conservation of the wetlands.

- Establishing government agencies such as REMA to oversee the management and conservation of the wetlands.
- Enactment and enforcement of laws that govern the utilisation of the wetlands.
- Put more effort to prevent the outbreaks of fire that damage the wetlands.
- Sensitisation of people and industries on proper waste disposal to control pollution.

5. “Drainage systems and human activities are inseparable.” Discuss.

- Drainage systems influence the establishment of economic activities in several ways.
- They provide water which is used for irrigation to grow both food and cash crops.
- Some rivers which are navigable and lakes provide cheap means of transport for people and goods.



- Some rivers provide water that is used to generate hydroelectric power which encourages industrialisation and mining.
- Some rivers have features that attract tourists.

-Accept other correct answers

6. To what extent are man's activities influenced by drainage systems in Rwanda?

- Drainage systems provide water for domestic or industrial use.
- Drainage systems provide water for irrigation.
- Drainage systems such as navigable rivers and lakes are used for water transport.
- Drainage systems provide water for generation of hydroelectric power which

is used for domestic and industrial purposes.

- Features on drainage systems are tourist attractions.
- Drainage systems are habitat for fish leading to fishing.
- Some drainage systems contain valuable minerals leading to mining.
- Clay found along rivers is used as a raw material in ceramics, tiles and brick industries.
- Drainage systems lead to formation of rainfall which encourage agriculture.
- Swamp vegetation is harvested and used in making art and craft items.
- Drainage systems are used for research purposes.

# Topic area: Human and Economic Geography

## Sub-topic area: Population

UNIT

# 9

## Population in Rwanda

**Key unit competence:** By the end of this unit, the learners should be able to research demographic problems in Rwanda and evaluate their solutions.

### Unit objectives

*By the end of this unit, a learner should be able to:*

1. Give the definition of different concepts and population.
2. State the areas of high and low population densities in Rwanda.
3. Show the population structure and growth in Rwanda.
4. Identify the causes of rapid population growth and its effects in Rwanda.
5. List the types, causes and consequences of migration.

## Content map

Unit 9: Population in Rwanda	
Number of periods	14
Introduction	Asking learners to define population and name the population concepts.
Classroom organisation	Whole class orientation followed by pair work, group work and individual work.
Equipment required	Pictures, Internet, video clips, local environment.
Activities	<ul style="list-style-type: none"> <li>• Interpreting photographs</li> <li>• Discussing population concepts</li> <li>• Defining population concepts</li> <li>• Explaining population concepts</li> <li>• Calculating population concepts</li> <li>• Making presentations in class.</li> </ul>
Competences practiced	<ul style="list-style-type: none"> <li>• Teamwork</li> <li>• Interpretation</li> <li>• Communication</li> <li>• Numeracy</li> <li>• Critical thinking</li> </ul>
Language	<ul style="list-style-type: none"> <li>• Discussion in groups</li> <li>• Presentations in class</li> <li>• Written assignments</li> <li>• Terminologies related to population</li> </ul>
Vocabulary acquisition	<ul style="list-style-type: none"> <li>• Terminologies related to population</li> </ul>

Study skills	<ul style="list-style-type: none"> <li>• Writing notes.</li> <li>• Organising ideas for presentation.</li> <li>• Explaining different concepts of population.</li> <li>• Revision exercises provided.</li> </ul>
Revision	
Assessment	<ul style="list-style-type: none"> <li>• Ability to work in groups and communicate ideas with others</li> <li>• Ability to correctly answer the questions asked in the revision exercises</li> </ul>
Learning outcomes	<ul style="list-style-type: none"> <li>• To define concepts of population</li> <li>• State areas of high and low population densities in Rwanda</li> <li>• To show population growth and structure in Rwanda</li> <li>• To identify causes and effects of rapid population growth in Rwanda</li> <li>• To explain the concept of migration</li> <li>• To comprehend the role of every individual in making sure that genocide never happens again in Rwanda</li> </ul>

## Notes for the teacher

When discussing the concepts on population, focus on the population of Rwanda. Engage the learners as much as possible in the discussion so that they can have a clear understanding of the population concepts.

Make sure that the learners get the correct definition of the population concepts and the factors influencing them. They should understand the factors that influence the population concepts discussed.

Use the local environment and maps to discuss the population distribution in Rwanda. Emphasise on the factors that influence the population distribution in the country. The learners have to fully understand the meaning of population structure and give the characteristics of the population of Rwanda.

Guide the learners in discussing population growth in Rwanda. Clearly indicate that population growth can either be positive or negative. Involve the learners in explaining the positive and negative effects of population growth in Rwanda and possible solutions to rapid population growth in the country. Guide the learners to discuss the types, causes and consequences of migration.

## Teaching steps

- Begin the lesson by asking the learners recall questions on facts about population that they had learnt in earlier classes.
- Ask the learners to do Activity 9.1 of the Student’s Book individually.

- Give the learners time to do Activity 9.2 where they will be required to define the population concepts listed by use of the Internet and Geography textbooks.
- Begin the discussion on the definitions by discussing the birth rate. Ask the learners to read through the case study of the Student’s Book and to answer the questions that follow it.
- Go through Example 1 given of the Student’s Book on how to calculate the birth rate of a given population.
- Individually ask the learners to answer the questions in Task 9.1 of the Student’s Book.
- Discuss the death rate of a population. Begin this by asking the learners to do Activity 9.3 of the Student’s Book.
- Briefly discuss the growth rate of a population by referring the Student’s Book. Give the learners to do Activity 9.4 of the Student’s Book in pairs as a takeaway assignment.
- Discuss the fertility rate of a population. Refer to the text of the Student’s Book. Give the learners Activity 9.5 of the Student’s Book as a takeaway assignment.
- Discuss life expectancy of a population with reference to the population in Rwanda. Begin this section by asking the learners to do Activity 9.6 in order to understand the life expectancy of a population.

- Discuss while referring to the text on page 164 of the Student's Book.
- Briefly take the learners through the population of Rwanda and its characteristics. Refer to Activity 9.7 of the Student's Book and the text of the Student's Book.
- Discuss population distribution and density in Rwanda while referring to Activity 9.8 and the text of the Student's Book.
- Explain the factors that influence population distribution in Rwanda. Begin by asking the learners to do Activity 9.9 in groups of three.
- After the presentation of the activity findings, go through the factors highlighted in the Student's Book.
- Ask the learners to do Activity 9.10 of the Student's Book as a takeaway assignment.
- Discuss the population structure of Rwanda. Ask the learners to individually do Activity 9.11 of the Student's Book. Define population structure and focus on Figure 9.2 of the Student's Book that shows the population structure of Rwanda. Refer to the text of the Student's Book.
- Discuss population growth in Rwanda with reference to Activity 9.12 of the Student's Book.
- Discuss the factors that influence population growth in Rwanda. Refer to the text of the Student's Book as you do the discussion.
- Discuss the consequences of rapid population growth in Rwanda. Ask the learners to do Activities 9.13 and 9.14 of the Student's Book individually and to also answer the questions in Task 9.2 of the Student's Book.
- Make reference to the text as you analyse the consequences of rapid population growth in the country. Discuss both the positive and negative effects.
- Ask the learners to do Activity 9.15 as a takeaway assignment.
- Discuss the solutions to the rapid population growth. Ask the learners to read through the case study of the Student's Book. Referring to the text of the Student's Book, go through some of the solutions of rapid population growth.
- Discuss the concept of migration by asking the learners to do Activity 9.16 of the Student's Book. Define migration.
- Discuss the types of migrations by asking the learners to do Activity 9.17 of the Student's Book.
- Referring to the text and to the case study, discuss the types of migration.
- Discuss the causes of migration by referring to the case study and text of the Student's Book.

- Explain the consequences of migration in reference to Rwanda and her neighbours. Refer to the case study and to the text of the Student's Book. Remember to discuss both the positive and the negative consequences.
- Together with the learners, go through the Did you know? section of the Student's Book. This section contains interesting facts about Rwanda's population.
- Ask the learners to individually answer the questions in the End of unit revision task of the Student's Book.

### Diagnostic questions

1. Owing to the land area of Rwanda, discuss the consequences of the rapid population growth rate of the country.
2. Suggest homegrown solutions that can be used by the government to contain the population of the country.
3. Is the population in Rwanda fairly distributed? Discuss.

### Note:

- Give the learners lesson notes to either write during the lesson or during remedial time. This will depend on your convenience.
- Remember to actively include the special education needs learners in all the learning activities. Give them extra attention to ensure that they catch up with the rest of the learners.

- Schedule for remedial lessons to ensure that the slow learners catch up with the work provided.
- Provide extra and more challenging tasks to the bright and talented learners.
- Give emphasis on genocide studies as a cross-cutting issue. This is an event in the history of Rwanda that affected the population of Rwanda and caused migration of people to other countries.
- Mark the activities according to how well the learners do them. Some of them might have different outcomes in the different groups or pairs that the learners work in. Remember to check out the specific skill and attitude that an activity is required to bring out in the learners.

### Suggested answers to Task 9.1

1.
  - Source of labour to the country.
  - Source of revenue to the government.
  - Available markets for manufactured goods.
  - Adequate exploitation of resources.
  - Urbanisation.
  - Industrialisation.

2. – Destruction of wetlands and forests in search of land for agriculture and settlement
- Pollution.
- Overexploitation of resources. such as water and soils .
- Accept other correct answers.

### Suggested Answers to Task 9.2

1. – Source of labour
- Source of revenue
- Creation of markets
- Exploitation of resources
- Urbanisation and industrialisation
- Mark correct explanations
2. – Pressure on land
- Environmental degradation
- Mark correct explanations

### Suggested answers to End of unit revision task

1. (a) **Birth rate** - the number of new born babies per every 1000 people of the total population of a given place.
- (b) **Death rate**- the number of people who lose lives per every 1000 people of the total population.
- (c) **Growth rate** - the natural change in the numbers of a population. A population will either increase or decrease.
- (d) **Life expectancy** - the average period or number of years that a person expects to live.
2. The population of Rwanda is not

evenly distributed. Some areas such as Kayonza, Nyagatare and Bugesera districts are sparsely populated while others such as Nyabihu, Nyarugenge, Musanze, Burera and Rubavu districts are highly populated.

3. – Physical factors that include; climate, water supply, vegetation, relief, soil and biotic factors.
- Human factors that include; urbanisation, security and political stability, historical factors, farming systems, government policy, transport and communication facilities, industrialisation and social services.
4. The population of Rwanda is youthful in nature. About 42.1% of the total population is made up of people between 0-14 years of age. 18.9% of the total population is made up of people who are between 15-24 years of age. 32.5% of the population is made up of people who are between 25-54 years of age. 4% of the population is made up of people between 55-64 years of age. 2.5% of the population is made up of people who are 65 years and over. The population structure of Rwanda shows that females are more than males. It has a sex ratio of 93 males to 100 females. The total dependency



ratio of Rwanda is also high. It stands at about 78.1%.

5. (a) – Religion  
– Early marriages  
– High birth and fertility rates  
– Polygamous marriages
- Improved health care
  - Accept correct explanations.
- (b) – Source of labour  
– Source of revenue  
– Creation of markets  
– Exploitation of resources  
– Urbanisation and industrialisation

Accept correct explanations.

6. (a) Types of migration – voluntary migration, involuntary migration, temporary migration, permanent migration and internal migration.
- (b) Causes of migration in Rwanda;
- Shortage of land
  - Insecurity
  - Government policy
  - Religion
  - Education
  - Accept correct explanations.
- (c) Consequences of migration that are evident in Rwanda;
- Mark correct answers that are applicable to the case of Rwanda.

# Topic area: Human and Economic Geography

## Sub-topic area: Settlement and urbanisation

# Rural and urban settlement in Rwanda

UNIT  
**10**

**Key unit competence:** By the end of this unit, the learners should be able to describe, explain and evaluate the impact of rural and urban settlements on sustainable development in Rwanda

### Unit objectives

*By the end of this unit, a learner should be able to:*

1. Name the various types of rural settlements.
2. State the factors and effects of rural settlement.
3. Give the characteristics and functions of urban centres in Rwanda.
4. State the factors favouring the growth of urban centres in Rwanda.
5. Identify the major urban centres of Rwanda.
6. Identify the effects of urban settlements.

## Content map

Unit 10: Rural and urban settlement in Rwanda	
Number of periods	26
Introduction	Asking learners to define settlement and identify the types of settlements.
Classroom organisation	Whole class orientation followed by pair work, group work and individual work.
Equipment required	Photographs, Internet, video clips, pens and paper and maps.
Activities	<ul style="list-style-type: none"> <li>• Interpreting photographs.</li> <li>• Discussion.</li> <li>• Drawing diagrams.</li> <li>• Displaying diagrams.</li> <li>• Making a class presentation.</li> <li>• Writing notes.</li> </ul>
Competences practiced	<ul style="list-style-type: none"> <li>• Teamwork</li> <li>• Communication</li> <li>• Literacy</li> <li>• Application of knowledge</li> <li>• Interpretation</li> </ul>
Language	<ul style="list-style-type: none"> <li>• Discussion in groups</li> <li>• Class presentations</li> <li>• Written assignments</li> </ul>
Vocabulary acquisition	<ul style="list-style-type: none"> <li>• Terminologies related to settlement</li> </ul>
Study skills	<ul style="list-style-type: none"> <li>• Writing notes</li> <li>• Analysis of photographs</li> <li>• Organisation of information for presentation</li> </ul>

Revision	
Assessment	<ul style="list-style-type: none"> <li>• Revision exercises provided</li> </ul>
Learning outcomes	<ul style="list-style-type: none"> <li>• Ability to work in groups and present the findings</li> <li>• Describing rural settlements</li> <li>• Stating the characteristics of rural settlements</li> <li>• Explaining the factors influencing the establishment of rural settlements</li> <li>• Stating the problems and solutions of rural settlements</li> <li>• Identifying government policy towards rural settlements</li> </ul>

## Notes for the teacher

Introduce the unit by asking the learners to identify the settlements in their local environment such as in the villages, towns and cities. Classify the settlements as rural and urban.

Use field study and personal experiences to discuss rural and urban settlements. Guide the learners by explaining the factors influencing the establishment of rural and urban settlements together with their characteristics.

Discuss the functions of rural and urban settlements. Guide the learners by explaining the problems and solutions of rural and urban settlements. Discuss the reasons for the government's policy on rural settlements in the country. Discuss the few selected urban centres in Rwanda.

## Teaching steps

- Begin the unit by defining settlements. Ask the learners to do Activity 10.1 of the Student's Book.
- Briefly introduce rural settlements by referring to the text of the Student's Book.
- Discuss the types of rural settlements by asking the learners to do Activity 10.2 and to read the text of the Student's Book. Begin by discussing the clustered or nucleated rural settlements, dispersed rural settlements, linear rural settlements and planned rural settlements.
- Ask the learners to individually answer the questions on Task 10.1 of the Student's Book.
- Discuss the characteristics of rural settlements by asking the learners to do Activity 10.3 and to refer to the text of the Student's Book.
- Discuss the factors that influence rural settlements. Ask the learners to do Activity 10.4 and to refer to the text of the Student's Book.
- Discuss the problems and solutions of rural settlements. Ask the learners to do Activity 10.5. Begin by discussing the problems first before discussing the solutions. Refer to the text as you do the discussion on the problems.
- Referring to the text of the Student's Book, discuss the solutions to the problems discussed.
- Discuss the government of Rwanda's policy on rural settlements. Begin by asking the learners to do Activity 10.6 of the Student's Book. Discuss the policy in details by referring to the text of the Student's Book.
- Ask the learners to individually answer the questions on Task 10.2 of the Student's Book.
- Introduce the discussion on urban settlements by asking the learners to do Activity 10.7 of the Student's Book. Briefly discuss the urban centres of Rwanda and discuss their characteristics and functions. Refer to the text of the Student's Book.

- Discuss the factors that favour the growth of urban centres in the country. Begin by asking the learners to do Activity 10.8 of the Student’s Book. As you discuss, refer to the text of the Student’s Book.
- Discuss the major urban centres of Rwanda by asking the learners to do Activity 10.9 of the Student’s Book.
- Begin the discussion by focusing on the functions and factors that led to the establishment of Kigali City. Ask the learners to do Activity 10.10 of the Student’s Book.
- Discuss each of the cities highlighted in the Student’s Book. Focus on Kigali City, Huye town, Rubavu town and Musanze town. Highlight their functions and the factors that led to their establishments.
- Discuss the effects of urban settlements. Refer to the case study and the text of the Student’s Book. Consider both the positive and negative effects of urban settlements.
- Ask the learners to answer the questions in Task 10.3 of the Student’s Book.
- Referring to Activity 10.11 and the text of the Student’s Book, focus on the problems and solutions associated with urban centres.
- Give the learners Activity 10.12 as a takeaway assignment.
- Discuss the development of slums, characteristics of slums, their causes, problems associated with them and solutions to their problems. Refer to the text of the Student’s Book.
- Ask the learners to do Activity 10.14 of the Student’s Book. Guide them to answer the questions asked in the activity.
- Together with the learners, go through the Did you know section? This section has some interesting facts about settlements in Rwanda.
- Ask the learners to individually answer the questions in the End of unit revision task of the Student’s Book.

### Diagnostic questions

1. Give reasons why the dominant settlement in Rwanda is rural.
2. Discuss some of the measures that the government of Rwanda has put in place to slow down the growth of slums in the urban centres of the country.
3. What are some of the advantages that Rwanda enjoys as a result of its urban centres?
4. Discuss the effects of urbanisation to the environment of the country.

### Note:

- Give the learners lesson notes to either write during the lesson or during remedial time. This will depend on your convenience.
- Remember to actively include the special education needs learners in all the learning activities. Give them extra attention to ensure that they catch up with the rest of the learners.
- Schedule for remedial lessons to ensure that the slow learners catch up with the work provided.
- Provide extra and more challenging tasks to the bright and talented learners.
- Give emphasis on the need to protect the environment as a cross-cutting issue due to the rise of urban centres and the development of slums.
- Mark the activities according to how well the learners do them. Some of them might have different outcomes in the different groups or pairs that the learners work in. Remember to check out the specific skill and attitude that an activity is required to bring out in the learners.

### Suggested answers to Task 10.1

1. A settlement refers to a place where people live.
2.
  - Clustered rural settlements
  - Dispersed rural settlements
  - Linear rural settlements
  - Planned rural settlements
3.
  - Most of the people are still poor
  - A large part of the population is illiterate
  - There is still a very low level of technology in the country
  - Most people are unemployed etc.
  - Mark other correct answers.

### Suggested answers to Task 10.2

1. The Rwandan government has dealt with rural populations through the establishment of rural settlement schemes known as the *imidugudu*. The scheme was created to deal with thousands of landless people who returned to the country after the 1994 genocide against the Tutsis. This scheme was created as part of the land reforms program in the country to promote equal sharing of land and to help the poor to build homes with the government's assistance.
2.
  - To improve the living standards of the people.
  - To promote peace and unity among the Rwandese people.
  - To utilise the natural resources in the country.

- To provide better social services to the people.
  - To provide general education and other social services.
  - To implement the government's policies and programs.
  - To settle thousands of refugees who returned after the 1994 genocide against the Tutsis.
  - To find land for the landless people in the country.
3. - Resettling of the returning refugees.
- Easy provision of better housing to low income earners.
  - Easy provision of social services.
  - Promotion of peace and security.
  - Support the land reform program.
- Accept the problem of land shortage.
4. Accept correct answers that the learners will give.

### **Suggested answers to Task 10.3**

1. Urbanisation refers to a population increase in the people living in cities and towns as opposed to the rural areas. It is the population shift from the rural to urban areas.
2.
  - They are administrative centres.
  - They host various recreational facilities.

- They have improved infrastructure and social facilities.
  - They have trade supporting aids.
  - They have a high population.
  - Accept other correct answers.
3. - Development of slums.
- High crime rates and other social ills.
  - Shortage of social services and facilities.
  - High cost of living
  - Shortage of land etc
- Accept other correct answers.
4. Mark correct answers that the students discuss.
5.
  - Creation of affordable housing facilities.
  - Creation of more employment opportunities.
  - Provision of affordable social services that will serve all, etc.
  - Accept correct answers.

### **Suggested answers to End of unit revision exercise**

1. (a) A rural settlement is considered to be any settlement in the areas defined by the government as rural. This may include even rural towns.
- (b)
  - Clustered rural settlements.
  - Dispersed rural settlements.



- Linear rural settlements.
- Planned rural settlements.

Accept correct examples and explanations.

- (c) - They have sparse settlements.
- They have poor transport network.
- They have limited social amenities.
- They have a less developed economy.
- The residents are culturally rigid.
- They are characterised by poor sanitation.

- 2. (a) - High cost of living in urban areas.
- Need for space to run businesses.
- Fertile soils
- Agricultural activities.
- Large size of families.
- Mark correct explanations and other correct answers.

- (b) - Poor transport and communication facilities.
- Low levels of education.
- Poor medical care.
- Ease of spread of

diseases.

- Lack of social services.

Accept correct explanations, solutions and answers.

- (c) Mark correct explanations on the *imidugudu* scheme.

- 3. (a) Urbanisation is the population increase in the people living in cities and towns as opposed to the rural areas. It is the population shift from the rural to urban areas.

- (b) - They are administrative centres.
- They host various recreational facilities.
- They have improved infrastructure and social facilities.
- They have trade supporting aids.
- They have high population.
- They have slum settlements.
- Accept correct answers.

- (c) - Mining
- Transport and communication
- Industrialisation
- Supportive government policies
- Historical factors
- Accept correct explanations and

- answers.
4. Accept correct functions of any four urban centres that the learners choose to discuss.
  5. (i) Positive:
    - Employment opportunities
    - Tourist attractions
    - Administration centres
 (ii) Negative:
    - Social ills
    - Development of slums
    - High insecurity
    - Accept other correct answers.
 (b) Accept correct answers that the learners discuss as solutions to the negative effects of urban centres.
  6. (a) – Rural urban migration  
 – Natural disasters  
 – Poverty  
 – Poor planning  
 – Urbanisation  
 – Accept other correct answers.
 (b) – Poor sanitation  
 – Spread of diseases  
 – Unemployment  
 – Crime  
 – Illiteracy  
 – High population  
 – Congestion and lack of privacy  
 – Degradation of the environment.
 (c) Accept correct solutions discussed by the learners to the problems discussed.

# Topic area: Human and Economic Geography

## Sub-topic area: Economic activities

# UNIT 11

## Agriculture in Rwanda

**Key unit competence:** By the end of this unit, the learners should be able to investigate the impact of various agricultural activities on sustainable development in Rwanda.

### Unit objectives

*By the end of this unit, a learner should be able to:*

1. Identify the different subsistence crops grown in Rwanda.
2. State the factors favouring subsistence farming in Rwanda.
3. Outline the advantages and disadvantages of subsistence farming in Rwanda.
4. Identify major plantation crops in Rwanda and their characteristics.
5. State the factors favouring plantation farming in Rwanda.
6. Outline the advantages and disadvantages of plantation farming.
7. State the factors for agricultural modernisation in Rwanda.
8. Outline the problems limiting agricultural modernisation in Rwanda.
9. Identify ways of improving agricultural production in Rwanda.
10. Identify the different systems of rearing animals in Rwanda and their characteristics.
11. State the factors hindering the development of dairy farming .
12. Outline the ways of improving livestock farming in Rwanda.
13. Identify the types of small animals kept in Rwanda.

14. State the factors affecting the keeping of small animals.
15. Outline the methods of improving small animals.
16. Give the importance of keeping small animals.
17. Identify the contributions of livestock farming to the economy of Rwanda.
18. Identify the problems affecting livestock farming in Rwanda.
19. State the importance of agriculture on sustainable development of Rwanda.

## Content map

Unit 11: Agriculture in Rwanda	
Number of periods	28
Introduction	Asking learners to define agriculture and to classify agriculture into crop cultivation and livestock farming.
Classroom organisation	Whole class orientation followed by pair work, group work and individual work.
Equipment required	Photographs, maps, Internet access, pens and paper.
Activities	<ul style="list-style-type: none"> <li>• Discussing agriculture</li> <li>• Interpreting photographs</li> <li>• Drawing diagrams</li> <li>• Naming agricultural practices</li> <li>• Identifying crops grown and livestock reared</li> <li>• Locating areas where crops are grown and livestock reared on the map of Rwanda.</li> <li>• Explaining factors influencing agriculture</li> <li>• Field visits</li> <li>• Identifying significance of agriculture.</li> </ul>
Competences practiced	<ul style="list-style-type: none"> <li>• Teamwork</li> <li>• Presentation of findings</li> <li>• Interpretation</li> <li>• Literacy</li> </ul>
Language	<ul style="list-style-type: none"> <li>• Discussion in groups</li> <li>• Written assignments</li> </ul>

Vocabulary acquisition	<ul style="list-style-type: none"> <li>• Terminologies related to agriculture</li> </ul>
Study skills	<ul style="list-style-type: none"> <li>• Classifying crops and types of agriculture .</li> <li>• Writing notes.</li> <li>• Organising ideas for presentation.</li> <li>• Observation.</li> </ul>
Revision	<ul style="list-style-type: none"> <li>• Revision exercises provided</li> </ul>
Assessment	<ul style="list-style-type: none"> <li>• Ability to work in groups and present the findings</li> </ul>
Learning outcomes	<ul style="list-style-type: none"> <li>• Suggest ways of improving agriculture modernisation in Rwanda</li> <li>• Study the different systems of rearing animals in Rwanda and their characteristics</li> <li>• Explaining factors that hinder the development of dairy farming</li> <li>• Suggest ways of improving livestock farming in Rwanda</li> <li>• Identifying the types of small animals kept in Rwanda</li> <li>• Study the factors that affect the keeping of small animals</li> <li>• Suggest methods of improving the keeping of small animals</li> <li>• Analyse the contributions of livestock farming to the economy of the country</li> <li>• Outline the problems affecting livestock farming in Rwanda</li> <li>• Explain the importance of agriculture on sustainable development of Rwanda</li> </ul>

## Notes for the teacher

This unit has been divided into two main areas that are crop cultivation and livestock farming in Rwanda.

Crop cultivation deals with subsistence cultivation and plantation farming while livestock farming deals with dairy farming and the keeping of small animals. The topic then deals with modernisation of agriculture that includes both crop and livestock farming.

The new terminologies and concepts should be explained clearly in order for the learners to understand. Involve the learners in the discussions as much as possible. The local environment, field visits, video clips and photographs should be of great help during the discussions. This is because they substitute the information obtained from the Student's Book. Make use of the map of Rwanda to enable the learners to locate the areas where various agricultural practices are carried out. Guide the learners in explaining the importance of modernisation of agriculture.

## Teaching steps

- Begin the lesson by asking the learners some recall questions about agriculture. It should be understood that this is not a new topic to them and it should then be easy for them to answer questions about the topic. Agriculture is also a practice that they relate with in their everyday lives as it happens in their neighbourhoods.

- Ask the learners in pairs to do Activity 11.1 of the Student's Book in pairs.
- Discuss crop cultivation by asking the learners to do Activity 11.2 of their Student's Book in pairs.
- Briefly discuss crop cultivation in Rwanda and classify the types of crop cultivation practiced in Rwanda. Focus on subsistence cultivation in the country. Ask the learners to do Activity 11.3 of the Student's Book in pairs. Define subsistence cultivation and its characteristics as you refer to the text of the Student's Book.
- Discuss the types of subsistence cultivation that are practiced in the country.
- Ask the learners to do Activity 11.4 in pairs. Discuss the small holder farming, market gardening and horticulture. Refer to the text of the Student's Book.
- Go through the examples of subsistence crops that are grown in Rwanda. Ask the learners to do Activity 11.5 of the Student's Book in pairs as they give examples of crops and the areas where they are grown in the country. Confirm the crops by going through the crops listed in the Student's Book.
- Discuss the factors that favour subsistence farming in Rwanda. Ask the learners to do Activity 11.6 of the Student's Book. Together with the learners, go through the factors highlighted on the same page.
- Discuss the advantages and

disadvantages of subsistence farming.

- Ask the learners to do Activity 11.7 of the Student’s Book. After the activity, go through the text on the advantages and disadvantages as highlighted in the Student’s Book.
- Give the learners Activity 11.8 as a takeaway assignment.
- Ask the learners to individually answer the questions in Task 11.1 of the Student’s Book.
- Define plantation farming by asking the learners to do Activity 11.9 of the Student’s Book. Ask the learners to list the crops that are grown in plantation farms in Rwanda. This is Activity 11.10 of the Student’s Book.
- Discuss the plantation crops that are discussed in the Student’s Book and the areas where they are grown.
- Ask the learners to identify the characteristics of plantation farming as it is in Activity 11.11 of the Student’s Book.
- Together with the learners discuss the characteristics of the crops mentioning the areas where they are grown. Refer to the text .
- Ask the learners to research on the factors that favour plantation farming in Rwanda. Begin by asking the learners to do Activity 11.12 and to discuss their findings, while referring to the text of the Student’s Book. Discuss both the physical and human factors that favour plantation farming.
- Analyse the advantages and

disadvantages of plantation farming. Ask the learners to do Activity 11.13 which is a field visit in order to understand the advantages and disadvantages better.

- Go through the text of the Student’s Book for reference.
- Discuss the case studies of the plantation farms that grow different crops in the country. Ask the learners to do a research on the plantation farms in the country, the areas where they are located and the crops grown in the various farms.
- Beginning with tea as the first and main plantation crop, discuss the plantation farms and the areas where they are found. Begin the study with the Kitabi tea plantation that is located in the Southern Province of the country. Refer to the text of the Student’s Book as you discuss.
- Go on to discuss the Kabuye sugar plantation as outlined of the Student’s Book.
- Ask the learners to individually answer the questions in Task 11.2 of the Student’s Book.
- Discuss agricultural modernisation in Rwanda. Ask the learners to study the photographs in Activity 11.15 and answer the questions asked in the Student’s Book.
- Discuss the factors for modernisation of agriculture in Rwanda. Ask the learners to do Activity 11. 16 of the Student’s Book. Together with the learners, go through the factors



- in the Student’s Book.
- Ask the learners to do Activity 11.17 of the Student’s Book in pairs as a takeaway assignment.
- Ask the learners to do the research on Activity 11.18 so as to find out the methods that have been used to modernise agriculture in the country. Discuss with the learners the methods that are used to modernise agriculture as outlined in the Student’s Book.
- Discuss the problems limiting modernisation of agriculture in Rwanda. Ask the learners to do Activity 11.19 in groups of three. They are required to identify the problems of modernisation of agriculture in their local environments. Highlight the problems as you make reference to the text of the Student’s Book.
- Go through the ways of improving agricultural modernisation in the country. Begin by asking the learners to do Activity 11.20 in pairs. They are required to suggest ways of improving agricultural modernisation in Rwanda. Make reference to the text of the Student’s Book to study the ways suggested.
- Ask the learners to individually answer the questions in Task 11.3 of the Student’s Book.
- Discuss livestock farming in Rwanda. Begin by asking the learners to do Activity 11.21 of the Student’s Book. Briefly go through livestock farming in the country by referring to the text of the Student’s Book.
- Discuss ranching and dairying as discussed in the Student’s Book. Ask the learners to do Activity 11.22 in pairs. They are required to define the terms listed that are used in livestock farming.
- Explain the characteristics of ranching as discussed in the Student’s Book.
- Discuss dairying and dairy farming and the characteristics of dairy farming in Rwanda. Refer to the text of the Student’s Book. Go through the types of dairy farming and the areas where dairy farming is carried out in Rwanda. Refer to the text of the Student’s Book.
- Analyse the factors that hinder the development of dairy farming in Rwanda. Ask the learners to do Activity 11.23 of the Student’s Book. This activity is a field visit.
- Go through the ways to improve livestock farming in Rwanda. In groups of five, ask the learners to do Activity 11.24 of the Student’s Book. This is a field visit to a livestock farm in the sector where the school is found. Go through the text of the Student’s Book on the suggested ways of improving livestock farming.
- Discuss the keeping of small animals in the country. Begin by defining small animals. Ask the learners to do Activity 11.25 of the Student’s Book in pairs.
- Referring to the text of the Student’s Book, discuss pig keeping, poultry farming, goat keeping, rabbit keeping and apiculture.
- Explain the factors that affect

the keeping of small animals in Rwanda. Ask the learners to do Activity 11.26 and to read the text of the Student's Book.

- Suggest methods of improving the keeping of small animals in the country by going through the highlighted methods in the Student's Book. Guide the learners in doing Activity 11.27 of the Student's Book. This is a field visit to one of the farms where small animals are kept.
- Study the importance of keeping small animals by referring to the text of the Student's Book. In groups of three, ask the learners to do Activity 11.28 of the Student's Book.
- Ask the learners to individually answer the questions in Task 11.4 of the Students Book.
- Describe the problems that affect livestock in Rwanda and their solutions. Guide the learners in doing Activity 11.29 which is a field study. Go through the text of the Student's Book.
- Analyse the contribution of livestock farming to the economy of the country. Ask the learners to go through Activity 11.30 and the text of the Student's Book.
- Wrap up the unit by studying the importance of agriculture to the economy of the country. Ask the learners to do Activity 11.31 and the text of the Student's Book.
- Ask the learners to do Activity 11.32 as a takeaway assignment.
- Ask the learners to individually

answer the questions in Task 11.5 of the Student's Book.

- Together with the learners go through the points under the Did you know section? of the Student's Book.
- Ask the learners to individually answer the questions in the End of unit revision task of the Student's Book.

### Diagnostic questions

1. Give reasons why agriculture is the backbone of Rwanda's economy.
2. Other than tea, coffee and pyrethrum, name other crops that are grown in plantations in Rwanda.
3. Differentiate between subsistence and commercial farming.

#### Note:

- Give the learners lesson notes to either write during the lesson or during remedial time. This will depend on your convenience.
- Remember to actively include the special education needs learners in all the learning activities. Give them extra attention to ensure that they catch up with the rest of the learners.
- Schedule for remedial lessons to ensure that the slow learners catch up with the work provided.
- Provide extra and more challenging tasks to the bright and talented learners.

- Give emphasis on the need to protect the environment as a cross-cutting issue. This helps in supporting agriculture.
- Mark the activities according to how well the learners do them. Some of them might have different outcomes in the different groups or pairs that the learners work in. Remember to check out the specific skill and attitude that an activity is required to bring out in the learners.

## Suggested answers to Task 11.1

1. Horticulture is the growing of vegetables, fruits and flowers for sale while market gardening is the growing of vegetables and fruits for sale in the nearby urban centres.
2.
  - Shortage of capital to engage in commercial farming.
  - Land fragmentation that has led to the shortage of land to practice large scale farming.
  - The hilly landscape is unsuitable for large scale farming thus the little available land is used for subsistence farming.
  - Use of traditional methods of farming in some areas due to remoteness.
  - Lack of awareness of other farming methods.
  - Production of similar crops

- lowers the demand for the goods hence people grow crops for subsistence.
  - The small scale farmers are not willing to abandon subsistence farming for new methods of farming.
3. Explain why subsistence farming is important to the country's economy.
    - It ensures a steady supply of food.
    - It earns farmers income since they are able to sell the excess produce from their farms.
    - It fully utilises labour since most the work is manual.
    - Different plants grown on the same piece of land provide cover to the soil reducing soil erosion.
    - Mixed cropping helps to maintain soil fertility.

## Suggested answers to Task 11.2

1. Plantation farming is necessary in Rwanda. This is because of the following reasons;
  - Plantation farming earns the government revenue which is used for economic development.
  - Plantation agriculture provides more employment to people leading to improved standards of living.
  - Plantation farming avails goods that are required locally such as sugar and tea

- thus meeting the people's needs.
- Some commodities from the plantations are exported earning the country foreign exchange which is used for economic development.
  - Plantation agriculture avails raw materials for industries leading to industrialisation in the country.
  - Plantation agriculture encourages research leading to production of high quality produce.
  - Plantation agriculture leads to the development of transport and communication networks in the rural areas making such areas more accessible.
  - Plantation agriculture leads to the establishment of social amenities in the rural areas leading to improved standards of living.
2. Challenges faced by plantation agriculture in the country;
- Monoculture causes soil exhaustion leading to low yields.
  - Price fluctuations in the world market for the agricultural produce leading to low profits.
  - Unpredictable weather conditions such as prolonged drought damage the crops leading to losses.
  - Attack by pests and diseases
- destroy the crops leading to losses.
- Overproduction of some plantation crops flood the market leading to decline in prices.
  - Stiff competition from other countries that practice plantation agriculture leading to low demand.
  - Some plantations are owned by foreigners who repatriate the profits to their home countries. This leaves the host country with little income.
3. Ways in which plantation agriculture can be improved in Rwanda.
- The government can provide capital to local investors to practice plantation farming.
  - The government should fund research on better farming methods and high quality crop varieties.
  - Modernisation of plantation farming in order to increase yields and quality.
  - Training of personnel in order to provide skilled labour in the plantations.
- Suggested answers to Task 11.3**
1. Ways in which modernisation of agriculture will improve agricultural productivity in the country.
- Modernisation of agriculture will enable people to take farming as a commercial

activity and thus lead to increased income.

- Modernisation of agriculture will result in increased yields making the country food secure.
  - Modernisation will make farming easier.
2. Modernisation of agriculture is not taking place as it should in the country due to the following reasons;
- Shortage of capital
  - Steep and rugged terrain that hinders mechanisation.
  - Unreliable rainfall
  - Shortage of skilled labour
  - Poor storage facilities
  - Accept other correct answers
3. Measures that should be taken to ensure that the citizens of Rwanda embrace modernisation of agriculture include the following;
- Encourage farmers to form co-operative societies to enable them acquire capital and to market their produce.
  - Cross-breeding local livestock breeds with exotic ones to improve quality and yields.
  - Use of early maturing and high yielding seed varieties.
  - Educating the public on the benefits of modernisation of agriculture.
  - Implementation of land reform programmes “*imidugudu*” in order

to create more land for agriculture.

- Accept other correct answers

#### **Suggested answers to Task 11.4**

1 – 4 Mark current proposals by the various groups of Students

#### **Suggested answers to Task 11.5**

1. Differentiate between;
- (a) – Ranching and dairy farming.
- Ranching is the keeping of large herds of cattle or sheep often grazing on communal land and following natural cycles of reproduction.
  - Dairy farming is the keeping of animals for commercial purposes for milk production.
- (b) – Livestock farming and small animal keeping.
- Livestock farming is the rearing of domesticated animals such as cattle, sheep, goats, pigs for food, milk, meat, fibre and labour.
  - Small animal keeping is the keeping of animals such as rabbits, sheep, goats, pigs, bees and poultry for domestic and commercial purposes.

2. Problems affecting livestock in Rwanda.

- Harsh climatic conditions e.g. drought leading to shortage of water and pasture.
- Inadequate capital to modernise livestock keeping and to purchase the farm inputs.
- Lack of sufficient market for the livestock products.
- Shortage of skilled labour hinders modernisation of livestock keeping.
- Poor transport and communication networks.
- Pests and diseases attack the crops and livestock leading to low yields.
- Accept other correct answers

3. Solutions to the problems affecting livestock.

- Encouraging farmers to form co-operative societies to market their produce.
- Provision of credit facilities to the farmers through the financial institutions.
- Cross-breeding of indigenous animals with exotic breeds to improve their quality and yield.
- Training of farmers on better farming methods.
- Provision of commercial feeds to supplement natural pastures.

Accept other correct answers

## Suggested answers to the End of unit task

1. Reasons why the hilly terrain of Rwanda is a problem to agricultural modernisation;

- Steep and rugged terrain hinders mechanisation.
- Soils in the steep and rugged terrain are prone to soil erosion.
- The steep and rugged terrain hinders movement of livestock.
- The steep slopes have thin soils which are unsuitable for crop growing.
- The steep and rugged terrain is not connected by road and is therefore inaccessible.
- The steep terrain is unsuitable for irrigation farming since the water drains away faster.

2. (a) Commercial livestock farming is the rearing of livestock such as cattle, sheep and goats for sale.

(b) Challenges faced by the livestock farmers in Rwanda;

- Harsh weather conditions such as drought cause shortage of water and pasture.
- Pests such as ticks and diseases such as anthrax attack the animals leading to low yields or death of the animals.

- Shortage of market for the livestock products such as milk.
  - Poor road network and muddy roads in some areas cause losses due to spoilage of milk.
  - Shortage of capital to purchase farm inputs leads to low yields.
- (c) Physical conditions that favour ranching in Rwanda;
- Availability of large tracts of land for grazing.
  - Availability of water from rivers and wells for the animals to drink.
  - Availability of rainfall that supports the growth of pasture.
3. Role played by agriculture in industrial development.
- Agricultural produce provides raw materials leading to development of industries.
  - Agriculture provides market for some industrial products e.g. machinery, fertiliser.
4. (a) Land consolidation is the planned readjustment and rearrangement of land parcels and their ownership to form larger and more rational land holdings.
- (b) Identify and explain factors that have hindered land use in Rwanda.
- Population pressure on land has caused land fragmentation to form small units that are uneconomical to develop.
  - Steep and rugged terrain discourages agriculture.
  - Little and unreliable rainfall in some areas limits agricultural modernisation.
  - Poor soils in some areas discourage crop farming.
  - Some farms are located in inaccessible areas which discourage agriculture.
5. (a) Factors which have favoured the growing of coffee and tea in Rwanda.
- Moderate temperatures
  - Deep soils
  - Well drained soils
  - Volcanic soils
  - Gently sloping landscape
  - Absence of pests and diseases.
- (b) Analyse the benefits of either coffee or tea to the people of Rwanda.
- Processed tea is exported earning

the country foreign exchange which is used for economic development.

- Tea growing creates more employment opportunities to people leading to improved standards of living.
- The sale of tea is a source of income to the farmers leading to improved standards of living.

- Tea leaves are used as a raw material leading to establishment of tea processing factories which encourage industrialisation in the country.
- Growing of tea has led to the development of roads in the tea growing areas leading to increased accessibility.

Accept other correct answers.

(c) Problems faced by farmers who plant tea or coffee.

- Pests such as termites and beetles attack the crops lowering the yields leading to low income to the farmers.
- Diseases such as root rot attack the plants lowering the yields leading to low income to the farmers.
- Adverse weather conditions such as hail stones/ frost/ prolonged drought destroy the crop lowering the yields leading to low income to the farmers.
- Poor feeder roads cause delayed delivery of the green tea leaves



- lowering quality.
- High cost of farm inputs reduces the farmers' profit margins thus discouraging the farmers.

Accept other correct answers

6. To what extent have physical factors been responsible for the development of plantation farming in Rwanda?
- Heavy and reliable rainfall/2030mm – 2346mm provides adequate water to support perennial plantation crops.
  - Moderate temperatures favour maturity and ripening of crops.
  - Deep fertile, well drained volcanic soils enhance the growth of the plantation crops.
  - The gently sloping landscape encourages the growth of the crops due to good drainage.
  - Pest and disease free areas are suitable for plantation farming.
7. The contribution of agricultural co-operative societies to the development of Rwanda;
- Co-operative societies provide employment opportunities to people thus reducing unemployment in the country.
  - They provide credit facilities to the farmers enabling them to purchase the farm inputs.
  - The co-operatives market the agricultural produce on behalf of the farmers.
  - They collect the farm produce and deliver them to the factories/market on behalf of the farmers.
  - They buy farm inputs in bulk and sell them to the farmers at lower prices.
8. (a) Main features of improved subsistence farming in Rwanda;
- The farm sizes are small.
  - High yields per unit area.
  - Farmers use modern scientific farming methods.
  - Capital intensive
  - It is market oriented
  - Farms are intensively cultivated.
- (b) The contribution of small holding farming to the socio- economic development of Rwanda;
- Source of food
  - Provides employment
  - Surplus produce are sold to earn income to the farmers

9. Explain the following agricultural concepts;
- (i) Market gardening
    - The growing of crops and rearing of animals near market areas.
  - (ii) Subsistence farming
    - The growing of crops for home consumption e.g. beans, peas, maize, sweet potatoes.
  - (iii) Plantation agriculture  
This is a form of commercial farming where crops are grown for profit.
  - (iv) Pastoralism
    - This is a form of animal agriculture practiced by nomadic people with large, migratory herds and flocks grazing over communal lands. The movement is in search of water and pasture.
  - (v) Ranching
    - This is a form of commercial agriculture involving keeping of large herds of cattle or sheep often grazing on communal land and following natural cycles of reproduction.
10. (a) Agricultural modernisation is the process of transforming the agricultural sector into one that is dynamic, technologically advanced and competitive, yet centred on human resource development, guided by the sound principles of social justice.
- (b) Factors that have favoured the development of agricultural modernisation in Rwanda;
- Availability of capital to purchase modern farming equipment.
  - Government policy on land reform to avail more land for modern agricultural practices.
  - Use of research findings and discoveries in agricultural activities.
  - Commercialisation of agriculture in order to increase yields.
  - Availability of skilled labour for use in modernising agricultural practices.
  - Improved technological advancements in the country leading to improved farming methods.

-Accept other correct answers

11. The challenges that have hindered the implementation of agricultural modernisation in Rwanda;
- Lack of capital
  - Unfavourable topography with steep slopes and rugged terrain.
  - Unfavourable climatic conditions such as little and unreliable rainfall.
  - Shortage of skilled labour.
  - Poor storage facilities.
  - Accept other correct answers.
12. Account for low agricultural productivity in Rwanda;
- Harsh climatic conditions such as prolonged drought.
  - Inadequate capital to purchase modern farm equipment to modernise farming.
  - Shortage of skilled labour.
  - Poor transport network
  - Lack of sufficient markets for agricultural products.
  - Attack by crop and animal pests and diseases.
  - Stiff competition from other neighbouring countries that produce similar agricultural goods.
13. (a) Crops grown in Rwanda under plantation agriculture;
- Coffee, tea, sugarcane and coffee.
- (b) Characteristics of plantation agriculture in the Rwandan context;
- Crops are grown on a large scale.
  - Monoculture is practiced.
  - It utilises a large labour force.
  - Heavy capital investment.
  - It is practiced for commercial purposes.
- Accept other correct answers
14. Difference between small animal farming and ranching in Rwanda.
- Small animal farming refers to the keeping of animals such as rabbits, sheep, goats, bees and poultry.
  - Ranching is the practice of raising grazing livestock or herds of animals such as cattle or sheep for meat, wool, skin or hides on large tracts of land.

15. Account for the successful development of small animal farming in Rwanda.

- Cross-breeding of the animals with exotic breeds to improve the breed quality.
- Feeding of the animals with fodder to supplement the natural pasture.
- Availability of veterinary services.
- Constant cleaning of the places where the animals are kept.
- Purchasing of animals or birds to be reared from reliable sources.

# Topic area: Human and Economic Geography

## Sub-topic area: Economic activities

# UNIT 12

## Forestry in Rwanda

**Key unit competence:** By the end of this unit, learners should be able to investigate the impact of forests and forestry on sustainable development in Rwanda.

### Unit objectives

*By the end of this unit, a learner must be able to:*

1. Define forest and forestry.
2. Identify the major forested areas of Rwanda.
3. List the factors influencing forest exploitation.
4. State different methods of lumbering in Rwanda.
5. Give the importance of forests and forestry in Rwanda.
6. Outline the products of lumbering in Rwanda.
7. Identify the problems affecting forest exploitation in Rwanda.
8. State the causes and effects of deforestation in Rwanda.
9. State the measures for forest conservation in Rwanda.

## Content map

Unit 12: Forestry in Rwanda	
Number of periods	14
Introduction	Asking the learners to define forests and forestry.
Classroom organisation	Whole class orientation followed by pair work, group work and individual work.
Equipment required	Photographs, maps, Internet access, pens and paper.
Activities	<ul style="list-style-type: none"> <li>• Defining forests and forestry.</li> <li>• Interpreting photographs.</li> <li>• Drawing maps.</li> <li>• Naming forests.</li> <li>• Locating forests on the map of Rwanda.</li> <li>• Describing the characteristics of the various forests in Rwanda.</li> <li>• Explaining concepts related to forestry.</li> </ul>
Competences practiced	<ul style="list-style-type: none"> <li>• Teamwork</li> <li>• Presentation of findings</li> <li>• Interpretation</li> <li>• Communication</li> <li>• Literacy</li> </ul>
Language	• Discussion in groups
Vocabulary acquisition	• Terminologies related to forestry

Study skills	<ul style="list-style-type: none"> <li>• Locating forests on a map.</li> <li>• Writing notes.</li> <li>• Organising ideas for presentation.</li> <li>• Revision exercises provided.</li> </ul>
Revision	<ul style="list-style-type: none"> <li>• Ability to work in groups and communicate ideas with others.</li> </ul>
Assessment Learning outcomes	<ul style="list-style-type: none"> <li>• To define forests and forestry</li> <li>• Locating the major forested areas in Rwanda</li> <li>• Discussing lumbering in Rwanda</li> <li>• Describing the characteristics of the forests of Rwanda</li> <li>• Explaining factors influencing forest exploitation</li> <li>• Explaining the importance of forests and forestry in Rwanda</li> <li>• Identifying lumbering products in Rwanda</li> <li>• Discussing the problems that affect forest exploitation in Rwanda</li> <li>• Discussing deforestation in Rwanda</li> <li>• Discussing forest conservation and management in Rwanda</li> <li>• Analysing the main forests of Rwanda case by case</li> </ul>

## Notes for the teacher

Clearly distinguish between forests and forestry. Use the map of Rwanda to guide the learners in identifying the major forests of Rwanda. Use fieldwork, photographs and videos to help the learners to discuss the characteristics of forests. Guide the learners to explain the physical and human factors that influence the exploitation of forests. The use of local examples will enable learners to understand the concepts.

Clearly explain the concept of lumbering. Use fieldwork studies to help the learners to identify and describe the methods of lumbering, the products of lumbering, the importance of forests and forestry and the problems affecting the exploitation of forests in Rwanda.

Deforestation is a major problem facing forestry. It should be explained clearly together with its effects for the learners to appreciate the need to properly manage and conserve forests.

Use the local environment to discuss the causes of deforestation and possible solutions. Emphasis should be placed on the conservation measures that should be put in place to save the forests from destruction by human beings.

## Teaching steps

- Begin the lesson by asking the learners to define forests and forestry in their own understanding.
- Ask the learners to do Activity 12.1 of the Student's Book.
- Discuss with the learners and define the two terms. Refer to the text of the Student's Book.
- Briefly discuss forestry in Rwanda and the main forests that are found in Rwanda.
- Ask the learners to study the map on Fig 12.2 that shows the forested areas of Rwanda.
- Discuss the major forested areas of Rwanda and their characteristics. Ask the learners to do Activity 12.2 of the Student's Book.
- Discuss the two types of forests which are the natural and artificial forests. Name the natural forests of Rwanda one by one and their characteristics. Refer to the text of the Student's Book. Begin with the Nyungwe Forest with its characteristics, the Gishwati Forest, the Mukura Forest, the Birunga Forest, the Cyamudongo Forest and the Akagera Forest.
- Discuss the artificial forests of Rwanda by asking the learners to do Activity 12.3 of the Student's Book. Briefly name the artificial forests in the country. Ask the learners to give more examples of artificial forests in the country that they know of.
- Ask the learners to individually answer the questions in Task 12.1 of the Student's Book.
- Discuss the factors influencing forest exploitation. Begin by asking the learners to read the case study of the Student's Book.
- Explain both the physical and human factors while referring to the text of the Student's Book.



- Discuss lumbering in Rwanda by asking the learners to do Activity 12.4 of the Student’s Book.
- Discuss lumbering while referring to the text of the Student’s Book.
- Discuss the methods of lumbering. Begin by asking the learners to do Activity 12.5 of the Student’s Book. Discuss the methods by discussing the text of the Student’s Book.
- Ask the learners to individually answer the questions in Task 12.2 of the Student’s Book.
- Discuss the importance of forests and forestry in Rwanda.
- Ask the learners to read the case study of the Student’s Book and answer the questions that follow.
- Referring to the text of the Student’s Book, discuss the importance of forests and forestry in Rwanda.
- Discuss the products obtained from lumbering in Rwanda. Ask the learners to do Activity 12.6 of the Student’s Book. Referring to the text of the Student’s Book, discuss the products obtained from lumbering that the students can relate to.
- Introduce the subtopic on the problems affecting forest exploitation in Rwanda by asking the learners to do Activity 12.7 of the Student’s Book.
- Referring to the text of the Student’s Book, discuss the problems.
- Ask the learners to individually answer the questions in Task 12.3 of the Student’s Book.
- Discuss deforestation in Rwanda. Begin by asking the learners to do Activity 12.8 of the Student’s Book. Briefly define deforestation and study the causes of deforestation in Rwanda. Make reference the Student’s Book as you discuss this.
- Together with the learners, analyse the effects of deforestation in Rwanda. Begin this sub-topic by asking the learners to do Activity 12.9 of the Student’s Book.
- Discuss the effects by making reference to the text of the Student’s Book.
- Ask the learners to answer the questions in Task 12.4 of the Student’s Book.
- Discuss forest conservation and management in Rwanda by asking the learners to read the case study of the Student’s Book and to answer the questions that follow.
- Explain the conservation measures by referring to the text of the Student’s Book.
- Study the Nyungwe Forest as a case study of forest management in Rwanda. Refer to the text of the Student’s Book.
- Guide the learners to do Activity 12.10 of the Student’s Book. This is a field visit to one of the forests in Rwanda. It should be an interesting activity and a great learning experience to the learners.
- Together with the learners, go through the Did you know? section of the Student’s Book.
- Ask the learners to individually ask the learners to answer the

questions in the End of unit revision task of the Student's Book.

### Diagnostic questions

1. Analyse the contribution of forestry to the economy of the country.
2. Suggest solutions to the problems affecting forest exploitation in Rwanda.
3. Come up with ways in which as a class you can help the community around your school appreciate the importance of forests.

### Note:

- Give the learners lesson notes to either write during the lesson or during remedial time. This will depend on your convenience.
- Remember to actively include the special education needs learners in all the learning activities. Give them extra attention to ensure that they catch up with the rest of the learners.
- Schedule for remedial lessons to ensure that the slow learners catch up with the work provided.
- Provide extra and more challenging tasks to the bright and talented learners.
- Give emphasis on the need to protect the environment through forest conservation and management as a cross-cutting issue.

- Mark the activities according to how well the learners do them. Some of them might have different outcomes in the different groups or pairs that the learners work in. Remember to check out the specific skill and attitude that an activity is required to bring out in the learners.

### Suggested answers to Task 12.1

1. Akagera Forest, Nyungwe Forest, Gishwati Forest, Cyamudongo Forest, Virunga Forest and Birunga Forest.
2. (a) An artificial forest is a forest that has been planted by humans.  
(b) Forests on Mount Kigali and the Arboretum of Ruhunde in Huye district.
3. Characteristics of Cyamudongo Forest
  - The forest has a dense canopy that hardly allows the penetration of sunlight to reach the forest ground.
  - There is dense vegetation with little under growth.
  - The forest has a wide range of tree species.
  - It has many climbing trees.
  - The trees are very tall.

### Suggested answers to Task 12.2

1. Climate, relief, presence of humidity, presence of forests, tree

species, drainage, availability and nature of labour force, availability of adequate capital, level of technology, government policy, transport and communication, availability of markets, research, population levels and political stability. (Accept correct discussion on any of these points.)

2.
  - Felling
  - bucking
  - Yarding or dragging
  - Loading
  - A booming ground

### **Suggested answers to Task 12.3**

1.
  - Employment opportunities.
  - Source of water catchment areas.
  - Raw materials.
  - Protection of soil against erosion.
  - Source of revenue to the government
  - Home for wildlife
  - Accept correct answers.
2.
  - Poor technology.
  - Inadequate skilled labour force.
  - Reduced forest resources.
  - High demand for wood products.
  - Mismanagement of forest plantations.
  - Poor grading and treatment standards.
  - Accept correct answers.

### **Suggested answers to Task 12.4**

1. Deforestation is the permanent destruction of forests in order to make the land available for the other uses.
2.
  - Global warming
  - Air pollution
  - Interference with the hydrological cycle
  - Loss of valuable tree species
  - Severe soil erosion
  - Reduction of the natural evaporation cooling system.
  - Acidification of water bodies.
  - Negative effects on the quality of life
  - Increased government expenditure.
  - Imbalance of the ecosystem
  - Floods
  - Mark correct explanations

### **Suggested answers to End of unit revision task**

1. (a)
  - Akagera Forest
  - Nyungwe Forest
  - Gishwati Forest
  - Cyamudongo Forest
  - Mukura Forest
  - Birunga Forest

Mark any two correct names of forests that the learners give.

- (b) Mark correct answers with regards to any of the forest in Rwanda.

2. (a) Forest conservation is the practice of planning and maintaining forested areas for the benefit and sustainability of future generations while forest management is concerned with the administrative, economic, legal and social aspects of forest protection and regulation. It is mainly aimed at maintaining the quality and standards of the forests.
- Inadequate skilled labour force.
  - Reduced forest resources.
  - High demand for wood products.
  - Mismanagement of forest plantations.
  - Poor grading and treatment standards.
  - Accept other correct answers and explanations.
3. (b) – Establishment of conservation and protected forested areas.
- Reforestation.
  - Afforestation.
  - Introduction of improved tree species.
  - Agroforestry.
  - Strengthening institutions concerned with forestry.
  - Accept other correct answers and explanations
4. Accept correct explanations on the physical factors that influence forest exploitation in Rwanda. The physical factors include; climate, relief, tree species, presence of humidity, presence of forests and drainage.
5. (a) Mark correctly drawn sketch maps and correctly located forests on the map.
- (b) - Poor technology.
5. (a) Lumbering- This is the act of extracting timber and logs from the trees in a forest for commercial purposes.
- (b) Mark other correct answers that learners give.
- (c) – timber
- poles
  - plywood
  - sawn wood
  - veneers
  - fuel wood etc.
6. (a) Causes of deforestation;
- Increased population.
  - Bush burning.
  - Charcoal burning.
  - Poor farming methods.
  - Road and infrastructural development.
  - Overgrazing.
  - Accept other correct answers and explanations

Effects of deforestation;

- Global warming.
- Air pollution.
- Interference with the hydrological cycle.
- Loss of valuable tree species.
- Severe erosion
- Reduction of natural evaporation cooling system.
- Accept other correct answers and explanations.

- Restriction of the use of timber in the construction industry.

Accept other correct answers.

(b.) Conservation measures taken by the Rwandan Government

- Establishment of conservation and protected forested areas
- Reforestation
- Afforestation
- Introduction of improved tree species
- Agroforestry
- Strengthening of institutions concerned with forestry
- Improved lumbering methods
- Reduction of wastage
- Use of alternative source of fuel.
- Intensive research on forestry

# TOPIC AREA: HUMAN AND ECONOMIC GEOGRAPHY

## Sub-topic area: Economic activities

# UNIT 13

## Fishing in Rwanda

**Key unit competence:** By the end of this unit, the learners should be able to explain the impact of fishing on sustainable development of Rwanda.

### Unit objectives

*By the end of this unit, a learner should be able to:*

1. Define fishing and fish farming.
2. Identify the major fishing grounds of Rwanda.
3. Identify the factors favouring fishing in Rwanda.
4. State different types of fish and methods of fishing used in Rwanda.
5. State the methods used for fish conservation and preservation in Rwanda.
6. Outline the importance and the problems of fishing and fish farming in Rwanda.
7. Identify different ways of improving fishing and fish farming in Rwanda.

## Content map

Unit 13: Fishing in Rwanda	
Number of periods	10
Introduction	Asking learners to define fish and fishing.
Classroom organisation	Whole class orientation followed by pair work, group work and individual work.
Equipment required	Internet access, photographs, maps, pens and paper and local environment.
Activities	<ul style="list-style-type: none"><li>• Defining fishing.</li><li>• Locating the fishing grounds on a map of Rwanda.</li><li>• Discussing the factors that favour fishing in Rwanda.</li><li>• Naming types of fish, fishing methods and fishing grounds.</li><li>• Discussing methods of fish conservation and preservation in Rwanda.</li><li>• Explaining the importance of fishing and fish farming in Rwanda.</li><li>• Discussing the problems and solutions associated with fishing and fish farming in Rwanda.</li><li>• Discussing fish farming in Rwanda.</li><li>• Identifying the problems and prospects of fish farming in Rwanda.</li><li>• Explaining ways of improving fish farming in Rwanda.</li><li>• Interpreting photographs.</li><li>• Drawing diagrams.</li><li>• Case studies of fishing grounds in Rwanda.</li></ul>
Competences practiced	<ul style="list-style-type: none"><li>• Presentation</li><li>• Teamwork</li><li>• Interpretation</li><li>• Critical thinking</li><li>• Communication</li><li>• Literacy</li><li>• Problem solving</li></ul>

Language	<ul style="list-style-type: none"> <li>• Discussion in groups</li> <li>• Written assignments</li> </ul>
Vocabulary acquisition	<ul style="list-style-type: none"> <li>• Terminologies related to fishing</li> </ul>
Study skills	<ul style="list-style-type: none"> <li>• Taking notes</li> <li>• Observation</li> <li>• Discussion</li> <li>• Organising ideas for presentation</li> <li>• Drawing maps</li> <li>• Locating features on maps</li> </ul>
Revision	<ul style="list-style-type: none"> <li>• Revision exercises provided</li> </ul>
Assessment	<ul style="list-style-type: none"> <li>• Ability to work in groups and to present the findings</li> </ul>
Learning outcomes	<ul style="list-style-type: none"> <li>• Define fishing and fish farming.</li> <li>• Identify main fishing grounds in Rwanda.</li> <li>• Identify the factors that favour fishing in Rwanda.</li> <li>• Name types of fish.</li> <li>• Describe the methods of fishing used in Rwanda.</li> <li>• State the methods of fish conservation and preservation used in Rwanda.</li> <li>• Stating the importance of fish and fishing in Rwanda.</li> <li>• Identifying the problems affecting fishing and fish farming in Rwanda and possible solutions.</li> <li>• Identify ways of improving fishing and fish farming in Rwanda.</li> </ul>



## Notes for the teacher

Clearly differentiate between fishing and fish farming and the purpose for which these activities are carried out. Make use of the fishing map of Rwanda that gives the location of the fishing grounds in Rwanda.

When discussing the factors influencing fishing and fish farming, classify them into natural and human factors. Guide the learners to be able to distinguish between natural and human factors. The use of local examples will help the learners to understand the concepts.

The use of sketch diagrams, photographs and field visits will enable the learners to identify the fishing methods used. Emphasise on the steps when describing the methods of fishing.

Lead the learners in discussing fish farming. The use of a field study will enable the learners to get a better understanding of fish farming.

Involve the learners in identifying the importance and the problems of fishing and fish farming in Rwanda. Once again, the use of local examples will help the learners to have understanding of the concepts. Guide the learners in discussing the ways that can be used to improve fishing and fish farming in the country.

Fish is a resource that needs to be conserved and preserved. Guide the learners in discussing the methods of fish preservation and conservation. Make sure that the learners distinguish

between the terminologies, conservation and preservation.

## Teaching steps

- Begin the lesson by defining fishing and fish farming. Ask the learners to do Activity 13.1 of the Student's Book.
- Referring to the text on the Student's Book, define fishing.
- Guide the learners in identifying the main fishing grounds in Rwanda. Ask them to do Activity 13.2 of the Student's Book.
- Together with the learners, study the map on Fig 13.2 that shows the major fishing grounds of Rwanda.
- Discuss the main fishing grounds in the country as you make reference to the text of the Student's Book.
- Discuss the factors that favour fishing in Rwanda. Begin by asking the learners to do Activity 13.3 of the Student's Book.
- Guide the learners in the field visit that is in Activity 13.4 of the Student's Book. You will decide on an appropriate time for the field visit.
- Discuss the factors while referring to the text of the Student's Book.
- Discuss the types of fish in Rwanda. Ask the learners to do Activity 13.5. Name some of the types as mentioned in the text on the same page.
- Introduce the methods used in fishing by organising for the field visit that is on Activity 13.6 of the Student's Book.

- Discuss each of the methods used by referring to the text of the Student’s Book.
- Ask each of the learners to individually answer the questions in Task 13.1 of the Student’s Book.
- Discuss the methods of fish conservation and preservation in Rwanda. Organise for the field visit that is in Activity 13.7 of the Student’s Book. Discuss fish conservation and the methods used in fish conservation. Refer to the text of the Student’s Book.
- Discuss fish preservation as outlined in the text of the Student’s Book.
- Discuss the importance of fish and fishing in Rwanda. Ask the learners to do Activity 13.8 of the Student’s Book. Discuss the points of the Student’s Book.
- Guide the learners in identifying the problems affecting fishing and the possible solutions. Ask the learners to do Activities 13.9 and organise for the field visit that is Activity 13.10 of the Student’s Book.
- Together with the learners, study Table 13.1 of the Student’s Book on the problems of fishing in Rwanda and their possible solutions.
- Ask the learners to individually answer the questions in Task 13.2 of the Student’s Book.
- Discuss fish farming in Rwanda. Ask the learners to do Activity 13.11 of the Student’s Book. Refer to the text of the Student’s Book in the course of the discussion.
- Discuss the factors that favour fish farming in Rwanda. Begin by asking the learners to do Activity 13.12 of the Student’s Book and to the text of the Student’s Book.
- Discuss the problems and prospects of fish farming in Rwanda. Ask the learners to do Activity 13.13 of the Student’s Book and to refer to the text of the Student’s Book.
- Explain some of the ways in which fish farming in Rwanda can be improved. Ask the learners to do Activity 13.14 of the Student’s Book. Go through the text of the Student’s Book.
- Organise for a field visit to a fish farm with the learners. This is Activity 13.15 of the Student’s Book.
- Go through the case studies of some of the main fishing grounds in Rwanda.
- Ask the learners to answer the questions in Task 13.3 of the Student’s Book.
- Together with the learners, go through the Did you know? section of the Student’s Book. This section contains interesting facts about fishing in Rwanda.
- Ask the learners to individually answer the questions in the End of unit revision task of the Student’s Book.

**Diagnostic questions**

1. Find out the contribution of fishing as an economic activity to the GDP of the country.

2. Predict the future of fishing and fish farming in Rwanda.
3. Find out how fishing turns around the lives of the people in the rural areas of Rwanda.

### Note:

- Give the learners lesson notes to either write during the lesson or during remedial time. This will depend on your convenience.
- Remember to actively include the special education needs learners in all the learning activities. Give them extra attention to ensure that they catch up with the rest of the learners.
- Schedule for remedial lessons to ensure that the slow learners catch up with the work provided.
- Provide extra and more challenging tasks to the bright and talented learners.
- Give emphasis on the need to protect the environment so as to be able to conserve fish as a cross cutting issue.
- Mark the activities according to how well the learners do it. Some of them might have different outcomes in the different groups or pairs that the learners work in. Remember to check out the specific skill and attitude that an activity is required to bring out in the learners.

## Suggested answers to Task 13.1

1. Fishing refers to the activity of catching fish for food or as a sport.
2. Lakes, rivers and swamps.(Accept correct names of either of these where fishing takes place.)
3. Hook and line method, use of fishing baskets and the cast net method.(Accept correct discussions)

## Suggested answers to Task 13.2

1. Sun drying, salting, deep frying, use of freezers, smoking, refrigeration, canning.(Mark any correct five methods)
2. Importance of fish and fish farming in Rwanda;
  - Source of food.
  - Employment opportunities.
  - Source of revenue for the government.
  - Source of income to farmers.
  - Source of raw materials etc.
 Accept correct answers and explanations.
3. (a)
  - Overfishing
  - Water pollution
  - Competition from other countries etc.
 Accept correct answers.
- (b)
  - Regulation of fishing by law.
  - Strict laws that prohibit water pollution.

- Standardisation of fish products in order to make them competitive etc.

Accept correct answers.

### Suggested answers to Task 13.3

1. Fish farming in Rwanda is a growing and thriving sector. The controlled fishing practices by the government as well as the encouragement of private fish farms has gone along way in boosting the sector. The proceeds from fishing have greatly improved and the future looks promising.
  2.
    - Adequate capital required for fish farming.
    - Steady supply of affordable labor force.
    - Favourable climate.
    - The presence of a variety of water bodies from which fishing is carried out.
    - The use of artificial feed supplements.
    - The presence of ready markets for fish.
    - The introduction of favourable government policies.
    - The presence of improved transport networks.
    - The modernisation of fish farming.
    - Accept other correct answers.
  3. (a) – Overfishing in fish ponds and other waterbodies.
    - Pollution of the water bodies.
    - Poor transport networks that limits accessibility to fish farms.
    - Production of low quality fish.
    - Lack of capital to practice fish farming.
    - Competition from those who fish in the natural water bodies.
    - Lack of ready markets.
    - Invasion of fish farms by fish predators such as snakes and crocodiles.
    - Accept any five correct explanations.
- (b)
- Development of new agencies that deal with fishing.
  - Development of a fish farming plan for the country.
  - Protection of the country's fishing grounds.
  - Restoration and protection of watersheds.
  - Control of water weeds.
  - Restocking of overfished lakes.
  - Commercialisation of fish farming.
  - Development of infrastructure around the fishing grounds.
  - Accept other correct explanations.

## Suggested answers to End of unit revision task

1. (a) Fishing is the catching of fish for food or as a sport from the fisheries.

- (b)
- Lakes e.g. Kivu, Muhazi
  - Rivers e.g. Akagera, Akanyaru
  - Swamps e.g. Akanyaru, Kagera.
  - Ponds.e.g Kigembe

Gikoro

2. – Availability of planktons which is fish food attract a large variety of fish species.
- Cool and well oxygenated water are ideal for survival of fish and growth of planktons.
- The favourable climate such as ideal temperatures encourage the growth of planktons and the survival of fish.
- The forests provide timber for making boats and wood fuel for smoking the fish.
- Numerous lakes, rivers, ponds and swamps provide suitable habitats for fish.
- Availability of cheap and steady labour supply for use in the fishing industry.
- Accept other correct answers.

3. (a) • Tilapia, mud fish, stolothrisa tanganice, barbus, clarias,

Haplochromis, Tanganyika sardines, limnothrissa middon, lung fish.

(b) *Hook and line method*

- A string is tied to a single hook.
- The string is tied to a long rod which is held at the shore.
- The hook is baited.
- The hook is cast into the water.
- As the fish tries to eat the bait, it is hooked.
- The string is pulled to obtain the fish.

*Fishing basket*

- This method is used in shallow waters like swamps and rivers.
- The basket is conical in shape to allow easy entry of fish.
- A bait is put into the basket.
- The basket is lowered into the water with the mouth facing the direction from which the water is flowing.
- The basket is held in position by ropes or sticks to prevent it from being swept downstream.

- The basket is held in that position for some time/overnight.
- It is then removed to the land.

#### *Fishing nets*

- The net is wide.
- The net is cast into the water and lifted up at intervals as the fish swim in water.
- The net is pulled to the shore and the fish is removed.
- It is used to catch fish that swim close to the surface of the water.
- When used at night, lights are used to attract the fish.

#### *Spear fishing*

- This method is used in clear, calm shallow water.
- The fisherman stands at the shore.
- When the fish is spotted, it is speared and lifted to the shore.

#### *Cast net method*

- This method is used to catch fish that swim close to the water surface.
- The net is circular in shape.
- The net is cast into the water by use of hands.

- The fish are trapped as they swim in water.
- The net is pulled out of the water and the fish is removed.

#### *Gill net method*

- The net is lowered vertically into the water.
  - The net has a mesh which lets only the head of fish to go through.
  - The net is fitted with weights at the bottom and floaters on top to make it stretch.
  - The net is left in position for some time.
  - As the fish try to swim they are caught by their gills.
  - The net is removed from the water.
  - The fish is removed and stored.
4. (a) – This is the protection of fish in the fishing grounds to maintain them and to prevent them from being depleted.
- (b) – Introduction of modern methods of fishing.
- Use of proper fishing equipment.

- Artificial hatching of fish.
  - Restocking of overfished waters.
  - Educating the public on sustainable ways of utilising water resources.
  - Cross-breeding fish with high yielding fish species to increase the fish species and size.
  - Accept other correct answers.
- (c)
- Sun drying – the intestines of fish are removed and the fish is dried in the sun.
  - Deep frying – the fish is dissected and the intestines and scales are removed. It is then dipped in boiling cooking oil until it becomes hard and dry.
  - Salting – the fish is salted and packed between layers of salt.
- Smoking – the intestines of fish are removed. The fish are hanged above the fire where they are dried.
  - Canning – the fish is processed and packed in tightly sealed containers.
  - Refrigeration – The fish is kept under very low temperatures in freezers.
- 5.
- Fishing creates more employment opportunities to people leading to improved standards of living.
  - Fish provides an alternative source of food leading to improved standards of living.
  - Fishing has led to improved local and international trade leading to improved international relations/ improved balance of trade.
  - Fishing has promoted the establishment of transport and communication networks e.g. roads leading to increased accessibility to areas where fishing is practiced.
  - Fishing earns the government revenue through taxation which is used for economic development.

- Fishing is a source of income to the fishermen from the sale of fish leading to improved standards of living.

Accept other correct answers.

- 6.
- Overfishing has led to depletion of certain fish species.
  - Poor disposal of industrial and domestic waste pollute the water in the fisheries leading to the death of fish.
  - Stiff competition in the external market for fish from the neighbouring countries such as Tanzania lowers the demand for fish.
  - Inadequate capital to purchase modern fishing equipment such as motorised boats and preservation facilities.
  - Lack of modern preservation facilities limits fishing.
  - Some fishing grounds are found in remote areas which are inaccessible; this hinders fishing.

Accept other correct answers.

*Possible solutions*

- Restocking overfished fisheries to increase the fish population.
- Restrict fishing to specific seasons to allow fish to regenerate.
- Enacting and enforcement of laws control overfishing and pollution.

- Encourage the fishermen to form fish co-operative societies for them to acquire capital and market their fish.
- Encourage fishermen to use standard sized nets that only catch mature fish and allow immature fish to grow.
- The government should construct roads to link the fishing grounds in remote areas to the markets to improve accessibility.

Accept other correct answers.

- 7.
- The cool and well oxygenated waters are ideal for fish breeding because of abundant supply of planktons/fish food.
  - Presence of numerous lakes, rivers, swamps and ponds provide suitable fishing grounds.
  - Presence of forests such as Akagera which provide timber for making boats and fuel wood for smoking of fish.
  - Availability of capital for purchasing the fishing equipment.
  - Availability of cheap and steady supply of labour for use in the fishing industry.
  - Political stability in the country encourages fishing since the fishermen are guaranteed of security.



Accept other correct answers.

8. (a) – The artificial rearing of fish in ponds or tanks for domestic or commercial purposes.
- (b) Problems
- Use of indiscriminate fishing methods in some areas leads to overfishing.
  - Artificial feeds leads to water pollution in some farms leading to the death of fish.
  - Some fish farms are located in remote areas which are inaccessible leading to increased transport costs thus low profits for the farmers.
  - Poor fish farming methods in some areas leading to low quality fish which fetch low prices.
  - High cost of farm inputs discourages many people from taking part in fish farming.
  - Fish predators eat the fish in some fish farms leading to losses to the farmers.

Accept other correct answers.

*Possible solutions*

- Encourage fish farmers to use modern methods of fishing to control overfishing.
- Restocking overfished ponds with improved fish species.
- Use of better feeding systems to avoid water pollution in the ponds.
- The government should construct good roads to link the areas with fish farms to the market.
- Carry out research to come up with high yielding and early maturing fish varieties to improve quality.
- Encourage the fish farmers to form co-operative societies to help them to acquire capital and to market the fish.

Accept other correct answers.

- (c) Fishing in Rwanda has a bright future. This is because of the following reasons;
- The high population growth provides increased market for fish.
  - Fishing especially

fish farming requires a smaller space to operate unlike other farming methods.

- There is favourable government policy that encourages fishing.
  - Political stability in the country has enabled economic activities such as fishing to flourish.
  - The cool climate provides a conducive environment for fish and planktons to flourish.
9. - Restocking of overfished waters to increase the fish population.
- Encourage people to venture

into commercial fish farming as an alternative source of income.

- The government should develop a fish farming policy in order to promote fishing.
- Control of water weeds in the main fishing grounds in order to encourage fish to flourish.
- Encourage the fishermen to form co-operative societies in order to help them acquire capital and market the fish.
- Construction of infrastructure such as roads to promote fishing.

Accept other correct answers.

# TOPIC AREA: HUMAN AND ECONOMIC GEOGRAPHY

## Sub-topic area: Economic activities

# UNIT 14

## Mining in Rwanda

**Key unit competence:** By the end of this unit, the learners should be able to investigate the impact of mining on sustainable development in Rwanda.

### Unit objectives

*By the end of this unit, a learner should be able to:*

1. Identify major minerals in Rwanda.
2. State methods used in mining in Rwanda.
3. State factors affecting the exploitation of minerals in Rwanda.
4. Identify the importance of mining to the economy of Rwanda.
5. State the problems affecting mining.

## Content map

Unit 14: Mining in Rwanda	
Number of periods	7
Introduction	Asking learners to name some of the minerals in Rwanda and where they are mined.
Classroom organisation	Whole class orientation followed by group work and individual work.
Equipment required	Photographs, Internet access, maps, pens and paper.
Activities	<ul style="list-style-type: none"> <li>• Identifying main types of minerals.</li> <li>• Interpreting photographs.</li> <li>• Drawing diagrams.</li> <li>• Locating minerals on the map of Rwanda.</li> <li>• Describing the mining methods.</li> <li>• Identifying the factors that favour the exploitation of minerals in Rwanda.</li> <li>• Discussing importance of minerals.</li> </ul>
Competencies practiced	<ul style="list-style-type: none"> <li>• Teamwork</li> <li>• Communication</li> <li>• Presentation of findings</li> <li>• Interpretation of photographs</li> </ul>
Language	<ul style="list-style-type: none"> <li>• Discussion in groups</li> <li>• Written assignments</li> </ul>
Vocabulary acquisition	<ul style="list-style-type: none"> <li>• Terminologies related to fishing</li> </ul>

Study skills	<ul style="list-style-type: none"> <li>• Taking notes.</li> <li>• Organising ideas for presentation.</li> <li>• Locating mining sites on the map of Rwanda.</li> </ul>
Revision	<ul style="list-style-type: none"> <li>• Revision exercises provided.</li> </ul>
Assessment	<ul style="list-style-type: none"> <li>• Ability to work in groups and communicate ideas with others</li> </ul>
Learning outcomes	<ul style="list-style-type: none"> <li>• Identify major minerals in Rwanda</li> <li>• Describe the distribution of major minerals in Rwanda</li> <li>• Describe methods of mining</li> <li>• Explain factors that affect exploitation of minerals</li> <li>• Explain the importance of mining to the economy of Rwanda</li> <li>• Identify the products from minerals in Rwanda</li> <li>• Identify the problems affecting mining in Rwanda</li> <li>• Outline possible solutions to the problems facing mining in Rwanda</li> </ul>

## Notes for the teacher

Guide the learners to distinguish between mining and quarrying. Make use of the map of Rwanda to enable the learners to give the location of the main minerals in Rwanda.

Help the learners to account for the distribution of minerals in Rwanda.

When discussing the methods of mining, use sketch diagrams, photographs and field visits to help the learners to have a better understanding of the methods of mining. Emphasise the steps followed when extracting minerals. Explain the factors that influence the exploitation of minerals.

Involve the learners in using local examples of how these factors have affected mining in Rwanda. Discuss the importance of mining to the economy of Rwanda.

Guide the learners in explaining the problems that face mining and their possible solutions. The learners need to be involved in the learning activities in order to make the topic more interesting.

## Teaching steps

- Begin the lesson by defining mining. Ask the learners to do Activity 14.1 of the Student's Book.
- Define mining and mention some of the minerals found in Rwanda. Refer to the text of the Student's Book.
- Ask the learners to do Activity 14.2

of the Student's Book. Together with the learners, study Table 14.1 which shows the minerals in Rwanda and areas where they are found.

- Give the learners Activity 14.3 as a takeaway assignment.
- Discuss the methods of mining that are used in Rwanda. Begin by asking the learners to do Activity 14.4 of the Student's Book. Discuss the methods by referring to the Student's Book.
- Ask the learners to do Activity 14.5 as a takeaway assignment.
- Ask each individual student to answer the questions in Task 14.1 of the Student's Book.
- Guide the learners in studying the factors that affect the exploitation of minerals in Rwanda. Begin by asking the learners to do Activity 14.6 of the Student's Book.
- Discuss the factors by referring to the text of the Student's Book.
- Discuss the importance of mining to the economy of Rwanda. Ask the learners to do Activity 14.7 of the Student's Book. Go through the points while making reference to the text of the Student's Book.
- Guide the learners in identifying the products from minerals in their country. Begin this by asking the learners to do Activity 14.8 of the Student's Book.
- With the help of the learners, identify the problems affecting mining in Rwanda. Ask the learners to do Activity 14.9 of the Student's Book. Quickly go through the

- points of the Student’s Book with the learners.
- Discuss the possible solutions to the problems highlighted. This is in the Student’s Book.
- Give the learners Activities 14.10 and 14.11 of the Student’s Book. These can be given as takeaway assignments.
- Together with the learners go through the Did you know? section of the Student’s Book. This section contains interesting facts about mining in Rwanda.
- Ask the learners to individually answer the questions at the End of unit revision task of the Student’s Book.

### Diagnostic questions

1. Assess the contribution of mining to the economy of Rwanda.
2. Discuss the future prospects of mining in Rwanda.
3. Minerals have always been a blessing as well as a curse to the countries that possess them. Suggest ways in which the Government of Rwanda can ensure that the minerals mined in the country are only a blessing.

#### Note:

- Give the learners lesson notes to either write during the lesson or during remedial time. This will depend on your convenience.

- Remember to actively include the special education needs learners in all the learning activities. Give them extra attention to ensure that they catch up with the rest of the learners.
- Schedule for remedial lessons to ensure that the slow learners catch up with the work provided.
- Provide extra and more challenging tasks to the bright and talented learners.
- Give emphasis on the need to protect the environment so as to be able to conserve the minerals.
- Mark the activities according to how well the learners do them. Some of them might have different outcomes in the different groups or pairs that the learners work in. Remember to check out the specific skill and attitude that an activity is required to bring out in the learners.

### Suggested answers to Task 14.1

1. Mining is the extraction of valuable minerals from the earth.
2. Cassiterite (tin ore), coltan, wolfram, methane gas, gold, limestone, peat coal etc.
3. Open cast mining, shaft or underground mining, alluvial mining and drilling method.

## Suggested answers to End of unit revision questions

1.
  - Shortage of capital hinders the exploration and exploitation of minerals.
  - Some minerals occur in small quantities and thus are uneconomical to mine.
  - Poor transport and communication networks limit the exploitation of minerals.
  - Lack of skilled labour makes the country to rely on expatriates which is costly.
  - Shortage of power hinders mining.
  - Some mining companies are owned by foreigners who repatriate some of the profits leading to less revenue to the government.
2.
  - Export of minerals earns the country foreign exchange which is used for economic development.
  - Mining provides employment to people leading to improved standards of living.
  - Mining earns revenue to the government through taxation which is used for economic development.
  - Minerals are used as raw materials for industries leading to industrialisation in the country.
- Mining has led to the development of transport and communication networks leading to increased accessibility in areas where mining is carried out.
- Export of minerals has helped to improve the country's balance of trade.
3. (a) (i) Open cast mining method.
  - The unwanted material/overburden lying on top of the mineral ore are removed.
  - The soft mineral ore is removed by digging/quarrying/stripping.
  - Any hard rock/mineral ore is broken up by blasting.
  - Huge power shovels are used to dig up the mineral deposits.
  - The mineral ore is loaded onto trucks or railway wagons and taken to the processing factories.
- (ii) Deep shaft or underground mining method
  - A vertical shaft is sunk into the earth's crust.
  - Horizontal tunnels are dug to reach the mineral.



- Props are erected to support the roof.
  - The mineral is blasted or dug out.
  - It is transported by light railway track or conveyer to the bottom of the shaft.
  - Cranes are used to transport the ore to the surface.
- (iii) Drilling method
- Vertical shafts are sunk into the earth's crust.
  - Pipes are fitted into the shafts.
  - The gaseous liquid minerals are pumped to the surface.
  - At the surface, the minerals are trapped and taken to the factory for processing.
- (iv) Alluvial mining (pawning)
- A mixture of water, sand or mud and mineral particles is scooped from the river using a pawn.
  - Water is added if the mixture is thick.
  - Water is drained away if it is in excess.
  - The material is swirled in the pan. This separates the lighter material from the heavier particles which contain the mineral particles.
- (b)
- The lighter material is poured out.
  - The heavier materials are sorted to display the mineral particles.
  - The mineral particles are collected from the pan.
  - The land is left with gaping quarries which are ugly.
  - Heaps of rock waste hinder other forms of land use.
  - Mining leads to loss of biodiversity.
  - Dust produced during mining cause air pollution.
  - Mining causes shortage of land for human settlement or agriculture.
  - The water that collects in the mining pits create ponds which become habitats for disease causing organisms.
  - Large-scale blasting of rocks leads to instability of the basement rocks which can cause landslides.

- (c)
    - Refilling the mining pits.
    - Landscaping the land for settlement.
    - Introducing agriculture.
    - Creating parks to attract tourists.
    - Planting of trees.
    - Enacting and enforcing laws to protect the environment.
4. (a)
  - Cement, jewellery, chemicals, metals, glass, ceramics, batteries, fertilisers, medicine and cutting tools.
- (b)
  - Introduction of modern methods of mining.
  - Hiring of skilled labour/training labourers locally.
  - The government should provide incentives to the mining companies e.g. tax holidays.
  - Construction of transport and communication networks e.g. roads to link the mining sites.
- Improve on safety standards and precautions to guard against accidents.
  - Establish more industries that use minerals as raw materials to increase the local demand.
  - Process mineral ores before export to increase their value and earn more income.
  - Encourage more exploration for minerals so that more minerals can be extracted.
  - Enforcement of laws that govern mining so as to conserve the environment.
5. Give the main types of minerals mined in Rwanda and the places where they are found.

Types of mineral	Location
<p>Cassiterite (Tin ore)</p> <p>This is a metallic mineral. It is the most important ingredient in making tin cans.</p>	<p>It is mined in:</p> <ul style="list-style-type: none"> <li>• Rwinkwavu</li> <li>• Musha</li> <li>• Bugarama</li> <li>• Rutongo</li> <li>• Gatumba</li> <li>• Mwaka</li> <li>• Rutsiro</li> <li>• Bisesero</li> </ul>
<p>Coltan</p>	<p>It is found in:</p> <ul style="list-style-type: none"> <li>• Kabaya</li> <li>• Rutsiro</li> <li>• Ngoma</li> <li>• Nyagatare</li> <li>• Gatsibo</li> <li>• Rubavu</li> <li>• Rusizi</li> </ul>
<p>Natural gas and methane gas</p> <p>These are among the minerals currently exploited in Rwanda. They are used in brewing industries like Bralirwa.</p>	<p>They are found in Lake Kivu</p>
<p>Gold</p>	<p>It is found in:</p> <ul style="list-style-type: none"> <li>• Nyungwe</li> <li>• Miyove in Gicumbi district</li> <li>• Nyamasheke</li> </ul>
<p>Limestone</p>	<p>Bugarama in Rusizi district</p>
<p>Peat coal</p>	<p>It is found in marshy areas along Rivers Akagera, Akanyaru, Nyabarongo and around Lakes Burera, Ruhondo etc.</p>
<p>Wolfram(Tungsten)</p>	<p>It is found in:</p> <ul style="list-style-type: none"> <li>• Rwinkwavu</li> <li>• Gatumba</li> <li>• Rutongo</li> <li>• Nyakabingo</li> <li>• Bugarama</li> <li>• Gifurwe</li> </ul>

# TOPIC AREA: HUMAN AND ECONOMIC GEOGRAPHY

## Sub-topic area: Economic activities

# UNIT 15

## Power and Energy in Rwanda

**Key unit competence:** By the end of this unit, the learners should be able to investigate the impact of power and energy production on sustainable development in Rwanda.

### Unit objectives

*By the end of this unit, a learner should be able to:*

1. Recall the forms of energy used in Rwanda and the difference between renewable and non renewable energy.
2. State factors favouring power production in Rwanda.
3. Give the importance of power and energy in Rwanda.
4. Identify the factors that hinder the potential exploitation of rivers in Rwanda in production of power and energy.

## Content map

Unit 15: Power and energy in Rwanda	
Number of periods	12
Introduction	Asking learners to define energy and give examples of forms of energy.
Classroom organisation	Whole class orientation followed by group work, pair work and individual work.
Equipment required	Camera, Internet access, photographs, maps, pens and paper.
Activities	<ul style="list-style-type: none"> <li>• Classifying forms of energy.</li> <li>• Identifying sources and types of energy.</li> <li>• Explaining factors favouring power development in Rwanda.</li> <li>• Interpreting photographs.</li> <li>• Giving examples of power stations.</li> <li>• Identifying challenges facing power production.</li> </ul>
Competences practiced	<ul style="list-style-type: none"> <li>• Teamwork</li> <li>• Interpretation.</li> <li>• Communication</li> <li>• Literacy</li> <li>• Presentation of findings</li> </ul>
Language	<ul style="list-style-type: none"> <li>• Discussion in groups</li> <li>• Written assignments</li> </ul>
Vocabulary acquisition	<ul style="list-style-type: none"> <li>• Terminologies related to power and energy</li> </ul>

Study skills	<ul style="list-style-type: none"> <li>• Taking notes</li> <li>• Observation</li> <li>• Organising ideas for presentation</li> <li>• Discussion</li> </ul>
Revision	<ul style="list-style-type: none"> <li>• Revision exercises provided</li> </ul>
Assessment	<ul style="list-style-type: none"> <li>• Ability to work in groups and present findings</li> <li>• Ability to correctly answer the questions asked in the tasks</li> </ul>
Learning outcomes	<ul style="list-style-type: none"> <li>• Classifying forms of energy</li> <li>• Identifying sources and types of energy</li> <li>• Stating advantages of renewable and non renewable types of energy</li> <li>• Locating areas where power is generated on the map of Rwanda</li> <li>• Understanding factors favouring power production in Rwanda</li> <li>• Understanding the importance of power and energy</li> <li>• Identify challenges facing exploitation of rivers in the production of power and energy in Rwanda</li> </ul>

## Introduction

In this unit, the learners will discuss power and energy, forms of energy, factors that favour power production, importance of power and energy and the factors that hinder the development of power and energy in Rwanda. Power and energy play a very significant role in the economic development of a country. Without power, it would be difficult to produce goods and provide the services required in a country. Learners should appreciate the importance of proper management and conservation of energy.

### Notes for the teacher

Clearly explain the meaning of power and energy. Classify energy into renewable and non-renewable forms. Guide the learners to distinguish between the two forms of energy.

Involve the learners in identifying the sources, types and advantages of the different forms of energy. Use the local environment, field visits, videos and photographs to enable the learners to get the concepts clearly.

Guide the learners in explaining the factors that favour power development. The use of local examples will enable the learners to develop interest in the topic. Involve learners in discussing the importance of power, challenges and possible solutions to the problems of power and energy development in Rwanda.

## Teaching steps

- Begin the lesson by briefly defining power and energy. Go on to ask the learners to do Activity 15.1 of the Student's Book.
- After the activity, differentiate between power and energy and begin the discussion on the renewable and non-renewable sources of energy.
- Begin with the renewable sources of energy and the examples under this category. Discuss hydroelectric power, solar energy, biomass, biogas and geothermal energy. Make reference to the text of the Student's Book.
- Discuss the non-renewable sources of energy with its examples. Begin with oil, peat coal and methane gas. Make reference to the text of the Student's Book.
- Ask the learners to do Activities 15.2 and 15.3 as takeaway assignments.
- Ask the learners to individually answer the questions in Task 15.1 of the Student's Book.
- Discuss the factors that favour power production in Rwanda. Organise a field visit to a power station for the students. After the visit, discuss the factors as outlined in the Student's Book.
- Analyse the importance of power to the development of Rwanda as discussed in the Student's Book. Ask the students to read the case study of the Student's Book and to answer the questions that follow it.

- Give them Activity 15.5 to be done as a takeaway assignment.
- Ask the learners to do Activity 15.6 of the Student’s Book. After the activity, guide the learners in explaining some of the problems that hinder the development of power production in the country.
- Make reference to the Student’s Book.
- Ask the learners to do Activity 15.7 of the Student’s Book. After the activity, discuss the solutions to the problems affecting the production of energy in the country. Refer to the points of the Student’s Book.
- Ask the learners to individually answer the questions asked in Task 15.2 of the Student’s Book.
- Together with the learners, go through the case studies of the Mukungwa I and II and the Rusizi II power station that have been discussed in the Student’s Book.
- Organise for the learners a field visit to a hydroelectric power station. This is Activity 15.8 of the Student’s Book.
- Ask the learners to do Activity 15.9 of the Student’s Book as a takeaway assignment.
- Guide the learners in going through the Did you know? section of the Student’s Book. This section contains interesting facts about energy and power in Rwanda.
- Ask the learners to individually answer the questions in the End of unit revision task of the Student’s Book.

### Diagnostic questions

1. Account for the low exploitation of energy in Rwanda.
2. Rwanda still has high energy potential that has not been exploited. Suggest ways in which the energy resources in the country can be fully utilised.

### Note:

- Give the learners lesson notes to either write during the lesson or during remedial time. This will depend on your convenience.
- Remember to actively include the special education needs learners in all the learning activities. Give them extra attention to ensure that they catch up with the rest of the learners.
- Schedule for remedial lessons to ensure that the slow learners catch up with the work provided.
- Provide extra and more challenging tasks to the bright and talented learners.
- Give emphasis on the need to protect the environment as a cross-cutting issue. This helps in conserving energy especially the renewable sources of energy.
- Mark the activities according to how well the learners do them. Some of them might have different outcomes in the different groups or pairs that



the learners work in. Remember to check out the specific skill and attitude that an activity is required to bring out in the learners.

3. Mark correct points highlighted by the learners.

**Note:**

In all these answers, refer to the Student's Book.

**Suggested answers to Task 15.1**

1. Power is the ability to do work or to make things easier to handle. Energy is power derived from the utilisation of physical or chemical resources, especially to provide light and heat or to work machines.
2. Renewable sources of energy – These are sources of energy that cannot be exhausted. They have the capacity of refilling themselves after being used. The production of such energy is endless because the energy can be regenerated naturally. Examples include; hydroelectric power, solar energy, biomass, biogas and geothermal energy.  
Non-renewable sources of energy – This is a form of energy that can be depleted.  
This means that the resources used to generate it can be exhausted once they are used. Examples include; oil, peat coal and methane gas.

**Suggested answers to Task 15.2**

1. Mark any three correct factors that the learners will discuss.
2. Mark correct answers given by the learners.

**Suggested answers to the End of unit revision task**

1. (a)

Source of power and energy	Description
Water	Water turns the turbines to generate hydroelectric power.
Sun	Solar panels are used to generate solar energy.
Wind	Moving air turning windmills to generate wind energy.
Biomass	Organic remains are put in a digester to produce biogas.
Geothermal steam	Steam is trapped and used to generate geothermal power.

(b) Renewal sources of energy – These are sources of energy that have the capacity to replenish themselves after being used e.g. sun, water, wind.

Non-renewable sources of energy – These are sources of energy which lack the capacity to replenish themselves after use.

2. Mark correct answers that have been well explained by the learners.

3. (a) Biogas

- It is a renewable form of energy.
- It is environmentally friendly.
- It is affordable/ cheaper compared to other forms of energy.

- It utilises wastes that would have otherwise polluted the environment.
- It is suitable for sparsely populated areas.

(b) Hydroelectric power

- Inexhaustible
- It is environmentally friendly
- Easy to use by use of switches.
- It can be put into many uses e.g. cooking, lighting, heating.
- It can be adjusted to fractions according to the required energy.
- The dams constructed lead to the formation of lakes which are put into other uses e.g. irrigation.

(c) Solar energy

- It is a renewable source of energy.
- It is environmentally friendly.
- It is cheaper compared to other forms of energy.
- It is available in all parts of the world.

- Solar energy can be stored in batteries.
4. • Biomass is the energy produced from organic matter (plants and animals) e.g. firewood, charcoal or agricultural residue.
- Biogas is a combustible gas which is produced from the fermentation of organic matter such as cow dung. Biogas is used for lighting and cooking.
5. • Supportive government policies e.g. rural electrification.
- Large volumes of water in the rivers that is used to generate H.E.P.
  - Availability of ready local and external market for power.
  - Political stability in the country ensures continuous generation of power and encourages investors in the power sector.
  - Availability of capital to establish power generation plants.
  - Availability of advanced technology that is used in power generation.
- Accept other correct answers.
6. (a) • Rural electrification is the process of bringing electrical
- power to the rural and remote areas.
- (b) • It would encourage setting up of industries in the rural areas and thus encourage decentralisation of industries.
- It would reduce the cutting down of trees as electricity would be available for use and thus help conserve forests.
  - It would improve social amenities in the rural areas thus reduce rural-urban migration.
  - It would encourage the development of agriculture/ horticultural farming.
  - It would attract more investment in the rural areas leading to improved standards of living.
7. • Power is important for domestic purposes such as cooking, lighting and heating leading to improved standards of living.
- Power is used to run the industries leading to industrialisation in the country.

- Petroleum is used to run motor vehicles facilitating transportation of goods and people in the country.
- Power such as solar, petroleum and electricity is used to run machineries and pumps promoting the agricultural sector.
- Electricity is used in schools, hospitals and printing industries leading to improved standards.
- Power has led to the growth of small-scale industries and other businesses leading to the growth of towns in the country.

Accept other correct answers.

- 8.
- The reservoirs created behind the dams covers the land that would have been used for agriculture.
  - The reservoirs cause displacement of people.
  - The dams cause silt to be deposited depriving the people downstream of the fertile alluvium that would have been used for crop cultivation.
  - The dams control the flow of water downstream depriving water to the wetlands downstream.

- The reservoirs separate people who live on either side of the river.
  - The water in the reservoirs form breeding grounds for disease-causing organisms such as mosquitoes.
- 9.
- Encourage the use of alternative sources of energy other than H.E.P to satisfy the local demand.
  - Encourage the use of renewable sources of energy such as solar.
  - Encourage the use of forms of energy which are environmentally friendly to reduce pollution.
  - Construction of more power stations to increase power production in the country.
  - Harvesting of the water weeds to ensure continuous generation of power.
  - Dredging the rivers and reservoirs to enable them hold more water and thus ensure continuous generation of power.

Accept other correct answers.

10. (a)
- Musanze district along river Mukungwa.
  - Ntamka in Burera district.

Accept other correct answers.

- (b)
- Presence of large volumes of water from rivers/lakes to provide water to drive the turbines.
  - Constant water supply to ensure continuous generation of power.
  - Hard basement rock to provide a firm foundation for the construction of the dam and H.E.P station.
  - Presence of waterfalls to provide massive hydraulic force for power generation.
  - Presence of a deep valley/gorge to save on the cost of the construction of the dam.
  - Presence of non-porous rock to prevent seepage.
11. Study the table below and fill in the areas in Rwanda where the respective energy production takes place.

Source of power	Where it is generated from
H. E.P	Rubavu, Gatsatsa, Gikondo, Mukungwa, Ntaruka, Kilinda, Runyombyi, Murunda.
Solar energy	Jali in Gasabo district Kigali Province
Methane gas	Lake Kivu
Peat / coal power station	Gisagara

# TOPIC AREA: HUMAN AND ECONOMIC GEOGRAPHY

## Sub-topic area: Economic activities

# UNIT 16

## Industry in Rwanda

**Key unit competence:** By the end of this unit, the learners should be able to explain the impact of industrialisation on sustainable development in Rwanda.

### Unit objectives

*By the end of this unit, a learner should be able to:*

1. Recall the definition of industry.
2. Name the types of industries in Rwanda.
3. State factors affecting the location of industries in Rwanda.
4. Identify the importance of industries in Rwanda.
5. Identify the problems affecting industrial development in Rwanda.
6. Outline the environment and health issues associated with industrialisation.

## Content map

Unit 16: Industry in Rwanda	
Number of periods	14
Introduction	Asking learners to define industry and industrialisation and give examples of industries in Rwanda.
Classroom organisation	Whole class orientation followed by group work , pair work and individual work.
Equipment required	Pictures, Internet access, maps, pens and paper.
Activities	<ul style="list-style-type: none"> <li>• Discussing industries and industrialisation.</li> <li>• Interpreting photographs.</li> <li>• Locating industries on the map of Rwanda.</li> <li>• Naming industries in Rwanda.</li> <li>• Explaining factors for the location and development of industries.</li> <li>• Presentation of findings.</li> <li>• Identifying the significance and effects of industrialisation.</li> </ul>
Competences practiced	<ul style="list-style-type: none"> <li>• Teamwork</li> <li>• Interpretation</li> <li>• Communication</li> <li>• Critical thinking</li> <li>• Application of knowledge</li> <li>• Presentation of findings</li> <li>• Literacy</li> </ul>
Language	<ul style="list-style-type: none"> <li>• Discussion in groups</li> <li>• Written assignments</li> </ul>
Vocabulary acquisition	<ul style="list-style-type: none"> <li>• Terminologies related to industries</li> </ul>

Study skills	<ul style="list-style-type: none"> <li>● Locating industries on the map of Rwanda.</li> <li>● Writing notes.</li> <li>● Presentation of findings.</li> </ul>
Revision	<ul style="list-style-type: none"> <li>● Revision exercises provided</li> </ul>
Assessment	<ul style="list-style-type: none"> <li>● Ability to work in groups and communicate ideas with others</li> <li>● Ability to correctly answer the questions asked in the tasks</li> </ul>
Learning outcomes	<ul style="list-style-type: none"> <li>● To define industry and industrialisation</li> <li>● To classify industries</li> <li>● Understand factors that influence the location and development of industries</li> <li>● To locate main industries on the map of Rwanda</li> <li>● To understand the challenges and solutions affecting industrial development</li> <li>● Appreciate importance of industries</li> <li>● Explain environmental and health issues associated with industrialisation</li> </ul>



## Notes for the teacher

The terms industry and industrialisation should be explained so that the learners can make a clear distinction between the two. Involve the learners when discussing the types of industries.

Use local examples in order for them to get the concepts clearly.

Guide the learners in explaining the meaning of factors for the location and development of industries. Location is the site where an industry is established while development refers to the expansion of industries. The two terms should not be confused. Discuss the importance of industries in Rwanda. Make use of the local examples to create interest in the learners. Explain the problems facing industries and their possible solutions. Involve the learners in discussing the negative impact of industrialisation and ways to overcome those effects.

## Teaching steps

- Begin the lesson by defining industry and industrialisation. Ask the learners to do Activity 16.1 of the Student's Book.
- Refer to the text of the Student's Book and give the learners activity 16.2 as a takeaway assignment.
- Discuss the types of industries and industrial products in Rwanda. Begin by asking the learners to do Activity 16.3 of the Student's Book.
- Discuss the types of industries while referring to the text of the

Student's Book. Give the learners Activity 16.4 of the Student's Book.

- Discuss the factors affecting the location of industries in Rwanda. Ask the learners to do Activity 16.5 of the Student's Book.
- Discuss the factors while referring to the text of the Student's Book.
- Go through the factors influencing industrial development in Rwanda. Ask the learners to do Activity 16.6 of the Student's Book.
- Discuss the factors while referring to the text of the Student's Book.
- Ask the learners to individually answer the questions in Task 16.1 of the Student's Book.
- Discuss the importance of industries in Rwanda. Begin this section by asking the learners to read the case study of the Student's Book and to answer the questions that follow.
- Guide the learners in discussing the importance of industries as outlined in the Student's Book.
- Discuss the problems affecting industrial development in Rwanda. Begin this section by asking the learners to do Activity 16.7 of the Student's Book.
- Discuss the points outlined in the Student's Book.
- Discuss the solutions suggested to the problems highlighted. Ask the learners to do Activity 16.8 of the Student's Book.
- Discuss the points outlined in the Student's Book on the

solutions to the problems facing industrialisation in Rwanda.

- Discuss environmental and health issues associated with industrialisation and ways to mitigate them. Begin this section by asking the learners to do Activity 16.9 of the Student's Book.
- Discuss the points on the issues while making reference to the text of the Student's Book and the mitigation measures highlighted in the Student's Book.
- Guide the learners in the field visit that is Activity 16.10 of the Student's Book.
- Ask the learners to individually answer the questions in Task 16.2 of the Student's Book.
- Discuss the case studies of the industries as shown in the Student's Book. The industries include the Mulindi Tea Factory, Rwanda Farmers Coffee Company, the Inyange Industry, Bugarama Cement Factory and the Bralirwa Breweries.
- Together with the learners, go through the points in the Did you know? section of the Student's Book. This section contains interesting facts about Industries in Rwanda.
- Ask each of the learners to answer the questions in the End of unit revision task of the Student's Book.

### Diagnostic questions

1. Give reasons why industrialisation in Rwanda is slow.

2. Discuss the future prospects of industrialisation in Rwanda.
3. Suggest measures that the government of Rwanda can undertake to ensure that more private investors venture in industries in the country.

### Note:

- Give the learners lesson notes to either write during the lesson or during remedial time. This will depend on your convenience.
- Remember to actively include the special education needs learners in all the learning activities. Give them extra attention to ensure that they catch up with the rest of the learners.
- Schedule for remedial lessons to ensure that the slow learners catch up with the work provided.
- Provide extra and more challenging tasks to the bright and talented learners.
- Give emphasis on the need to protect the environment as a cross-cutting issue. This helps in dealing with industries and industrialisation with their associated effects on the environment.
- Mark the activities according to how well the learners do them. Some of them might have different outcomes in the different groups or pairs that

the learners work in. Remember to check out the specific skill and attitude that an activity is required to bring out in the learners.

### Suggested answers to Task 16.1

1. (a) Industry – an establishment set up to process and transform complex, simple and ordinary raw materials to either semi-finished or finished materials.
- (b) Industrialisation refers to the process concerned with the mechanical or chemical transformation of inorganic and organic substances into new products.
2.
  - Primary industries
  - Secondary industries
  - Tertiary industries
  - Quarternary industries
3.
  - Availability of raw materials
  - Transport and communication facilities
  - Availability of power and other sources of energy
  - Proximity to markets
  - Availability of water etc.

Accept correct and well explained points.

### Suggested answers to Task 16.2

1.
  - Employment opportunities.
  - Provision of products needed by the society.
  - Source of foreign exchange.
  - Improved standards of living.
  - Diversification of the Rwandan economy etc.

Accept correct and well explained answers.

2.
  - Shortage of skilled labour.
  - Limited markets for products produced.
  - Low technological development.
  - Inadequate supply of raw materials.
  - Stiff competition from other countries.
  - The landlocked state of the country etc.

Accept correct and well explained answers.

3.
  - Industries emit gases which pollute the atmosphere.
  - Industries emit a lot of heat that is produced during the production processes of certain products. This heat affects the temperatures of the surrounding air leading to global warming.
  - Industries that deal with forests, mining and processing destroy the

environment because they use up the available scarce natural resources such as trees.

*Mitigation measures*

- The government of Rwanda has designed various policies that aim at protecting the environment and people against the negative effects of industries.
- There are standards that have been put in place that the industrialists have to follow. These are safety standards to ensure that the working conditions do not endanger the lives of the workers and the communities around.
- The government of Rwanda has set up new industrial areas such as the Free Trade Zone at Ndera, the Masaka region and the new huge industrial region in Gashora in Bugesera district.

Accept correct answers.

**Suggested answers to the End of unit revision task**

1.
  - Availability of raw materials e.g. Cemerwa Cement Factory.
  - Availability of power for industries e.g Bralirwa Breweries.
  - Availability of water e.g Bralirwa Breweries.
  - Readily available labour e.g. in Kigali City.

- Availability of land since they require little space e.g. Gihaya links handcrafts products.
- Readily available market e.g. in Kigali City.

Accept other correct answers.

2.
  - Bralirwa Breweries is located in Rubavu near Lake Kivu. The area is densely populated and thus favoured its location due to availability of labour.
3. With reference to Kigali;
  - (a) Examine the factors that have influenced the location of industries.
    - Availability of transport and communication facilities.
    - Availability of power.
    - Proximity to the market.
    - Government policy.
    - Availability of water.
    - Proximity to aids to trade.
    - Industrial inertia.
  - (b) State and explain the factors that have led to the development and growth of industries in the area.
    - Raw materials – Constant supply of the raw materials has led

- to the growth of industries.
  - Market – The large population in Kigali provides ready market for industrial goods.
  - Transport – Availability of well developed transport networks such as roads which are used to transport raw materials to the industries and finished products to the markets.
  - Technology – Use of advanced technology leads to the production of high quality goods which are on high demand.
  - Power and energy resources – Availability of abundant power and energy such as H.E.P make it possible for continuous operations in the industries.
  - Industrial inertia – Industrial inertia encourages the expansion of industries. New industries are likely to be located in Kigali due to the advantages of already established infrastructure and public utilities.
- Accept other correct answers.
4. Account for the distribution of industries in Rwanda.
- Primary industries which deal with the extraction of natural resources are distributed widely across the country. Their location is determined by the availability of the natural resources from agriculture, forestry, mining and fishing.
  - Food processing industries are located in areas where the raw materials are produced. This is because they are perishable or bulky e.g. tea, coffee, sugar or dairy processing or brewing.
  - Non-agricultural manufacturing industries are located in areas where the raw materials are found such as Kigali Cement Factory, CIMERWA Cement Factory.
  - Agricultural non-food processing industries utilise non-edible agricultural products like cotton. Textile industries are found in Kigali e.g.

- UTEXIRWA Limited.
- Service industries are found in the main urban centres where people or industries require services e.g. Kigali Huye, Rubavu and Musanze.
  - Cottage industries are widely distributed in the country since the artisans use locally available raw materials to make useful craft items such as pottery, carvings.
5. (a) Distinguish between industry and industrialisation.
- An industry is an establishment that is set up to process and transform raw materials into semi-finished or finished goods.
  - Industrialisation is the process of transforming raw materials into finished products.
- (b) Examine the implications of industrialisation to the socio- economic development of Rwanda.
- Industrialisation leads to creation of more employment opportunities thus raising the standards of living of the people.
  - Rwanda exports industrial goods which earns the country foreign exchange that is used for economic development.
- It has led to the development of infrastructural facilities such as insurance, banking, road and air leading to improved standards of living.
  - It has led to diversification of the economy thus reduced reliance on the agricultural sector.
  - It has led to better utilisation of natural resources like minerals, forests and fisheries which are available in the country.
  - It has promoted friendly international relations with other countries through trade.
  - It has led to increased production in the mining, fishing and agricultural sector by providing markets for the raw materials.
  - It has promoted research ,creativity and innovation in order to produce high quality goods and services.
  - It has led to the production of goods to satisfy the local demand and thus reduced overdependence on foreign countries.
6. Pollution is the only environmental

concern associated with industries in Rwanda. Discuss.

- Pollution is not the only environmental concern associated with industries in Rwanda. Other environmental concerns include the following;
  - Industrialisation that has led to overexploitation of natural resources like forests and minerals leading to depletion.
  - Gases and heat released by the industries contribute to global warming.
  - Establishment of industries leads to the destruction of vegetation to create space for the industries.
  - Industries in the urban centres cause rural-urban migration in search of employment leading to the establishment of slums which have a negative impact on the environment.
  - Industrial wastes, heat and noise are health hazards.
  - Some industries produce goods which are harmful to people's lives.
7. Analyse the problems affecting industrialisation in Rwanda.
- Shortage of skilled labour resulting in reduced production/importation of skilled labour.
  - Shortage of market for industrial goods.
  - Low level of technology.
  - Inadequate supply of raw materials.
  - High transport costs due to the landlocked status of the country.
  - Stiff competition in the international market from other industrial countries like Kenya.
    - Lack of capital to establish and expand the industries.
    - Accept other correct answers.
8. Analyse the problems resulting from industrialisation in Rwanda.
- Depletion of natural resources such as forests and minerals in order to satisfy demand.
  - Emergence of slums due to shortage of land and housing facilities.
  - Concentration of infrastructure and services in the industrial centres has caused an imbalance in economic development.
  - It has led to rural-urban migration leading to shortage of labour in the rural areas.
  - Industries produce wastes which lead to pollution of the environment.
  - Expansion of industries has led to shortage of land for settlement and agriculture.

# TOPIC AREA: HUMAN AND ECONOMIC GEOGRAPHY

## Sub-topic area: Economic activities

# UNIT 17

## Transport, Communication and Trade in Rwanda

**Key unit competence:** By the end of this unit, the learners should be able to explain the impact of transport, communication and trade on sustainable development in Rwanda.

### Unit objectives

*By the end of this unit, a learner should be able to:*

1. State different types of transport in Rwanda.
2. Identify the factors influencing the development of transport.
3. Give the importance of transport in Rwanda.
4. Outline the advantages and disadvantages of different types of transport in Rwanda.
5. Identify the problems affecting transport in Rwanda.
6. List the means of communication used in Rwanda.
7. Identify the factors influencing the development of communication in Rwanda.
8. Give the importance of communication in Rwanda.
9. Outline the problems affecting communication and possible solutions.
10. Define internal and external trade.
11. Identify the factors affecting trade in Rwanda.
12. Give the importance of trade in Rwanda.



13. Identify imports and exports of Rwanda.
14. Identify the problems affecting trade in Rwanda.

## Content map

Unit 17: Transport, Communication and Trade in Rwanda	
Number of periods	14
Introduction	Ask learners to define transport, communication and trade and give their examples in Rwanda.
Classroom organisation	Whole class orientation followed by group work ,pair work and individual work.
Equipment required	Paper, pens, Internet access, photographs.
Activities	<ul style="list-style-type: none"> <li>• Identifying types of transport and communication.</li> <li>• Locating main types of transport networks on the map of Rwanda.</li> <li>• Identifying the advantages and disadvantages of each type of transport.</li> <li>• Stating factors affecting transport, communication and trade.</li> <li>• Explaining the importance of transport, communication and trade.</li> <li>• Identify challenges facing transport, communication and trade in Rwanda.</li> <li>• Group discussions.</li> </ul>
Competences practiced	<ul style="list-style-type: none"> <li>• Literacy</li> <li>• Teamwork</li> <li>• Communication</li> <li>• Presentation of findings</li> <li>• Application of knowledge</li> </ul>
Language	<ul style="list-style-type: none"> <li>• Discussion in groups</li> <li>• Written assignments</li> </ul>
Vocabulary acquisition	<ul style="list-style-type: none"> <li>• Terminologies related to transport, communication and trade</li> </ul>

Study skills	<ul style="list-style-type: none"> <li>• Taking notes.</li> <li>• Organisation of ideas for presentation.</li> <li>• Observation.</li> </ul>
Revision	<ul style="list-style-type: none"> <li>• Revision exercises provided</li> <li>• Ability to correctly answer the questions in the written assignments</li> </ul>
Assessment	<ul style="list-style-type: none"> <li>• Ability to work in groups and present the findings</li> </ul>
Learning outcomes	<ul style="list-style-type: none"> <li>• Identify different types of transport and communication</li> <li>• State factors influencing development of transport and communication</li> <li>• Understand the advantages and disadvantages of different types of transport</li> <li>• Locate main roads on the map of Rwanda</li> <li>• Understand the problems facing the development of transport and communication in Rwanda</li> <li>• Suggest solutions to the problems facing transport and communication in Rwanda</li> <li>• Outline the importance of transport and communication</li> <li>• List the different means of communication in Rwanda</li> <li>• Identify internal and external trade; importation and exportation in Rwanda</li> <li>• Identify factors affecting trade in Rwanda</li> <li>• Give the importance of trade in Rwanda</li> <li>• Identify exports of Rwanda</li> <li>• Identify problems affecting trade in Rwanda</li> </ul>

## Notes for the teacher

Clearly explain the meaning of transport and communication in order for the learners to make a clear distinction between the two. Use the examples known to the learners in their surrounding for them to understand. Discuss the different types of transport and engage the learners in giving their advantages and disadvantages. Discuss the different means of communication using local examples in Rwanda. Explain the factors and problems affecting development of transport and communication. Involve the learners in discussing the importance of transport and communication.

The topic on trade has terminologies that should be defined clearly. Classify trade into two namely internal and external. Guide the learners in explaining factors and problems affecting trade. Explain the prospects of trade in Rwanda. Use local examples and involve the learners when discussing trade in order to create interest in the learners.

## Teaching steps

- Begin the lesson by defining transport to the learners. Refer to the definition in the Student's Book.
- Discuss the major types of transport and their distribution in Rwanda. Ask the learners to do Activity 17.1 of the Student's Book.
- Ask the learners to read the case study of the Student's Book and to answer the questions that follow.
- Discuss the text in the Student's Book as you discuss the types of transport.
- Ask the learners to do Activities 17.2, 17.3 and the case study of the Student's Book.
- Guide the learners in discussing the distribution of the types of transport in Rwanda. Ask the learners to do Activity 17.4. Refer to the text of the Student's Book as you discuss the distribution.
- Discuss the factors that influence the development of transport in Rwanda. Ask the learners to read the case study of the Student's Book and to answer the questions that follow.
- Refer to the text as you discuss the factors.
- Discuss the importance of transport on the sustainable development of Rwanda. Ask the learners to do Activity 17.5 of the Student's Book.
- Guide the learners in discussing the points highlighted in the Student's Book. Give the learners Activity 17.6 as a takeaway assignment.
- Discuss the advantages and disadvantages of the different types of transport.
- Ask the learners to do Activity 17.7 of the Student's Book. Begin with the advantages and disadvantages of land transport. Here, discuss road, railway and

- pipeline transport. Refer to the text of the Student's Book. Give the learners Activity 17.8 As a takeaway assignment.
- Discuss the advantages and disadvantages of water transport. Refer to the text of the Student's Book.
  - Discuss the advantages and disadvantages of air transport. Refer to the text of the Student's Book.
  - Explain the problems affecting transport in Rwanda. Begin by asking the learners to do Activity 17.9 of the Student's Book. Discuss the points outlined in the Student's Book.
  - Discuss the possible solutions to the problems and the future prospects of transport in Rwanda. Begin by asking the learners to do Activity 17. 10 of the Student's Book.
  - Discuss the points highlighted in the Student's Book.
  - Ask the learners to individually answer the questions in Task 17.1 of the Student's Book.
  - Discuss communication. Begin by asking the learners to do Activity 17.11 of the Student's Book.
  - Define communication and discuss the different means of communication in Rwanda. Refer to the text of the Student's Book.
  - Give the learners Activity 17.12 of the Student's Book.
  - Discuss the factors influencing the development of communication in Rwanda. Begin by asking the learners to do Activity 17.13 of the Student's Book.
  - Discuss the factors by going through the text highlighted of the Student's Book. Give the learners Activity 17.14 as a takeaway assignment.
  - Explain the importance of communication in Rwanda. Begin by asking the learners to do Activity 17. 15 of the Student's Book.
  - Discuss the importance of communication by referring to the text of the Student's Book.
  - Discuss the problems that affect communication in Rwanda and their solutions. Ask the learners to do Activity 17.16 of the Student's Book. Refer to the text of the Students' Book as you discuss the problems and their solutions.
  - Organise for a field visit to a communications company in the country. This is Activity 17.17 of the Student's Book.
  - Ask the learners to answer the questions in Task 17.2 of the Student's Book.
  - Discuss trade in Rwanda. Begin by asking the learners to do Activity 17.18 of the Student's Book.
  - Define trade by referring to the definition of the Student's Book.
  - Discuss internal and external trade in Rwanda. Begin by asking the learners to read the case study of the Student's Book.
  - Discuss both internal and external trade by referring to the text of the

- Student's Book. Give the learners Activity 17.19 as a takeaway assignment.
- Discuss the factors affecting trade in Rwanda. Begin this section by asking the learners to do Activity 17.20 of the Student's Book.
  - Discuss the factors by making reference to the text of the Student's Book.
  - Explain the importance of trade in Rwanda. Begin this discussion by asking the learners to do Activity 17.21 of the Student's Book. Referring to the text of the Student's Book, discuss the importance of trade in Rwanda.
  - Explain importation and exportation of products. Begin by asking the learners to do Activity 17.22 of the Student's Book.
  - Discuss the concepts of importation and exportation as you refer to the text of the Student's Book. Give the learners Activity 17.23 as a takeaway assignment.
  - Explain the problems affecting trade in Rwanda. Ask the learners to do Activity 17.24. Making reference to the text of the Student's Book, discuss the problems of trade in the country.
  - Discuss the possible solutions to the problems of trade in Rwanda and the prospects of trade in the country. Refer to the text of the Student's Book.
  - Give the learners Activity 17.25 as a takeaway assignment.
- Together with the learners go through the Did you know? section of the Student's Book. This section has interesting facts about transport, communication and trade in Rwanda.
  - Ask the learners to individually answer the questions in the End of unit revision task of the Student's Book.

### Diagnostic questions

1. Account for the unequal distribution of the three main types of transport in Rwanda.
2. Track the development of communication in Rwanda from independence to date.
3. Describe Rwanda's balance of trade. Is it healthy for the nation? Suggest ways in which this can be improved.

### Note:

- Give the learners lesson notes to either write during the lesson or during remedial time. This will depend on your convenience.
- Remember to actively include the special education needs learners in all the learning activities. Give them extra attention to ensure that they catch up with the rest of the learners.
- Schedule for remedial lessons to ensure that the slow learners catch up with the work provided.

- Provide extra and more challenging tasks to the bright and talented learners.
- Give emphasis on development studies as a cross-cutting issue. Transport, communication and trade play a key role in the development of the country.
- Mark the activities according to how well the learners do them. Some of them might have different outcomes in the different groups or pairs that the learners work in. Remember to check out the specific skill and attitude that an activity is required to bring out in the learners.

### **Suggested answers to Task 17.1**

1. Accessibility in the rural areas of Rwanda is poor. The roads are mainly earth roads which become muddy and impassable in the rainy season. The state of the roads in the rural areas is attributed to the following reasons;
  - Hilly and mountainous landscape especially in the southern and northern regions discourage road construction.
  - Areas covered by vegetation such as forests are unavailable for construction of roads.

- Areas with swamps have no roads due to poor drainage.
  - Shortage of capital to develop transport network.
2.
    - Hilly and mountainous relief.
    - Presence of vegetation e.g. forests.
    - Poor drainage e.g. swamps.
    - Shortage of capital
    - Limited navigable waterways.

### **Suggested answers to Task 17.2**

1.
  - Communication has promoted education e.g. through E-learning.
  - Communication has led to effective and efficient transmission of information leading to economic development.
  - Communication has promoted trade through advertisement.
  - It has made it easy to implement government policies.
  - It has led to a more informed society through the internet.
  - It has created more employment opportunities e.g. broadcasters and engineers.
  - It earns the country revenue through taxation.

- It has facilitated the implementation of regional integration programmes.
  - It has strengthened social ties in the society through exchange of information.
2. • Integration of ICT in the school curriculum in order to expand the existing human resource.
- Intensive training of personnel in ICT.
  - Encouraging foreign investors to invest in the communication sector.
  - Setting up policies that promote communication in the country.
  - Repair, maintenance and upgrading of already existing communication equipment.
  - Provision of funds to investors in the communication sector.
- (d) Air transport – This refers to the movement of people and goods from one place to another by air using aeroplanes, helicopters and hot air balloons.
2. (a)
- Road transport
  - Railway transport
  - Pipeline transport
  - Water transport
  - Air transport.
- (b) (i) Road transport
- Advantages*
- It is flexible.
  - It is less expensive.
  - It saves time over short distances.
  - It offers door to door services.
  - It is easy to establish since the construction and maintenance of roads is manageable.
  - It is the most suitable for moving goods and people in the rural areas.
  - It is easier for people to access vehicles.

### **Suggested answers to the End of unit revision task**

1. (a) Transport is the physical movement of people, animals, goods and services from one place to another.
- (b) Land transport – This refers to the movement of people and goods over land using automobiles.
- (c) Water transport – This refers to the movement of people and goods over the water bodies.



- It requires less packaging expenses.
- There is minimum risk of damage to goods on transit.

*Disadvantages*

- It is prone to accidents and breakdowns unlike railways.
- It is unsuitable and costly for transporting cheap and bulky goods over long distances.
- The speed of motor transport is slow compared to air transport.
- Road transport is less organised compared to other forms of transport.
- Increased cost of petrol and diesel makes this mode of transport expensive.
- The high taxes levied on road

transport discourages the road users.

- Traffic jams on roads increases the cost of fuel and loss of time.
- It is prone to uneconomical return journeys.
- Road transport is affected by weather e.g. rainfall.
- It is unsuitable for transporting perishable goods over long distances.
- Vehicles on roads are prone to robbery and theft of goods.
- Vehicles are unsuitable for transporting bulky and heavy goods due to limited space.

(ii) Railway transport

*Advantages*

- It is convenient to transport goods over long distances.

- It is less affected by poor weather thus dependable.
  - It is cheaper compared to road or air transport.
  - Trains have a large carrying capacity compared to vehicles.
  - Railway lines occupy less space on land unlike roads.
  - Railway transport is safer since it is less prone to accidents or breakdowns.
  - Trains operate on fixed time schedules and thus less affected by traffic congestion.
- is expensive compared to the roads.
  - Railway transport is uneconomical to use over short distances.
  - Trains use varied rail gauges thus making interconnection between countries impossible.
  - Railway transport is limited to relatively flat terrain.
  - Only one train uses a single railway line at a time. This causes delays in the movement of goods and people.

#### *Disadvantages*

- Railways are not flexible i.e they do not offer door to door services.
- Construction and maintenance of railway lines

#### (iii) Pipeline transport

##### *Advantages*

- It is cheaper to operate and maintain pipelines compared to other means of transport.

- Pipelines can be laid on all types of terrains like hills and mountains unlike roads and railway lines.
- Pipelines are not affected by weather such as fog or rainfall unlike other means of transport.
- Pipelines allow for continuous supply of the commodities being transported.
- Pipelines are convenient in transporting highly inflammable products such as petroleum.
- Pipelines are not affected by traffic congestion unlike the roads.
- Pipeline transport does not pollute the environment unlike other

means such as road transport.

#### *Disadvantages*

- Pipelines are expensive to construct.
- Pipelines are inflexible.
- Heavy losses occur incase leakages are not detected.
- Pipelines are limited to liquids and gaseous commodities.

#### (iv) Water transport

##### *Advantages*

- Low maintenance costs.
- Water transport is cheaper compared to rail, air or road transport.
- Water transport is suitable for transporting heavy and bulky goods.
- It is relatively safe compared to other forms of transport.

- It experiences less traffic congestion compared to road transport.
- It is suitable for transporting fragile goods.

*Disadvantages*

- It is a slow means of transport compared to road or air transport.
- It is only limited to areas with lakes, canals and rivers.
- Some rivers are seasonal thus they cannot be used throughout the year.
- It is affected by strong waves.
- Presence of obstacles such as rocky islands hinder movement of vessels.

(v) Air transport

*Advantages*

- It is faster compared to

road, railway or water transport.

- It is convenient to transport perishable goods.
- It operates on fixed time schedules and thus the users can plan in advance.
- It is useful for agriculture to spray pesticides.

*Disadvantages*

- Occurrence of accidents leads to loss of lives and goods.
- It is expensive compared to other types of transport.
- Aircrafts have a small carrying capacity.
- It is affected by weather changes e.g. fog.
- It requires highly trained and skilled personnel.

- It is not flexible since aircrafts only land in areas with airports.
  - Highly inflammable goods are not allowed into airplanes.
3. The relief of Rwanda is hilly and mountainous. Areas with steep slopes such as the northern and western regions discourage construction of roads and railway lines. Gently sloping and flat terrain encourage the development of transport networks.
4. • Hilly and mountainous landscape offers suitable sites for constructing transmitters.
- Relatively calm climate supports the transmitters that are erected on hills.
  - Availability of modern technology has encouraged the development of communication in the country.
  - Presence of skilled labour.
  - The size of the country ensures reception of signals all over the country.
  - Government policy in Rwanda favours the development of I.C.T.
  - Political stability in the country attracts many investors in the communication sector.
5. • Improved purchasing power among the citizens has provided a high demand for communication facilities in Rwanda.
- Transport has created more employment opportunities to people in Rwanda.
  - Transport is a source of revenue to the government through taxation.
  - Transport has facilitated proper exploitation and utilisation of resources in the country.
  - Transport has led to the growth of urban centres.
  - Transport has encouraged domestic and international trade.
  - Transport has influenced the growth and development of industries by availing raw materials and distributing processed goods to the market.
  - It promotes the development of tourism by transporting tourists.
  - It has promoted international relations between Rwanda and other countries especially those that share transport routes.
  - Water transport has led to the development of ports e.g. Rubavu in Lake Kivu.
6. • The distribution of natural resources has a great effect on the construction and availability of road transport.

- Areas with fertile soils support wide variety of agricultural activities. They are connected with roads in order to transport the agricultural inputs and outputs e.g. in Musanze.
  - Areas with industries such as Ndera and Gikondo have well developed road networks in order to transport raw materials and finished products.
  - Tourist attraction sites such as the Nyungwe Forest are connected to roads in order to facilitate faster movement of tourists.
  - Urban centres such as Kigali, Huye, Rubavu and Musanze are well connected to roads to facilitate easy movement of people and trading activities.
  - Areas with ports around Lake Kivu are well connected to road networks in order to ease transport of goods to and from the hinterland.
  - Areas where minerals are extracted such as Rusizi, Nyagatare and Lake Kivu are well connected with road network to ease movement of the minerals to the market.
7. (a) • Shortage of capital to expand and maintain the transport and communication network/purchase modern transport equipment.
- Traffic congestion in some areas like Kigali causes delays in the movement of people and goods along the roads.
  - Importation of petroleum increases the transport costs.
  - Heavy rainfall causes the roads to be muddy. This interferes with the movement of goods and people.
  - Steep and rugged relief in the northern and western parts of Rwanda discourage road construction.
  - There are few navigable rivers in the country. This hinders the expansion of water transport.
  - Shortage of skilled labour hinders the construction of new transport and communication facilities or expansion of existing ones.
- (b) • Construction and rehabilitation of feeder roads in the rural areas.
- Construction of railway lines to reduce dependence on roads.
  - Enacting and

enforcing laws to manage traffic in the urban centres.

- Expansion of the roads/construction of dual carriage roads and by passes to control traffic congestion in urban centres.
  - Construction of traffic lights/road signs to control the traffic flow and reduce accidents.
  - Encourage people to use public transport to reduce the number of private vehicles and thus reduce congestion on roads.
  - The government should partner with financial institutions to construct better transport and communication networks.
  - The government should ensure that there is peace and stability in the country to safeguard the transport facilities.
8. • Communication has promoted education through online, distance and E-learning.
- Communication has made it easy to transmit information which has boosted trade, mining and technology.
- Communication has enabled the government to communicate policies and administrative information to the grass root level.
  - Communication has led to a more informed society through the use of the internet.
  - Communication has created more employment opportunities leading to improved standards of living.
  - The government earns revenue through taxation on the communication companies which is used for economic development.
  - Communication has strengthened social ties within the society through exchange of ideas on social media platforms.
  - Communication has made it possible to implement regional integration programmes through exchange of ideas.
9. • To create employment opportunities.
- To earn revenue to the government through taxation.

- To facilitate exploitation of resources.
- To stimulate the growth and development of urban centres.
- To stimulate the growth of domestic and international trade.
- To stimulate the growth and development of industries.
- To promote the development of tourism.
- To foster international relationships with other countries especially those that share transport routes.
- To encourage the development of ports to handle people and goods in its waterways.
- To promote dissemination of information.
- To strengthen social ties within the Rwandan society through exchange of information.
- To promote education through online and distant learning or E-learning.



# TOPIC AREA: HUMAN AND ECONOMIC GEOGRAPHY

## Sub-topic area: Economic activities

# UNIT **18** Environmental conservation in Rwanda and Tourism

**Key unit competence:** By the end of this unit, the learners should be able to investigate the impact of environmental conservation and tourism on sustainable development of Rwanda.

### Unit objectives

*By the end of this unit, a learner should be able to:*

1. Give the definition of environmental conservation.
2. Name different natural resources of Rwanda.
3. State the reasons and ways of conservation of environment in Rwanda.
4. Identify the impact of conservation on the environment in Rwanda.
5. Identify the factors and problems affecting conservation in Rwanda.
6. Define tourism and eco-tourism.
7. State major tourist attractions in Rwanda.
8. State the factors affecting tourism in the world.
9. Give the importance of tourism in Rwanda.
10. Identify the problems of tourism in Rwanda.
11. State the impact of tourism on the environment of the country.

## Content map

Unit 18: Environmental conservation in Rwanda and Tourism	
Number of periods	10
Introduction	Ask learners to define environment and give examples of natural resources and their uses.
Classroom organisation	Whole class orientation followed by group work, pair work and individual work.
Equipment required	Pictures, Internet, maps, paper, pens and local environment.
Activities	<ul style="list-style-type: none"> <li>• Interpreting photographs.</li> <li>• Discussion.</li> <li>• Identifying natural resources.</li> <li>• Giving reasons for conservation of the environment.</li> <li>• Locating main tourist attraction sites on the map of Rwanda.</li> <li>• Describe problems facing tourism and conservation of the environment.</li> <li>• State the impact of tourism on the environment.</li> </ul>
Competences practiced	<ul style="list-style-type: none"> <li>• Team work</li> <li>• Communication</li> <li>• Interpretation</li> <li>• Application of knowledge</li> <li>• Literacy</li> </ul>

Language	<ul style="list-style-type: none"> <li>• Discussion in groups</li> <li>• Presentation of findings</li> <li>• Written assignments</li> </ul>
Vocabulary acquisition	<ul style="list-style-type: none"> <li>• Terminologies related to environmental conservation and tourism</li> </ul>
Study skills	<ul style="list-style-type: none"> <li>• Taking notes.</li> <li>• Observation.</li> <li>• Critical thinking.</li> <li>• Organisation of ideas for presentation.</li> <li>• Discussion.</li> </ul>
Revision	<ul style="list-style-type: none"> <li>• Revision exercises provided</li> </ul>
Assessment	<ul style="list-style-type: none"> <li>• Ability to work in groups and present the findings</li> <li>• Ability to correctly answer the questions in the written assignments</li> </ul>
Learning outcomes	<ul style="list-style-type: none"> <li>• Define environmental conservation and tourism.]</li> <li>• Classify natural resources</li> <li>• Understand reasons and ways for environmental conservation</li> <li>• Identify the impact of conservation on the environment</li> <li>• Understand the challenges facing tourism and environmental conservation.</li> <li>• Define eco-tourism</li> <li>• Identify main tourist attractions in Rwanda</li> <li>• State factors affecting tourism in Rwanda</li> <li>• Outline importance of tourism and environmental conservation in Rwanda</li> <li>• Identify the impact of tourism on the environment</li> </ul>

## Notes for the teacher

The terms management and conservation should be clearly defined. Make use of local examples in order to enable the learners to clearly get the distinction between the two. Classify natural resources and explain the reasons why the resources need to be conserved. Involve learners in discussing ways that are used to conserve natural resources in Rwanda. Explain the problems facing environmental conservation in the country and their possible solutions.

Clearly define the terms tourism and eco-tourism. Classify tourism according to its different types. Guide the learners in identifying major tourist attractions in Rwanda. Discuss factors and problems affecting tourism in Rwanda. Guide the learners in discussing the importance of tourism and its future prospects in Rwanda. Involve the learners as much as possible when discussing this unit in order to create more interest.

## Teaching steps

- Begin the lesson by defining environmental conservation. Ask the learners to do Activity 18.1 of the Student's Book.
- Referring to the text of the Student's Book, define environment and environmental conservation.
- Ask the learners to do Activity 18.2 of the Student's Book as a takeaway assignment.
- Introduce types of natural resources. Ask the learners to do Activity 18.3 and 18.4 of the Student's Book.
- Discuss the types of natural resources. Discuss biotic resources, abiotic resources, renewable resources and non-renewable resources. Refer to the text of the Student's Book.
- Discuss the reasons for the conservation of natural resources in Rwanda. Begin by asking the learners to read the case study of the Student's Book.
- Discuss the reasons outlined in of the Student's Book.
- Study the ways of conservation of natural resources in Rwanda. Ask the learners to do Activity 18.5 of the Student's Book. As you discuss, refer to the ways outlined in the Student's Book.
- Discuss the impact of conservation on the environment and on the development of Rwanda. Begin by asking the learners to do Activities 18.6 and 18.7. Discuss the impact as outlined in the Student's Book.
- Explain the problems encountered in conserving the environment and their possible solutions. Begin by asking the learners to do Activity 18.8 of the Student's Book.
- Discuss the problems and their solutions as outlined on Table 18.1 of the Student's Book.
- Ask the learners to answer the questions in Task 18.1 individually.

- Introduce tourism. Begin by asking the learners to do Activity 18.9 of the Student’s Book. Define tourism and eco- tourism.
- Discuss the forms of tourism. Begin by asking the learners to read the passage in the case study of the Student’s Book.
- Refer to the forms of tourism outlined in the Student’s Book.
- Discuss the major tourist attractions in Rwanda. Ask the learners to do Activity 18.10 of the Student’s Book.
- Discuss the attractions by referring to the text of the Student’s Book.
- Ask the learners to do Activity 18.11 of the Student’s Book as a takeaway assignment.
- Discuss the factors affecting the development of tourism in Rwanda. Begin by asking the learners to do read the case study of the Student’s Book. Discuss the factors by referring to the text of the Student’s Book.
- Explain the importance of tourism to Rwanda. Begin by asking the learners to do Activity 18.12 of the Student’s Book.
- Discuss the problems of the student’s Book.
- Discuss the importance of tourism by referring to the text of the Student’s Book.
- Explain the future prospects of tourism in Rwanda. Ask the learners to do Activity 18.13 of the Student’s Book. Discuss the prospects as you refer to the text of the Student’s Book.
- Discuss the problems of the Student’s Book.
- Discuss the solutions to the problems facing tourism in Rwanda as outlined in the Student’s Book.
- Discuss the impact of tourism on the environment and on the development of Rwanda. Ask the learners to read the passage in the case study of the Student’s Book.
- Discuss the positive impacts as you refer to of the Student’s Book.
- Discuss the negative impacts as outlined in of the Student’s Book.
- Ask the learners to do Activities 18.15 and 18.16 of the Student’s Book as take away assignments.
- Introduce the case studies by asking the learners to do Activity 18.17 of the Student’s Book.
- After the activity, ask the learners to answer the questions in Task 18.2 of the Student’s Book.
- Discuss the case studies of Nyungwe National Park, Akagera National Park, Birunga National Park and their special features.
- Refer to the text of the Student’s Book as you discuss the case studies.
- Together with the learners, go through the Did you know? section. This section has interesting facts on environmental conservation and tourism in Rwanda.
- Ask the learners to answer the questions in the End of unit revision task of the Student’s Book.

- Advise the learners to go through the End of unit glossary to find the meanings of the new words used in the unit.

### Diagnostic questions

1. Analyse the future prospects of tourism.
2. Suggest improvements that the Government of Rwanda can adopt to improve its environmental conservation measures.
3. Give examples of sites in Rwanda that can be turned into tourist attraction venues.

### Note:

- Give the learners lesson notes to either write during the lesson or during remedial time. This will depend on your convenience.
- Remember to actively include the special education needs learners in all the learning activities. Give them extra attention to ensure that they catch up with the rest of the learners.
- Schedule for remedial lessons to ensure that the slow learners catch up with the work provided.
- Provide extra and more challenging tasks to the bright and talented learners.
- Give emphasis on environmental conservation as a cross cutting issue. This helps to boost tourism in a great way.

- Mark the activities according to how well the learners do it. Some of them might have different outcomes in the different groups or pairs that the learners work in. Remember to check out the specific skill and attitude that an activity is required to bring out in the learners.

### Suggested answers to Task 18.1

1. Environmental conservation is the process involving activities that are aimed at saving the natural resources through careful management. These activities may be short-term or long-term and require concerted effort of individuals, families, governmental and non-governmental organisations. Measures taken to conserve the environment include reducing waste, saving trees, recycling, use of renewable resources and control of soil erosion.
2. (a)
  - Remoteness/ inaccessibility
  - High pressure on available resources such as water and land due to high population.
  - Harsh climatic conditions such as prolonged drought.
  - Shortage of funds to implement conservation measures.

- Occurrence of natural disasters such as floods and landslides.
- Lack of skilled labour.

Accept other correct answers

(b) Solutions to the problems highlighted.

- Construction of feeder roads to increase accessibility especially in the rural areas.
- Control population growth e.g. by the use of family planning methods.
- Planting of drought resistant crops.
- Use of modern methods of farming.
- Provision of more funds for implementation of conservation measures.
- Encourage international and non-governmental organisations to participate in environmental conservation.
- Accept other correct answers

3. Significance of environmental conservation in your district.

- To promote tourism.
- To protect endangered species of some wildlife from extinction.
- To control global warming.
- To purify the air.
- To provide employment opportunities.

- For steady supply of wood fuel.

Accept other correct answers

## Suggested answers to Task 18.2

- Tourism – This is travel for recreation, leisure, religious, family or business purposes usually for a limited duration.
  - Eco-tourism – This is tourism that is directed toward exotic, often threatened, natural environments, especially to support conservation efforts and observe wildlife.
- Leisure tourism
  - Cultural tourism
  - Religious tourism
  - Family tourism
  - Health tourism
  - Sports tourism
- Wild animals
  - Mountains and hills
  - Vegetation
  - Water bodies
  - Hot springs
  - Beaches
  - Historical sites
  - Caves

## Suggested answers to the End of unit revision task

1. Define the following terms:

(a) Environment

- This refers to our surrounding.

(b) Conservation

- This refers to the act of saving our natural resources through careful management.

(c) Deforestation

- Deforestation refers to the permanent destruction of forests in order to make land available for other uses.

(d) Soil erosion

- Soil erosion refers to the carrying away of top fertile soils by running water, moving ice or wind.

2. (a) Account for the occurrence of environmental degradation in Rwanda.

- Poor farming methods cause loss of soil fertility.
- High demand for wood fuel and timber cause deforestation.
- Poor waste disposal cause environmental pollution.
- Industrialisation releases

greenhouse gases into the atmosphere leading to global warming.

- Overgrazing exposes the soils leading to soil erosion by water or wind.
- Mining leads to loss of biodiversity.
- Deforestation and cultivation along the river banks causes siltation in the denser rivers leading to flooding.
- Forest and bush fires caused by man lead to loss of vegetation.
- Occurrence of wind storms causes loss of lives and destruction of property.

(b) Outline and explain the steps being taken to solve the environmental degradation problem in Rwanda.

- Legislation – Enacting laws that are aimed at conserving the environment and natural resources.
- Conduct environmental impact assessments – it is mandatory to conduct an environmental impact



assessment before any development project is approved to avoid misuse of the environment and natural resources.

- Mass education – creation of public awareness through the media on the importance of environmental conservation.
- Integration of environmental issues in the education system – Environmental issues are taught in schools to enable the learners to develop a positive attitude towards environmental conservation.
- Better forms of energy – encourage the use of alternative sources of energy other than biomass e.g. H.E.P
- Treating wastes before disposal – Industries should treat the wastes before disposing them into the water bodies.

Accept other correct answers.

3. (a) Differentiate between renewable and non-renewable resources in relation to Rwanda.
- Renewable resources

refers to those resources that can be replenished naturally such as wind while non-renewable resources refers to those resources that get exhausted once used and not get replenished such as fossil fuels.

- (b) With supportive examples from Rwanda, examine the measures being taken to conserve the renewable resources.

- Protection and conservation of water catchment areas such as Nyungwe forest to ensure continued supply of water.
- Encourage use of alternative sources of energy other than wood fuel to control deforestation.
- Carry out afforestation and reforestation in order to ensure continued supply of wood fuel.

4. Discuss the causes of environmental degradation in Rwanda.

- Poor waste management.
- Deforestation.
- Pollution from industries.

5. Examine the challenges experienced in the process of environmental conservation in Rwanda.
- Remoteness hinder conservation measures due to inaccessibility.
  - High population levels have led to increased pressure on resources such as land, water and minerals.
  - Shortage of funds limit implementation of conservation measures.
  - Harsh climatic conditions such as prolonged drought hinder conservation measures such as tree planting.
  - Occurrence of natural disasters such as landslides.
  - Shortage of skilled manpower limits implementation of conservation measures.

Accept other correct answers.

6. To what extent have physical factors been responsible for the development of tourism in Rwanda? Discuss.

Physical factors have influenced tourism in the following ways:

- Volcanic hills and mountains such Mount Karisimbi and Mount Sabyinyo form beautiful features.
- Varied vegetation in the country that range from forests, savanna and swamp vegetation attract tourists.

- There are a variety of wild animals in the national parks such as mountain gorillas, elephants, buffaloes, giraffes, lions and birds which attract tourists.
- Natural water bodies such as lakes e.g. Lake Kivu and wetlands form beautiful features that attract tourists.
- Hot springs such as Bugarama, Rubavu and Kinigi attract tourists.
- Beautiful lake beaches along Lakes Kivu, Rumira and Muhazi offer beautiful sites for relaxation.
- Waterfalls along some rivers form beautiful features that attract tourists e.g. Rusuma waterfall.
- Natural caves associated with volcanicity found in the Northern Province attract many tourists.

7. "Tourism is a lucrative invisible export" Justify this statement with reference to Rwanda.

- Tourism is an invisible export that is the leading producer of the country's GDP. The rich biodiversity and the beautiful sceneries in the country attract many tourists into the country.

8. Account for the development of the tourism industry in Rwanda. The success of tourism in Rwanda is attributed to the following reasons;

- Presence of a variety of tourist attraction sites e.g. mountains rich in biodiversity
- Political stability which ensures safety for the tourists.
- Intensive and extensive marketing of tourism by the government.
- Availability of adequate capital to modernise and expand tourist facilities.
- Availability of tourism infrastructure such as hotels, roads and resort centres.
- Presence of trained and qualified personnel to provide excellent services to the tourists.

Accept other correct answers.

9. Explain the significance of the tourism industry in Rwanda.

- Tourism earns the country foreign exchange which is used for economic development.
- Tourism earns revenue to the government which is used for economic development.
- Tourism creates more employment opportunities leading to improved standards of living.
- It is a source of income to the people around the tourist attractions leading to improved standards of living e.g. tour guides.
- Tourism has led to the development of

infrastructure e.g. roads around the tourist attraction sites which make the tourists comfortable.

- Tourism enables people to interact promoting unity and international relations.

Accept other correct answers.

10. Examine the factors that have hindered the development of tourism in Rwanda and suggest possible solutions.

Problems that hinder the development of tourism;

- Lack of adequate skilled labour.
- High population has led to encroachment into the tourist sites which interferes with wildlife habitats.
- Negative image of the past due to the genocide against the Tutsis of 1994 scare away tourists.
- Low levels of participation in tourism by the citizens.
- Inadequate social amenities.
- Low levels of technology limit modernisation of tourist facilities.

Accept other correct answers.

*Possible solutions*

- Carry out intensive and extensive campaigns to market the country as a tourist destination.
- The government should avail credit facilities to investors in

the tourism sector in order to establish modern facilities.

- Integration of tourism in the education system in order to create awareness on the importance of tourism.
- Construction and maintenance of roads in the tourist destinations to increase accessibility.
- Improving security of the tourists by providing more security personnel to the tourist attraction sites.
- Encourage the private sector to invest in the tourism sector e.g. in the hotel industry.

Accept other correct answers.

11. Explain the following in relation to Rwanda:

(i) Eco-tourism;

Ecotourism refers to the development and management of tourism while conserving the environment. Eco-tourism is encouraged in the country by sensitising people to conserve the environment while the proceeds from tourism is used to improve their well being.

(ii) Sustainable utilisation of natural resources is being implemented through the following measures.

- Encouraging the use of renewable sources of energy e.g. wind and solar

to reduce demand for wood fuel and discourage deforestation.

- Carrying out afforestation and reforestation to control on deforestation.
- Control of soil erosion.
- Protection of the water catchment areas in order to ensure continued supply of water.
- Protection of endangered species of animals and plants such as mountain gorillas to prevent them from being extinct by creating national parks and game reserves.
- Educating the public through the media on the importance of environmental conservation.
- Recycling of products in order to reduce the demand for resources.
- Introduction of better farming methods in order to conserve the environment.

- Enactment and enforcement of laws that govern the exploitation of natural resources.

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