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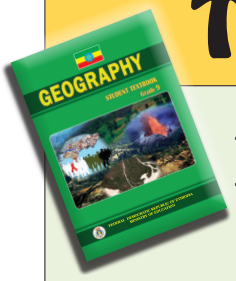
GEOGRAPHY

STUDENT TEXTBOOK
Grade 9



FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA
MINISTRY OF EDUCATION

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GEOGRAPHY

STUDENT TEXTBOOK

GRADE 9

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Contents



Unit 1

Pages

THE CONCEPT OF GEOGRAPHY AND MAP-READING 1

1.1 INTRODUCTION TO THE CONCEPT OF GEOGRAPHY 3

1.2 INTRODUCTION TO THE CONCEPT OF MAP READING 8

⇨ *Unit Summary 38*

⇨ *Review Exercise 39*



Unit 2

PHYSICAL ENVIRONMENT OF THE WORLD AND ETHIOPIA 41

2.1 FORCES THAT CHANGE THE SURFACE OF THE EARTH 42

2.2 WEATHER AND CLIMATE 65

2.3 NATURAL REGIONS OF THE EARTH 91

2.4 ECOSYSTEM 119

2.5 VILLAGIZATION OF THE WORLD THROUGH DISTANCE TIME DECAY... 123

⇨ *Unit Summary 126*

⇨ *Review Exercise 128*

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Unit 3



HUMAN POPULATION AND ECONOMIC ACTIVITIES .. 131

3.1 CONCEPT AND FACTS ABOUT HUMAN POPULATION 132
3.2 ECONOMIC ACTIVITIES 148
3.3 NATURAL RESOURCES 166

⇨ *Unit Summary 174*
⇨ *Review Exercise 176*

Unit 4



PUBLIC AND POLICY RELATED ISSUES IN ETHIOPIA 177

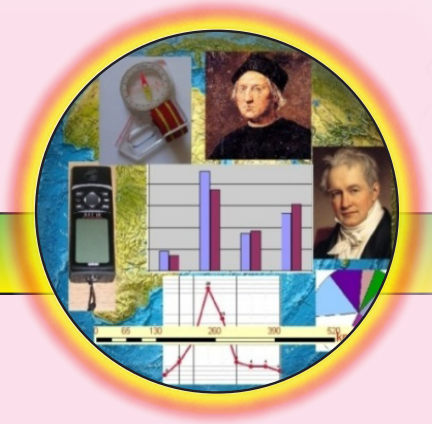
4.1 HIV/AIDS 178
4.2 ENVIRONMENTAL POLICY 184
4.3 ECONOMIC POLICY OF ETHIOPIA 191

⇨ *Unit Summary 196*
⇨ *Review Exercise 197*

Glossary 199

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Unit 1



THE CONCEPT OF GEOGRAPHY AND MAP-READING

Unit Outcomes

After completing this unit, you will be able to:

- recognize the concept, scope and branches of geography
- express the meaning, historical development, uses and types of maps
- compute field distance and areas of irregular shaped figures, construct and interpret statistical diagrams.

Main Contents

1.1 **INTRODUCTION TO THE CONCEPT OF GEOGRAPHY**

1.2 **INTRODUCTION TO THE CONCEPT OF MAP-READING**

- *Unit Summary*
- *Review Exercise*

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INTRODUCTION

In this unit, you will learn about the concept of geography and map reading. The major topics to be covered include the meaning of *geography*, scope of geography, branches of geography, what makes geography a science, meaning of *map*, historical development of maps, uses of maps, classification of maps, magnetic declination, linear and areal scales, how to find the scale of a map, measurement of regular and irregular shaped areas and statistical diagrams.

Geography, as a branch of knowledge, has been defined by different people. The ancient Greeks and Romans defined it as the description of the earth. The Germans in the 18th century defined it as a science that deals with the relationship between people and their environment. In the mid 20th century, it became a spatial science dealing with the arrangement and distribution of things and phenomena over the surface of the earth.

The differences in these definitions reflect the fact that geography had various scopes during its historical development. Initially it was considered as a general earth science; geography has now become a science that examines "place and space" on the Earth's surface in relation to **location**, **distribution**, **arrangement**, **interaction**, **causes** and **effects** of (things and) phenomena. Modern geography is a *spatial temporal-areal* science.

Nowadays, geography has two main branches of study - physical and human.

The most important tools that geographers 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.

Start-up Activity

Examine carefully Figure 1.1 and try to understand their linkage with the subject Geography.

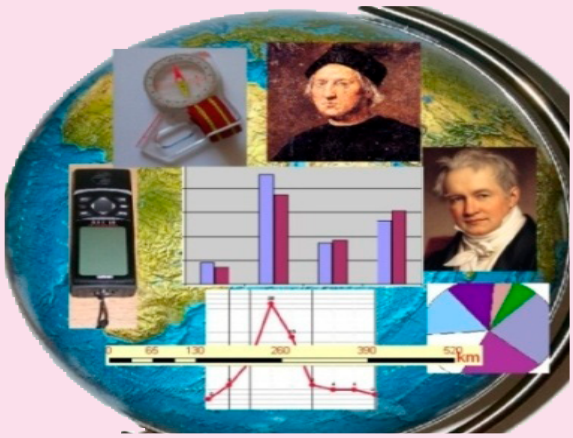


Figure 1.1 **Geographic profiles**

1.1 INTRODUCTION TO THE CONCEPT OF GEOGRAPHY

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

- define the term geography;
- describe the development of geography as a discipline;
- determine the scope of geography;
- identify the branches of geography; and
- identify the characteristics that make the subject of geography a science.

Key Terms

- Spatial
- Geography
- Scope
- Development
- Science

1.1.1 Meaning of Geography

What is geography? Do you think that geography has a single universally accepted definition? Why?

From the ancient Greeks to modern-day geographers, geography has been defined differently. However, the various definitions share some common ideas.

Here are some of the most important definitions that geographers have proposed:

- ***Eratosthenes (276-196 BC)*** *– Geography is the description of the earth.*
- ***Concise Oxford Dictionary (1964)*** *– Geography is the science of the earth's surfaces.*
- ***Hartshorne, R. (1899-1992)*** *– Geography is a branch of knowledge that is concerned with the provision of an accurate, orderly and rational description of distributions on the surface of the earth.*
- ***Yeates, M. (1968)*** *– Geography is a science that is concerned with the rational development and testing of theories that explain and predict the spatial distribution and locations of (things and) phenomena on the surface of the earth.*

As you can see, each of these definitions includes the idea that *geography studies the earth*. Most of them specify the *surface of the earth*.

At this level, we will define geography as a *branch of science that studies the earth's surface and the distribution, arrangement and interaction of natural and human features and their causes and effects.*

1.1.2 The Scope of Geography

What is scope? How wide is geography's scope?

- *Scope means the range and variety of contents which are included in a subject or field of study. Geography's scope is very wide. As the scope is dynamic, it changes often as new discoveries and ideas enter the field.*
- *Geography studies a great many physical and human features of the world. Its focus includes their causes, effects, and interactions. As indicated above, the subjects that geography examines include features in the hydrosphere, atmosphere, lithosphere and biosphere.*

Note

The earth's surface consists of:

- hydrosphere – It includes all the bodies of water, i.e., oceans, rivers, lakes and others.
- biosphere – This refers to all living organisms in and on the earth's surface.
- atmosphere – It includes all aspects of air composition surrounding our planet.
- lithosphere – It is the solid layer of rocks which covers the entire surface of the planet.

Geography has undergone profound changes in its scope and focus:

- *In ancient times, geography was considered to be the mother of many other sciences, including philosophy and the earth sciences.*
- *In the 16th century, geography began to emphasize location, focusing on questions of where, why and what.*
- *In the mid 18th century, European geographers, especially Germans, considered the relationship between geography with philosophy. This approach caused geography to focus on the relationship between human and the natural environment. Alexander Von Humboldt and Carl Ritter were among the major contributors to this approach.*
- *In the 19th century, geographical societies and research groups formed. They enhanced the role of geography as a discipline.*
- *In the late 20th century, geography became a spatial science.*

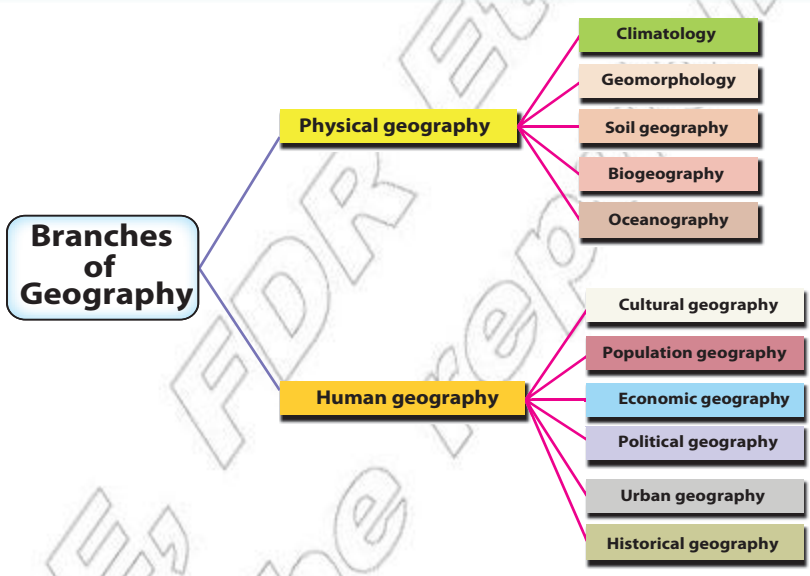
1.1.3 Branches of Geography

What are the two branches of geography? Can you list some of the fields of geography that fall into each of the two branches?

You have studied the definition of geography, and you have considered its scope. Next you will learn about the main parts of geography – its *branches.*

They are:

- ***Physical geography***
- ***Human geography***



What does physical geography study?

i **Physical Geography:** This branch of geography studies the distribution of the natural features of the world, such as climate, landforms, soil, vegetation, and drainage systems. Physical geography also considers causes, effects and interactions of these features.

Physical geography includes the following specialized fields of study:

- ***Climatology:*** *studies factors that create climate and examines the variation and distribution of climate and related causes and effects.*
- ***Geomorphology:*** *studies the distribution of landforms (such as mountains and plains) and the forces that change them.*
- ***Soil geography:*** *studies the distribution of soils and their characteristics.*

- ***Biogeography:*** *studies the distribution of plants and animals in relation to the environments that they inhabit.*
- ***Oceanography:*** *studies the location, causes and effects of ocean currents, waves and tides.*

What does human geography study? Do you know the sub-branches of human geography?

ii **Human Geography:** This branch of geography studies the distribution and influence of human aspects of our world, including cultures, population settlement, economic activities and political systems.

Human geography includes these specialized fields of study:

- ***Cultural geography:*** *studies the distribution and interactions of cultures, including peoples' beliefs and customs. It also examines the movement, expansion and interaction of cultures on the surface of the earth.*
- ***Population geography:*** *studies the distribution, growth and structure of population.*
- **Economic geography:** *studies production, consumption and exchange and the spatial distribution of goods and services and factors affecting them.*
- ***Political geography:*** *studies the distribution of political systems and the ways people use them to exercise power and make decisions.*
- ***Urban geography:*** *studies the development and characteristics of towns, cities and other urban centers.*
- ***Historical geography:*** *is the study of the geography of the past and how places or regions change over time.*

Activity 1.1



Discuss the following in small groups.

1 Geography studies the distribution and influence of human aspects of our world including cultures, population, economic activities and political systems. Do you agree or disagree with this statement? Why?

2 Some people say geography is concerned only with the study of place names. DO you agree or disagree to such idea? Why?

3 Some people say geography has a limited scope. Do you agree or disagree with such idea? Why?

1.1.4 Geography as a Science

What is science? What makes geography a science?

Science is a system of acquiring knowledge through scientific methods. These methods involve observation, identification, description, experimental investigation, and theoretical explanation of phenomena.

Geography investigates facts and relationships related to physical and social phenomena, and examines their distribution across the world and changes over time.

The main tools geography uses to gather and analyze information are observation, systematic description, systematic recording and mapping. As you can see from its subject matter and methodologies, geography is a subject that bridges the natural and social sciences.



Activity 1.2

In pairs, discuss the following questions:

1 Do you appreciate learning geography? Why?

2 Is geography a science? Why?

3 What are the areas of the study of geography?

4 Write a short report on the relationships between geography and natural and social science.

Exercise 1.1

I ***Determine which of the sentences is True or False.***

1 Geography studies physical and human features of the world.

2 Cultural geography studies the distribution of population and factors that affect their distribution.

3 Human geography deals with human-made features on the earth's surface, such as settlements, economic activities and conservation measures.

4 The *scope of geography* means the extent of geography as a field of study.

II *Choose the correct answer.*

5 The branch of geography that studies landforms and the forces that shape them is known as:

A Biogeography
B Oceanography
C Geomorphology
D Soil geography

6 It is the solid layer of rocks which covers the entire surface of the planet.

A Hydrosphere
B Atmosphere
C Biosphere
D Lithosphere

7 One of the following is not a branch of human geography

A Political geography
B Urban geography
C Biogeography
D Historical geography

8 It is a branch of human geography that studies the distribution, growth and structure of population.

A Cultural geography
B Historical geography
C Political geography
D None of the above

9 One of the following is a branch of physical geography:

A Climatology
B Soil geography
C Oceanography
D All are correct

III *Give short answers to the following questions.*

10 What are the two major branches of geography?

11 What is the serious concern of geographical study?

12 Which branch of geography studies the distribution of plants and animals in relation to the environments that they inhabit?

13 What does political geography study?

14 What does physical geography study?

1.2 INTRODUCTION TO THE CONCEPT OF MAP-READING

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

- explain the meaning of a map;
- appreciate the historical development of maps;
- state the basic uses of maps;

- categorise maps based on scales and purposes;
- distinguish the conventional signs and symbols used to represent different features on maps;
- identify some of the marginal information given on maps;
- convert linear scale to areal scale;
- calculate the scale of a map;
- calculate the areas of regular and irregular shaped figures by referring to the scale of a map;
- construct statistical diagrams using simple line graphs, bar graphs and pie charts based on the provided data.

Key Terms

- Latitude
- International Grid Reference (IGR)
- National Grid Reference (NGR)
- Magnetic declination
- Remote sensing
- Global Positioning System (GPS)
- Geographical Information System (GIS)
- Longitude

Start-up Activity

What is the actual distance between points X and Y?

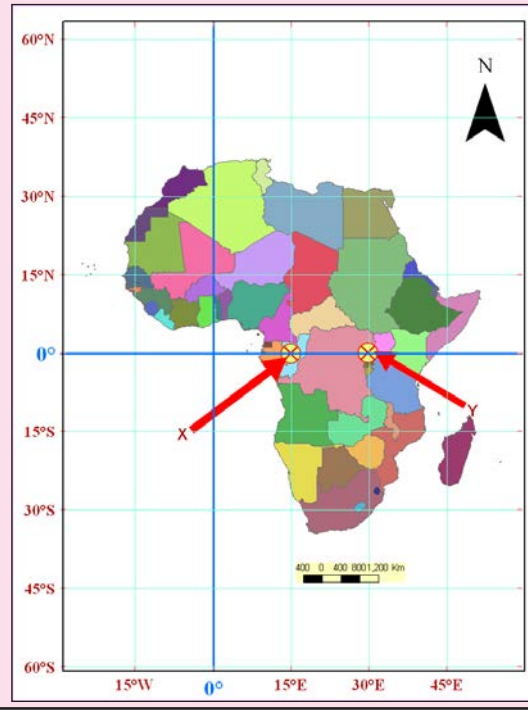


Figure 1.2 **Map of Africa**

1.2.1 Meaning of Map

What is a map? Do you remember what you have learned in previous grades about map?

Here is a simple definition:

> *A map is a simplified, diminished, plain representation of all or part of the earth's surface as viewed from vertically above.*

Here are 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.*

  For example, if one mountain's diameter is twice as large as that of another mountain, the first mountain would be shown on a map as twice as large as the second.
- *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.*

Activity 1.3



Discuss the following question and perform the following tasks in your group.

1. What does this mean: "A map is a two-dimensional plane representation"?
2. Compare and contrast maps and globes.
3. Prepare sketch map of your locality and show on the map the settlement pattern in the locality.

1.2.2 Historical Development of Maps

Describe the historical development of maps. How do traditional and modern map-making differ from each other?

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:

- *Traditional map-making*
- *Modern map-making*

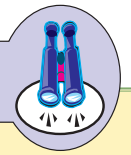
A *Traditional map-making*

What are the major features of traditional map-making? How did people represent the environment on maps in the past?

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 have included paths that led to these places.

Focus



In traditional map-making, collecting measurements of distances, directions, areas and locations was one of the greatest challenges. Each measurement was be made by hand, through field work 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,

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a traditional map might be somewhat pictographic (or physiographic) rather than strictly diagrammatic. Most traditional maps are sketch maps. For example, look at this ancient world map that Eratosthenes drew.





Eratosthenes (276 BC-194 BC)

Eratosthenes was a Greek mathematician, geographer and astronomer.

In 200 BC, Erastosthenes adopted a word geography, which means a description of the earth.

Figure 1.3 **Eratosthenes' map**

B *Modern map-making*

When did modern map-making start? What features characterize modern map-making? What is the role of GIS in modern map-making?

The modern science of map-making has its basis in the 17th century. The various developments that took place during the Renaissance gave way 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, computers have come to be "close friends" of map-makers. This is because they have become in valuable in making maps. In the last three decades of the 20th century computers have been seen as integral part at almost every stage of the cartographic process. They play roles in the collection, storage, analysis, and presentation of data, and even in the mapping and reproduction of maps. This makes the Geographic Information System (GIS) indispensable to modern map-making.

A GIS needs a geographic database of, for example, a digital record of geographic information. The first step in developing a GIS is to create the geographic database from such sources as maps, field surveys, aerial photographs, satellite imagery, and so forth.

Generally, modern map-making is fast and uses modern ways and means of collecting information, such as specially designed airplanes, remote sensors and the Global Positioning System (GPS).



Activity 1.4

In a small group, discuss the following questions.

1 What are the major characteristics of modern map-making?

2 What are the components of GIS?

1.2.3 Uses of Maps

Why are maps very important in geography? What are the major uses of maps?

As you know, the map is geography's most important tool. It is also one of the most flexible tools in terms of the information it presents and the uses we can make of it. For example, it can present very simple information or highly detailed results from a complicated geographical investigation. Maps are basically used for identifying locations, distance, area and direction.

Location: With the help of a map it is possible to locate a place in reference to another place. 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. For example, the absolute location of Ethiopia is 3°N-15°N latitude and 33°E-48°E longitude.

Distance: It is possible to calculate the distance between two or more places on a map. This is done by using the scale of the map. For example, the air distance between Bahir Dar and Addis Ababa can be calculated by using a map of Ethiopia.

Area: The area of a place, a country, a region, a continent, a sub-continent or the whole world 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. For example, a map of Ethiopia can help us to find the direction and bearing of Mekele by referring to Addis Ababa.

In addition to these, maps can be used to:

- ***Show the distribution of physical and human phenomena on the earth's surface:*** *distribution maps show the locations of phenomena on the earth's surface. For example, we use distribution maps for Ethiopia to show the presence of human and animal populations, minerals, and vegetation. Similarly, we use distribution maps to show patterns of settlement, temperature, and health conditions.*
- ***Show surface configuration:*** *topographic maps give information about variations in height on the earth's surface. For example, they show heights and depths of valleys, plains and mountains.*
- ***Offer visual comparisons:*** *because the earth's surface is vast, it is difficult to compare places by direct observation. For example, it would be difficult to compare the distribution of landforms in Ethiopia and Kenya, even from an airplane. However, by offering us relatively small but accurate representations of the two countries, maps solve this problem completely.*
- ***Support development planning:*** *Maps can provide planners with vital information to plan for the future. For example, maps can show current conditions and ongoing trends, and they can help us predict a nation's socioeconomic conditions. Such information is invaluable to the country's planners as they analyze possibilities and livelihoods and then prepare for the future.*



Activity 1.5

Look at the map in Figure 1.2 and perform the following tasks and answer the following question.

1 Write down the relative location of Ethiopia.

2 Which neighbouring country is located south of Ethiopia?

1.2.4 Classification of Maps

How many types of maps do you know? Do you think that all maps are one and the same? Why?

Although most maps have similar characteristics, they can differ from one another in many ways.

This topic teaches you how to classify maps in terms of the following features:

- ***Focus and level of detail (purpose)*** *– the amount of information they present about their subjects, especially their ability to show small details.*
- ***Scale*** *– the size of the area for which they give information and, therefore, the scope of the information that they give about these areas.*

Classification Based on Purpose:

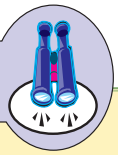
Maps can be classified as *general-purpose* or *specific-purpose*.

General-Purpose Maps

What are general-purpose maps? What are they used for? List uses of topographic maps.

A general-purpose map is a map that shows the features of a place in a relatively general way. It provides a wide range of information about the place it represents. General-purpose maps are not topical. Instead, they tend to contain a little of many kinds of information at a relatively low level of detail. Topographic information of each kind in lesser detail. A topographic map is a good example of this. It can illustrate both physical and human-made features of the earth.

Focus



General-purpose maps are prepared to provide a wide range of information about different features of an area. They contain a little information of each kind about the area they represent. Their ability to provide different information is their advantage, whereas their weakness is to show limited detailed information.

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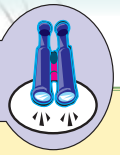
Specific–Purpose Maps

What kind of map is a specific-purpose map? How does it differ from a general-purpose map?

Specific-purpose maps are often called thematic maps or topical maps. We use these terms because specific-purpose maps emphasize on a single topic. These maps show detailed information about their subjects. Thematic maps can show almost any kind of information that varies from place to place, such as population distribution, rainfall and temperature patterns, and the distribution of types of soil or vegetation.

- *Soil maps*
- *Vegetation maps*
- *Climate maps*

Focus



Specific-purpose maps are thematic/topical maps. They usually show a high level of detail and have a deep focus on their subjects. Many specific-purpose maps are created for specialists in particular subjects.

Classification by Scale

Scale is a ratio that shows the degree to which the area that is mapped has been reduced. Based on scale differences, maps can be classified into:

- *Large-scale maps*
- *Medium-scale maps*
- *Small-scale maps*

Let us now consider each of these types of map in more detail.

Large-Scale Maps ≥ 1:50,000

What are large scale maps?

Large-scale maps present small areas in detail with great accuracy.

Large-scales are greater than or equal to 1:50,000. A large-scale map, such as the map of Addis Ababa, shows the city in considerable detail.

Large scale maps present a relatively small area and show its features in considerable detail. For example, at a scale of 1:5,000, a map of a city can include many features – such as buildings. The map can also include many details, such as the bends in highways.

Medium-Scale Maps 1:50,000 - 1:250,000

What are medium-scale maps?

These are maps that 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.

Small-Scale Maps ≤ 1:250,000

What are small-scale maps?

Small-scale maps are those which are prepared with scales less than or equal to 1:250,000. These small–scale maps cover wider areas than large and medium scale maps.

Focus

Large-Scale maps

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

Small-Scale Maps

- *Scale:* ≤ 1:250,000
- Cover large areas
- Contain less-detailed information

Medium-Scale Maps

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

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Activity 1.6

In pairs, discuss the following questions.

1 Do you know how a map-maker can reduce the size of ground objects while making maps?

2 Compare and contrast large and small scale map?

3 Compare the scale of 1 : 25,000 with 1 : 250,000. Which one is a smaller scale? Why?

1.2.5 Marginal Information of Maps

What is a map's margin? What are the most common types of information that are found in the margin of a map?

Maps are used to convey information. To read maps effectively, map users need information about the map. Such information is presented in the map's margins and is known as *marginal information*.

Marginal information includes:

- ***Title of the map:*** *Gives the map's name. For example, "Soil Map" explains that the map presents information about soil.*
- ***Year of publication:*** *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 map's contents are current or might be out of date.*
- ***Author:*** *identifies the copyright owner of the map and indicates who (or what organization) has prepared the map.*
- ***Place of publication and publisher:*** *tells where the map was published and identifies the organization that published the map.*
- ***Scale:*** *This information indicates the extent to which the area that is represented in the map has been reduced.*
- ***Legend/Key:*** *explains the meaning of the signs and symbols used in the map.*
- ***Type of projection:*** *tells the kind of projection used in making the map.*
- ***Direction or orientation (North) arrow:*** *Shows the north direction on the map.*
- ***The magnetic declination (variation):*** *is the difference between Magnetic North and True North. This will be explained later in this unit.*

Conventional Signs and Symbols

How do maps show different features of the earth? What do map-makers use to represent the different physical and human features on maps?

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.*

Table 1.1: **Conventional signs and symbols**

Symbol	Description
	All-weather road
	Bridge
	Permanent lake
	Plantation
	Mine

Map Scale

What is map scale? Why do we need map scales?

The scale of a map is the ratio between the measurement of distance on the map and the corresponding measurement on the earth's surface.

For instance, the ratio of the map distance between two cities on a map and the actual distance between the two corresponding cities on the earth is the scale to which that map is drawn.

Grid References

What is a grid reference? Why is it important? What is the difference between a geographic grid and a national grid reference?

A map grid is a set of imaginary lines that divides the earth's surface into regular grids.

There are two major map grid systems:

- International (Geographic) Grid System
- National Grid System

The **International (Geographic) Grid System** shows the absolute locations of places on the surface of the earth.

Its *references* are made up of:

- ***parallels or lines of latitude*** – *define locations north and south of the equator. They are horizontal lines of the grid.*
- ***meridians or lines of longitude*** – *define locations east and west of an imaginary north-south map line called the Prime Meridian. They are vertical lines of the grid.*

Latitude: When looking at a map, latitude lines run horizontally. Lines of latitude are also known as parallels since they are parallel and are an equal distant from each other. Each degree of latitude is approximately 111 km apart. Degrees of latitude are numbered from 0° to 90° north and south. Zero degree is the equator, the imaginary line which divides our planet into the northern and southern hemispheres. 90° north is the North Pole and 90° south is the South Pole.

Longitude: The vertical lines of longitude are also known as *meridians*. They converge at the poles and are widest at the equator (about 111 km apart). Zero degrees longitude is located at Greenwich (0°). The degrees continue 180° east and 180° west where they meet and form the International Date Line in the Pacific Ocean.

Parallels and meridians are imaginary lines. Latitudes are angular distances measured to the north and south of the equator in degrees, minutes and seconds. Longitudes are also angular distances, but they are measured to the east and west of the Greenwich meridian.

Try to explore how lines of latitudes and longitudes create a grid network on the following map.

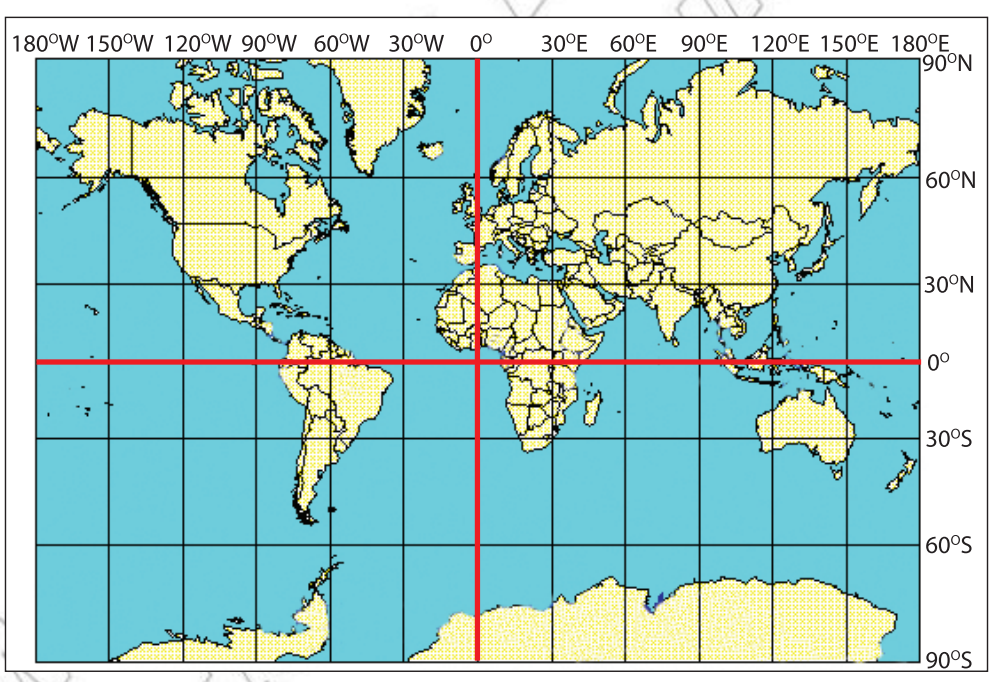


Figure 1.4 **The Geographic Grid System**

The National Grid Systems: is used on maps of individual countries and regions within them. Its references differ from those of the International (Geographic) Grid System.

The National Grid System uses *eastings* and *northings*. Eastings are lines that are drawn from north to south. Northings are lines that are drawn from east to west.

Eastings and northings in the National Grid System originate from the "False Grid Origin" that lies at the southwestern corner of the place they cover. While the values of eastings increase eastwards, the values of northings increase northwards. Eastings and northings are measured in kilometres.

In Ethiopia, there are two ways of giving national grid reference. They are *four-digit and six-digit grid reference.* Eastings are always given before northings.

For example, the six-digit grid reference of letter A is 490970.

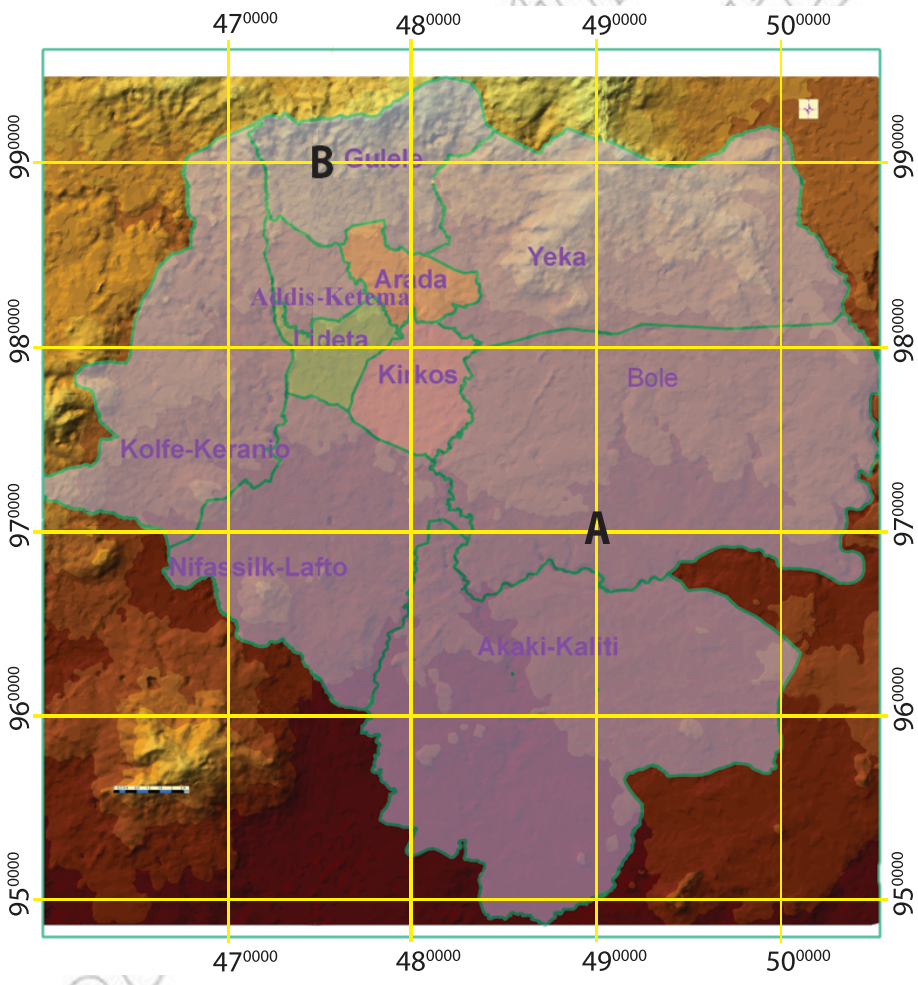


Figure 1.5 **Map of Addis Ababa**

Magnetic Declination

What is magnetic declination? What is magnetic north? What about true north?

The earth has north and south geographic poles at the northern and southern convergence points of the meridians. It also has north and south magnetic poles.

Magnetic compasses that are used in navigation point towards the north magnetic pole, rather than the geographic North Pole.

Magnetic *declination* is the difference between magnetic north and true north. It is the angle between magnetic north and true north from a particular point on the earth's surface.

The position of the north magnetic pole moves over time. Therefore, the declination factor must be updated from time to time. However, a relatively new navigation device, the *gyrocompass*, is adjusted so that it points to the geographic North Pole directly that it does not need this compensating factor.

The amount, direction, and annual change of the variation for most localities on the surface of the earth has been determined, and this data is recorded.

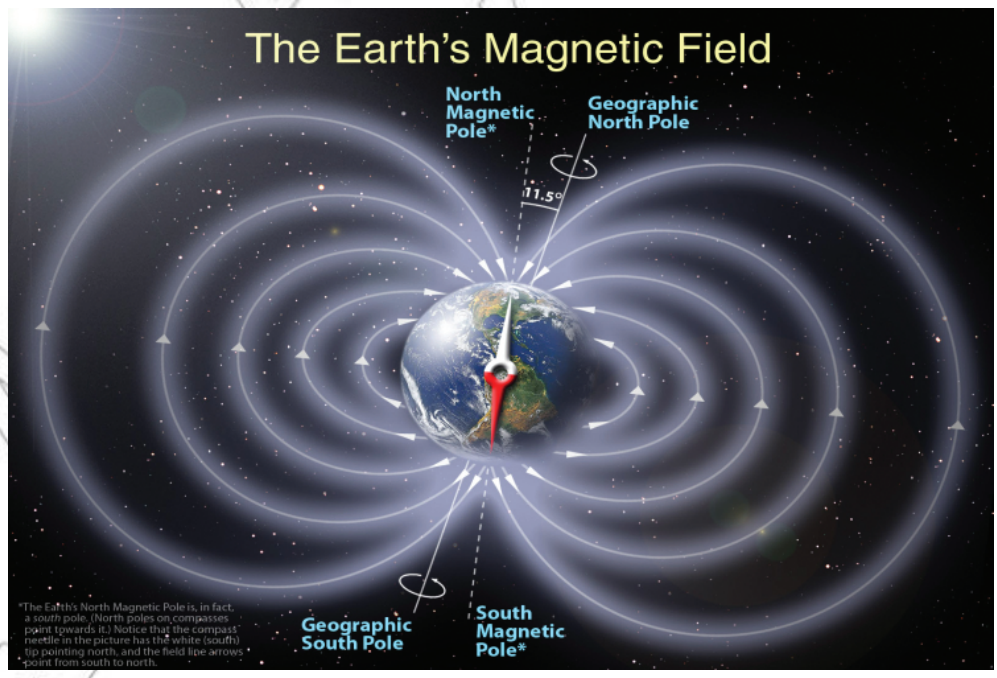


Figure 1.6 **Magnetic Declination**



Activity 1.7

Perform the following tasks in your group.

1 Find a political map of Ethiopia and discuss the marginal information in the class.

2 Sketch a map of your school compound. Use a scale and symbols.

1.2.6 The Relationship Between Linear and Areal Scale

What is linear scale? What about areal scale? Is it possible to convert one into the other? How?

- ⇨ *Map scale can be linear or areal.*
- ⇨ *Linear scale expresses the ratio of map distance to ground distance. It is the most common scale type.*
- ⇨ *Areal scale shows the relationship between map area and ground area.*

Areal scale is the square of linear scale. For example, if a map has a linear scale of 1 cm to 6 km, then the areal scale of the map is $(1\text{ cm})^2$ to $(6\text{ km})^2$, which means 1 cm^2 to 36 km^2.

$$\text{Areal Scale} = (\text{Linear Scale})^2 = \left(\frac{\text{Distance on the map}}{\text{Distance on the Ground}}\right)^2$$

To calculate linear scale from areal scale, you put the areal scale into a square root. For instance, if the areal scale of a map is 1 cm^2 to 36 km^2, then the linear scale of the map is the square root of the given areal scale, as shown below.

$$\text{Linear Scale} = \sqrt{\text{Areal scale}} = \sqrt{\frac{\text{Map Area}}{\text{Ground Area}}}$$

$$= \sqrt{\frac{1\text{ cm}^2}{36\text{ km}^2}} = 1\text{ cm to }6\text{ km}$$

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Focus

Areal scale is the square of linear scale. On the other hand, linear scale is the square root of areal scale. Therefore, if a certain linear scale is doubled, then its areal scale equivalent would be four times larger than its original scale.

Activity 1.8



Perform the following tasks.

1 Find the areal scale for the following:

a 1 cm to 2 km
b 1 : 100,000
c 5 cm to 25 km
d 3 cm to 9 km

2 Find the linear scale for the following:

a 4 cm^2 to 400 km^2
b 4 cm^2 to 16 km^2
c 5 cm^2 to 500 m^2
d 1 cm^2 to 4 km^2

1.2.7 How to Find the Scale of a Map

Is it possible to calculate the scale of a map when it is not given? How?

In principle, every map should show the scale to which it has been drawn. If the scale is not shown, we can calculate it.

There are two ways of finding a map scale, if it is not given:

A *By using the known distance between two points on the map*

This method is used if the ground distance between two points or places shown on the map is given. Then use the following procedure to obtain the scale:

i Measure the distance between the two points on the map in centimeters.

ii Divide the obtained distance on the map by the ground distance to obtain the ratio between the two. This gives you the scale of the map.

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To understand this better see the following example.

Let us say, if the straight-line distance between Addis Ababa and Mekele is 555 km. Using Figure 1.7, calculate the scale of the map:

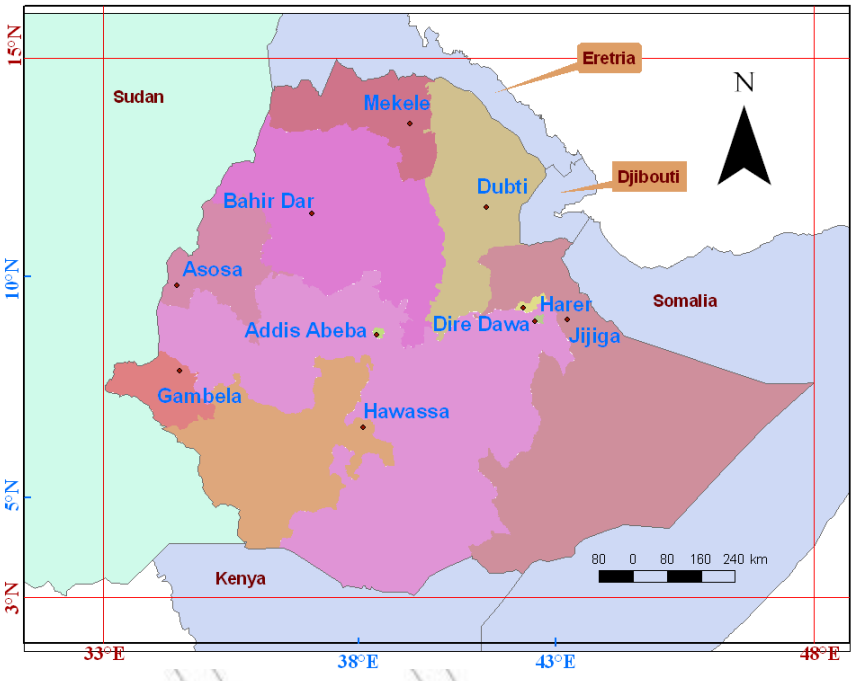


Figure 1.7 **Map of Ethiopia**

➲ Using the distance between Addis Ababa and Mekele:

i Measure the distance between Addis Ababa and Mekele by using a ruler approximately 3 cm.

The given air distance between the two places is 555 km.

ii Find the ratio between the distance on map and the actual distance. This is the scale.

$$\text{Scale} = \frac{\text{Distance measured on the map}}{\text{Ground distance}}$$

3 cm to 555 km = 1 cm to 185 km = 1 : 18,500,000.

B *By using latitudes*

In this method, the scale of the map can be obtained by using the values of latitudes.

For example, let us calculate the scale of Figure 1.7 by using the 5° and 10° N latitude lines:

1 The degree difference between the two latitudes is 5° (10° – 5°).

2 The distance that 5° represents is 555 km (111 km × 5).

3 The distance between the two latitudes on the map is approximately 3 cm.

4 The scale of the map is, therefore:

$$\text{Scale} = \frac{\text{Distance on the Map}}{\text{Ground Distance}} = \frac{3\,\text{cm}}{555\,\text{km}} = 1\text{ cm to }185\text{ km}$$

1: 18,500,000

Focus

1° latitude is about 111 km

This relationship is derived from the circumference of the earth – 40,000 km.

If 360° = 40,000 km

1° = ?

$$= \frac{1^\circ \times 40{,}000\,\text{kms}}{360^\circ} = 111\text{ km}$$

Activity 1.9

Answer the following questions in your group.

1 The ground distance between two places is 100 km. If this distance is represented by 5 cm on a map, what is the scale of the map?

2 If two places on the ground that are located 5° north and 10° north are shown 10 cm apart on a given map, what is the scale of the map?

1.2.8 The Measurement of Regular and Irregular Shaped Areas

Do you think that we can tell how large an area is from a map? If so, how can we measure it?

Some areas have regular or geometric shapes, such as rectangles, triangles, circles and squares. Others have irregular or non-geometric shapes.

This procedure is important for measuring areas on maps:

1. Measure the area of the feature on the map;
2. If the map scale is linear, convert it to areal;
3. Using the areal scale, convert the area on the map to actual ground area by using cross multiplication.

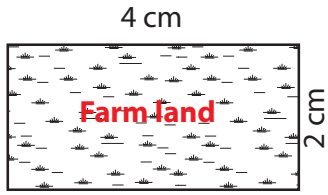
Measuring Regular-Shaped Areas

A *regular shape* is a geometrical shape such as a circle, triangle or square. If you are measuring an area with a regular shape, use the mathematical formula for its geometric shape. Then calculate the ground area by using the map's areal scale. The following table gives you some of geometric formulae for calculating the areas of regular shapes.

Table 1.2: **Geometrical 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	$A = \pi r^2$; where A = area, and r = radius. ($\pi = 3.14$)

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Scale = 1 cm to 2 km

Figure 1.8 **A sketch map of a farm**

What is the ground area of the farmland?

In the above sketch, the farm has a regular shape.

- *Measure the length and width of the rectangle on the map. Obtain its area on the map by multiplying the length by the width (area of rectangle = l × w). This gives you the area of the farm on the map.*
- *Change the linear scale, which is 1 cm to 2 km, into areal scale by squaring it. This gives you the areal scale :1 cm^2 to 4 km^2.*
- *Convert the map area into ground area by using cross multiplication. In other words, if 1 cm^2 is to 4 km^2, then what will 8 cm^2 be? This gives you the ground area of the farm 32 km^2.*

Without changing the given linear scale into areal scale, it is possible to calculate the area.

$$L = \frac{2\,cm \times 2\,km}{1\,cm} = 4\,km \text{ and } W = \frac{4\,cm \times 2\,km}{1\,cm} = 8\,km$$

Area = L × W

Area = 4 km × 8 km

= 32 km^2

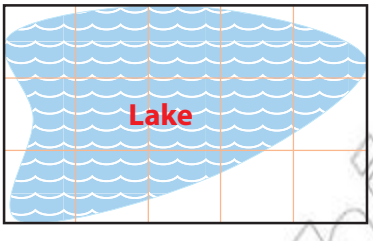
Therefore, the area of the farm land is 32 km^2.

Measuring Irregular-Shaped Areas

If the feature to be measured has an irregular shape, its area cannot be directly calculated by using mathematical formulae. For example, the lake in Figure 1.9 has an irregular shape. In such cases, we can use the grid square method to measure the area of the lake on the map.

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To better understand this, let us see how the area of the lake is measured. (See Figure 1.9)



Scale = 1 cm to 2 km

Figure 1.9 **A sketch map of a lake**

In order to find the area of the lake, we follow the following steps:

1 Copy the boundary of the lake.

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

3 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*

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

4 *Calculate the approximate area of the lake.*

a First, find the area of one square by using the scale.

area = S^2 = 1 cm × 1 cm = 1 cm^2 or 2 km × 2 km = 4 km^2

b Then, calculate the total area of the lake.

If one square = 4 km^2

10 square = ?

The approximate area of the lake is 40 km square.

Activity 1.10



Answer the following questions in your group.

1 The base and height of a right angle triangle are 3 cm and 6 cm, respectively. The scale is 1 cm to 2 km. What is the ground area of the right angle triangle?

2 The radius of a circle is 4 cm. The scale is 1 cm to 5 km. What is the ground area of the circle.

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1.2.9 Statistical Diagrams

What is "statistics"? What are statistical diagrams?

Statistics is a branch of mathematics that deals with the collection, organization, and analysis of numerical data. "Statistics" also refers to a collection of numerical information about a particular feature. Information such as the amount of crop that is produced, the growth rate of population, or the number of unemployed people in an area are all *statistical* figures because they present situations in terms of numbers.

In geography, such statistical figures are presented by using statistical 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:

- Simple line graphs
- Simple bar graphs
- Pie charts

Simple Line Graph

What is a 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 1.10, illustrates the data presented in Table 1.3. It shows the changes in population size of Africa from 1750 to 2050.

The graph can also help you to compare periods of actual and projected population growth on the African continent.

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 to represent dependent variable, such as temperature and other qualities or values.

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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 Use small crosses or dots to mark values, when plotting the graph.

Table 1.3: **Growth of the African Population (1750-2050)**

Year	1750	1800	1850	1900	1950	2000	2050
Population (x millions)	106	107	111	133	228	797	1,846

Source: *Microsoft Encarta (2008)*

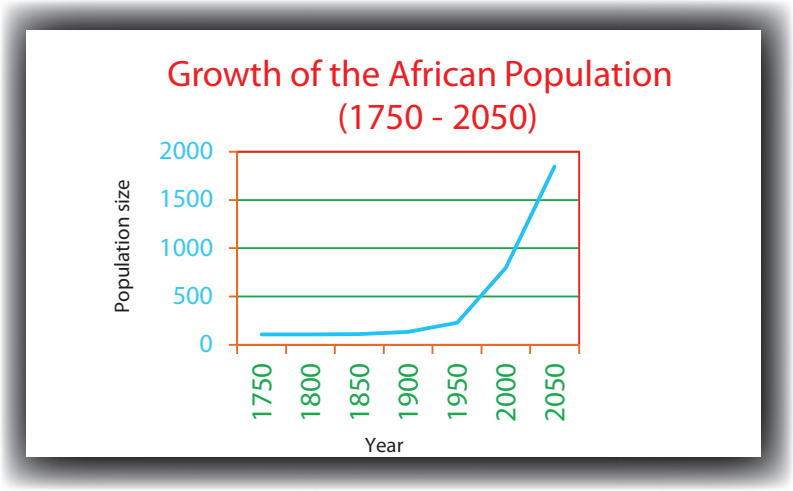


Figure 1.10 **Growth of the African Population (1750 - 2050)**

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.

Simple Bar Graph

What is a 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 the number of people living in each continent or 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 1.4. It shows how the world's population is distributed in six regions of the world.

Steps used to draw a simple bar graph.

1 The horizontal scale usually represent the independent variable, more specifically when the time element is of significant, such as when graphing mean monthly rainfall or annual production.

2 All bars must start at zero and bar graphs drawn for the purposes of comparison must be drawn on the same scale.

3 When vertical bars are drawn, the time sequence should be from left to right.

4 The width of the bar is a matter of choice. However, avoid bars that are too thick or too thin.

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

Table 1.4: **World Population by Region (2009)**

Region	Africa	Asia	Europe	L. America and the Caribbean	N. America	Oceania
Population (in millions)	999	4,117	738	580	341	36

Source: *Population Reference Bureau (2009)*

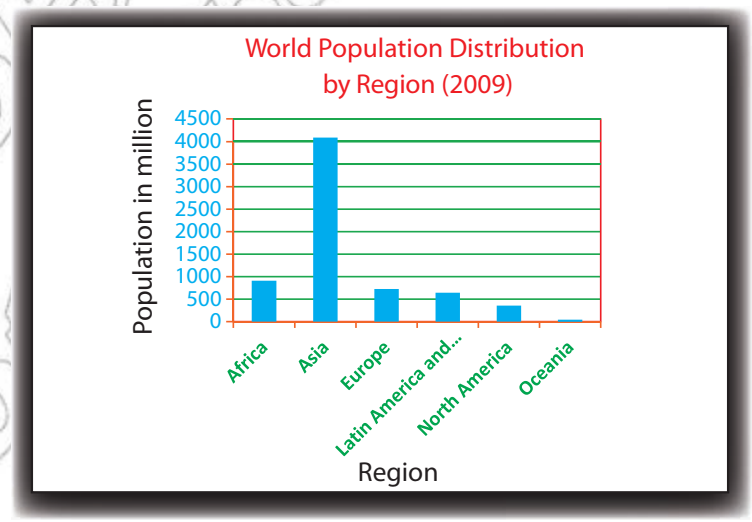


Figure 1.11 **World population by region (2009)**

As indicated earlier, bar graphs, like the one in the previous example, let you 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 Addis Ababa can be shown as follows. The graph in Figure 1.12 has been drawn using the data given in Table 1.5.

Table 1.5: **Monthly average rainfall of Addis Ababa, 2009**

Month	J	F	M	A	M	J	J	A	S	O	N	D
Rainfall (mm)	21.3	2.7	28.4	80.6	58.9	82.6	349.9	388.3	112.9	45.8	44.4	0.0

Source: *CSA Ethiopian Statistical Abstract, 2009*

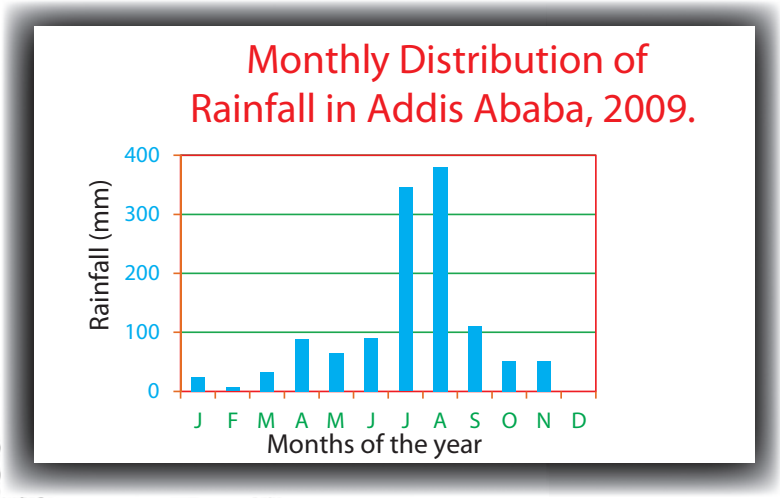


Figure 1.12 **Monthly Average Rainfall of Addis Ababa**

Using the graph, you can identify which months are the wettest and which are the driest.

Pie Chart

What is a pie chart? What are they used for?

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 1.6 gives the area of each of the five oceans in square kilometers. Then, the same data appears as a pie chart in Figure 1.13.

Pie charts use segments of a circle to show the size of items that make up a data series.

Steps used to draw a pie chart.

1 The circle can be of any convenient size depending upon available space for drawing.

2 The circle is divided into segments which are proportional to the value of the individual components calculated as 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 1.6: **The Areas of the World's Oceans**

Ocean	Area (million sq km)
Pacific Ocean	155.6
Atlantic Ocean	76.8
Indian Ocean	68.5
Southern Ocean	20.3
Arctic Ocean	14.1
Total	335.3

Source: *Microsoft Encarta (2008)*

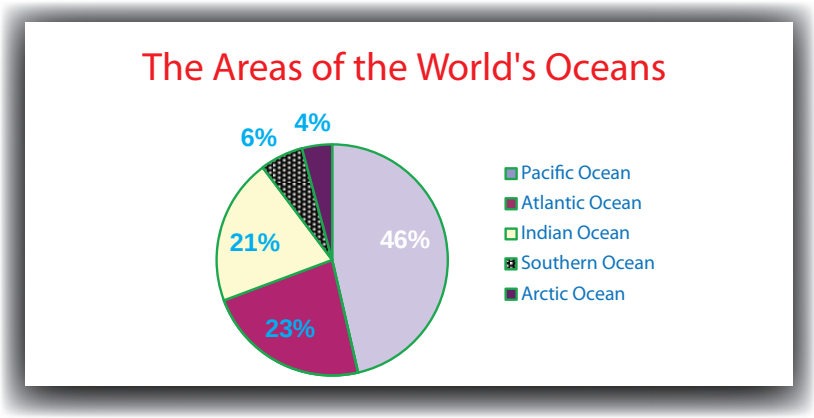


Figure 1.13 **Pie chart of the areal coverage of the world's oceans**



Activity 1.11

Do the following in groups.

1 State the different methods used for diagrammatic representation of statistical data.

2 Collect data for the male and female populations of your school and draw a simple bar graph.

3 Draw a pie chart to illustrate the following data.

Table: 1.7 **Land use area by type, 2009/10**

Land utilization	Percent (%)
Temporary crop area	75
Permanent crop area	7
Grazing land	9
Fallow land	4
Other land use	4
Wood land	1

Source: *CSA, Agricultural sample survey, 2010*

Exercise 1.2

I *Choose the correct answer.*

1 A color used on a map to represent a body of water is

A Red B Blue C Brown D Yellow

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

A Key B Title C Scale D Grids

3 Which is not true about a map?

A A map represents things as we see them from vertically above.

B A map is the exact representation of the shape of the earth.

C A map is a diminished representation of a given place.

D A map represents information with the help of symbols.

4 If two places that are found at 1^{o}N and 2^{o}N latitudes are 5 cm apart on a map, what is the areal scale of the map?

A 1 cm^2 to 400 km^2 C 1 cm^2 to 492.84 km^2

B 1 cm to 492.84 km D 1 cm^2 to 492.84 cm^2

5 The corresponding linear scale of the areal scale 1 cm^2 to 100 km^2 is

A 1 : 15 C 1 cm to 8 km

B 1 cm to 10 km D 1 cm to 5 km

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Unit Review

UNIT SUMMARY

- Geography is the branch of science that studies the earth's surface and the distribution, arrangement and interaction of natural and human features, and their causes and effects.
- The scope of geography is very wide. Also, this scope is dynamic, which means that it changes often as new discoveries and ideas enter the field.
- There are two branches of geography. They are physical and human geography.
- Geography investigates facts and relationships related to physical and social phenomena, and examine their distribution across the world and changes over time. As you can see from its subject matter and methodologies, geography is a subject that bridges the natural and social sciences.
- A map is a simplified, diminished, plain representation of the earth's surface.
- The history of map-making is broadly categorized into traditional and modern. Traditional map-making traces back to history's earliest times. Modern map-making began in the 17th century.
- Maps have many uses. For example, they can be used to:
  - ⇨ *locate places on the earth's surface*
  - ⇨ *calculate the distance between two or more places on a map*
  - ⇨ *the area of a place, a country, a region, a continent, a sub-continent or the whole world can be calculated from a map*
  - ⇨ *identify the direction and bearing of any place on the map*
- Maps are classified as general-purpose and specific-purpose, based on their functions. Maps can be small-scale, medium-scale or large-scale.
- Marginal information of a map helps to read and understand map easily. The marginal information include the title, the year and place of publication, magnetic declination, North arrow and the legend or key.
- Conventional signs and symbols are those signs and symbols that are used on maps through the agreement of all map-makers of the world.
- Maps use geographic and national grid references to locate both human-made and natural features.
- Areal scale is the square of linear 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.
- Regular-shaped area can be calculated by using mathematical formula on the map. On the other hand irregular-shaped area also can be calculated by using grid square method on the map.
- There are different types of maps. Maps differ in terms of characteristics such as purpose, information conveyed and variation in scale.
- 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.
- Geographers use statistical diagrams to illustrate information in different ways. These statistical diagrams include line graphs, bar graph and pie-charts.

REVIEW EXERCISE FOR UNIT 1

I *Match items in column 'B' with items in column 'A'.*

A		B	
1	Political geography	A	is interested in political features, such as political boundaries and their distribution over the earth's surface.
2	Urban geography	B	studies the structure and development of cities
3	Geomorphology	C	studies aspects of populations, including distribution and change.
4	Population geography	D	is the study of land forms and the forces that change them.
5	Phytogeography	E	examines the distribution of plants in relation to the physical environment.

II *Choose the correct answer.*

6 Yeates, M. definition refers to geography as:

A an earth science
B developing and testing theories that explain the distribution of things over the earth's surface
C providing information about patterns of distributions
D the relationship between human and their environment

7 The general trend in the development of geography indicates that its scope is

A wide and limitless

B specific and specialized

C universal and unbound

D interested only in natural elements

8 A map:

A is a reduced representation of the earth

B shows the earth's surface as if it were seen from directly above

C is a two-dimensional representation of the earth

D all of the above

9 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

10 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

11 Large-scale maps:

A cover smaller areas than small-scale maps

B convey less information than small-scale maps

C have scales that lie between 1:50,000 and 1:250,000

D are used to cover a large area in detail

12 A statistical diagram that shows the share of a part in a whole is:

A Bar graph

B Line graph

C Pie chart

D None of the above

III *Explain what the following terms mean.*

a Scale

b Statistical diagram

c Legend

d Linear scale

e Areal scale

f Map

g Magnetic declination

Unit 2



PHYSICAL ENVIRONMENT OF THE WORLD AND ETHIOPIA

Unit Outcomes

After completing this unit, you will be able to:

- analyze the internal and external forces that change the surface of the earth and relate them to the resulting landforms;
- appreciate the origin, composition and the layers of the earth's atmosphere;
- analyze the association between elements and controls of climate and interpret climate data;
- realize the concept of region and distinguish different temperature zones of the earth and describe Ethiopia as a tropical mountainous country;
- assess the concept, components, interdependence and, the factors that affect the distribution and features of ecosystems;

Main Contents

2.1 **FORCES THAT CHANGE THE SURFACE OF THE EARTH**

2.2 **WEATHER AND CLIMATE**

2.3 **NATURAL REGIONS OF THE EARTH**

2.4 **ECOSYSTEM**

2.5 **VILLAGIZATION OF THE WORLD THROUGH DISTANCE-TIME DECAY**

- *Unit Summary*
- *Review Exercise*

INTRODUCTION

Geography, as a discipline, helps us to learn about people, their life styles, and the ways their lives are affected by their interactions with their physical environments. Geography also provides us with closely related facts about how such factors affect our own day-to-day lives throughout our lifetimes.

In the previous unit, you have learned about the concept of geography and map reading. In this unit you will learn about the physical environment of the world and Ethiopia. The unit is organized in five sub-topics. These are ***Forces that Change the Surface of the Earth, Weather and Climate, Natural Regions of the Earth, Ecosystem and Villagization of the World through Distance-time Decay.*** You were introduced to most of these topics in earlier units. This unit presents them in greater detail to give you more information about our physical environment and to help you interactively learn more about them.

2.1 FORCES THAT CHANGE THE SURFACE OF THE EARTH

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

- list the landforms formed by each internal force;
- describe the process of each internal force;
- relate some major landforms with their respective internal forces;
- explain the effects of earthquakes on infrastructure; like buildings, dams, roads;
- review external forces;
- state the meaning of weathering;
- distinguish the different types of weathering;
- identify land features resulting from chemical weathering; stalactite, stalagmite, pillar etc;
- explain the types and characteristics of agents of erosion;
- relate types of erosions;
- state the effects of erosion on human activities; with various landscapes;
- explain the process of deposition;
- recognize erosion-deposited soils and landforms.

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Key Terms

- Block mountains (Horst)
- Caldera
- Crater
- Earthquake
- Epicentre
- Faulting
- Fissure
- Folding
- Fold mountains
- Focus
- Force
- Landform
- Lava
- Magma
- Orogeny
- Rift valley
- vent
- Volcanism

Start-up Activity

1 What is a landform? What are the factors that influence the formation of landforms?

2 Look at Figure 2.1 and describe what you can see.

3 Then categorise them into internal forces and external forces.



Figure 2.1 **Different forces that are shaping the surface of the earth**

2.1.1 Internal Forces

What are the internal forces that affect the formation of landforms?

Those forces that drive energy from the interior part of the earth are called *internal forces*. Internal forces form the ups and downs on the earth's crust by breaking and bending (faulting and folding) it. Forces inside the crust cause folding, faulting (cracking), volcanism and earthquakes.

➲ **Folding** is one of the *internal processes* which occurs when two forces act towards each other from opposing sides. Due to this force, rock layers are bent into folds. The process by which folds are formed due to *compression* is known as *folding*. There are large-scale and small-scale folds. Large-scale folds are found mainly along destructive plate boundaries.

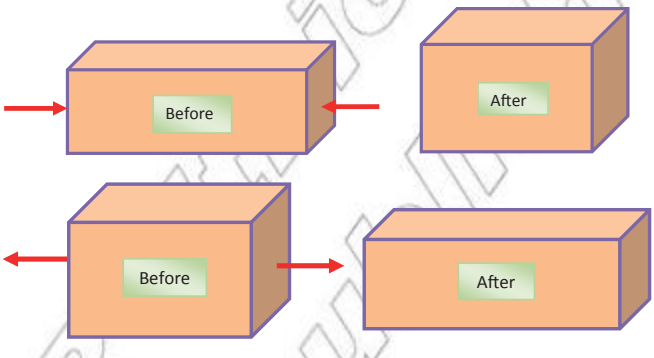


Figure 2.2 **Compression forces and their resulting effect**

Figure 2.3 **Tensional forces and resulting effects**

Folding can be explained using two important parameters

⇨ *Axial Plane* ⇨ *Limbs*

Types of folding: different types of folds are created, based on the nature of the forces applied on bedrock. If the fold is upward and convex, it is called **anticline**. If the fold is downward, it is called **syncline**.

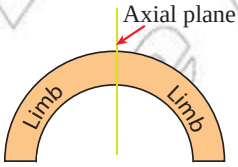
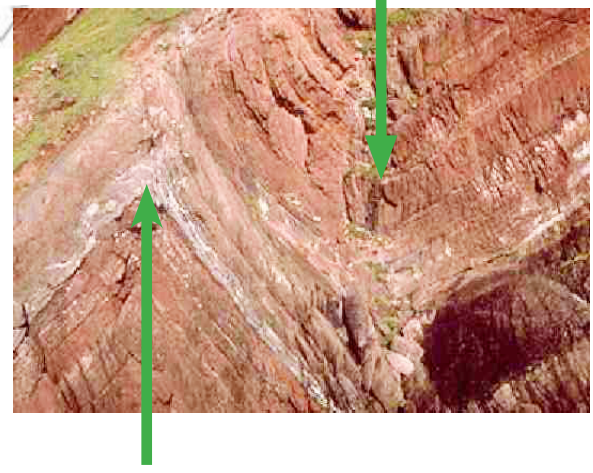




Figure 2.4 **Syncline fold**



Figure 2.5 **Anticline fold**



Fold Mountains

What are fold mountains? How are fold mountains formed? Name some of the fold mountains of the world.

Fold mountains are formed by crust which has been uplifted, and folded by compressional forces. They are formed when two plates move towards each other. The compressional force which is created as a result of this movement pushes sedimentary rocks upwards into a series of folds. Fold mountains are usually formed from sedimentary rocks and are usually found along the edges of continents. This is because the thickest deposits of sedimentary rock generally accumulated along the edges of continents. There are two types of Fold Mountains: young fold mountains (10 to 25 million years of age, example, the Atlas, Rockies and the Himalayas) and old fold mountains (over 200 million years of age, example, the Cape Range, the Urals in Russia and the Appalachians of the USA).

Many ranges of mountains have been formed by folding. The **Andes**, the **Rocky** mountains, the **Alps**, the **Himalayas** and the **Australian Alps** are some examples. The **Atlas** mountains in north west Africa and the **Cape Range** in South Africa were formed by folding. This process of mountain building is called *orogeny*.

Faulting

What is faulting? Describe types of faults.

Movements in the crust of the earth sometimes make cracks. These cracks are called *faults*. Faulting can be caused by either lateral or vertical forces, which can be either *tensional* or *compressional*. Tension causes a **normal fault**, and compression causes a **reverse fault**.

Activity 2.1



1 Study Figure 2.6 and identify the difference between a reverse fault and a normal fault.

2 Explain the difference between tensional and compressional forces.

3 Is faulting a way by which the surface of the earth is changed? Why or why not?

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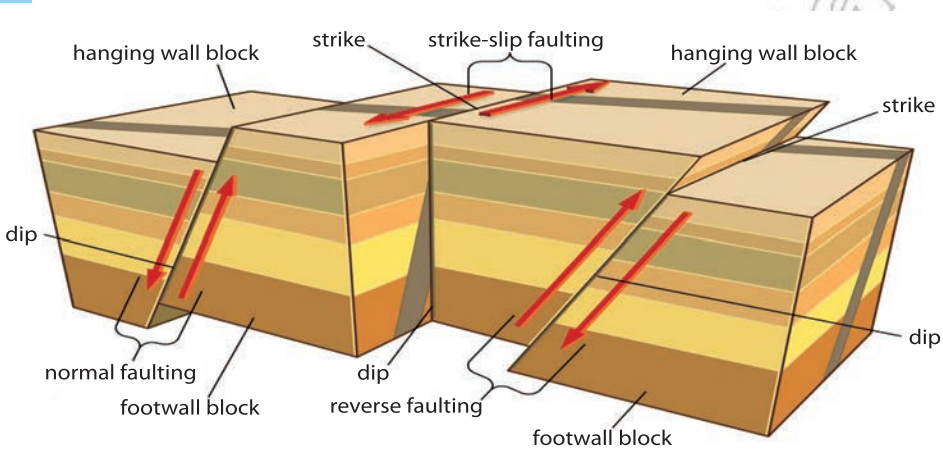


Figure 2.6 **Formation of normal and reverse faults**

Major features formed by faulting include *rift valleys* and *block/Horst mountains*

Rift Valleys

What is rift valley? How are rift valleys and block mountains formed?

A rift valley is a linear shaped lowland area between highlands or mountain ranges created by geologic rifts or faults.

A rift valley is a valley formed by faulting. When two parallel faults occur on the surface of the earth, and when the land between the two faults sinks down, a rift valley is formed.

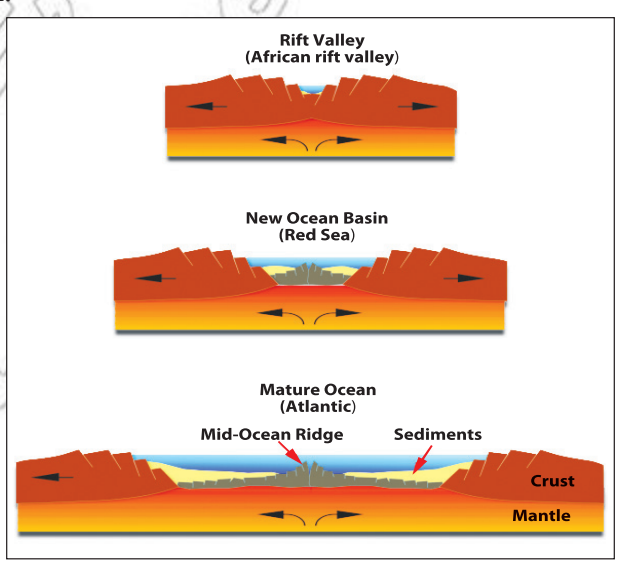


Figure 2.7 **Formation of a rift valley**



Activity 2.2

In your group, answer the following question and perform the following task.

1 Which is the largest rift valley in the world?

2 Identify the location of the largest rift valley on a map.

The largest rift valley in the world is the East African Rift Valley. It extends from Syria to Mozambique, passing through the Red Sea, Eritrea, Ethiopia, Kenya, Tanzania, DR Congo, Rwanda and Burundi.

What other countries are touched by this rift valley?

The total length of the East African Rift Valley is about 7,200 km, of which 5,600 km is in Africa.

The Ethiopian Rift Valley is a part of the East African Rift Valley. It extends from northeast to south west. Features found in the Rift Valley include active volcanoes, lakes, hot springs and fumaroles.



Figure 2.8 **East African Rift Valley**

Block (Horst) Mountains

What is block mountain? How do block mountains form?

Block mountains are formed when land between two parallel faults is pushed upward due to pressure from inside the earth. If there are two parallel faults, the crustal block between them may either rise to produce a Horst (block) mountain, or fall, to produce a rift valley.

Examples:

- *The Sierra Nevada mountains in North America.*
- *The Harz Mountains in Germany.*
- *The Afar block mountain in Ethiopia.*
- *The Ruwenzori in Africa.*

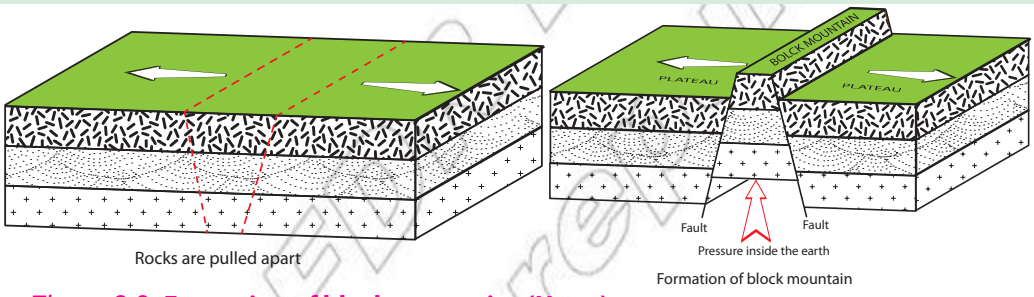


Figure 2.9 **Formation of block mountains (Horst)**



Activity 2.3

1 Prepare models representing
   - Types of folds
   - Anticline and syncline
   - Rift valley and block mountains using mud, paper mach'e, wood blocks, etc.

2 Explain the meanings of
   - Syncline and anticline
   - Tensional forces and compressional forces.

Volcanism

What is volcanic activity?

What landforms are associated with volcanic activity?

Volcanic activity is another internal force which changes the surface of the earth. It is caused by internal movements within the earth. Volcanism is the process by

which magma, gases, water vapour, ashes and other solid materials are forced out to the surface. Inside the earth the temperature is very hot. This high temperature changes rocks into molten magma. When this magma reaches the surface, volcanic activity takes place. When the magma emerges on to the surface, it cools and hardens. It is then called **lava**.



Figure 2.10 **The process of volcanic activity**

Magma reaches the earth's surface through two kinds of holes. They are **vents** and **fissures**. Magma may force its way violently through a small hole called a vent. If lava emerges via a vent, it builds up into a volcano (cone-shaped mound), and if it emerges via a fissure, it builds up to form a lava plateau or lava flow. Magma may pour quietly through long cracks (fissures) onto the earth's surface.

If the magma flows to the surface through a vent, acrater is formed. Sometimes a volcano erupts very forcefully. When this happens, the top part of the volcano is blown away. This forms a large crater called a *caldera*. Water collects in the crater or in the caldera and forms a lake. We call this a **crater lake** or **caldera lake**. In Ethiopia there are many crater lakes such as Zuquala, Wonchi and Dendi.

If an eruption begins again in a caldera, a new small cone-shaped volcano is formed inside the caldera. These are known as *caldera cones*.

Part of the magma may not reach the earth's surface, and when this magma cools, solidifies and forms rocks inside the crust, features such as **batholiths**, **lacoliths, sills and dikes**, are formed.

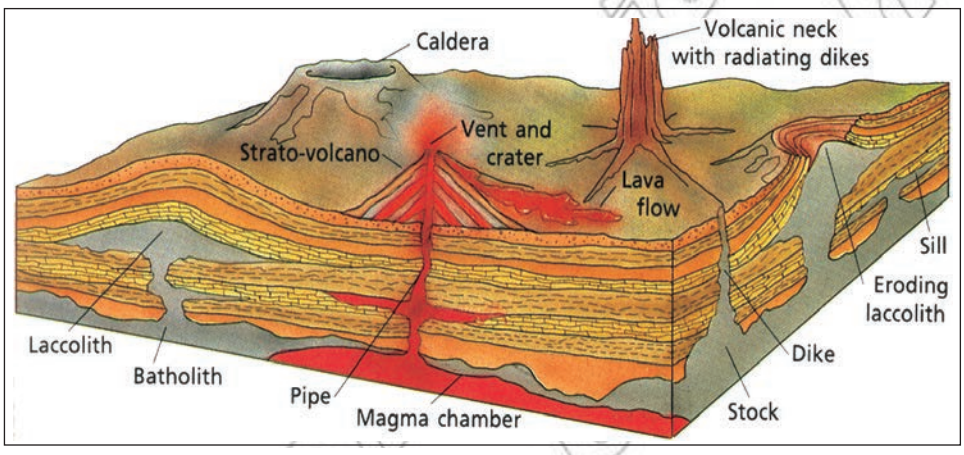


Figure 2.11 **The most important types of volcanic intrusion and extrusion features**

- **A batholith** *is a very large mass of magma which accumulates in the crust. It is the largest structure.*
- **A laccolith** *is a mushroom shaped body of intrusive igneous rock. Smaller than a batholith.*
- **A dike** *is formed when magma solidifies in a vertical or near-vertical crack.*
- **A sill** *is formed when magma solidifies horizontally or nearly horizontally along a bedding plane.*

Table 2.1: **Types of volcanoes**

Active volcano	Erupts from time to time	Erta'li, Fentale Dubbi and Damiali
Dormant volcano	Has not erupted for a long time but may erupt again in the future	Tatali and Dabbahu
Extinct volcano	Has not erupted within historic time	Mt. Zuquala, Ras Dashen and Batu

Importance of volcanic eruptions:

- *Give us some ideas about the interior of the earth.*
- *Provide fertile soil.*
- *Provide hot springs (with medical value).*
- *Generate geothermal energy.*
- *Help in the formation and concentration of minerals.*
- *Help in the creation of new land.*



Activity 2.4

Make models of volcanoes and show the different parts of a volcano, using wooden blocks, mud or paper mach'e.

Earthquake

What is an earthquake? Why do earthquakes occur?

Earthquakes are sudden movements in the earth's crust. They are caused by internal movements deep down inside the earth. Earthquakes are frequently associated with faults. They take place along fault lines where the earth's crust is weak. When an earthquake occurs, vibrations from the centre spread out in the form of waves in all directions.

The point at which an earthquake originates is called the **focus**. The point on the earth's surface immediately above the focus is called the **epicentre**. As the vibrations spin out from the centre, the damage they cause becomes less and less.

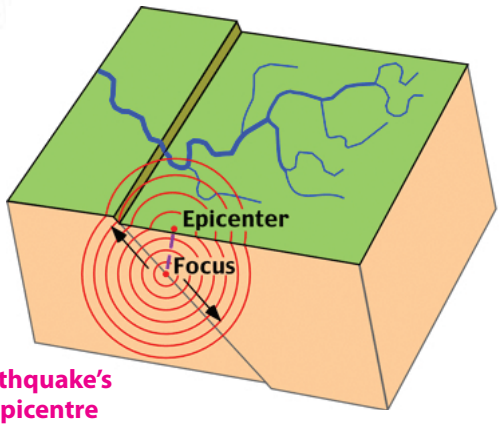


Figure 2.12 **An earthquake's waves, focus and epicentre**

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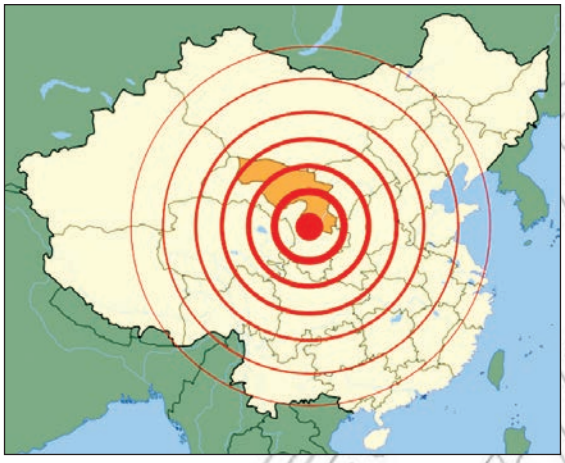


Figure 2.13 **The wave pattern and strength of an earthquake**

How do we determine the intensity or magnitude of an earthquake?

The intensity of an earthquake is measured by an instrument called a **seismometer,** and is recorded on a seismograph. It records the vibrations produced by an earthquake. The scale which gives the magnitude is called the **Richter scale.** It ranges from 0 to 9. Each number of this scale indicates a tremor that is ten times stronger than the next lower number. An earthquake with a magnitude of 4.0 is ten times stronger than one that measures 3.0. Readings of 7.0 or higher indicate a strong or major earthquake. The strongest ever recorded earthquake was the Valdivia earthquake in Chile that occurred on May 22, 1960 (9.5 on the Richter scale).

Table 2.2: **Richter scale values and the corresponding magnitude of earthquakes**

The Richter Scale	Effects
< 3.5	Detected only by instruments (seismometers)
3.5 – 4.8	Feels like a lorry passing
4.9 – 5.4	Loose things fall
5.5 – 6.1	Walls crack
6.2 – 6.9	Chimneys fall, some buildings collapse
7.0 – 7.3	Many buildings fall, landslides
7.4 – 8.1	Most buildings and bridges are destroyed
> 8.1	Total destruction

Effects of Earthquakes

What are the effects of Earth quakes?

Indian Ocean Earthquake

In December 2004, an earthquake with a magnitude of 9.1 to 9.3 rocked the Indian Ocean and caused a tsunami, known as the Boxing Day Tsunami. The initial death toll reported by the Associated Press was 100,000, but after the final count, it was reported that the death toll reached up to 225,000.



In addition to destruction of life and property, an earthquake causes:

- *displacement of parts of the earth's crust vertically or laterally.*
- *landslides and deep cracks in surface rocks.*
- *the devastation of cities, fires and diseases.*
- *the rise or lowering of the sea floor.*

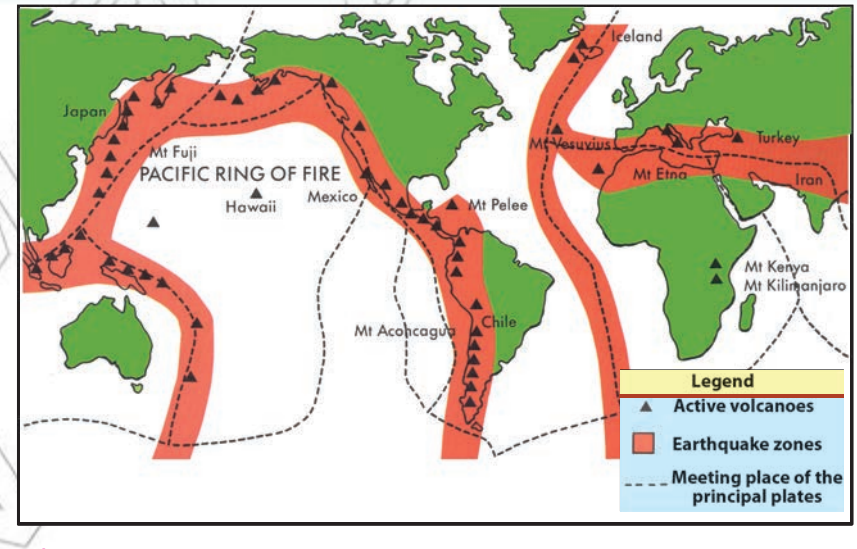


Figure 2.14 **The major earthquake and volcanic belts of the world**

About 80% of all earthquakes occur in three regions. They are

- *Around the Pacific Ocean zone. The largest earthquake and volcano zone lies along the edges of the Pacific Ocean. This zone is known as the Pacific Ring of Fire.*
- *Across Southern Europe and Southern Asia.*
- *The west-coast areas of North and South America.*

The two most recent earthquakes in Ethiopia measuring more than 5 on the Richter Scale occurred:

- *July 14, 1960, near Lake Shalla with a magnitude of 6 on the Richter Scale.*
- *June 2, 1961, in Karakore.*



Activity 2.5

In your geography work group, perform the following tasks.

1 Describe the effect of earthquakes on people, buildings and the infrastructure.

2 Name ten countries within the Pacific Ring of Fire.

2.1.2 External Forces

Weathering

What is weathering? What is the effect of weathering on landforms?

External forces can lower the level of the land by washing it away, and this process is called **denudation**. They also can raise the level of the land by **deposition**. **Denudation** consists of **weathering** and **erosion**.

Weathering includes *disintegration* (physical weathering), which breaks rocks into smaller pieces and **decomposition** (chemical weathering), which forms new substances.

Physical (Mechanical) Weathering

What is physical weathering? What are the main agents of physical weathering?

Physical weathering breaks the rocks into smaller pieces. Its main agents (causes) are **temperature changes**, **frost action** and **the action of plants and animals**.

The effects of temperature changes: The temperature variation between day and night causes rock to expand and to contract. This process causes cracks to develop. In time, the cracked layer peels off and falls to the ground. This process is called **exfoliation** (see Figure 2.15).



Figure 2.15 **Exfoliation domes**

The effects of frost action: Due to frost action, rock breaks up into pieces and these fragments accumulate around the lower slopes of the rock. This material is called **scree**. Frost action is very common in the winter season in the temperate zone and in some high mountains all year round (see Figure 2.16).

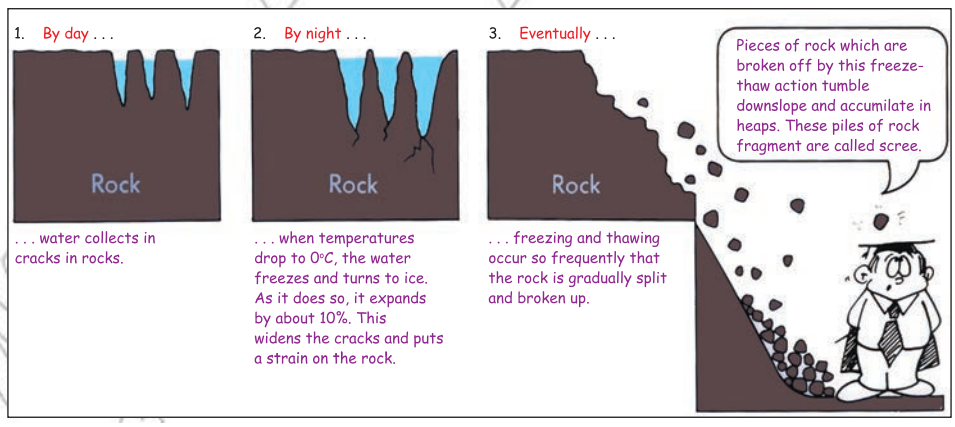


Figure 2.16 **The breaking of rocks by the action of frost**

The effects of plant and animal action: Plants and animals also cause weathering. For example, seeds may fall in cracks of rocks. If water collects there, it forms suitable conditions for the seeds to germinate and grow. As plants develop their roots may push the rock apart. Some animals burrow, and this also helps to break up rocks.



Figure 2.17 **Breaking of rock by a plant**

Chemical Weathering (Decomposition)

What process is important in chemical weathering? What are main agents of chemical weathering?

Chemical weathering is a process that forms new substances, and it is affected by the minerals in the rock. Its main agents are rain action and plant and animal actions.

As rain water passes through the atmosphere, it takes in carbon dioxide (CO_2) and forms a weak carbonic acid. When this acid water comes into contact with rock, it begins to dissolve minerals in the rock. The rate at which rock dissolves depends on the type of rock. Limestone, for example, dissolves very quickly. This process is known as **carbonation**.

$H_2O + CO_2 \Rightarrow$ carbonic acid $\Rightarrow$ dissolves and erodes limestone and forms caves.

Example:

Sofomer Cave along the River Weiyb in Bale.



Figure 2.18 **Sofomer Cave, in Bale formed by the River Weiyb and seeping rainwater**

In underground rivers, seeping rain water continues to dissolve the limestone beneath the surface, gradually forming passages and caves. These caves contain features such as stalactites, stalagmites and pillars.

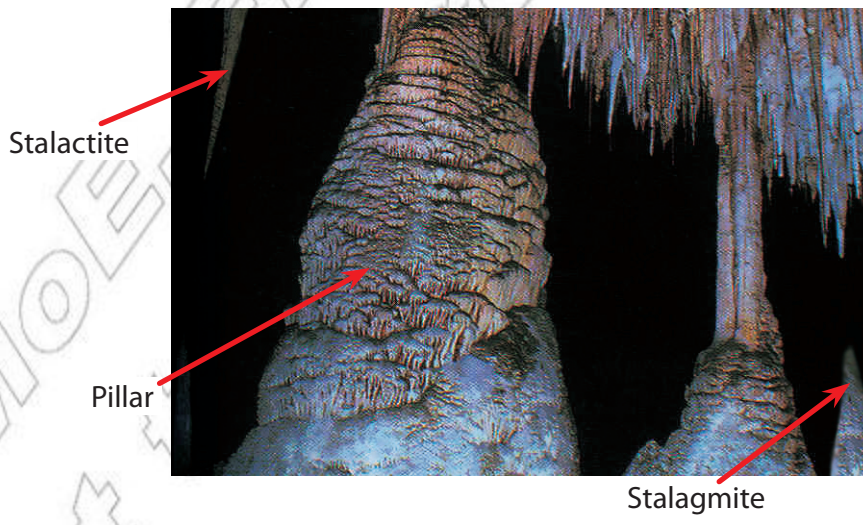


Figure 2.19 **Underground cave in a limestone area**

- *A stalactite is a limestone column that hangs down from the ceiling of the cave.*
- *A stalagmite is a limestone column that builds upwards from the floor of the cave.*

- *A pillar is formed when a stalactite and a stalagmite join together.*

When rain water dissolves oxygen and reacts with iron in rocks, the rocks become rusty.

Pollution in towns and cities increases chemical weathering.

How do plants and animals act as agents of chemical weathering?

Plants absorb minerals, and decaying vegetation produces organic acid, which causes a further breakdown of minerals.

Bacteria in the presence of water breaks down certain minerals in the soil.

Leaching is a major soil-forming process. It occurs when substances are dissolved in water that percolates through soil. Such substances include soluble chemicals that move out of biological tissues into soil - for example, rainfall causes potassium and other ions to be lost by foliage.

Erosion

What is erosion? What are the major agents of erosion? What are the major types of erosion? What are the characteristics of the agents of erosion?

Erosion is the transporting of weathered material by various natural forces such as moving water, wind and moving ice.

Erosion occurs when particles of rock or soil are:

- *washed away by a river*
- *removed by waves of the sea*
- *crushed under a glacier*
- *blown away by the wind*

Erosion by Running Water

How does running water cause erosion? What processes are included in erosion?

Rivers are the most important of all natural agents which help in shaping the earth's surface. The work of running water includes **eroding, transporting** and **depositing** eroded material.

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There are three types of running water erosion:

1 **Sheet erosion**: occurs when surface water moves in a wide flow.

2 **Rill erosion**: occurs when surface water cuts relatively small channels.

3 **Gully erosion**: occurs when floods cut deep wide gorges.

The course of a river, from its source to its mouth, can be divided into 3 stages. The action of the river is different in these three parts. The stages are upper course, middle course and lower course.

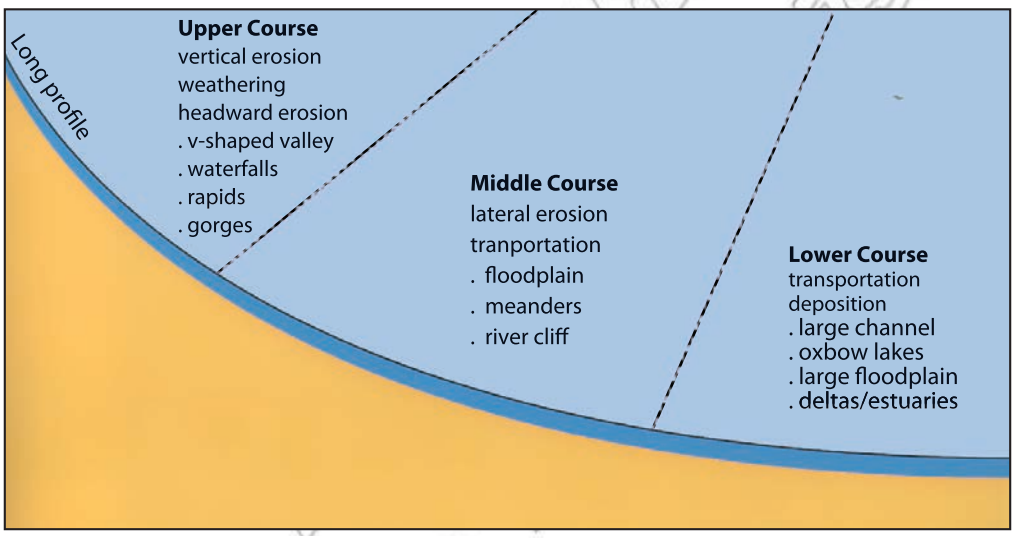


Figure 2.20 **The three stages of a river**



Activity 2.6

In pairs, discuss the followinq questions.

1 What are the main characteristics of the river stages shown in Figure 2.20?

2 Which stage has a steeper slope?

Upper Course

In this stage the river water is usually small in volume. As the river flows very fast down steep-slopes, a V-shape valley, waterfalls and deep gorges are formed. The fast flow of the river causes vertical erosion and destruction. The V-shape valley has steep sides and a narrow floor. The fast flowing river cuts down deeply into the land.

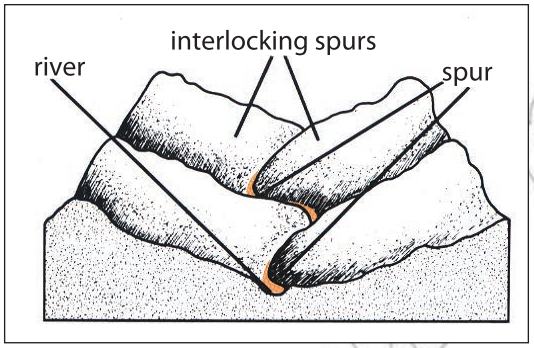


Figure 2.21 **Features of the upper course of a river**

Waterfalls are caused by sudden drops in the level of rivers. Waterfalls are formed when water flows over hard rock which cannot be eroded easily, while soft rocks are easily eroded. The hard rock produces an overhang, and the water flows over it as a waterfall.

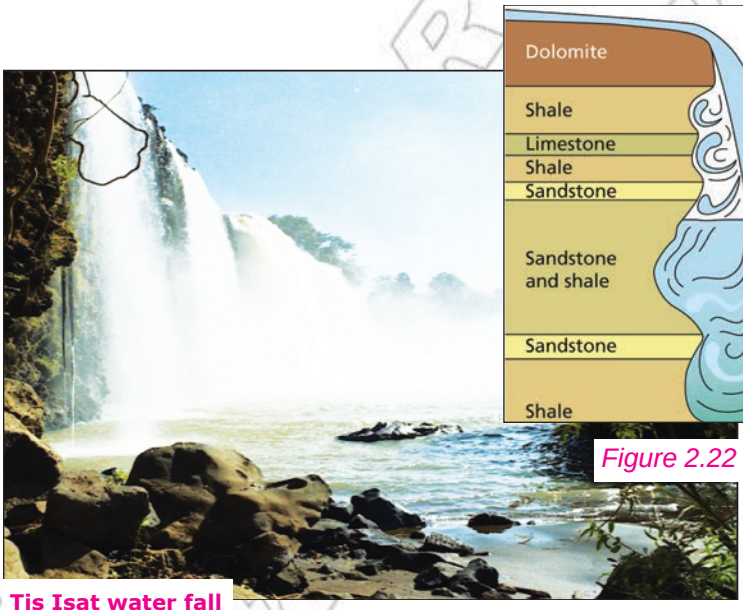


Figure 2.22 **Waterfall formation**

Tis Isat water fall

The Middle Course

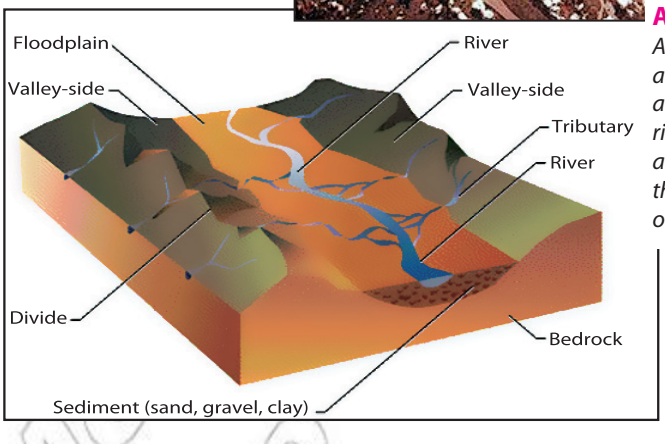
During a river's middle course, the river valley becomes wider and larger. The river may receive waters of many tributaries, which increase the volume of water. Wide-floored valleys with gentle slopping sides are the main features of the middle course of the river. Instead of taking the most direct course possible, the river begins to meander. Meanders are pronounced curves in the course of a river.

The Lower Course

The river flows fast, meandering over wide plains, and makes widespread deposition. The load is so large that deposition occurs. **Flat floodplains**, **big meanders**, **levees**, **ox-bow lakes** and **deltas** are the main features of this course.



Nile Delta
This satellite image of the Nile Delta shows the Nile River spilling out from the Egyptian desert into the Mediterranean Sea. The longest river in the world, the Nile, has a delta about 250 km wide.



Anatomy of a Floodplain
A floodplain is a broad, flat section of a valley floor filled with sand, gravel, and clay. Floodplains form when a river running along a valley floods and spills out of its channel. The river then deposits sediments as it flows over portions of the floodplain.

Figure 2.23 **Features of the lower course of a river**

Floodplains are broad flat areas which border with the lower course of a river and are sometimes flooded by the river. They are covered with fertile alluvial soils which are deposited by the river when flooding. **Levees** are narrow ridges of alluvial deposits found along the bank of a river. **Ox-bow lakes** are crescent-moon shaped lakes created due to meanders that have been abandoned. They are formed when meanders are cut off from the main river channel. **Deltas** are usually triangular areas of land which are usually formed at the mouth of rivers.



Activity 2.7

In your group, perform the following tasks and answer the following question.

1 How do rivers transport materials?

2 If there is a river near your school, your teacher will organize a field trip to it. At that site, identify landforms such as meanders, waterfalls, gorges, floodplains, V-shaped valleys, etc. Then write a short note on your findings and present it in your classroom discussion.

3 Prepare charts or models representing major landforms associated with a river.

Erosion and Deposition by Sea Waves

What are coastal landform features produced by wave erosion?

Waves are formed when wind moves over the surface of the sea. This causes the particles of water to move in a circular motion, which forms a wave. This movement of water in the sea clashes against coastal lands and picks up rock particles and throws them into the sea as sediments. The work of the sea along the coast includes erosion, transportation and deposition. Some of these features formed along the shoreline are **beaches, spits** and **lagoons**.

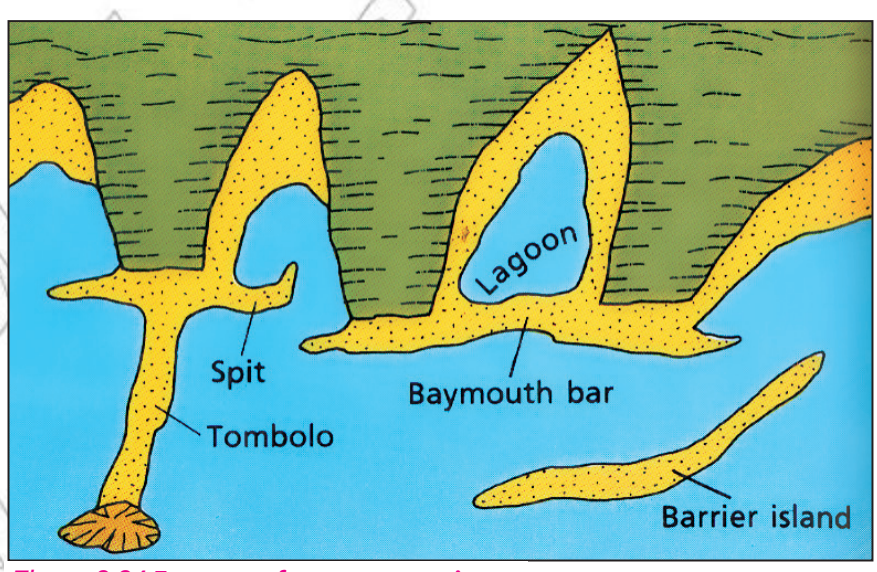


Figure 2.24 **Features of sea wave erosion**

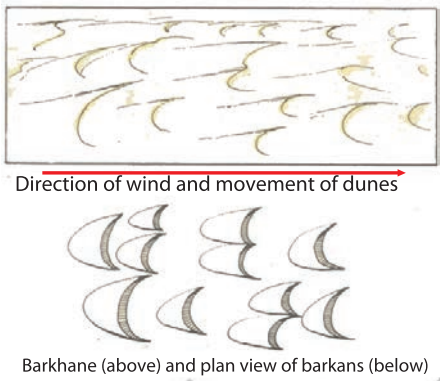
Beach is a strip of land along the sea coast covered with various types of sediment. A **Spit** is a narrow ridge of sand or shingle. It projects into the sea but is attached to the land at one end.

Lagoon is an area of saltwater separated from the sea by loose sandbanks.

Wind Erosion and Deposition

What is the most active agent of erosion in desert regions? What is the most common type of wind deposit?

Wind erosion is common in desert and semi-desert areas. Wind erosion and deposition form different landforms such as **sand dunes, barchans and loess deposits**.



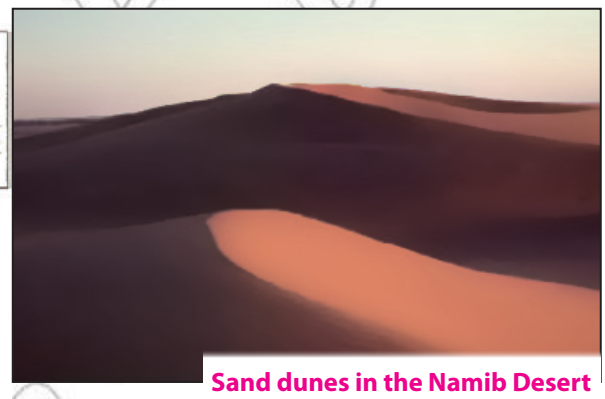

Sand dunes in the Namib Desert

Figure 2.25 **Landforms associated with wind erosion**

- **Sand dune** *is a small hill of sand formed by the action of the wind.*
- **Barchan** *is a sand hill that has a crescent-moon shape.*
- **Loess deposit** *is a deposition of fertile soil in the desert by wind.*



Activity 2.8

In your group, perform the following tasks and answer the following questions.

1 Describe the difference among spit, lagoon and beach.

2 Compare and contrast barchans, sand dunes and loess deposits.

Exercise 2.1

Word Game

Down

1 The method by which the strength of an earthquake is measured.

Across

2 Sleeping volcano.

3 The opposite of compression.

4 Young fold mountain in North America.

5 Young fold mountain in Asia.

6 Sudden movement in the earth crust.

7 Magma may force through this narrow hole.

8 Types of erosion occur when surface water cuts relatively small channels.

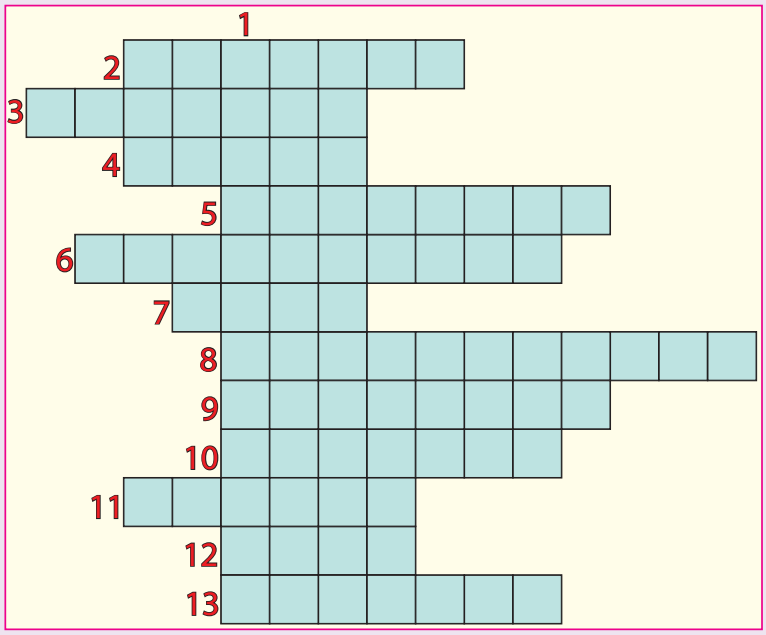
9 Downward fold of bedrock.

10 Large crater at the top of volcano.

11 Circular funnel-shaped depression produced by volcanic eruption.

12 The side of an upfold.

13 The transporting of weathered materials by water, wind, etc.



2.2 WEATHER AND CLIMATE

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

- explain the meaning of atmosphere;
- discuss the composition and layers of the earth's atmosphere;
- explain weather and climate;
- express the concept of temperature;
- appraise the variation of temperature;
- demonstrate how to measure and record temperature data;
- compute normal temperature lapse rate;
- interpret temperature data;
- explain the formation of rain;
- discuss the types of rainfall;
- relate the various roof slopes of houses in various climatic regions to the respective types of rainfall;
- explain what cloud is;
- describe types of clouds;
- practice measuring and recording rainfall data;
- differentiate types of winds (local, monsoon and planetary winds, including cyclones and anticyclones);
- relate direction and deflection of winds to the earth's rotation;
- interpret wind speed and direction from wind gradient map;
- explain how conditions of wind affect structures of buildings and crop production;
- Identify types of atmospheric pressure;
- relate atmospheric pressure with temperature and altitude;
- demonstrate the pressure belts of the world:
- develop the skills of measuring and recording atmospheric pressure;
- analyze the position of the sun at various latitudes at noon time of Dec. 22/ June 21;
- examine the impact of latitude on temperature;
- justify the effect of altitude on the characteristics of temperature, rainfall and air pressure;
- compare and contrast the condition of rainfall and temperature between places of coastal and interior areas;
- express the meaning and types of ocean current;
- identify the impacts of ocean currents;
- recognize the effects of ocean currents on temperature and rainfall on land surfaces;

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- discuss the types and location of pressure belts of the world;
- state seasonal movements of pressure belts in relation to the apparent movement of the sun;
- relate movements of planetary winds with pressure belts;
- predict the impact of cloud cover on temperature.

Key Terms

- Aerosols
- Atmosphere
- Convectional
- Cyclonic
- Evaporation
- Exosphere
- Jetstream
- Lapse rate
- Mesosphere
- Ocean current
- Orographic
- Precipitation
- Radiation
- Stratosphere
- Thermosphere
- Troposphere

2.2.1 Earth and Atmosphere

What is atmosphere? How do you explain the importance of atmosphere for human beings or for all life forms?

The air that surrounds the earth is called the atmosphere. It is an envelope of transparent colorless, tasteless and odorless gases found above the earth's surface.

Composition of the Atmosphere

The earth's atmosphere is a mixture of gases, suspended dust particles and condensed moisture droplets which are collectively known as **aerosols.** The gases are different in their volume.

Table 2.3: **Gases of Earth's atmosphere**

Major gases		Minor gases		Rare gases
Nitrogen	78%	Argon	0.93%	Hydrogen, ozone, methane, neon, helium, krypton , xenon, carbon monoxide
Oxygen	20.95%	Carbon dioxide	0.03%	

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Activity 2.9

In your geography work group, perform the following task and answer the following questions.

1 Is carbon dioxide useful? If yes, how?

2 Why are carbon dioxide, oxygen, and ozone important to the earth's organisms?

3 How could plants or agricultural crops and animals in your locality be affected by the atmosphere?

Structure of the Atmosphere

The earth's atmosphere is divided into four layers based on temperature variation. They are troposphere, stratosphere, mesosphere and thermosphere (see Figure 2.26).

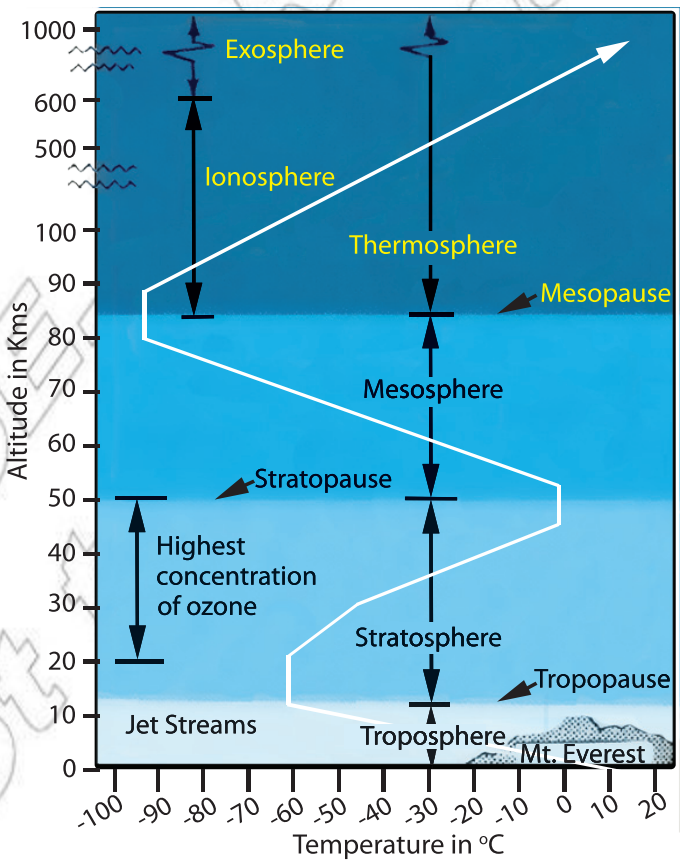


Figure 2.26 **Vertical structure of the atmosphere**

Table 2.4: **Atmosphere layers and their characters**

Name of the layer	Average height	Major characteristics
Troposphere	Extends from sea level to 8/16 kms	⇨ Contains 75% of the atmospheric mass. ⇨ Uniformly, temperature decreases with an increase of altitude. ⇨ The top boundary is known as the tropopause, which is characterized by jet streams (high velocity winds).
Stratosphere	Extends up ward to 50 kilometres	⇨ Has constant temperature. ⇨ High concentration of ozone gases. ⇨ Its upper limit is called the stratopause.
Mesosphere	Extends from 50 to 80/85 kilometres	⇨ It is the coldest part of the atmosphere. ⇨ Its upper surface is known as the mesopause. ⇨ Temperature decreases to nearly –100°C at the top of the mesosphere. ⇨ Meteorites burn and disintegrate because of friction here.
Thermosphere ⇨ Ionospheres ⇨ exosphere	Extends from 80/85 kilometres upward into space	⇨ Have extremely low density ⇨ Very little heat can be absorbed, held or conducted. ⇨ Temperature rises as high as 1200°C. ⇨ The ionosphere is a layer of electrically charged particles. These electrons and ions are useful for communication because they reflect radio waves. ⇨ The exosphere begins at an altitude of about 500 to 700 kilometres above the earth's surface and extends to interplanetary space.



Activity 2.10

Discuss the following issue and questions in pairs.

1 The main characteristics of the layers of the atmosphere.
2 Which layer of the atmosphere contains ozones? Discuss the use of ozone gas.
3 What is the coldest layer of the atmosphere?

2.2.2 Meaning of Weather and Climate

What is the condition of the atmosphere today? What is weather? What is climate? How is climate different from weather?

Weather is the condition of the atmosphere over a short period of time. Weather includes daily changes in **precipitation, air pressure, temperature, wind,** etc. Weather refers to atmospheric conditions in a given location.

What is the weather like in your locality today?

Climate is the average of all weather conditions of an area over a long period of time. These conditions include **average temperature, air pressure, humidity,** and **days of sunshine for a period of 30 years**. Climate tells us what it is usually like in the place where we live.

Major Elements of Weather and Climate

The major elements of weather and climate are **temperature, rainfall, winds, air pressure, clouds,** etc. You will learn more about these elements of weather and climate.

Temperature

What is temperature?

Temperature is the amount of hotness or coldness of an object. The sun is the primary heat source for the earth and its atmosphere. The sun's energy is called **insolation** or **solar radiation**, and this turns into heat energy at the earth's surface.

How is energy transferred in the atmosphere?

Not all the energy that originates from the sun reaches the earth's surface.

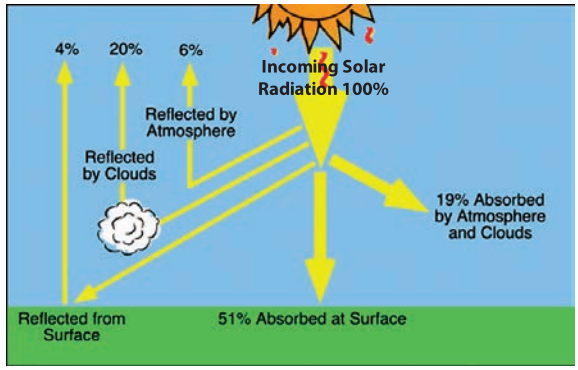


Figure 2.27 **Global modification of incoming solar radiation by atmospheric and surface processes**

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Heat transfer takes place in three ways. These are

- Radiation
- Conduction
- Convection

Radiation is the transfer of energy from one body to another by means of electromagnetic waves. Energy transmitted from the sun reaches the earth's surface through the process of radiation. Electromagnetic waves usually travel through empty space. When these electromagnetic waves come in contact with an object, they transfer the heat to that object. The sun warms the earth through radiation of electromagnetic waves.

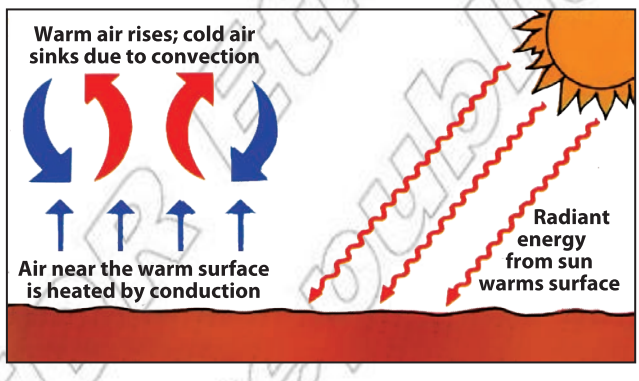


Figure 2.28 **Solar energy reaches earth by radiation**

Conduction refers to the transfer of heat through molecular contacts within and between bodies. Molecules are always in motion. The process of conduction is more important in solids. Air and water are poor conductors of heat.

Convection is the transfer of heat due to differences in density. As gas or liquid either warms and rises or cools and falls, it creates convection currents. Convection is the method by which heat moves through gases or liquids. As gas or liquid is heated, it warms, expands and rises because it becomes less dense. When the gas or liquid cools it becomes dense and falls. Heat gained through radiation or conduction usually transfers by convection.



Activity 2.11

In pairs, perform the following task and discuss the following questions.

1. Explain weather and climate.
2. How does energy in the atmosphere transfers?
3. Why is convection the most important form of heat transfer in the atmosphere?
4. Which method of heat transfer is the most important to bringing heat to the earth's surface?

Measuring and Recording Air Temperature

What is the instrument that is used to measure temperatures? Explain how air temperature is measured and recorded?

We measure temperature with thermometer. There are two types of thermometers: *maximum* and *minimum thermometers*.

A **maximum thermometer** is a mercury-in-glass thermometer that has a constriction near the bulb end. When the temperature of air rises, the mercury in the thermometer expands and forces its way into the stem past this constriction. But when the bulb cools, none of the mercury above the constriction moves back into the bulb. Therefore, the length of the mercury in the stem remains the same. The end of the mercury thread, which is the farthest from the bulb, registers the highest temperature reached in a day.

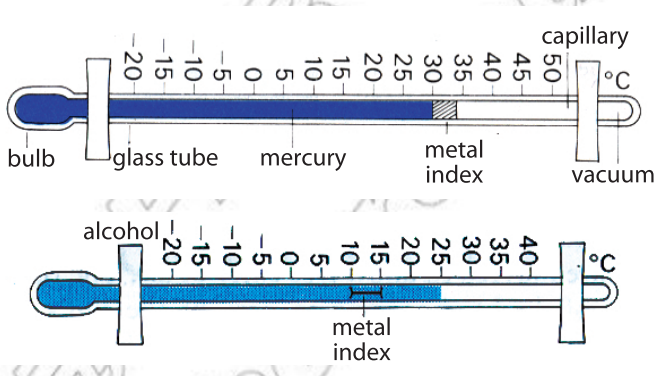


Figure 2.29 **The maximum and minimum thermometers**

- ⇨ *The freezing point of mercury is –38.83°C, and the boiling point is 356.73°C*
- ⇨ *Alcohol freezes at a temperature of negative one hundred thirty degree Celsius (–130°C)*

A minimum thermometer has alcohol as its liquid, and it sets a metal index. When the temperature falls, the alcohol column drags the index towards the bulb end. When the temperature rises, the alcohol column expands and runs past the index without disturbing it. Thus, the end of the index, moves the farthest from the bulb and gives the lowest temperature attained in a day. **Alcohol thermometers** may be used to measure temperatures from -130°C (freezing point of alcohol) to 785°C (boiling point of alcohol). The standard thermometer for environmental measurements needs only to cover the range between -30°C to 50°C.

Maximum and minimum thermometers are kept in a box-like shelter which is known as a **Stevenson screen**.

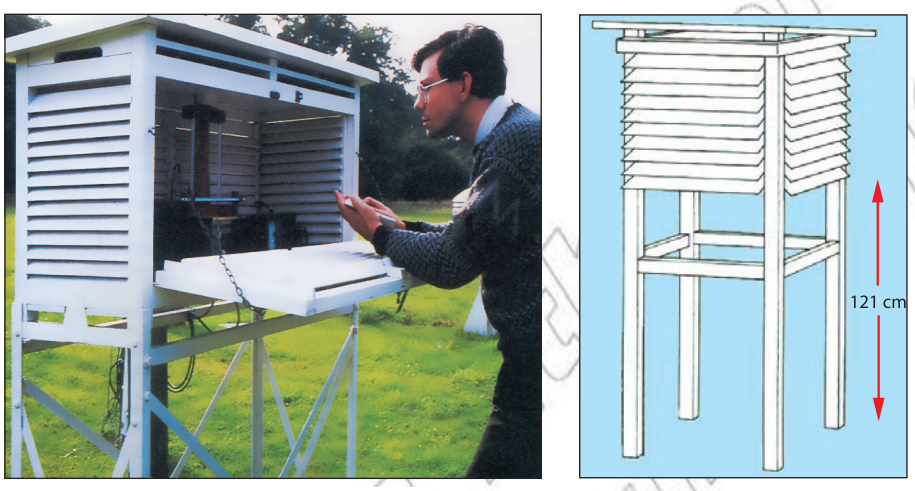


Figure 2.30 **Stevenson screen**

The temperature of the air changes from time to time. Typically we measure the daily and annual variations. The changes between the highest and the lowest temperatures during 24 hours of a day is known as the **daily march of temperature or the diurnal range.**

The changes of temperature from month to month within a year is known as the **annual march of temperature**. To describe this temperature variation, we have to use records for a long period of time. We use words like **average** and **range** to indicate the variations.

Daily average (mean) temperature: is obtained by adding the maximum and minimum temperatures of a day and dividing the sum by two.

Example 1:

If the maximum daily temperature is 25°C, and the minimum daily temperature is 5°C, daily average temperature = $\frac{25^{o}C + 5^{o}C}{2} = 15^{o}C$

- ⇨ *Monthly average (mean) temperature is calculated by adding all daily averages and dividing the sum by the number of days of the month.*
- ⇨ *Annual average is obtained by adding the average monthly temperatures and dividing the sum by 12.*
- ⇨ *Daily (diurnal) range is the difference between the maximum and minimum temperature in a day.*

Example 2:

If the maximum temperature is 25°C, and the minimum temperature is 5°C,

- ⇨ *Daily range = maximum – minimum* = 25°C – 5°C = 20°C.
- ⇨ *Annual range is the difference between the temperatures of the hottest and coldest months in a year.*

Example 3:

If the hottest month is 40°C, and the coldest moth is – 10°C,

Annual range = 40°C −(−10°C) = 50°C

Table 2.5: **Average annual temperature for Addis Ababa**

Months	J	F	M	A	M	J	J	A	S	O	N	D
Annual Max.Temp (°C)	23.3	24.3	24.8	24.2	24.4	22.8	20.6	20.6	21.3	22.3	22.6	22.8
Annual Min.Temp (°C)	9	10.8	11.6	12	12.3	11.2	11.3	11.2	11	9.9	8.7	8.1



Activity 2.12

1 By referring to Table 2.5,
   - a Calculate annual range of temperature.
   - b Calculate annual average (mean) temperature.
   - c Convert the data into graphs

2 When do the maximum and minimum temperatures of the month occur in Ethiopia? Why?

Rainfall

What is rainfall?

Rainfall is liquid precipitation. Any moisture that falls from the clouds towards the earth's surface is called precipitation. Precipitation may occur in the form of rain, snow, hail, sleet and drizzle. Precipitation is part of the water cycle or hydrological cycle. The water cycle begins as water is changed from liquid to vapour by evaporation and transpiration of water vapour. Once water vapour is formed, it expands and cools. Then, **condensation** occurs, forming clouds, and the water falls as snow, sleet or rainfall. The whole process is powered by solar

energy and is repeated continuously. This whole process is called the hydrological cycle.

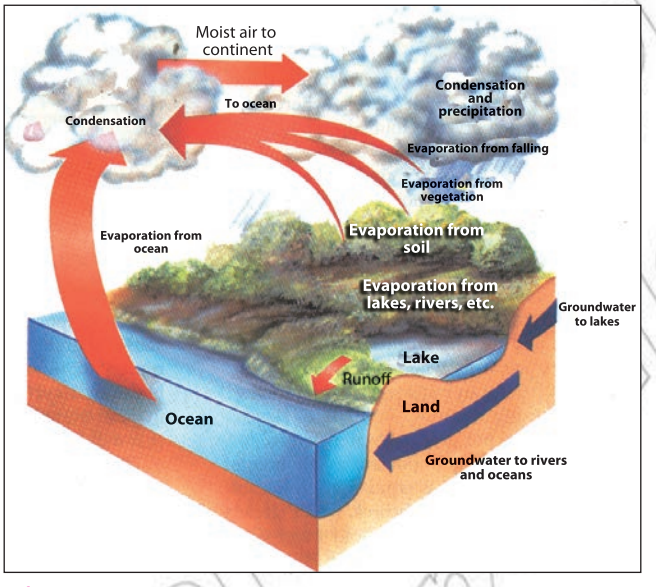


Figure 2.31 **The hydrological cycle**

- *Evaporation is the process by which liquid water is converted into gases.*
- *Transpiration is the transfer and change of water from plants to water vapour in the air.*
- *Evapotranspiration is the combined loss of water through the process of evaporation and transpiration.*
- *Condensation is the process by which vapour becomes liquid.*
- *Sublimation is the process in which ice changes into water vapour without first becoming a liquid, and vice versa.*

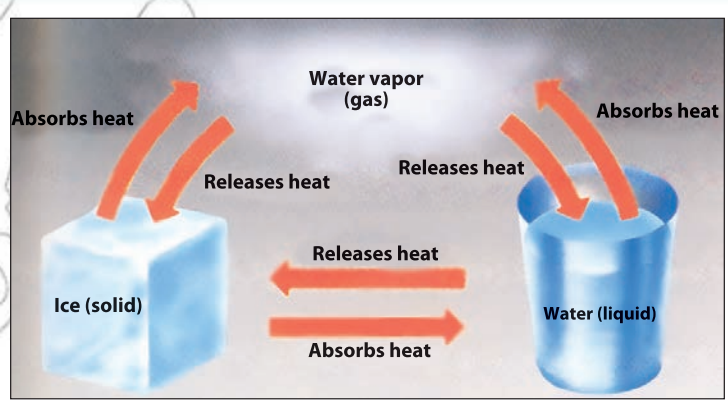


Figure 2.32 **Water exists in three forms**

Water is a unique substance, because it can exist in three states as liquid, solid and gas) in the atmosphere. Water either absorbs or releases heat when changes from one state to another (see Figure 2.32).

Types of rainfall

What are the types of rainfall? Explain their formation.

Rain is given three different names according to the different ways in which moisture is forced to rise. They are:

- Convectional rainfall
- Orographic or relief rainfall
- Cyclonic rainfall

1 **Convectional rainfall:** When the ground surface is heated by the sun, the air above it is warmed up. At high altitudes, the water vapour cools, condenses to form clouds and falls as rain. This type of rainfall is common in humid areas where temperature is high throughout the year.

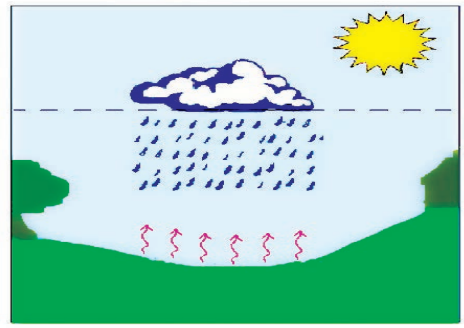


Figure 2.33 **Convectional rainfall**

2 **Orographic (relief) rainfall**: occurs when moist air is forced to rise over mountains. As it rises, it cools, then condenses and falls as rain. Almost all orographic rainfall falls on the windward side of mountains.

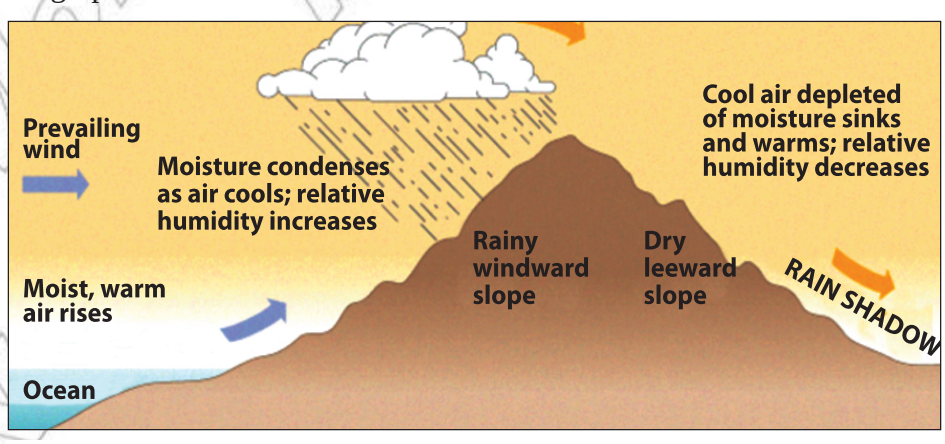


Figure 2.34 **Orographic (relief) type of rainfall**

3 **Cyclonic or Frontal rainfall** when two air masses (warm and cold) meet, they do not mix freely with each other. They remain separated with a boundary surface between them. The warmer and less dense air is forced to rise over the colder and heavier air. As the warmer air rises, it cools and condenses. Then clouds form and rain falls. The place where warm air and cold air meet is called a **front**. Frontal rainfall is very common in the middle and high latitudes (60° north and south from the equator).

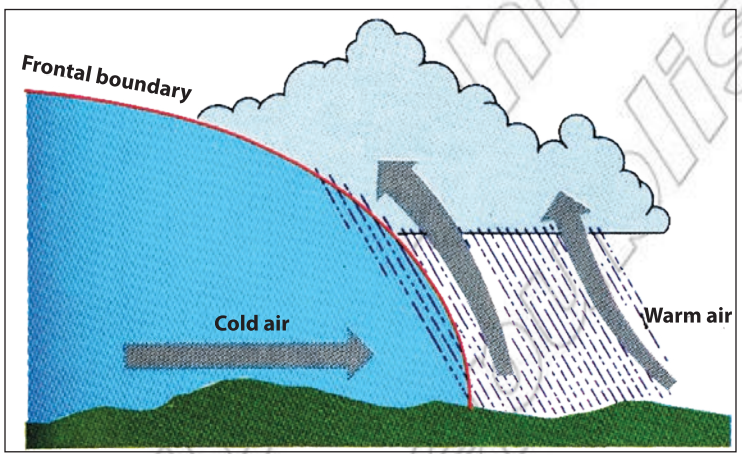


Figure 2.35 **Cyclonic/frontal rainfall**

Measuring and Recording Rainfall

Rainfall is measured using an instrument called **rain gauge**. A rain gauge consists of a wide-mouthed funnel placed over a cylindrical container. Rain water passes through the funnel into the container below. The water in the container is poured into a measuring cylinder, and then the amount of rainfall is measured in millimeters and is recorded.

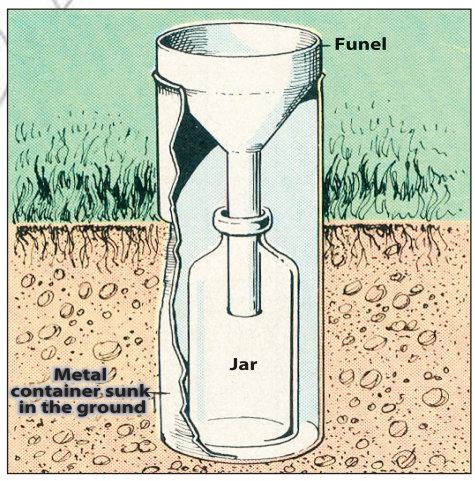


Figure 2.36 **A rain gauge**

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Activity 2.13

Table 2.6: **Rainfall data for Debre Markos**

Months	J	F	M	A	M	J	J	A	S	O	N	D
Rainfall (mm)	18.3	12.1	57.5	55.1	173.1	113	256.5	293.8	210.8	12	91	9.4

Using the preceding rainfall data for the Debre Markos station, perform the following tasks.

1 Calculate the total annual rainfall
2 Identify the season of heaviest rainfall.
3 Draw a line graph to illustrate each monthly total rainfall.

Air Pressure

What is air pressure? Explain how to record and measure pressure?

The air around us has weight. This weight exerts pressure on the surface of the earth. We call this atmospheric pressure. Atmospheric pressure is not the same all over the earth, and it is not the same even in one place all the time.

Pressure is measured by a mercury barometer. Normal pressure, at sea level, is about 760 mm/1013 mb.

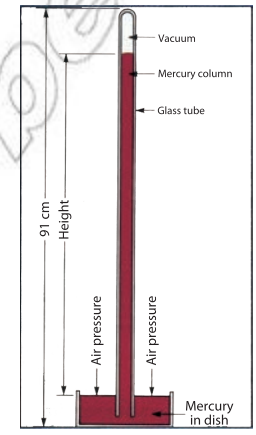


Figure 2.37 **Mercury Barometer**

The distribution of pressure over the earth's surface depends on (1) the **altitude** of places above sea level and, (2) most importantly, on **temperature**.

Pressure decreases with an increase in altitude. This explains why air pressure is highest at sea level and decreases with increasing altitude.

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High temperature makes air expand, so that it has a lower density and pressure. Low temperature makes the air to contract, resulting in a higher density and creating an area of high pressure.

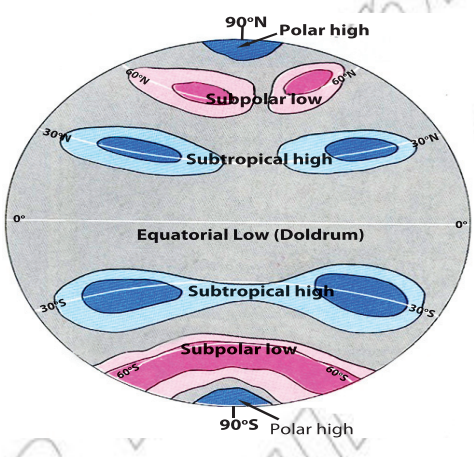


Figure 2.38 **Air pressure belts**

The distribution of air pressure over the globe is known as the *horizontal distribution of pressure*. Pressure distribution can be shown on a map. Lines connecting all places that have the same pressure are called **isobars**.

Focus

Global Pressure Belts:

1 Equatorial low pressure belt (Doldrums):

⇨ *Located from 5° North to 5° South.*

⇨ *There is tremendous heat, and thus warm air, creating low pressure. Also, the centrifugal force is very high at the equator, because the earth's velocity of rotation is high. Hence, the air masses tend to be thrown outwards, resulting in low pressure.*

⇨ *Wind speed is low, that is why this pressure belt is called the doldrums (Belt of Calm).*

2 Tropical high pressure belt (Horse Latitude):

⇨ *Located from 30° to 35° North and South.*

⇨ *Except for two months, temperature is usually high.*

⇨ *Here the pressure is high, because pressure depends on the rotation and movement of air (as winds from the Doldrums rise up and accumulate here. Also winds from the sub-polar low pressure belt accumulate here).*

3 Sub-polar low pressure belt:

⇨ *Located from 60° to 65°, North and South.*

➪ *Here the low pressure is created because of intense high pressure at the poles.*

4 Polar Highs

➪ *Located near the north and south poles.*

➪ *The polar zones have permanent centers of high pressure known as polar highs.*

The pressure distribution over the earth's surface is not a continuous belt. Except in the higher latitude of the southern hemisphere, they form belts due to the small land areas which do not affect the free flow of the atmosphere. However the position of the pressure belts and cells does not remain fixed in one position. They move north or south with the apparent movement of the sun.

During the northern hemisphere's summer, the sun is overhead north of the equator. The pressure belts then shift northward by a few degrees from their average position. During the southern hemisphere's summer, the sun is overhead south of the equator. As a result, the pressure belts move southward by a few degrees from their average position.

Activity 2.14



In your geography work group, answer the following questions.

1 What is atmospheric pressure?
2 Why does pressure decrease as there is an increase in altitude?
3 What effect does temperature have on atmospheric pressure?

Wind

What is wind?

Wind is air in horizontal motion. Winds have **speed** and **direction**. Wind force (speed) and wind direction are affected by

➪ *Pressure gradient*

➪ *Frictional force*

➪ *Coriolis force*

On weather maps, pressure is indicated by drawing isolines of pressure, called isobars. The difference in distance between *Isobars* is called the pressure gradient. If the isobars are closely spaced, we can expect the pressure gradient force to be

great, and wind speed to be high. In areas where the isobars are spaced widely apart the pressure gradient is low and light winds normally exist. High speed winds develop in areas where isobars are closer.

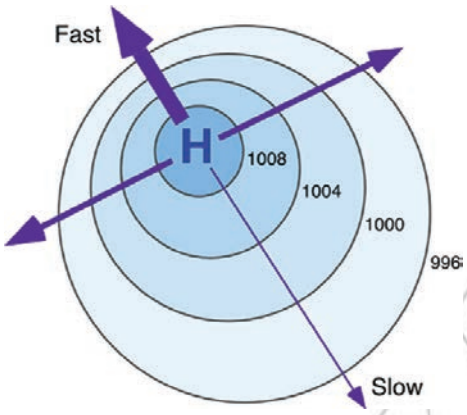


Figure 2.39 **Association between wind speed and distance between isobars**

Figure 2.39 shows that, thicker arrows represent relatively faster winds. Wind speed is often measured with animometer.

Winds are named according to the compass direction of their source. Wind direction is measured as the direction from where wind comes. For example, a southerly wind comes from the south and blows to the north. Direction is measured by an instrument called wind vane.

Strong winds are danger for aviation, sailors, and tall structures such as towers, masts and cranes. Winds also affect different homes in different ways depending on their design and location. The wind can collapse windows and doors, rip off roof sheeting and destroy gables and walls.

Regarding wind erosion, the speed and direction of the wind are directly related to the extent of soil erosion. Soil moisture levels can be very low at the surface of excessively drained soils, thus releasing soil particles to be transported by wind. This condition negatively affects the fertility of the soil, which reduced the yield of crop production.

Deflection of Winds Due to the Earth's Rotation

Because of the earth's rotation, the direction of wind blow may not be at right angles to wind isobars, but rather at slanting angles to them. This deflection is caused by friction. The speed of wind also affects the amount of deflection. The force which affects the direction of movements of winds is called the "**Coriolis force**." The deflection is to the right in the Northern Hemisphere and to the left in the Southern Hemisphere.

Near the ground, where the winds are slowed by friction, the air blows at an acute angle toward areas of low pressure, forming great gyres creating **cyclones** and

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anticyclones. In the Northern Hemisphere, the **Coriolis** force causes air in low-pressure areas to spiral counter clockwise and inward, forming a cyclone, whereas air in high-pressure areas spirals clockwise and outward, forming an anticyclone. In the Southern Hemisphere, cyclones turn clockwise and anticyclones, counter clockwise.

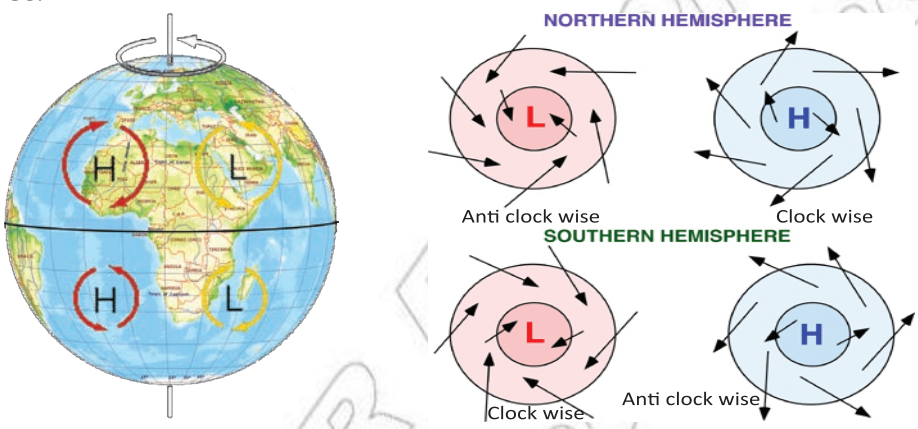


Figure 2.40 **Cyclones and anticyclones**

Focus

Cyclones are atmospheric disturbances which involve a closed circulation about a low-pressure center. They move inward, anticlockwise, in the Northern Hemisphere and clockwise in the Southern Hemisphere. Cyclones are commonly known as **lows** or **low pressure areas**.

Anti-cyclones are vast areas of high pressure which have a diverging system of surface winds. The winds in anti-cyclones blow outward in the anti-clockwise direction in the Southern Hemisphere and in the clockwise direction in the Northern Hemisphere.

Anticyclones are commonly called **highs** or **high pressure areas**.

Types of Winds

There are three types of surface winds. They are:

- ⇨ *planetary*
- ⇨ *monsoon*
- ⇨ *local winds.*

Planetary winds and their relationship with pressure belts: Planetary winds blow over large areas of the earth's surface. They are closely associated with

the world pressure belts. Winds blow from areas of high pressure to areas of low pressure. The most common planetary winds are **trade winds, westerlies** and **polar easterlies**. They have wide influence over the earth's surface (see Figure 2.41).

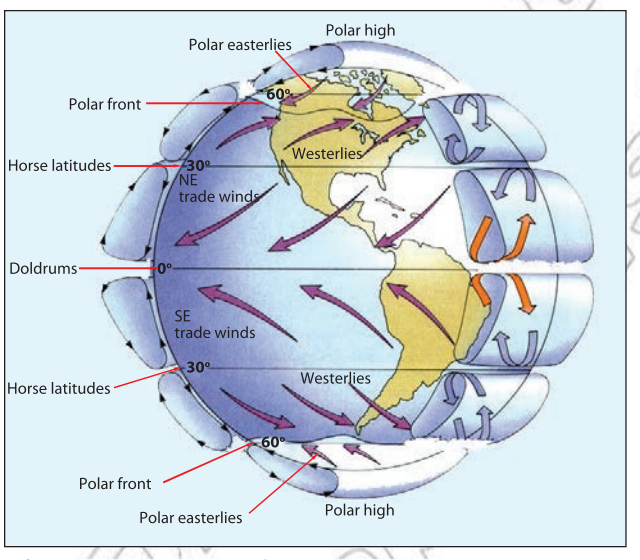


Figure 2.41 **Pattern of global wind belts**

Monsoon winds: They are seasonal winds whose movements are controlled by pressure that differs during different seasons.

Monsoon winds are very common in South and South East Asia. Seasonal changes in the direction of these winds are caused by the unequal heating of land and water surfaces. The direction of monsoon winds changes between summer and winter.

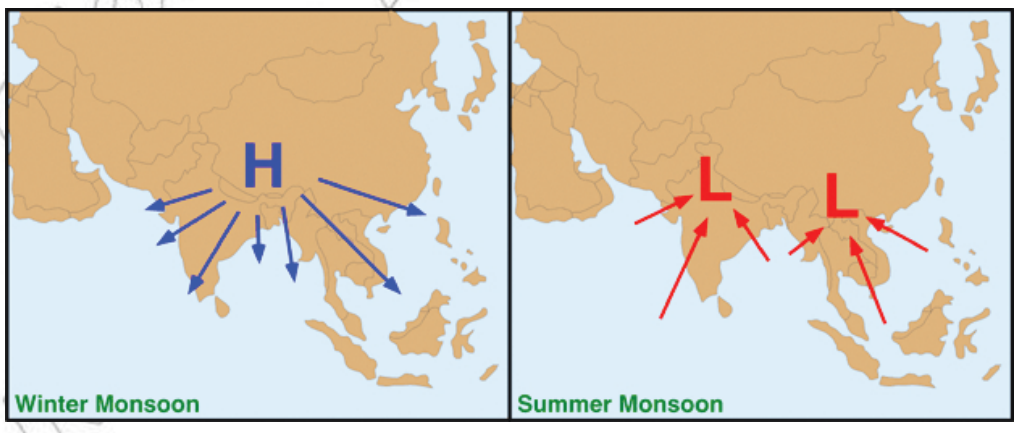


Figure 2.42 **Monsoon winds**

Local winds: They affect only limited areas and blow for a short period of time. They affect climate conditions on a small scale. Local winds are caused by the nature of the physical features of the area. The main local winds are:

- Land and sea breezes
- Mountain and valley breezes

1 **Land and sea breezes:** These winds are common along coastal areas. These winds change their directions daily and affect very small areas. During the daytime, temperature on the land is higher than on the water/sea. So low pressure is formed on the land, while it is relatively high on the sea. Wind blows from the sea towards the land. This is known as a **sea breeze**. At night the land is colder than the sea. So low pressure develops over the sea. The wind blows from land towards the sea. This is known as a **land breeze**.

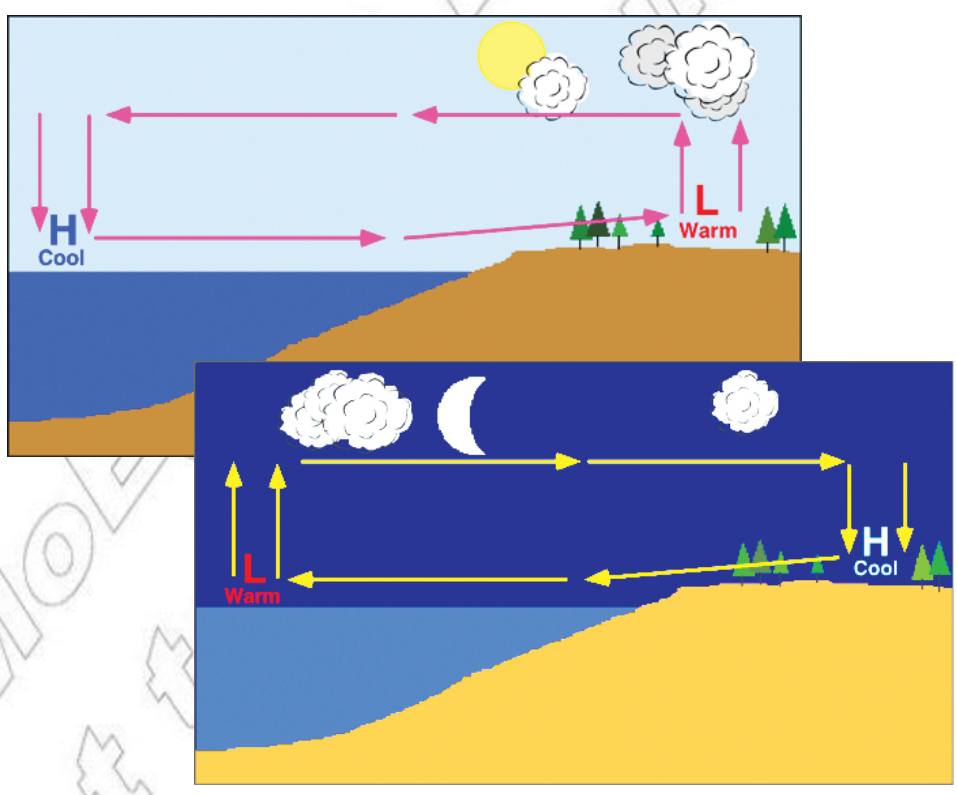


Figure 2.43 **Daytime and nighttime development of sea breeze and land breezes**

2 **Mountain and valley breezes:** Mountain and valley breezes arise from contrasts in temperature between a valley floor and mountain slopes. During the day the air at the bottom of the valley becomes warmer. As a

result it expands and rises along the mountain slopes. This is known as a **valley breeze**.

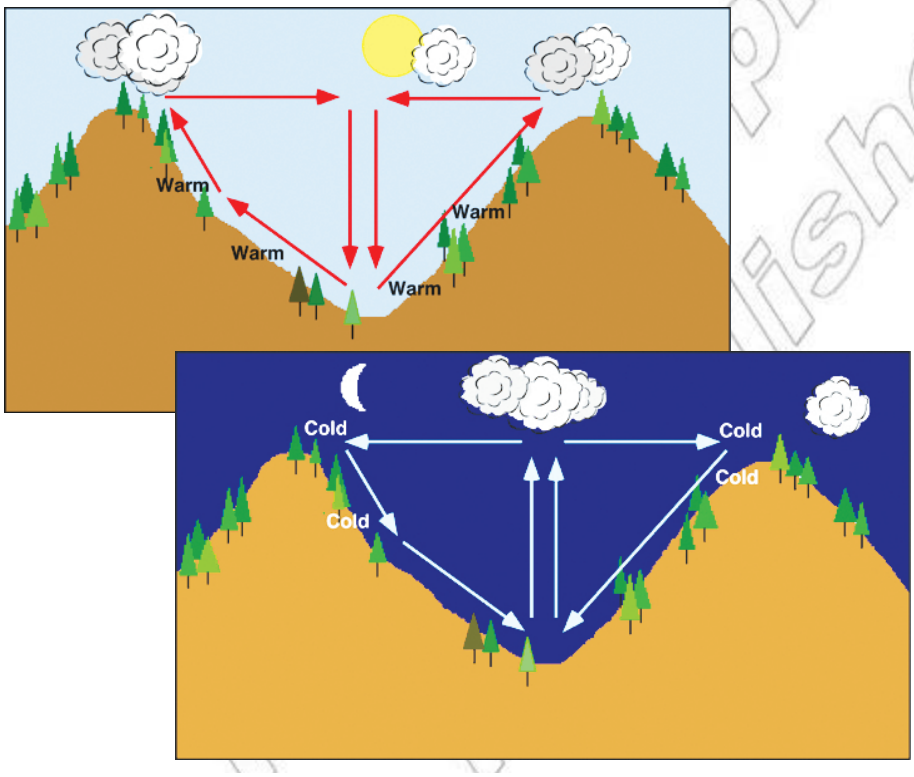


Figure 2.44 **Daytime and nighttime development of valley breezes and mountain breezes**

At night the wind over the slope of the mountain becomes cool. Then this cooler and heavier mountain air slides down slopes towards the valley. This is called a **mountain breeze**.

Clouds

What are clouds? How are clouds formed? What are the major types of clouds?

A cloud is a dense concentration of very fine invisible water droplets, sleet or ice crystals. Clouds are formed by the condensation of water vapour below the dew point in the atmosphere. There are varieties of clouds, based on their height, appearance and shape.

Table 2.7: **Types of clouds**

Group	Cloud type	Description
High clouds > 6000 m	Cirrostratus	Thin, wispy, appears in sheets.
	Cirrus	Thin, wispy, filamentous or curly, mostly composed of ice crystals.
	Cirrocumulus	Small, puffy, patchy and/or with a wave-like appearance.
Middle clouds 2000 – 6000 m	Alto cumulus	Medium-sized, puffy, patchy, scattered clouds – often in linear bands.
	Alto stratus	Thin and uniform.
Low clouds < 2000 m	Stratocumulus	Broad and flat on the bottom, puffy on the top.
	Stratus	Uniform, flat thick to thin layered clouds. Mostly composed of liquid droplets.
	Nimbostratus	Uniform, dark, flat, low clouds that produce precipitation. Mostly composed of liquid droplets.
Vertical clouds < 500 and > 18000 m	Cumulus	Puffy and piled up.
	Cumulonimbus	Can cause lightning, hail, strong rains, strong winds and tornados.

Source: *Focus on Earth science*

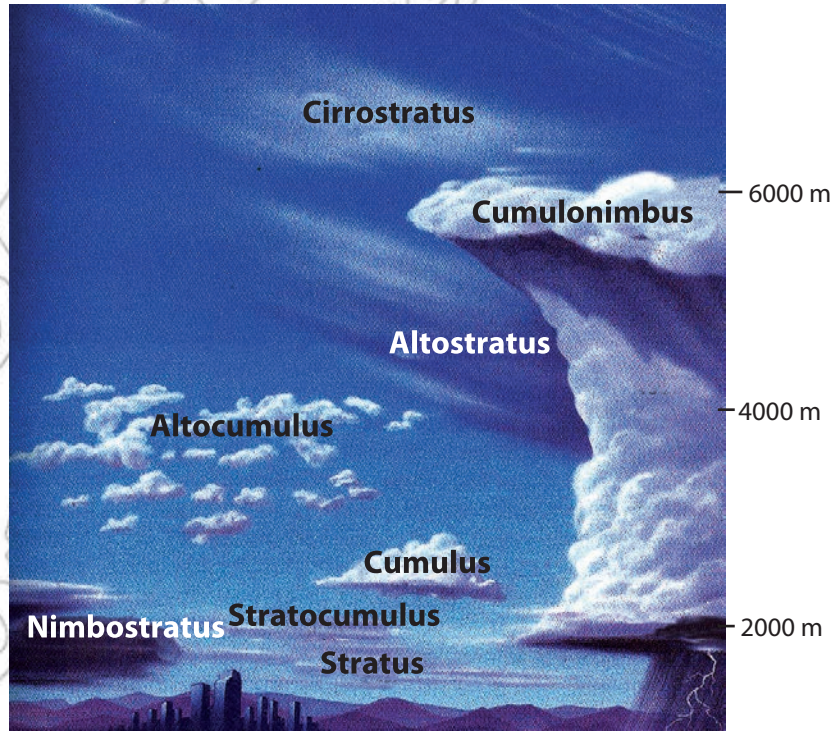


Figure 2.45 **Diagram of cloud types**



Activity 2.15

In your group, perform the following tasks and answer the following questions.

1. What are the major controlling factors responsible for the direction and speed of winds?
2. What is the difference between cyclones and anticyclones?
3. What are the effects of sea breezes and land breezes in a given locality?
4. Compare and contrast the characteristics and formation of monsoon winds and local winds.
5. Discuss the basic characteristics of planetary winds.

Controls of Weather and Climate

What are the major controls of weather and climate?

The energy that the earth receives from the sun is not distributed evenly. Many factors affect the distribution. These include **latitude, altitude, distance from the sea, cloud cover, ocean current**, **planetary winds** and **pressure**.

Latitude

What is latitude? What is the effect of latitude on temperature?

On a global scale, latitude is the most important factor determining the strength of heat reaching the earth's surface. When the sun's rays are vertical (at a right angle) to the surface, the amount of heat received is the greatest. But when the sun's rays are slanting (oblique) the heat's strength decreases.

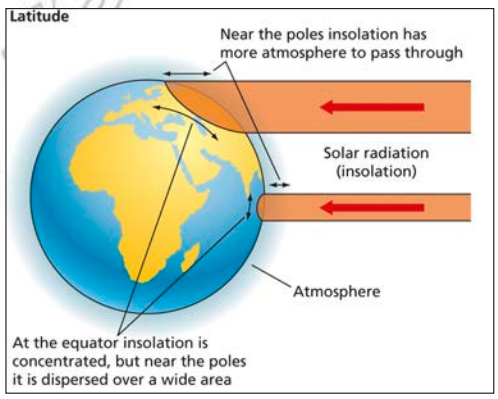


Figure 2.46 **Angle of the sun**

At the equator, the overhead sun is high and of high intensity insolation is received. At the poles, the overhead sun is low, so the amount of insolation is low. The sun is overhead at noon for six months between the equator and the Tropic of Cancer, and it is overhead for another six months between the equator and the Tropic of Capricorn.

The sun is directly overhead at the Tropic of Cancer on June 21 (the June solstice). The sun is directly overhead at the Tropic of Capricorn on December 21 (the December solstice). At March and September equinoxes, the sun is directly overhead at the equator. At times between solstices and equinoxes, the sun is

overhead in tropical areas in the zone between the Tropic of Cancer and the Tropic of Capricorn. The sun passes directly over every tropical place twice a year: once as the sun moves from being overhead at the equator to being overhead at the tropic and then again on the return from the tropic to the equator. The sun is never overhead outside of the tropics. The sun is closer to overhead in the middle and high latitudes on the day of their hemisphere's summer solstice.

Altitude

Do you know how to compute temperature change with altitude?

Air temperature decreases with increasing altitude. The normal decrease of temperature with height is 6.4°C per 1000 m. This is known as the normal lapse rate. The normal lapse rate is the average rate or proportion at which temperature changes per unit of altitudinal change. The highland areas of Ethiopia are good examples of places that demonstrate the effect of altitude on temperature.

Example: If the altitude of the given mountain is 4070 m above sea level and the temperature at sea level is 20°C. What will be the expected temperature at the top of the mountain?

Solution: At normal lapse rate temperature decreases 6.4°C per 1000 m

Altitude of mountain = 4070 m

1000 m = 6.4°C

4070 m = ?

$$\frac{4070\ \text{m} \times 6.4^{\circ}\text{C}}{1000\ \text{m}} = 26.048^{\circ}\text{C}$$

Therefore, the temperature at the top of the mountain = 20°C – 26.05°C = - 6.05°C

Distance from the Sea

How distance from the sea affects the distribution of temperature over the surface of the earth?

Land heats more quickly than water. But it loses its heat quicker than water. This is because of the transparency of water reflections from water surfaces, evaporation, mixing and currents in water. All these conditions result in greater and more rapid temperature changes on land than in the seas. Therefore coastal regions are cooler than inland regions.

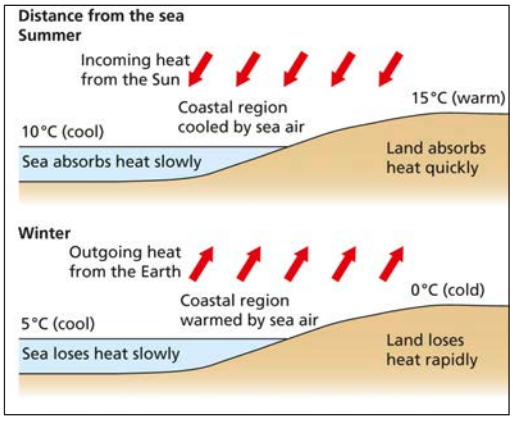


Figure 2.47: **Distance from the sea**

In winter in mid latitudes, the ocean surface is much warmer than land areas. So onshore wind brings heat to coastal lands. During the summer, coastal areas remain much cooler than inland sites.

Cloud Cover

What is cloud? How cloud affects temperature?

Cloud reduces the amount of solar radiation reaching the earth's surface and the amount of radiation reflected from the earth's surface. When there are no clouds both types of radiation will be at a maximum level.

Ocean Current

What is ocean current? How ocean current affects the distribution of temperature?

Ocean current is the horizontal movement of ocean waters caused by winds and differences in temperature. The effect of ocean currents on temperatures depends upon whether the current is **cold** or **warm**.

The water at the equator is warmer and less dense than that in polar areas. Convection currents in the oceans result in a pole ward flow of warm, light,surface water. Compensating heavy cold water flows through the ocean depths towards the equator.

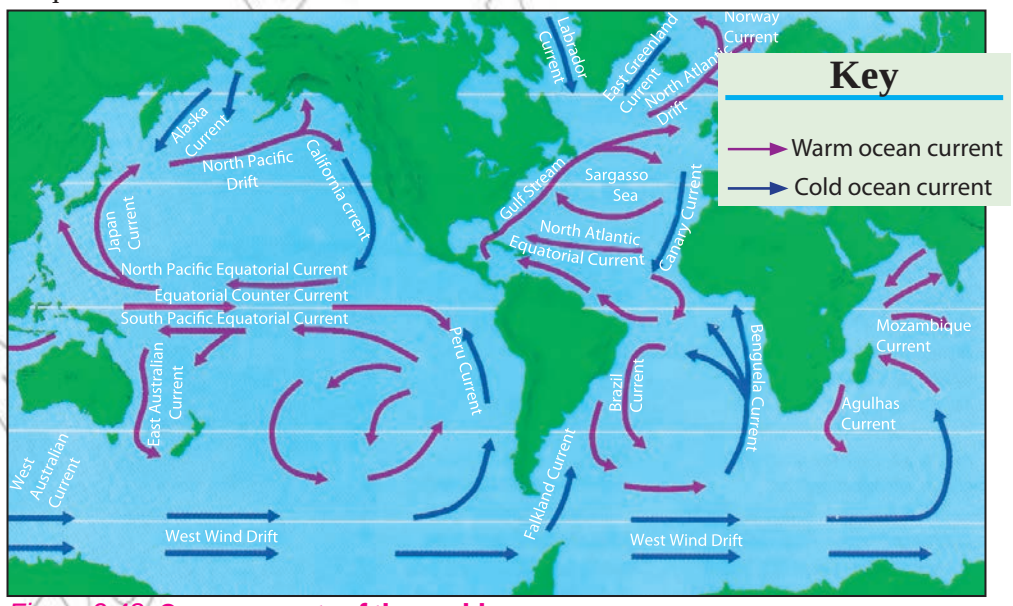


Figure 2.48: **Ocean currents of the world**

Ocean currents are the source of temperature regulation on the earth. Ocean currents change the temperature of a particular region. A warm ocean current makes the weather of the nearby regions to go up in temperature, whereas cold

ocean currents reduce the surrounding temperature. For instance, the European coasts get warmth from the ocean current of the Mexican Gulf stream, and southwestern Africa's Namib Desert is cooled by the Benguela current off the continent's western coast.

The currents also play major roles in determining the global geography of precipitation. The sun can more easily evaporate warm water than cold water and thereby produce the atmospheric vapor that results in rain. Therefore, land impacted by warm currents tends to have abundant precipitation in addition to a comparatively warm climate. In contrast, land impacted by cold currents tends to receive very little precipitation in addition to having a comparatively cool climate.

Winds

What is wind? What is the effect of wind on temperature?

Winds indirectly change the temperature of places near the sea according to the areas from which they blow. There are two ways by which distribution of temperature is influenced by winds.

1 Winds carry the temperature from one place to another.
2 Winds blow the surface layers of a body of water in the direction of their flow.

In this way, the winds have the effect of raising the temperature of the shore towards which the wind is blowing and lowering the temperature of the opposite shore.

Note

In temperate zones, winds that blow from the land lower winter temperatures, but raise summer temperatures. Winds blowing from the sea lower summer temperatures, but raise winter temperatures.



Activity 2.16

In your group, perform the following task and answer the following questions.

1 Which area of the world receives the overhead sun (the sun's rays at a right angle)?
2 Why does temperature decrease with increase in altitude?
3 In what ways do ocean currents change temperature?
4 Why do average temperatures fall as you move from the tropics to the poles?
5 What would be the temperature be at the top of mountain Ras Dashen assuming that the temperature at sea level is 30°C?

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Exercise 2.2

I *Determine whether each of the sentences below is True or False.*

1 Air pressure increases with altitude.

2 Compared to warm air, cold air is more dense for a given volume.

3 Winds blow away from the center of high pressure.

4 Winds that blow in opposite directions in different seasons because of the differential heating of the land and oceans are called monsoons.

II *Choose the correct answer.*

5 Almost all of the energy reaching the earth from the sun is in the form of _____.

A gamma rays
B ultraviolet ray
C atomic particles
D electromagnetic waves

6 The process by which ice changes directly into water vapor is referred to as

A Conduction
B Sublimation
C Condensation
D All

7 The instrument used to measure wind speed is _____.

A Barometer
B Windvane
C Animometer
D Thermometer

8 Ocean currents influence temperature by

A eroding shorelines
B washing warm, dry sediments out to sea
C heating or cooling the air
D dispersing the rays of the sun

9 At the equator, the sun's rays always strike the earth

A at a low angle
B 18 hours each day
C at nearly 90° angle
D no more than 8 hours each day

III *Complete each of the following sentences with the correct word or phrase.*

10 Atmospheric pressure is measured with a _____.

11 Ozone within the atmosphere protects us from _____.

12 Jet streams occur in the layer of the atmosphere called the _____.

13 We live in the layer of the atmosphere called the _____.

14 The abundant gases in the atmosphere are _____ and _____.

2.3 NATURAL REGIONS OF THE EARTH

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

- analyse the concept of region and regional study;
- demonstrate temperature zones of the world;
- discuss the major characteristics of a tropical zone;
- state the general characteristics of the equatorial rainforest and hot deserts;
- distinguish the major sub regions of the tropical zone;
- explain the major relief features of Ethiopia;
- assess the major characteristics of the temperate zone and sub-regions;
- describe the general characteristics of the Mediterranean region;
- explain the general characteristics of a coniferous region;
- recognize the major characteristics of the frigid zone; and
- differentiate the general characteristics of tundra and the polar ice caps.

Key Terms

- Altitude
- Conifer
- Deserts
- Environment
- Forest
- Laterite
- Latitude
- Liana
- Rayon
- Relief
- Region
- Savanna
- Tundra
- Twilight
- Xerophyte

The Concept of Region and Regional Studies

What is a region? What are the major human activities in your locality? Can you identify the natural features of your locality?

A region is a part of the earth's surface which has similar physical elements and to some extent similar human activities. The earth provides many environments that vary in natural elements, such as relief, climate, vegetation, soil, etc. A region can be natural or human-made, can be small or large, and does not have a clear boundary.

To study the different ways of life of all the peoples of the world, one by one, would be very difficult. We have a method by which we can study the different geographical environments of the earth through peoples' social and economic activities. This is what we call a **regional study**.

The regions we are going to learn about are based on the physical elements of climate, vegetation, human activities, etc.

Major Natural Regions of the Earth

What is a natural region? Are all environments similar? What makes them different?

Different environments result in differences in human activities, population distribution and economic development. Mostly, natural regions are named after the dominant vegetation found in them. But their division is based on climate. The earth can be divided into three major temperature zones. These are:

- Tropical (hot) zone.
- Temperate zone.
- Frigid (cold) zone.

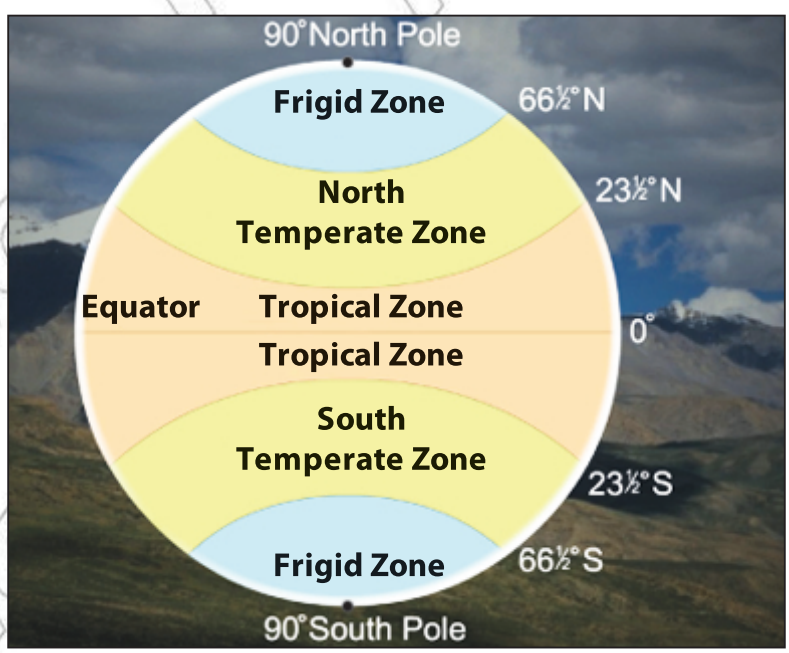


Figure 2.49 **Temperature zones of the earth**

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Within each zone, there is a great deal of variation. Each zone can be divided into a number of sub-regions.

I Tropical (Hot) Zone

What is the location of Tropical zone? Explain the general characteristics of temperature?

The tropical or hot zone is the zone between the Tropic of Cancer (23½°N) and Tropic of Capricorn (23½°S).

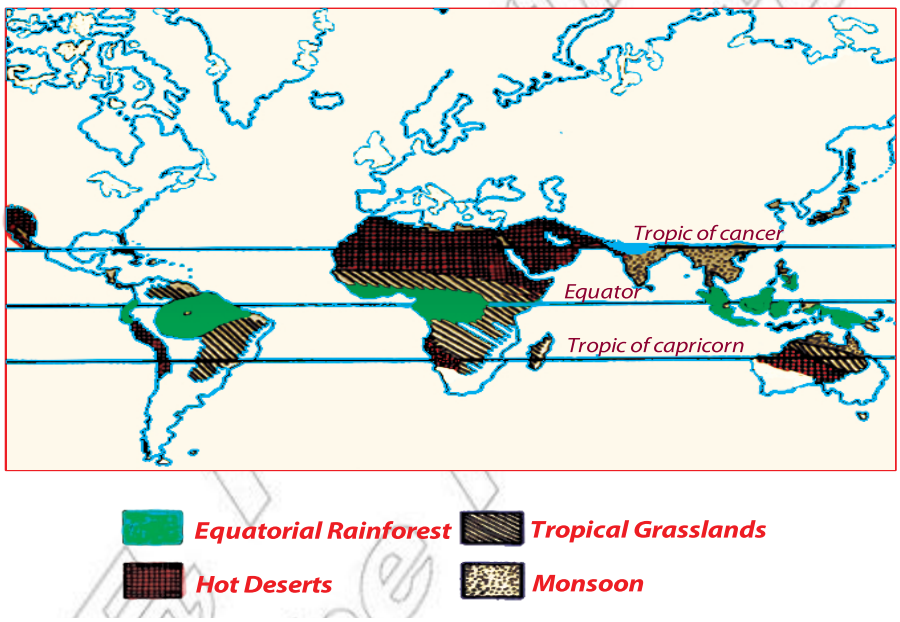


Figure 2.50 **Natural regions of the tropical zone**

The tropical zone is characterized by high temperature throughout the year. The annual average temperature is above 20°C, which decreases polewards from the equator. Rainfall decreases and becomes seasonal as one moves away from the equator. Along the equator there is dense forest which gradually changes with distance from the equator, to savanna grassland, semi-desert vegetation and true desert vegetation. Agriculture and mining are the major economic activities of the zone.

The tropical zone is divided into four sub-regions. These are:

- *the equatorial rainforest region*
- *the savanna grassland region*
- *the desert region*
- *the tropical monsoon land.*



Activity 2.17

Study Figure 2.50 and then perform the following tasks and answer the questions below.

1 List countries where equatorial rainforests are found.
2 Which continent has the largest desert?
3 What countries have the largest areas of tropical grassland or savanna?

Two sample sub regions are treated in detail below.

A *The Equatorial Rainforest Region*

What is the location of equatorial rainforest region? What are the major areas of the equatorial rain forest region?

Location

They are found in the lowland areas within 6° north and south of the equator. The main areas in the world include.

- *The Amazon Basin*
- *The Congo Basin*
- *Southern Malaysia and some Indonesian islands*

The equatorial rainforest region does not form a continuous belt around the earth. It is broken by high altitudes in East Africa and South America. The Amazon Basin is the most extensive area.

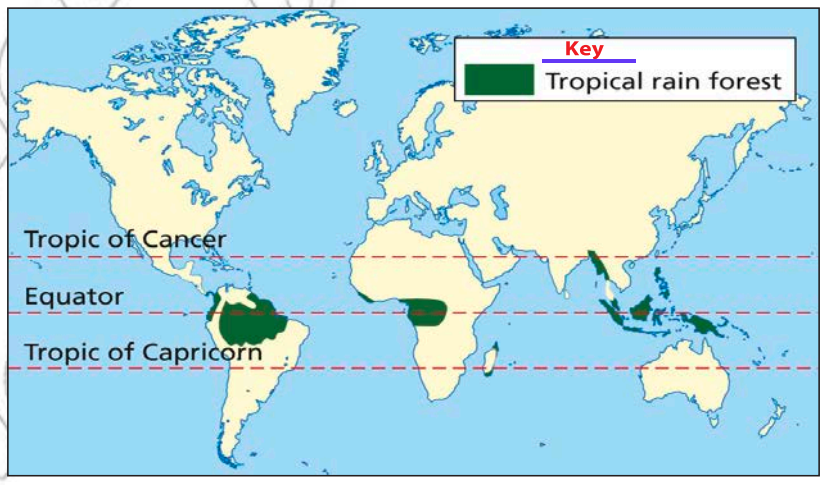


Figure 2.51 **Distribution of Equatorial rainforest Region**

Climate

Equatorial rainforest region has uniformly high temperature and heavy rainfall throughout the year. The mean annual temperature is about 27°C, and the annual range of temperature is less than 3°C. But the daily range is greater than the annual range of temperature. Rainfall in this region is mainly of a **convectional** type which falls every day, usually in the afternoon. The total annual rainfall is very high, usually between 1500 mm and 2500 mm. All months have rainfall with a small variation in amount.



Activity 2.18

Study Table 2.8 and answer the questions and perform the task that follow it.

Table 2.8: **Mean monthly temperatures and mean monthly rainfall of Singapore**

Month	J	F	M	A	M	J	J	A	S	O	N	D
Temp °C	27	27	27	28	28	27	27	27	27	27	27	27
R.F (cm)	251	188	188	193	170	173	173	201	173	206	251	269

Singapore is located 1° north of the equator.

1. What is the mean annual temperature of Singapore?
2. What is the annual range of temperature of Singapore?
3. What is the total annual rainfall of Singapore?
4. In which month is the highest rainfall received?
5. Plot line and bar graphs showing temperature and rainfall of Singapore respectively.

Natural Vegetation

The region has dense, tall, broad-leafed and evergreen trees. The high temperature and abundant moisture of this region makes plants growth continuous. The ground is covered with tropical rainforest, the most luxuriant type of natural vegetation in the world. Most of the trees are hardwood, such as rosewood, ebony, and mahogany, which are valuable for making durable furniture.

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There are three layers in the forest:

1 **The top layer:** This is made of giant trees, often over 50 m high. They do not grow close together. They have very few branches except at the top.

2 **The middle layer:** This is made of the trees that are from 20 m to 40 m high. It is the main part of the forest.

3 **The lower layer:** This is made of the smaller, younger trees. In time, these grow and take the place of the larger trees.

Trees are closely spaced and interlaced with climbing vines called *lianas*. There are as many as about 3,000 species within a few square kilometres.



Figure 2.52 **Vertical stratification of a rainforest**

Wild Animals

The Equatorial rainforest is inhabited by varieties of animals, such as insects, birds, reptiles, mammals. Most mammals are arboreal. They are small in size and are tree climbing, example apes, monkeys, bats, squirrels, etc.

Water body animals, such as crocodiles, alligators, hippopotamuses, fish, etc, are also available.



Activity 2.19

In pairs, discuss the following questions.

1 Why is the equatorial rainforest covered with thick evergreen forest?

2 What are the major characteristics of the climate of the equatorial rainforest?

3 What are the major animals in equatorial rainforest?

Human Activities

What are the major economic activities in the equatorial rain forest region?

The human activities found in equatorial rainforests include primitive hunting and gathering, shifting cultivation, plantation agriculture, and mining.

Hunting and gathering: Many of the people of the equatorial rainforest region lead a simple and primitive way of life. The forest vegetation provides them with food in variety, if not in abundance. They also hunt animals and fish from the rivers.

Shifting cultivation: This is more advanced than hunting and gathering, and it provides people with a continuous food supply. An area of forest is cleared to create a small plot of land which is cultivated until the soil becomes exhausted. The plot is then abandoned and a new area is cleared. This is a threat for this region in the long run. Frequently the cultivators work in a circular pattern, returning to previously used land once the natural fertility of the soil has been renewed.

Shifting cultivation is, a simple form of agriculture based on the shifting of plots after two or more years.

This type of agriculture is practiced in equatorial rainforests because of the nature of the soil. The soil of the region lacks valuable mineral nutrients which resulted from excessive leaching. Such leached soil is called **laterite**.

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Activity 2.20

1 In a small groups work the following. Find and read articles written in newspapers or magazines about:
   a plantation
   b mining in Ethiopia; and share the information with your group.

In pairs, discuss the following questions.

2 What is the advantage of the practice of shifting cultivation?

3 What is the threat in the long run caused by shifting cultivation?

Plantation agriculture: is a large scale production of one or two crops for sale. It is based on modern techniques of production. It was first introduced to the region by Europeans during the colonial period. Plantation agriculture is characterized by:

- ⇨ *Large-scale holdings, which draw most of their labor supply from the local inhabitants.*
- ⇨ *The production of a single crop (mono culture)*
- ⇨ *Heavy investment in processing plant, railway, shipment facilities, etc.*

The most important crops grown in the plantations of the equatorial rainforest region include rubber, palm oil, jute, bananas, pineapples, cocoa, sugarcane, etc.

There are a number of areas that produce commodities for export. For example, nearly half of the world cacao production comes from Ghana.

Rubber is one of the main plantation crops in Malaysia, Indonesia and Congo. The Amazon basin supplies only a very small amount of the world's rubber.

Mining: is the extraction of mineral-bearing substances from the earth's crust. The equatorial rainforest region is a source of useful minerals. Bauxite (an ore of aluminium) is found in Ghana, Guyana and Venezuela. Petroleum is found in Nigeria, Venezuela, and Indonesia. Iron ore is found in Liberia.

B *Tropical Deserts*

What is a desert? Where are the major tropical hot deserts? How were tropical deserts formed? What are the major characteristics of hot deserts?

Location

Deserts are almost barren lands. The tropical hot deserts are located between 15° to 30° north and south latitudes of the equator. The largest hot desert is the Sahara

Desert. There are also other important deserts such as the Kalahari, Atacama, Colorado, Arabia, Thar and Australian deserts. Deserts are formed due to their location

- *in the trade-wind belts*
- *on the leeward side of high mountains*
- *in the interior of continents*
- *along cool ocean currents*

Most deserts arise due to atmospheric wind conditions. Warm air masses create two belts of desert, one along the Tropic of Cancer and the other along the Tropic of Capricorn. Other deserts result from the effects of ocean currents on land masses, where cool air masses carry fog and moist, but little rain, along coastal regions.



Figure 2.53 **Tropical desert regions**

Deserts are located on the western margins of continents, except for the Sahara Desert, which is in North Africa and extends to the northeastern coast of the African continent.

Climate

The main characteristics of desert is that the climate is hot throughout the year, and there is very low and unreliable rainfall (not more than 250 mm per year).

Temperature ranges from 25°C to 40°C or above during the daytime, and they can fall even below 0°C during the night, due to the absence of clouds. The winds are warm and dry.

The following graph for Baghdad, Iraq shows the annual average weather condition readings covering rain, monthly average, maximum and minimum temperatures.

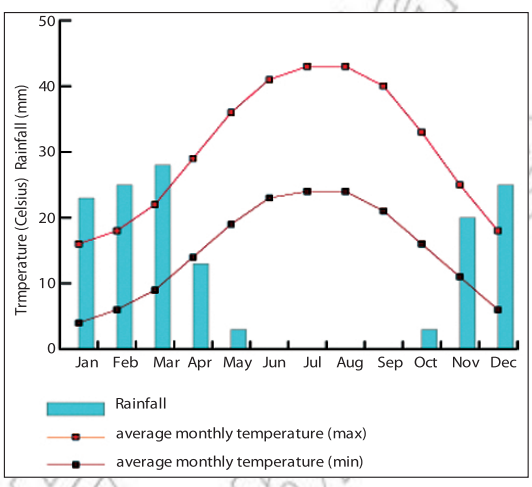


Figure 2.54 **Climate graph for Baghdad (example of hot desert climate)**

Vegetation

The climate of the hot desert is not favourable for plant growth. However, there are some plants that have a special way of behaving or special features (adaptations) which enable them to survive. Plants in deserts have long roots, few or no leaves, hard bark and an oily leaf surface. These features help the plants to extract every drop of moisture from the soil and reduce the loss of water by evapotranspiration. These are called *xerophytes*. Xerophytes are woody and thorny plants, grasses and herbs, for example cacti.

Animal life

Animals such as gazelle, hare, fox, snakes, lizards, etc are commonly available in the desert region. For the desert people camel is their best companion. It has special adaptations, which helps it to survive the desert.

Human Activities:

The major economic activities found in the hot deserts are pastoralism, crop cultivation and mining.

Pastoralism is the grazing of animals. Many of the desert people practice a nomadic way of life. Nomads do not live in one area. They move with their animals from place to place looking for water and pasture. They keep animals like camels, sheep, goats, cattle, etc. Small-scale crop cultivation is possible along wadis (small streams) and in the oases; dates, vegetables, fruits and cereals are grown. In areas where the deserts are crossed by rivers, irrigation on a large scale is possible. The waters of the Nile, Tigris-Euphrates and Indus have made possible the cultivation of crops in desert areas.

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Most deserts are important sources of minerals. The most important mineral is oil. The Middle East alone accounts for about 60% of the world's total oil reserve.

Other minerals produced in hot deserts are nitrates and copper in the Atacama Desert, gold in the Australia Desert, diamond in the Kalahari, natural gas in the Sahara Desert and the Middle East, phosphate and iron ore in the northwest Sahara Desert. Therefore, mining is an important occupation in deserts.



Activity 2.21

In your group, discuss the following questions and perform the following tasks:

1 Why do deserts have very cold night and hot days?
2 Explain the three ways in which deserts are formed.
3 How plants have adapted to survive in deserts.
4 Why it is difficult to live in a hot deserts?

Case Study 1

Vertical Distribution of Climate in Ethiopia

Ethiopia lies within the tropics (3°N to 15°N latitude). It lies in a zone of maximum insolation where every place has overhead sun twice a year. However, as it is a highland country, tropical temperature conditions are not experienced everywhere. They are limited to the lowlands in the peripheries.

The traditional classification of climatic zones of Ethiopia is divided into five:

1 **Bereha (hot arid)**: found below 500 m a.s.l., where the average annual temperature range is between 30°C and 40°C or higher.
2 **Kola (warm to hot semiarid):** It is a climate of hot lands with altitudinal ranges of 500 - 1,500 m a.s.l. Average temperature is between 20°C – 30°C.
3 **Weina dega (warm to cool semi-humid)**: This is a zone which covers the temperate highlands that fall in altitudinal ranges of 1,500 – 2,300 m a.s.l. Its average annual temperatures are between 15°C and 20°C.
4 **Dega (cool to cold humid):** This describes the cool temperate highlands with an altitude ranging from 2,300 – 3,300 m a.s.l. and average temperatures between 10°C to 15°C.
5 **Wurch (cold moist temperature):** It coincides with the Afro-alpine areas on the highest areas of the plateaus. The lower limit of the wurch

zone, generally, coincides with the transition from coniferous forest to the vegetation dominated by Asta. This happens above 3,300 m.a.s.l. where Average temperature is below 10°C.

⇨ *Though Ethiopia is a tropical country, its climate types range from desert to hot steppe, and from tropical savanna and rainforest to warm temperate cool highlands. Ethiopia is a multifaceted tropical country, because of the influence of altitude.*

Case Study 2

Altitudinal Condition and Temperature Distribution of the Central African Republic

The Central African Republic (C.A.R.) is a landlocked country which lies in the heart of equatorial Africa. Most of its land is plateau that ranges with altititude from about 610 m to 792 m. Two ranges of hills in the north and northeast rise to maximum heights of about 1,402 m.

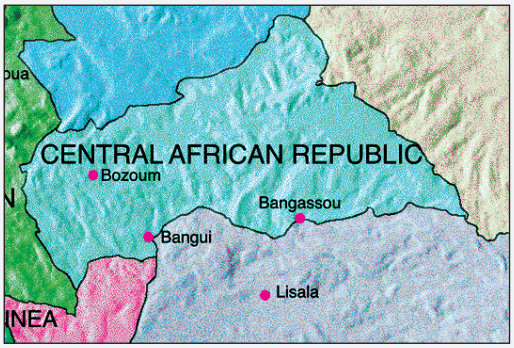


Figure 2.55 **Central African Republic**

The Central African Republic is characterized by the tropical climate with hot dry winters and mild-to-hot wet summers. The average annual temperature is about 26°C. The average annual temperature ranges in Bangui are from 21°C to 29°C, in July or August, to 21°C to 34°C in February. The northern part has a drier climate with temperatures reaching as high as 40°C, and it is prone to harmattan (hot dusty) winds, and even to desertification. The temperature in the south is lower, as 30°C during the day and 20°C at night. These conditions are similar to those in Ethiopia's western lowlands.

Though the C.A.R. gets a lot of rainfall (mostly in May-October), because of its altitude, it is not as hot and humid as many equatorial countries.



Activity 2.22

In your group, perform the following tasks.

1 Describe the differences and similarities in temperature distribution and altitudinal conditions between Ethiopia and the Central African Republic.

2 Examine the important factors that determine temperature distribution in Ethiopia and in the Central African Republic.

C *Ethiopia, a Mountainous Tropical Country in Eastern Africa*

Location of Ethiopia

What is location? Where is your region located? Describe the location of Ethiopia.

Location refers to the position or site that a place occupies. It is understood in two ways, **relative location** and **absolute location**.

Relative Location: Location of a place in relation to water bodies or land masses. It is also known as **vicinal location**. It can also be explained in terms of compass points such as North, East, South and West etc.

Ethiopia is located in the Horn of Africa. It shares common boundaries with five neighbouring countries.

Table 2.9: **Ethiopia's borderlines, shared with neighbouring countries**

Country	Location	Boundary lines in (km)
Sudan	West	1750
Somalia	South East	1600
Eritrea	North	840
Kenya	South	760
Djibouti	East	310

- *Size of Ethiopia is 1,106,000 sq. km*
- *In terms of land-area size Ethiopia is 10th in Africa and 25th in the world*

Absolute location is the position obtained in reference to the parallels of latitudes and meridians of longitude. The latitudes and longitudes are measured in degrees, which are expressed in numbers. Ethiopia has four extreme points. These are the

southern most tip, northern most tip, western most tip and eastern most tip. Thus, Ethiopia's absolute location is 3° N to 15° N and 33°E to 48°E.

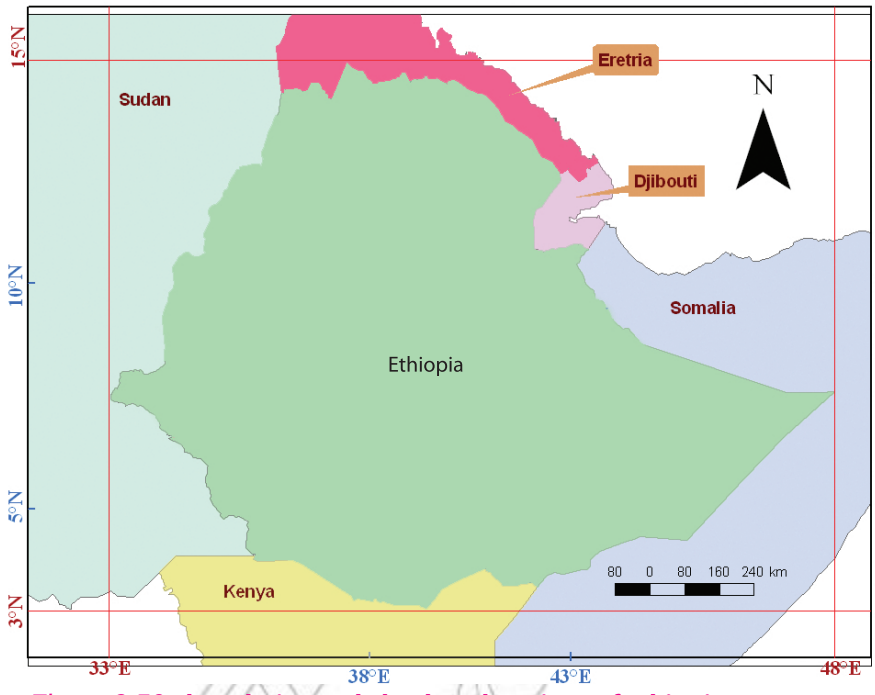


Figure 2.56 **The relative and absolute locations of Ethiopia**

- *The north – south extent of Ethiopia is 12°*
- *The east – west extent of Ethiopia is 15°*



Activity 2.23

Using Figure 2.56, perform the following task and answer the following question.

1 Explain the relative location of Ethiopia.

2 What is the influence of the south–north extent of Ethiopia on its climate? Discuss.

The Relief of Ethiopia

What does relief mean? What are the major relief features of Ethiopia?

Relief means the differences in altitude and surface structure of any part of the earth.

Ethiopia is characterized by a variety of landforms, such as mountains, plains, depressions, and valleys. The major landforms of Ethiopia can be classified into

- Highlands
- Lowlands

The point at an altitude of 1000 meters above sea level is generally considered to be the division between highlands and lowlands.

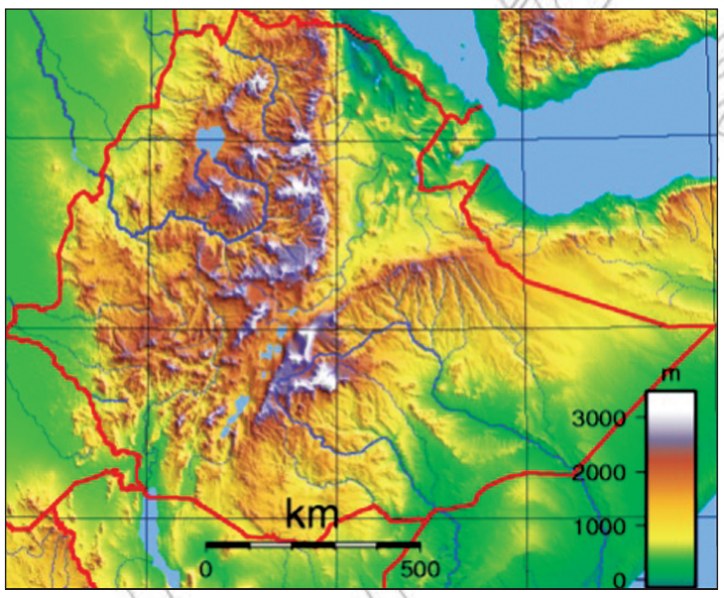


Figure 2.57 **Major relief of Ethiopia**

I *Highlands*

What is highland? What are the major highland areas of Ethiopia?

***Highlands** of Ethiopia are grouped into three areas:*

1. **Northern highlands:** include Tigray, Wollo, Gojjam, Gonder and the Shewan plateaus.
2. The **Southwest Highlands:** include parts of Wellega, Illubabor, Keffa, Gamogoffa and Benishangul highlands.
3. The **Southeast Highlands:** They are separated from the northern and southwestern highlands by the Ethiopian Rift Valley. They include the Arsi-Bale Massif, Jemjem Plateaus and Hararghe Highlands.

The highlands of Ethiopia account for more than half of the total area of the country. They experience cool climate and adequate rainfall. Here altitude modifies the climatic condition of Ethiopia.

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II Lowlands

What is low land? What are the major lowland areas of Ethiopia?

Lowlands of Ethiopia include the areas below 1000 meters in altitude, and they are mostly found in the peripheral parts of Ethiopia. They are grouped into three categories. These are:

1. **Western Lowlands:** They include the Tekeze-Setit lowland, the Abay-Dinder and the Baro Akobo lowlands.
2. **Southeastern Lowlands:** include the Borana, Elkerre and Ogaden lowlands.
3. **Awash-Afar Lowland:** occupies the floor of the Rift Valley.
   - ⇨ **The Awash Valley:** *extends from the south of Koka Dam to the mouth of the Awash River.*
   - ⇨ **Afar Depression:** *extends northwards within the floor of the Rift Valley. It is the lowest point of Ethiopia, and the Kobar sink (116 m below sea level) is part of it.*



Activity 2.24

In your group, answer the following question and perform the following tasks.

1. Can you name the basic physical features of Ethiopia?
2. Using the map in Figure 2.57, locate regions (kilil) where the lowlands of Ethiopia are mostly found.

II Temperate Zone

What does temperate zone mean? Where is the temperate zone located?

What are the climatic characteristics of the temperate zone?

Location

The temperate zone is located between 23½°, and 66½°, both north and south of the equator. The temperate zone is the transitional zone between the tropical zone and the frigid zone. It is also known as a mid-latitude region.

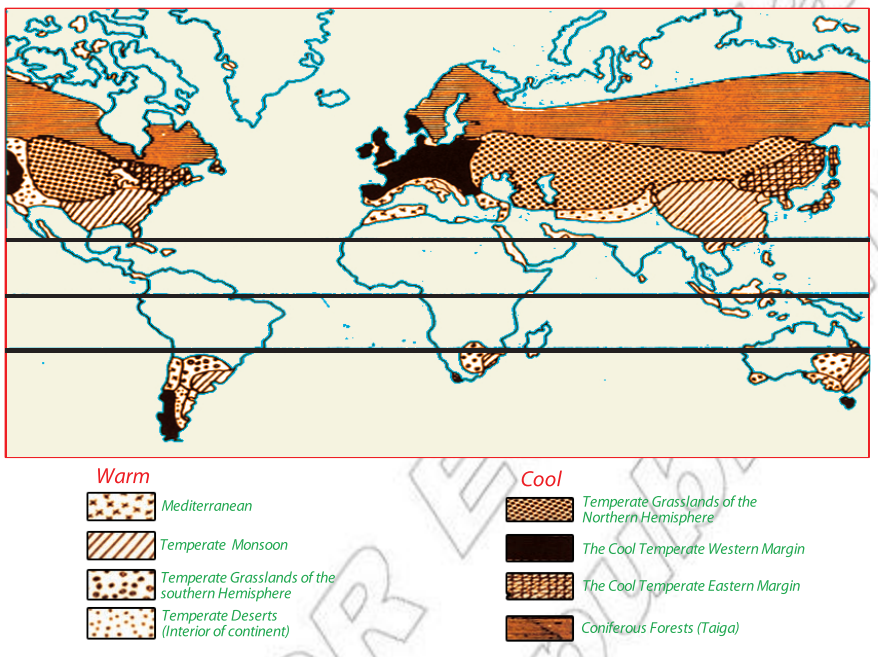


Figure 2.58 **Natural regions of the temperate zone**

Climate

Temperate regions usually have four distinct seasons. They are summer, winter, autumn and spring. Weather changes are observed in each season. Precipitation ranges from 750 mm to 1500 mm. Temperature ranges from below freezing point during the winter, to 30°C or more during the warmest days of summer. There are important factors that bring about frequent weather changes in the temperate zone. These are:

- **Convergence of tropical** *and* **polar air masses:** *This results in cyclonic storms and fronts.*
- **Angle of the sun:** *The sun is never overhead in the temperate zones. Therefore it does not heat the earth very much.*
- **Length of day:** *There is a big difference in the length of day between summer and winter. Days are longer in summer and shorter in winter.*
- **Effects of continents:** *This is more important in the northern hemisphere, where there are very large areas of land. In winter, the centres of the continents become very cold because they are far away from the sea. In this season, the angle of the sun is very oblique and it does not give much heat. During summer, the interiors of the continents become very hot. The annual range of temperature is therefore very great.*

Temperate region has coniferous forest, grasslands and shrublands. The region as a whole is generally more developed than the other regions. Most of the worlds industries are found in this region. Agriculture is also highly developed. Both growing of crops and rearing of animals are carried on modern and scientific basis. This is true with fishing and forestry, too.

The temperature region is, therefore, the most important producer of both agricultural and industrial productions in the world.

Sub-regions: The temperate zone is a very extensive zone. It contains many regions with different characteristics. But the two main divisions are the **warm temperate** and the **cool temperate regions.**

The warm temperate region includes:

- ⇨ *The **Mediterranean region areas**.*
- ⇨ *The **temperate monsoon lands**.*
- ⇨ *The **warm temperate grasslands** of the southern hemisphere.*
- ⇨ *The **temperate deserts** (in the interiors of the continents).*

The cool temperate region includes:

- ⇨ *The **temperate grasslands** of the northern hemisphere.*
- ⇨ *The **cool temperate western margins**.*
- ⇨ *The **cool temperate eastern margins**.*
- ⇨ *The **coniferous forest belts**.*

One sample area of each sub-region is discussed in detail below.

A *Mediterranean Region*

What is the location of the Mediterranean region? What are the climatic characteristics of the Mediterranean region?

Location

The Mediterranean region is located on the western coasts of the continents, particularly in the middle latitudes (30° to 45° north and 30° to 40° south of the equator). The major Mediterranean-region areas are:

- ⇨ *The surrounding area of (the shore of) Mediterranean sea*
- ⇨ *Southwestern part of South Africa*

- *Central Chile*
- *Central California.*
- *Southwest and Southern Australia (Adelaide to Melbourne).*
- *Northern New Zealand.*

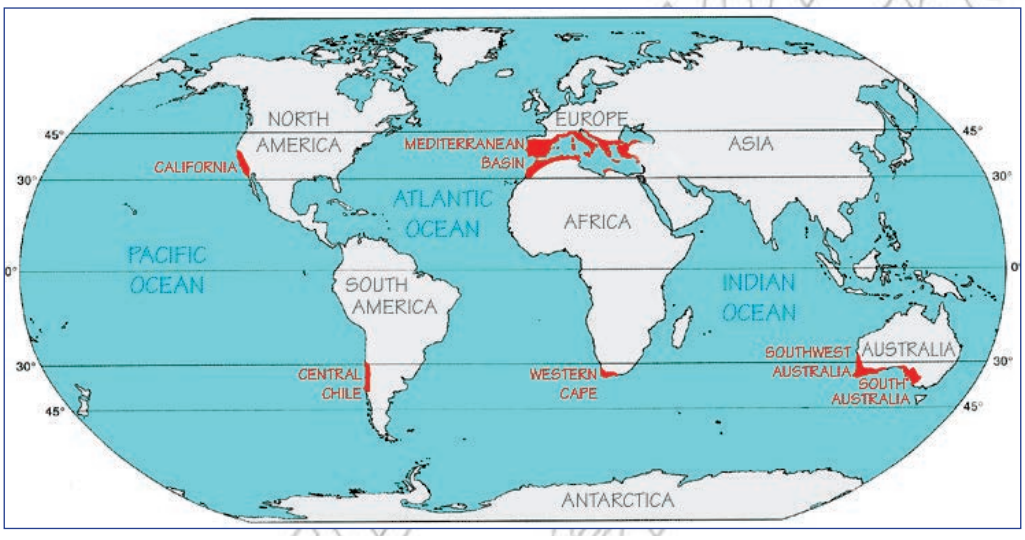


Figure 2.59 **Location of Mediterranean-region areas**

Climate

The climate is characterized by warm to hot, dry summers and mild to cool, wet winters. Summer has off shore dry winds. But winter has on shore wet westerly winds.

During the summer season, the Mediterranean lands are under the influence of sub-tropical (Horse Latitude) high pressure. This means the dry trade winds blow out from them and do not bring rain, but temperature is high. In winter, the winds that blow over these areas are the onshore westerlies. These winds blowing from the ocean bring rain to the Mediterranean-region areas, but the temperature is low.

Table 2.10: **Climate data for Algers 37°N**

Months	J	F	M	A	M	J	J	A	S	O	N	D
Temp. °C	10	11	13	15	18	22	24	25	23	19	15	12
Rainfall, in mm.	116	76	57	65	36	14	2	4	27	84	93	117



Activity 2.25

Study Table 2.10 and answer the following questions and perform the following tasks.

1 Which months of the year represent summer and winter?

2 List the months with the highest and lowest rainfall.

3 List the months with the highest and lowest temperatures.

Natural Vegetation

What is Natural vegetation?

Many years ago the Mediterranean region was covered with evergreen forests. However, in most areas the forests have been destroyed and replaced by a type of vegetation known as Maquis. The Maquis vegetation consists of small short trees with dense growth of **shrubs**. The olive tree is the most common. Almost all kinds of citrus fruits grow in the Mediterranean region.

Human Activities

Agriculture is highly diversified and specialized in the Mediterranean region areas. The most important crops grown in the Mediterranean lands are grapes, figs, oranges, apples, vegetables, olives, wheat and, in the wetter areas, rice. Because of the dry hot summer, agriculture in the Mediterranean region depends on **irrigation**.

Transhumance is also practiced in the area. This is the practice among pastoral farmers of moving their herds and flocks between two regions of different climates. In mountainous regions, the animals are driven from mountain to valley pastures for the winter and back again to mountain pastures for the summer.

Mining: Only a few areas have mineral deposits-such as gold and petroleum in California and copper in Chile. Italy is a major producer of mercury. Chrome and coal are mined in Turkey.

Manufacturing Industries: The existing industries process agricultural products. Wine making, extraction of olive oil and fruit drying are some of the industrial activities.

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Activity 2.26

In your group, perform the following tasks and answer the following questions.

1 Why is irrigation important in the Mediterranean region areas?
2 The Mediterranean-region areas are scattered in different parts of the world. What common things do they share?
3 In most parts of the world, winter is cold and dry. But in Mediterranean region areas, it is rainy. Discuss why this happens.

B *Coniferous Forest Region/Taiga*

Where is the location of the coniferous region? What are the major areas of the coniferous region? What are the climatic characteristics of this region?

Location

This region lies approximately between 55° North and 70° North latitudes. The coniferous forests are found only in the northern hemisphere. The major coniferous forest areas are:

- *Northern America*
- *Northern Norway, Sweden and Finland*
- *Parts of Asia, South of the arctic circle and north of the temperate grassland.*

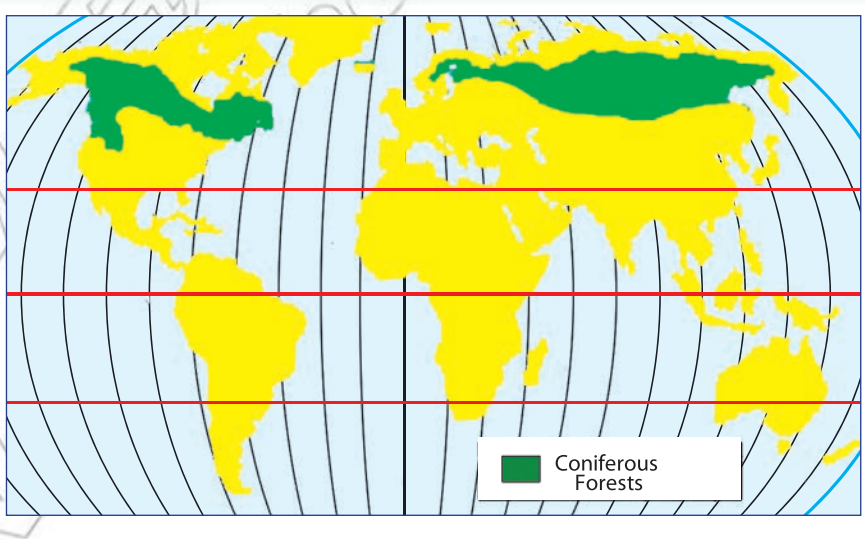


Figure 2.60 **The Coniferous forest belt (Taiga)**

Climate

The climate changes a lot from season to season. Winter is long and very cold. For over half of the year, the mean monthly temperature is below zero. The winter days are short, but the sky is clear. In winter, the northern hemisphere is tilted away from the sun. As a result these lands get only short periods of daylight.

When the summer season begins, the long days of bright sunshine make the temperature high. In summer, the northern hemisphere is tilted toward the sun, so these lands get long hours of daylight. Summer is also a season of maximum rainfall. The rainfall is mainly cyclonic. The total annual rainfall ranges between 300 mm and 750 mm. Even though the total rainfall is low, it is adequate for plant growth, as the rate of evaporation is low.

Table 2 11: **Climate table of Verkhoyansk, Siberia**

Months	J	F	M	A	M	J	J	A	S	O	N	D
Annual Max. Temp. °C	-43	-37	-20	-3	10	20	23	18	9	-9	-32	-40
Annual Min. Temp. °C	-49	-46	-39	-22	-3	6	9	4	-3	-19	-40	-47
Precipitation mm.	6	6	5	6	12	23	33	32	14	13	10	8

Source: *Pogoda. ru. net*



Activity 2.27

Using Table 2.11, answer the following questions.

1. From the table can you tell how many months have temperatures above zero?
2. What is the mean annual temperature of Verkhoyansk?
3. What is the annual range of temperature of Verkhoyansk?
4. Plot a line and bar graphs showing both temperature and rainfall of Verkhoyansk?

Natural vegetation

What type of natural vegetation can grow in this region?

The vegetation in the region consists of conifer trees. The coniferous forests have low species diversity. Single species of trees grow together in large stands where there is suitable soil. The trees have adapted to the harsh climate of the region. They get and save moisture through their long roots, spongy wood and

needle shaped-leaves. As the trees are evergreen, no moisture is lost in making new leaves each year.

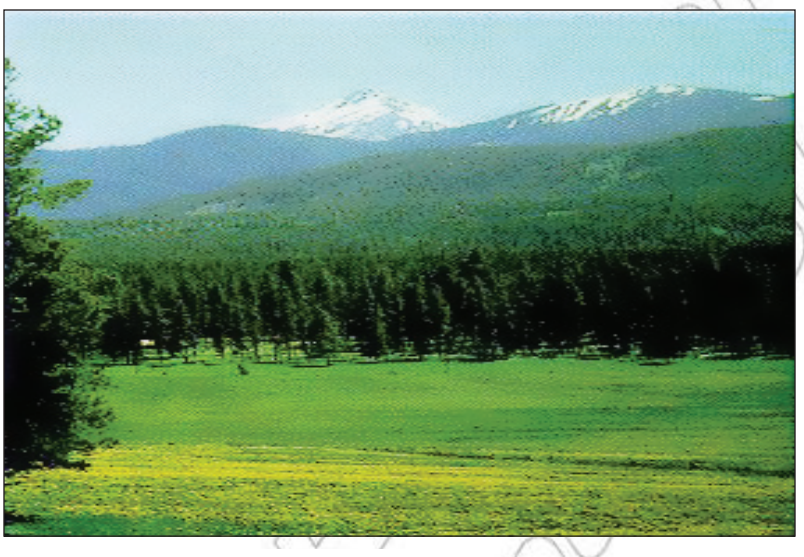


Figure 2.61 **Coniferous forest**

Human Activities

What type of economic activities are practised in this region?

The climate of the coniferous forests is not favourable for growing crops because the growing season of this region is too short. The soils are not usually fertile. As a result, agriculture is not an important activity in this region. But conditions are excellent for forestry, which is one of the most important economic activities in these areas.

The coniferous trees are softwood, which can be easily cut and shaped. The trees are long and straight, from which long and flat pieces of timber for building can be made. The logs of coniferous trees are good for making pulp, from which paper and rayon are made. The nature of the forest makes their exploitation easier. This is because the same kind of trees grow in dense stands.

Lumbering (the felling of trees) is usually done during winter because of two reasons.

- *There is little water inside the trees.*
- *The ground becomes hard and frozen. which makes movement easy.*

Nowadays, power machines that fell, trim, drag and load the logs are available. In order to get a continuous supply of timber for the woodwork industry, reforestation is carried out in the region.

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Mining: The coniferous forest region is also rich in several mineral deposits. Iron ore, gold, cobalt, zinc, uranium, oil, copper and lead are the main minerals of the region. Sweden, Canada, and the Russian Federation have rich iron ore deposits. Siberia is well known for its coal, oil and gas deposits.

Generally, the coniferous forest region has a well-developed industrial base. This is supported by the availability of many mineral deposits, rich forest resources and cheap and abundant water power from rivers.

Activity 2.28



In your group, perform the following tasks and answer the following questions.

1 Describe the natural conditions that favour forestry in the coniferous forest region.
2 How does the vegetation withstand the harsh climate of the coniferous forest region?
3 What factors facilitated industrial development in the coniferous forest region?

III *Frigid (Cold) Zone*

Where is the location of frigid zone? Why is this region cold?

The frigid zone is located between 66½° to 90°, both N and S of the equator. In some areas natural conditions of this zone are not limited by latitudinal location. For example, in Canada, this zone bends southwards to about 55°N. The boundary between the cold temperate and the frigid zone is marked by 10°C isotherm of the warmest month. Common vegetations of this zone are lichens, mosses, grasses, cushion plants, and low shrubs which spring to life during the short summer season. They remain dormant for about ten months of the year. However on the ice bound areas, such as Antarctica, there is no vegetation because the temperature is not above the freezing point and there is no sufficient sunlight that serves as a source of energy for life.

The most widespread people in the region are the Inuit (Eskimos), Indians, Lapps, Chukchi, Koyaki, and Yakuts. They are found in Alaska, Canada, Greenland, Finland, Norway, Sweden and Siberia. They follow their traditional ways of life as hunters, reindeer herders, fishing, fur trapping, and they are being trained for more settled occupations, such as Farming and mining.

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All of the native Arctic people have developed a unique ability to survive in their harsh environment by skillfully using the few materials available to them. From snow, ice and animal skins and bones they have fashioned a simple technology that enables them to build shelters, weapons, and forms of transportation such as sleds and kayaks (small, skin-covered boats). Land and sea animals and fish provide their main source of food. The frigid zone has two sub-regions. These are tundra and the polar ice caps.

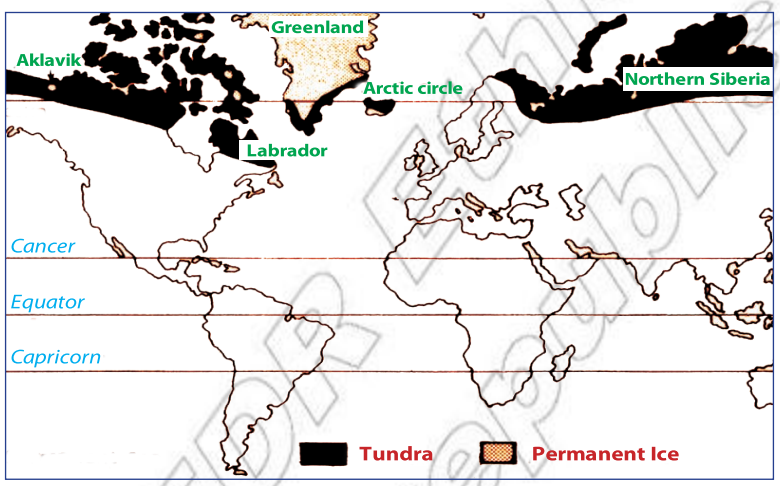


Figure 2.62 **Frigid zone**

A *Tundra Region*

What is tundra? Where are the areas of tundra located? What are the climatic characteristics of the tundra sub-region?

The word **tundra** refers to an area where the growth of trees is prevented due to low temperatures and short seasons that restrict growth.

The tundra is a transitional zone between the polar ice caps and the coniferous forest belt. Tundra is found only in the northern hemisphere. It extends along the northern Arctic shores of the continental land mass.

Climate

Tundra has two distinct seasons. These are the summer and winter seasons. During the summer season, there is long daily duration of sunshine, but the temperature is very low. Only three or four months have average temperatures above the freezing point. This is because the sun's rays are very slant, and therefore lack heat. Winter is cold and long. During the daytime, the sky is dark, and stars can be seen shining. There is twilight in the middle of the day.

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The rainfall level in the tundra is low. The amount of annual total rainfall is below 250 mm.

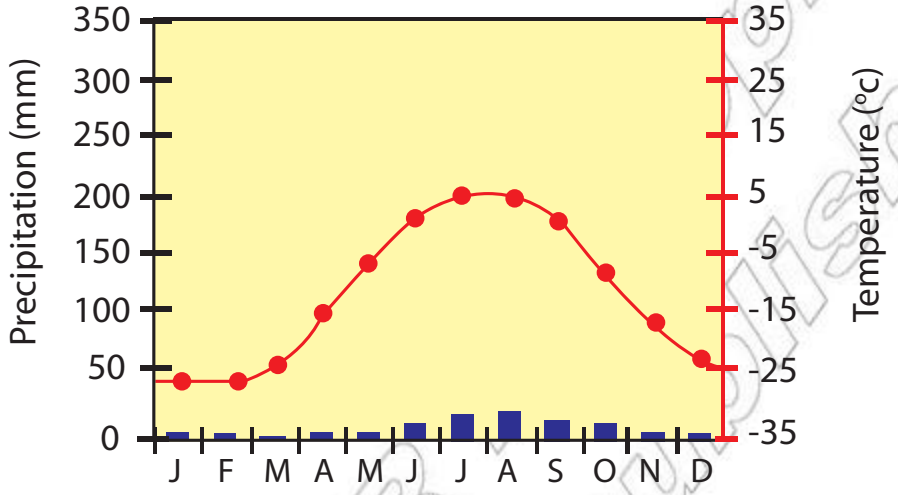


Figure 2.63 **The climate graph for Barrow, Alaska**



Activity 2.29

Using Figure 2.63,

1 List the months with the highest and the lowest precipitation.

2 List the months with the highest and the lowest temperature.

Natural Vegetation

Is the type of climate experienced in the tundra suitable for plant growth? Why? What kind of plants grow in the tundra?

As plants cannot grow in temperatures below 6°C, there is little or no vegetation in tundra areas. In places where the snow is not thick, low forms of plants such as lichens, mosses and sedges grow during the summer season. On the southern margins of the tundra lands, and in lower areas, there are short trees and flowering plants.

Human Activities

What are the main human activities in tundra?

The tundra is a sparsely populated region. There are a few scattered tribes such as Eskimos (Inuit), Lapps, Finns, Aleuts and Tunguses. These are primitive peoples who have adapted themselves to the cold and difficult environment of the tundra.

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The people lead primitive ways of life and depend on hunting, fishing, and reindeer herding. In North America, the Eskimos settle along the seashores in igloos (houses made up of blocks of ice) in the cold winter. During the summer, the people move inland and live in tents which are made of animal skins.



Figure 2.64 **Eskimos (Inuit) building a snow house (Igloo)**

Activity 2.30



In pairs, perform the following tasks.

1. Compare the adaptations of tundra vegetation to its environment with the adaptations of desert vegetation.
2. Describe the way of life of the tundra people and explain how they have adapted themselves to the conditions of the tundra region.

B *Polar Ice Cap Region*

What is polar ice cap? Where is the location of polar ice cap?

A polar icecap is a high latitude region of the earth that is covered with ice. The two polar ice caps are located near the North and South poles. These natural regions include Greenland and the Arctic islands and Arctic Ocean in the northern hemisphere and the continent of Antarctica and the South Sea in the southern hemisphere.

Climate

Ice caps are generally characterized by negative temperatures. The average temperature for each month of the year is less than 0°C. The precipitation is very low and falls in the form of snow. In Greenland the total annual precipitation is about 80 to 100 mm. The whole of Antarctica receives an average precipitation of less than 150 mm per year.

Natural Vegetation

Plant growth is impossible as the regions are permanently covered by ice and snow. The soil of the region is permanently frozen. Except few areas the surface

is covered with ice. In those areas, a little vegetation, like mosses, lichens, and algae may grow with the help of the light of the very short summer.

Human Activities

There are no people living permanently in Antarctica. Only scientists and hunters visit this cold continent. At present, the only resource of Antarctica is whale oil. But it is believed to contain rich deposits of coal. The Arctic Ocean is rich in animals that can be used as sources of food and material for clothing. The Arctic region is also important for military strategies. For example, the USA has an air base at Thule in Greenland.



Activity 2.31

In your geography work group, answer the following questions.

1 Do people live on polar ice caps? If your answer is no, why not?

2 Explain the influence of climate on the vegetation of the polar ice caps and of the hot regions.

Exercise 2.3

I *Determine whether each of the following statements is true or false*

1 The equatorial rainforest region is the most advanced industrial region of the world.

2 Climate makes the tropical zone different from the frigid zone.

3 The longitudinal extension of Ethiopia results in a tropical climate.

4 Temperature decreases from the equator towards the poles.

5 Taiga is part of the polar zone.

II *Choose the correct answer.*

6 Tropical deserts exhibit all of the following characteristics except

A extremely dry conditions

B dense plant growth

C location between 20˚ and 30˚ latitude

D influenced by the subtropical highs

7 In regions with a Mediterranean climate, almost all the yearly precipitation falls

A in autumn
C in winter
B in spring
D in summer

8 The most important economic activity of the coniferous forest region is

A Plantation agriculture
C Crop cultivation
B Forestry
D All are correct

9 Identify the equatorial rainforest area that is the largest, after the Amazon Basin.

A Congo Basin
C South East Asia
B Indonesian islands
D Mehagreb region

10 The geographical criteria used to classify the whole world as in the tropical, temperate or frigid zone is

A Latitude
C Population
B Altitude
D Temperature

2.4 ECOSYSTEM

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

- define the term ecosystem;
- identify the components of ecosystem; and
- demonstrate interdependence in the ecosystem.

Key Terms

- Abiotic
- Biotic
- Carnivorous
- Consumers
- Decomposers
- Ecosystem
- Herbivorus
- Omnivorous
- Producers

What is an ecosystem? What are the components of an ecosystem?

An ecosystem is a community of living things and their non-living environment.

It is a basic functional unit of biosphere, consisting of organisms (plants and animals) and their environment (air, water, soil and rock). The non-living features of the environment are the *abiotic factors*, and the organisms in the environment

are the *biotic factors*. Populations and communities make up an ecosystem. An ecosystem may be small organisms in a drop of water, or even the whole earth as one system. There are many types of ecosystems, even within a relatively small area. Some are on land, others are aquatic. All components of an ecosystem function together as a closed unit of biological community or association.

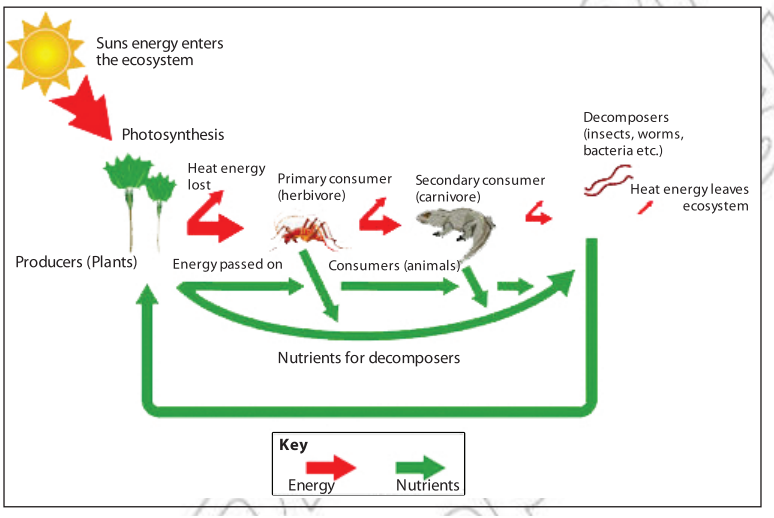


Figure 2.65 **All plants and animals are linked with the natural environment. This is an ecosystem**

All ecosystems require energy in order to exist. This is provided by sunlight, with only minor contributions from other sources. Energy from the sun reaches the earth's surface in two forms. These are **heat energy** and **light energy**. Heat energy cannot be used directly by plants and animals. Light energy can be captured only by green plants during the process of photosynthesis. Only about one percent of light energy falling on leaves is converted into food energy and stored as carbohydrate molecules.

Ecosystems have lots of different living organisms that interact with each other. The living organisms in an ecosystem can be divided into three categories: **producers**, **consumers** and **decomposers**. They are all important parts of the ecosystem.

- **Producers** *are the green plants. They make their own food by means of photosynthesis. Green plants are the primary passage from one organism to another along the food chain. A food chain is a simple way of showing how energy in the form of food passes from one organism to another.*
- **Consumers** *are animals, which get their energy from the producers or from organisms that eat producers.*

There are three types of consumers:

- **Herbivores** (primary consumers) are animals that eat plants.
- **Carnivores** (secondary consumers) are animals that eat herbivores and sometimes other carnivores.
- **Omnivores** are animals that eat both plants and other animals.

- **Decomposers** *are plants and animals that break down dead plants and animals into organic materials that go back into the soil. When organisms die, their bodies decompose and form a source of energy and nutrients for other organisms. Similarly, waste matter passed from the bodies of living organisms are also sources of energy and nutrients. These materials are not wasted by their ecosystems. They form the food for many other organisms, which are referred to as decomposers. Decomposers are micro organisms, mainly fungi and bacteria, which live on dead organic matter.*

Activity 2.32



In pairs, perform the following task and discuss the following questions.

1 Give an example of ecosystem and explain how it is self-supporting.

2 What is the difference between abiotic factors and biotic factors? Give five examples of each.

3 What is the food chain?

4 "Everything in the biosphere is connected." Do you agree or disagree? Discuss this question.

Exercise 2.4

I *Choose the correct answer.*

1 A community and its physical environment together is

A population C habitat

B an ecosystem D niche

2 An ecosystem is a community of plants and animals that depend upon one another and their surroundings for survival.

A True B False

3 Which of the following best explains why many kinds of plants and animals can live together in an ecosystem?

A plants and animals all care for each other and protect one another.

B plants and animals are all parts of a food chain and depend on each other to live.

C plants and animals have nothing to do with each other, so they can live together.

D plants and animals all feed on the same thing, so they compete with each other for food.

4 What name is given to all organisms that feed on other organisms?

A Carnivores

B Consumers

C Omnivores

D Producers

5 Deer and zebra feed on grasses and other plants. Leopards and lions feed on deer and zebra. Which of these is the role of the deer and zebra in this ecosystem?

A Producers

B Carnivores

C Consumers

D Decomposers

6 Which one of the following best describes the role of a producer in an ecosystem?

A A producer supplies energy for the consumers in the ecosystem.

B A producer supplies light for the consumers in the ecosystem.

C A producer supplies oxygen for the consumers in the ecosystem.

D A producer supplies water for the consumer in the ecosystem.

7 An ecosystem includes

A one type of organism

B two types of organisms

C at least one type of plant and one type of animal

D a wide variety of organisms

8 What kind of organisms can produce their own food?

A Carnivores

B Animals

C Green plants

D Herbivores

II *Complete each of the following statements with the correct word or term.*

9 The original source of energy in an ecosystem is _____.

10 A population and the environment in which its members interact form _____.

2.5 VILLAGIZATION OF THE WORLD THROUGH DISTANCE-TIME DECAY

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

- identify what developments of transport and communication technology has brought changes in location of economic activities.
- discuss how development of transport and communication technology has brought changes in location of economic activities.

Key Terms

- Communication
- Development
- Distance-time decay
- Globalization / Villagization
- Technology
- Transport

Villagization and Distance-Time Decay

What is villagization? What makes the world a global village ?

Villagization in this context refers to the time-space compression which has resulted from the increasing, rapid movement and interaction of people from all parts of the world. Today, due to advancements in transportation and other communications technologies, the world's population are much "closer" than ever before. These technological advancements have reduced the time needed to travel from one corner of the world to any other and to communicate over distances.

Distance-time decay: is a geographical term which describes the effects of distance and time on cultural or spatial interactions, the production of goods and the location of activities. The distance-time decay effect is the decline in interaction between two localities as the distance and time between them increases.

With the advent of faster travel, distance and time have less effect than they did in the past. Advances in communications and technological devices such as phones, radio and television broadcasts, and the internet, have further decreased the effects of distance and time.

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The socio-economic impacts of world villagization

World villagization impacts many socio-economic and cultural features of our world. Although some of them operate primarily in the developed countries, their effects are increasingly evident in developing countries such as Ethiopia.

- **On production of goods and service delivery**: In the past, time and distance had a profound impact on the location of markets and the production of goods. Perishable goods, such as vegetables, fruits, and fresh milk, used to be primarily produced and sold close to urban centers in order to sell and consume them fresh. However, today any type of perishable good can reach its consumers within a short period of time without perishing or losing its freshness. Hence, today distance and time have little or no impact on the production and market of perishable goods.

  Fast communications such as the internet have improved the delivery of goods and services even without face-to-face contact. Today people can make a purchase or transfer money from one part of the world to another while sitting at home. Similarly, many people are working for companies located thousands of kilometers away from their homes, and do not need to be there physically.

- **On location of settlements and industries**: In the past, the distance-time-decay effect deeply affected the location of settlements and industries. They had to be located near resources and energy. Similarly, industrial workers needed to live near their work places. Now, advancements in transportation networks have allowed many industrial workers to commute daily from their homes to workplaces many kilometres away. In the same way, industrial components such as sources of energy and natural resources can now be transported to almost anywhere they are needed. In general, the time-distance-decay effect that used to profoundly affect our socio-economic and physical environments on local, regional, and global scales has been mostly overcome in many parts of the world. This has produced what we call the villagization of the world. Another term for this process is **globalization**. It has greatly affected the social, cultural, political and economic landscapes of our world.

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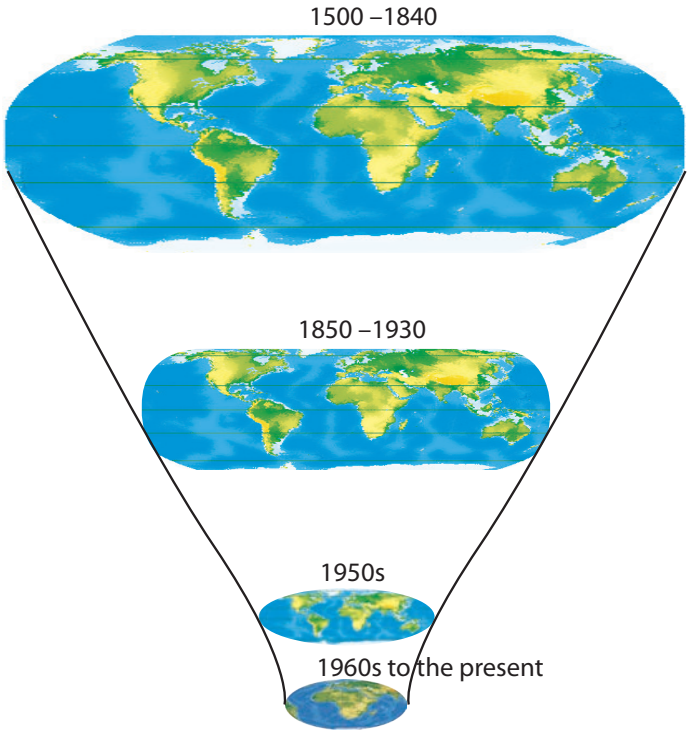


Figure 2.66 Villagization of the world through distance-time decay



Activity 2.33

Be in groups and give answers to the following questions.

1. The world is considered to be a "global village." What do you understand by this?
2. Why is the world called a global village?
3. What is the contribution of modern transport and communication technologies to connecting distant areas of the entire world?

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Unit Review

UNIT SUMMARY

- The surface of the earth is changed by internal and external forces.
- Internal forces shaping the earth are folds, faults, earth quake and volcanoes.
- Fractures, faults, and folds are structures caused by crustal stress (tensional and compressional forces).
- Formations of block mountains, fold mountains, and rift valleys are caused by internal forces.
- Earthquakes are caused by the movement of rock along faults in the earth's crust.
- Earthquakes originate at the focus. The epicentre is the point on the surface directly above the focus.
- The movement of magma (molten rock below the surface) into the crust or onto its surface is called volcanicity.
- The products of volcanicity are; external (volcanoes, lava plateaus, geysers and hot springs) and internal (sills, dikes, batholiths, and laccoliths).
- External forces shaping the earth are weathering and erosion.
- Weathering is the simple breaking down of rocks.
- The two types of weathering are physical and chemical weathering.
- Physical weathering breaks up rocks into smaller pieces. Its main agents are frost, temperature changes, plants and animals.
- Chemical weathering (decomposition) causes rock to dissolve or decompose. Its main agents are rainwater and actions of plants and animals.
- Erosion involves the breaking down of rock and the carrying away of rock particles. Erosion is caused by moving water, wind, etc.
- The major agents of erosion are water and wind erosion.
- The types of erosion by running water are sheet, rill and gully erosions.
- Atmosphere is composed of a variety of suspended dust particles, gases and condensed moisture droplets collectively known as aerosols.
- Nitrogen is a major part of the atmosphere.
- The layers of the atmosphere include the troposphere, stratosphere, mesosphere and thermosphere.
- Weather is the sum total of atmospheric condition for a short period of time.
- Climate is the average of weather conditions over a long period of time.
- The major elements of weather and climate are temperature, rainfall, winds, air pressure, etc.
- Temperature affects air pressure, winds, and humidity.

- Solar energy powers the water cycle.
- Heat transfer occurs by radiation, conduction and convection.
- The major factors that affect the distribution of temperature include latitude, altitude, distance from the sea, cloud cover, ocean currents, pressure and winds.
- Temperature is measured with a thermometer.
- Clouds are made up of water droplets.
- The three types of rainfall are convectional, cyclonic and orographic (relief) rainfall.
- Rainfall is measured with a rain gauge
- Air has weight and exerts pressure on the earth's surface.
- Air pressure is measured by a barometer.
- Air pressure depends mainly on temperature.
  - ⇨ *High temperature makes air expand so that it has a lower density, creating an area of low pressure.*
  - ⇨ *Low temperature makes air contract so that it has a higher density. This makes an area of high pressure.*
- Winds blow outward from the centre of high pressure areas and blow toward the center of low pressure areas.
- Deflection of winds is caused by the rotation of the earth.
- The speed of wind affects the amount of deflection
- The force which affects the direction of movements of winds is called the coriolis force.
- The three types of surface winds are planetary, monsoon and local winds.
- A region as a whole is understood to be a part of the earth's surface which has similar physical elements and, to some extent, similar human activities.
- The earth is divided into three major natural regions (tropical, temperate and frigid zones).
- Ethiopia is a tropical country with a multifaceted environment.
- All living things in an ecosystem have close links in the transfer of energy which is called the food chain.
- Through the process of the food chain, food energy is passed from one to another member of an ecosystem.
- Globalization/vilagization is a broad term that is used for an emerging global society in which economic, political, cultural and environmental events taking place in one part of the world quickly come to have significance for people of other parts of the world.
- Globalization is the result of communication and information technologies, it establishes links between individuals communities and governments, various international institutions and multinational companies play an important role in globalization.
- People may continue to live in a single nation but culturally or psychologically they are engaged with the lives of people of other countries.

REVIEW EXERCISE FOR UNIT 2

I *Determine whether each of the following sentences is true or false.*

1 Water is the most active erosion agent in a desert region.

2 The force that causes the stretching of rocks is tension.

3 The focus of an earthquake is the point on the surface directly above the epicentre.

4 All of the sun's energy that reaches the atmosphere is absorbed by the earth's surface.

5 The upper boundary of our weather is known as the tropopause.

II *Match items in column 'B' with items in column 'A'.*

A		B	
6	Anticyclone	A	Element of weather and climate.
7	Lapse rate	B	Changing of solid into gas and vice versa.
8	Sublimation	C	Low-pressure area.
9	Temperature	D	Change of temperature per unit of altitude.
10	Cyclone	E	High-pressure area.
		F	Summer solstice for the northern hemisphere.

III *Choose the correct word or phrase from the given alternatives.*

11 Which of the following is not associated with earthquakes?

A body waves C geyser

B focus D seismograph

12 Which one of the following is not fold mountain?

A Andes C Ras Dashen

B Himalaya D Alps

13 Which one of these does not belong to volcanic activity?

A caldera C waterfall

B hot springs D crater

14 Which one is a common feature in the upper course of a river?

A flood plain
B meander
C ox-bow lake
D 'V'-shape valley

15 A limestone column that hangs down from the ceiling of an underground cave is _____ .

A artesian
B stalagmite
C stalactite
D barchans

16 Which of the following is not an internal force?

A earthquake
B erosion
C volcanic eruption
D folding

17 Which one is not associated with wind action?

A barchans
B sand dune
C lagoon
D loess deposit

18 Batholiths are:

A dissected mountains
B igneous rock structures
C plateaus
D fold mountains

19 Anticlines and synclines are the product of

A tension
B compression
C shearing
D A and B

20 Meanders are associated with

A waterfalls
B flood plains
C drainage basins
D V-shape valleys

21 The apparent force that causes moving bodies to be deflected westward is the

A prevailing westerlies
B convection current
C coriolis effect
D earths' gravity

22 The coldest layer of the atmosphere is

A thermosphere
B troposphere
C mesosphere
D stratosphere

23 The zone that receives the most radiant energy from the sun is

A snow cover
B cloud covers
C clear sky
D vegetation cover

24 Identify which pairing is incorrect.

A Desert-xerophytes

B Maquis-Mediterranean Vegetation

C Tundra-Eskimos

D Savannah-coniferous

25 Deserts have cold nights because of

A snow cover

B cloud cover

C clear sky

D vegetation cover

26 Which of the following is a biotic factor?

A animals

B air

C soil

D sunlight

IV *Complete each of the following sentences with the correct word or phrase.*

27 The average weather condition recorded for a long period of time is _____.

28 _____ forces push rocks together, _____ forces pull rocks apart.

29 The type of rainfall in a equatorial rainforest region is mainly _____ type.

30 The process of mountain building is known as _____ .

31 The break up and decomposition of rocks in a place is _____.

32 Wearing away of the land is called _____ .

Unit 3



HUMAN POPULATION AND ECONOMIC ACTIVITIES

Unit Outcomes

After completing this unit, you will be able to:

- analyze the concept of human population and the sources of population data;
- indicate the densely, moderately and sparsely populated regions of the world;
- distinguish settlement patterns of the world population;
- discuss the major economic activities of the world; and
- recognize the importance of natural resources.

Main Contents

3.1 **CONCEPT AND FACTS ABOUT HUMAN POPULATION**

3.2 **ECONOMIC ACTIVITIES**

3.3 **NATURAL RESOURCES**

- *Unit Summary*
- *Review Exercise*

INTRODUCTION

In the previous unit, you have learned about the physical environment of the world and Ethiopia. In this unit you are going to deal with human population, economic activities and natural resources.

Through out human history, people have changed and adapted to the earth. They have done so in order to survive. Humans have been very successful. Today there are several billion people living on the earth. The study of human population has long been of interest to geographers. The pressure of population growth in today's world adds great urgency to the study of population for everyone.

There are many questions which can be asked about human population. Among these might be:

How many people actually live on the earth?

How many have lived on the earth at some time in the past?

Why do they live in some places but not in others?

What do they do for living?

Humans desire to live and enjoy life. Food, shelter and clothing are needed for preservation of life, goods for luxury and comfort for enjoyment. To provide themselves with the necessities of life, people are engaged in various occupations. These occupations are called economic activities. In the world, there are numerous activities through which human beings earn their living. In order to live, a person must produce his/her basic necessities. For this, human beings employ elements of the natural environment, i.e., natural resources.

3.1 CONCEPT AND FACTS ABOUT HUMAN POPULATION

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

- define the concept of human population;
- discuss facts about human population;
- distinguish sources of population data;
- identify the densely and sparsely populated areas of the world; and
- discuss the settlement patterns of world population.

Key Terms

- Population
- Population data
- Settlement
- Rural settlement
- Urban settlement
- Farmstead
- Census
- Town
- Metropolis
- Demography
- Hamlet
- City
- Village
- Megalopolis
- Conurbation

Start-up Activity

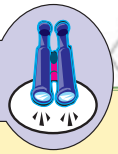
1. What is population? What makes the human population different from other populations?
2. Do you think that studying human population is useful and necessary? Why?
3. How do we acquire information or data about human population? What do you think makes each source different? Discuss with your friends.

The term population, in population studies, refers to the total number of human inhabitants of a specified area, such as a city, country, or continent, at a given time. The human population has been a matter of study for various academic disciplines such as geography, biology, sociology, medical science, history, etc. Population geography is concerned mainly with the spatial analysis of the human population. It focuses on population-space relationships. Population geography emphasizes the spatial aspects of human population and the interaction and interdependence between the human population and the physical environment.

The human population is given great emphasis and is studied by various disciplines including population geography. The human population is studied for many reasons including the following.

- *It is very dynamic as it demonstrates significant quantitative and qualitative changes over time and space. Such changes have a tremendous impact on the socio-economic development of societies.*
- *Change in the size, composition, structure and the location of human populations can have policy implications.*
- *Knowing about the characteristics of the human population is important in order to adjust situations to existing realities.*

Focus



Population studies yield knowledge that is important for planning, particularly by governments, in fields such as health, education, housing, social security, employment, and environment preservation. Such studies also provide information needed to formulate government population policies, which seek to modify demographic trends in order to achieve economic and social objectives.

Human population is the number of people living in a definite area. The study of human population is also necessary for development and socio-economic activities. For example, population is the major source of the labour force for the productive and non-productive economic sectors, such as agriculture, manufacturing, teaching, health services, etc. Human population is also the main productive force and creator of material wealth. This makes the study of population extremely important for the overall socio-economic development of a country.

Activity 3.1



In a small group, discuss the following questions.

1 What is population?
2 Why is studying human population important?
3 For what purposes, do you think, governments use population information/data?

The world's population has been experiencing continuous growth since the 15th century. The rapid increase in the size of the human population is attributed to many factors that include:

- ⇨ *advancements in scientific knowledge, agriculture, industry, medicine, and social organization;*
- ⇨ *humans; ability to control famine and disease, which have been major killers of humans;*
- ⇨ *the relatively lower cost of importing vaccines, antibiotics, insecticides, and high-yielding varieties of seeds;*
- ⇨ *improvement in peoples living conditions, which have resulted in the decline of deaths from infectious and parasitic diseases;*
- ⇨ *increase in life expectancy in most developing countries from about 35-40 years in 1950 to 66 years by 2000.*

As a result of these and many other factors, the human population has increased rapidly since the 15th and 16th centuries. As some sources indicate, by 1750 there were only about 791 million people in the world. However, in a matter of 250 years, the world's population reached over 6 billion. The growth of the human population between 1750 and 2000 has been very rapid. The trend of growth during that period is shown as follows:

Table 3.1: **Trends in world population growth (1750-2050)**

Region	Population Size (Millions)						
	1750	1800	1850	1900	1950	2000	2050
Africa	106	107	111	133	228	797	1,846
Asia	502	635	809	947	1,437	3,689	5,369
Europe	163	203	276	408	546	727	642
Latin America and the Caribbean	16	24	38	74	166	523	480
North America	2	7	26	82	221	481	722
Oceania	2	2	2	6	12	30	45
Total	791	978	1,262	1,650	2,556	6,073	9,104

Source: *Microsoft Encarta (2009)*

The rapid increase in human population over the course of the 20th century has raised concerns. The earth is experiencing over population. The scientific consensus is that the current rate of population expansion and the accompanying increase in usage of resources are linked to threats to the ecosystem, such as rising levels of atmospheric carbon dioxide, global warming, and pollution. Thus, population growth has a direct effect on socio-economic development and on the quality of the environment of a given society.

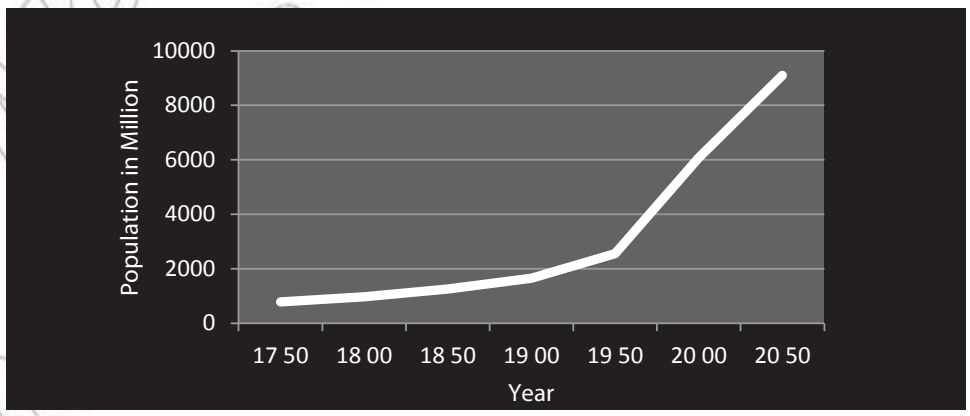


Figure 3.1 **Trends in world population growth**

The distribution of human population shows great variation. Africa and other developing regions account for the largest share of the world's population. As world population rose from 2.5 billion in 1950 to 6.7 billion in 2008, the proportion of people living in the developing countries of Africa, Asia and Latin America has expanded from 68 percent to more than 80 percent. India and China alone make up about 37 percent of the world's total. The share of the developed countries is projected to drop from about 18 percent in 2008 to less than 14 percent in 2050.

Table 3.2: **World population size and percentage, by continent (2009)**

Region	Population Size (million)	Percent share (%)
World	6,810	100
Asia	4,117	60.5
Africa	999	14.7
Europe	738	10.8
Latin America and the Caribbean	580	8.5
N. America	341	5.0
Oceania	36	0.5

Source: *Population Reference Bureau (2009)*

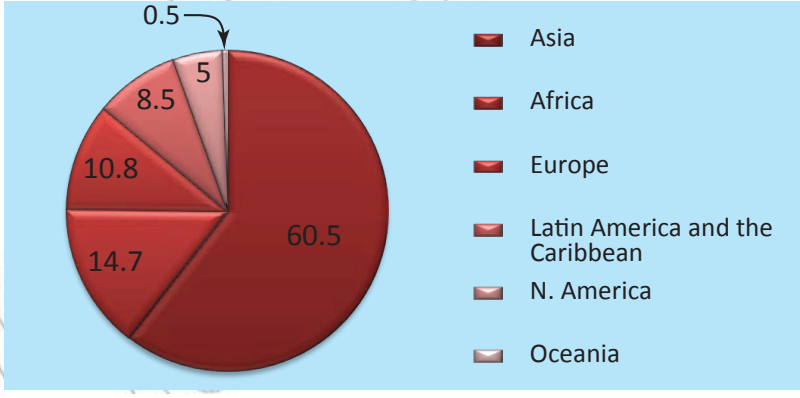


Figure 3.2 **World population size and percentage share by continents**

As you can observe from the figure above, Asia accounts for over 60 percent of the world population, with almost 4.1 billion people. Africa follows with 999 million people, accounting for about 14.7 percent of the world's total. Europe's 738 million people make up 10.8 percent of the world's population. Likewise, the populations of Latin America and the Caribbean, North America and Oceania account for about 8.5 percent, 5 percent and 0.5 percent of the world's population, respectively.

Country wise, while some countries have smaller population sizes, others are home to a much larger number of people. Of the world's countries, the ten most populous ones are shown in the following table with their respective population sizes.

Table 3.3: **The world's ten largest countries, in terms of population (2009)**

Country	Population (million)	Percentage share
China	1,331	19.54%
India	1,171	17.20%
USA	307	4.51%
Indonesia	243	3.57%
Brazil	191	2.80%
Pakistan	181	2.66%
Bangladesh	162	2.38%
Nigeria	153	2.25%
Russia	142	2.09%
Japan	128	1.88%
Total	4,009	58.88%

Source: *Population Reference Bureau (2009)*



Activity 3.2

1 By referring to Figure 3.2, attempt the following questions:
   - i Which continent holds over 50 percent of the world's population?
   - ii Which three continents have the smallest percentages of the world's total population?

2 By referring to Table 3.3, attempt the following tasks.
   - i List the three most populous countries in rank order, according to their population size.
   - ii Categorize the ten most populous countries with respect to their continents.

3 Draw a pie chart to illustrate the data in Table 3.3.

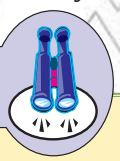
A *Sources of Population Data*

What is population data? What are the techniques of population data collection? How do these techniques/methods differ from each other? Which one, do you think, is most reliable? Why?

Now you know what human population is and you have considered facts about world population. Next you will learn about the sources of population data.

Population data refers to population information, such as number, age, marital status, births and deaths, occupation, religion, educational status, and other characteristics of the human population. Such information is vital for studying the different aspects of the human population. That is why we say that studying human population is dependent on reliable population data. Statistical information about human population is obtained through a variety of ways.

Focus



Population information is important for many reasons. The data acquired through various methods is used for many purposes that include the following.

- ⇨ *It provides statistical information for making decisions related to social and economic affairs.*
- ⇨ *It indicates future requirements of the population in terms of social, health, education, employment and other socio-economic needs.*
- ⇨ *It helps policy makers to forecast the needs of the population and to understand how to meet them.*

The following are among the most commonly used methods of gathering information about human populations.

i Population census
ii Sample survey
iii Vital registration

I Population Census

What is a population census? When was the third Ethiopian population and housing census conducted?

Censuses are the main source of population data in many countries including Ethiopia. The history of census goes back to ancient times in places such as Rome, Greece, Palestine, India, etc. **Census** is usually defined as "The total process of collecting, analyzing, compiling and publishing demographic,

economic and social data of all persons in a country or delineated territory at a specified time." In other words, it is the official counting of all the people of a certain geographical area with a well defined boundary so as to collect socio-economic and demographic information about the population.

Census provides a wealth of demographic and socio-economic data. The size, growth rate, fertility and mortality characteristics, marital status, employment situations, religion, ethnicity, income, educational status, housing conditions, sex and age structures and much more information about the population of a given area can be obtained through census.

Focus



In Ethiopia, the census is one of the most important ways of collecting population data. So far, three censuses have been taken. The first was in 1984, the second in 1994 and the last one in 2007. Census in Ethiopia is conducted every ten years.

Activity 3.3



Find data for the following:

a The total number of students in your school, by grade, age and sex. Illustrate the data on a bar graph.

b Total population of your region by age and sex. Try to examine what impact the current population will have in the future.

The Main Features of Census

The following are the main features that distinguish census from the rest of the sources of population data.

- **Government Sponsorship:** *It is the responsibility of the national government to provide or seek the resources necessary to conduct census. Obtaining them requires adequate legislative support or legal authority.*

- **Defined territory:** *census refers to specified geographical unit such as state, country, or province. The unit needs to have its own demarcation or boundaries.*
- **Universality:** *Enumeration must include every person within the scope of the territory without omission or duplication. Census of population usually try to count every one in the country as of a fixed day, often known as Census Day.*
- **Simultaneity:** *The census should have a specific well-defined time, and it should be conducted simultaneously throughout the country.*
- **Individual Units:** *in censuses, data is collected on an individual basis. The information that is obtained normally relates to individuals rather than groups. It is compiled and published.*
- **Periodicity:** *Ideally, census should be taken at certain specified time interval, usually every ten or five years. For example, in the United States and Ethiopia, census is conducted every ten years, while Canada and the UK conduct census every five years.*
- **Expensiveness:** *Census is the most expensive method of data gathering. This is because of its universality which necessitates complete coverage of the entire territory and population of the place where the census is taken.*



Activity 3.4

In your group, discuss the following questions.

1 What are the advantages of studying population?

2 Regarding the significance of collecting population data: Do you think they can affect your life? If yes, how?

3 Do people in your locality co-operate with census enumerators in giving dependable information? If no, why?

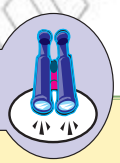
II Sample Surveys

What is sample survey? Is there any difference between population census and sample survey? Do you know of a survey that has been conducted in Ethiopia?

A sample survey is the second most important and widely used source of population data. It collects information only from a part of the whole population. They are usually undertaken to generate socio-economic and demographic data in greater detail than conventional censuses can provide.

Surveys are usually undertaken during a period of transition between two consecutive censuses. They are employed to arrive at estimates of demographic characteristics (age, sex, marital status, etc), population size, population distribution, mortality, fertility and migration. Sample surveys are also an important source of population statistics in areas where census is not conducted. In addition, they are important for gathering data to fill population information gaps. As there are many countries that do not conduct census regularly, the main source of information about world population comes from the United Nations Organization through sample surveys.

Focus



As compared to census, sample survey is:

- ⇨ *Less expensive because it does not involve the entire population;*
- ⇨ *Capable of providing very detailed information about the population;*
- ⇨ *If the sample takers are well-trained and strict supervision is in place, it can provide data of a better quality than census; and*
- ⇨ *Able to estimate margins of error, or the accuracy of the data.*

Activity 3.5



Discuss the following questions in your group.

1 Compare and contrast census and sample surveys.

2 Which one provides detailed information for a specific section/sample of the whole population?

III *Vital Registration*

What is vital registration?

Vital registration is another source of population data. It refers to the continuous registration of such vital events as births, deaths, marriages and divorces. These events are recorded as they occur. Data on vital events are gathered from birth

and death certificates, marriage licenses, divorce records and other official registers. The building up of a reliable vital registration system is an expensive and extensive process.

The completeness of registration and the reliability of the data gathered through vital registration can be affected by several factors including the following:

- *Level of literacy and awareness of the importance of population data in the population;*
- *Social custom may lead to non-registration as a result of superstitions or taboos;*
- *The rural population may be widely dispersed or inaccessible.*

Factors Affecting the Quality of Data

What are the factors that affect the quality of data?

As we have seen so far, population data can be acquired through different methods. Though a variety of information can be obtained by using such systems, the gathered information may not necessarily be accurate. This is because there are a number of socio-economic and culture related problems that affect the quality of the data.

Some of these problems include:

i Inadequate financing.

ii The use of different methods of census enumeration by different countries.

iii Inadequate awareness about the importance of population data among the general population.

iv Double entry (counting of a person twice).

v Neglecting or ignoring certain groups of people.

vi False information about the age and the occupation of people.

vii Lack of equal acceptance of the importance of vital registration by all countries.

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Activity 3.6

Discuss how the following factors affect the quality of population data.

a Inadequate financing
b Lack of awareness about the uses of population information
c Provision of false information by the people being counted

B *Distribution and settlement patterns*

Do you think that human population is evenly distributed throughout the world? Why? What are the factors that influence the spatial distribution of people in the world? What does the population concentration of your locality look like? What factors, do you think, result in such distribution of people in your locality?

Population distribution is the way that population is spread out over a given area. That area can be anything from a small region to the earth as a whole. For several reasons, human population is spread very unevenly over the earth's surface. This distribution of population forms a pattern. While some areas are heavily populated, others are sparsely populated.

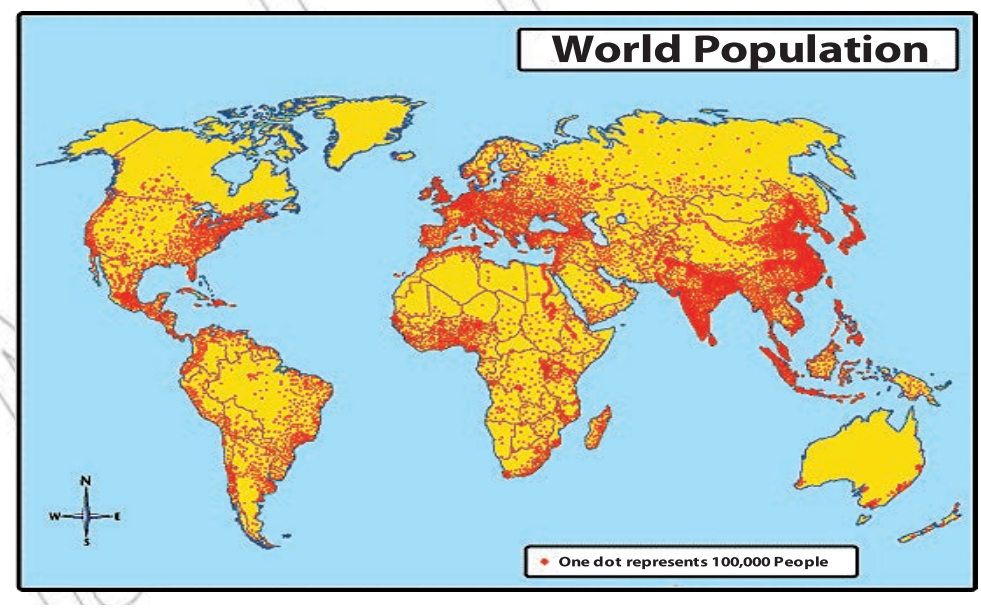


Figure 3.3 **Dot map of the world's population distribution (Source:** *Media.maps.com*)



Activity 3.7

Look at the map in Figure 3.3 and attempt the following questions.

1. Which areas of the world are the most densely populated? Where are the most sparsely populated areas?
2. When did the world's population begin to increase dramatically?
3. Why do the most densely populated areas have high population concentrations? What about the cases for the presence of lesser number of people in the sparsely populated regions?

The availability of natural resources, the nature of topography, the productivity of the soil, and many other factors have resulted in an uneven distribution of people. There are densely, moderately and sparsely populated areas in the world. The densely and sparsely populated regions of the world are outlined below.

Densely Populated Regions

There are three main belts of high population density and concentration in the world. These areas are also called "Population Clusters" or ''Population Nodes''. The three belts alone account for well over two-thirds of the total world's population. These regions are:

1. Asiatic population belt
2. Peninsular Europe
3. Northeastern North America

1. **Asiatic Population Belt:** this belt is confined to the river basins of Monsoon Asia. The region accounts for about 60 percent of the world's total population. The belt includes:
   a. **East Asia** - Japan and China are the most populous in the sub-region.
   b. **South Asia** - India, Pakistan and Bangladesh are densely populated.
2. **Peninsular Europe**: Europe makes up 10.8 percent of the world's total population. It is the most developed cluster, in both economic and demographic terms globally.
3. **Northeastern North America**: this part of North America (mainly the USA) is highly urbanized and industrialized. It accounts for about 5 percent of the world's total population.

Sparsely Populated Regions

In contrast to the above discussed population clusters, there are areas of thin population cover. These areas include:

1. **Tundra:-** These areas support only a very few nomadic peoples.
2. **Hot-dry lands:-** Include many of the tropical desert lands. Shortage of water and high temperature do not encourage permanent settlement. However, in desert areas where water is available, such as oasis and river basins, and mining sites, there are settlements located right in the heart of hot deserts. Example: the Sahara Desert.
3. **Hot-wet lands:-** Because of the unfavourable climate, there are few people living in these areas.
4. **High relief:-** Includes regions of mountainous areas with high altitude, rugged topography and cold temperature. These areas do not encourage large settlements because the terrain makes movement and interaction difficult.
5. **Areas with poor soil:-** Include very large areas of the world which are covered by infertile soil. Such areas do not support agricultural practices and hence are sparsely populated.

Settlement Pattern

Define the term 'settlement'? What is the difference between a rural settlement and an urban settlement? What are the advantages of living in an urban area? Do you think that living in rural areas is disadvantageous? Why?

A settlement is defined as a place in which people live, carrying out a variety of activities, to make their livings, such as trade, agriculture and manufacturing. There are varieties of settlements, and they are changing rapidly over time. These include hamlets, villages, towns, cities, metropolises, megalopolises, etc. These range, in size and function, from the simple isolated one-family farmstead and tiny rural hamlet to the great metropolises like New York or London. In all cases, however, 'settlement' designates an organized colony of human beings, together with their residences, buildings (stores, factories, warehouses etc.) and the paths and streets.

Studies of settlements are concerned with the facilities humans construct in the process of living in an area and using its resources. Naturally, settlements are

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situated as strategically as possible with respect to natural features, such as water, fuel, food, and protection, as well to access to transportation and communications.

Settlements may broadly be divided into rural and urban, based on the density of human-made structures, population concentration and dominant economic activity.

What do you think are the differences between rural and urban settlements?

Where would you prefer to live? Is it in an urban or a rural area? Why?

Rural settlement: is the name given to all villages and dispersed (scattered) settlements in areas far from urban centres. Such settlements are widely dispersed and are dominated by isolated homesteads. The inhabitants of rural settlements are mainly engaged in agriculture.

Urban settlement: refers to town or city settlements. People in urban areas depend on non-agricultural activities. In most cases, it is difficult to give an exact definition for **urban centres**. Some of the criteria used to identify urban centres include the official status of urban settlement, size of population, and occupation of the population.

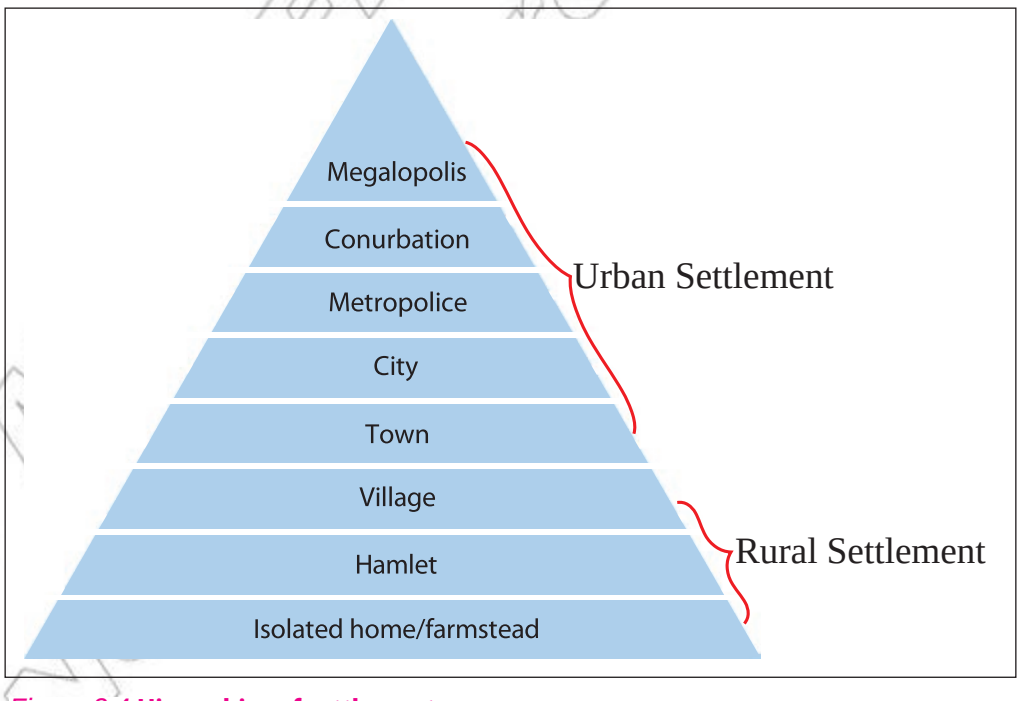


Figure 3.4 **Hierarchies of settlement**

Exercise 3.1

I *Determine whether each of the following sentences is true or false.*

1 Censuses are the only source of population data.
2 Nigeria is the eighth most populous country in the world.
3 The tundra is one of the sparsely populated regions of the world.
4 In Ethiopia, the first housing and population census was conducted in 1994.
5 A person in a rural area depends on non-agricultural activity.

II *Match items in column 'B' with items in column 'A'.*

A	B
6 Sample survey	A Villages and hamlets
7 Vital registration system	B Is a population data source that collects information from a fraction of the population
8 Peninsular Europe	C Densely populated region
9 Urban settlement	D Sparsely populated region
10 Rural settlement	E City and town
	F It is the continuous registration of births, deaths, marriages and divorces

III *Choose the correct answer.*

11 One of the following is a branch of human geography that deals with the number, composition and distribution of human population in relation to the environment

A Climatology
B Population geography
C Morphology
D Map reading

12 Which of the following countries in the world has the largest population?

A India
B China
C Pakistan
D Nigeria

13 The largest proportion of the world's population lives in

A Africa
B Europe
C North America
D Asia

14 One of the following is the main feature of a census.

A Universality
B Periodicity
C Individual unit
D All are correct

15 People living in rural settlements are mainly engaged in

A Industry
B Trade
C Mining
D Agriculture

3.2 ECONOMIC ACTIVITIES

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

- list the five types of economic activities;
- explain the major characteristics of economic activities;
- examine how economic activities modify and transform resources;
- describe concept and meaning of land use;
- identify land use system in Ethiopia;
- differentiate driving forces that change land use systems;
- differentiate rural land use from that of urban land use.

Key Terms

- tourism
- industry
- fishing
- white-collar
- harvest
- forestry

What is economic activity? What influences economic activity?

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.

In the world, there are numerous activities through which human beings earn their livings. In order to live, a person must provide for his/her basic necessities such as food, clothing and shelter. For this, people use elements of the natural environment, i.e., natural resources.

3.2.1 Classification of Economic Activities

What are the major classes of economic activities? Can we classify economic activities? If yes, how?

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.

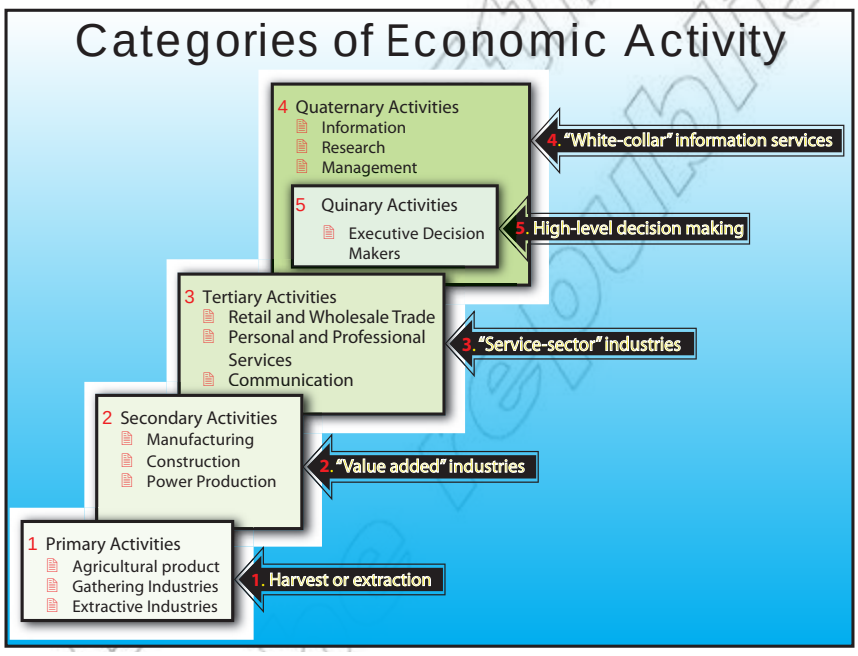


Figure 3.5 **Categories of economic activity**



Activity 3.8

By referring to Figure 3.5, try to answer the following questions.

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 What, do you think, are the differences among them?

A Primary Economic Activities

What are the major primary economic activities practiced in your locality?

What are the main purposes of producing primary goods in your area?

Primary economic activities focus directly on the extraction of resources from the environment. They involve the production of food stuffs 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 upon the natural resources of the earth.

Focus

Primary economic activities are characterized by the following. 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 3.6 **Primary economic activities**

The dominant primary economic activities of the world that support the lives of millions of people are discussed below.

Agriculture

What is agriculture? Why is agriculture an important primary economic activity?

Agriculture is the science and art of cultivation of the soil and the rearing of livestock for either local consumption or commercial purposes. It is one of the most important activities of human beings, because it provides them with the most basic necessity; food. Agriculture, as a primary economic activity, aims at solving the basic problems of any society. It provides foodstuffs for the population and raw materials for industries. Above all, it forms the basic livelihood for the majority of the peoples of the world. For example, in Ethiopia about 85 percent of the population is engaged in agricultural activities.

In agricultural activity, land is one of the basic means for production. The characteristic feature of land as a means of production is that when properly used its productivity increases. Another peculiarity of agriculture is that plants and animals are simultaneously means and objects of labor. Moreover agricultural production is seasonal in character, because of the fact that crops ripen at varying stages and times of the year.



Figure 3.7 **Agricultural activities**

Forestry

What is forestry?

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. Forestry is important for the production of wood, timber, gums, nuts, barks, etc.

Today forest products are being used for various domestic and industrial purposes. The following are the most important ones. Forest products are being used:

- ⇨ *for construction purposes;*
- ⇨ *as a source of industrial raw materials;*
- ⇨ *as a source of foodstuffs such as roots, leaves, fruits, barks, gums, stems, flowers, etc.*

Also, indirectly forests are important because they check rapid runoff and consequently control soil erosion. In addition, moisture from forest vegetation has a moderating effect on the climate of the local environment. They also regulate the concentration of greenhouse gases, such as carbon dioxide, thereby regulating the temperature condition of the local environment. A forest is also a habitat for wild animals, and the preservation of a forest ensures the preservation of wild animals.

Activity 3.9



Discuss the following questions in your group.

1. Are there forest resources in your locality? If yes, list the major types of tree species there.
2. What are the major forest products obtained from forests in your locality?
3. List the major wild animals living inside the forests in your locality.

Fishery

What is fishing?

Fishing is a primary economic activity concerned with the catching and harvesting of fish, other marine creatures, such as whales, seals, pearls, lobsters, crabs, prawns, molluscs, sponges and seaweed.

Fishing is one of the oldest occupations of humankind. At present a number of people in some nations depend on fishing as the mainstay of their livelihoods, for example, Norway, Iceland and Japan. But compared to other primary economic activities, fishing is not a very basic economic activity.



Figure 3.8 **Fishing**



Activity 3.10

1 Do people in your area catch fish? Where and how? If not, why?
2 How often do you eat fish? If you do not, give reasons.
3 Do people in your area consider fish as a source of food? If not, why?

Currently fishing as an activity provides employment opportunities for only a very small percentage of people. Marine life provides a very minor source of food and non-food products.

Ethiopia has a number of lakes, reservoirs and rivers rich in fish resources. However, fishing as an activity is at a low level of development.

Mining

What is mining?

Mining is a primary economic activity concerned with the extraction of mineral-bearing substances from the earth's crust. It is closely linked to manufacturing, which is a secondary type of activity.

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.

Even though, most minerals are inorganic; there are also some organic minerals, such as coal, petroleum and natural gas. Minerals are not evenly distributed on the earth's surface.

The different types of minerals that people use for construction, jewelry making, and in industry come from the mining sector.

B *Secondary Economic activities*

What is manufacturing? Is there any difference between manufacturing and industry?

Secondary economic activities include manufacturing, construction and power production. Manufacturing activities take place in factories. It is the activity of making articles. **Manufacturing** is the activity which turns raw materials into products by using labor, energy and equipment, while **industry** refers to the place where manufacturing takes place. Also, sometimes the word **industry** is used to many types of economic activities, for example, the hotel industry, the tourist industry, etc. Therefore, to distinguish the activity of processing raw materials from the other economic activities, we specifically use the term manufacturing.

Manufacturing uses machines, tools and labor to make things for use or sale. The term may refer to a range of human activities, from handicraft to the use of high technology. However, it is most commonly applied to the creation of industrial products in which raw materials are transformed into finished goods on a large scale.

Manufacturing activities are characterized by the following features:

i. Dependency on raw materials that are obtained from the primary economic sector;
ii. Transformation of raw materials into finished and/or semi-finished goods;
iii. Most modern manufacturing industries need power, skilled manpower, huge capital and modern technology;
iv. Most modern manufacturing industries are characterized by a high level of division of labor;
v. The production of end products that are ready for consumption or semi-finished goods that serve as an input for other industries.

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Figure 3.9 **Secondary economic activities**



Activity 3.11

1 Categorize the following economic activities as primary or secondary: agriculture, manufacturing, fishery, forestry, mining, steel industry, cement industry

2 As arranged by your teacher, a visit, in groups, a manufacturing industry in your locality and gather information on:

- i ownership;
- ii total capital invested;
- iii types of raw materials and products;
- iv number of people employed;
- v power source; and
- vi problems of production and distribution, if any.

3 prepare a report for class discussion.

C *Tertiary Economic Activities*

What is a tertiary economic activity?

The tertiary sector of the economy, (the service sector or the service industry) is the next type of economic activity. The basic characteristic of this sector 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 education, legal services, medical services, trade, transportation services, tourism, etc.



Figure 3.10 **Tertiary activities**



Activity 3.12

In pairs, discuss the following questions:

1 How are tertiary economic activities different from primary and secondary economic activities?

2 What are the contributions of tertiary economic activities?

Trade

What is trade? Can you explain the significance of trade in a society? How many forms of trade exist?

Trade is a tertiary economic activity. It is the process of buying, selling, or exchanging of commodities. The earliest form of trade was bartering, which is the exchange of one article for another of equal value.

The emergence of trade is related to the unequal distribution of resources that are essential to satisfying human needs. It also resulted from specialization of skills, such as weaving, metalwork, tannery, pottery, etc. Due to the variety of their

occupations, people began to exchange goods in the form of bartering. Later on, they started using metal, salt and paper money as the medium of exchange.

Differentiation of products, surplus of production, demand for commodities, differences in culture, adequate transport facilities and suitable world conditions are the main bases of trade.

Transportation

What sorts of transportation systems are available in your area? How do you explain the usefulness of transportation in the world in general and in Ethiopia in particular?

Transportation facilitates the movement of people, commodities, and mail. 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.

Over the year, faster means of transportation have been introduced, and now distances which used to take days or months to cover can be covered in a matter of minutes or hours. The rapid progress in transportation and other forms of communications have made places all over the earth functionally closer to each other.

Good transportation systems are needed to move goods within a country and abroad. They are also essential to spreading the benefits of health care and education.

There are many ways in which goods and people can be transported. In many areas of the world, human porters and animals like horses, donkeys, camels, etc. are the main means of transportation. These are, however, limited to local business. In international business interaction, fast and efficient means of transportation are necessary because of the huge quantities of commodities involved. These include land, water and air transport. The main transportation systems are road, railway, inland waterways, oceans and airways.

Each of these has its own advantages and the ideal situation for a country is to have a network of systematically coordinated transport links.

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Figure 3.11 **Addis Ababa Gotera Interchange Ring Road**



Activity 3.13

Discuss the following questions in your group.

1. Why do you use transportation?
2. Which one of the transportation systems is the most common one?
3. Give at least three examples of land transportation system.
4. Is transportation a tertiary economic activity? Why?

Communication

Which form of communication is the most modern communication system?

The word communication involves the transmission of words and messages from one place to another. The following are the major types of communications:

Mail: This includes the distribution of letters, pakages as well as money.

Example: Postal services

Telephone: is a telecommunications device that transmits and receives sound, most commonly the human voice. Telephones are a point-to-point communication system whose most basic function is to allow two people separated by large distances to talk to each other. Example: Mobile phone, land line telephone.

Radio: It is one of the most important means of communication. All over the world, information is transmitted using radios, with the help of electromagnetic waves.

Television: It is a means of communication used to transmit messages using both images and sounds. Nowadays, it is possible to receive information and entertainment via TV from any corner of the world with the help of satellites.

Internet and other modern communications tools: by using satellites and other electronic equipment like the computer and telephone, new methods of communication have been introduced to the world. Some of them include fax, e-mail and internet.



Figure 3.12 **Internet network**



Activity 3.14

Discuss the following questions in your group:

1 What are the different modes of communication?

2 What are the different types of communication devices?

Tourism

What is tourism?

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. The following are some of the reasons for tourism:

- *site-seeing;*
- *conferences;*
- *sport activities, such as skiing, mountaineering, boating, yachting, fishing, hunting, swimming, etc;*
- *health purposes – for example to secure fresh air and sunshine and sometimes to bathe in hot springs etc;*
- *research;*
- *religious ceremonies.*

Features that encourage the development of a tourist industry include:

- *good weather conditions;*
- *beaches, scenery (scenic attractions) or physical landscape features;*
- *services, such as bathing, boating, recreation, hotels, restaurants, etc.*
- *accessibility (transport facilities);*
- *interesting features (historical sites, parks, etc).*

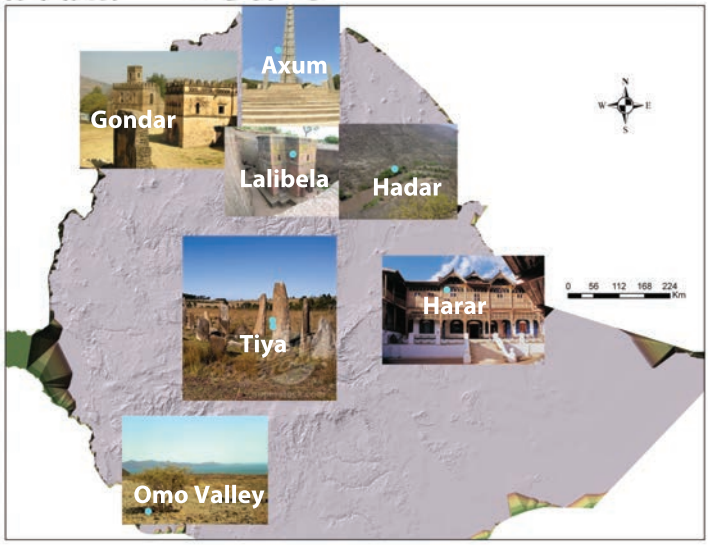


Figure 3.13 **Some tourist sites of Ethiopia**

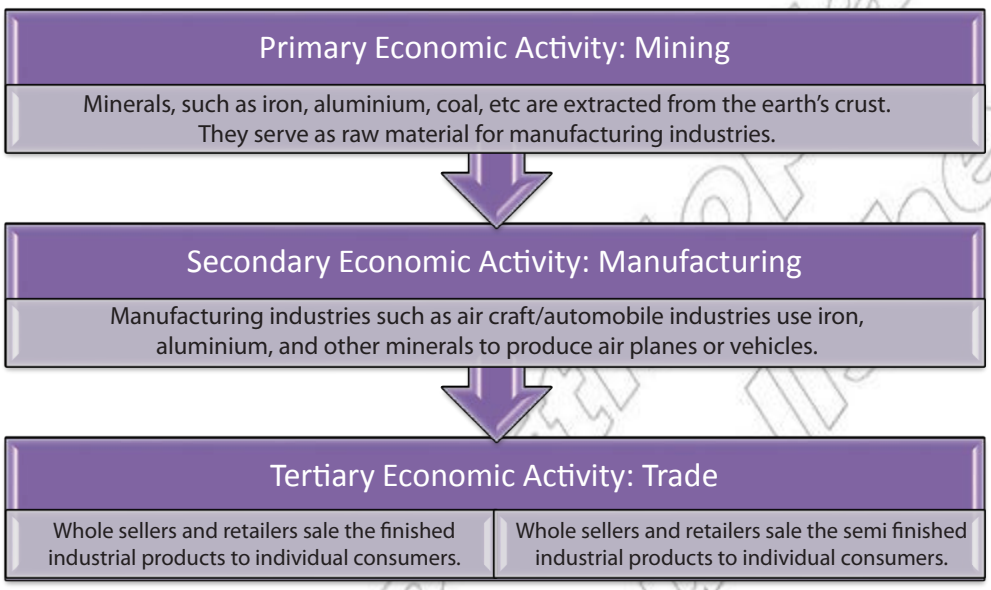


Figure 3.14 **The relationship among primary, secondary and tertiary economic activities**



Activity 3.15

In your small group, discuss the following questions.

1 What is the importance of tourism?

2 What are the benefits of tourism to our economy?

3 What is the difference between tourism and the tourism industry?

D *Quaternary Economic Activities*

What are the major quaternary economic activities practiced in your locality?

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 education, research, development, 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.



Activity 3.16

In pairs, discuss the following questions.

1 What is a quaternary economic activity?

2 Which of the following is a quaternary economic activity?

- ⇨ mining,
- ⇨ food processing,
- ⇨ research and development.

E *Quinary Economic Activities*

What are quinary economic activities? Is there any difference between quaternary and quinary economic activities?

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.

3.2.2 Land Use

Concept and Meaning of Land Use

What is land use? How is land use information presented?

Land use refers to the human activities which are directly related to land, making use of its resources, or having an impact on it. Land has many functions and must be managed to meet the needs of people.

The term land use has both rural and urban aspects. Land use automatically involves the concepts of optimizing land use potential, and of land-use planning. Land use may vary in nature and in intensity according to both the purpose it serves (Example: for food production, recreation, or mining) and the biophysical characteristics of the land itself.

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Land is one of our most precious assets. It provides food and shelter, it stores and filters water, and it is a base for urban and industrial development. Land is, however, finite in quantity. The combination of population growth, limited expansion of arable land, and the growing need for land for non-agricultural purposes increases competition for the available space.

Land is also, constantly under threat of degradation, mainly as a result of intensive cropping, mining, poor management, and population pressure.

Land Use in Ethiopia

How is the land in Ethiopia being used? For what purpose is most of the land used in Ethiopia?

Of the total land area of Ethiopia, 21 percent is under cultivation and 51 percent is pasture. It is also estimated that over 60 percent of the cultivated area is cropland. Alternative land uses include grazing land, fallow land, woodland and land for other purposes.

Inaccessibility, water shortage, and prevalence of disease-causing insects, mainly mosquitoes, prevent the use of large parcels of potentially productive land. In Ethiopia's lowlands, for example, the presence of malaria-causing mosquitoes keeps away farmers from settling in such areas.

Most agricultural producers are subsistence farmers with small holdings, often broken into several plots. Most of these farmers live in the Ethiopian highlands, mainly at elevations of 1,500 to 3,000 meters.

The population in the lowland peripheries is pastoralist, engaged mainly in livestock rearing. Sandy desert soils cover much of the arid lowlands in northeast and southeast Ethiopia. Because of low rainfall, these soils have limited agricultural potential, except in some areas where rainfall is sufficient for the growth of natural forage at certain times of the year. These areas are used by pastoralists who move back and forth into the area looking for pasture for their animals.

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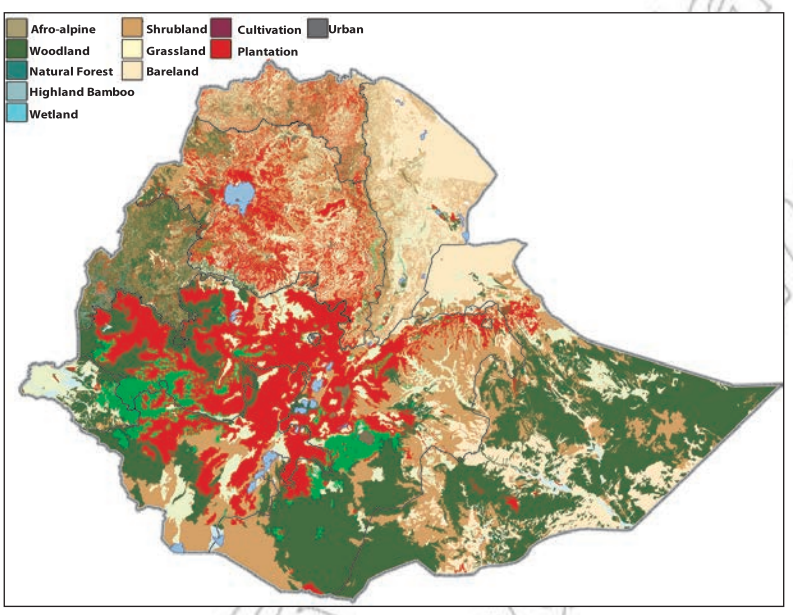


Figure 3.15 **Ethiopian land use**



Activity 3.17

In pairs, discuss the following questions.

1 State three factors which influence land use changes in Ethiopia.

2 What is the difference between land use and land utilization?

Driving Forces in Changing Land Use

What are the physical, economic and social determinants of land use?

Land use is influenced by two types of driving forces. These are human and natural or environmental. Land use changes can move in two directions: either negatively, leading to land degradation and loss of (production) potential, or positively, resulting in a higher value or potential.

Influences on land use include:

- *local culture;*
- *different economic activities;*
- *environmental conditions (soil quality, terrain, and moisture availability);*
- *land policy and development programs (agricultural programs, road building, zoning);*
- *Past human activities on the land (land degradation, irrigation and roads).*

Rural Land Use versus Urban Land Use

What are the differences between land use in urban and rural areas?

Land use, as the product of human activity on the earth's surface, shows a very large variation, within both local towns and regional cities. Land use varies from area to area. In this regard, the following table try to show land utilization of rural and urban area:

Rural	Urban
⇨ Settlements are scattered.	⇨ Settlements are closely constructed.
⇨ Most areas are used for farming, forestry, pasture.	⇨ Most areas are used for housing, industry, transportation, and other businesses.

Exercise 3.2

I *Determine whether each of the sentences is True or False.*

1 Fishing is a secondary economic activity concerned with the catching of fish and other marine creatures.

2 Power production is one type of secondary economic activity.

3 The tertiary sector of industry involves the provision of services to other businesses as well as final consumers.

4 The quaternary sector consists of economic activities which involve the highest level of decision making in a society or economy.

5 Tourism is a type of primary economic activity.

II *Match items in column 'B' with items in column 'A'.*

A	B
6 Forestry	A Tertiary economic activity
7 Processing	B Primary economic activity
8 Tourism	C Quinary economic activity
9 Consultation	D Secondary economic activity
10 High-level decision making	E Quaternary economic activity

III *Choose the correct answer.*

11 The types of human activities can be broadly grouped into several major groups of economic activities. To which does the extractive sector belong to?

A Secondary C Primary

B Tertiary D Quaternary

12 One of the following is not a primary economic activity.

A Trade C Forestry

B Agriculture D Mining

13 One of the following is a characteristics of manufacturing activities.

A It requires large capital investment and involves mass units of production

B Large number of employees are engaged

C They involve a high degree of division of labor

D All are correct answers

14 Which of the following is not a tertiary economic activity?

A Wholesale trade C Transportation

B Tourism D Construction

15 Which of the following is influential in changing land use?

A Environmental condition

B Local culture

C Land policy and developmental program

D All are correct

3.3 NATURAL RESOURCES

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

- define the concept of natural resources;
- classify natural resources into renewable and non-renewable;
- state the direct and indirect uses of natural vegetation;
- identify Ethiopia's common woods used for construction purposes;
- select Ethiopia's woods potentially significant for furniture and other purposes;
- recognize the economic significance of wild animals;
- show appreciation of the varied uses of minerals, and
- express the importance of soil.

Key Terms

- conservation
- renewable resources
- non-renewable resources
- natural resources
- natural vegetation

3.3.1 Concept

Can you list some of the materials that people use from their environments? What do we call the materials that people use from the environment to meet their needs?

Natural resources occur naturally within environments when those environments exist in their natural forms, relatively undisturbed by people. A natural resource is often characterized by the amount of biodiversity that exists in various ecosystems. Natural resources are derived from the environment. Many of them are essential for human life, while others are used for satisfying our wants. Natural resources include fertile soil, clean water, minerals, wildlife, vegetation, and energy sources. People use all these resources to improve their lives.



Activity 3.18

In pairs, discuss the following questions.

1. What are natural resources?
2. How do people use resources to make a living?
3. How does overusing resources threaten the environment?
4. What effects do human activities have on natural resources?

Types of Resources

How are environmental resources classified? What is the difference between renewable and non-renewable resources?

In the content of renewability, natural resources can be categorized as follows:

1. **Renewable resources**: are types of resources that can be replaced as they are used. They can be replaced naturally or grown fairly quickly. Forests, water, soil, plant and animal life all can be renewable resources if people manage them carefully. The renewable resources are replaceable in character since they are able to reproduce themselves. For example, forest is a renewable resource that can produce timber and other forest products year after year if it is carefully and scientifically managed.

2 **Non-renewable resources**: As their name suggests, non-renewable resources cannot be replaced once they have been used. The most important example of non-renewable resources are the fossil fuels like, coal, oil and natural gas and minerals. These resources are generally non-replaceable in character.

Resources are not evenly distributed throughout the world. There is a great disparity in the distribution of natural resources. This unevenness in the distribution of natural resources has led to the notion of the "have and have nots" nations, although the total resource quantities of the world have not yet been adequately determined.

Through out the world, people cut more and more trees and mine more minerals. This has led to the occurrence of environmental problems. Sometimes, resources are misused, as a result their quantities become smaller and smaller. This process is called environmental degradation. To overcome this problem, renewable and non-renewable resources should be wisely or sustainably used.

Now adays a number of people believe that the earth's resources are being over used and some times misused. If this situation continues uncontrolled, many of the resources will be lost or will deteriorate. Unless something is done quickly, we will face disasters.

In order to overcome this problem, people in many parts of the world practice different resource-conservation measures. Such practices help to maintain the volumes of resources and make them last longer.



Activity 3.19

Copy and complete the table, which is about the types of environmental resources.

Types of Resources	Definition	Examples
Renewable resources		
Non-renewable resources		

3.3.2 Importance of Natural Resources

A *Natural Vegetation*

What are the direct and indirect uses of natural vegetation?

When you observe your surroundings, you may see different types of plants. Some of these plants might have been planted by people and others might have grown naturally. Those which grow naturally are known as natural vegetation.

The term natural vegetation refers to the original cover of plants of a region resulting from normal conditions of climate, soil, drainage and other natural conditions. The vegetation of a region can be modified to a marked extent by people, because of agricultural or urban development. The following are the direct and indirect uses of natural vegetation.

Direct use	Indirect use
⇨ Serves as a source of energy such as fuel wood, charcoal etc. ⇨ Serves as a source of industrial raw materials such as gums, lumber, nuts etc. ⇨ Serves as source of construction materials. ⇨ Serves as a source of food such as nuts, fruits, roots, leaves, barks etc. ⇨ Serves as a source of income.	⇨ Regulates local climatic conditions. ⇨ Maintains the balance of nature. ⇨ Maintains soil fertility and regulates soil erosion. ⇨ Serves as habitats for wild animals. ⇨ Provides aesthetic value (adds beauty to the natural environment).



Figure 3.16 **Natural Vegetation**

The natural vegetation in Ethiopia is a most important source of raw materials for the construction and furniture industries. Among the most common woods that are used for these purposes are juniperus (tid), podocarpus (zigba), Aningeria (kerero), Arundineria (kerkaha), olea (weira), wanza, tikur inchet and bamboo.

Bamboo is one type of natural vegetation. In the world there are over 1,200 different species of bamboo forest. The highland bamboo species is one of the

types of Ethiopian bamboo. This species grows naturally in the ecological zone of the country that is between 2200 – 3500 meters above sea level.

Alpine bamboo has traditionally been used as a material for making fences and water pipes, as well as a variety of handicraft, items. The culms are used by cottage industries for woven and plaited products such as basketry, mats, and other decorative items.

Ethiopian highland bamboo also has been used for manufacturing industrial products such as parquet flooring, window blinds, and curtains. It is also useful for bio-energy.



Figure 3.17 **Ethiopian highland Bamboo**



Activity 3.20

Perform the following tasks in your group.

1 List the types of plants or trees that are commonly found in your area. Write their names in the local language and English.

2 Identify economic importance of Ethiopian woods, like bamboo and 'Wanza' trees.

B *Wild Animals*

What are wild animals? Have you ever seen wild animals?

Wildlife includes all wild living creatures, large or small. Mammals, birds, fish, reptiles, amphibians and insects are regarded as wildlife.

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These animals are important for many reasons. Among the most common important functions of wild animals for human beings are the following.

- ⇨ *Source of food*
- ⇨ *Source of industrial raw materials*
- ⇨ *Scientific and educational purpose*
- ⇨ *Maintaining the balance of nature*
- ⇨ *Add beauty to the environment (aesthetic value)*
- ⇨ *Source of individual and national income*



Figure 3.18 **Wild animals**

C *Minerals*

What are minerals used for?

A mineral is an element or a combination of elements. It is either inorganic or organic chemical elements or compounds found naturally in the crust of the earth.

Minerals are useful in many ways. The major uses of minerals are as follows:

- *Minerals are raw materials for a variety of manufacturing establishments. For example, iron, copper and tin are used in the production of many types of manufactured goods.*
- *Some minerals are sources of energy that is used to run machinery. Examples: coal, petroleum and natural gas.*
- *Some minerals are used for making fertilizers. These include minerals like phosphates, sulphur, potash, and nitrates.*
- *Some minerals are used directly as materials in building construction. Such minerals include limestone, marble, granite, clay, etc.*
- *Some minerals are used for both aesthetic and ornamental purposes. For example, silver and platinum are used in the minting of coins as well as for other industrial purposes. Diamonds, gold and some others are useful ornamental minerals.*

D Soil

What is soil? What are soils used for? What are the parent materials of soil?

Soil is a natural resource consisting of layers of mineral constituents of variable thicknesses. It is composed of particles of broken rock that have been altered by chemical and environmental processes that include weathering and erosion. Soil differs from its parent rock due to interactions between the lithosphere, hydrosphere, atmosphere, and the biosphere. It is a mixture of mineral and organic constituents that are in solid, gaseous and liquid states. The following are the major uses of soil:

- *Soil is used in agriculture, where it serves as the primary nutrient base for plants. The types of soil used in agriculture vary with respect to the species of plants that are cultivated.*
- *Soil resources are critical to the environment and food production. Soil provides minerals and water to plants. Soil absorbs rainwater and releases it later, thus preventing floods and drought. Soil cleans the water as it percolates through. Soil is the habitat for many organisms.*
- *The biological component of soil is extremely important for the carbon sink. Even in desert areas, bacteria, lichens and mosses capture a significant amount of carbon by photosynthesis. Restoring the world's soils could offset some of the huge increase in greenhouse gases which is causing global warming, while improving crop yields and reducing water needs.*

Exercise 3.3

I *Determine whether each of the sentences is True or False.*

1 Renewable natural resources are types of resources that can be replaced as they are used.

2 Natural resources are evenly distributed throughout the world.

3 Mineral fuel is a renewable natural resource.

4 Plants and animals are renewable natural resources.

5 Regulate local climatic condition is the direct use of natural vegetation.

II *Choose the correct answer.*

6 One of the following is not a renewable natural resources.

A Coal
B Forest
C Soil
D Water

7 What do people use in order to satisfy their needs?

A Natural conservation
B Natural resources
C GNP
D None of the above

8 One of the following explains the importance of wild animals. They are important for:

A Maintaining the balance of nature
B Source of industrial raw material
C Source of food
D All are correct

9 Which of the following is a non-renewable natural resources?

A Wild animals
B Gold
C Air
D Soil

10 The wise use of natural resource is _____.

A Degradation
B Misused
C Destruction
D Conservation

Unit Review

UNIT SUMMARY

- **Human population** refers to the number of people living in a definite area.
- The world's population has been experiencing continuous increases since the 15th century. As some sources indicate, by 1750 there were only about 791 million people in the world. However, 250 years later, the world's population reached over 6 billion.
- Population data refer to population information, such as number, age, marital status, births and deaths, occupation, religion, educational status, and other characteristics of the human population. Censuses, sample surveys and vital registration are among the most commonly used methods of gathering information about human populations.
- Population distribution is the way that a population is spread out over a given area, whether a small region or the earth as a whole. This distribution of population forms a pattern. While some areas are densely populated, others are sparsely populated.
- There are densely, moderately and sparsely populated areas in the world. There are three main population belts of high population density and concentration in the world. These include the Asiatic population belt, peninsular Europe and Northeastern North America. On the other hand, there are thinly populated areas. These areas include tundra, hot-dry lands, hot-wet lands, high relief and areas with poor soil.
- A settlement is a place in which people live, carrying out a variety of economic activities such as trade, agriculture and manufacturing. There are many types of settlements that include hamlets, villages, towns, cities, metropolises, and megalopolises.
- Settlements are broadly divided into **rural** and **urban**.
- **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.
- Quaternary economic activities include education, research, development, financial services and government activities.
- Quinary economic activities are a sub-set of quaternary activities and are those that involve high-level decision making and scientific research skills.
- Land use refers to human activities which are directly related to land, making use of its resources, or having an impact on it.
- Of the total land area of Ethiopia, 21 percent is under cultivation and 51 percent is pasture the Forest land of the country accounts for less than 3 percent of the total land area.
- Local culture, different economic activities, environmental conditions land policy and development programs and past human activity are driving forces that change land use.
- Land use varies from area to area. In rural areas, land use can include forestry and farming. On the other hand, in urban areas land use could be housing, industry, transportation and business administration.
- **Natural resources** occur naturally within the environments and exist relatively undisturbed by humans, in their natural forms.
- Natural resources are derived from the environment. Many of them are essential for human life, while others are used for satisfying our wants.
- Renewable resources are types of resources that can be replaced as they are used. These renewable resources can be replaced naturally or grown fairly quickly. Forests, water, soil, and plant and animal life all can be renewable resources if people manage them carefully.
- Non-renewable resources cannot be replaced once they have been used. The most important examples of non-renewable resources are the fossil fuels, coal, oil and natural gas and minerals.
- Natural vegetation can be used directly or indirectly.
- Juniperus (tid), podocarpus (zigba), Aningeria (kerero), Arundineria (kerkaha), Olea (weira), wanza, Tikur inchet and bamboo are common Ethiopian woods that are used for construction purposes.
- Bamboo woods are potentially significant for furniture.
- Wild animals can be used as sources of food, sources of industrial raw materials and also sources of individual and national income.
- Minerals are useful in many ways. The major uses of minerals are as raw materials for manufacturing industries, sources of energy, and making of fertilizers.
- Soil is used in agriculture.

REVIEW EXERCISE FOR UNIT 3

I *Choose the correct answer.*

1 Which of the following pairs of continents have contrasting population situations?

A Europe and North America
B Africa and Asia
C Asia and Oceania
D Africa and Europe

2 The highest population concentration in the world is in _____.

A Asia
B South America
C Europe
D Australia

3 Which one of the following affects the quality of population data?

A Fertile soil
B Adequate water supply
C Double entry
D Doubling time

4 Of the following, one is the most densely populated region in the world.

A Latin America
B Australia
C Asiatic population belt
D Africa

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

A Forestry
B Trade
C Tourism
D Refineries

6 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

7 The service sector of human economic activities is designated as:

A Secondary
B Quaternary
C Primary
D Tertiary

8 The most common rural residential pattern in the world's agricultural areas is:

A Dispersed
B Nucleated
C Spaced
D Hierarchical

II *Explain the following terms.*

9 Primary economic activity
10 Secondary economic activity
11 Mining
12 Land use
13 Population data

Unit 4



PUBLIC AND POLICY RELATED ISSUES IN ETHIOPIA

Unit Outcomes

After completing this unit, you will be able to:

- realize the prevalence and impacts of HIV/AIDS;
- accept and participate in the implementation of environmental policies in Ethiopia; and
- realize the economic policy of Ethiopia.

Main Contents

4.1 **HIV/AIDS**

4.2 **ENVIRONMENTAL POLICY**

4.3 **ECONOMIC POLICY**

- *Unit Summary*
- *Review Exercise*

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INTRODUCTION

In the previous unit you learned about human population and economic activities. The current unit is about public issues and policy related issues in Ethiopia. The unit has three sections: HIV/AIDS, Environmental Policy and Economic Policy.

Ethiopia belongs to the countries of sub-Saharan Africa that are heavily affected by HIV/AIDS. The first case of HIV in Ethiopia was reported in 1986. Since then, HIV/AIDS has become a major public health concern in the country. In 2007, the estimated adult HIV/AIDS prevalence in Ethiopia was 2.1 percent. Although the expansion of the epidemic is currently stable, HIV/AIDS remains a major development challenge for Ethiopia. Poverty, food shortages, and other socio-economic factors amplify the impact of the epidemic. According to UNAIDS, approximately 980,000 Ethiopians were infected with HIV/AIDS in 2007, and 67,000 individuals had died as a result of infection with the virus.

The aim of environmental policies and programs are to protect the environment from natural and human-made problems. Ethiopia has formulated environmental policies and programs which protect the environment by law. The law is designed to protect soil, water, forest, and minerals.

4.1 HIV/AIDS

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

- analyze the global prevalence of HIV/AIDS;
- explain the prevalence of HIV/AIDS in Ethiopia;
- reflect upon the impact of HIV/AIDS in Ethiopia; and
- decide to join the school anti-HIV/AIDS club to alleviate the prevalence of HIV/AIDS in Ethiopia.

Key Terms

- HIV
- AIDS
- Orphan
- Epidemic
- Antiretroviral
- Pandemic
- Vulnerable

Start-up Activity

1 What is HIV/AIDS?

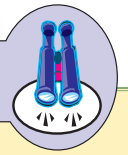
2 What should be done in order to overcome the HIV/AIDS pandemic?

3 What are the major means of transmission of HIV/AIDS? Discuss with your friends.

The Human Immunodeficiency Virus (HIV) is the virus that causes Acquired Immune Deficiency Syndrome (AIDS). HIV destroys the natural ability of the human body to fight off opportunistic infections such as tuberculosis (TB). A person infected with HIV can stay for a long time without showing any symptoms. The spread of the HIV/AIDS epidemic has emerged as one of the most critical problems of the population of the world, causing a high level of deaths as well as social and economic problems. So far, no cure has been found nor has a vaccine been developed.

There are many ways in which a person can be infected with HIV/AIDS. In all cases, the virus can get into a person's body if there is direct contact of body fluids such as blood from the infected person.

Focus



The most common ways of contracting an HIV/AIDS infection are through:

- ⇨ *Unsafe or unprotected sexual intercourse.*
- ⇨ *Shared use of items such as needles, blades and other sharp objects.*
- ⇨ *Transfusion of infected blood,*
- ⇨ *Unsafe delivery and breast feeding.*

However, it must be noted that you cannot get infected with HIV/AIDS by sitting, eating, swimming or shaking hands, etc. with a person who is HIV-positive.

You cannot tell whether a person is infected with the virus by looking at his or her physical appearance. The only way to know if a person has the virus is through a blood test. A person whose blood test shows an infection with HIV/AIDS is referred to as *HIV-positive.*

HIV/AIDS Around the World

What are impacts of HIV/AIDS at the global level?

During 2008, some 2.7 million people in the world became infected with the HIV,

which causes AIDS. The year also saw 2 million deaths from AIDS, a high global total, despite antiretroviral (ARV) therapy, which reduced AIDS-related deaths in the population that received it.

Around half of the people who acquire HIV become infected before they turn 25 years of age, and AIDS is the second most common cause of death among 20-24 year old. By the end of 2007, the epidemic had left 15 million AIDS orphans, defined as those aged under 18 who have lost one or both parents to AIDS. These orphans are vulnerable to poverty and exploitation and to becoming infected with HIV themselves. They are often forced to leave the education system and find work, and sometimes to care for younger siblings or to head a family.

In the same year, around 430,000 children, aged 14 or younger, became infected with HIV. More than 90 percent of newly infected children are babies born to women with HIV, who acquire the virus during pregnancy, laboring or delivery, or through their mother's breast milk. Over nine-tenths of such transmissions occur in sub-Saharan Africa.

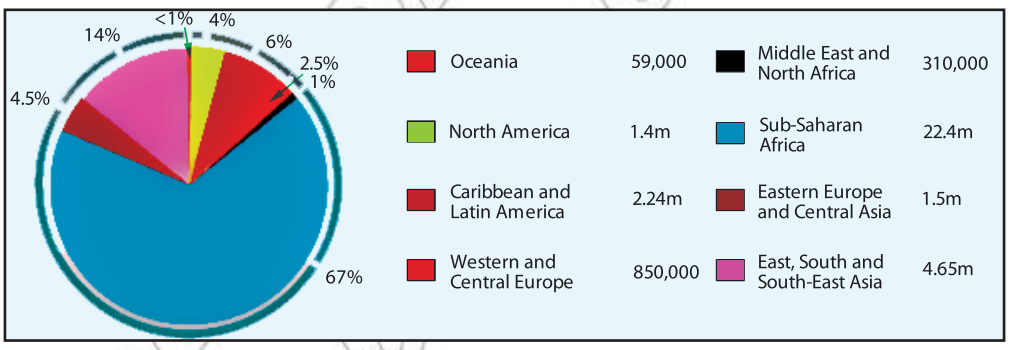


Figure 4.1 **Distribution of people living with HIV around the world, in 2008**

In terms of the AIDS epidemic, the area in Africa, south of the Sahara Desert, known as sub-Saharan Africa, is by far the worst-affected in the world. The region has just over 10 percent of the world's population, but is home to 67 percent of all people living with HIV. An estimated 1.9 million adults and children became infected with HIV during 2008. This brought the total number of people infected with HIV/AIDS in the region to 22.4 million by the end of the year. HIV prevalence varies considerably across this region − ranging from less than 1 percent in Madagascar to over 25 percent in Swaziland.

In sub-Saharan Africa, AIDS killed approximately 1.4 million people in 2008. Average survival in the absence of treatment is around 10 years after infection.

Antiretroviral (ARV) drugs can dramatically extend survival, allowing many years of healthy life, but these drugs remain unavailable to most Africans.

Unlike women in most other regions in the world, African women are more likely at least 1.4 times – to be infected with HIV than men. There are a number of reasons why female prevalence is higher than male in this region, including the greater efficiency of male-to-female HIV transmission through sex and the younger age of initial infection for women.

HIV/AIDS in Ethiopia

Can you describe the prevalence and trend of HIV/AIDS in Ethiopia?

The first evidence of HIV infection in Ethiopia was recognized in the early 1980's. The first two AIDS cases were reported in 1986. Since then, the disease has spread at an alarming rate. The primary mode of HIV transmission in Ethiopia is sexual contact. Even though of small magnitude at present, the next most common modes of infection are harmful indigenous practices and unsafe injections. These major causes for the spread of the virus, require due attentions.



Activity 4.1

Discuss the following questions in your group.

1. Is HIV/AIDS curable? What should you do to protect yourself from this disease?
2. What is the status of HIV/AIDS in Ethiopia? Is it an increasing or decreasing phenomenon?
3. Can you explain how the HIV/AIDS pandemic affects individuals, families and the society at large?
4. How, do you think, participation in anti-HIV/AIDS clubs contributes to the fight against the problem?

The 2010 report of the Federal HIV/AIDS Prevention and Control Office (FHAPCO) indicated that the current national adult prevalence rate in Ethiopia was about at 2.4 percent. The prevalence varies in urban (7.7%) and rural areas (0.9%). There are about 1.2 million people infected with HIV/AIDS in the country. Out of these, 90,311 are pregnant women, and 79,871 are children. The number of orphaned children due to AIDS is estimated at 804,184. The number of deaths due to AIDS in 2010 is estimated at 28,073.

Impacts of HIV/AIDS

What are the impacts of HIV/AIDS in general?

HIV/AIDS has several multifaceted impacts on humanity. So far, it has shortened life expectancy and caused an increase in tuberculosis. It has increased hospital-bed occupancy and depleted the productive work force as well as intensified food insecurity in Ethiopia.

AIDS also has large social, psychological, demographic, and economic impacts on both individuals and societies. In addition to the painful stress, disability and death that AIDS causes to the individual patients the family, social and economic problems that follow are many and varied. Such problems include divorce, family disintegration, orphaned children, etc. AIDS destroys the prime productive-age group and their children with death rates much higher than usual. When it affects large population groups it can diminish the quality and quantity of the labor force, leading to social and economic crisis in the community. The social tension and sense of hopelessness that follow are some examples of the psychological impacts of HIV/AIDS.

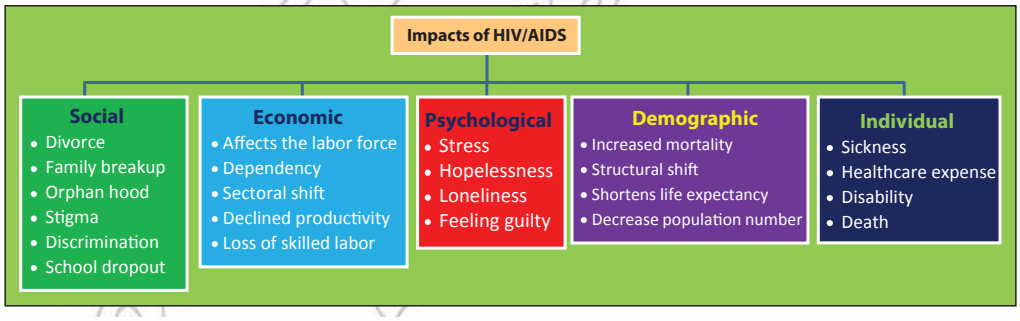


Figure 4.2 **Impacts of HIV/AIDS**

Vulnerability

Who are the most affected people in Ethiopia?

Women, young commercial sex workers, and orphans and children in general are the most vulnerable groups in Ethiopia. Women, due to economic, educational and biological factors as well as various harmful traditional practices, such as female circumcision and body scarification, are considered more vulnerable than men. Age, emotional development and financial dependence as well as poverty and lack of awareness about the disease, are major factors of vulnerability among the youth.



Activity 4.2

Discuss the following questions in your group.

1 What kinds of responsibilities do you think citizens should have for controlling and combating the HIV/AIDS epidemic?

2 In your opinion, what roles should teachers and students play to help control the expansion of the HIV/AIDS pandemic in Ethiopia?

Exercise 4.1

I *Determine whether each of the following sentences is true or false.*

1 A person who is infected with HIV can stay for a long time without showing any symptoms.

2 HIV/AIDS is only transmitted through sexual intercourse.

3 It is possible to tell whether a person is infected with the HIV/AIDS virus by looking at his or her physical appearance.

4 A person whose blood test shows an infection with HIV/AIDS is referred to as *HIV-negative.*

II *Choose the correct answer.*

5 When was the first evidence of HIV infection in Ethiopia recognized?

A In the late 1970's
C In the early 1980's
B In 1990
D In 2000

6 Which one of the following is a demographic impact of HIV/AIDS?

A Orphanhood
C Dependency
B Stress
D Shortens life expectances

7 Which one of the following is not true about HIV/AIDS?

A has shortened life expectancy
B has caused an increase in tuberculosis incidents
C has increased hospital-bed occupancy
D None of the above

8 Which of the following age groups of the population is highly affected by HIV/AIDS?

A infants
B The older population
C The younger population
D children

9 Of the following geographic areas, which one is highly infected by HIV/AIDS?

A Western Europe and North America
B The caribbean and Pacific regions
C South and southeast Asia
D Sub-Saharan Africa

10 Which one of the following activities is extremely dangerous regarding the transmission of HIV/AIDS?

A Re-use of blades
B Kissing
C Re-use of injections
D Unprotected sex

4.2 ENVIRONMENTAL POLICY

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

- adhere to implementation of Ethiopia's environmental policy.

Key Terms

- deforestation
- policy
- sustainable

What is environmental policy? What is the importance of environmental policy?

Environmental policies are guidelines formulated for a wise use of environmental resources. They help us to form systematic conservation techniques, which help to minimize miss use of resources. Most solutions for major conservation problems are derived from environmental policies. The main goal of these policies is the protection of the environment from natural and human-made problems.

When people use natural resources to make a living, they affect the environment. The unwise use of resources is a threat to the environment. Many human activities can cause pollution, putting toxic or poisonous substances into the land, water, and air.

Land and water: chemicals that farmers use may increase the productivity of their crops but some also damage the land. Pesticides or chemicals that kill insects, can pollute rivers and ground water. Illegal dumping of dangerous waste products also causes problems. Untreated sewage reaching rivers pollutes lakes and groundwater as well.

Air: Industries and vehicles that burn fossil fuels are the main sources of air pollution. Throughout the world, fumes from cars and other vehicles pollute the air. The chemicals in polluted air can seriously damage people's health. These chemicals, combined with precipitation, may fall as *acid rain*, or rain carrying large amount of sulphuric acid. Acid rain corrodes the surfaces of buildings, kills fish, and can destroy entire forests.

Energy: Developed nations and developing nations both need safe and dependable sources of energy. Fossil fuels are most often used to generate electricity, heat buildings, run machinery, and power vehicles. Fossil fuels, however, are non-renewable resources. In addition, they contribute to air pollution.



Activity 4.3

In your group, discuss the following questions.

1 How do farmers pollute the environment?
2 What natural and human-made factors cause environmental pollution?
3 How can you help control pollution?
4 How can industries harm the environment?

These days, the above-mentioned problems are becoming very serious. Therefore Ethiopia has launched a policy of environmental protection.

The Objectives (Goals) of the Environmental Policy of Ethiopia

What are the specific environmental policy objectives of Ethiopia?

The overall policy goal of Ethiopia's environmental policy is to improve and enhance the health and quality of life of all Ethiopians and to promote sustainable social and economic development through the sound management and use of natural, human-made and cultural resources or of the environment as a whole. This

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goal aims at meeting the needs of the present generation without compromising the ability of future generations to meet their own needs.

Specific Policy Objectives

The specific objectives of the environmental policy of Ethiopia are to:

- *Promote development that is sustainable and optimize resource use and management opportunities.*
- *Ensure that environmental concerns are explicitly addressed and incorporated into the decision-making process.*
- *Develop, implement and measure programs that promote management systems for the environment.*
- *Prevent, minimize or offset the adverse impacts of municipal waste and other potential pollutants.*
- *Prevent the adverse effects of developmental proposals that may generate hazardous substances or wastes.*
- *Raise public awareness and promote understanding of the essential linkages between environment and development.*



Activity 4.4

In pair, discuss the following question.

1 List and discuss some objectives of the Ethiopian environmental policy.

2 Do you think that people, including students and teachers, should be involved both in the formulation and implementation of such policies? Why or why not?

Sectorial Environmental Policies

Not all countries of the world have similar environmental problems. The policies also differ among countries. For example, in developed regions, environmental problems are the results of industrialization. On the other hand, in developing countries of the world, major environmental problems include deforestation, soil degradation, wildlife destruction and misuse of water resources. Therefore, the environmental policies of the developing countries focus on such problems.

The environmental policies of Ethiopia related to major resources are summarized as follows.

Policy Related to Soil and Agriculture

- *To base, where possible, increased agricultural production on sustainably improving and intensifying existing farming systems by developing and disseminating technologies which are biologically stable, appropriate under the prevailing environmental and socio-cultural conditions for farmers, economically viable and environmentally beneficial.*
- *To ensure that planning for agricultural development in corporates in its economic cost-benefit analysis the potential costs of soil degradation through erosion and salinization as well as soil and water pollution.*
- *To safeguard the integrity of the soil and to protect its physical and biological properties, through management practices for the production of crops and livestock which pay particular attention to the proper balance in amounts of chemical and organic fertilizers, including green manures, farm yard manures and compost.*
- *To promote the use of appropriate organic matter and nutrient management for improving soil structure, nutrient status, soil conservation and land husbandry.*
- *In order to safeguard human and environmental health, prepare regulation of agricultural (crop and livestock) chemicals.*

Policy related to Forest, Woodland and Tree Resources

- *To recognize the complementary roles of communities, private entrepreneurs and the state in forestry development.*
- *To encourage all concerned individuals and communities as well as the government to be actively involved in the planning and implementation of forestry programs to ensure sustainability, minimize cost, and forestall (prevent) conflict.*
- *To ensure that forestry development strategies integrate the development, management and conservation of forest resources with those of land and water resources, energy resources, ecosystems and genetic resources as well as with crop and livestock production.*
- *To pursue agricultural and other policies and programs that will reduce pressure on fragile woodland resources and ecosystems.*
- *To promote changes in agricultural and natural-resource management systems which will limit the need for free grazing of animals in protected forest areas.*

Policy related to Genetic, Species and Ecosystem Biodiversity

- *To promote the involvement of local communities inside and outside protected areas in the planning and management of such areas.*
- *To ensure that the conservation of biological diversity outside the protected-area system be integrated with strategic land use plans, local level plans and sustainable agricultural and pastoral production strategies.*

Policy related to Water Resources

- *To promote the protection of the interface between water bodies and land (example: lake shores, river banks and wetlands).*
- *To involve water resource users, particularly women and animal herders, in the planning, design, implementation and follow up in their localities of water policies, programs and projects so as to carry them out without affecting the ecological balance.*
- *To subject all major water conservation, development and management projects to the environmental impact assessment process and to include the cost and benefits of protecting watershed forests, wetlands and other relevant key ecosystems in the economic analysis of such water projects.*
- *To promote, through on-site training, effective water management techniques at the farm level for improved performance of medium to large-scale irrigation schemes.*

Policy related to Energy Resources

- *To adopt an inter-sectoral process of planning and development which integrates energy development with energy conservation, environmental protection and sustainable utilization of renewable resources.*
- *To locate, develop, or adopt energy sources and technologies to replace biomass fuel.*

Policy related to Mineral Resources:

- *To provide technical and material assistance to artisan miners to improve environmental protection and output efficiency.*

- *To encourage and support small-scale miners to practice mining which is organized and responsible so as to be consistent with environmental laws, rules and regulations to safeguard the well-being of the land and its other natural resources.*
- *To advise and train mining communities in methods of environmental protection and reclamation of abandoned mining areas.*
- *To prepare and enact specific mining environmental protection legislation.*

Policy related to Industrial Waste

- *To establish clear linkages between the control of pollution and other policy areas including water resources, agriculture, human settlements, health and disaster prevention and preparedness.*
- *To provide adequate regulation of agricultural (crop and livestock) chemicals and micro-organisms.*
- *To ensure that pollution control is related to the potency, longevity and potential to increase or reproduce the pollutant.*

Activity 4.5



In your group, discuss the following questions.

1. What do you think the role of the community should be in protecting natural resources?
2. Are there industries in your locality? If yes, where do they dispose their waste? Inside water bodies or in the open field? Do you think their waste-disposal activities are right or wrong? Why?
3. Are forests, wildlife and soils legally protected in your area? What happens to people who misuse these resources?
4. Is there an environmental club in your school? If so, discuss its activities in protecting the environment. If not, what do you think such a club should do?

Exercise 4.2

I *Determine whether each of the following sentences is true or false.*

1 Fossil fuels are the main sources of air pollution.

2 All countries of the world have similar environmental problems.

3 The environmental policies of the developing counties focus on only industrialization.

4 The unwise use of resources is a threat to the environment.

II *Choose the correct answer.*

5 Which one of the following is not an environmental problem?

A Deforestation
C Wildlife depletion
B Soil degradation
D Reforestation

6 Which of the following is true about the environmental policy of Ethiopia?

A It encourages increased agricultural production through sustainable methods by improving and intensifying existing farming systems.

B To locate, develop or adopt energy resources and technologies to replace biomass fuel.

C To recognize the complementary roles of communities, private entrepreneurs and the state in forestry development.

D All are correct.

7 In terms of the objectives of the environmental policy, which one of the following countries is different from the others?

A Netherlands
C England
B France
D Kenya

8 Ethiopia's environmental policy came into effect in the decades of the

A 1980's B 1970's C 2000's D 1990's

9 Which of the following is given lesser attention in the environmental policies of Ethiopia?

A Soil protection
C Forest protection
B Urban development
D Water pollution

10 To which of the following problems do the environmental policies of developed countries pay the most attention?

A Water pollution
B Forest destruction
C Industrial wastes
D Soil degradation

4.3 ECONOMIC POLICY OF ETHIOPIA

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

- realize the contribution of the economic policy of Ethiopia for development.

Key Terms

- non-agriculture
- domestic market
- geothermal energy

What is an economic policy? What types of economic policy does Ethiopia have?

Economic policy refers to the action that governments take in the economic field. It covers the system for setting interest rates and government budget as well as actions related to the labor market, national ownership and many other areas of government intervention in the economy. Such policies are often influenced by international institutions as well as political ideology.

Types of Economic Policy

Types of economic policy include:

- *Macroeconomic stabilization policy;*
- *Trade policy;*
- *Policies designed to create economic growth;*
- *Policies related to development economics;*
- *Industrial policy.*

An economic development plan (policy) provides the general objectives, priorities, and different phases of development and organization and the major policies and measures to be adopted. Based on the new economic policy, the

Ethiopian government formulated a long-term economic development strategy known as Agricultural-Development-Led-Industrialization which was devised to stimulate the country's underdeveloped economic structure. It is a two-sided strategy, integrating:

- *the external sector (export-led)*
- *the internal sector which explains the forward and the backward-relationship between agriculture and industry.*

The Objectives (Goals) of the New Economic Policy of Ethiopia

- *Changing the role of the state in the economy.*
- *Mobilizing external resources to the development efforts of the country.*
- *Involving regional administrations in economic management.*
- *Promoting public participation in development.*
- *Promoting private investment.*

Sectorial Economic Policies

Policy Related to Agriculture and Food Production

- *Increased extension and research services with extension packages that provide better solutions to respond to farmers' needs.*
- *Adoption of new rural land proclamations in the four largest regions of the country.*
- *Shifting of the rural labor force from agricultural to non-agricultural activities, which would improve productivity and ease the population pressure on rural land.*

Policy Related to Industrial Sector

This emphasized the development of the manufacturing sector which produces materials mainly for domestic markets.

Policy Related to Energy

The energy sector policy stresses the need for the expansion of hydro-power, the exploitation of geothermal energy and the sustainable utilization of traditional energy sources.

Policy Related to Transport/Communication

The transport and communication policy focus on the expansion of facilities, especially rural roads, the improvement of construction material supply and ultimately self-sufficiency, planned and coordinated development of urban social services.

Policy Related to Education

The main objective of the education policy is to improve the relevance and quality of teaching methods and materials and to foster student success and equity. Upgrading standards, through the provision of educational abilities and instructional materials as well as upgrading the quality of teachers by way of pre-service and in-service training are major efforts to be made.

The overall goal of the educational policy of Ethiopia

- *To improve quality.*
- *Increase student access to educational opportunities at the primary level and to achieve universal primary education by the year 2015.*
- *To enhance efficiency and use resources wisely.*
- *To address equity issues by narrowing the gap between male and female, among regions, and between rural and urban areas.*
- *To provide increased access to Adult and Non-Formal Education in order to combat the problem of adult illiteracy.*
- *To increase access to quality secondary education based on the demand of the economy for skilled human resources and the intake capacity at the tertiary level.*

In Technical and Vocational Education and Training/TVET

- *To provide relevant and demand-driven education and training that corresponds to the needs of economic and social sectors for employment and self-employment by re-orienting and re-focusing the existing TVET system.*
- *To assure the quality of TVET training programs.*
- *To enable TVET institutions to generate their own income and thereby reduce government allocations to the sub-sector.*

In Tertiary Education

- *To develop responsible and competent citizens who meet the nation's quantitative and qualitative demand for a high-level trained labor force based on the socio-economic needs of the country.*
- *To set up cost-effective, efficient and results-oriented systems and develop modern and effective human-resource management procedures and practices.*
- *To develop the volume, quality and relevance of research and consultancy services directed to the needs of the country.*

Policy Related to Health

The health policy focuses on primary and preventive health measures, with a new five year policy of health delivery, based on community-level services.

In order to achieve the Health Sector Developmental Program, the following strategies have been designed:

- *Vigorous implementation of the Health Service Extension Program for the effective prevention and control of communicable diseases and promotion of healthy living;*
- *Enhancing the capacity of district health offices in the expansion of Public Health Centre (PHC) facilities and services;*
- *Improving the quality of health care through provision of adequate resources, implementation of a two-way referral system, and enhancing the capacity of Health Education Workers (HEWs) for the detection, referral and follow-up of patients. Strengthening secondary and tertiary hospitals and referral laboratories;*
- *Improving the number, skills, distribution and management of health workers;*
- *Ensuring the planned training of health managers in adequate numbers and providing them with appropriate knowledge and skills;*
- *Mobilizing adequate financial resources, ensuring their efficient utilization, and strengthening sustainable financing mechanisms for the health sector;*
- *Improving the health information system and the capacity for effective monitoring and evaluation;*
- *Ensuring full community participation in the planning, implementation, monitoring and evaluation of health care;*
- *Promoting and coordinating the activities of the public sector, private sector, international organizations and NGOs in health intervention.*

Exercise 4.3

I *Determine whether each of the following sentences is true or false.*

1 Economic policy can be influenced by international institutions as well as political ideology.

2 The main objective of the educational policy of Ethiopia is to improve relevance, quality, success and equity.

3 One of the objectives of the new economic policy of Ethiopia is strengthening government control on the economy.

4 In the new economy policy of Ethiopia the health policy focuses on primary and preventive health measures.

II *Choose the correct answer.*

5 In the objectives of the new economic policy of Ethiopia, which one of the following is NOT included?

A Promoting private investment
B Continuing the role of the government in the economy
C Involving regional administration in economic management
D Promoting the participation of the population in developmental sectors

6 Which of the following are NOT the prime objectives of the new economic policy of Ethiopia.

A Promoting population participation in the development process of the country
B Changing the role of the state in the economy
C Minimizing private investment both in the national and regional economy
D Involving regional administration in managing the economy

7 Which one of the following refers to the current long term development strategy of Ethiopia?

A Industrial-development-led agriculture
B Giving priority to the development of energy resources
C Agricultural-development-led industrialization
D Making the economy dependent on mining rather than on agriculture

Unit Review

UNIT SUMMARY

- The spread of the HIV/AIDS epidemic has emerged as one of the most critical problems of the population of the world, causing a high level of deaths as well as social and economic problems.
- In terms of the AIDS epidemic, the area in Africa south of the Sahara desert, known as sub-Saharan Africa, is by far the most-affected in the world. The region has just over 10 percent of the world's population, but is home to 67 percent of all people infected with HIV/AIDS.
- The primary mode of HIV transmission in Ethiopia is sexual contact. There are about 1.2 million people infected with HIV/AIDS in the country.
- HIV/AIDS has shortened life expectancy and caused an increase in tuberculosis incidents. It has also increased hospitals' bed occupancy and depleted the productive forces as well as aggravated food insecurity in Ethiopia.
- Environmental policies are guidelines formulated for a wise use of environmental resources.
- The overall policy goal of Ethiopia's environmental policy is to improve and enhance the health and quality of life of all Ethiopians, and to promote sustainable social and economic development through the sound management and use of natural, human-made and cultural resources or of the environment as a whole.
- Economic policy refers to the action that governments take in the economic field. It covers the system for setting interest rates and government budget as well as actions regarding the labour market, national ownership and many other areas of government intervention in the economy.
- Based on the new economic policy, the Ethiopian government formulated a long-term economic development strategy known as Agricultural-Development-Led Industrialization which was devised to stimulate the country's underdeveloped economic structure.

REVIEW EXERCISE FOR UNIT 4

I *Determine whether each of the following sentences is true or false.*

1 HIV/AIDS is curable.

2 A person can be infected with HIV/AIDS because of sitting, eating, swimming or shaking hands with a person who is HIV-positive.

3 A person whose blood test shows an infection with HIV/AIDS is referred to as *HIV-positive.*

4 Environmental policies are guidelines formulated for the misuse of resources.

5 The main objective of the new Ethiopian Economic Policy is to change the role of the state in the economy.

II *Choose the correct answer.*

6 Which one of the following is not true about HIV/AIDS?

A HIV/AIDS is a non-communicable disease.

B A person can be infected with HIV for a long time without showing any symptoms.

C The first case of HIV in Ethiopia was reported in 1986.

D HIV/AIDS can be transmitted through unsafe sex.

7 Which of the following is/are the most common route of HIV/AIDS infection?

A Unsafe or unprotected sexual intercourse.

B Shared use of items such as needles, blades and other sharp objects.

C Transfusion of infected blood, unsafe delivery and breast feeding

D All are correct

8 The primary mode of HIV transmission in Ethiopia is _____.

A Unsafe delivery and breast feeding

B Sexual intercourse

C Safe sex

D Abstinence

9 Whcih one of the following is/are an impact of HIV/AIDS?

A Decline productivity

B Increased mortality

C School dropout increases

D All are correct

10 Among the following populations, the most vulnerable group is/are

A Women
B Youth
C Commercial sex workers
D All are correct

11 One of the following is not an objective of the environmental policy of Ethiopia

A Develop programs that promote management systems for the environment.
B Promote development that is sustainable and optimize resource use and management opportunities.
C Minimize the adverse impacts of municipal waste and other potential pollutants.
D None of the above.

12 One of the following is not an environmental problem in developing countries.

A Deforestation
B Soil degradation
C Environmental problem as the result of industrialization
D Wildlife destruction

13 Which of the following is the main goal of the environmental policies of Ethiopia?

A Minimizing the use of natural resources
B Prohibiting people from using natural resources
C Protecting natural resources from wastage
D Ending exploitation of natural resources

14 Which point is not stated in the new economic policy of Ethiopia?

A increase imported goods
B encourage private investment
C increase rate of industrialization
D promote better utilization of resources

15 Which one of the following is not a component of the economy policy of Ethiopia?

A Trade policy
B Population policy
C Industrial policy
D Agricultural policy

Glossary

Abiotic: *not involving biology or living things*

Aerosol: *A colloid, in which particles are dispersed in a gas, usually air. Because of their small size, airborne aerosols fall very slowly.*

AIDS (Acquired Immuno Deficiency Syndrome): *sexually transmitted disease in which the immune system fails to protect the individual from other diseases.*

Altitude: *distance above sea level; generally applied to a location above the earth's surface.*

Anticline: *a fold in which the beds dip outward and the older rocks are in the center of the fold.*

Antiretroviral: *Antiretroviral drugs are used to treat certain types of virus, especially HIV.*

Atmosphere: *the envelope of air that surrounds the earth, held in place by gravity. The most abundant gas in the atmosphere is nitrogen (78%), followed by oxygen (21%), argon (0.9%),carbon dioxide (0.03%), and minor amounts of helium, krypton, neon, and xenon.*

Biotic: *related to living things.*

Block (Horst) mountain: *a raised block of land bounded by two normal faults.*

Caldera: *a basin-shaped volcanic depression; such large depressions are typically formed by the subsidence of volcanoes.*

Carnivore: *animal that eats primarily meat.*

Census: *a count of a population.*

City: *a large urban area, large town; inhabitants of a city in a collective manner.*

Communication: *formal a message such as a letter, phone call, or e-mail.*

Conifer: *a tree that produces its seeds within cones.*

Conservation: *the view that natural resources should be used wisely and that society's effect on the natural world should be the result of stewardship and not exploitation.*

Consumers: *organisms in an ecological food chain that receive their energy by consuming other organisms.*

Conurbation: *large urban community made up of several cities or towns.*

Convection rain: *rainfall that comes when moist air, warmed by a heated land surface, expands rises and is cooled, which decreases the capacity of the air to hold water, resulting in precipitation.*

Crater: *a steep-sided, usually circular depression formed by either explosion or collapse at a volcanic vent.*

Decomposer: *organisms that break down the dead or decaying organisms and in doing so carry out the natural process of decomposition.*

Deforestation: *process of clearing forests or trees.*

Demography: *the study of human population, including their size, growth, density, distribution and rates of births, marriages, and deaths.*

Desert: *a region of substantial size that is largely or entirely devoid of vegetation, usually as a result of aridity.*

Development: *change, growth, or improvement over a period of time.*

Dike: *any tabular, parallel-sided igneous intrusion that generally cuts across layering in the surrounding country rocks*

Earthquake: *sudden, strong shaking of the earth's surface, caused by movement of the rocks in the earth's crust: The worst earthquakes happen where there are fault lines.*

Ecosystem: *a collection of the organisms and surrounding physical elements that together functions an ecological unit.*

Epicenter: *the point on the earth's surface directly above the focus of an earthquake.*

Epidemic: *a situation in which a disease spreads every quickly and infects many people.*

Evaporation: *the conversion of a liquid to a vapor, such as water to vapor*

Exfoliation: *a weathering process where rocks spall off in successive shells, like the skin of an onion.*

Exfoliation is caused by differential stresses within a rock formed during chemical weathering processes.

Faulting: *the cracking or fracturing of rock, followed by the movement of the two sides of the fracture relative to one another.*

Fishing: *the sport or business of catching fish.*

Fissures: *elongated fractures or cracks on the slopes of a volcano. Fissure eruptions typically produce liquid flows, but pyroclastics may also be ejected.*

Focus: *the point below Earth's surface along which initial earthquake tremors occur.*

Folded mountain: *landform created when tectonic movements bend and uplift rock layers.*

Folding: *the bending of rock layers subjected to tectonic stresses.*

Forestry: *the science of caring for forests, and the trees and other plants that grow in them.*

Force: *things that makes great changes to the environment.*

Frost: *ice crystals that have sublimated on surface objects because the overlying air has cooled below the dew point.*

Geographic information system (GIS): *an organized collection of computer hardware, software, and geographic data that is designed to capture, store, update, manipulate, and display geographically referenced information.*

Geography: *a branch of science that studies the earth's surface and the distribution arrangement and interaction of natural and human features and their causes and effects.*

Geothermal energy: *energy from the earth's intense interior heat, which transforms underground water to steam that can be used to heat homes or to make electricity.*

Global positioning system (GPS): *a system of satellites which orbit the earth on precisely predictable, paths, broadcasting highly accurate time and locational information.*

Globalization/villagization: *a process which embodies a transformation in the spatial organization of social relations and transactions, expressed in transcontinental or interregional flows and networks of activity, interaction and power.*

Hamlet: *small village*

Harvest: *gathering of crops*

Herbivores: *organisms that are adapted to eat plants.*

HIV (human immunodeficiency virus): *virus that causes AIDS.*

Industry: *a place where manufacturing activity takes place.*

International grid reference: *shows the absolute locations of places on the surface of the earth.*

Jet stream: *high-level, narrow, fast-moving currents of air.*

Lagoon: *a rare class of restricted coastal bay that is separated from the ocean by an efficient barrier that blocks any tidal influx and that does not have significant freshwater influx from the mainland.*

Land forms: *individual earth surface features.*

Lapse rate: *the rate at which air temperature changes with altitude. This depends on local conditions, especially humidity.*

Laterite: *thick infertile soils produced in tropical climates*

Latitude: *the angular distance of a place north or south of the equator or regions with reference to their distance from the equator.*

Lava: *magma which has reached the surface through a volcanic eruption. The term is most commonly applied to streams of liquid rock that flow from a crater or fissure. It also refers to cooled and solidified rock.*

Leaching: *the removal of dissolved materials and fine textured particles from the upper soil by downward percolating soil water. This material may be deposited deeper within the soil, or they may be removed completely from the soil.*

Liana: *any of a variety of climbing plants that root in the ground large woody lianas is characteristics of the tropical rainforest.*

Longitude: *the angular distance of a place east or west of a standard meridian, especially Greenwich meridian.*

Magma: *Molten rock beneath the surface of the earth.*

Magnetic declination: *the difference between the magnetic north and true north.*

Megalopolis: *large city, capital city.*

Mesosphere: *region of the atmosphere that lies above the stratosphere, extending between 50 and 80 to 85 km.*

Metropolis: *main city, important city, and capital city.*

National grid reference: *used on maps of individual countries and regions.*

Natural resources: *assets that come from nature.*

Natural vegetation: *the typical plant life that bounds in areas where humans have not significantly altered the landscape.*

Non-renewable resources: *natural resources that cannot be replaced once it is used.*

Ocean current: *the movement paths of water irregular courses, driven by the wind and thermo-hyaline forces across the ocean basin.*

Omnivores: *species that eat both plants and animals as their primary food source. They are opportunistic, general feeders not specifically adapted to eat and digest either meat or plant material primarily.*

Orogeny: *the process of building mountains.*

Orographic effect: *the phenomenon occurring when clouds move over a mountain range and cool, which decreases the capacity of the air to behold water, resulting in precipitation falling on the windward side of the range. As the air mass moves down the leeward side of the mountain, it warms and is able to hold more moisture than is present, so the leeward sides of mountains tend to be dry.*

Orphans: *child whose parents are dead.*

Oxbow lake: *an elongate and curved lake formed by an abandoned meandering stream channel on a floodplain.*

Pandemic: *a disease that affects almost everyone in a very large area.*

Policy: *a set of plans or actions agreed on by a government, political party, business, or other groups. Policy guidelines*

Population data: *refers to population information such as number, age, marital status, births and deaths, occupation, religion, educational status and other characteristics of the human population.*

Population: *group of individual organism of the same species that occupy particular areas at given times.*

Precipitation: *water that falls to the surface from the atmosphere in liquid, solid, or fluid form.*

Producers: *the beginnings of a simple food chain. Producers are plants and vegetables. Plants are at the beginning of every food chain that involves the Sun. All energy comes from the Sun and plants are the ones who make food with that energy. They use the process of photosynthesis. Plants also make loads of other nutrients for other organisms to eat.*

Radiation: *energy in the form of waves.*

Radio waves: *electromagnetic waves with the longest wavelengths in the spectrum, between 1 mm and 100,000 km commonly used to transport information through the atmosphere and space without wires.*

Rayon: *a synthetic textile fiber made from cellulose.*

Raw material: *substance that is still in its natural state.*

Region: *a portion of the earth that displays relative similarity in one or more attributes.*

Relief: *the distance between two elevations at Earth's surf; the general 'lay of the land.*

Remote sensing: *the collection of information about parts of the Earth's surface by means of aerial photography or satellite imaginary designed to record data on visible, infrared, and micro wave sensor systems.*

Renewable resources: *a natural resource that the environment continues to supply or replaces as it is used.*

Rift valley: *a deep, linear, steep-sided trough produced by subsidence of a strip of land between two faults.*

Rural settlement: *all villages and dispersed (scattered) settlements in area far from urban centers.*

Savanna: *a tropical grassland that contains scattered trees or shrubs.*

Science: *the study and knowledge of the physical world and its behavior that is based on experiments and facts that can be proved, and is organized into a system.*

Scope: *the content (how broad or narrow) of the field of a given discipline.*

Settlement: *a place in which people live, carrying out a variety of activities for their living such as trade, agriculture and manufacturing.*

Spatial: *the position, shape, size, etc of things.*

Stratosphere: *region of the atmosphere above the troposphere that continues to a height of about 50 km.*

Sustainable: *capable of continuing for a long time at the same level.*

Syncline: *a fold structure in which the associated beds dip inward and the youngest rocks occupy the core of the fold structure*

Technology: *the process by which humans modify nature to meet their needs and wants. Most people, however, think of technology in terms of its artifacts: computers and software, aircraft, pesticides, water-treatment plants, birth-control pills, and microwave ovens, to name a few. But technology is more than these tangible products.*

Thermosphere: *region of the atmosphere above the mesosphere that thins upward and extends to about 500 km above the surface.*

Time-distance decay: *the attenuation of a process or effect over distance. With respect to cultural diffusion, distance decay refers to the decrease in the impact or spread of a cultural trait or innovation as the distance from the center of innovation increases. Time–distance decay incorporates the concept of diminution of effects over time.*

Tourism: *practice of travelling for recreation.*

Town: *populated area that is smaller than a city.*

Transportation: *the movement of people and goods from one location to another. Modes include air, rail, road, water, cable, pipeline, and space. The field can be divided into infrastructure, vehicles, and operations.*

Troposphere: *the lower 8/16 km of the atmosphere.*

Tsunami: *a giant harbor or deepwater wave with long wavelengths, initiated by submarine landslides, earthquakes, volcanic eruptions, or another cause, that suddenly displaces large amounts of water.*

Tsunami can be much larger than normal waves when they strike the shore, and they can cause great damage and destruction.

Urban: *settlement refers to town or city settlement.*

Vent: *the opening at the earth's surface through which volcanic materials issue forth.*

Village: *small rural town*

Volcanism: *Processes involving the transfer of molten rock material either from one subsurface location to another, or its explosion onto the surface.*

Vulnerable: *having a risk of being hurt or exposed to danger or attacks.*

Weathering: *the breaking down of rocks into smaller particles by physical and chemical processes*

White-collar: *those having professions free of hard labor, office and profession workers.*

Xerophytes: *a plant especially adapted to grow in a region deficient in water.*

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