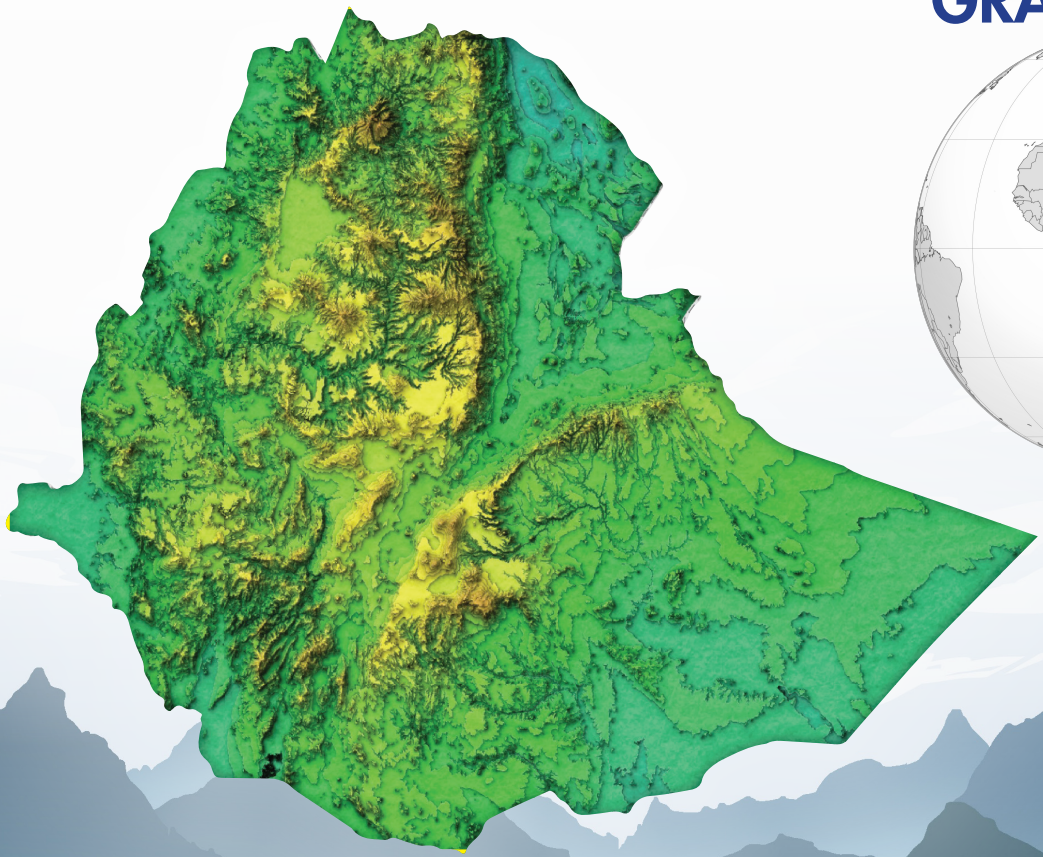
GEOGRAPHY

DISTANCE LEARNING MATERIAL GRADE 9



MODULE TWO

FDRE Ministry of Education
2023

GEOGRAPHY

DISTANCE LEARNING MATERIAL

GRADE 9

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MODULE II

FDRE, MINISTRY OF EDUCATION

HAWASSA UNIVERSITY

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MODULE II

Module Introduction

Hello, Dear distance learner! How have you been doing? We hope you have enjoyed your study of the distance learning of geography module one for grade nine in semester one. Here, we present module two in continuation of module one of this grade level.

Dear distance learner! In module two you are going to study Major Economic and Cultural Activities in Ethiopia, Human – Natural Environment Interaction in Ethiopia, Contemporary Geographic Issues and Public Concerns in Ethiopia, and Geography inquiry skills and techniques.

We hope that you have experienced how to proceed in learning at distance with this kind of module. However, we would like to mention the following methods to ensure that you study this material efficiently. New topics and sub-topics with detailed explanations are provided for you. Besides, some brainstorming activities are given following the topics and reflective activities are given proceeding to the descriptions of each topic. These brainstorming and reflective activities should be done by you. Of course, the answers for each activity are given at the end of the unit. At the end of each section, there is a checklist that helps you to assess the extent of your understanding of the section. And then if you are successful in responding positively that is good, just proceed to do the self-test exercises whose answers are available at the end of the unit. Otherwise, you have to go back and revisit the section. Moreover, at the end of each unit, the summary of each unit and the required reference materials of the unit are given.

Finally, there are assignments in the module that you must correct and assignments for submission corrected by the tutor in the module. Therefore, you are expected to do the assignments carefully and submit them to your tutor. We wish you great success.

Module Objectives

At the end of this module, you will be able to:

- *know the importance of the major economic activities of Ethiopia,*
- *recognize trade and transport systems of Ethiopia,*
- *understand the diversity of language and religion in Ethiopia,*
- *distinguish relationship between human activities and the environment by giving examples from their local environment,*
- *identify the implications of trend in population growth on sustainable use of natural resources,*
- *describe the impact of rapid population on environmental and socioeconomic development,*
- *constructing statistical diagrams to represent data on distribution maps,*
- *make a conversion of map scale,*
- *measure area and distances using maps,*
- *demonstrate position on maps and make sketch maps,*
- *undertake investigate, gather geographic information and analyze the data using appropriate techniques,*
- *value the importance of the major economic activities of Ethiopia,*
- *appreciate for the realization of plan for accelerated sustained development to end poverty*
- *aspire natural resource management in Ethiopia, and*
- *adhere natural resource conservation and management policy of Ethiopia.*

Module Contents

Module Assessment Methods

Formative assessment

- Open-ended questions
- Worksheets
- Rubrics
- Portfolios
- Essays
- Self-test exercises
- Diagnostic test at the beginning of the class term
- Feedback on learning-in-process
- Peer and self-evaluation

Summative assessment

- Mid-term examination
- Assignments
- Portfolios
- Final examination

Table of Contents For Module II

UNIT FIVE

MAJOR ECONOMIC AND CULTURAL ACTIVITIES IN ETHIOPIA

Unit Introduction

Dear distance learner, in the module one unit four of this subject you have studied the population and demographic characteristics of Ethiopia. In this unit, are going to learn the major economic and cultural activities of Ethiopia. Humans have been involved in many activities in order to satisfy their diverse material and spiritual needs. These activities, which are designed to satisfy the needs of human beings, are known as economic activities. Economic activities are highly diversified in their nature and character. Some are simple while others are complex. Some of them are primitive whereas others are advanced. But whatsoever characters they have, all of them are equally important in satisfying peoples' needs.

The unit has five sections. Section one deals with major economic activities in Ethiopia. The second section of the unit focuses on the contribution of subsistence farming and cash crop farming to the Ethiopian economy. The third section deals with trade and transport in Ethiopia. The fourth section attempts to examine road safety in Ethiopia. Finally, the fifth section deals with the cultural landscape and tourism in Ethiopia.

Unit Learning Outcomes

By the end of studying this unit, you will be able to:

- *recognize the importance of the major economic activities of Ethiopia;*
- *examine the trade and transport systems of Ethiopia; and*
- *appreciate cultural landscapes and their contribution to tourism industry.*

Key Terms

- *Agriculture*
- *Cultural landscapes*
- *Economic activity*
- *Industry*
- *Passengers*
- *Pedestrians*
- *Road safety*
- *Road Traffic Accident*
- *Tourism*
- *Trade*
- *Transport*

Unit Contents

Major Economic Activities
Contribution of Subsistence Farming and Cash Crop to the Ethiopian Economy
Trade and Transport in Ethiopia
Road Safety in Ethiopia
Cultural Landscape and Tourism in Ethiopia

The required study time for unit one : 12 Hrs

Unit Learning Strategies

Suggested learning strategies are:

- *written brainstorming questions;*
- *case study;*
- *field visit;*
- *Problem-solving method;*
- *individual project;*
- *report writing;*
- *observation;*
- *written activities;*
- *practical activities;*
- *self-test assessments;*
- *online dialog (if possible); and*
- *electronic portfolios (if possible).*

Section 1 Major Economic Activities in Ethiopia

Section Overview

Dear learner, this is the first section of the unit. In this section you will study the concept of economic activities and major economic activities in Ethiopia. In human life, food, shelter and clothing are basic needs for the sustenance of life, and goods of luxury and comfort for its enjoyment. To obtain these necessities of life, human beings are engaged in various occupations. These occupations are called economic activities. Some of the occupations or activities are hunting, fishing, farming, grazing, mining, manufacturing, transportation, and trade, among others.

Section Learning Outcomes

By the end of this unit, you will be able to:

- *explain the major characteristics of economic activities;*
- *examine how economic activities modify and transform resources;*
- *describe agricultural practices in Ethiopia;*
- *differentiate secondary economic activity from primary economic activity; and*
- *explain the nature and characteristics of service-giving activities.*

Required study time:3 Hours

Major Types of Economic Activities

Dear learner! *What does the term "economic activity" mean? What factors influences economic activity? Please, try to write your answer in the given space below.* _____

_____

_____

Have you tried? If not, no problem. Have look at the following the following explanations. Economic activity is the production, distribution, and exchange of goods and services. Some examples of these activities are hunting, fishing, farming, grazing, mining, manufacturing, transportation, trade and others.

Dear learner! *What are the major classes of economic activities? Please try on the following space.* _____

_____

_____.

Have you tried? If so, that is great. The economic activities practiced in the world are grouped into five, namely primary, secondary, tertiary, quaternary , and quinary. Each type of economic activity is important to a society. The distribution of jobs in a particular economic activity in a country may indicate the level of development of the country. Geographers classify a nation's economy into primary, secondary, tertiary, and the service sectors. Increasingly the service sectors are seen as forming a fourth or quaternary sector and a fifth or quinary sector.

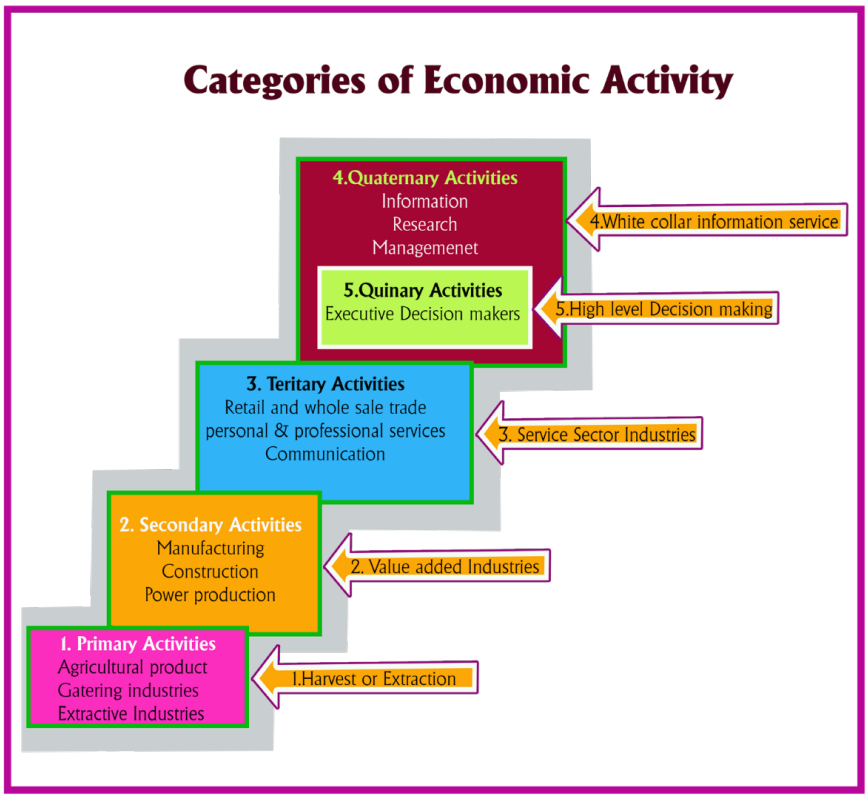

Figure 5.1: Categories of Economic Activity

5.1.1. Primary Economic Activities

Dear learner! *What are the major primary economic activities practiced in your locality? Please, try with your answer in the following spaces.* _____

_____

_____

Have you stated? If so that is wonderful. Primary economic activities focus directly on the extraction of resources from the environment. They involve the production of foodstuffs and raw materials. These economic activities occur at the beginning of the production cycle, where people live in close contact with the resources of the earth. A few examples of primary economic activities include agriculture, fishing, forestry, and mining. All of these jobs are dependent on the natural resources of the earth.

Here are some characteristics of Primary economic activities. They are;

- dependent on the natural environment;
- related to the production of foodstuffs and raw materials through the exploitation of the resources of the earth;
- influenced by the condition of the physical environment in one way or another

Figure 5.2: Types of Primary Activities (Agriculture, Fishing, Forestry and Mining)

1. Agriculture

Dear learner! *What is agriculture? Why is agriculture an important primary economic activity? Please write your answer in on the following space provided below.* _____

_____

Have you tried? If so, that is fantastic. Agriculture is the science and art of cultivation of the soil and the rearing of livestock for either local consumption or commercial purposes. In Ethiopia, agriculture is an old economic activity, which has been practiced since 4000 BC. Thus, Ethiopia is mentioned as one of the original centers of the world's most important cultivated crops. In Ethiopia, most agricultural production takes place in the Dega and Weyna Dega zones, where land productivity has traditionally coincided with the densest rural population.

Types of agriculture in Ethiopia can be divided into two broad types namely: crop production and livestock raising.

I. Crop Production/Arable Farming:

Dear learner! *What is arable farming? Try to write your answer in the space provided below and compare it with what you will read in the following paragraphs.* _____

_____

Crop production is the process of cultivating of plants to yield food, feed, and fiber to provide medicinal or industrial ingredients, or to grow ornamental products. Arable farming practices in Ethiopia can be classified into the following types:

a) Seed (Grain) Production

In Ethiopia, in areas of Weina Dega and Dega zones on north western highlands and parts of South eastern highlands, seed farming is a common activity. Seed/grain production mainly includes cereals, pulses and oilseeds)

- The principal cereal crops are teff, barley, wheat, maize, sorghum, millet, and oats.
- Pulses include horse beans, chickpeas, haricot beans, field peas, lentils and vetch.
- Oilseeds include Oil Niger, linseed, fenugreek, rapeseed, sunflower groundnuts, and sesame.

b) Permanent (Perennial) Crop Cultivation

Perennial crops like enset, coffee, cotton, etc. are major crops in the Woina Dega areas of the southern and south western parts of the country. *Enset* is the staple food of the people in these areas.

c) Shifting Cultivation

Shifting cultivation is the cut-and- burn cultivation system. In Ethiopia, Shifting cultivation is practiced in the western and south western fringes of the Ethiopian highlands and lowlands or Benishangul-Gumuz, Gambella and Southern Regions where population density is low and livestock rearing is limited.

d) Plantation Agriculture

In Ethiopia, plantation agriculture produces mostly cash or industrial crops like sugarcane, cotton, coffee, tea, and rubber. Such agricultural systems are found in areas either where there is abundant rainfall or irrigation is possible.

II. Livestock Raising

Dear learner! *Do you know what livestock raising mean?* _____

_____

_____

_____

Have you tried? If not, no problem. Have look at the following explanation. The term livestock includes all animals that are kept on the farm to provide food, power, raw materials, or are meant for market. Ethiopia has a large livestock population that includes cattle, goats, sheep, amels, poultry, and packed animals. In cattle population, Ethiopia stands first in Africa and tenth in the World. The Livestock sector is an important subsector of the nation's economy and supports both the agricultural income and the Growth of Domestic Production (GDP).

In human life, food, shelter and clothing are basic needs for the sustenance of life, and goods of luxury and comfort for its enjoyment. To obtain these necessities of life, human beings are engaged in various occupations. These occupations are called economic activities. Some of the occupations or activities are hunting, fishing, farming, grazing, mining, manufacturing, transportation, and trade, among others.

2. Forestry

Dear learner! *Do you know what forestry means? Please write your answer in the space given below.* _____

_____

_____

Have you tried? If so that is great. A forest is a mass of plants or a wooded area in which trees are the most common features. The extraction of forest products for different purposes by people is called "forestry". Economic Significance of Ethiopian forestry even though the importance of

forest and forest products is little in terms of earning foreign exchange, their significance at a local level is large. For instance, their contribution to the national economy in the form of GDP is about 6.10%.

Most of the trees cut in Ethiopia today are used for domestic purposes like :

- Fuel wood,
- Timber household furniture,
- For building and construction.

3. Fishery

Dear learner! *Do you know what fishing means? Please, write your answer in the given space below.* _____

_____

Have you tried? If not, no problem. Have look at the following explanation. Fishing is a primary economic activity concerned with the catching and harvesting of fish, and other marine creatures. Fishing is one of the oldest occupations of humankind. Most fishing activities in Ethiopia take place in freshwater, such as rivers, lakes and ponds. In general, the Ethiopian fishing grounds could be classified as Lakes, and Rivers

4. Mining

Dear learner! *What is mining? Please try on the following space.* _____

_____

_____

_____

Have you tried? If so that is great. Mining is a primary economic activity concerned with the extraction of mineral-bearing substances from the earth's crust. The earth's crust is composed of rock containing minerals. A mineral is an inorganic chemical element or compound found naturally in the crust of the earth. Mining is important to the economy of Ethiopia. Currently, mining contributes to only 1.5 % of the GDP

5.1.2. Secondary Economic Activities

Dear learner! *What is manufacturing? Please try to answer the question in the space provided below and compare it with on the what you will read in the following paragraph.* _____

_____

Secondary economic activities include manufacturing, construction, and power production. Manufacturing activities take place in factories. It is the activity, which turns raw materials

into products by using labour, energy, and equipment, while industry refers to the place where manufacturing takes place.

Activities associated with the secondary sector include metalworking and smelting, automobile production, textile production, chemical and engineering industries, aerospace manufacturing, energy utilities, engineering, breweries and bottlers, construction and, shipbuilding.

Figure 5.3: Types of Secondary Activities (Manufacturing & Power Production)

Types of Manufacturing Industries in Ethiopia

Manufacturing industries in Ethiopia can be classified into two. These are:

a) Cottage(traditional) industries
b) Modern Manufacturing industries

a) Cottage (Traditional) Industries

The main cottage industries include weaving, woodcarving, pottery, metal works, basketry, etc. The cottage industries of Ethiopia have existed with little changes and refinement throughout history. The major factor that hindered their development was the negative traditional outlooks towards these activities. Hence, people engaged in such activities had, in some instances, low social status. Still, this low status has not been done away with entirely.

b) Modern Manufacturing Industries

As a developing nation, Ethiopia's modern manufacturing sector is at a low level. Ethiopia's modern manufacturing consists of largely light industries, which produce consumer goods.

5.1.3. Tertiary Economic Activities

Dear learner! *Do you know what tertiary economic activity means? Please try to answer it below.* _____

_____

_____.

Have you tried? If so that is fantastic. The basic characteristic of tertiary economic activity is the provision of services. The tertiary sector involves the provision of services to other businesses as well as to the final consumers. Examples of tertiary economic activities include legal services, medical services, trade, transportation services, tourism, etc.

Figure 5.4: Types of Tertiary Activities (Transport and Tourism

5.1.4. Quaternary Economic Activities

Dear learner! *Can you mention the major quaternary economic activities practiced in your locality? Please list them in the space below.* _____

_____

_____

Have you tried it? That is good. The quaternary sector may realistically be seen as an advanced form of service activity involving specialized knowledge, technical skills, communication

ability, or administrative competence. These activities include research, financial services, and government activities. These are the activities performed in office buildings, elementary and university classrooms, hospitals and doctors' offices, theatres and television stations. They are activities primarily concentrated in large urban places and require higher levels of education than the other sectors. This section also includes other pure services, such as the entertainment industry.

5.1.5. Quinary Economic Activities

Dear learner! *What do you know about quinary economic activities? Please try to write your answer in the space below.* _____

_____

_____.

Quinary economic activities are generally considered to be a sub-set of quaternary activities and are those that involve high-level decision-making and scientific research skills. It is also a sub-division of the tertiary sector representing the special and highly paid skills of top business executives, government officials, research scientists, financial and legal consultants, and the like. These people find their places of business in major metropolitan centres, in and near major universities and research centres.

Resources

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Activity 1

Answer the following questions

1. What are economic activities?
2. Explain the contribution of primary economic activity for Ethiopian economic development.
3. Which types of economic activities involve the production of items directly from nature?

Checklist

Dear learner! Here is a checklist provided for you to check your understanding about the economic activities. Put a tick mark (√) against each of the following statements. You must select either res 'YES' or 'NO' as your response.

No	Items	Yes	No
1.	Can you list the five types of economic activities?		
2.	Can you explain the major characteristics of economic activities?		
3.	Can you examine how economic activities modify and transform resources?		
4.	Can you give an example of secondary economic activities?		
5.	Can you mention the major sectors of tertiary economic activities?		
6.	Can you give an example of secondary economic activities?		

Is there any box that you mark 'No' underneath it? If there is any return to your text and read about it before you go to the following exercise.

SELF-TEST EXCERCISES FOR SECTION 1

Part I. Write True if the statement is correct and False if the statement is incorrect.

1. Fishing is a secondary economic activity concerned with the catching of fish and other marine creatures.
2. In Ethiopia, most agricultural production takes place in the Dega and Weyna Dega zones.
3. The types of human activities related to the extractive sector belong to the secondary sector.
4. In Ethiopia, Plantation agriculture produces mostly cash or industrial crops.
5. Shifting cultivation is the cut-and- burn cultivation system.
6. Power production is one type of secondary economic activity.
7. The Secondary sector of industry involves the provision of services to other businesses as well as final consumers.
8. Tourism is a type of primary economic activity.

Part II. Match Items in Column 'A' With Items in Column 'B'

Column "A"	Column "B"
1. Cereal crop	A. Sunflower
2. Perennial crop	B. Haricot beans
3. Pulses	C. Cotton
4. Oil seed	D. cut-and- burn cultivation
5. Cash crop	E. Wheat
	F. Enset

Part III. For the following questions, choose the correct answer from the given alternatives.

1. The service sector of human economic activities is designated as:

   A. Secondary
   B. Quaternary
   C. Primary
   D. Tertiary

2. Of the following, one is a primary economic activity.

   A. Forestry
   B. Trade
   C. Tourism
   D. Refineries

3. Which one of the following refers to a tertiary economic activity?

   A. Processing raw materials
   B. The production of services
   C. The provision of services
   D. The production of raw materials

4. The types of human activities related to the extractive sector belongs to----------activity.

   A. Secondary
   B. Tertiary
   C. Primary
   D. Quaternary

5. One of the following is a characteristic of manufacturing activities

   A. It requires large capital investment
   B. Large number of employees are engaged
   C. They involve a high degree of division of labour
   D. All are correct answers

6. Which of the following is **not** a tertiary economic activity?

   A. Wholesale trade
   B. Tourism
   C. Transportation
   D. Construction

Section 2 Contribution of Subsistence Farming and Cash Crop to the Ethiopian Economy

Section Overview

Dear distance learner! In this section you are going to study the contribution of subsistence farming and cash crop farming to the Ethiopia's economy. Subsistence farming is a method of farming in which nearly all of the crops or livestock raised are used to maintain the farmer and the farmer's family, leaving little, if any, surplus for sale or trade. It is a common feature of developing countries including Ethiopia. Commercial farming as opposed to the subsistence farming sector it concerned with producing crops for sale. Hence the main objective of this sector is to make money.

Section Learning Outcomes

At the end of this section, you will be able to:

- *describe agricultural practices in Ethiopia;*
- *explain the importance of subsistence farming to the Ethiopian economy; and*
- *explain the contribution of cash crop production to the Ethiopian Economy.*

Required study time:2 Hours

Dear learner! *Can you mention the contributions of farming to the Ethiopian economy?* _____

_____

_____.

Have you mentioned it? If so, that is great. Ethiopia's national economy largely bases itself on agriculture. Agriculture constitutes the principal source of income and employment for the majority of the population in Ethiopia. The greater proportion of the foreign exchange the country earns also comes from this sector.

The importance and predominance of the agricultural economy in the country can be suggested by the following facts:

1. Agriculture employs the majority (80%) of Ethiopia's total population
2. Agriculture supplies more than 90% of export commodities. Thus, agriculture is the main source of Ethiopia's export earnings.
3. Agriculture contributes 32.7% of the Gross Domestic Product (GDP) of the country (See Table 1.1).

Table 5.1: Sectoral Percentages Shares in GDP (2014-2020)

Sector	Share (%)					
	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
Agriculture	39.6	37.5	36.3	34.9	33.3	32.7
Industry	21.0	23.7	25.9	27.0	28.1	29.0
Service	39.5	39.7	38.8	39.2	39.8	39.5

Source: National Bank of Ethiopia, 2019/20

Agriculture's main products are food crops, cash crops, industrial crops, fruits and vegetables, flowers, and animal products. Agriculture had been the leading sector followed by the service sector until 2014/15. But, after 2015/16, the service sector emerged as the dominant sector mainly due to natural and economic factors.

5.2.1. The Contribution of Subsistence Farming to the Ethiopian Economy

Subsistence farming is a method of farming in which nearly all of the crops or livestock raised are used to maintain the farmer and the farmer's family, leaving little, if any, surplus for sale or trade. It is a common feature of developing countries, including Ethiopia. Both crop farming and animal rearing use traditional tools and techniques and hence, subsistence agriculture is hand-to-mouth in nature.

The subsistence farming sector of Ethiopia produces varieties of food crops, which grow in different agro-climatic conditions. The crops include cereals such as teff, wheat, barley, sorghum, etc. Enset is another major food crop cultivated in parts of southern, western, and central Ethiopia. Pulses and oilseeds are also among the food crops grown in this sector.

Agriculture in Ethiopia is typically characterized by smallholder, and subsistence farming that is highly dependent on rainfall. Urban livelihood is also highly dependent on the rural economy, and as such small farms constitute the life support mechanism of the country.

Subsistence farming is the practice of self-sufficiency in which the farmers focus only on producing enough food for personal consumption. Thus, it can play an important role in Ethiopia's economy by reducing the vulnerability of rural food-insecure households, and improving livelihoods.

5.2.2. Contribution of Cash Crop Production to the Ethiopian Economy

Dear distance learner! Can you describe some of the contributions of cash crop production in your locality? Please try on the following space and compare it with what you are going to read in the subsequent paragraph. _____

_____

_____

Have you tried? That is great. Commercial farming as opposed to the subsistence farming sector, is concerned with producing crops for sale. Hence, the main objective of this sector is to make money. In this regard, Ethiopian farmers produce varieties of cash crops such as coffee, oilseeds, pulses, chat, sugar cane, cotton, and fruit. Contributions of cash crop production to the Ethiopian economy are listed hereunder:

a) Source of Food and Raw Materials

One of the main roles of agriculture in the Ethiopian economy is being the source of food and raw materials. For example, agriculture supplies the country with food grains, dairy, and meat products. The agricultural sector is also the supplier of foodstuff to consumers and raw materials to agro- industries

b) Source of Capital

Cash crops provide a stimulus to agricultural innovation, by raising capital for agricultural investment and accelerating the build-up of institutions that enable further commercialisation. Cash crop production in Ethiopia provides funds for capital formation such as: agricultural taxation and the export of agricultural products,

i. Agricultural taxation: Taxes paid by cash crop production farmers' important contribution to the Ethiopian Economy.

ii. Export of Agricultural products: The major Cash crop productions for export items of the country include coffee, oilseeds, flower, *chat* and pulses. Coffee is Ethiopia's most important export commodity, accounting for about 28.6 % of the value of all exports in 2019/20. Other cash crops oil seeds, pulses and *chat* accounts for 11.5%, 7.9%, and 10.9%.of the total value of all exports in 2019/20 respectively.

C. Contribution to Employment:

About 80% of the Ethiopian population earns their livelihood from agriculture. Cash crops bring substantial wages and employment opportunities to the rural economy.

- Subsistence farming is a method of farming in which nearly all of the crops or livestock raised are used to maintain the farmer and the farmer's family.
- Commercial farming as opposed to the subsistence farming sector, is concerned with producing a crop for sale.
- Subsistence farming plays an important role in Ethiopia's economy by reducing the vulnerability of rural food-insecure households,
- Contributions of cash crop production to the Ethiopian economy are: source of food and raw material, source of capital and contribution to employment,

5.2.3. Problems of Agriculture in Ethiopia

Dear learner! *What are the problems of agriculture in your locality? Try to answer the question in the following space and compare it with the following paragraph.* _____

_____

_____.

Have you tried? If so, that is great. As discussed in the previous section, agriculture is the mainstay of the Ethiopian economy. The majority of the Ethiopians are farmers, but they have not yet secured food at large. Ethiopian agriculture reveals a picture of virtual stagnation in production, a rapidly rising population, and declining domestically produced food per capita. The major obstacles to the development of this sector include:

A. Land degradation

Studies revealed that because of the topography of the land, 50% of the cultivable land of Ethiopia is exposed to various levels of soil erosion. The soil in many areas has lost some biological productivity and physical properties needed for optimal plant growth. Land degradation can reduce soil fertility, depth, essential nutrients and water holding efficiencies thereby reducing the crop production capacity.

B. Variable Rainfall

It is a matter of fact that Ethiopian agriculture is heavily dependent upon unreliable rainfall which may produce surplus only in years of favourable weather. What is more, it has not always been timely. Sometimes it comes early or late. Other times it falls short of the required amount or it falls in excess amount that can highly impact both productivity and food security.

C. Fragmentation of Farm Plots and Small Size of Holdings

The land owned by peasants is getting smaller and smaller over time due to the continuous division of farmland among the number of families in the form of inheritance. The agricultural lands are therefore highly fragmented.

Table 1.2 shows that agricultural land is highly fragmented, the majority (38%) of households access less than 0.5 hectares of land, 23.65% of households access between 0.51 to 1.0 hectares, 24.04% between 1 and 2 hectares, that only the remaining 14.31% of households access more than 2 hectares of land. Households with less than one hectare of land are often unable to fulfil household needs including necessary food consumption.

Table 5.2: Distribution of Households by Farmland Size in Ethiopia 2014/15

Farmland Size holding (in hectares)	% of Farmers
< 0.10	7.71
0.10 – 0.5	30.29
0.51 – 1.00	23.65
1.01 – 2.00	24.04
2.01 – 5.00	13.03
5.01 – 10.00	1.20
> 10.00	0.08
Total	100

D. Backward Technology

In Ethiopia smallholder farming is characterized by dependence on traditional tools and farming practices. Land preparation is done by oxen-drawn plough. Planting is generally performed by manual broadcasting, which hampers effective weeding and spraying activities. Weeding is done manually, and harvesting is also performed manually with the help of a sickle.

E. Poor Rural Infrastructure

Agricultural infrastructure primarily includes a wide range of public services that facilitate production, procurement, processing, preservation and trade. It has mainly focused on irrigation, transportation, electric power and agricultural markets.

? Activity 2

By referring to Table 1.1, try to answer the following questions.

1. Which sector has a) the highest share?
   b) the smallest share?
2. What is the trend (pattern) of agriculture's contribution to the Ethiopian economy? Is it increasing or decreasing? Why?

Resources

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Checklist

Dear learner! Here is a checklist provided for you to check your understanding. Put a tick mark (√) against each of the following statements. You are expected to respond under 'YES' or 'NO'

No	Items	YES	NO
1.	Can you explain the agricultural contribution to Gross Domestic Product of the country?		
2.	Can you describe agricultural practices in Ethiopia?		
3.	Can you explain the importance of subsistence farming to the Ethiopian economy?		
4.	Can you explain the contribution of cash crop production to the Ethiopian Economy.?		
5.	Can you mention the major obstacles to the development of agricultural sector in Ethiopia?		

Is there any box that you mark 'No' under it? If there is any, please go back to your text and read about it before you move on to the following exercise.

SELF-TEST EXERCISES FOR SECTION 2

Part I. Write True if the statement is correct and False if the statement is incorrect

1. Agriculture is the pillar of the national economy of Ethiopia.
2. In Ethiopia both crop farming and animal rearing use modern tools and techniques
3. The cultivable land of Ethiopia is exposed to various levels of soil erosion.
4. Ethiopian agriculture is heavily dependent upon reliable rainfall.
5. Agricultural infrastructure primarily includes a wide range of public services.

Part II. For the following questions, choose the correct answer from the given alternatives.

1. 1. Which one of the following involves periodic abandoning of farm plots?

A. Subsistence farming
B. Terracing
C. Shifting cultivation
D. A and C are correct answers

2. Which one of the following methods of farming is nearly all of the crops or livestock raised are used to maintain the farmer?

A. Commercial farming
B. Subsistence farming
C. Shifting cultivation
D. Arable farming

3. 3. Which of the following is not the characteristic of Ethiopia agriculture?

A. Highly dependent on rainfall
B. Principal source of income
C. Employment for the majority of the population
D. None of the above

4. *Enset* is a major food crop cultivated in

A. Parts of southern, western and central Ethiopia
B. Northern Ethiopia
C. Eastern Ethiopia
D. Central Ethiopia

5. Which of the following crop is the type of cash crop production?

A. Enset
B. Wheat
C. Coffee
D. Maize

Section 3 Trade and Transport in Ethiopia

Section Overview

Dear learner, I hope you have successfully completed the first and second sections of unit five. In this section you are going to study trade and transport in Ethiopia. Trade is a basic economic concept involving the buying and selling of goods and services, with compensation paid by a buyer to a seller, or the exchange of goods or services between parties. Transportation may be defined as the movement of materials and goods, or people from one place to another with a specified objective. Transportation is fundamental to the functioning of any society.

Section Learning Outcomes

At the end of this section, you will be able to:

- *explain the need for expanding trade;*
- *describe the major types of trade in Ethiopia; and*
- *explain the importance of transport to the Ethiopian economy.*

Required study time:3 Hours

5.3.1. Trade

Dear learner! *What is trade? Can you explain the significance of trade in a society? Please write your answer in the space given below.* _____

_____

_____

___.

Have you answered the question? That's good. Trade is a basic economic concept involving the buying and selling of goods and services, with compensation paid by a buyer to a seller, or the exchange of goods or services between parties. Trade can take place within an economy between producers and consumers.

Types of Trade

In Ethiopia there are two main types of Trade namely:

a) Internal (Domestic) trade: This refers to the exchange of goods and services within the country. Internal trade is the base for foreign trade.

b) External (Foreign) trade: It is the process of trading, which involves the exchange of commodities among different countries. Since there is no country that is self-sufficient in all demands, the movement of items from one country to another in the form of trade is unavoidable.

The Structure of Export and Import Trade

I. Export Trade Sector of Ethiopia

As the Ethiopian economy is an agrarian one, raw materials that mainly originate from the agricultural sector are the country's main exports. These include coffee, oilseeds, flower, chat, pulses, gold, textile and textiles products, etc. According to the National Bank of Ethiopia 2019/20 report, the most dominant export item of the country is coffee.

Table 5.3: Values of Major Export items (In Millions of USD)

Export Item	2017/18		2018/19		2019/20		Percentage change	
	A	% share	B	% share	C	% share	B/A	C/B
Coffee	839.0	29.6	764.1	28.7	855.9	28.6	2.0	12.0
Oil seeds	423.5	14.9	387.8	14.5	345	11.5	-18.5	-11.0
Leather and leather products	132.4	4.7	117.4	4.4	72,9	2.4	-45.6	-38.6
Pulses	269.5	9.5	272.3	10.2	234.8	7.9	-12.8	-13.8
meat & Meat products	101.7	3.6	88.6	3.3	67.4	2.3	-33.7	-23.9
Fruit and Vegetables	61.4	2.2	60.9	2.3	58.8	2.0	-4.2	-3.4
Textile & Textile Products	103.8	3.7	152.9	5.7	168.9	5.7	62.6	10.5
Live Animals	61.1	2.2	45.8	1.7	54.1	1.8	-11.5	18.1
Chat	263.2	9.3	303.6	11.4	324.4	10.9	23.3	6.9
Gold	100.2	3.5	27.9	1.0	196.5	6.6	96.2	604.5
Flower	228.6	8.1	256.6	9.6	422.3	14.1	84.7	64.6
Electricity	80.5	2.8	55.7	2.1	66.4	2.2	-17.4	19.3
Others	171.2	6	132.9	5.0	121.1	4.1	-29.3	-8.9
Total Exports	2836.1	100	2,666.50	100.0	2,987.70	100.0	5.3	12.0

Table 1.3 reveals the fact that despite the persistent decline of the share of coffee in the total export since 2018/19, it is still the major source of export earnings for the country. The second and third positions in the share of total export value were occupied by flowers and oilseeds with 14.1 %, and 11.5%, respectively for the year 2019/20.

II. Import Trade sector of Ethiopia

Ethiopia imports mainly finished products like machinery, transport equipment, electrical and electronic goods, fuel, and the like. The overall annual import values of Ethiopia have been constantly declining both by value and percentage.

Table 5.4: Values of Imports by Commodity Groups (In Millions of USD)

Export Item	2017/18		2018/19		2019/20		Percentage change	
	A	% share	B	% share	C	% share	B/A	C/B
Coffee	839.0	29.6	764.1	28.7	855.9	28.6	2.0	12.0
Oil seeds	423.5	14.9	387.8	14.5	345	11.5	-18.5	-11.0
Leather and leather products	132.4	4.7	117.4	4.4	72,9	2.4	-45.6	-38.6
Pulses	269.5	9.5	272.3	10.2	234.8	7.9	-12.8	-13.8
meat & Meat products	101.7	3.6	88.6	3.3	67.4	2.3	-33.7	-23.9
Fruit and Vegetables	61.4	2.2	60.9	2.3	58.8	2.0	-4.2	-3.4
Textile & Textile Products	103.8	3.7	152.9	5.7	168.9	5.7	62.6	10.5
Live Animals	61.1	2.2	45.8	1.7	54.1	1.8	-11.5	18.1
Chat	263.2	9.3	303.6	11.4	324.4	10.9	23.3	6.9
Gold	100.2	3.5	27.9	1.0	196.5	6.6	96.2	604.5
Flower	228.6	8.1	256.6	9.6	422.3	14.1	84.7	64.6
Electricity	80.5	2.8	55.7	2.1	66.4	2.2	-17.4	19.3
Others	171.2	6	132.9	5.0	121.1	4.1	-29.3	-8.9
Total Exports	2836.1	100	2,666.50	100.0	2,987.70	100.0	5.3	12.0

Table 1.4 above indicates that the total merchandise import bill 15.1 billion USD (United States Dollars). Meanwhile, for the year 2018/19 reached 13.9 billion USD for the year 2019/20 depicting an 8.1 percent decline mainly due to lower import bills of fuel, capital goods and consumer goods. Payments for semi-finished goods, raw materials, and miscellaneous goods, however, are registered as annual increments.

Trade Balance of Ethiopia

Trade balance is the yearly difference between the export and import values. If the yearly export value of a given country exceeds its yearly import value there will be a positive or surplus trade balance. If import exceeds export there will be a negative trade balance. In Ethiopia import values exceed export values, hence the country experiences a trade deficit (negative trade balance).

- Agricultural sector are the export items of the country. These include coffee, oilseeds, flower, chat, pulses, gold, textile and textile products, etc.
- Ethiopia imports mainly finished products like machinery, transport equipment, electrical and electronic goods, fuel and the like.
- Trade balance is the yearly difference between the export and import values.

5.3.2. Transportation in Ethiopia

Transportation may be defined as the movement of materials and goods, or people from one place to another with a specified objective. Transportation is fundamental to the functioning of any society. One of the major functions of the transport system is to facilitate the movements of

different goods or commodities from areas of surplus to areas of deficit. Transport plays a vital role in the expansion and development of the socioeconomic life of people at all levels.

Nowadays, the types and quality of transportation have made much progress. This has enabled people to travel longer distances in shorter times than ever before. Also, the flow of ideas, beliefs, and innovations has become faster and wider.

5.3.3. Modes of Transport in Ethiopia

Dear learner! *Can you explain the use of transportation in Ethiopia?* _____

_____

_____

_____.

Have you tried? If so, that is great. Based on their stage of development the existing modes of transport in Ethiopia are broadly divided into two:

I. Traditional modes of transport: include the use of pack animals and human porterage.

II. Modern modes of transport: the modern transport sector in Ethiopia uses the following four different modes of transport. This includes:

a) Road transport
b) Railway transport
c) Inland waterways
d) Air transport

a. Road Transport

Road transportation is the mode of freight and passenger transportation using buses, cars, and trucks. Road transport is more widespread and more flexible than a railway. Road transportation is most important to the Ethiopian economy. Roads are the most important transport infrastructure in providing access to rural and urban areas in Ethiopia.

Road Network

Table 1.5 below shows the status of road development and road network in Ethiopia. During 2005/06 classified road network in Ethiopia was 39,477 kms while the total road network increased rapidly and reached 138,127 kms during 2018/19. The country's total road network consisted of 55,808 kms (40.4%) Woreda road, 30,924kms (22%) Rural road, 28,699 Kms (20.8%) Federal road and 22,697 Kms (16.4%) urban road. Asphalt road network accounted for about 11.5% of the road network in the country.

Table 5.5: Length of All Weather Roads by Type

Year	Federal Road		Rural Road	Woreda Road	Urban Road			Total
	Asphalt	Gravel			Paved	Cobel	Unpaved	
2005/06	5,002	14,311	20,164	NA	-	-	-	39,477
2006/07	5,452	14,628	22,349	57,764	-	-	-	42,429
2007/08	6,066	14,363	23,930	70,038	-	-	-	44,359
2008/09	6,938	14,234	25,640	85,767	-	-	-	46,812
2009/10	7,476	14,373	26,944	100,385	-	-	-	48,793
2010/11	8,295	14,136	30,712	854	-	-	-	53,997
2011/12	9,875	14,675	31,550	6,983	-	-	-	63,083
2012/13	11,301	14,455	32,582	27,628	-	-	-	85,966
2013/14	12,640	14,217	33,609	30,056	-	-	-	99,522
2014/15	13,551	14,055	30,641	46,810	1,693	850	2,814	110,414
2015/16	14,632	13,400	31,620	48,057	1,693	-	3,644	113,066
2016/17	15,886	12,813	33,367	52,748	1,693	-	3,644	120,171
2017/18	15,886	12,813	35,985	56,732	1,693	2,814	850	126,773
2018/19	15,886	12,813	30,924	55,808	1,914	5,199.6	15,583	138,127

b. Railways

The major advantage of rail transport is that it helps transport bulky products. For more than a century; Ethiopia was served by an international meter gauge railway, from Addis Ababa to Djibouti. The railway was built from 1897–1917 and was about 781 km long primarily served to move export- imports for a long time. Compared to those of the developed countries the railway was backward. It was also a single lane track. Eventually, the Ethio-Djibouti Railway and its decades old rolling stock were lacking spare parts and were forced to close down over a number of years.

Recently a new railway line of 752.7 km length connecting Addis Ababa to Djibouti was officially inaugurated in Djibouti in 2018. The Addis Ababa–Djibouti Railway is a new standard gauge international railway that serves as the backbone of the new Ethiopian National Railway Network. It provides Ethiopia with access to the sea, linking Addis Ababa with Djibouti and its Port of Doraleh. More than 95% of Ethiopia's trade passes through Djibouti. The railway line has double-track for 115 km, from Addis Ababa to Adama, and a single track for the remaining 600 km to Djibouti. Power is supplied through 20 distribution stations 17 in Ethiopia and 3 in Djibouti.

The other important railway is Addis Ababa Light Rail Transit (AA-LRT). It is the first light rail and rapid transit in Eastern and Sub-Saharan Africa. The total length of both lines (north-south and east-west) of the rail is about 31.6 kilometres, with 39 stations. It is estimated that AA-LRT currently transports about 60,000 people daily, significantly reducing traffic congestion in the capital, Addis Ababa.

c. Inland Waterways

Water transport is cheap and convenient for transporting bulky goods over long distances. The use of Ethiopian rivers and lakes as inland waterways is extremely limited. This is due to the ruggedness of the topography and the seasonal nature of rainfall in most parts of the country. The only navigable river in Ethiopia is Baro. There is also small-scale transportation over lakes Tana, Abbaya, and Ziway.

d. Air transport

For countries like Ethiopia where the topography is difficult for communication, air transport is of special significance. Air transport is the most recent and fastest mode of transportation. Ethiopian Airlines, which is the major airlines in the country, is among the best airlines by African standards. Ethiopian Airlines (EAL) was established in 1945.

Ethiopian Airlines is the leading and most profitable airline in Africa. It has more than 62 destinations in Africa and more than 127 international destinations in five continents. It also has more than 22 domestic destinations and 58 cargo destinations. It is the largest cargo network operator in Africa. Ethiopian Airlines joined the Star Alliance Network, an international airline network giving it access to more routes with partner airlines, in 2011.

Figure 5.5: Ethiopian airlines cargo transport during Covid 19

Ethiopian Airlines Group has transported 50 million doses of COVID 19 vaccine to more than 28 countries across the globe and became the only African carrier to reach such a milestone playing crucial role during such a difficult time. In addition to this, Ethiopian Cargo and Logistics Services, Africa's largest cargo service provider, has successfully distributed the vaccines to different countries with its technologically equipped facility called 'Pharma Wing'.

Furthermore, the air transport sector makes a major contribution to Ethiopia's economy. In 2018, the air transport industry, including airlines and its supply chain, are estimated to support US $1.54 billion of GDP in Ethiopia. Foreign tourists arriving by air to Ethiopia, who spend their money on the local economy supports a further US $2.61 billion of the country's GDP, totalling to US $4.15 billion.

Resources

National Bank of Ethiopia. (2019). Annual Report (2017/18). Addis Ababa, Ethiopia
National Bank of Ethiopia. (2020). Annual Report (2018/19). Addis Ababa, Ethiopia
National Bank of Ethiopia. (2021). Annual Report (2019/20). Addis Ababa, Ethiopia
Waugh, D. (1990) Geography: An Integrated Approach Nelson, London.

Activity 3

Answer the following questions

1. Describe types of trade in Ethiopia.
2. What are the main export items in Ethiopia?
3. Which mode of transport is used to transport bulky products?
4. Give at least three examples of the land transportation system.

Checklist

Dear learner! Here is a checklist provided for you to check your understanding. Put a tick mark (√) against each of the following statements. You are expected to respond under 'YES' or 'NO'

No	Items	YES	NO
1.	Can you explain the need for expanding trade?		
2.	Can you describe the major types of trade in Ethiopia?		
3.	Can you explain the importance of trade to the Ethiopian economy?		
4.	Can you distinguish the major types of mode of transport in Ethiopia?		
5.	Can you mention the advantages of road transport?		

Is there any box that you mark 'No' underneath it? If there is any please go back to your text and read about it before you go to the following exercise.

SELF-TEST EXERCISE FOR SECTION 3

Part I. Write True if the statement is correct and False if the statement is Incorrect.

1. The level of transport development is a good indicator of economic development.
2. The major advantage of air transport is that it helps transport bulky products.
3. Trade activities have a considerable effect on socio-economic life of any society.
4. Ethiopia exports mainly finished products.
5. The tertiary sector of industry involves the provision of services to other businesses as well as final consumers.

Part II. Match Items in Column 'A' With the Items in Column 'B'

Column "A"	Column "B"
1. The fastest mode of transport	A. Balance of trade
2. Cheap & convenient mode of transport	B. Pack animals
3. Exchange of commodities among different countries	C. Road transport
4. Flexible mode of transport	D. Water transport
5. Traditional modes of transport	E. Domestic trade
6. The difference between the export & import value	F. Foreign trade
7. Exchange of goods and services within the country	G. Air Transport

Section 4 Road Safety in Ethiopia

Section Overview

Dear learner! In this section, you are going to study about road safety in Ethiopia. Road safety is safety in using roads. Road crashes are a global problem affecting all parts of society. However, road safety has received insufficient attention at national and regional levels. As a result, traffic accident has been increasing dramatically from time to time. Ethiopia has experienced high rates of road traffic accidents, as the road is the major means of transportation.

Section Learning Outcomes

By the end of this unit, you will be able to:

- *identify the cause of road traffic safety in Ethiopia;*
- *describe the consequences of road traffic safety in Ethiopia; and*
- *explain the performance of road safety in Ethiopia.*

Required study time:2 Hours

Dear learner! *Do you know what road safety means? Please, try to write your answer in the space provide below.* _____

_____

_____.

Have you stated? If so, that is great. Road safety is safety in using roads. There are ways to make roads safe for motor traffic, cyclists and pedestrians. It involves rules such as speed limits and those about drinking and driving, and control systems, such as traffic lights and crossings.

5.4.1. Current Accident Severity Definition in Ethiopia:

1. **A fatal accident** is one in which one or more individuals die as a result of a traffic accident within 30 days of the accident's occurrence.
2. **A serious injury** is one in which a victim sustains severe cuts, bleeding, breaks, and other damages, which requires medical treatment as "inpatient" in hospital.
3. **A slight injury** is the one as a result of which the victim sustains only small cuts, scratches, and other small damages which may be treated as an outpatient without requiring admission to a hospital.
4. **Property damage** accident is one as a result of which no person is injured only one or more vehicles involved in the accident are damaged.

5.4.2. Road Traffic Accidents in Ethiopia

Road accidents are a global problem affecting all parts of society. However, road safety has received insufficient attention at national and regional levels. As a result, traffic accidents have been increasing dramatically from time to time. According to the WHO (2020) report, as a consequence of road traffic accidents, an estimated 1.3 million people die and about 50 million people are injured each year on the world's roads. Most road traffic deaths and injuries occur in low- and middle-income countries.

Ethiopia has experienced high rates of road traffic accidents, as the road is the major means of transportation. According to official statistics for Ethiopia, road traffic deaths more than doubled in the 12-years period between 2007 and 2018, rising from 2,161 to 4,597. The size of the vehicle fleet in 2018 was 1,071,345 (see Table 1.6). This implies that nearly 43 people were killed per 10,000 vehicles in the country in 2018. Viewed from another perspective, Ethiopia loses 13 people per day in road traffic crashes.

Table 5.6: Number of vehicles in the regions (up to June 2019) Registered vehicles

Regions	Number of vehicles
Addis Ababa	596,084
Amhara	94,001
Afar	6,598
Benishangul	8,842
Dire Dawa	21,938
Somali	15,160
Tigray	52,751
Gambela	5,558
Harari	8000
SNNPR	91,105
Oromia	171,308
Total	1.071,345

5.4.3. The Main Road Safety Actors in Ethiopia

The National Road Safety Council (NRSC) of Ethiopia is overseen by several ministries and private stakeholders. The Council is led by the Ministry of Transport, the Ministry of Finance, the Ministry of Education, the Ministry of Health, the Federal Police Commission, the Ethiopian Roads Authority, the Federal Transport Authority, and private and public transport associations.

Recently, there has been a yearly increase in the number of fatalities and serious injuries from road traffic crashes. The trends show that road traffic crashes have become a burden in economic, social and health proportions for the country.

Table 5.7: Road Traffic injury victim distribution among the Regional States in Ethiopia

Region	2016			2017			2018		
	Deaths	Serious Injuries	Slight Injuries	Deaths	Serious Injuries	Slight Injuries	Deaths	Serious Injuries	Slight Injuries
Tigray	386	854	381	374	858	584	371	664	356
Afar	56	73	20	72	49	31	131	164	79
Amhara	1 104	1 032	1 252	1 152	1 181	1 924	1 035	1 190	1 990
Oromia	1 478	1 448	1 386	1 882	1 710	1 586	1 541	1 459	1 485
Somalia	132	127	134	204	533	447	157	408	396
Benishangul	91	136	266	36	126	215	33	224	395
SNNPR	712	1152	725	720	1121	922	634	990	937
Gambela	19	43	81	18	20	48	16	38	101
Hareri	55	203	188	34	224	507	53	123	284
Addis Ababa	528	2 210	1 274	585	1 804	1 232	477	2 085	1 232
Dire Dawa	36	129	242	41	128	279	31	141	180
Total	4 597	7 407	5 949	5118	7 754	7 775	4479	7 486	7 435

Road traffic injuries in Ethiopia mostly affect passengers and pedestrians. In other words, one person is killed on the roads every two hours. It is likely that actual fatality figures in the country are larger than those reported by the Ethiopian Federal Police Commission due to factors such as underreporting and misclassification of road traffic fatalities. An integrated crash database is needed to overcome the underreporting of road traffic crashes.

According to the (2019) report of the Federal Police Commission distribution of road traffic crashes in the country is uneven, with road fatalities and injuries concentrated on roads in the central part of the country. For instance, four out of the 12 regional States, namely the Oromia, Amhara, South Nations Nationality People regions, and the Addis Ababa City Administration accounted for almost 85 % of the fatalities in the country.

Factors Influencing Road Accidents

Dear learner! *What are the causes of road traffic accidents in your locality? Try to write your answer in the space provided below. and compare it with what you are going to read in the subsequent paragraph.* _____

_____

_____.

Have you tried? If so, that is great. There are four major factors influencing road traffic accidents. These are:

- Vehicle related factors
- Road related factors
- Road user related factors
- Environmental related factors

Causes of Road Traffic Accidents

Many factors result in car crashes, and sometimes multiple causes contribute to a single crash. Factors include the following:

- **Driver distraction**: Drivers miss their attention while driving due to factors including fiddling with technical devices, talking with passengers, eating or grooming in the car, dealing with children or pets in the back seat, or attempting to retrieve dropped items;
- **Driver Impairment by Tiredness:** Driver impairment describes factors that prevent the driver from driving at their normal level of skill. Common impairments include: illness, alcohol, legal or illegal drugs, and sleepiness, impaired driving is dangerous. It's the cause of more than half of all car crashes.
- **Mechanical failure:** These are factors associated with the vehicle itself including flat tires or tires blowing out, brake failure, axle failure, and steering mechanism failure.
- **Road conditions:** It refers to those factors related to the road infrastructure, including foreign obstacles or substances on the road surface; making the roads

slick; road damage, including potholes.

- **Speed exceeding safe conditions**: Speed exceeding safe conditions such as the speed for which the road was designed, the road condition, the weather, the speed of surrounding motorists, and so on.

Consequences of road traffic accidents include:

- loss of productivity among the victims,
- the cost of the legal system,
- the cost of pain and suffering, and
- loss of quality of life for the victim and their family.

- Ethiopia has experienced high rates of road traffic accidents, as the road is the major means of transportation.
- There are four major factors influencing road traffic accidents. These are: Vehicle related factors, road related factors, road user related factor, and environmental related factors.
- Causes of Road Traffic Accident are: Driver distraction, driver impairment by tiredness, mechanical failure, road conditions, and speed exceeding safe conditions.

Road Safety Rules

Road Safety rules for Pedestrian	*Road Safety rules for drivers*
▸ Prepare a safe walking route in advance. ▸ Use sidewalks if they are available. ▸ Walk facing the traffic if a sidewalk isn't available. ▸ Obey all signs and signals. ▸ Only cross streets at designated areas. ▸ Stay on well-lit paths at night. ▸ Wear bright colours during the day and reflective tape at night.	▸ Never drink & drive. Always wear seat belt. ▸ Keep a safe distance from the vehicle ahead, ▸ Always avoid distractions. Never break red signal. ▸ Always drive within speed limit. Avoid the drowsiness while driving.

Resources

Debela Deme (2016), Traffic Accident Causes and Countermeasures of Addis Ababa-Adama Expressway, AAU.

Ethiopian Road Fund Office (2019). Annual report. Addis Ababa.

Ethiopian Roads Authority (2018). Road sector development program: 21 years performance assessment.

Federal Transport Authority (2019). Registered vehicle Statistics. Addis Ababa: Federal Transport Authority.

UN (2020). Road Safety Performance Review Ethiopia.

Activity 4

Answer the following questions

1. What is road safety?
2. What are the causes of road traffic accidents?
3. What are the consequences of road traffic accidents?

Checklist

Dear learner, here is a checklist provided for you to check your understanding. Put a tick mark (√) against each of the following statements. You are expected to select either 'YES' or 'NO' as your response.

No.	Items	YES	NO
1.	Can you explain the performance of road safety in Ethiopia?		
2.	Can you describe the main road safety actors of Ethiopia?		
3.	Can you mention the causes of road traffic accident?		
4.	Can you describe the consequences of road traffic accident?		
5.	Can you define fatal injury?		
6	Can you define serious injury?		

Is there any box that you marked 'No' under it? If there is please go back to your text and read about it before you move on to the following exercise.

SELF-TEST EXERCISES FOR SECTION 4

Part I. Write True if the statement is correct and False if the statement is incorrect.

1. Road traffic injuries in Ethiopia, mostly affect passengers; and pedestrians.
2. Ethiopia has experienced low rates of road traffic accidents.
3. Road crashes are a global problem affecting all parts of society.
4. Most road traffic deaths and injuries occur in high-income countries.
5. Road traffic injuries in Ethiopia, mostly affect passengers and pedestrians.

Part II. Match Items in Column 'B' With Items in Column 'A'

Column "A"	Column "B"
1. Drivers miss their attention while driving	A. Mechanical failure
2. Factors that prevent the driver from driving at their normal level of skill.	B. Road conditions
3. Factors associated with the vehicle itself	C. Driver Impairment
4. Factors related to the road infrastructure	D. Speed exceeding safe conditions
5. The speed of surrounding motorists	E. Driver distraction

Section 5 Cultural Landscapes and Tourism in Ethiopia

Section Overview

Dear learner,! This is the fifth section of unit five. In this section you will learn the cultural landscape and tourism in Ethiopia. A cultural landscape is a geographic area (including both cultural and natural resources), that is associated with a historic event, activity, or person, or exhibiting any other cultural or aesthetic values. Cultural landscapes represent the "combined works of nature and man".

Section Learning Outcomes

By the end of this section, you will be able to:

- *identify cultural landscape places in Ethiopia;*
- *explain the importance of tourism; and*
- *identify natural and human made tourist attraction sites.*

Required study time:2 Hours

5.5.1. Cultural Landscape in Ethiopia

Dear learner! *Do you know what cultural landscape means? How is it characterized in the context of Ethiopia? Please try to answer it below.* _____

_____

_____

Have you tried it? If so, that is great. A cultural landscape as a geographic area (including both cultural and natural resources), is associated with a historic event, activity or person, or exhibiting any other cultural or aesthetic values. It represents the "combined works of nature and man". Konso cultural landscape is one of the examples of a cultural landscape in Ethiopia.

The Konso cultural landscape is located in a dry, hilly environment at the edge of the Rift Valley in southern Ethiopia. The Konso cultural landscape is characterized by dry stone terrace agriculture and walled town settlement. Dry stone terrace agriculture and walled town lifestyle might have been practiced for 400 years. The dry stone terrace agriculture is an indigenous adaptation to the dry environment of Konso which is mountainous, barren and rocky. These terraces retain the soil from erosion and create terrace saddles that are used for agriculture. The terraces are the main features of the Konso landscape and the hills are contoured by the dry stone terraces that could reach at some places up to 5 meters high. The Konso Cultural Landscape was officially recognised by the United Nations Educational, Scientific, and Cultural Organisation (UNESCO) in 2011.

Figure 5.6: Konso Cultural Landscape

5.5.2. Tourism in Ethiopia

Dear learner! *What is tourism? Please, write your answer in the space below.* _____

_____

_____

Have you tried? If not, no problem. Have look at the following explanation. Tourism is a collection of activities, services and industries that delivers a travel experience, and they include transportation, accommodations, eating and drinking establishments, retail shops, entertainment businesses, activity facilities and other hospitality services provided for individuals or groups travelling away from home. Tourism is a source of both job opportunities and income. It is known as a 'smokeless industry'. The main tourist attractions include natural and human-made features.

Natural Tourist Attraction Sites in Ethiopia

- The Simien Mountains National park
- Bale Mountains National Park
- Awash National Park
- NechSar National Park
- Omo National park
- The Blue Nile Falls (Tis isat Falls)
- Mago National Park
- The Lake Tana
- Gambella National park
- The Sof Omar Cave
- Abijata – Shalla National park
- The Rift Valley

Human-made Features

- Lalibela
- Harar
- Gonder Castle
- Axum
- Tiya

- Cultural Landscapes: a cultural landscape as a geographic area (including both cultural and natural resources), that is associated with a historic event, activity, or person, or exhibiting any other cultural or aesthetic values.
- Konso cultural landscape is one of the examples of the cultural landscape in Ethiopia.
- Tourism is a collection of activities, services and industries that delivers a travel experience.
- The main tourist attractions include natural and human made features.

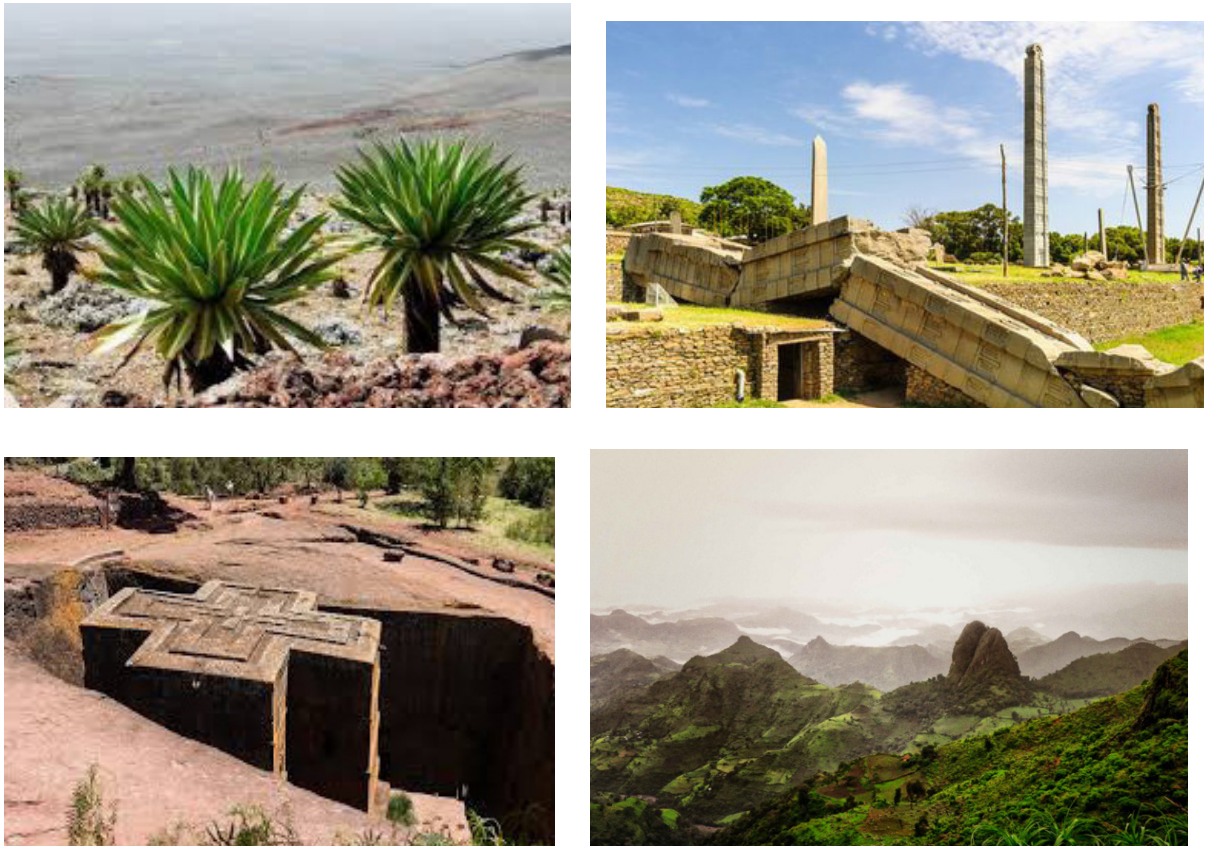

Figure 5.7: Some Tourist Attraction Sites in Ethiopia

Resources

Addis Ababa Culture and Tourism Bureau. (2016). Available from:http://www.addisculturetourism.gov.et/

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Activity 5

Answer the following questions

1. What is the importance of tourism?
2. What are the benefits of tourism to our economy?
3. Mention cultural landscape places in Ethiopia.

Checklist

Dear learner! Here is a checklist provided for you to check your understanding. Put a tick mark (√) against each of the following statements. You are expected to select either 'YES' or 'NO' as your response.

No	Items	YES	NO
1.	Can you identify cultural landscape places in Ethiopia?		
2.	Can you explain the importance of tourism?		
3.	Can you identify natural and human made tourist attraction sites?		
4.	Can you describe the Konso cultural landscape?		
5.	Can you identify problems related to the tourism sector?		
6	Can you mention cultural landscape places in Ethiopia?		

SELF-TEST EXERCISES FOR SECTION 5

Part I. For the following questions, choose the correct answer from the given alternatives.

1. Ageographic area including both cultural and natural resources:

   A. Natural Landscape
   B. Cultural Landscape
   C. Natural Vegetation
   D. Omo National Park

2. Which one of the following is an examples of a cultural landscape in Ethiopia?

   A. Lalibela
   B. Axum
   C. Konso
   D. Gondar Castle

3. Which of the following is an example of 'smokeless industry?

   A. Tourism
   B. Transport
   C. Mining
   D. Manufacturing

4. Which of the following is a natural tourist attraction site in Ethiopia?

   A. Lalibela
   B. Gondar Castle
   C. The Lake Tana
   D. Harar

5. The Konso Cultural Landscape was officially recognised by

   A. UN
   B. WHO
   C. UNESCO
   D. FAO

Pat II. Fill in the blank spaces with the correct word or phrase.

1. Tourism is a source of _____and _____.
2. The main tourist attractions include _____and _____ features.
3. _____ is a collection of activities, services, and industries thatdelivers a travel experience
4. _____ are the main features of the Konso landscape
5. The dry stone terrace agriculture is _____ to the dry environment of Konso.

UNIT SUMMARY

- Economic activity is the production and distribution of goods and services. Some of the activities are hunting, fishing, farming, grazing, mining, manufacturing, transportation, trade and others.
- The various economic activities practiced in the world may be arranged into 5 groups, namely primary, secondary, tertiary, quaternary, and quinary.
- The main types of primary economic activities include agriculture, forestry, fishing, and mining.
- Secondary economic activities include manufacturing, construction, and power production.
- The tertiary sector involves the provision of services to other businesses as well as to final consumers. It includes tourism, transportation, trade, etc.
- More than 80% of Ethiopia's population is engaged in agricultural activities.
- Ethiopian agriculture can be divided into arable farming and pastoral farming.
- Agriculture is the science and art of cultivation of the soil and the rearing of livestock for either local consumption or commercial purposes.
- Agriculture in Ethiopia is typically characterized by small holder and subsistence farming which is highly dependent on rainfall.
- Fishery is a primary economic activity that involves the catching of fish and other marine creature.
- Ethiopia has a number of lakes, reservoirs and rivers rich in fish, but fishery is not yet developed in the country.
- Mining is a primary economic activity concerned with the extraction of mineral bearing substance from the earth's crust.
- Manufacturing industries in Ethiopia can be classified into cottage(traditional) and modern manufacturing industries
- One of the major functions of transport system is to facilitate movements of different goods or commodities from areas of surplus to areas of deficit.
- Road safety is safety in using roads. There are ways to make roads safe for motor traffic, cyclists and pedestrians.
- Ethiopia has experienced high rates of road traffic accidents, as the road is the major means of transportation.
- Trade balance is the yearly difference between the export and import values.
- The main tourist attractions include natural and human-made features.

GLOSSARY

Agriculture - is the science and art of cultivation of the soil and the rearing of livestock.

Cash crops - are agricultural crops that are planted for the purpose of selling.

Economic activity - is a process that, based on inputs, leads to the manufacture of a good or the provision of a service.

Environmental degradation- is loss or deterioration of the quality of the environment often expressed by loss of soil, plants and other living things.

Forestry - is a primary economic activity mainly concerned with the exploitation of forest products such as wood, timber, gums, nuts, barks, etc

Gross domestic Product (GDP) - the final value of the goods and services produced within the geographic boundaries of a country during a specified period of time

Horticulture- is an economic activity that concerned with the production of fruits and vegetables.

Mining - is a primary economic activity concerned with the extraction of mineral bearing substances from the earth's crust.

Mixed farming - is a combination of both crop production and livestock rearing.

Manufacturing - is a process which turns raw materials into products using labor, energy and equipment.

Poverty - the state of being extremely poor.

Primary economic activities - are economic activities that are directly tied to the extraction resources of the earth.

Quaternary economic activities - are economic activities with primary services based on research, information, and technology.

Secondary economic activities - refer to economic activities add value to the raw materials by changing their form, or combining them into useful and hence more valuable commodity.

Subsistence agriculture - is a type of farming in which the farmers grow crops to meet the needs of themselves and their families on smallholdings.

Trade - is the exchange of commodities

Tertiary economic activities - consist of those businesses and labor specialization that provide services to the general community.

SELF-ASSESSMENT CORRECTED BY THE STUDENT

Part II. Write short answer for the following questions.

1. What are the major forest products obtained from forests in your locality?
2. Do people in your area catch fish? Where and how? If not, why
3. Which one of the transportation systems is the most common in Ethiopia?
4. Give at least three examples of the land transportation system.
5. Is transportation a tertiary economic activity? Why?
6. What is terracing?
7. List down natural tourist attraction sites in Ethiopia.
8. List down cultural tourist attraction sites in Ethiopia.

WRITTEN ASSIGNMENT (CORRECTED BY A TUTOR)

1. What are the major activities that are categorized under?
   A. Primary economic activities?
   B. Secondary economic activities?
   C. Tertiary economic activities?
   D.) Quaternary economic activities?
   E.) Quinary economic activities?
2. Write a report on: "Road Accidents in Ethiopia: Causes, consequences and Possible Remedies"
3. Prepare the general outline map of Ethiopia and show the location of the leading tourist attraction sites in Ethiopia.
4. Explain the importance of tourism in Ethiopia
5. Mention natural landscape places in Ethiopia.
6. Describe the Konso cultural landscape

ANSWER FOR UNIT 5 SECTION LEVEL ACTIVITIES

Activity 1

1. Economic activity is the production, distribution and exchange of goods and services. Some examples of these activities are hunting, fishing, farming, grazing, mining, manufacturing, transportation, trade, and others.

2. **Agriculture**
   - *Employs the majority (80%) of the Ethiopian total population.*
   - *supplies more than 90% of export commodities. Thus, agriculture is the main source of Ethiopia's export earnings*
   - *Agriculture contributes 32.7% of the Gross Domestic Product (GDP) of the country.*

Forestry:
- *Even though the importance of forest and forest products is little in earning foreign exchange, their significance at a local level is large. For instance, their contribution to the national economy in the form of GDP is about 6.10%.*

Mining:
- *It generates revenue from sales, taxes, and royalty, it also generates foreign currency earnings, and employment opportunities. Mining is important to the economy of Ethiopia. Currently, mining contributes to only 1.5 % of GDP.*

3. Primary Economic Activities

Activity 2

1. a) In 2019/20 service sector

   b) Industry sector

2. Agriculture had been the leading sector followed by the service sector until 2014/15. But, after 2015/16, the service sector emerged as the dominant sector mainly due to natural factors and economic factors. Natural factors such as: climate changes, soil erosion and lack of adequate rainfall and economic factors such as: land tenancy, size of holdings and fragmentation of agricultural lands, marketing facilities, etc.

Activity 3

1. In Ethiopia there are two main types of Trade namely:
   a) **Internal (Domestic) trade**: *This refers to the exchange of goods and services within the country. Internal trade is the base for foreign trade.*
   b) **External (Foreign) trade**: *is the process of trading, which involves the exchange of commodities among different countries. Since there is no country that is self-sufficient in all demands, the movement of items from one country to another in the form of trade is unavoidable.*

2. Coffee, leather and leather products, pulses, meat & meat products, fruit and vegetables, live animals, flower, *chat*, and gold etc.

3. Water transport

4. Road transport, railway transport and animal transport

Activity 4

1. Road safety is safety in using roads. There are ways to make roads safe for motor traffic, cyclists and pedestrians. It involves rules such as speed limits and those about drinking and driving, and control systems, such as traffic lights and crossings.

2.
   - *Driver distraction*
   - *Driver Impairment by Tiredness*
   - *Mechanical failure*
   - *Road conditions*
   - *Speed exceeding safe conditions*

3. Consequences of road traffic accidents include:
   - *loss of productivity of the victims,*
   - *the cost of the legal system,*
   - *the cost of pain and suffering, and*
   - *loss of quality of life for the victim and their family.*

Activity 5

1. The significance of tourism are: strengthening communities, preservation of heritage, empowering communities, protecting nature, environmental improvements, rest and relaxation, and Enhanced well-being.

2. Benefits of tourism to our economy: foreign exchange generation, employment generation, regional development, contributions to government revenues, contribution to local economies, and overall economy boost.

3. Konso cultural landscape

ANSWER KEY TO SELF-TEST EXERCISES OF UNIT 5

Self-test Exercise Section 1

Part I. Answer key for True or False Items

1. False 2. True 3. False 4. True
5. True 6. True 7. False 8. False

Part II. Answer key for Matching Items

1. E 2. F 3. B 4. A 5. C

Part III. Answer key for Multiple Choice items

1. D 2. A 3. C 4. C 5. D 6. D

Self-test Exercise section 2

Part I. Answer key for True or False Items

1. True 2. False 3. True 4. False 5. True

Part II. Answer key for Multiple Choice items

1. C 2. C 3. D 4. A 5. C

Self-test Exercise for Section 3

Part I. Answer key for True or False Items

1. True 2. False 3. True 4. False 5. True

Part II. Answer key for Matching Items

1. G 2. D 3. F 4. C 5. B 6. A 7. E

Self-test Exercise for Section 4

Part I. Answer key for True False Items

1. True 2. False 3. True 4. False 5. True

Part II. Answer key for Matching Items

1. E 2. C 3. A 4. B 5. D

Self-test Exercise for Section 5

Part I. Answer key for Multiple Choice items

1. B 2. C 3. A 4. C 5. C

Pat II. Answer for Fill in the Blank Space

1. job opportunities and income.
2. natural and human made
3. Tourism
4. The terraces
5. an indigenous adaptation

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UNIT SIX

HUMAN – NATURAL ENVIRONMENT INTERACTIONS IN ETHIOPIA

Unit Introduction

Dear distance learner! In unit five of this subject, you have studied about economic and cultural activities of Ethiopia. In this unit, we are going to learn human-environment interaction in Ethiopia.

The unit has three sections. Section one deals with human-environment relationship. The second section of the unit focuses on optimum, over and underpopulation and resource Use. The third section provides the impacts of rapid population growth.

Unit Learning Outcomes

By the end of this unit you will be able to:

- *describe the relationship between human activities and the environment by giving examples from their localities;*
- *describe the link between 'optimal' population and sustainable development;*
- *explain how protecting the environment is in the interest of humans and other living beings;*
- *examine the dynamic flows, interactions and exchanges within an integrated human-environment system at different spatial and temporal scales in the highlands and lowlands of Ethiopia;*
- *recognize the implication of trends in population growth on sustainable resources;*
- *assess how humans use natural resources and give examples that illustrate overexploitation in the over-populated area of Ethiopia;*
- *explain the advantages and disadvantages of under-population for environmental and socioeconomic development; and*
- *assess the impacts of rapid population growth on environmental and socioeconomic development.*

Key Terms

- *Adaptation*
- *Deforestation*
- *Degradation*
- *Modification*
- *Optimum Population*
- *Overpopulation*
- *Pollution*
- *Rapid population growth*
- *Resource Use*
- *Underpopulation*

Unit Contents

Human – Environment Relationship
Optimum, Over and Under Population and Resource Use
Impacts of Rapid Population Growth

Required study time:12 Hours

Unit Learning Strategies

Suggested learning strategies are:

- *written brainstorming questions;*
- *case study;*
- *field visit;*
- *Problem-solving method;*
- *individual project;*
- *report writing;*
- *observation;*
- *written activities;*
- *practical activities;*
- *self-test assessments;*
- *online dialog (if possible);*
- *electronic portfolios (if possible).*

Section 1 Human – Environment Relationship

Section Overview

Dear learner! This is the first section of the unit. In this section, you will learn about the human-environment relationship. Humans have been interacting with their environment since people first walked the Earth. For example, humans have been cutting down forests to clear land to grow crops for centuries and by doing so we have altered the environment. Conversely, the environment affects us in many different ways as well. A simple example is the way we change our clothes in response to cold or hot weather.

Section learning outcomes

By the end of this unit, you will be able to:

- *describe the relationship between human beings and the environment;*
- *identify the three modes of human-environment interaction ; and*
- *explain how human beings affect the physical environment and vice versa.*

Required study time:5 Hours

Dear learner! *What kinds of relationships exist between human beings and the environment? Please, try to write your answer in the space provided.* ___

_____

_____

_____

Have you tried? If not, no problem. Have a look at the following explanation. Environment refers to the physical surroundings and the characteristics of the place in which we live. It also refers to the wider natural world of land, sea, and atmosphere. Humans have been interacting with their environment since people began to live on Earth. For example, humans have been cutting forests to grow crops for centuries and by doing so we altered the environment. Conversely, the environment affects humans in many different ways as well. A simple example is the way we change our clothes in response to cold or hot weather.

A good climate, accessible clean water, fertile soil, etc. are aspects of the physical environment that enable people to live and thrive. However, harsh environments, such as a very hot or cold climate, limited water, and infertile land, make it more difficult for people to survive. Humans are also affected by major environmental events such as earthquakes, floods and drought that damage homes, property and agriculture. These can lead to the displacement of people and cause injury, loss of life and the destruction of livelihoods. They can also damage water sources and pipelines, causing water contamination and spreading waterborne diseases.

The relationship between human beings and the environment can be seen in three ways namel: dependence, modification and adaptation.

A. Dependence on the Environment

Dear learner! *How are human beings dependent on physical environment? Please, try to write your answer in space provided below.* _____

_____

_____.

Have you stated? If so, that is great. Every single living thing on this planet is dependent on the environment it lives in. Whether it is for air, water, food, or shelter, living beings simply cannot survive without some form of interaction. Basically, everything you see around you is entirely dependent on environmental resources that come from thousands of miles away.

B. Modification of the Environment

Dear learner! *How does human being modify his/her environment? Please, try to write your answer in the spaces provided.* _____

_____

_____

Have you tried? If not, no problem. Human activities frequently result in environmental change, both negative and positive results. Even the most ecologically sustainable farming methods and renewable energy projects require resources provided by nature. Human beings use increasing amounts of land to build homes, shopping centers, and schools.

C. Adaptation to the Environment

Dear learner! *How do human beings adapt the environment? Please, try to write your answer in the provided spaces below* _____

_____

_____

_____

Have you stated? If so, that is great. People seem to live in the strangest places on this planet, which is partly due to increased knowledge of the environment. The more successful species are able to adapt to changes in their environment, the more likely they are to survive. For example, there are people who live in different climatic regions, such as the Arctic, deserts and dense forest regions. It proves how humans are adapted to the natural environment.

The links between human activities and the environment are complex as well as varied, but they can be grouped into two main types of activities:

- use of natural resources such as land, food, water, soils, minerals, plants and animals, and
- production of wastes from a range of activities including agriculture, industry and mining, as well as wastes from our bodies.

1) Use of Natural Resources

We use many different types of natural resources in our daily lives. We depend on food and water for survival and we need energy for many different purposes, from domestic cooking through to major industrial processes. Our clothes, transport, buildings, tools, and all other items we use require many different resources for their production. Let us take a simple example. Think of the resources that have been used to produce a notebook of the type you may be using right now as you study this subject. Manufacturing the paper needed raw materials of wood and water as well as energy for its production process. The trees that supplied the wood required soil, water and land to grow on. There may be ink or metal staples or other components in your notebook that were made from other types of resources. Our need for resources is vast and it is growing as the population and consumption per person increases with socio-economic progress.

Globally, both population and resource extraction increased by almost 50% in the 25 years from 1980 to 2005. Over that time, the world population increased from 4.44 billion in 1980 to 7.8 billion in 2020. Metals are used in the manufacture of a wide range of goods – from cars to computers. Minerals are used in industrial processes and in construction to build houses and roads. Both metallic and non-metallic minerals are obtained from rocks that have been mined and are then processed in various ways to extract valuable resources.

Natural resource extraction shows a steady increase from 1980 to 2005, with the greatest amount extracted in the most recent years. The most likely reason is the increase in the global population during this period; more people need more resources. It could also be the case that the amount used by individuals and by a wider society is increasing due to changes in behavior and levels of consumption.

Overfishing and other examples of over- and exploitation of natural resources can result in damage to or the loss of entire ecosystems. An ecosystem includes all the living organisms (humans, plants, animals, micro-organisms) and their physical environment (soil, water, air, and land) as well as the interactions between them. If one component of the system is removed, this can have knock-on effects on the other parts of the system.

I. Use of Forest Resources

One particular problem caused by over-exploitation of forest resources is deforestation, which occurs when forest areas are cleared and the trees are not replanted or allowed to regrow. In Ethiopia, clearing land for agriculture to meet the food needs of the growing population and the demand for fuel and construction materials has resulted in a steady loss of forest area, which is continuing, as you can see from Figure 6.1 below.

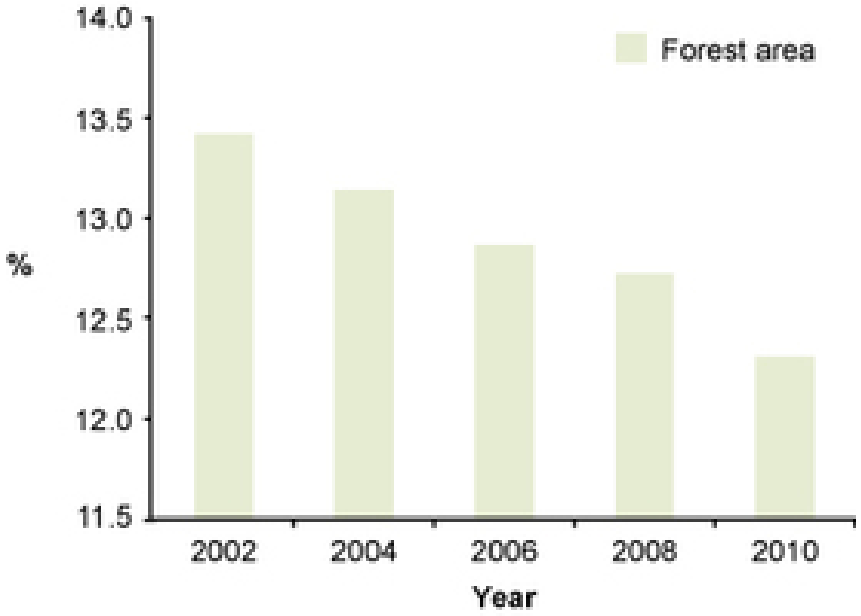

Figure 6.1: Proportion of Land Area in Ethiopia Covered by Forest (%) (2002-2011). Source: MoFED, 2012a)

Humans have been interacting with their environment since people first walked the Earth. For example, humans have been cutting down forests to clear land to grow crops for centuries and by doing so we have altered the environment. Conversely, the environment affects us in many different ways as well. Human beings are dependent on the physical environment, modify their environment, and adapt to the environment.

The loss of forests has several undesirable consequences. Forests are home to many different types of trees, as well as other plants, and a wide range of animals from insects to birds, and mammals. The conversion of forest lands to agriculture greatly reduces biodiversity, which is a measure of the variety of living organisms (all life forms). Biodiversity is important for humans because we use other living organisms to provide several essentials, like:

- Food: we use plants and animals, such as fish, goats, wheat, rice, and maize, as sources of food.
- Medicines: many traditional medicines are made from plants and animals, and new medicines are developed from them as well.
- Ecological services: living organisms, especially plants and microorganisms, play an important role in processes that maintain our lives and environment, such as providing oxygen, cleaning the air, purifying water, breaking down wastes, and controlling erosion.

Deforestation is a significant contributory cause of soil erosion. Once the trees and undergrowth are removed, the underlying ground is exposed. Without the intercepting effect of the vegetation and the tree roots binding the soil together, it is more likely to be washed away when it rains. Loss of forests also has a significant impact on water supply. Tree roots reach deep into the soil and create spaces between the particles which increases soil permeability, and allows rainwater to soak in and replenish groundwater.

II. Energy Resources

The use of renewable or non-renewable resources is a critical factor when considering energy resources. Fossil fuels have been the main energy source for global industrialization, but because they are non-renewable, their quantity is ultimately limited and their use is not sustainable over the long term. Furthermore, the burning of fossil fuels is the main cause of climate change. There are several renewable alternatives to fossil fuels. The wood used as a fuel is renewable in the sense that trees will regrow, but there are other disadvantages such as deforestation, as you have read.

In Ethiopia, wind farms are harnessing wind power to generate electricity but the most important source of renewable energy in Ethiopia is water. Ethiopia already has several hydroelectric power stations and more are planned, including the Grand Ethiopian Renaissance Dam, which is currently under construction. Hydroelectric power is renewable because it makes use of the energy of flowing water without using up the water in the process. Another renewable energy source is solar power, which uses photovoltaic cells that convert the sun's energy into electricity.

III. Water Resources

The direct use of water falls into three main categories:

- domestic uses, including drinking, washing, and cooking;
- agricultural uses, principally irrigation; and
- industrial uses, in manufacturing processes, and for energy generation.

The relative proportions of these three categories vary in different parts of the world, but globally the sector using the most water is agriculture.

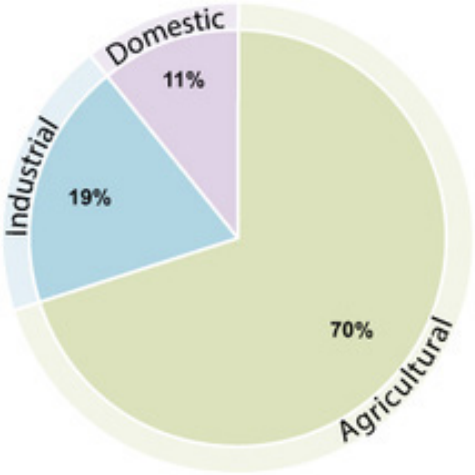

Figure 6.2: Global Water Withdrawal by Sector. (Adapted from FAO, 2012)

In addition to the direct use of water for human activities, it is also essential for the environment to maintain biodiversity. Rivers, lakes and wetlands are important habitats for wildlife and need a certain amount of water at all times to function properly within the system. This becomes a problem when the demand for water for human activities exceeds the supply.

Water is not an endlessly renewable resource. In many parts of the world, water demand is significantly above sustainable water supply. Sustainable water supply means there are adequate supplies, in both quality and quantity, to meet the current and future needs of people and- the environment.

Many countries are already experiencing water stress or scarcity. These terms refer to the volume of water available relative to the use and demand for it, which are linked to the population served. Countries that have less than 1700 m3 of water per person per year for all purposes are defined as water stressed. Water-scarce countries have been defined as those with less than 1000 m3 of water per person per year. These precise figures should be used with caution, however, because they do not recognize variations between countries and they hide the underlying causes of water scarcity.

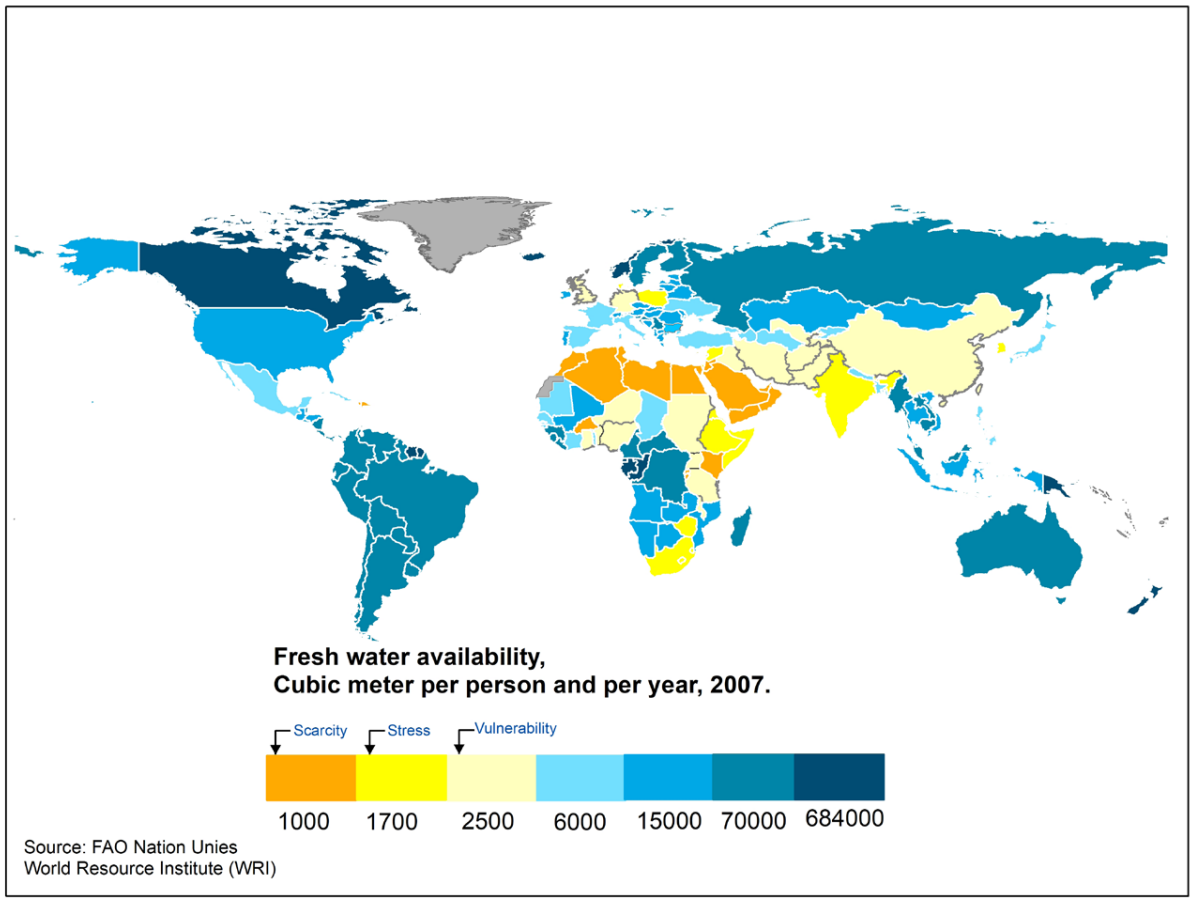

Figure 6.3: Global Freshwater Availability in Cubic Meters (m3) Per Person Per Year (2007).(Note that although calculated 'per person', these figures apply to all uses of water not just personal use.)

2) Production of Waste and Pollutants

The impacts of open defecation and inadequate sanitation on human health and the wider environment are profound. Waterborne diseases are caused by pathogens (disease-causing agents) in water and food that have been contaminated by the wastes of infected people.

Industry, agriculture, and energy production all generate wastes that can pollute the air, water, and soil. Pollution means the introduction into the environment of substances liable to cause harm to humans and other living organisms. For example, the leather industry produces large amounts of liquid wastes from the tanning process. These wastes contain organic materials such as fat from the hides and toxic (poisonous) chemicals, including some human carcinogens (cancer-causing agents). Another example is the release of so-called greenhouse gases such as carbon dioxide, methane, and nitrous oxide, which contribute to human-induced climate change.

Figure 6.4 summarizes the interactions between human activities and 'the environment. The green arrow indicates the waste generated as a product of this interaction. The red arrows indicate the negative effect on both the environment and humans if the waste is not properly managed.

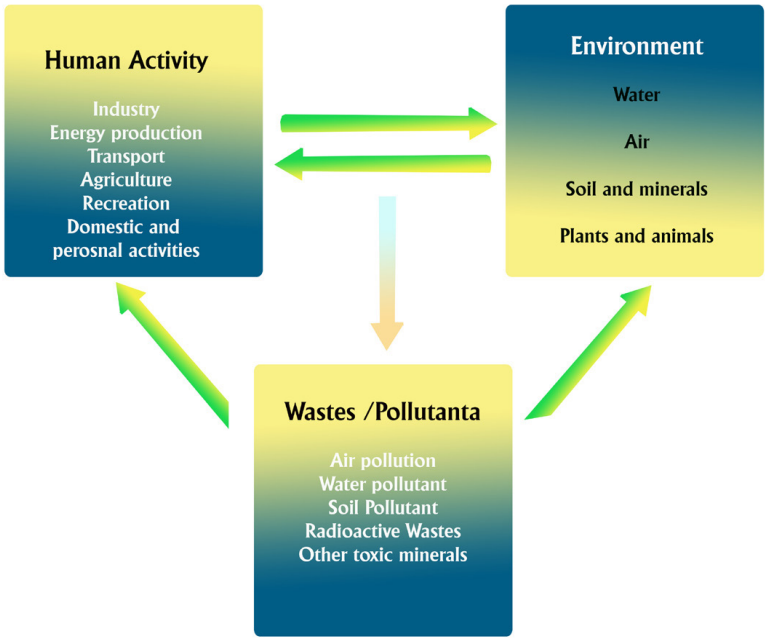

Figure 6.4: Human–environment Interaction and the Generation of Waste and Pollutants

Activity 1

Answer the following questions

1. How do human beings affect the physical environment?
2. Explain the positive and negative impacts of physical environment on human beings.
3. Explain the three modes of human-environment interaction.

Resources

Federal Democratic Republic of Ethiopia (FDRE) (2007) Solid Waste Management Proclamation No.513/2007, Addis Ababa, FDRE

Federal Democratic Republic of Ethiopia (FDRE) (2013) Environmental and Social Management Framework (ESMF), Water Supply and Sanitation Program – WASH-II, Addis Ababa.

United Nations (2007): Indicators of Sustainable Development: Guidelines and Methodologies. Third Edition. New York

World Water Assessment Programme (WWAP) (2012) The United Nations World Water Development Report 4: Managing Water under Uncertainty and Risk, Paris, UNESCO.

Checklist

Dear learner, here is a checklist provided for you to use to make sure that you understand. Put a tick mark (√) against each of the following statements. You must select either 'YES' or 'NO' as your reponse.

No.	Items	Yes	No
1.	Can you identify the three modes of human-environment interaction?		
2.	Can you explain how human beings affect the physical environment?		
3.	Can you explain how human beings are dependent on physical environments?		
4.	Can you explain how human beings modify their environment?		
5.	Can you explain how human beings adapt to the environment?		
6.	Can you define deforestation?		

Is there any box that you marked 'No' under it? If there is please go back to your text and read about it before you go to the following exercise.

SELF-TEST EXERCISES FOR SECTION 1

Part I. Write True if the statement is correct and False if the statement is Incorrect.

1. Human being can live solely by isolating him/herself from the natural.
2. The links between human activities and the environment are complex and varied.
3. Advances in technology have increased natural resource exploitation.
4. The links between human activities and the environment are simple and not varied.
5. Water is not an endlessly renewable resource.

Part III. For the following questions, choose the correct answer from the given alternatives.

1. Resources available to us in limited quantities are

   A. Renewable resources
   B. Non-renewable resources
   C. Natural resources
   D. Human resources

2. Which one of the following is an example of renewable resource?

   A. Coal
   B. Natural gas
   C. Soil
   D. Uranium

3. _____ is the way of human-environment interaction that relates to how humans adjust themselves, their lifestyles, and their behavior to live in a new environment with new challenges.

A. Adaptation
B. Modification
C. Dependency
D. Assimilation

4. Which one of the following resources are replenished naturally in the course of time.

A. Renewable resources
B. Non-renewable resources
C. Natural resources
D. Human resources

5. Which of the following production sectors pollute the air, water and soil?

A. Industry
B. Agriculture
C. Energy
D. All of the above

6. Which one of the following particular problem is caused by over-exploitation of forest resources?

A. Afforestation
B. Deforestation
C. Reforestation
D. Forest resource

Section 2 Optimum, Over and Under Population and Resource Use

Section Overview

Dear learner! In this section you are going to learn optimum, over and underpopulation and resource use. The optimum population is the best and most desirable size of a country's population. Overpopulation occurs when there is an excess of population over utilized or potential resources. Whereas underpopulation occurs when there are more resources in an area (for example, food, energy and minerals) than can be used by the people living there in an area..

Section Learning Outcomes

At the end of this section, you will be able to:

- *define the concepts of optimum population, overpopulation and under-population;*
- *show the balance between population size and the amounts of resources available using concrete examples;*
- *explain how the growth and decline of a population affects the availability of natural resources; and*
- *identify the causes of under-population.*

Required study time:3 Hours

5.2.1. Optimum Population and Resource Use

Dear learner! *What is an optimum population size? What are the advantages of optimum population size?Please, write your answer in the provided space below.* _____

_____

_____

_____

Have you tried? If not, no problem. Have a look at the following explanation. Optimum population is where the amount of resources available in a country is equal to the country's population needs; therefore there are enough resources to maintain its population. The optimum population is the best and most desirable size of a country's population. Thus an optimum population yields the highest quality of life, which means each person has access to adequate food, water, energy and air of the highest quality, adequate medical care, recreational facilities and cultural outlets. The optimum size of a population along with the existing natural resources and a given state of technology, yields the highest income per capita in a country.

Indications of an optimum population may be high average living standards, full employment, the rational development of increasing resources and a balanced demographic structure, but these are not precise criteria. Optima vary in time and space according to a wide variety of factors: the size of a state, its geography, social structure, stage of technical progress, quality of communications, etc. In general, the numerical range of the optimum is greater in varied economies and open environments than in specialized economies and isolated communities, where population growth, economic crises, war, or drought may prove disastrous to the delicate balance between population and resources.

- Optimum population is where the number of resources available in a country is equal to the country's population needs. The optimum population means the best and the most desirable size of a country's population.
- Overpopulation is when there are too many people, to be supported to a good standard of living, by the resources of a region or country. It has too little resources to maintain its population.
- Under population is when there are more resources in an area (for example, food, energy and minerals) than can be used by the people living there.

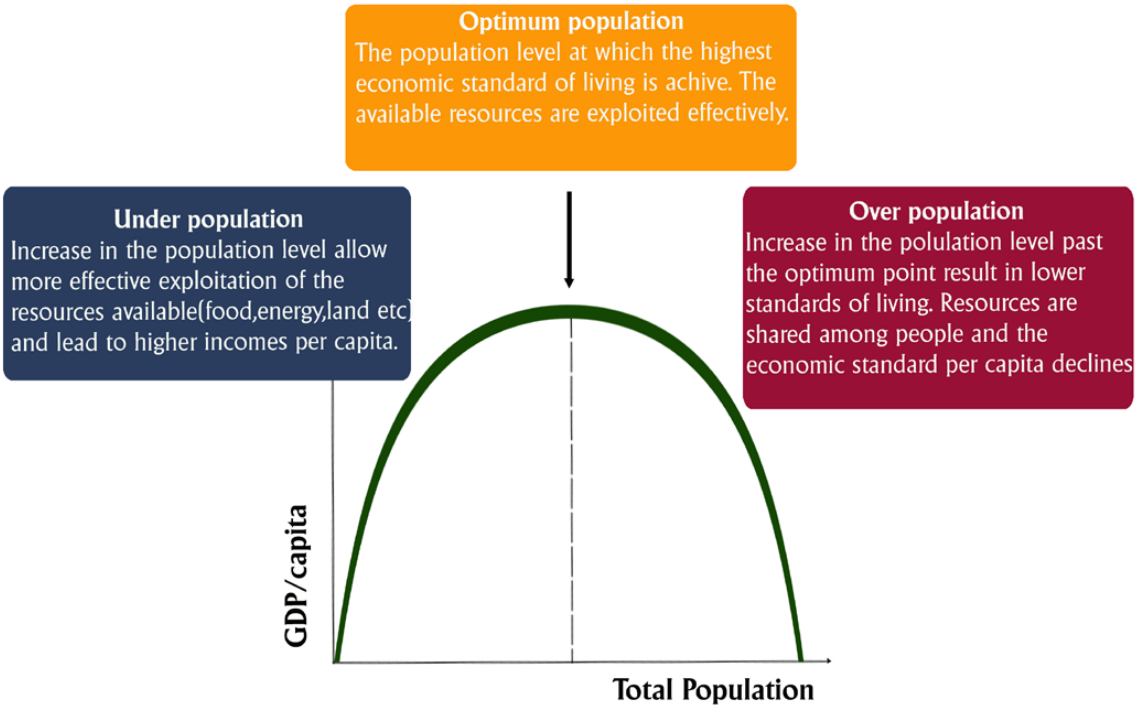

Figure 6.5: Under, Optimum and Over population

5.2.2. Overpopulation and Resource Use

Dear learner! *Can you define the concept of "overpopulation"? What do you think about the population size of Ethiopia? Please, write your answer in the provided space below.* _____

_____

_____

_____.

Have you stated it? If so, that is great. Overpopulation occurs when there is an excess of population over utilized or potential resources. It may result from an increase in population, a decline in resources, a decline in the demand for labor, or a combination of these factors. In other words, overpopulation may take place where resource development does not go hand in hand with population growth, and where the growth of tertiary services lags behind technical progress.

Absolute overpopulation may be distinguished from relative overpopulation, the former occurring where the absolute limit of production has been attained even though living standards remain low, while the latter indicates that present production is inadequate for the population although greater production is feasible. Relative overpopulation is more common than absolute overpopulation.

Overpopulation may be found at various levels: rural, industrial, regional, and national. Rural overpopulation is common but is most striking in populous underdeveloped areas. In South-East Asia, where there is high fertility and declining mortality, intensive agriculture, land fragmentation and minimal mechanization, natural checks on overpopulation have exercised great control in the past. The demographic evolution of China has been frequently interrupted by famines, floods, droughts, and epidemics. Rural overpopulation may also result from:

a) uneven distribution of land among farmers;
b) increased mechanization and reduced demand for agricultural laborers;
c) a change from cultivation to livestock farming and again reduced demand for labor; and
d) rapid rural population growth.

Many of these features can be seen in old countries in Europe. Famine, hunger, prolonged unemployment and an increase of landless laborers and beggars are all symptoms of rural overpopulation. Unfortunately, solutions other than emigration are slow and difficult, but in the long run social and cultural revolutions are more effective. Invariably overpopulation expresses itself only at the lowest levels of society: rural overpopulation affects the landless and the smallholders; industrial overpopulation hits the unskilled and semi-skilled workers.

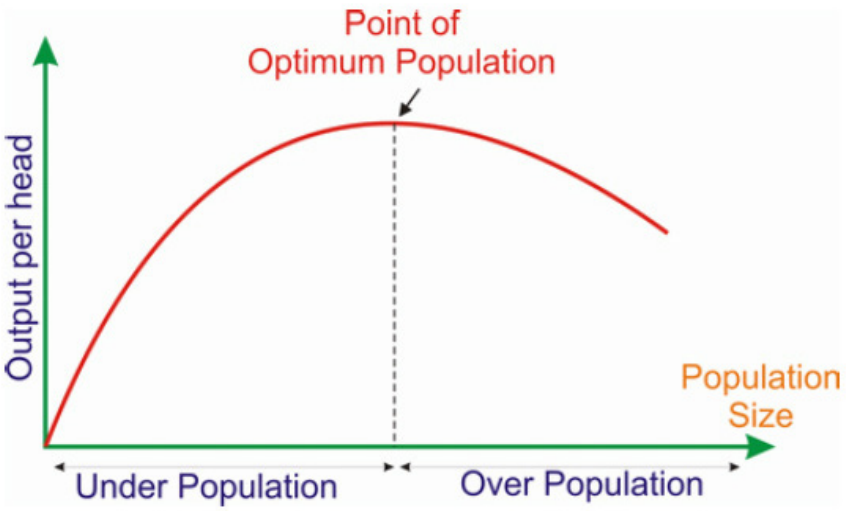

Figure 6.6: Population Resource Relationship

Overpopulation can result from: an increase in births, a decline in mortality rates due to medical advances, an increase in immigration and a decrease in emigration, a lack of education, poverty, and poor contraceptive use.

Effects of overpopulation are: depletion of resources, especially fossil fuels, the problem of water shortages, increased levels of air pollution, water pollution, soil erosion, and noise pollution, deforestation and loss of ecosystems, changes in atmospheric composition and consequent global warming, permanent loss of arable land, and increases in desertification, migration, mass species extinctions, starvation, malnutrition or poor diet with ill health and diet-deficiency diseases (e.g. rickets), low life expectancy, high crime rate, and conflict over scarce resources.

Moreover, it results in over-utilization of infrastructures, such as mass transit, highways, and public health systems, and higher land prices.

5.2.3. Under-population and Resource Use

Dear learner! *What do you know about under-population? What are the causes of underpopulation? Please write your answer in the provided space below.* _____

_____

_____

Dear learner, underpopulation may be said to exist where a population is too small to utilize fully its resources, or where the resources could support a larger population without lowering living standards or increasing unemployment. The former is more frequent than the latter.

Absolute underpopulation is quite rare, serve in the case of isolated populations where numbers are incapable of normal demographic replacement of adequate economic production. Relative under-population takes place where there is insufficient development of the resources available; nowhere is it more common than in the southern continents.

Underpopulation is when there are more resources (for example, food, energy and minerals) in an area than can be used by the people living there. It is also when a region or country has insufficient workers to exploit their resources efficiently, support retired population and to provide growth. Therefore, too few people use all the resources of an area to the maximum efficiency. The number of people is not sufficient to utilize the resources of the country, the resources are vast, much can be produced, but men are not sufficient. Most areas considered underpopulated today are large in area and rich in resources. These countries can export the surplus of food, energy, and mineral resources, have high incomes, good living conditions and level of technology and immigration. This phenomenon results in a decline in population. With fewer people, there is a decrease in demands for services.

The impacts of under-population include: shortage of workforce, fewer people to pay taxes etc.

Activity 2

Answer the following questions

1. What are the main causes of overpopulation in Ethiopia?
2. Discuss the advantage and disadvantages of under populated countries on resource usage.
3. Explain the following:
   A. Carrying capacity
   B. Absolute overpopulation
   C. Relative overpopulation

Resources

Aaseng, Nathan.(2010) Overpopulation: Crisis or Challenge?. Franklin Watts, Inc. New York,

FAO. The future of our land: facing the challenge. guidelines for integrated planning for sustainable management of land resources. Food and Agriculture Organization. 1999;p:88.

Newton C., A. (2007). Forest Ecology and Conservation: A Handbook of Techniques. New York: Oxford Univrsity Press

Checklist

Dear learner! A checklist is provided here for you to use to make sure that you understand. Put a tick mark (√) against each of the following statements. You are expected to respond under 'YES' or 'NO'

No.	Items	YES	NO
1.	Can you define the concept of "optimum population"?		
2.	Can you define the concept of "over population"?		
3.	Can you define the concept under-population?		
4.	Can you explain the impacts of an optimum population on natural resources?		
5.	Can you identify indications of an optimum population?		
	Can you explain the disadvantages of overpopulation?		

Is there any box that you marked 'No' under it? If there is any please go back to your text and read about it before you go to the following exercise.

SELF-TEST EXCERCISES FOR SECTION 2

Part I. Write True if the statement is correct and False if the statement is incorrect

1. Optimum population is the most preferable for economic development.
2. Relative overpopulation is more common than absolute overpopulation.
3. High birth rate is a reason for underpopulation.
4. Optimum population occurs when there is an excess of population over utilized or potential resources.
5. Underpopulation is the best and most desirable size of a country's population.

III. Match Items in Column 'A' With Items Under Column 'B'

''A''	''B''
1. Population size greater than resource consumption	A. Optimum Population
2. Amount of resource is greater than existing population size	B. Population Explosion
3. Balanced number of population and resource usage	C. Over Population
4. Clearance of trees	D. Deforestation
5. Unexpected rise in the number of population	E. Under Population
	F. Mortality
	G. Fertility

Section 3 Impacts of Rapid Population Growth

Section Overview

Dear learner! I hope you have successfully completed the first and the second sections of unit six. In this section, you are going to study about impacts of population growth. Ethiopia is the most populous country in Africa with a higher rate of population growth. This rapid population growth has caused many environmental and socio-economic problems in Ethiopia.

Section Learning Outcomes

At the end of this section, you will be able to:

- *explain how the growth and decline of population affects the availability of natural;*
- *describe the balance between the population size and the amounts of resources available; and*
- *assess the impacts of rapid population growth on the environment and socioeconomic development.*

Required study time:4 Hours

The rapid increase of the human population is putting an incredible strain on our environment. While developed countries continue to pollute the environment and deplete their resources, developing countries are under increasing pressure to compete economically, and their industrial advancements are damaging as well. The demands that this growth places on our global environment are threatening the future of sustainable life on earth. One of the largest environmental effects of human population growth is the problem of global warming.

Some scientists fear that global warming will lead to rising sea levels and extreme weather conditions in the future. In order to support the growing population, forests are being destroyed

at an alarming rate. Humans also continue to put a great demand on the natural resources of our planet. Many non-renewable resources are being depleted due to the unrestrained use of fuel and energy. Many parts of the world also suffer from a shortage of food and water. The growth of population puts demands on our already limited resources. The environment on earth is suffering from the growth of the global population. The depletion of resources and biodiversity, the production of waste, and the destroying of natural habitats are serious problems that must be addressed in order to ensure that life on earth will be sustainable throughout the next century.

It is clear that the growing population demands more space to construct houses and availability of more consumer goods. It also requires more means of transport, more consumption of fossil fuels, and more pollutants of air, land and water. Thus, the growth of population leads to pollution of air, land and water. To this effect, different types of pollutions are causing many problems in the physical environment that are further affecting the biological environment.

Ethiopia is the most populous country in Africa with a higher rate of population growth. Its population was estimated to be over 101 million by 2016 and is currently growing at a rate of 2.6%. The majority of the population make their livelihoods in lands that are now categorized as moderately to severely degraded areas; mostly in the Ethiopian highlands. Unless significant conservation measures are set out and implemented accordingly, many of the moderately degraded lands might be severely degraded in the future. This often becomes the underlining cause for overexploitation of the natural resources and subsequent environmental degradations

Some of the impacts of rapid population growth are discussed in detail below.

I. Deforestation

Dear learner! *What is deforestation? Can you mention some of the problems caused by deforestation? Please try on the following space.* _____

_____

_____

Deforestation refers to the removal of forest cover from an area without adequate replacement. In other words, it is the process of the indiscriminate destruction of the natural vegetation cover of a forest area.

The removal of a forest has several consequences. Among these, the most important one is the increase of carbon dioxide in the atmosphere which in turn results in global warming. During photosynthesis plants absorb carbon dioxide and release oxygen on which all heterotrophs can depend. Such circulation and interdepence can be disrupted by deforestation and finally result other species of biodiversity will be affected negatively.

The forest cover resources of Ethiopia have been declining significantly over time. This is caused mainly by rapid population growth and the increasing population's needs for forest resources such as fuel wood and land. Many people in the country use wood for cooking, heating, and lighting, as well as for houses and furniture.

Similarly, the increasing demand for agricultural and settlement lands is a major cause of forest destruction in the country. In Ethiopia, there is a direct correlation between population density and deforestation – the more people there are in an area, the more trees they cut down. New trees do not spring up to replace the old ones.

In Ethiopia, rapid population growth leads to deforestation mainly because of people's increasing needs for more:

- wood
- agricultural land
- settlement land
- grazing land

Such deforestation has various negative consequences, both directly on the natural environment, and indirectly on the socio-economic conditions of the people. Its direct consequences include the following.: It accelerates soil erosion.

- It destroys biodiversity.
- It affects rainfall by decreasing evapotranspiration.
- It results in shortages of wood supply.
- It affects the natural beauty of the affected areas.

While little reliable information exists about the extent and location of the past and present natural forest and woody vegetation cover in Ethiopia, historical sources indicate, on the basis of potential climatic climax, that high forests might once have covered about 35 to 40 percent of the country's total land area. If the Savannah woodlands are included,66 percent of the country used to be covered with forests and woodlands. However, the country's forest and woodland resources have been declining both in size (deforestation) and quality (degradation).

Figure 6.7: Deforestation in Ethiopia

As a result, it has been estimated that high forests covered 16 percent of the land area in the early 1950s, 3.6 percent in the early 1980s, and only 2.7 percent in 1989. Some five million hectares of savanna woodlands remained at that time, giving a total forest and woody vegetation area of 7 percent. In 1994, it was estimated that such forests covered less than 2.7 percent of the country. With the current annual loss of high forests, estimated at 150,000-200,000 hectares, it has been projected that the area covered by high forests may be reduced to scattered minor stands of heavily disturbed forests in inaccessible parts of the country within a few decades.

The major reasons for deforestation are the clearing of forests and woodlands for cultivating crops and the cutting of trees and shrubs for various purposes, notably for fuel wood, charcoal, construction materials, etc. The fact that plantation forestry has been very far from meeting the demand for wood indicates the inevitability of deforestation.

Table 6.1: Forest Resource Degradation in Ethiopia

The local area under vegetation cover	Study years	Forest cover decline (%)	% change year–1
South Wollo	1958–1986	30.6 & 51*	1.1 & 1.8*
Northwestern Ethiopian Highlands	1957–1995	98.9	2.6
Hawassa watershed	1972–2000	82	2.9
Northern Afar ranglands	1972–2007	89.9**	2.6
Gish Abbay watershed	1957–2001	64	1.5
Eastern Ethiopia highlands	1985–2011	63.4*	2.4
Central rift valley area	1973–2014	56.6	1.4
Gumara watershed, Lake Tana basin	1957–2005	85.3 & 91.4*	1.8 & 1.9*
Libokemkem District, South Gonder	1973–2015	82.2	1.9
Andassa watershed, Blue Nile Basin	1985–2015	45	1.6
Gelda catchment, North Western Ethiopia	1957–2014	83.8	1.5
South-Western Ethiopia	1987–2015	54.4	1.9
Muga watershed, Upper Blue Nile basin	1985–2017	21 & 12*	0.7 & 0.4*
Central Highlands of Ethiopia	1957–2017	37.8	0.6
Komto protected forest East Wollega Zone	1991–2019	37.4	1.3
Lake Ziway watershed	1973–2018	76.4**	1.7

** Shrublands (areas covered with small trees, bushes and shrubs which are less dense than forests)*

*** Woodlands (areas covered by woody plants mainly acacia-dominated species)*

Rapid population growth has not only led to land clearance for agricultural purposes, but also to overgrazing in a dominant mixed cereal-livestock production system. It also urges increased pressure on existing forests because of the increasing demand for fodder, fuel wood, and building materials. At a national level, biomass energy offers over 99% of the total domestic energy consumption (92% for households, and the remaining being consumed by small-scale industry and food enterprises). From this, about 78% is derived from woody biomass, whereas around 12 and 9% are from animal dung and crop residue respectively.

Forest resources are also used as cash income sources through selling wood logs, fuel wood, and charcoal. During the last 50 years, charcoal production increased from one million tons to more than three million tons each year. Within this period, fuel wood consumption also increased from 40 to 100 million cubic meters in a year. These all had been done at the expense of forests. Encroachment of farmland and pasture into the natural forests had also been a common practice in many parts of Ethiopia. Such deforestation activities and overgrazing have led to soil erosion resulting in land quality deterioration, biodiversity loss, and impact on the overall climate system posing a serious problem in every aspect of human life.

II. Pollution

The term 'pollution' refers to any undesirable substance added or contaminated to environmental resources which are hazardous or potentially hazardous to human health, safety, and welfare or risky to the normal functioning of other living creatures. Pollution refers to any undesirable change in natural conditions of water, air, and other components of the natural environment that has negative effects on the health and activities of human beings and other living creatures.

Environmental pollution is any change within the environment that affects the integrity of an ecosystem. In most cases, such changes are caused by the action of human beings mainly due to urbanization, industrialization, construction and transportation activities, agricultural and land use management practices. Because of various unwanted substances released to the environment, the majority of natural resources have been affected, many destroyed and a large portion of it falls under immense threat.

Dear learner! *Can you mention some of the causes of air and water pollution? Please try to answer the question in the space given below.* _____

_____

_____

Water and air pollution are mainly caused by human activities in households, industries, farmlands, means of transportation, and so on. However, it can also be caused by natural events such as volcanic eruptions, wildfires, and the like.

When an area is overcrowded (i.e., inhabited by a rapidly growing number of people), the natural environment is polluted by a variety of unwanted and harmful wastes that people's activities produce. In Ethiopia, pollution is a major problem in overpopulated urban centers. In large cities like Addis Ababa, most people live in unsafe environments that have extremely polluted air and water. They are surrounded by the garbage, and pollutants that households, industries, automobiles, and other sources discharge.

Practically in Ethiopia, the agriculture sector is found to be the major source of environmental pollution. Application of chemical fertilizers and pesticides can easily contaminate living organisms, soil, water, meadows, and other vegetation. This has caused air pollution, which continuously affects human health, and also triggers global warming. In such cases, indoor air pollution from biomass fuel is responsible for 50,320 annual under-5-year children deaths accounting for 4.9% of the national burden of disease in the country.

At the same time, pollution due to emissions from motor traffic and industrialization processes has also its share in polluting the environment. Chemical wastes and byproducts from industries and unmanaged urban waste disposal from major cities in open landfill sites are continuously polluting the environment. For instance, many of the leather processing industries in Ethiopia lack proper waste treatment methods. By its very nature, leather processing involves soaking, fleshing, washing, etc. to remove dirt, flesh, salt, and other foreign substances by making use of water.

As a result, different things like salt, pesticides, flesh, hair, suspended solids, sulphate, ammonia, base, chlorides, acid, and other oxygen demanding substances might be released into the surrounding water bodies.

Generally, in Ethiopia, rapid population growth leads to environmental pollution by increasing emission of the amounts of pollutants such as:

- Sewage, solid wastes, and pollutant gases generated by households.
- Pollutant gases, liquids, and solid chemicals generated by expanded industries.
- Pollutant gases generated by the generated by the increasing number of automobiles.
- Agricultural pollutants, such as fertilizers, pesticides, animal wastes, etc

III. Land/Soil Degradation

The land serves as storage for water and nutrients required for plants and other living micro-macro-organisms. The demand for food, energy, and other human necessities depends upon the preservation and improvement of the productivity of land. The loss of arable land has been caused by a number of factors, many or most of which are tied to human development. The primary causes are deforestation, overexploitation of fuel wood, overgrazing, agricultural activities, and industrialization.

Land degradation involves both soil erosion and loss of soil fertility; hence, measurements of land degradation usually focus on the severity of soil erosion. Ethiopia with its high-intensity rainstorms and extensive steep slopes, is highly susceptible to soil erosion, especially in the highlands.

Erodibility also depends on the soil depth and the organic content of the soil; a 1 percent increase in organic matter reduces erodibility by about 15 percent.

Land degradation is also a widespread problem in Ethiopia, with over 85% of the land moderately to very severely degraded and about 75% affected by desertification. In the country, degradation of the land stems from the historical development of agriculture and human settlement in the highland regions. Recent estimates using satellite imagery show that land degradation hotspots over the last three decades have covered about 23% of the land area in the country, basically in large areas of Tigray, Wollo, and Gondar among others.

The factors influencing soil erosion and, therefore, land degradation are multiple and mutually reinforcing. As indicated earlier, the massive removal of vegetative cover is the driving force behind land degradation. This loss is largely due to an expanding population with its corresponding increased demand for crops, grazing land, and fuel wood. The removal of vegetative cover for use as fodder and fuel leads to an increase in surface runoff and, thus, to higher soil erosion. With the removal of top soil (reduction in soil depth), there is less root anchorage for plants. In addition, there is a loss of soil nutrients and a reduction in water holding capacity.

When animal dung and crop residues are used for household fuel rather than recycled into the soil, the soil loses nutrients and organic matter. As the fuel wood scarcity grows worse, women and children have to collect fuel wood from more distant sources and substitute more and more dung and crop residues for household fuel. In the intensively farmed rural areas as well as in the drought-prone degraded areas of the north and the east, cattle dung has already largely replaced wood as the primary household energy source. All of these factors combined lead to a reduction in crop productivity. They also contribute to crop failure, reduced crop intensity, and decreased resistance to drought. This induces further land clearing and reinforces the vicious cycle of land degradation. As soil depth is reduced, croplands revert to grassland and ultimately to bare rock.

Figure 6.8: Badly Degraded Lands in Ethiopia

- Deforestation refers to the removal of forest cover of an area without adequate replacement.
- In Ethiopia, rapid population growth leads to deforestation mainly because of people's increasing needs for more: wood, agricultural land, grazing land, etc.
- Pollution refers to any undesirable change in natural conditions of water, air, and other components of the natural environment that has negative effects on the health and activities of human beings and other living creatures.

Resources

Alemayehu, T. (2004) Assessment of Pollution Status and Ground Water Vulnerability Mapping of the Addis Ababa Water Supply Aquifers, Ethiopia. Leaflet distributed During the Workshop. Nov. 10th-12th/2004, Addis Ababa, Ethiopia

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Tenalem A. Water Management Problems in the Ethiopian Rift: Challenges for Development. J African Earth Sci. 2006; 48:222-236.

Activity 3

Answer the following questions

1. What do you know about global warming?
2. How does rapid population growth lead to environmental degradation?
3. What are the indirect consequences of deforestation on socio-economic conditions?

Checklist

Dear learner! A checklist is provided here for you to use to make sure that you understand. Put a tick mark (√) against each of the following statements. You must select either 'YES' or 'NO'

No.	Items	YES	NO
1.	Can you define deforestation?		
2.	Can you analyze the impacts of rapid population growth on natural environment and socio-economic development?		
3,	Can you explain how the growth and decline of the population affect the availability of natural resources?		
4.	Can you explain to them the consequences of deforestation?		
5.	Can you explain the causes and consequences of air and water pollution?		

Is there any box that you marked 'No' under it? If there is any, please go back to your text and read about it before you go to the following exercise.

SELF-TEST EXERCISES FOR SECTION 3

Part I. For the following questions, choose the correct answer from the given alternatives.

1. Which of the following alternative is not an example of physical environment?

   A. Land
   B. Water
   C. Soil
   D. Plant

2. Which of the following is not the consequence of deforestation?

   A. Accelerates soil erosion
   B. Destroys biodiversity
   C. Affects rainfall
   D. Decrease soil erosion

3. Which one of the following is agricultural pollutant?

A. Fertilizers
B. Sewage
C. Solid wastes
D. Pollutant gases

4. _____is the number of individuals an environment can support without significant negative impacts to the given organism and its environment.

A. Environmentalism
B. Natural resource
C. Carrying Capacity
D. Human resource

5. Ethiopia with high-intensity rainstorms and extensive steep slopes, is highly susceptible to soil erosion, especially in

A. The lowlands
B. The highlands
C. Lakes region
D. The rift valley

Pat II. Fill in the blank spaces with the correct word or phrase.

1. One of the largest environmental effects of human population growth is the problem of _____
2. _____ is any change within the environment that affects the integrity of an ecosystem.
3. Land degradation involves both _____ and _____
4. _____ refers to the removal of forest cover of an area without adequate replacement.
5. In Ethiopia, pollution is a major problem in _____

UNIT SUMMARY

- Our environment means our physical surroundings and the characteristics of the place in which we live. It also refers to the wider natural world of land, sea and atmosphere. Humans have been interacting with their environment since people first walked the Earth. The links between human activity and the environment are complex and varied, but can be grouped into two main types of activity namely the use of natural resources and the production of wastes from a range of activities.
- Optimum population is where the number of resources available in a country is equal to the country's population needs, so therefore there are enough resources to maintain its population. The optimum population is the best and most desirable size of a country's population.
- Overpopulation is when there are too many people, to be supported to a good standard of living, by the resources of a region or country. It has too few resources to maintain its population. Overpopulation is a condition when an organism's numbers exceed the carrying capacity of its ecological place.
- Underpopulation is when there are more resources (for example, food, energy and minerals) in an area than can be used by the people living there. Underpopulation is when a region or country has insufficient workers to exploit their resources efficiently, to support their retired population and to provide growth.
- Ethiopia is one of the countries which faced challenges as a result of rapid population growth. These were deforestation, pollution, extinction of species and land degradation

GLOSSARY

Adaptation - is a genetically determined structural or functional characteristic of an organism that enhances its chances of reproducing and passing on its genes.

Carrying capacity - is a maximum population size that a given ecosystem can support for an indefinite period or on a sustainable basis.

Deforestation - is a destruction of forests by clear-cutting.

Ecosystem (Ecological system)- is a geographic area where plants, animals, and other organisms, as well as weather and landscapes, work together to form a bubble of life.

Environment- is all the biological and nonbiological factors that affect an organism's life.

Human-environmental interaction - is the connection between human society and the environment.

Land degradation - is the temporary or permanent decline in the productive capacity of the land.

Natural Resources - are resources that are drawn from nature and used with few modifications.

Overpopulation - is a phenomenon in which a species' population becomes larger than the carrying capacity of its environment.

Pollution - refers to any physical, chemical, or biological alteration of air, water, or land that is harmful to living organisms.

Population growth- is a rate at which a population increases on a yearly basis, expressed as a percentage.

Sustainability - is the practice of using natural resources responsibly today, so they are available for future generations tomorrow.

Sustained development - is a continuous/unwavering development trend that meets the needs of the present generation without compromising the ability of future generations to meet their own needs.

Under–population - refers to a situation where the number of people is less than the resources within an area.

Working Population - people in employment who have to support the dependent population.

Zero Population Growth - is a condition in which population is not increasing.

SELF-ASSESSMENT CORRECTED BY THE STUDENTS

1. How do human beings affect the physical environment?
2. What are the indications of an optimum population?
3. Mention some of the causes of air and water pollution.
4. What are the consequences of deforestation?
5. Based on Figure 6.4. explain the relationship between the environment and your community, and write a report on this issue.

WRITTEN ASSIGNMENT CORRECTED BY THE TUTOR

1. Explain the positive and negative impacts of physical environment on human beings.
2. Do you think that Ethiopia is overpopulated? If yes, what is the impact of it?
3. Explain the difference between renewable and non-renewable resources.
4. Discuss the impact of rapid population growth in Ethiopia on:
5. Housing, education, food supply, health care, farmland, drought and famine.
6. Discuss the advantage and disadvantages of underpopulated countries in terms of resource usage.

ANSWER FOR UNIT 6 SECTION LEVEL ACTIVITIES

Activity 1

1. Humans have continuously influenced and manipulated the environment since they first inhabited Earth. When we think of how humans impact the environment today, we may consider such things as the development of cities, exploration of space and notable technological advances but equally, we may also consider the number of species rendered extinct, the vast amounts of waste and pollution generated and the level of inequality in society. Whatever way we look at it, of all living species, humans have had the greatest influence on our planet.

2. A good climate, accessible clean water, fertile soil, etc. are aspects of the physical environment that enable people to live and thrive. However, harsh environments, such as a very hot climate, limited water, and infertile land, make it more difficult for people to survive. We are also affected by major environmental events such as earthquakes, floods and drought that damage homes, property and agriculture. These can lead to the displacement of people and cause injury, loss of life, and the destruction of livelihoods. They can also damage water sources and pipelines, causing water contamination and spreading waterborne diseases.

3.

a) Dependence on the Environment
b) Modification of the Environment
c) Adaptation to the Environment

Activity 2

1. Overpopulation is an undesirable condition where the number of the existing human population exceeds the actual carrying capacity of the Earth. Overpopulation is caused by a number of factors. Reduced mortality rates, better medical facilities, and depletion of precious resources are a few of the causes which result in overpopulation. It is possible for a sparsely populated area to become densely populated if it is not able to sustain life.

2.

Advantages

- *Low pollution and fewer environmental problems*
- *Decreased strain on social amenities and physical resources.*
- *Sufficient employment opportunities*

Disadvantages

- *underutilisation of resources*
- *shortage of labour*
- *Lesser taxpayers*

a) Carrying capacity *is the maximum number of individuals of a species that*

can exist in a habitat indefinitely without threatening other species in that habitat.

b) **Absolute overpopulation** *occurs when the absolute limit of production that has been attained through living standards remains low,*

c) **Relative overpopulation** *occurs when present production is inadequate for the population although greater production is feasible. Relative overpopulation is more common than absolute overpopulation.*

Activity 3

1. Global warming is the unusually rapid increase in Earth's average surface temperature over the past century, primarily due to the greenhouse gases released as people burn fossil fuels. Global Warming is defined as the increase in the average temperature on Earth. As the Earth is getting hotter, disasters like hurricanes, droughts, and floods are becoming more frequent. Causes of Global Warming are:
   a) Industrial Activity
   b) Agricultural Activity
   c) Deforestation

2. Population impacts the environment primarily through the use of natural resources and production of wastes and is associated with environmental stresses like loss of biodiversity, air and water pollution and increased pressure on arable land. This often becomes the underlining cause for over-exploitation of the natural resources and subsequent environmental degradations, for example the size of Ethiopia's population has been growing very rapidly. The population growth rate is much higher, and it is increasing much faster than the economic growth rate and is growing beyond the carrying capacity of the country's natural resources, such as land, water, soil, forest, etc. These negative results of rapid population growth have caused many environmental and socio-economic problems.

3. The effects of deforestation on socio-economic activities: with reduced forests, people are less able to benefit from the natural resources these ecosystems provide. This can lead to increased poverty and in cases; people may need to move in order to find forests which can sustain them.

ANSWER KEY TO SELF-TEST OF UNIT 6

Self-test Exercises for Section 1

Part I. Answer key for True or False Items

1. False 2. True 3. True 4. False 5, True

Part II. Answer key for Multiple Choice items

1. B 2. C 3. A 4. A 5. D 6. B

Self-test Excercises for Section 2

Part I. Answer key for True or False Items

1. True 2, True 3. False 4. False 5. False

Part II. Answer key for Matching Items

1. C 2. E 3. A 4. D 5. B

Self-test Excercises for Section 3

Part I. Answer key for Multiple Choice items

1. D 2. D 3. A 4. C 5. B

Part II. Answer for Fill in the Blank Space

1. Global warming
2. Environmental Pollution
3. Soil erosion and loss of soil fertility
4. Deforestation
5. Overpopulated urban centers

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UNIT SEVEN

CONTEMPORARY GEOGRAPHIC ISSUES AND PUBLIC CONCERNS IN ETHIOPIA

Unit Introduction

Dear distance learner! Understanding the state of environmental degradation, its root causes and consequences as well as mitigation practices is important. Therefore, in this unit, you are going to study the major environmental problems prevailing in Ethiopia with an emphasis on their causes, consequences and management practices implemented to reverse the problem.

Unit Learning Outcomes

At the end of this unit, you will be able to:

- *state causes of natural resource degradation;*
- *explain the effects of natural resource degradation; and*
- *elaborate Ethiopia's vision to achieve development without undermining the potential of the natural environment.*

Key Terms

- *Afforestation*
- *Agroforestry*
- *Deforestation*
- *Leaching*
- *Reforestation*
- *Soil conservation*
- *Soil erosion*
- *Water management*
- *Water pollution*
- *Climate change*
- *Green legacy movement*

Unit Contents

Required study time:6 Hours

Unit Learning Strategies

Suggested learning strategies are:

- *written brainstorming questions;*
- *case study;*
- *field visit;*
- *Problem-solving method;*
- *individual project;*
- *report writing;*
- *observation;*
- *written activities;*
- *practical activities;*
- *self-test assessments;*
- *online dialog (if possible); and*
- *Electronic portfolios (if possible).*

Section 1 Natural Resource Degradation

Section Overview

Dear learner! You remember that in unit three, you learned about the natural resource base of Ethiopia. In this unit, you are going to study their degradation tendencies and conservation measures to combat them.

Section Learning Outcomes

At the end of this section, you will be able to:

- *describe the causes of natural resource degradation;*
- *recognize the effects of natural resource degradation; and*
- *identify the conservation measures to combat natural resource degradation.*

Required study time:3 Hours

5.1.1. Soil

Soil degradation refers to a change in the state of soil due to increased erosion, leaching or both processes. Among others, erosion by running water is the most serious problem of the soil resources in Ethiopia.

Erosion is the term given to the process of the wearing away of soil by natural agents (running water, wind, ice, wave action, and corrosion) and the transport of the eroded particles to some other location, where they are deposited as sediment. Soil erosion is a natural process that removes soil from the land. However, human activities frequently aggravate this process.

Dear learner! *Can you classify factors that contribute to soil erosion in Ethiopia? Try to recall and list them in the space provided and compare them with what you will read in the following paragraphs. Please, write your answer in the space given below.* _____

Have you tried? That's fantastic. As you may have categorized them, factors that accelerate soil erosion in Ethiopia can be divided into two categories: natural and human-made.

I. Natural Factors

It involves a combination of the following natural factors: steepness of slope (topography), the intensity, duration and seasonality of rainfall, soil type (for example, texture), torrent rivers during the summer and vegetation cover.

II. Human-made Factors:

Here are some of the many ways in which people have contributed to the erosion of the land that they depend on.

1. **Deforestation:** Most of the highlands of Ethiopia were once covered by forests. These forests provide habitat for animals and livelihood for humans; they also offer watershed protection, prevent soil erosion, and mitigate climate change. Deforestation is progressing at a rapid rate and has become one of the main causes of Ethiopia's hastened erosion rate.
2. **Overgrazing (keeping too many livestock in a small spatial unit):** Most areas used for pastoral activities are overgrazed because too many animals have been kept there relative to their grass. The livestock destroys the vegetation faster than it can replenish itself. When the vegetation is destroyed, the land is laid bare and therefore vulnerable to erosion. Among domestic animals goats are particularly damaging. They destroy all kinds and parts of an area's vegetation, including the roots.
3. **Bad cultivation practices:** Bad cultivation practices also speed up erosion by making the soil vulnerable to the natural forces that we have just described a few lines above. For example,
   - **Overcropping** – It is the act of planting an area too densely. This approach to farming uses up the soil's nutrients faster than natural processes can replenish them and destroys the land's fertility.
   - **Over-cultivation** – This one entails tilling land every year. For example, in order to keep up with increasing food requirements, people over-cultivate their lands. Too frequent tilling can remove nutrients from the soil faster than natural processes can replenish them.
   - **Slash-and-burn** – With such a practice, people slash (cut down and dig up) all or most of an area's vegetation and then burn the results. In farming, this practice is sometimes used periodically to strip an area before leaving it to lie fallow to regain its nutrients. However, since the soil is now bare and therefore unprotected, the land is vulnerable to the forces of erosion. Slash-and-burn techniques are also used to clear forestland in order to prepare it for farming, but unwittingly expose the soil to erosion.

In Ethiopia, about 1.9 billion tons of topsoil are washed away from the highlands every year. River Abbay alone carries away 3000 – 4000 million cubic metric tons of soil annually. The loss of topsoil has been estimated to cost billions of Ethiopian birr per year. Since topsoil production rates are so slow, the lost topsoil is essentially irreplaceable.

Conservation Measures to Combat Soil Erosion

Dear distance learner! What are the cheapest and most effective soil conservation measures? Try to name them in the space provided, and compare them with what you will read in the following paragraphs. _____

_____

_____

Have you tried it? If so, that is great. Here are some conservation measures that have been recommended for minimizing soil loss by erosion in Ethiopia.

- **Reforestation** – is the planting of trees on land previously forested but from which the trees have been removed (see Fig. 7.1)

Figure 7.1: Reforestation

- **Afforestation** - refers to the planting of land, not formerly so covered, with trees to make a forest for commercial or other purposes.
- **Terracing:** involves building level surfaces at right angles to the slope to retain water and reduce the amount of soil erosion (see Fig. 7.2).

Figure 7.2: Terraces in Konsso Zone

- **Strip cultivation** – is planting different crops in alternating strips to retain water and soil(see Fig. 7.3).

Figure 7.3: Strip Cultivation. The strips are planted with alternating crop types.

- Controlling livestock population.
- **Intercropping** – is the practice of growing two or more crops on the same field so that the land is not exposed to erosion.
- **Contour ploughing** – is ploughing across slopes, rather than up and down them, to create barriers to runoff (see Fig. 7.4).

Figure 7.4: Contour Plowing

- Developing improved grass types that can feed more livestock.
- Proper construction of tracks and routes so that drainage could not wash them easily.
- Constructing check dams.
- Installing shelter-belts and windbreaks in arid and semi-arid areas

Soil is a renewable resource that can be replenished indefinitely by applying appropriate measures of conservation, although some of these measures are enormously expensive. Conservation is a wise use of resources in the best possible way, so that the greatest long-term benefit is realized by the society.

5.1.2. Vegetation

Dear learner! *What are the major causes of the drastic rate of deforestation in Ethiopia? List your answer down in the space provided, and compare it with what you will read in the following paragraphs.* _____

_____

_____

_____

Have you written? That's good. Now compare your answer with the following points. One vital evidence for the prevailing natural vegetation degradation in Ethiopia is the growing deforestation. The major causes of deforestation are:

- demand for fuel wood;
- demand for construction materials;
- expansion of agricultural lands;
- slash-and-burn practices;
- overgrazing;
- forest fires (natural and artificial); and
- expansion of settlements.

Overgrazing: This is the practice of placing too many livestock on a given piece of land. The activities of these animals strip the land bare.

In addition to overgrazing pasture areas, people are increasingly converting forest land to pasture land. This practice has expanded grazing land at the expense of forest land – in other words, through deforestation.

Slash-and-burn practices: People are involved in slash-and-burn practices to clear forestland in order to prepare it for farming. This practice essentially strips the forest bare by slashing (cutting down and digging up) all or most of the trees and other vegetation and then burning the piles away.

Slash-and-burn is also used to periodically strip an area of farmland in order to leave it lying fallow to regain its nutrients. In Ethiopia, slashing and burning forests destroys a large area of forest annually. This approach to gaining farmland is commonly practiced in southwestern Ethiopia.

Expansion of built-up areas: Built-up areas are areas occupied by factories, residences, recreational sites, etc. Ethiopia's expanding human population increasingly requires more area for housing and other services. Some of the lands that are converted to build up areas are forestland.

Mitigation Measures of Deforestation

Dear learner! *Which conservation measures do you apply to conserve natural vegetation in your locality? Write your brief answer down in the space provided and compare it with what you will read in the succeeding paragraph.* _____

_____

Have you tried? If so that is great. The following approaches have been suggested for slowing down and/or mitigating Ethiopia's rapid deforestation rate. They are:

- conservation;
- capacity building; and
- institutional development.

These approaches are described below. However, despite their great potential, these approaches alone are not enough. More ideas are needed, and sustained effort must be applied to enhance the mitigation effort. **Conservation measures to combat deforestation include:**

- reforestation – planting trees after every tree harvest;
- afforestation – planting trees on bare and unproductive lands;
- controlling burning practices (i.e., the slash-and-burn activities);
- practicing agro-forestry;
- use alternative sources of energy for household consumption;
- using alternative raw materials for construction and household furniture;
- controlling overgrazing; and
- control population growth rate.

Capacity Building and Institutional Development

Here are some approaches to preserve Ethiopia's forests through capacity building and institutional development:

- Providing environmental education to enhance public awareness about the use and management of natural vegetation.
- Developing forest-related curricula for schools, colleges, universities, forestry institutions, and forestry-management institutions. Then implement those curricula.
- Supporting and protecting community forests by applying strict legal measures.
- Moderating the existing rapid rate of population growth
- Facilitate community participation in combatting deforestation.
- Changing the lifestyle of the people in terms of ongoing deforestation activities.

These goals must be dynamically implemented if we are to attain the country's ongoing goal of defeating deforestation. For example, the anti-deforestation rules and laws must be vigorously executed by relevant agencies.

Thus, responsibility and commitment with active community participation towards the conservation and preservation of the country's forest resources is a call to every citizen.

5.1.3. Water

Dear learner! *Give a major reason you thought for water resource depletion in Ethiopia. Try to answer it in the space given below.* _____

_____

_____

Have you written? Well. Ethiopia has been known as the "Water Tower of East Africa" for the last fifty to sixty years. Ethiopia is the second richest African country in terms of water-resource potential, following the Democratic Republic of Congo. However,

- Drought is recurring every 3 to 5 years.
- Some rift valley lakes such as lake Abijata and Lake Cheleklektu are disappearing or are on the verge of disappearance.
- The volume and purity of Ethiopia's rivers are decreasing. Pollutants like sewage, organic wastes and fertilizers are increasingly contaminating the country's water resources.
- Due to the rapid growth of the human population, there is a crucial growing demand for potable water.

These and other factors have led to the need for the conservation and management of water resources in Ethiopia. In response to this need, the Federal government has adopted a national strategy to conserve and manage water resources in Ethiopia. This strategy is adopted to:

a) subject all major conservation, development and management, projects should include the cost and benefits of protecting watershed forests, wetlands and other relevant key ecosystems;

b) recognize that natural ecosystems, particularly wetlands and upstream forests, are fundamental for regulating water quality and quantity, and integrate their rehabilitation and protection into the construction, development and management of water resources;

c) ensure that the control of environmental health hazards is a necessary condition in the design, constitution and use of dams and irrigation systems;

d) ensure that any proposed introduction of exotic species into water ecosystems is subject to detailed studies and environmental impact assessment;

e) promote the protection of the interface between water-bodies and land (for example, lake shores, river banks and wetlands);

f) involve water-resource users, particularly women and animal herders, in the local planning, designing, and follow-up of water policies, programs and projects, in order to promote these activities without affecting the ecological balance;

g) recycle waste water when it is found to be safe for health and the environment;

h) promote, to the extent possible, viable measures to artificially recharge ground

and surface water resources;

i) promote effective water-management techniques at the farm level for improved performance of medium-to-large-scale irrigation schemes; and

j) provide technical and credit support to the private sector in water resource development activities.

Resources

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Geography student textbook for grades 9 – 12

Activity One

1. Which conservation measures do you apply to conserve natural vegetation in your locality?
2. List the major consumptive use of water in Ethiopia.

Checklist

Dear learner! Now it is time to check your understanding of natural resource degradation in Ethiopia. Read each of the following questions and answer them by putting a tick (√) mark in one of the boxes under the alternatives ''Yes'' or ''No''.

S.N	ITEMS	YES	NO
1	Can you describe the causes of natural resource degradation?		
2	Can you recognize the effects of natural resource degradation?		
3	Can you identify the conservation measures to combat natural resource degradation?		

Is there any box that you marked 'No' underneath? If there is any, please return to your text and read about it before beginning the next exercise.

SELF-TEST EXERCISES FOR SECTION ONE

Part I. The following items focus on soil conservation measures. Match the Items under Column 'A' with the conservation measures under Column 'B'.

A	B
1. Restoring forests that have been destroyed	A. Intercropping
2. Growing two or more crops on the same field	B. Over cultivation
3. Constructions built to reduce water erosion in slopping areas	C. Reforestation
4. Natural factors that accelerate soil erosion by water	D. Topography
5. Tilling land every year	E. Terracing

Part II. Fill in the blank space.

6. A change in the state of soil due to increased erosion, leaching, and both processes is called_____.
7. _____ is the practice of placing too many livestock on a given piece of land.
8. The wise and rational use of natural resources is called _____.
9. _____ is the act of planting an area too densely.
10. The establishment of a forest in an area where there was no previous tree cover is known as _____.

Section 2 The Ethiopian "Green Legacy" Movement

Section Overview

Dear learner! In this section, you will be introduced to the newly launched "Green Legacy" initiative by the government of Ethiopia, which aspires to build a green and climate-resilient economy. With its "Green Legacy" program, the Ethiopian government wants to combat the effects of climate change; restore degraded landscapes and forests; promote a green culture and ecotourism; as well as improve the livelihoods of its citizens.

Section Learning Outcomes

At the end of this section, you will be able to:

- *describe the concept of the "Green Legacy" movement in Ethiopia; and*
- *identify the effects of the "Green Legacy" movement in Ethiopia.*

Required study time:3 Hours

Dear learner! *Did you take part in the "Green Legacy" movement in your district? If yes, which seedling species you planted? Explain to us the post-planting care you have carried out. Try to state your environmentally responsible behavior below.* _____

_____

_____

Did you try? If so that is great. The "Green Legacy "Initiative is part of the Government's plan launched in 2019 by Ethiopian Prime Minister Abiy Ahmed(PhD), aimed at a tree planting campaign to curb the effects of climate change and deforestation.

The "Green Legacy" movement encompasses agroforestry, forest sector development, greening, and renewal of urban areas and integrated water and soil resources management. It has the plan to plant 20 billion seedlings across the country over four years (2020-2023). Following this plantation program, post-planting care such as watering, weeding, and replacement planting will be carried out to enhance tree seedlings' survival rate.

Figure 7.5. "Green Legacy" Movement
Source: https://www.bbc.com (BBC Reality Check)

This will not only contribute towards the country's long-term social, economic, and environmental development goals but also towards meeting its international commitments such as the Paris Climate Change Agreement, the 2030 Agenda for Sustainable Development (UN), and the African Agenda 2063.

The efforts on the ground are guided by strategic documents such as the Climate Resilient Green Economy (CRGE) Strategy, the Ten-Year National Forest Sector Development Program, and the Bamboo Development Strategy and Action Plan. These programs and strategies are aligned with global goals and provide guidance on Ethiopia's afforestation, restoration, urban greening, forest protection, and sustainable use of forest resources for the coming years.

The overall "Green Legacy" movement goals are:

- to curb the effects of climate change and deforestation;
- to intensify climate smart agriculture to increase productivity;
- to improve food security;
- to prevent environment-related conflicts;
- to battle desertification and soil erosion;

- to build a climate-resilient green economy; and
- to ensure gender equality.

Resources

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Activity Two

1. What embraces the "Green Legacy" movement in Ethiopia?
2. What are the project areas of green shoot of recovery in Ethiopia?

Checklist

Dear learner! Now it is time to check your understanding of the Ethiopian "Green Legacy" movement. Read each of the following questions and answer them by putting a tick (√) mark in one of the boxes under alternatives 'Yes' or 'No'.

S.N	ITEMS	YES	NO
1	Can you describe the concept of the green legacy movement in Ethiopia?		
2	Can you describe the effects of the green legacy movement of Ethiopia?		

Is there any box that you marked 'No' under it? If there is any, please go back to your text and read about it before you go to the following exercise.

SELF-TEST EXERCISES FOR SECTION TWO

Write 'True' if the statement is correct and 'False' if it is wrong.

1. The "Green Legacy" initiative is part of the climate-resilient green economy strategy.
2. Agroforestry trees are planted merely for ecological benefit.
3. Since the "Green Legacy" movement began, many more trees have been planted.
4. Planting fruit trees in the backyard can help to improve family food security.
5. The "Green Legacy" movement cannot prevent environment-related conflicts.

UNIT SUMMARY

- Ethiopia is gifted with abundant natural resources of adequate landmass, fertile soil, favorable climate, water, wildlife, vegetation and others. However, these resources are under the influence of various interconnected factors like population pressure, agricultural expansion, migration, rapid urbanization, resettlement, climate change, and environmental pollution that result in serious degradation.
- The major problem of Ethiopia's soil is erosion by running water. Both human-made and natural factors are responsible for erosion. Attempts have been underway to check erosion through reforestation, afforestation, terracing, constructing check dams, plugging gullies, contour ploughing, strip cultivation, etc.
- Long-term human occupation of the highlands of Ethiopia, accompanied by sedentary agriculture and extensive cattle herding activities, in combination with population pressure have resulted in heavy deforestation, and subsequent wild animals extinction. The forest resource stock that had covered 40 percent of the country has come to less than 3 percent these days. However, due to the recently adopted Ethiopian government strategy known as "Green Legacy", the forest area coverage has been raised up to about 15.7%, as indicated by the National Forest Inventory report of 2018.
- Hence, the Ethiopian government has taken several steps to address these problems like launching soil and water conservation campaign, tree planting programs, developing water resources conservation and management policy, and others. Moreover, awareness has been created at all levels through school syllabi and extension services to mitigate the problem.

GLOSSARY

Agro-forestry - is the intentional integration of trees and shrubs into crop and animal farming systems to create environmental, economic, and social benefits.

Climate-smart agriculture (CSA) - is an integrated approach to managing landscapes cropland, livestock and forests that address the interlinked challenges of food security and accelerating climate change.

Climate Change- refers to a change in the state of the climate that can be identified (e.g. using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer.

Climate Resilient Green Economy (CRGE) - is strategy sets that by 2025 Ethiopia will be a middle-income country, resilient to climate change impacts and with no net increase in greenhouse gas emissions from 2010 levels.

Conservation - is the care and protection of resources so that they can persist for future generations.

Land cover - is the physical material present on the surface of the Earth, including categories such as vegetation (grasslands, shrubs, forests, etc.), bare ground, water, asphalt and artificial surfaces, and many others.

Leaching - is the removal of minerals that have been dissolved in water.

Science - is the intellectual and practical activity encompassing the systematic study of the structure and behavior of the physical and natural world through observation and experiment.

Seedling nursery - is an area, in which new saplings are raised and nourished until they are ready for transplanting at a permanent place in a field.

Soil degradation - is the physical, chemical and biological decline in soil quality.

Soil erosion - is a gradual process that occurs when the impact of water or wind detaches and removes soil particles, causing the soil to deteriorate.

Vegetation degradation - is a decrease in biomass or a change in the structure of the vegetation community.

Water pollution - the contamination of water by chemical or biological constituents which make it unfit for use.

SELF-ASSESSMENT CORRECTED BY THE STUDENT

1. What causes soil degradation?
2. What causes deforestation and what are the consequences of deforestation in Ethiopia?
3. What is Green Legacy Initiative?

SELF-ASSESSMENT CORRECTED BY THE TUTOR

1. What similarities and differences exist between reforestation and afforestation?
2. What should be done to protect, rehabilitate and achieve sustainable use of forests in Ethiopia?
3. Propose possible ways of effective conservation of water resources in Ethiopia.
4. List some climate changes that have the most noticeable effects.

ANSWER FOR SECTION LEVEL ACTIVITY

Answer for section level activity one

1. Since it is an individual-based activity, the answers are expected to vary from learner to learner. Therefore, let the distance learner try to answer it by him/herself.
2. The major consumptive uses of water are domestic use, agricultural use, industrial use, and generation of electricity.

Answer for section level activity two

1. The Green Legacy movement encompasses agroforestry, forest sector development, greening, and renewal of urban areas and integrated water and soil resources management.
2. The major project areas of green shoots of recovery are: creation of
3. pocket parks, tree planting, use of renewable forms of energy, reusing resources, recycling resources, adaptation, and living with the future impacts of climate change, etc.

ANSWER KEY FOR SELF-TEST EXERCISES

Self-test Exercise Answers Key for Section One

Part I. Matching Items

1. C 2. A 3. E 4. D 5. B

Part II. Fill in the Blank Space

6. Soil degradation 7. Overgrazing 8.Conservation
9. Overcropping 10. Afforestation

Self-test Exercise Answers key for Section Two

Part I. True/False Items

1. True 2. False 3. True 4. True 5. False

References

Aklilu Dalelo, Erango Ersido, Getachew Assefa, (2007). Natural Resource Management and Environmental Protection: Hand Book for Primary School Teachers. Addis Ababa.

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UNIT EIGHT

GEOGRAPHIC INQUIRY SKILLS AND TECHNIQUES

Unit Introduction

Dear distance learner! In the previous unit of this module you have learned contemporary geographic issues. In this unit you are going to learn geography inquiry skills and techniques of Ethiopia. The unit has four sections. Section one deals with maps and basic components. The second section of the unit focuses on scale, scale conversion and measurements on maps. The third section deals with position on maps and map sketching. The fourth section attempts to examine interpreting maps and graphs.

Nowadays, it is common to see maps in our daily lives. You might have observed this to be true. Therefore, acquiring basic knowledge and skills about maps is very necessary because doing many activities without them is very difficult. The most important tools that geographers need to use are maps. Like the science of geography itself, maps have evolved over the centuries. They have changed from simple sketches to complex representations such as spatial data compilations, which you will study in later grades

Unit Learning Outcomes

After completing this unit, you will be able to:

- *recognize the concept of a map and its basic components;*
- *categorize scales and interpret maps at different scales;*
- *make measurements of area and distances using maps;*
- *demonstrate position on maps and make sketch maps; and*
- *undertake investigations, gather geographic information and analyze the data using appropriate techniques.*

Key Terms

- *Bearing*
- *Cardinal points*
- *Cartography*
- *Diagram*
- *Distance*
- *Easting*
- *Grid*
- *Grid north*
- *Latitude*
- *Longitude*
- *Map Scale*
- *Meridians*
- *Northing*
- *Parallels*
- *Prime meridian*
- *Scale*
- *Sketch map*
- *True north*

Unit Content

Map and Its Basic Components
Scale, Scale Conversion and Measurements on Maps
Position On Maps and Map Sketching
Interpreting Maps and Graphs

Required study time:4 Hours

Unit Learning Strategies

Suggested learning strategies are:

- *written brainstorming questions;*
- *case study;*
- *field visit;*
- *Problem-solving method;*
- *individual project;*
- *report writing;*
- *observation;*
- *written activities;*
- *practical activities;*
- *self-test assessments;*
- *online dialog (if possible); and*
- *electronic portfolios (if possible).*

Section 1 Map and Its Basic Components

Section Overview

Dear learner! This is the first section of the unit. In this section you will learn about the meaning and basic components of a map. A map is a simplified, diminished, plain representation of all or part of the earth's surface as viewed vertically from above. The two main stages of the historical development of map-making are: traditional map-making and modern map-making. Maps are used for identifying locations, distance, area, and directions. Maps may contain a variety of elements or components. However, all maps have some common components.

Section learning outcomes

By the end of this unit, you will be able to:

- *explain the meaning of a map;*
- *express the historical development of maps; and*
- *describe the basic components of a map.*

Required study time:3 Hours

5.1.1. The Meaning of a Map

Dear learner! *Do you know what a map is? Please, try to write your answers on the following space.* _____

_____

_____

Have you tried? If not, no problem. Have a look at the following explanation. A map is a simplified, diminished, and plain representation of all or part of the earth's surface as viewed from above, vertically from above.

The main features of maps:

- A map represents all or part of the earth's surface. For example, a map might show a city such as Addis Ababa, the entire world, or a section of a garden.
- A map is a two-dimensional (plane) representation. For example, a map might be printed on a piece of paper.
- Maps show the earth's surface as if it were seen from directly above. This view is called a bird's-eye view.
- All maps are smaller than the area they represent.
- Maps are drawn to scale. In other words, the features shown on a map have the same relative proportions as they do in reality.
- Maps are simplified representations.
- Most maps use generally accepted symbols to represent natural, artificial or cultural features of the area they represent. They also use conventional notations to provide background information such as the map's title, date and scale.

5.1.2. Historical Development of Map

Maps are among our oldest tools. People created maps even in primitive times. For instance, men and women sketched their routes to hunting, fishing and gathering grounds. Today, we also prepare maps for many purposes. However, map-making has passed through many stages of development since its beginning. The two main stages of the historical development of map-making are:

a) Traditional map-making

b) Modern map-making

A. Traditional Map Making

The art of traditional map-making is as old as the human race. Traditional maps have been made in many ways. For example, early map materials included sticks, shells, clay tablets, parchment, paper, and solid plates of silver. Many traditional maps were locational. For example, they have shown the locations of water holes and hunting grounds and included paths that led to these places.

In traditional map-making, collecting measurements of distances, directions, areas and locations was one of the greatest challenges. Each measurement was being made by hand, through fieldwork in the area being mapped. This process was laborious and tiresome. Often the accuracy of the resulting information is imperfect and therefore not fully dependable.

Another main difference between traditional and modern maps is that a traditional map might include drawings of three-dimensional objects. As a result, a traditional map might be more pictographic (or physiographic) than strictly diagrammatic.

B. Modern Map Making

Modern scientific mapping has its roots in the 17th century. Several developments during the Renaissance gave impetus to accurate map-making (cartography). Furthermore, advancements in science and technology resulted in the invention of better cameras and airplanes specially designed to take aerial photographs. Today, map-makers have diverse opportunities to acquire spatial information. In addition to aerial photography, satellite imagery provides a wealth of information.

Nowadays, the use of computers has become common in cartography. This is because computers are found valuable to assist in making maps. The last four decades have witnessed that computers have become an integral part of almost every stage of the cartographic process. This process includes collection, storage, analysis and presentation and even in the mapmaking and reproduction of maps.

5.1.3. Uses of Maps

Dear distance learner! Do you know why maps are so important in geography? What are the major uses of maps? Please try to write your answers on the following space. _____

_____

_____

Have you tried? If so, that is great. Maps are used for identifying locations, distances, areas and directions.

Location: A map shows the exact site of a place as well as the general situation relative to other areas. For example, Ethiopia's location can be expressed in terms of its neighbouring countries,

external land masses and water bodies. It is also possible to locate a place using astronomical grid references – parallels and meridians.

Distance: With the help of a map, we can measure the distance between places. This is done by using the scale of the map. For example, the air distance between Hawassa and Addis Ababa can be calculated by using a map of Ethiopia.

Area: The size of a certain place, a country, a region, a continent can be calculated from a map. This is done by measuring the length and the width of the given place on the map and by converting them to ground distances with the help of the scale of the map.

Direction: A map can enable us to identify the direction and bearing of any place on the map. This is accomplished by referring to another place.

5.1.4. Basic Components of a Map

A map should include the following components namely: the title, scale, direction, grid reference, legend, date, place of publication and publisher, magnetic declination (variation), and compass.

Title: A map must have a title. The title of a map should tell the reader "what," "where," and possibly "when" about the map. If a map contains a title, the purpose of the map can be identified easily before someone goes deep into it.

Scale: is refers to the relationship between a unit of length on a map and the corresponding length on the ground. This information indicates the extent to which the area that is represented on the map has been reduced.

Direction or orientation (North) arrow: Shows the north direction on the map. By convention, cartographers or map-makers place the North at the top of maps.

Grid reference: The map needs to have a coordinate system in the form of parallels of latitude and meridians of longitude so that the area can be placed in its proper geographical location on the globe.

Legend/Key: There must be a legend or key that explains the symbols used by the cartographer. The map legend explains the meaning of the signs and symbols used in the map.

Date/Year of publication: It identifies the year in which the map was published. Because this information tells you how old the map is, you might be able to judge whether the contents of the map are current or might be out of date.

Place of publication and publisher: It tells where the map was published and identifies the organization that published the map.

Resources

Buckley, A. R., Muehrcke, P. C., & Muehrcke, J. O. (2011). Map Use: Reading, Analysis and Interpretation. Redlands, CA: Esri Press.

Daly, Charles P. "On the Early History of Cartography; or, What We Know of Maps and Mapmaking, before the Time of Mercator." Annual Address. Bulletin of the American Geographical Society 11 (1879): 1-40.

Krygier, J. & Wood, D. (2005). Making Maps. New York: The Guilford Press.

Michael Witherick, Simon Ross and John Small. (2001). A Modern Dictionary of Geography. United States of America by Oxford University Press Inc., New York

Activity 1

Answer the following questions

1. Name the two methods of map making.
2. What are the major characteristics of modern map-making?
3. Give a brief account of the uses of maps.

Checklist

Dear learner! Here is a checklist provided for you to check your understanding about Map reading. Put a tick mark (√) against each of the following statements. Put a tick mark under 'YES' or 'NO' in the table below.

No	Items	Yes	No
1.	Can you explain the meaning of a map?		
2.	Can you appreciate the historical development of maps?		
3.	Can you define a map?		
4.	Can you describe the basic components of a map?		
5.	Can you explain the difference between traditional and modern maps?		
6.	Can you explain the main features of a map?		

Is there any box that you marked 'No' under it? If there is please go back to your text and read about it before you go to the following exercise.

SELF-TEST EXERCISES FOR SECTION 1

Part I. Match Items under Column 'B' With Items under Column 'A'

Column "A"	Column "B"
1. A unit of length on a map and the	A. Absolute location
2. corresponding length on the ground	B. Relative location
3. Parallels of latitude and meridians of longitude	C. Cartography
4. Explains the symbols used by the cartographer	D. Grid reference:
5. Location expressed in terms of external land masses and water bodies.	E. Legend
6. Map-making	F. Scale

Part II. Answer the following questions.

1. What is a map?
2. What is the difference between traditional and modern maps?
3. What are the basic uses of a map?
4. What are the basic components of a map?

Section 2 Scale, Scale Conversion and Measurements on Map

Section Overview

Dear distance learner! In this section, you are going to study the scale conversion and measurements on the map. Each map is a diminished representation of the whole world or a part of it. The exact degree to which the map has been reduced in size is known as scale. Thus, scale is the ratio or proportion of the distance and area shown on the map to the corresponding distance and area on the earth's surface. Types of maps can be characterized based on variations in scale.

Section Learning Outcomes

At the end of this section, you will be able to:

- *distinguish between a small-scale, medium-scale and large-scale map;*
- *calculate the scale of a map;*
- *measure distance using the scale of the map; and*
- *measure area using the scale of a map.*

Required study time:4 Hours

5.2.1. Scale

Dear learner! *Do you know what "scale means"? Please try to answer it below.* _____

_____

_____.

Have you mentioned it? If so, that is great. Each map is a diminished representation of the whole world or a part of it. The exact degree to which the map has been reduced in size is known as scale. Thus, scale is the ratio or proportion of the distance and area shown on the map to the corresponding distance and area on the earth's surface. Mathematically, it can be shown as:

Based on scale differences, maps can be classified into three:

a) Large-scale maps
b) Medium-scale maps
c) Small-scale maps

1. Large-scale maps

Large-scale maps show a smaller geographic area with greater detail. Large-scales are greater than or equal to 1:50,000. (1cm on a map represents 50,000 cm on the ground) Large scale maps >1:50,000

2. Medium-scale maps

These maps are prepared with scales that range between 1:50,000 and 1:250,000. Medium-scale maps cover wider areas than large scale maps but cover smaller areas than small-scale maps. They are also able to present more detailed information than small-scale maps but are less detailed than large-scale ones. Medium scale maps 1:50,000 – 1:250,000

3. Small-scale maps

Small-scale maps tend to show a larger geographic area and less detailed. Small-scale maps are those which are prepared with scales less than or equal to 1:250,000. Small scale maps <1:250,000

Large scale maps depict a small area and show more detail, but small scale maps depict a large area and show less detail.

Large-Scale maps

- Scale: ≥ 1: 50,000
- Cover small areas
- Contain highly detailed information

Medium-Scale Maps

- Scale: between 1:50,000 and 1:250,000
- Cover medium sized areas
- Contain moderately detailed information

Small-Scale Maps

- Scale: ≤ 1:250,000
- Contain less-detailed information

5.2.2. Ways of Map Scale Expression

A map scale can be expressed on a map in three ways. These are:

a) Scale Statement

b) Representative Fraction

c) Graphic Scale

a) Scale Statement

It is a technique by which scale can be expressed in words. Example: One centimetre to one kilometre (1cm to 1km). One centimetre on the map represents one kilometre on the ground.

b) Representative Fraction

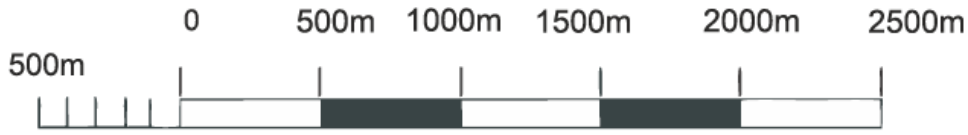
In this method, a map scale is expressed as a ratio or fraction. However, Representative fraction is commonly expressed in a ratio.

Example: 1:400,000 (ratio) or $\frac{1}{400,0000}$ (Fraction)

C) Graphic Scale/Linear Scale

It is called bar, linear, or line scale. Graphic scale is a line drawn on a map and it is subdivided into units appropriate to the scale of the map. This is usually a horizontal line of convenient length divided into a number of equal parts. Graphic scale is drawn with primary divisions towards the right of zero where one division with secondary divisions marked on the left of zero, for reading distances smaller than the values of primary divisions. The graphic scale is mostly drawn in the lower margin of the map.

RF 1:50,000



Graphic Scale

1cm =500m or, 1cm = 500 X 100 cm = 50,000 cm = 1:50,000

5.2.3. Conversion of a Map scale

Sometimes it becomes necessary to change one form of map scale into another. So conversion of a map scale can be done as follows.

1km = 100,000 cm

A. RF to statement scale

Example: Given RF = 1:500,000

This implies that 1cm to 500,000cms. To change 500,000 cm into kilometres, divided it by 100,000 (Because 1km= 100,000cm)

Therefore the answer is: $\frac{500,000}{100,000}$ = 5KM =1cm to 5Kms

B. Statement of scale to RF

Example: Given 1cm to 10kms

First, change 10kms into centimetres

1cm to 10 x 100,000 cms. RF is 1:1,000,000

5.2.4. Measurement on Maps

A variety of information about the earth and about the features distributed on its surface is obtained by direct measurements from maps. Two measurements of primary importance are the distance between locations and the area of a region.

Measurement of Distance

All distances obtained through measurements on maps and the use of the scale only are called map distances (MD), which are expressed in cm. Map distance is the straight-line air distance which does not take into account the ups and downs of the earth's surface. It is expressed in km or meter. We can find three different types of distances through measurements and calculations. These are:

I. Distance along Straight-line

A straight-line distance is the one that is simply measured along a straight line without considering the real earth's features. It is called air distance.

Example: Figure 4.1 straight line distance from B to C is 4 cm (map distance measured using a ruler). The scale of the map is 1:800,000

1cm = 800,000cm

4cm = X

$$\text{Ground Distance} = 4\text{cm} \times \frac{800,000}{100,000}$$

Thus the straight line ground distance between B and C is 32 Kilometres.

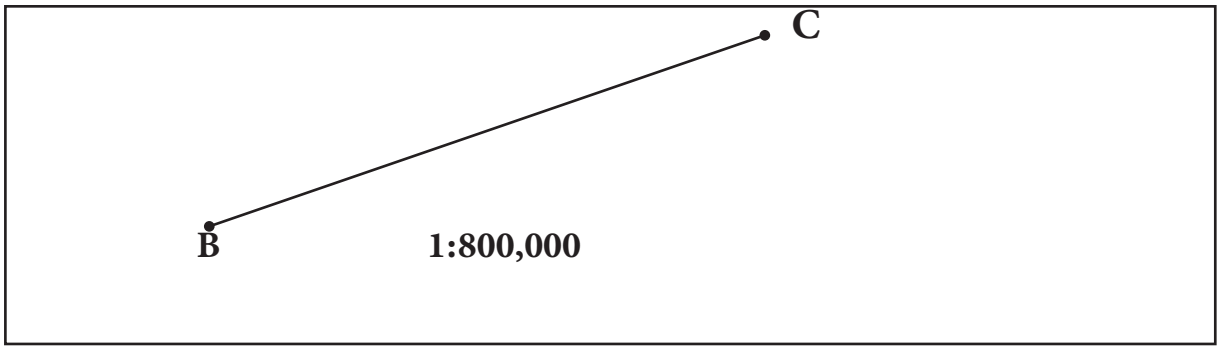


Figure 8.1: Measurement of Straight line distance on a map

II. Distance along the Curved line

The distance along a curved line is called a bending line curve. It includes distance along roads, railways, rivers and coastal lines. To find the distance on the map in the case of a bending line distance in addition to a ruler we need to use threads, strings or the edge of a pair of dividers. If the distance between two points is shown in curved line, divide a curved line into nearly straight portions. Then, measure each portion carefully and add the whole measurement together.

Example: What is the distance of the road shown below?

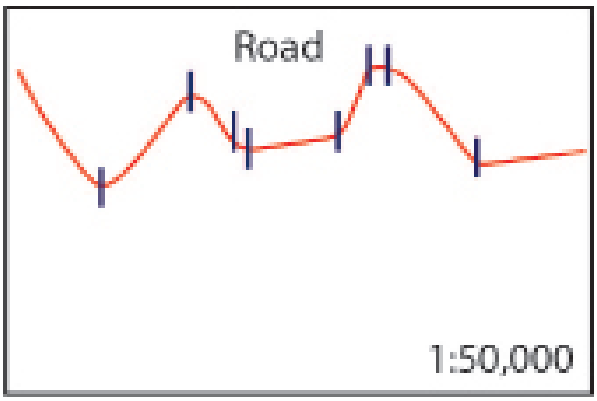


Figure 8.2: Distance along the C curved path

The road measures 8.4 cm on the map. The scale of the map is given as 1:50,000 or 1cm to 0.5km.

1cm = 50,000cm

8.4cm = x

The road line distance (ground) = 8.4cm X $\frac{50,000}{100,000}$ = 4.2 Kms

Measurement of Area

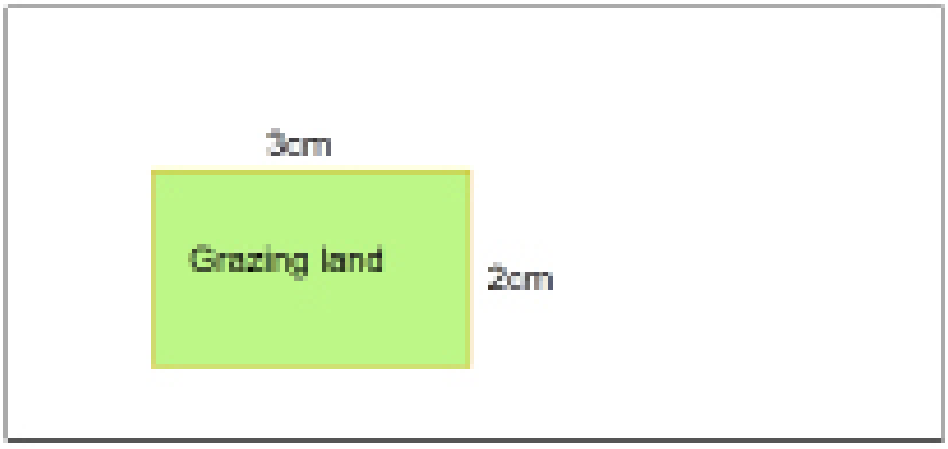
You may be asked to find areas of two different types of pieces of land. They are areas with a regular shape and areas with an irregular shape. The procedures to calculate the areas for each of the two shapes are different.

I. Measuring Regular shaped area:

These include squares, rectangles, triangles and circles. From your geometry lesson in the lower grade you know the formula for calculating the areas of these figures. However, you should know the necessary facts about them (sides, base, height, radius, etc.).Then calculate the ground area by using the map's areal scale. The following table gives you some geometric formulae for calculating the areas of regular shapes.

Table 8.1: Geometric Formula

Regular Shaped Areas	Mathematical Formula
Square	$A = S^2$; where A = area, and S = side
Rectangle	$A = l \times w$; where A = area, l = length, and w = width
Right Angle Triangle	$A = \frac{1}{2} bh$; where A = area, b = base, and h = height
Circle	$A = \varpi r^2$; where A = area, and r = radius. ($\pi = 3.14$)



scale = 1:250,000

Figure 8.3: A sketch map of grazing land

Activity 2

Answer the Following Questions

1. What does a map scale indicate?
2. Explain the way to measure irregular shaped areas.

Dear learner! *What is the ground area of the grazing land? Please write your to answers in the following space.* _____

_____

_____

_____.

Did you try? That is good. Good. The scale is 1:250,000 or 1cm to 2.5km

Length of grazing land = $\frac{3cm \times 2.5km}{1cm}$ = 7.5 Km

Width of grazing land = $\frac{2cm \times 2.5km}{1cm}$ = 5Km

Area = l x w = 7.5km X 5km = $37.5km^2$

Therefore, the total area of the grazing land is $37.5km^2$.

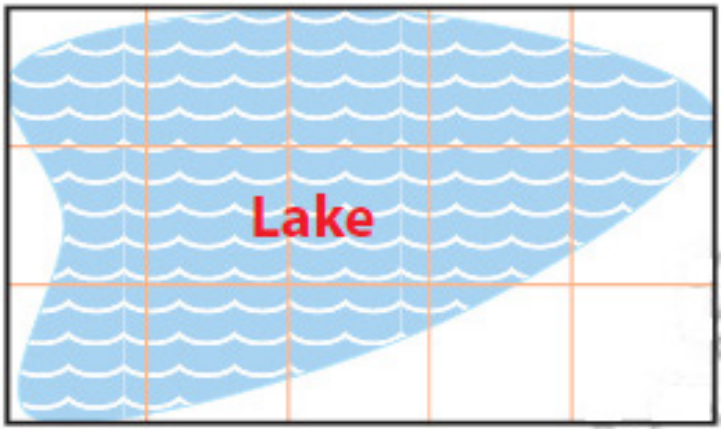
II. Measuring Irregular-Shaped Areas

The area of the irregularly shaped piece of land such as islands, farmlands, parks, etc. cannot be obtained accurately by simple methods as the regular shapes. Such areas can be obtained by devices like planimeter and other methods such as the grid square method.

Planimeter: is an instrument used to get accurate areas of both regular and irregularly shaped features from maps.

Grid Square method: it deals with the area of purely irregular shapes. It is manual and involves tremendous labour.

Example: If the map of an irregularly shaped lake is drawn with a scale of 1 cm to 2 km (Figure 4.5), calculate the area of the lake on the ground.



Scale= 1cm to 2km

Figure 8.4: A sketch map of a lake

To find the area of the lake, we follow the following steps:

a) Copy the boundary of the lake.

b) Draw grid lines at a uniform interval (for example, 1 cm a part) over the lake.

c) Count the number of grid squares within the lake:
- number of full squares = 4
- number of ¾ squares = 5 × ¾
- number of ½ squares = 4 × ½
- number of ¼ squares = 1 × ¼

Then, Area = [Full Cells + (half cells)/2 + (Quarter cells)/4] etc©X Cell value

Thus, total number of squares = 4 + 5 × ¾ + 4 × ½ + 1 × ¼ = 10

a) Calculate the approximate area of the lake.
- First, find the area of one square by using the scale.

Area = S2 = 1 cm × 1 cm = 1 cm2 or 2 km × 2 km = 4 km2

Then, calculate the total area of the lake.

If one square = 4 km2

10 Square =?

Therefore, the approximate area of the lake is 40 km square.

Resources

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Dent, B.D. (1999). Cartography: Thematic Map Design (5th ed). Mc Graw-Hill. New York.
Misra,R.P. (1989). Fundamentals of cartography. New Delhi.
Rabenhorst T. and McDermott P.(1989). Applied cartography: source material for map making, Merrill Publishing company.
Raisz, E. (1962). Principles of Cartography. Mc Graw-Hill. New York.

Checklist

Dear learner! Here is a checklist provided for you to check your understanding. Put a tick mark (√) against each of the following statements. Put a tick mark under 'YES' or 'NO' in the table below.

No	Items	YES	NO
1.	Can you calculate the scale of a map?		
2.	Can you calculate the areas of regular and irregular-shaped figures by referring to the scale of a map?		
3.	Can you categorize maps based on scales and purposes?		
4.	Can you convert the statement scale into q representative fraction?		
5.	Can you convert the graphic scale into a statement scale?		
6.	Can you draw a graphic scale for 1cm to 0.5 km?		

Is there any box that you marked 'No' under it? If there is please go back to your text and read about it before you go to the following exercise.

SELF-TEST EXERCISES FOR SECTION 2

Part I. For the following questions, choose the correct answer from the given alternatives.

1. The marginal information that shows the relationship between distance on the map and ground distance is:

   A. Key
   B. Scale
   C. Title
   D. Grid reference

2. Distance on the field is not usually measured in

   A. Centimetre
   B. Kilometre
   C. Mile
   D. Meter

3. Which one of the following scales is for a small-scale map?

A. 1: 250,000
B. 1:75,000
C. 1:40,000
D. 1:10,000

4. The unit of distance in both the numerator and denominator of a fraction are:

A. The same
B. Different
C. In meters
D. In kilometres

5. An instrument used to get accurate areas of both regular and irregularly shaped features from maps.

A. Scale
B. Grid reference
C. Grid Square method
D. Planimeter

Part II. Answer the following questions.

1. Convert the following RF into a Statement scale
   a) 1:50,000
   b) 1:250,000
   c) 1:400,000
2. Change the following statement scales into RF
   a) 1 cm to 100kms
   b) 4cms to 1km
   c) 2.5cms to 2.5kms

Section 3 Position on Maps and Map Sketching

Section Overview

Dear learner, this is the third section of unit four. In this section, you will learn position on maps and map sketching. The position is given accurately with the help of a grid composed of a network of lines known as parallels and meridians. One set of lines runs from the North Pole to the South Pole and these imaginary lines are called Meridians and join all the points with the same longitude. The other set of lines run around the globe parallel to the equator and are called Parallels and these lines join all the points with the same Latitudes. A sketch map is an outline map drawn from observation rather than from exact survey measurements and shows only the main features of the area.

Section Learning Outcomes

At the end of this section, you will be able to:

- *draw a sketch map of the existing situation of local areas;*
- *indicate the positions of selected features;*
- *define what the geographic grid system means;*
- *demonstrate the position of a given place using a geographic grid system;*
- *acquire the skill of finding directions on a map; and*
- *show the direction of a given place on a map using compass direction and bearings.*

Required study time:4 Hours

5.3.1. Position on Maps

Dear learner! *Can you mention the ways to give the position of places on the earth's surface and on maps? Try them in the space provided and compare them against what you will read in the following paragraphs.* _____

_____

_____

_____

Have you tried? That is great. The position of places on the earth's surface and upon maps can be given in many different ways. The most important is through the use of:

- Latitude and longitude (international grid references)
- National Grid References (eastings and northings)

Grid References

A. Position by the Use of Geographic Grid

In this method, the position is given accurately with the help of a grid composed of a network of lines known as Parallels and meridians. One set of lines runs from the North Pole to the South Pole – these imaginary lines are called Meridians and join all the points with the same longitude. The other set of lines run around the globe parallel to the equator and are called Parallels – these lines join all the points with the same Latitudes.

Latitude is angular measurements from the center of the earth northwards and southwards whereas longitude is angular measurements from the center of the earth eastwards and westwards. The parallels give the position in degree (0), minutes (‘), and seconds (”) north or south of the equator – this is the Latitude of the place.

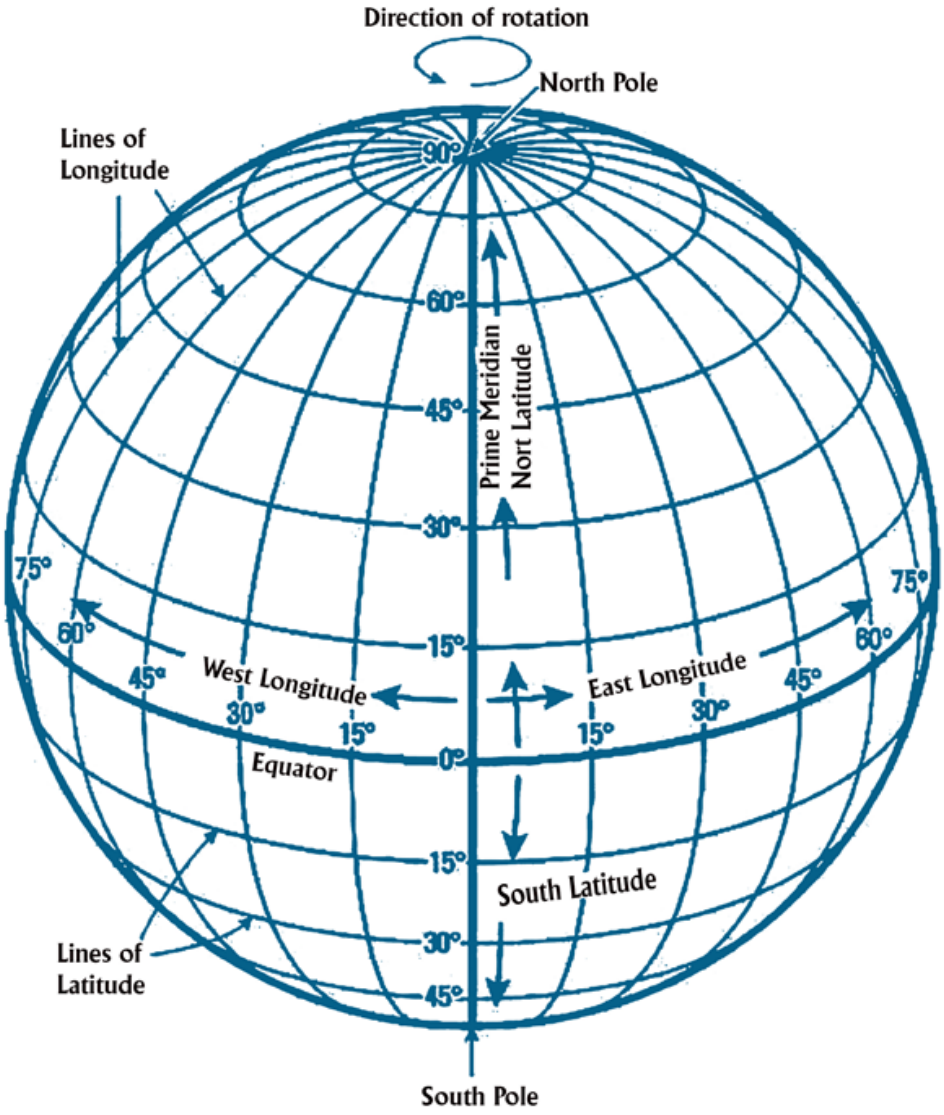

Figure 8.5: The Complete Geographic Grid

The meridians also give position of a point in degree, minute and seconds east or west of the zero degree (Prime Meridian)– this is the Longitude of the point (Figure 3.6).

Parallels are imaginary lines joining all points with the same latitude. Meridian: An imaginary line joining all points with the same longitude. Note that the first set of terms (latitude and longitude) deal with angles the second set (Parallel and Meridians) with lines. Consider the following figure for the positioning of points B, C, N, and O.

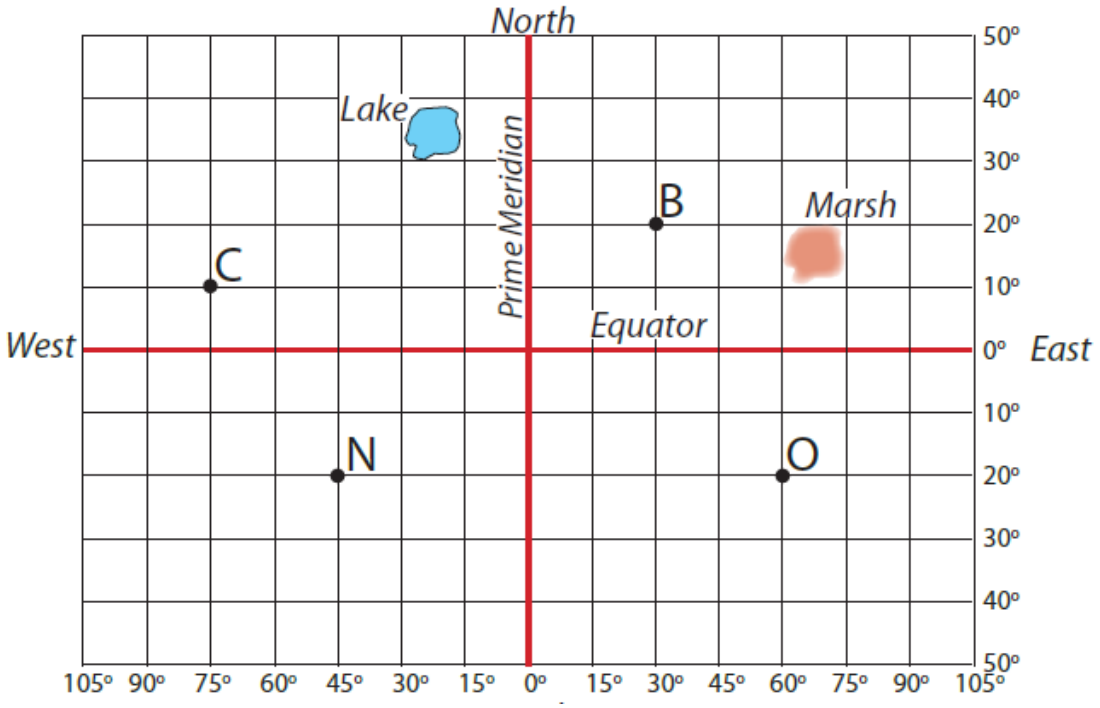

Figure 8.6: Geographic Grid

Dear learner! *How do we locate the position of a place on a map? Please try to answer in the following space.* _____

_____

_____.

Do you answer? Good. Example 1: Find the geographic grid of point C in Figure 3.6 Follow thefollowing steps:

1. Identify whether point C is North or South of the Equator.
2. Read the latitudes of C, North of the equator i.e., 10^0 N.
3. Read the longitude of C, West of the prime meridian i.e., 75^0 W.
4. The complete geographic grid of point C is 10^0 N 75^0 W.

B. Position by the use of National Grid Reference

Dear learner! *What is a National Grid system? How can a national grid system help us to identify the position of a place on a map? Please try to answers in the following space.* _____

_____

_____.

Have you tried it? If so that is great. The criss-cross reference lines on a map are called Grid. The grid provides a frame of reference for locating points on a map. The vertical and horizontal lines of the grid cross at the points called Co-ordinates – Each of these lines is numbered. The

lines that run horizontally are called Northings. The lines that run vertically are called Eastings. These lines are the basis for reference to landmarks and places shown on the map. There are two types of grid references:

- The four digit grid reference
- The Six digit grid reference

This point is the southwestern corner of the whole grid for the country and it is called the grid origin or the National grid origin.

- The grid origin of Ethiopia lies in south-west most corner at the point in SW Kenya where the 34^0 30'E meridian crosses the equator (0^0).
- Such a grid system provides the position of any point, in kilometres and fractions of kilometres east and north of the grid origin.
- From the origin, all vertical lines are numbered eastwards. They are called eastings.
- All horizontal lines are numbered northwards. They are called northings.
- In contrast to meridians, eastings (verticals) do not indicate true north.

The Four Digit Grid Reference

It is common on a map drawn on a small scale. The 10 Km sides of the square

are marked with numbers that increase towards East and North. The Northing and Easting are numbered at every 10 Km interval. Again, each side of the square is divided into 10 units (1 unit represents 1 Km).

Example: Find the four digit grid reference for point F using Figure 3.7

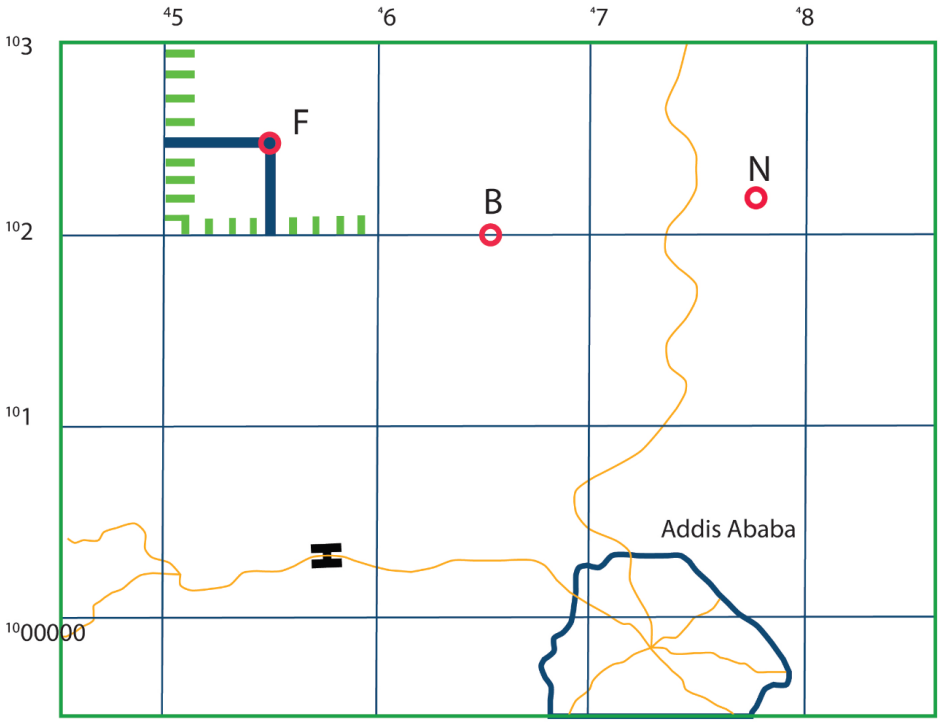

Figure 8.7: Four-digit Grid Reference

Table 8.2: Procedures of finding location using four digit grid references

	Steps for positioning F	Eastings (Verticals)	Northings (horizontals)
1	Locate the vertical grid line to the left of the point F and read the large number.	5	
2	Divide the square into ten equal divisions and pick the tenth of the point.	5	
3	Locate the horizontal grid line below the point F and read the large number.		2
4	Again divide the square into ten equal divisions and pick the tenth.		5
	The grid references for point F:	55	25
The 4-digit grid reference for point F: 5525			

The Six Digit Grid Reference

The six digit grid reference is appropriate on a map drawn in a larger scale so that greater accuracy in position can be obtained.

Example: Find the national 6 digit grid reference for the points B, F and N on the map.

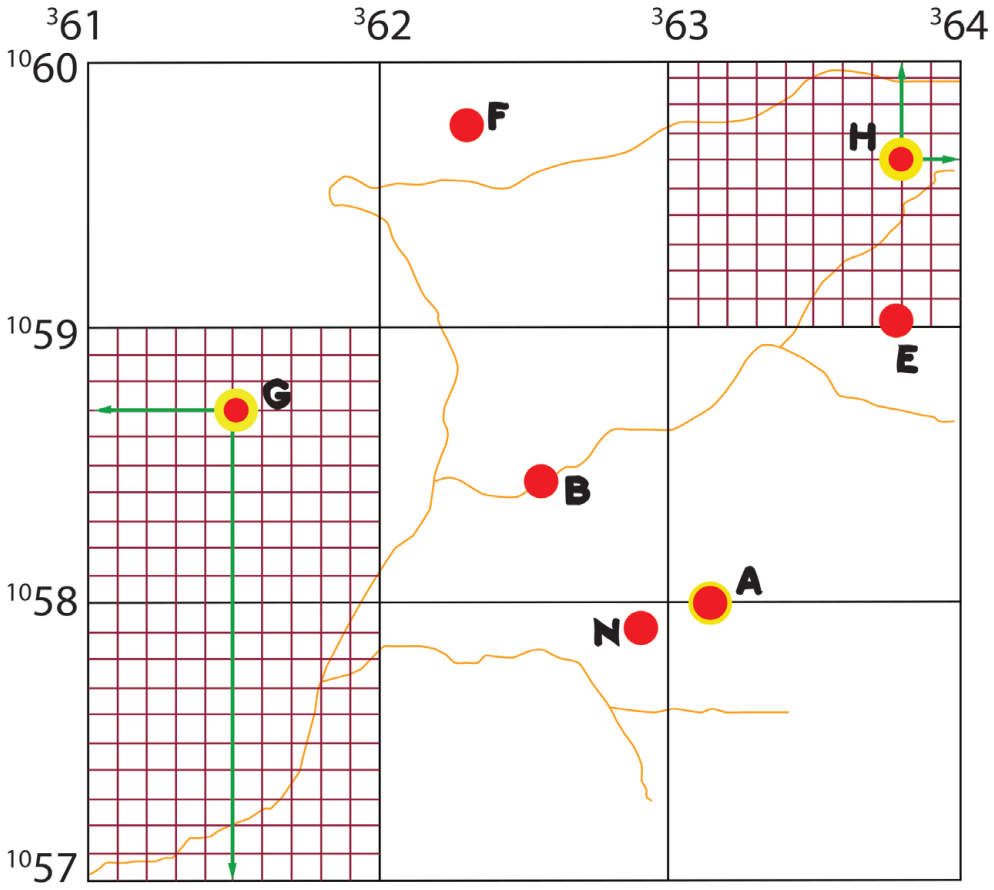

Figure 8.8: Six-Digit grid reference

In the above figure 4.8, the grid of a map drawn in the scale 1:20,000 is shown. Each square has a side of one kilometer. To find the location of points B, F, and N we can use the following steps.

Table 8.3: Procedures of finding location using six digit grid references

	Procedure	Point B	Point F	Point N
1	All points are in the 100 km square marked CA.	CA	CA	CA
2	Locate vertical grid line nearest to the left of the point and write large digits only	62	62	62
3	Measure tenths from grid line to point	6	3	9
4	Locate horizontal grid line nearest below point and write large digits only	58	59	57
5	Measure tenths from grid line to point	4	8	9
	Full National Grid Reference	CA 626584	CA 623598	CA 629579

Note that the three first digits in the grid reference always refer to the eastings and the three last digits to the northings. Where the two lines cross one another you will have the point you are looking for. The accuracy obtained with six figure grid reference as far as position is concerned is to the nearest 100 meters. This accuracy is made possible by the larger scale of the map. The actual difference between a four figure and six figure grid reference is therefore one of accuracy. Four figure grid reference should therefore be used only in connection with maps that have a scale so small that it is impossible to get a greater accuracy than to the nearest kilometre.

Remember always that a grid reference NEVER can be used to indicate an area. The reference always stands for a POINT, which is the intersection of two lines.

Points Compass Direction

Compass is an instrument that indicates or identifies direction, used by mariners, aviators, campers, hunters, and other travellers to enable them to get from one place to another. There are thirty-two points of the compass. Many of us are familiar with the four cardinal points of the compass–North, East, South and, West. The angle between two adjacent cardinal points is 900. Between the cardinal points there are subsidiary (Intermediate) points, which give a further indication.

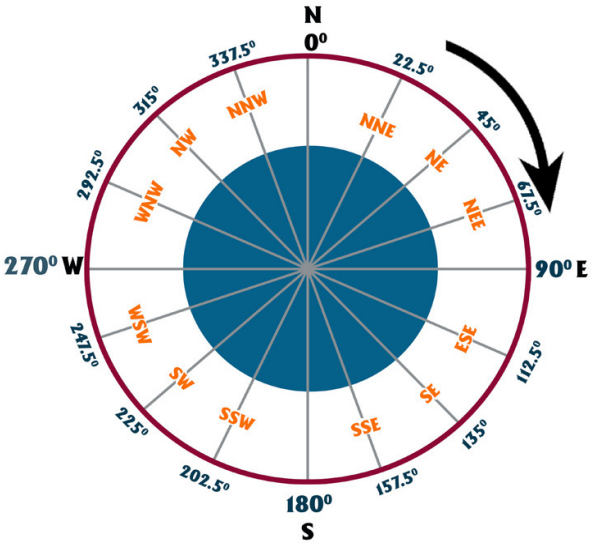

Figure 8.9: Compass Points

The points midway between the cardinal points at 450 intervals include; North West (NW), North East (NE), South East (SE) and South West (SW). There are additional sub-divisions between the cardinal and subsidiary points which give more precise directions at 22½0 intervals. These include: North-North-East (NNE), East-North- East (ENE), East-South-East (ESE), South-South-East (SSE), South-South-West (SSW), West-South-West (WSW) and West-North-West (WNW).

Compasses are marked with degrees as well as with the direction points we described earlier. As shown in Figure 8.7 above, the degrees start at the north from 0°, and increase in the clockwise direction. The direction points coincide with degree points. For example, 0° coincides with N, and 180° coincides with S. You can express direction more precisely in degrees than direction points.

North Points

In map reading, reference may be made to the three North Points. These are: True north, Magnetic north, and Grid north.

A. True North/Geographic North.

The most commonly used north for finding direction is True North (sometimes called Geographic North). True North is the northerly direction along a line on Longitude (Meridian Direction). The earth spins on an axis, which passes through the North and South poles. The North Pole is geographical North; or true North. Lines drawn from the North Pole to the South Pole are true north-south lines. True North is therefore the direction from any point on the earth's surface to the North Pole.

Figure 8.10: True North direction

B. Magnetic North

The position of the north magnetic pole varies slightly from year to year. The direction in a compass needle points is known as Magnetic North. The difference between True North and Magnetic North at any given location is called Magnetic Declination. A direction measured from the Magnetic North, the one indicated by the magnetic compass is referred to as the Magnetic bearing or Azimuth with respect to the True or Geographic North.

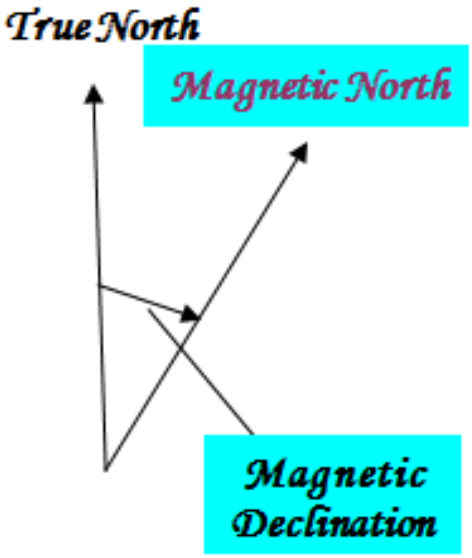

Figure 8.11: Magnetic North and Magnetic Declination

C. Grid North:

The grid lines on a map do not lie true north and south except along one standard Easting called the central meridian. Elsewhere on the map they make an angle with the true north-south line. Since the grid lines are parallel, and since they are drawn on most maps, it is very convenient to use them for drawing or measuring bearings. The direction of the north-south grid lines (Eastings) is therefore known as Grid North.

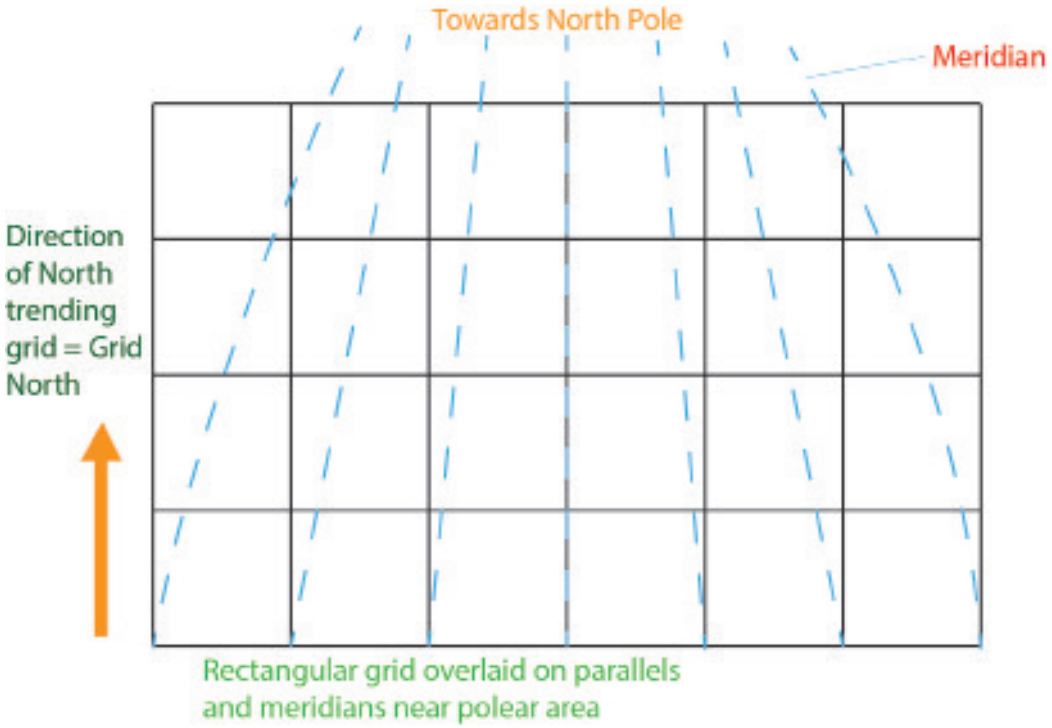

Figure 8.12: Grid North

- The position is given accurately with the help of a grid composed of a network of lines known as parallels and meridians.
- Compass is an instrument that indicates or identifies direction, There are thirty-two points of the compass. Many of us are familiar with the four cardinal points of the compass–North, East, South and, West.
- In map reading, reference may be made to the three North Points. These are: True north, Magnetic north and Grid north.

5.3.2. Map Sketching

Dear learner! *Can you explain what a sketch map means? Please try to answer it below* _____

_____

_____.

Have you tried? If so that is great. A sketch map is an outline map drawn from observation rather than from exact survey measurements and shows only the main features of the area. Sketch maps are free hand maps drawn on a blackboard or drawing pad to present geographic ideas and facts Sketch mapping minimizes irrelevant detail and maximizes major geographic points. Thus such maps are the ultimate in geo-graphic simplification.

One of the most important Geography skills is the ability to create maps. Maps are an ideal way to organize and present a large amount of information. As technology advances, students can create increasingly sophisticated maps using GIS, Google Earth, and other platforms. The sketch map can lay a foundation for understanding geographic relationships, organizing information, and answering questions.

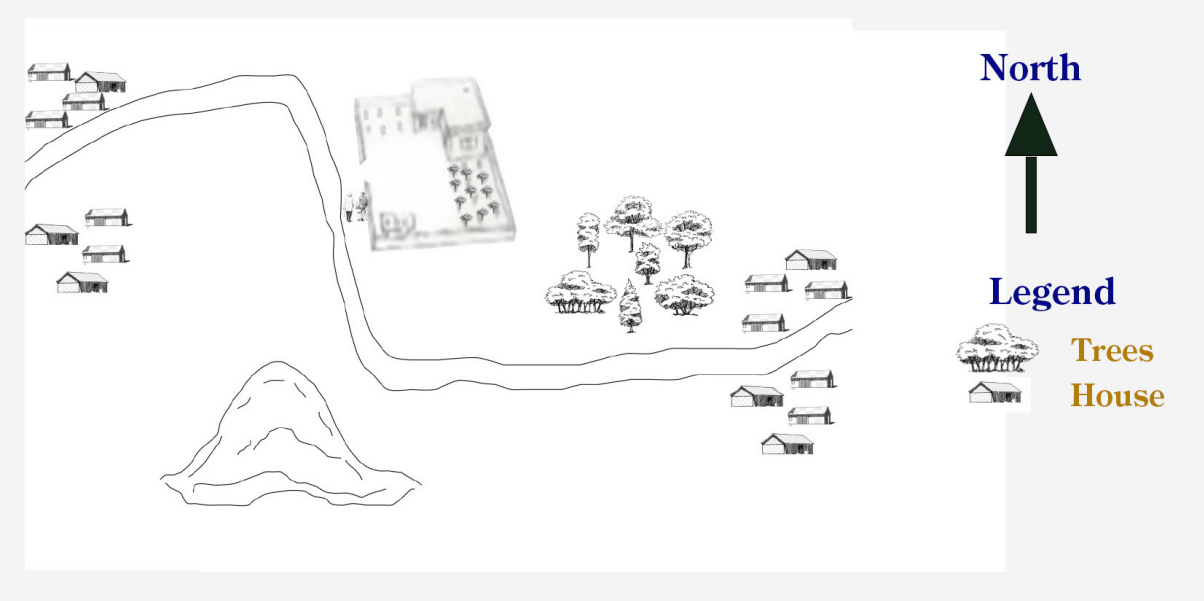

Figure 8.13: Sketch Map

How to draw a sketch map

1. Decide what region your map will show. Choose boundaries so that you do not sketch more than you need to.
2. Determine how much space you need for your map. Things that have the same size as each other in reality should have the same size as each other on your map.
3. Decide on and note the orientation of your map. Most maps use a directional indicator. On most maps, north is "up".
4. Select reference points so that viewers of your map can quickly and easily figure out what they are looking for. For a map of your community, a major street or river might be your reference point.
5. Decide how much detail your map will show. The larger the area you want to represent, the less detail you will need.
6. You are ready to begin sketching. First, sketch general shapes. If you do not know or cannot remember exact shapes, you can use circles, rectangles, and triangles.
7. Now, fill in more details, as they occur to you – names of places, major land features,
8. Do not spend more than an hour working on your map, and do not try to make it perfect or overly detailed.

Activity 3

Answer the following questions

1. Based on Figure 4.7 find the four digit grid reference for the following points :
   a) B b) N
2. Based on Figure 4.8 find the six digit grid reference for the following points:
   a) E b) A c) B

Resources

Campbell, John. (1991).Map Use and Analysis. Wm. G. grown Publishers,.
Jennings , J.H. (1952). An Elementary Map Interpretation. Ungman, London
Maling, A.H. (1973).Coordinate Systems and Map Projections.George Philips and Sons Ltd. London.
Robinson, A.H. (1995). Elements of Cartography (6th ed). John Wiley& Sons, Inc. New York.
US Department of Army (2004). Map Reading And Land Navigation. Lyon Press

Checklist

Dear learner! Here is a checklist provided for you to check your understanding. Put a tick mark (√) against each of the following statements. Put a tick mark under 'YES' or 'NO' in the table below.

No	Items	YES	NO
1.	Can you acquire the skill of finding directions on a map?		
2.	Can you show the direction of a given place on a map by means of compass direction and bearings?		
3.	Can you practice how to find direction and bearings of points on maps?		
4.	Can you define what geographical grid system mean?		
5.	Can you describe a sketch map?		
6.	Can you draw sketch map of existing situation of local areas?		

Is there any box that you marked 'No' under it? If there is please go back to your text and read about it before you go to the following exercise.

SELF-TEST EXERCISES FOR SECTION 3

Part I. Match the Items Under Column "A" With the Items Under Column "B"

''A''	''B''
1. The criss-cross reference lines on a map	A. The six digit grid reference
2. The lines that run vertically	B. Co-ordinates
3. It is appropriate on a map drawn on a larger scale	C. The four digit grid reference
4. The lines that run horizontally	D. Compass
5. The vertical and horizontal lines of the grid cross at the points	E. Grid
6. It is common on a map drawn on a small scale	F. Eastings.
	G. Northings

Part II. Fill In The Blank Spaces With The Correct Word or Phrase

1. Imaginary lines that join all the points with the same Latitudes are called_____.
2. _____ is the northerly direction along a line on Longitude.
3. The four cardinal points of the compass are:_____,
4. The most commonly used north for finding direction is _____ or _____
5. The difference between True North and Magnetic North at any given location is called _____
6. In map reading, reference may be made to the three North Points. These are: _____

Section 4 Interpreting Maps and Graphs

Section Overview

Dear learner, in this section you are going to learn about interpreting maps and graphs: Interpreting features of the physical and human landscapes and Interpreting graphs, tables and diagrams. Geographers have developed a standard set of symbols and other graphic conventional signs to represent features shown on maps. Conventional signs and symbols are those signs and symbols that are used on maps through the agreement of all map-makers of the world.

Section Learning Outcomes

By the end of this unit, you will be able to:

- *interpret different physical and human landscapes on maps; and*
- *construct statistical diagrams based on the provided data.*

Required study time:3 Hours

5.4.1. Interpreting Features of the Physical and Human Landscapes

Dear learner! *What do map-makers use to represent the different physical and human features on maps? Please, try to answer in the following space.*

_____

_____

_____.

Have you stated? If so that is great. Geographers have developed a standard set of symbols and other graphic conventional signs to represent features shown on maps. Conventional signs and symbols are those signs and symbols that are used on maps through the agreement of all map-makers of the world. They are used to represent the same detail on a map in all the countries of the world. Signs and symbols help the map reader to understand maps. Therefore, the map reader has to look first at the key or legend of the map.

When you create a map, the symbols you select should satisfy the following requirements.

- They should be uniform throughout the map.
- They should be easy to read and understand.
- The space occupation, orientation and size of the symbols should be constant.

Here are some of the symbols and conventional signs that are widely used, and understood worldwide:

- Cities and towns are indicated by dots or patches of shading;
- Streams and bodies of water are often printed in blue; and
- Political boundaries are shown by dot lines/solid lines.

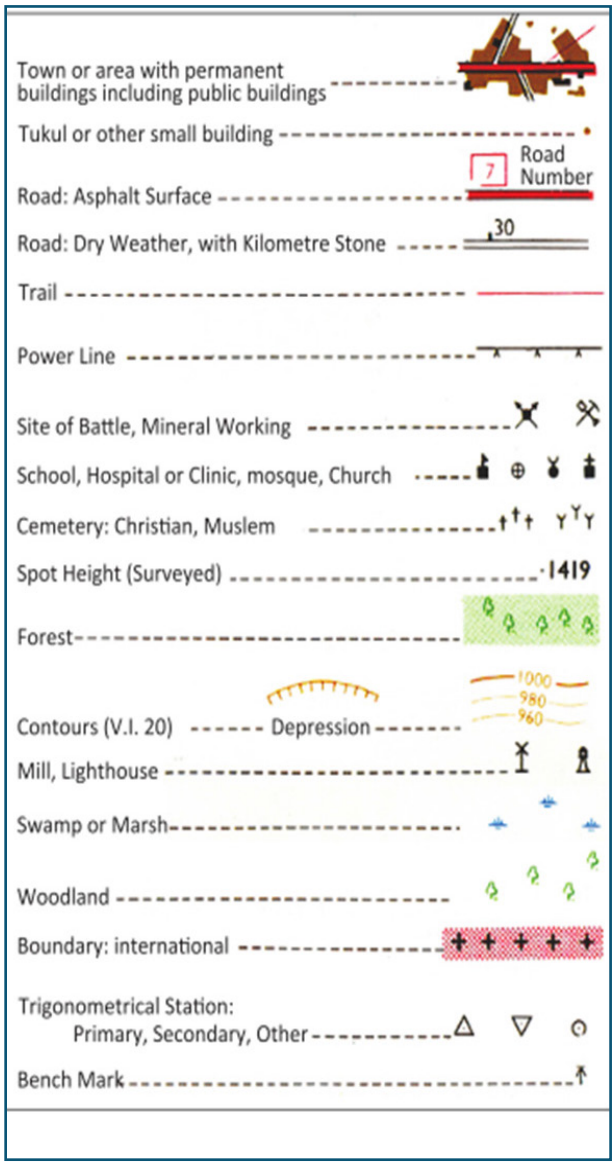

Figure 8.14: Conventional Signs and Symbols

Section 5 Interpreting Graphs, Tables, and Diagrams

Statistical diagrams are pictorial representations of numerical information. Charts, graphs and diagrams are examples of statistical diagrams. By using statistical diagrams, geographers make information easier to present and understand. It is easier to make comparisons, see trends (changes over time) and draw conclusions. Statistical diagrams are particularly important tools for presenting large amounts of statistical data.

In this section, you will learn about some of these statistical diagrams:

1. Simple line graphs
2. Simple bar graphs
3. Pie charts

i. Simple Line Graph

A line graph uses lines to show changes over time. It is also used to show the relationship between two sets of information/phenomena. The line graph shown in Figure 8.15, illustrates the data presented in Table 8.2. It shows the changes in the population size of Ethiopia from 1900 to 2020. In the graph, the x-axis represents years, and the y-axis represents population size. Steps used to draw a line graph:

1. The horizontal axis is normally used to represent an independent variable, i.e. time, while the vertical axis represents a dependent variable,
2. The base of the vertical scale should be at zero, and the top should be slightly higher than the maximum value to be recorded on it.
3. When plating the graph use small crosses or dots to mark values.

Table 8.4: Growth of the Ethiopian Population (1950-2020)

Year	1950	1960	1970	1980	1990	2000	2010	2020
Population in (Million)	19.2	23.5	29.5	37.7	51.2	63.4	87.6	114.9

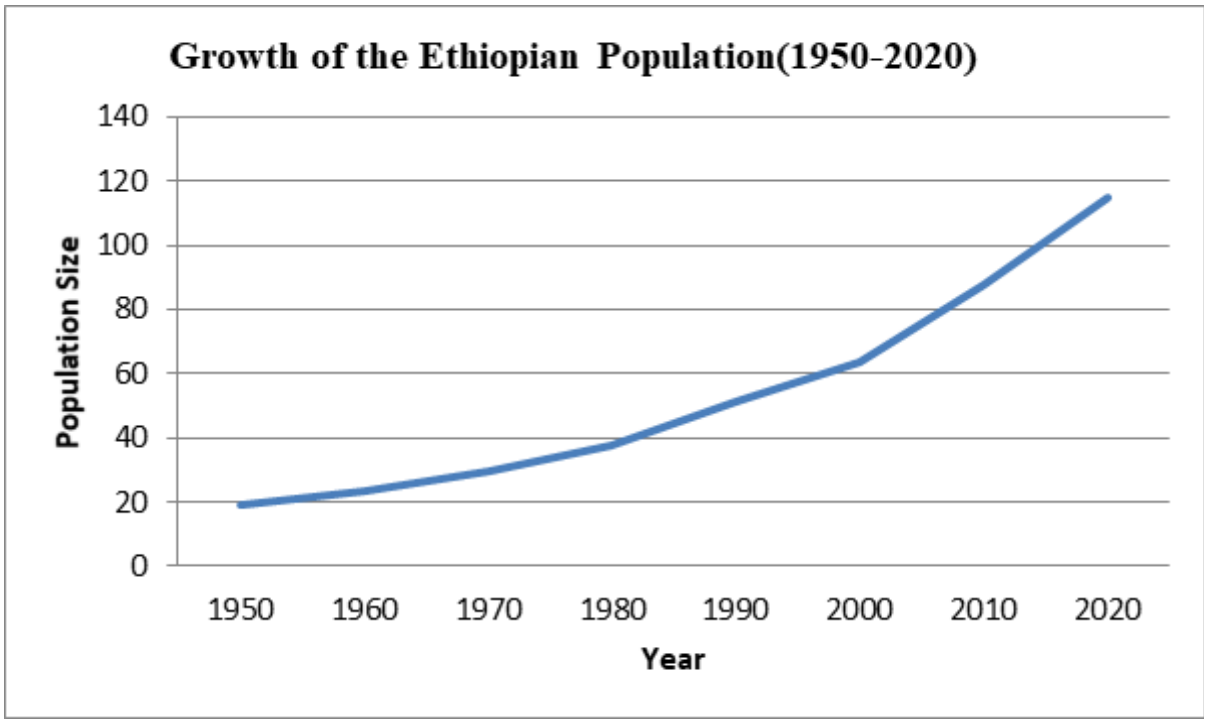

Figure 8.15: Growth of the Ethiopian Population (1950 - 2020)

As we have already indicated, similar line graphs can be used to present a variety of data in relation to time – for example, changes in temperature, employment, and production

Ii Simple Bar Graph

A bar graph is another graphical tool for displaying statistical data. It uses horizontal or vertical bars to show different amounts of the same item or different values for the same phenomenon. The heights or lengths of the bars on a graph are proportional to the quantities they represent. Such a graph might show how amounts or values differ from place to place or as they change over time.

For example, a bar graph can be used to show how rainfall varies from month to month in a certain place. The following bar graph has been prepared based on the data given in Table 8.3. It shows the monthly distribution of rainfall in Kokosa town West Arsi Zone of Ethiopia.

Steps used to draw a simple bar graph:

4. The horizontal scale usually represents the independent variable, more specifically when the time element is significant, such as when graphing mean monthly rainfall or annual production.
5. All bars must start at zero and bar graphs are drawn for the purposes of comparison must be drawn on the same scale.
6. When vertical bars are drawn, the time sequence should be from left to right.
7. The width of the bar is a matter of choice. However, avoid bars that are too thick or

too thin.

8. The value of each bar can be assessed more easily if space or gap is left between each bar.

Compare a single feature as it exists in different places or as it changes over time. For example, they can represent such statistical data as annual rainfall distribution on a monthly basis. The mean monthly distribution of rainfall in Kokosa town can be shown as follows. NB The graph in Figure 8.15 below has been drawn using the data given in Table 4.5.

Table 8.5: Monthly average rainfall of Kokosa town West Arsi, 2011

Months	J	F	M	A	M	J	J	A	S	O	N	D
RF mm	9.1	26	49.8	87.3	206.3	131.7	158.2	184.2	173.1	91.1	96.5	5.4

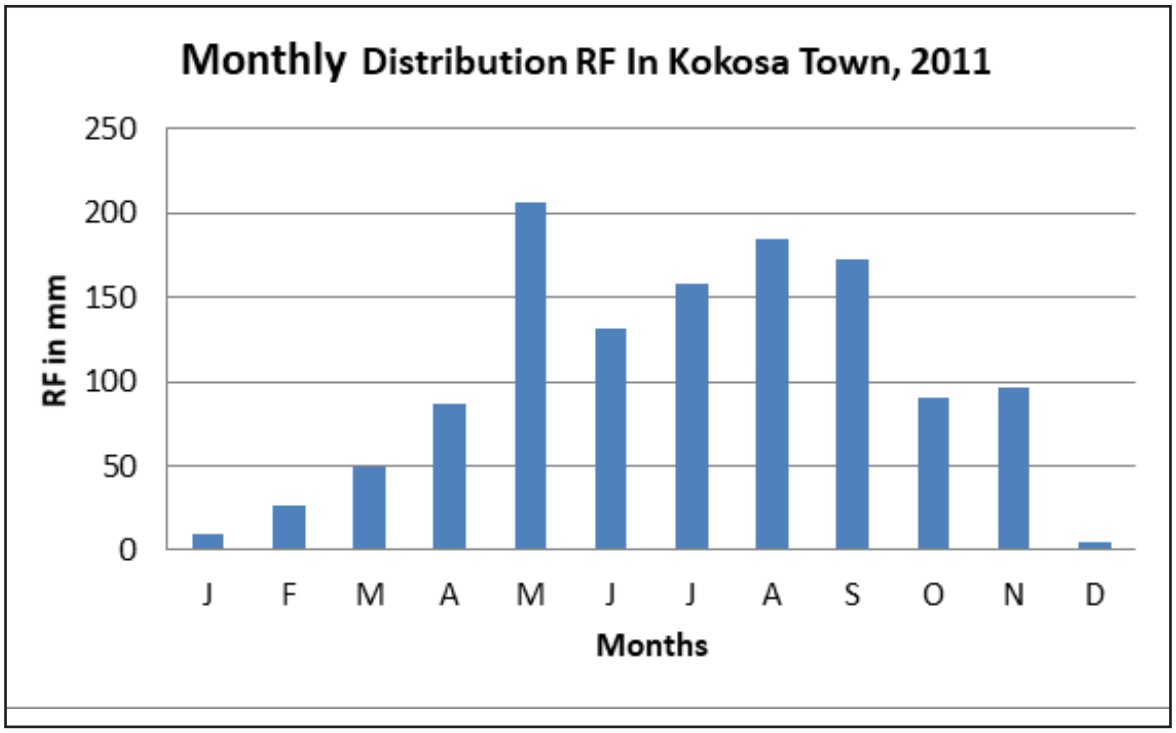

Figure 8.16: Monthly Average Rainfall of Kokosa Town West Arsi

iii. Pie Chart

Pie charts are circle graphs. They use segments of the circle to show the sizes of the items that make up its subject. The segments are shaped like the slices of a pie. The circle of the chart represents the total (100%). The segments represent parts of the whole. The size of each segment is proportional to the size of the part that it represents.

Pie charts are primarily used to

- Show the sizes of parts in relation to a single whole.
- Show the sizes of those parts in relation to each other.

Often, pie charts also emphasize one or more significant elements in the data. Table 4.6 gives the export item destination of the five continents in percent. Then, the same data appears as a pie chart in Figure 4.17.

Pie charts use segments of a circle to show the percentage of export destinations that make up a data series. Steps used to draw a pie chart:

1. The circle can be of any convenient size depending on the available space for drawing.
2. The circle is divided into segments which are proportional to the value of the individual components calculated as a percentage of the total and, 1% of the whole circle is equivalent to 3.6% of the value of an item or data component. Segments can be drawn accordingly with a protractor.

Table 8.6: Ethiopia's Export by destination continents

Destination continents	Africa	Europe	America	Asia	Oceania
Export (%)	18.9	33.6	10.6	36.4	0.6

Source: National Bank (2019/20)

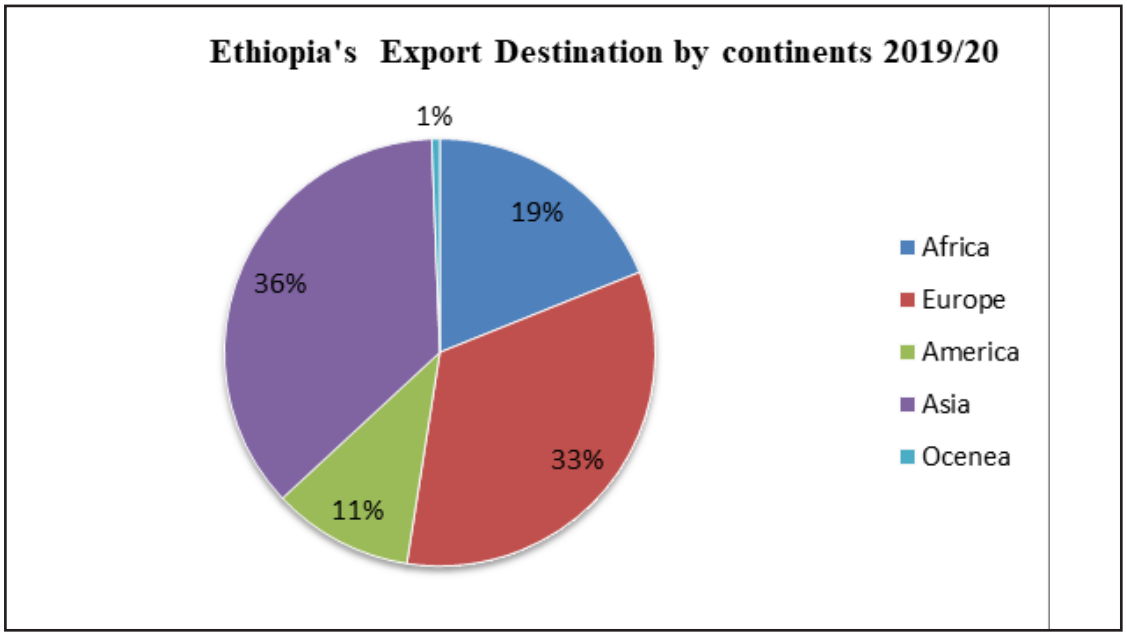

Figure 8.17: Ethiopia's Export Destination by Continents

- Conventional signs and symbols are those signs and symbols that are used on maps through the agreement of all map-makers of the world.
- Statistical diagrams are pictorial representations of numerical information Charts, graphs and diagrams are examples of statistical diagrams.
- Statistical diagrams are particularly important tools for presenting large amounts of statistical data

Resources

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Robinson, A.H. (1995). Elements of Cartography (6th ed). John Wiley& Sons, Inc. New York.

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Singh, G. (1998). Map Work and Practical Geography. 4th Ed., Vikasn Publishing House Pvt. Ltd. Delhi.

Table 8.7: Early Child Mortality Rate in Ethiopia (2000-2016)

Year	NMR	IMR	Under 5 MR
2000	49	97	166
2005	39	77	123
2011	37	59	88
2016	29	48	67

Source: Ethiopia Demographic & Health Survey (2016)

Checklist

Dear learner, here a checklist is provided for you to check your understanding. Put a tick mark (√) against each of the following statements. You are expected to respond under 'YES' or 'NO'

No.	Items	YES	NO
1	Can you explain the main uses of line graphs?		
2	Can you describe the procedures used to draw a pie chart?		
3	Can you construct statistical diagrams using simple line graphs based on the provided data?		
4	Can you construct statistical diagrams using simple bar graphs based on the provided data?		
5	Can you construct statistical diagrams using simple pie charts based on the provided data?		
6	Can you interpret different physical and human landscapes on maps?		

Is there any box that you marked 'No' under it? If there is please go back to your text and read about it before you go to the following exercise.

SELF-TEST EXERCISES FOR SECTION 4

Part I. Choose the correct word or phrase from the given alternatives

1. Which one of the following colours is used on a map to represent water bodies?

   A. Red
   B. Blue
   C. Brown
   D. Yellow

2. The meaning of symbols on a map can be obtained from

   A. Key
   B. Title
   C. Scale
   D. Grids

3. Pictorial representations of numerical information

   A. Sketch Map
   B. Statistical diagrams
   C. Magnetic North
   D. Compass Direction

4. Statistical diagram is used to show the change in one variable over time.

   A. Bar graph
   B. Pie chart
   C. Line graph
   D. All of the above

5. In q bar graph the horizontal scale usually represents

   A. The independent variable
   B. The dependent variable
   C. Title
   D. Legend/Key

Part I. Write True if the statement is correct and False if the statement is incorrect.

1. Statistical diagrams are particularly important tools for presenting large amounts of statistical data.
2. Conventional signs and symbols are used to represent the same detail on a map in all the countries of the world.
3. Bar graphs are drawn for the purposes of comparison and must be drawn on a different scale.
4. Signs and symbols help the map reader to understand maps.
5. In a line graph, the vertical axis represents an independent variable

UNIT SUMMARY

- Map-reading deals with the skill of reading maps. A map is a simplified, diminished, plain representation of the earth's surface
- Map making is the skill of making maps. Thus it includes traditional map making
- and modern map making
- Maps are basically used for identifying locations, distance, area and direction.
- A map scale can be expressed on map in three ways. These are: Scale statement, Representative fraction and Graphic scale
- The scale of a map can be calculated by using a known distance between two points or between parallels or latitudes.
- The area of regular and irregular features can be measured from maps.
- Direction is always measured clock wise starting from north. Direction can be expressed in compass points (N, E, S, W) or in degree (bearings)
- Position of a place can be described from maps by using latitude and longitude and national grid reference.
- The most accurate and international method used for locating places on maps is the geographic grid reference (latitude and longitude).
- Conventional signs and symbols are those signs and symbols that are used on maps through the agreement of all map-makers of the world.
- Line graphs, bar graphs and pie charts can be used to represent statistical data. These simplified and easily understandable formats make it easy to compare places and phenomena

GLOSSARY

Compass -is a device that indicates direction.

Contour - imaginary line on ground, all points of which are at the same elevation above or below a specific datum.

Economic or resource map-is a map shows the different resources present in the area or economic activity prevalent.

Geographic information system (GIS)- is an organized collection of computer hardware, software, and geographic data that is designed to capture, store, update, manipulate, and display geographically referenced information.

Globe - is an object with a spherical shape.

Global positioning system (GPS) - is a system of satellites which orbit the earth on precisely predictable, paths, broadcasting highly accurate time and locational information.

Grid -is a pattern of lines on a chart or map, such as those representing latitude and longitude, which helps determine absolute location.

Latitude - is angular distance of places north and south of the equator.

Longitude- is angular distance east and west wards from the prime Meridian.

Map - is a drawing or plan of the earth's surface or part of it, showing countries, towns, rivers, etc.

Map projection - is any systematic method of transforming the spherical representation of parallels, meridians, and geographic features of the earth's surface to a nonspherical surface, usually a plane.

Pantograph- is a simple instrument used for map reduction and enlargement.

Prime meridian - meridian of longitude 0 degrees, used as the origin for measurements of longitude.

Physical map - is one which shows the physical features of a place or country, like rivers, mountains, forests and lakes.

Political map - is a map that shows the state and national boundaries of a place.

Scale - is the relationship between a linear measurement on a map and the distance it represents on the Earth's surface.

Sketch map - a map which is drawn from observation rather than to exact scale measurements and which shows the main features of an area.

Thematic map - is a map that focuses on a particular theme or special topic.

Topographic Map - is a summary of the landscape and shows important physical (natural and man-made) features in an area.

SELF-ASSESSMENT CORRECTED BY THE STUDENT

Part II. Write short answers to the following questions

1. What is a map?
2. What are the major uses of maps?
3. Describe the two methods of map making
4. What is scale?
5. What are the three major classifications of a map?
6. What are the two types of grid reference?
7. What is a sketch map?
8. What do map-makers use to represent the different physical and human features on maps?

WRITTEN ASSIGNMENT CORRECTED BY THE TUTOR

1. Compare and contrast maps and globes.
2. Convert the following RF to statement of scale
   a) 1:10,000
   b) 1:1,000,000
   c) 1:250,000
   d) 1:500,000
3. Convert the following scale statement to RF
   a) 1cm to 1km
   b) 1cm to 2km
   c) 1cm to 1.5 km
   d) 1cm to 4.5km
4. Identify the four cardinal points.
5. Which points of the compass coincide with 900, 1350, 2250, 2700, and 3150?
6. Draw Bar Graph to represent the following data.

Ethiopia's Sectorial Percentages Shares in GDP (2017-2020)

Sector	Share (%)		
	2017/18	2018/19	2019/20
Agriculture	34.9	33.3	32.7
Industry	27.0	28.1	29.0
Service	39.2	39.8	39.5

Source: National Bank of Ethiopia, 2019/20

7. Draw a pie chart for the following data

Grain Crops Production Ethiopia(%) 2018/19

Crop Category	Cereals	Pulses	Oilseeds	Total
%	87.97	9.54	2.49	100

Source: CSA, 2020

ANSWER FOR UNIT 8 SECTION LEVEL ACTIVITIES

Activity 1

1. Traditional map-making and modern map-making.
2. Modern map-making is characterized by extensive map production and intensive use of more accurate and detailed maps of atlas, globe and charts.
3. Maps are used for identifying locations, distances, areas, and directions.
   - **Location:** *A map shows the exact site of a place as well as the general situation relative to other areas.*
   - **Distance:** *With the help of a map, we can measure the distance between places. This is done by using the scale of the map.*
   - **Area:** *is the size of a certain place, a country, a region, and a continent that can be calculated from a map.*
   - **Direction:** *A map can enable us to identify the direction and bearing of any place on the map.*

Activity 2

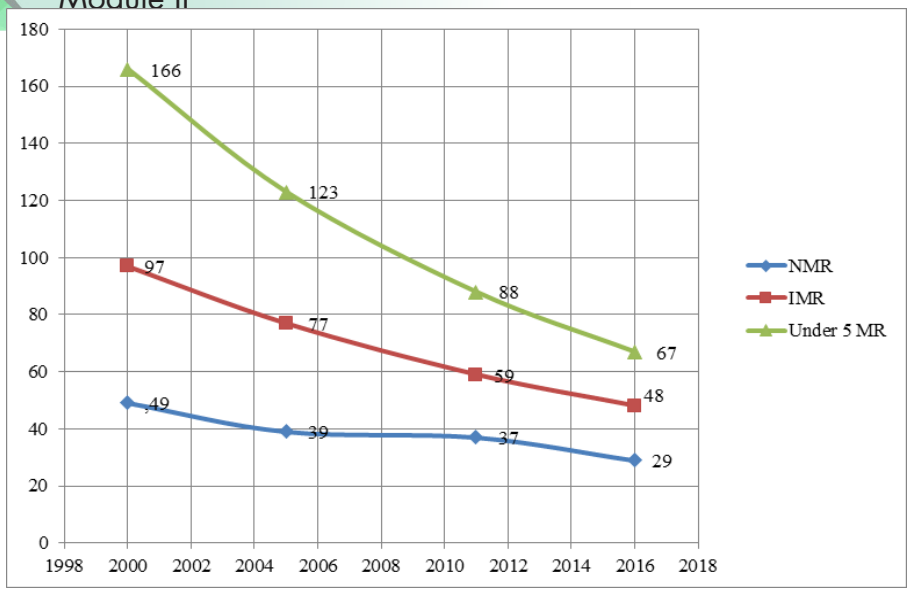
4. The scale of a map indicates the ratio between the measurement of distance on the map and the corresponding measurement on the earth's surface.
5. The area of the irregular-shaped piece of land such as islands, farmlands, parks, etc. cannot be obtained accurately by simple methods as the regular shapes. Such areas can be obtained by devices like planimeter and other methods such as the grid square
   - **Planimeter***: is an instrument used to get accurate areas of both regular and irregular shaped features from maps.*
   - **Grid Square method***: it deals with the area of purely irregular shapes. It is manual and involves tremendous labor.*

Activity 3

1. a) 6520 b) 7822
2. a) 638590 b) 632580 C) 626585

Activity 4

1. By using statistical diagrams, geographers make information easier to present and understand. It is easier to make comparisons, see trends (changes over time) and draw conclusions. Statistical diagrams are particularly important tools for presenting large amounts of statistical data.



Trends in Early Child Mortality rate in Ethiopia (2000-2016)

ANSWER KEY TO SELF-TEST EXERCISES OF UNIT 8

Self-test Exercises section 1

Part I. Answer key for Matching Items

1. F 2. D 3. E 4. B 5. C

Part II. Answer key for short answer questions

1. A map is a simplified, diminished, plane representation of all or parts of the earth's surface as viewed from vertically above.

2. **Traditional Map Making**: The art of traditional map-making is as old as the human race. Traditional maps have been made in many ways. For example, early map materials included sticks, shells, clay tablets, parchment, paper, and solid plates of silver. Many traditional maps were locational. Maps are basically used for finding location, distance, area, and direction

   Modern Map Making: Modern scientific mapping has its roots in the 17th century. Several developments during the Renaissance gave impetus to accurate map-making (cartography). Furthermore, advancements in science and technology resulted in the invention of better cameras and airplanes specially designed to take aerial photographs. Today, map-makers have diverse opportunities to acquire spatial information.

3. The basic Components of a map are the title, scale, direction, grid reference, legend, date, place of publication and publisher, magnetic declination (variation), and compass.

Self-test Exercise section 2

Part I. Answer key for Multiple Choice items

1. B 2. A 3. A 4. B 5. D

Part II. Answer key for short answer questions

1. a) Given RF = 1:50,000
   This implies that 1cm to 50,000cms
   To change 50,000 cm into kilometres, divided it by 100,000
   (Because 1km= 100,000cm)
   Therefore the answer is: $\frac{50,000}{100,000}$ =0.5km = 1cm to 0.5Km

   b) Given RF = 1:250,000
   This implies that 1cm to 250,000cms
   To change 250,000 cm into kilometres, divided it by 100,000
   (Because 1km= 100,000cm)
   Therefore, the answer is: $\frac{250,000}{100,000}$ = 2.5km = 1cm to 2.5Km

   c) Given RF = 1:400,000
   This implies that 1cm to 400,000cms
   To change 400,000 cm into kilometres, divided it by 100,000
   (Because 1km= 100,000cm)
   Therefore the answer is: $\frac{400,000}{100,000}$ = 4km = 1cm to 4Km

2. a) Given 1cm to 100kms
   First change 100kms into centimetres
   1cm to 100 x 100,000 cms
   RF is 1:10,000,000

   b) Given 4cm to 1kms
   First, change 1km into centimetres
   4cm to 1km x 100,000 cms (divide both sides by 4)
   4cm to 100,000cm
   RF is 1:25,000

   c) Given 2.5cm to 2.5kms
   First, change 2.5kms into centimetres
   2.5cm to 2.5km x 100,000 cms
   2.5 cm to 250,000cm (divide both sides by 2.5)
   RF is 1:100,000

Self-test Exercises for section 3

Part I. Answer key for matching items

1. E 2. F 3. A 4. G 5. B 6. C

Part II. Answer key for Fill in the blank items

1. Parallel
2. True North
3. North, East, South and, West
4. Geographic North
5. Magnetic Declination.
6. True north, Magnetic north and Grid north.

Self-test Exercises for section 4

Part I. Answer key for Multiple Choice items

1. B 2. A 3. B 4. C 5. A

Part II. Answer key for True False Items

1. True 2. True 3. False 4. True 5. False

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Geography

Distance Learning Material

Grade 9

Module II

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