DISTINCTION IN GEOGRAPHY

JUNIOR SECONDARY SCHOOL

COMPREHENSIVE MODULE

GRADE 8-9

By Robert L. Kaingu - 2021

Scanned with AnyScanner

The difference between a diagram and a map

- Diagrams can be defined as simplified drawings that show the appearance and different parts of something.
- Diagrams are usually line drawing that has labels.
- The labels help to explain how something works or how something should be done.
- A diagram often shows something in three dimensions, that is: how long it is, how broad (or wide) it is and how high it is.
- This can be abbreviated as L x B x H or 3D.
- Example of a diagram is a plan for the house showing all the rooms in the house or a sports field showing the dimension of each part of the field.
- On the other hand, a map is a specific type of plan that is a representation of a real place.
- This means that it shows a likeness or image of a place, but it is much smaller than the real place.
- A map represents an area of land. It can show physical features of nature, such as mountains and valleys unlike a diagram.

Characteristics of a map

- Symbols in a map key(A key)
- Direction indicator (Compass)
- Grid systems
- Scale
- Elevation

Symbols in a map key

- Symbols on map are used to represent about information about a place to show different things. Each symbol on a map tells something different about a place.
- The key is the name for the list of symbols and the description of what each symbols means.

Types of map symbols

Point symbols:

- These mark specific place where something important must be shown.
- The point can be a dot, square, triangle or a special symbol developed by the cartographer.

Line symbols:

- These show the route taken by roads or railways.
- They can also show the course of a river or a boundary line between countries

Polygons:

- These are shapes with many sides of different lengths.
- They show areas such as forests, the surface of a lake, or farmland used for a specific crop

Scanned with AnyScanner

EXAMPLES OF CERTAIN SYMBOLS OF SOME MAPS



Church



Dip Tank



National Monument or place of Historical interest

PS — Police Station

P.O — Post Office

PTA — Posting and Telegraphic Agency

Huts

Symbols or conventional signs

- Symbols or conventional signs used on a map are shown in the key at the bottom of the map.
- Symbols or conventional signs are needed because it is impossible to show many features correctly according to scale for they will be too small to be seen.
- Symbols are helpful as they show what the land is like and what man makes use of it as well as the way man lives.
- However symbols or conventional signs are dependent on each and every map used meaning that a pupil must study the key of every map given

Direction indicator

- It is used to show directions on a map. It can be a small drawing with arrows showing the cardinal points on a compass; north, south, west and east.
- Maps are usually drawn with north at the top of the map.

Grid systems

- A grid is a pattern of lines that cross each other, forming rows from side to side and columns from top to bottom.
- A grid system is used to describe the position of any given point within the grid pattern.
- The starting place for reading the grid reference is called the point of origin and it is important to take note of it.

A scale

- A map scale gives the relationship between distance on a map and distance on the actual ground.

Scanned with AnyScanner

Types of scales

Statement of scale (word scale)

- A statement of scale or word sale uses words to describe the relationship between the units measured on the map and the units measured on the actual ground.
- For example, one centimeter on the map to represent two kilometers on the ground.
- This can be abbreviated as 1 cm represents 2km.

Ratio scale (Representative fraction (R.F. scale)

- This type of scale uses only numbers to describe the relationship between the distance on the ground and that on the map. For example, 1:50,000 or $\frac{1}{50000}$

Line scale

- A line scale is a line drawn below the map that shows the relationship between map distance and ground distance.
- The length of the line matches the distance on the map. The units of measurement that are labeled on the line represent the distance on the ground.

Elevation

- Elevation means the height of a place in landscape.
- Another word with a similar meaning is altitude, which means height above mean or average sea level.
- Elevation is a characteristic of relief maps and topographic maps only.

Maps and Places: The use of grid references

- A map is a representation of the earth or part of it drawn on a piece of paper, wall plank etc.
- Position of places on the earth's surface:
- To find a particular place on a map, these must be an accurate method of locating it.
- The accurate method to be used when finding a particular place on a map is the grid reference system
- The grid reference system consists of a series of lines drawn across a map running from top to bottom and from side to side.
- These lines are numbered making it easy to locate the exact place.

How to read grid references

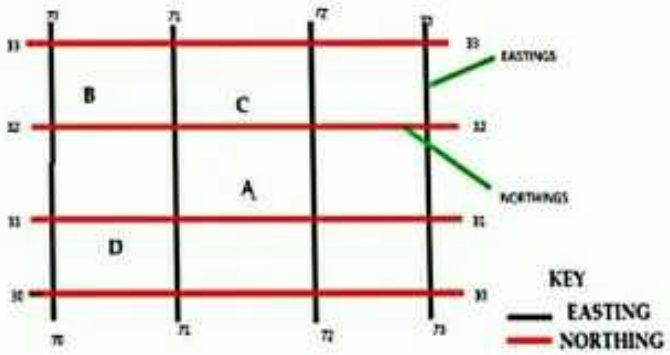
- The grid lines running from North to South (Top to Bottom) are called *Eastings* because they represent distances eastwards from the origin.

Scanned with AnyScanner

- The grid lines running from West to East (side by side) are called *Northings* because they represent distances Northwards from the origin.
- When locating a place you have to start with *Eastings* and then *Northings*.
- Grid Reference are given in one of two ways:
  - ❖ Four Figure grid reference - Used to identify a 1km x 1km square
  - ❖ Six Figure grid reference - Used to identify a location 100m x 100m

Four Figure Grid Reference

- We use a four figure grid reference if we want to identify a large object e.g. a lake
- The four figure grid reference depicts only a general location of the point in the grid square.



- When taking a reading from a grid reference map, you take the **EASTING** first
- After taking the eastings, **NORTHINGS** are then read.

EXAMPLES

1. What is the four figure grid reference for station A?

- **The EASTING for station A is 71**
- **The NORTHING for station A is 31**
- **Therefore the four figure grid reference for station A is 7131**

EXERCISE

1. What is the four figure grid reference for the following points?

(A) B

(B) C

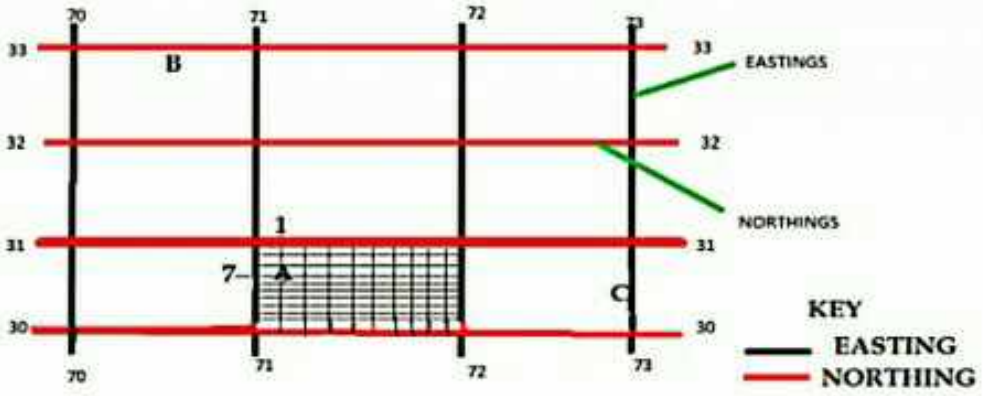
(D) D

SIX Figure Grid Reference

- The six figure grid reference is used when you want to identify a smaller object inside a square e.g. a stream junction
- A six figure grid reference gives a precise or accurate position of a point in a given grid square.

Scanned with AnyScanner

- We need to subdivide our 1km x 1km square into smaller 100m x 100m squares
- Write down the two figures representing the easting on the immediate left
- Divide the space between the easting in which the point is found into 10 equal lines and mark the lines 1 up to 9
- Write down the line that passes through or on the left of the point next to the first two digits



- When taking a six figure grid reference, a four figure grid reference is taken first
- Therefore, the six grid reference for point A can be taken in the following steps:
  1. The four figures are taken first starting with EASTING and then the NORTHING.
     71—30---
  2. Then the box is divided into 10 units of Easting's and Northings
  3. write down the line that passes through or on the left of the point next to the first two digits
- Starting with easting first (1) and then the Northing (7).
- Therefore, the six figure grid reference for station A is 711307

What is relief?

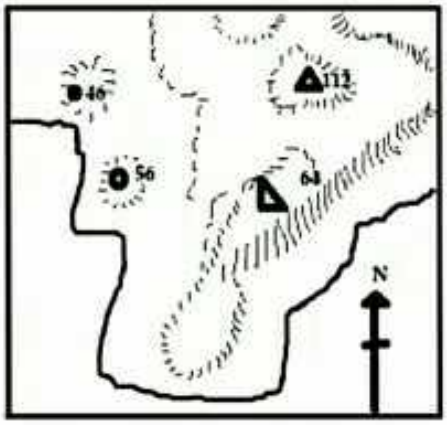
- Relief is the difference in elevation (or height) between parts of the Earth's surface
- Relief is a central component of topographical and physical maps
- There are a number of techniques which have been developed over time to accurately represent relief features on a map.

Ways of representing/Identifying and interpreting relief

- **Hachuring**
  - Hachures are short lines of varying thickness which show the shape and slope of the land.
  - In accordance with this technique, the steeper the slope is, the thicker the lines are which represent it.
  - They do not represent exact elevations, but are mainly used to show large, rocky outcrop areas.

Scanned with AnyScanner

- Hachures are used extensively on small-scale maps to show mountain ranges, plateaus, and mountain peaks.



- **Hill shading**
  - This method also shows the steepness of slope but it differs from hachuring in that it does not show the steepness using lines but uses shadow .
  - This method does not show the exact height of the slope
- **spot heights**
  - Spot heights are used to show the exact height of the land at a particular point.
  - Spot heights are depicted using a dot (or triangle) and a corresponding number, which represents the altitude (height above sea level) at that point

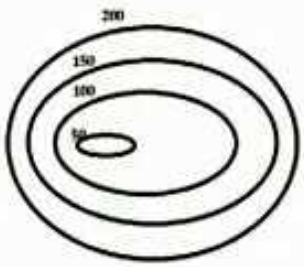
4. **Layer tinting (coloring)**
   - Layer tinting uses different colours (or shades) to represent different heights.
   - It is a mapping convention for darker colours to signify greater height.
   - When using layer tinting, green is often used for low land, yellow for higher land and brown for the highest land.
4. **Valley**
   - This is along depression usually occupied by a river.
   - On contour maps, valleys are shown by a series of V-shaped contours pointing upstream
5. **Ridge or Mountain range**
   - Mountain usually occurs together in mountain ranges with some peaks higher than others.
   - A ridge is a long narrow area of highland sometimes almost flat on top.
   - The contour lines of range or a ridge may be drawn close to another, indicating the presence of steep slope
6. **Spur**
   - This is a highland which extends towards longer ground.
   - On contour maps, a spur is shown by V-shaped contour lines pointing towards lower ground.

Scanned with AnyScanner

7. **Watershed**
   - Watershed is an area of high ground that separates the headwater streams of two river systems.
   - Mountains, ridges and spurs can form watersheds.
   - Water flows down opposite slopes into different rivers
8. **Gorge**
   - It is a narrow, steep-sided river valley.
   - Gorges have very narrow floors and valley walls that are almost vertical.
   - On contour maps, gorges are shown by contour lines that drawn close together and that approach very near to the river from both sides

9. **Gap**
   - It is an opening or way by which a natural mountain barrier can be crossed.
   - If there is a permanent road or way through a gap then it is called a **pass.**
   - The road between Livingstone and Lusaka goes through a gap in the Munali hills.
10. **Col**
   - It is a depression between peaks along ridge.
   - While its shape is similar to a gap, it is usually still too high in the mountains to allow a permanent route to pass from one side to the other.
   - The shape of a col resembles someone's neck when they are lying down.
11. **Saddle**
   - It is so called because it resembles a saddle of a horse.
   - The saddle includes the peaks on each side as well as the depression between them,so it is wider than a col.
12. **Contour Lines.**

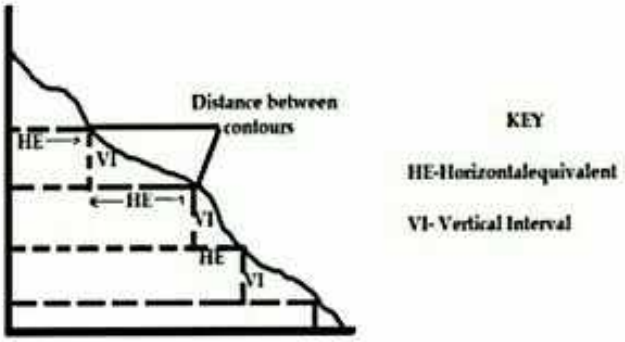
- Contour lines are the most common method of showing relief and elevation on a standard topographic map.
- A contour line represents an imaginary line on the ground, above or below sea level.
- All points on the contour line are at the same elevation.
- The elevation represented by contour lines is the vertical distance above or below sea level.



- A contour interval (VI)is the difference in height between contour lines.

Scanned with AnyScanner

- Contour lines always increase or decrease by the same amount.
- This means that if one contour line represents points 50 metres above sea level and the next contour line shows points at 100 metres above sea level, then the third contour line will be 150 metres above sea level. In this example, the contour interval is 50 metres.
- The Horizontal equivalent (HE) is the distance between two contours expressed as a horizontal measurement.
- The horizontal equivalence will vary according to how the steep or gentle the slope of the land is.



Trigonometrical points

These are found at the hill summit on which the height of the hill is shown.

Calculating distance

1. **Measuring straight line distance:**

The following steps are followed:

a. Draw a straight line connecting the two points as shown below in the example.

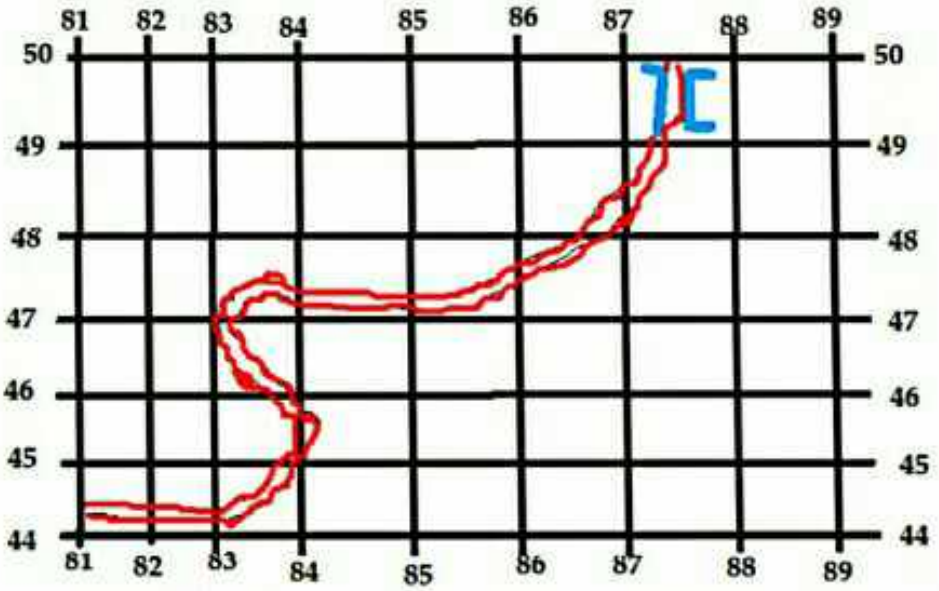


Scanned with AnyScanner

b. Get a piece of paper and place the edge of the piece of paper along the line and mark the two points on the piece of paper.

c. Measure the length on the linear scale by placing the piece of paper along the scale with the first marked point at 0.

2. Measuring distance not straight (i.e. Road, Railway) or River:



- **What is the distance of the road from grid square 8144 up to the bridge in grid square**
  8749.
- This can be done in the following way as follows:

A. Using a string

- A string is put along the road starting at easting 81up to northing 50.
- The string is then straightened and put along the scale and measure the distance it represents.

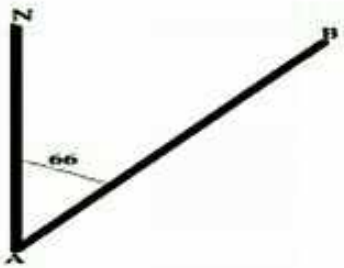


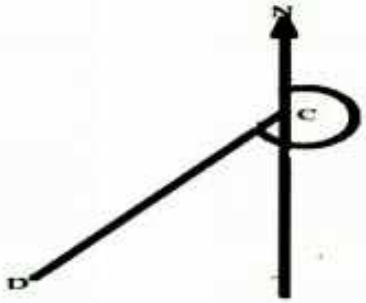
Measuring Bearings

- Bearing is an accurate way of giving the direction of one place in relation to another
- Bearing is the direction measured as an angle.
- Bearing is measured in degrees.

Scanned with AnyScanner

- The measuring of the angle is made from the true north and measured in a clock wise direction.
- True North is shown by the vertical straight line.
- True North is known as Geographic North or Map North.
- Magnetic North is shown by the arrow pointing to the west of True North.





EXAMPLES

1. What is the bearing of B from A= 66^0
2. What is the bearing of D from C= $180^0+50^0=230^0$

Gradient

- Gradient is the steepness of a slope.
- To calculate the average gradient, there is need to know:
  - ❖ The altitude or height of two points.
  - ❖ The distance between the two points
  - ❖ Then find the different in height between two points
  - ❖ Then measure and convert the distance in height of two points by their distance apart.
  - ❖ Finally divide the difference in height of two points by their distance apart (horizontal equivalence)
  - ❖ Therefore gradient is calculated by the following formula

$$\text{Gradient} = \frac{\text{Difference in Height}}{\text{Difference in equivalence}}$$

Example:

- **Find the average gradient between point A. 3000 metres high and point B. 2,000. B is 10km from A.**
  - ❖ **Difference in height between A and B is** 3000-2000=1000 meters
  - ❖ **The distance between A and B is** 10 km (10km x 1000 m) = 10,000 meters.
  - ❖ **Divide 1000 by 10000 as shown below:**

$$\textbf{Gradient} = \frac{1000}{10{,}000}$$

$$= 1 \quad \text{or} \quad 1 \text{ in } 10$$

Scanned with AnyScanner

Identifying cultural features on a map.

- Geography studies two important themes which are people and place.
- The two are represented on a map using two groups of map symbols which are physical or natural features and cultural or man made features.

a) **Natural features** such as landforms and drainage which occur without the influence of people.

b) **Cultural features** such as roads, rail lines, bridges and buildings which occur with the influence of man. They show evidence of the influence of people on the landscape.

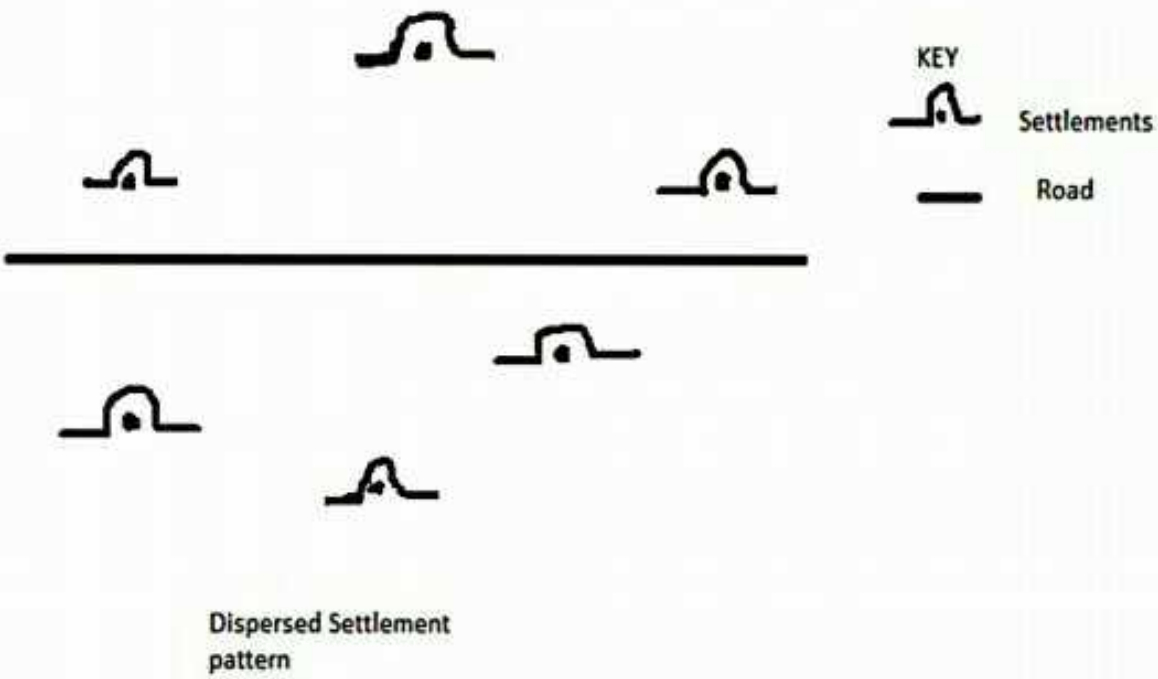
Settlement studies

- A settlement is a place where people live
- A human settlement is defined as a place inhabited more or less permanently
- It includes the temporary camps of the hunters and herders
- Settlements differ from place to place to the other e.g. settlements in towns differ from those in rural areas

The following are the types of settlement:

1. **Dispersed or isolated settlement**: This is the type of settlement where individual buildings lie isolated or part from one another.

- This type of settlement is mostly common in rural areas where the population is sparse

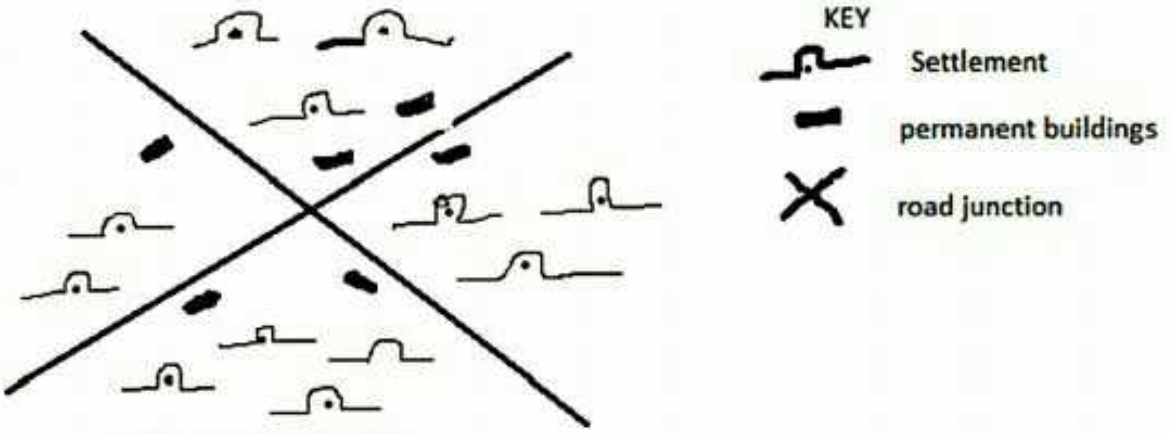


Dispersed Settlement pattern

2. **Nucleated or clustered settlement**: these are settlement arranged in such a way that there are a number of houses close together

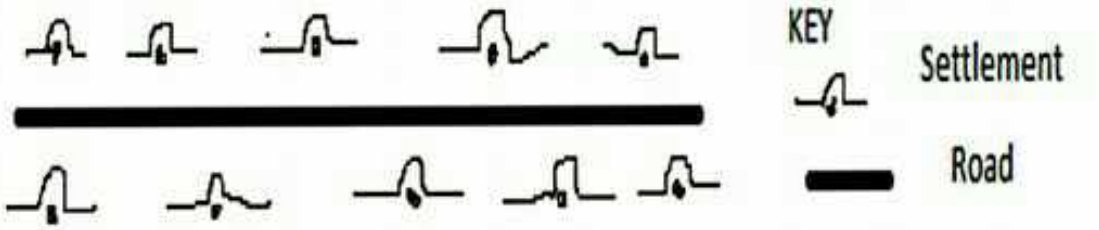
Scanned with AnyScanner

- In these settlements there are social amenities such as shops, schools, places of worship etc.



Nucleated Settlement

3. **Linear settlement:** This is the type settlement where buildings are built in a line along a road, river or stream
- This type of settlement is usually planned



A linear settlement pattern

Factors influencing rural settlement

They include the following:

Water supply: people in the rural areas settle in areas with water bodies especially rivers

Land: people want to settle in areas with fertile soils for the to practice agriculture

Upland: villages are located on uplands which is not prone to flooding. Thus in low lying rivers basins people chose to settle on terraces and levees which are "dry points."

Building materials: the availability of building materials such as those for constructing houses

Scanned with AnyScanner

Mining: people have settled in areas with mineral e.g. in the copper belt

Transport: most settlements tend to develop along the lines of communications e.g. along roads and railway line

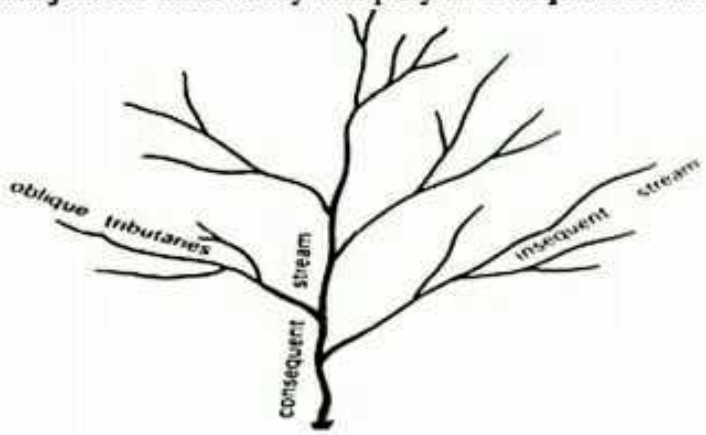
Drainage patterns

- A drainage pattern refers to the total network formed by the river and its tributaries over the surface of the earth.
- There are three types of drainage patterns namely:

a) Dendritic drainage
b) Trellis drainage
c) Radial drainage

Dendritic drainage

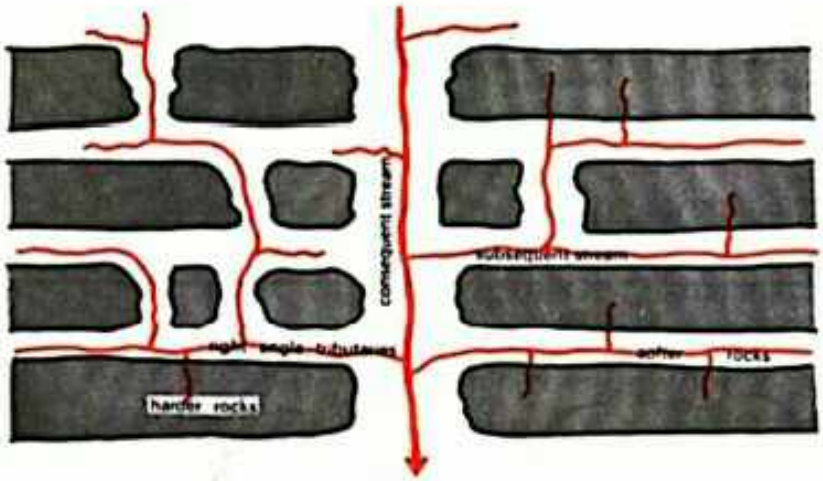
- The word dendritic comes from a Greek word **'Dendron'** which means 'tree'
- Dendritic or tree like drainage pattern developed on homogenous rock or beds of equal resistance.
- The initial stream that exists as a consequence of the slope is called the **consequent stream.**
- If the rocks are composed of homogeneous beds of uniform resistance to erosion, the tributaries will join the main valley obliquely as **in sequent streams.**



Trellis or rectangular drainage pattern

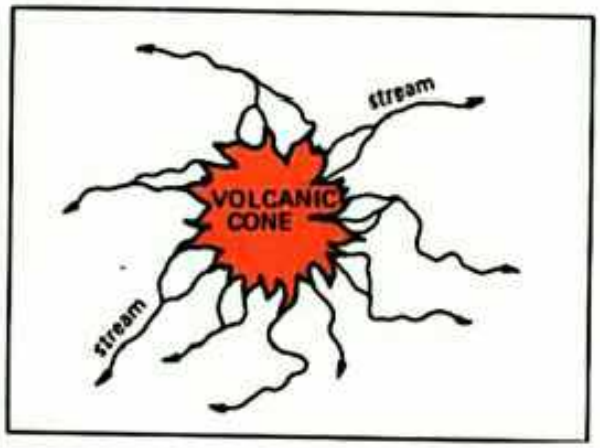
- This forms when faulting causes rectangular rock joining on which rivers develop.
- The tributaries join the main streams at right angles (90^0).
- The drainage pattern which will be developed will be rectangular in shape and is called trellis drainage pattern.
- Trellised or rectangular drainage pattern developed on alternating outcrops of harder and softer rocks

Scanned with AnyScanner



Radial drainage pattern

- This is develops on a dome shaped landforms such as volcanic or glaciated hills from which rivers radiate into different.
- It appears just like the spokes of the bicycle wheel
- An example of radial drainage pattern is on Mount Egmont in North Island, New Zealand



Revision questions

1. What is the difference between a map and a diagram?
2. Give the characteristics of a map.
3. Define settlement and give the three types of settlement pattern.
4. Explain the types of drainage patterns.

Scanned with AnyScanner

MAN AND THE ENVIRONMENT

PHYSICAL AND CULTURAL FEATURES OF ZAMBIA

Relief levels of Zambia

Relief refers to how high or low the land in different parts of an area is.

Physical features are natural features such as mountains, rivers, streams, swamps, hills, highlands, islands and some lakes.

Mountains are at higher levels, while valleys or plains are at lower levels. We describe relief by how many metres above sea level an area is. Sea level is the lowest level along the coastal areas of continents.

To understand the relief of Zambia, it helps to first understand the general relief of the African continent, as explained in the box below.

Relief of the African Continent

- Most of Africa consists of a higher, fairly level central part which is called a plateau. Most of the land on the plateau in the southern, central and eastern parts of Africa is more than 2000 metres above sea level.
- Around the edge of this large central plateau, the rest of the continent is mostly consists of an area that drops down from 2000 metres to 250 metres above sea level.
- Around the coast of the continent, there is usually a narrow coastal strip that is less than 250 metres above sea level.
- Higher mountain ranges and mountain peaks rise up above these levels in some parts of the continent.
- A larger numbers of rivers start from the highest part of the plateau. As smaller streams join up to form larger rivers, the rivers create deep, lower areas called valleys as they flow down towards lakes or the sea.

Relief of Zambia

- Zambia does not have a coastal area as it lies in the central part of the continent, surrounded by other countries. Most of the land in the country lies 900 metres or more above sea level.

- The relief of Zambia can be divided into three main levels: Land over 1200 meters, land between 900 and 1200 meters and land below 900 meters.

Land over 1200 metres above sea level

Scanned with AnyScanner

- The highest parts of Zambia, also known as the highlands or Highveld, form a natural boundary with the Democratic Republic of Congo (DRC) in the north, and continue as a natural boundary with Malawi and Tanzania in the northeast.
- The highest parts are the Mbala highlands, Mafinga hills and Makutu Mountains.
- Almost all the major rivers in the country have their **sources** on these highlands.
- The highlands are divided into two clear areas that are also called divides or watersheds. These watersheds separate waters flowing in different directions to rivers, lakes or seas:

1. ***The Zambezi-Congo watershed*** forms a natural boundary between Zambia and the Democratic Republic of Congo. This watershed separates the conga river system (flowing towards the DRC) from the Zambezi river system (flowing towards Zambia), and the **tributaries** that feed into each of these two river systems.
2. ***The Luangwa- Malawi watershed*** forms a natural boundary between Zambia and Malawi. It separates the Luangwa river system in Zambia and the Shrine River system in Malawi.

Land between 900 metres and 1200 metres above sea level

- This area, also known as the middle veld, is a large, flat plateau with smaller hills that gently rise and fall.
- This plateau makes up the largest part of the country.
- Many of the swamps and lakes that are part of the drainage system of Zambia also lie in the plateau.

Land below 900 metres above sea level

- This area, also known as the low veld, consists of deep valleys formed by larger rivers, such as the Zambezi, Luangwa and Luapula.
- As smaller streams join together to form larger rivers, the erosion caused by the force of large volumes of water flowing downwards from the plateau create these valleys.
- Another low-lying area is the basin around Lake Tanganyika, which forms part of the series of low-lying lakes of the East African Rift Valley. You will find out more about how this lake was formed in the section on drainage systems later in this sub-topic.
- Along the edges of these valleys there are long, steep slopes called escarpments, which are broken up by the smaller valleys of tributaries flowing into the larger rivers.
- The main escarpments are the Muchinga and Zambezi escarpments.

Scanned with AnyScanner



Map showing the three main relief levels of Zambia,

MAJOR DRAINAGE FEATURES OF ZAMBIA

- **Drainage** refers to the system of rivers, lakes and swamps.
- The drainage of Zambia refers to how rainwater is drained by rivers that flow into lakes and swamps, and eventually into the oceans.
- The fresh water lakes, rivers and swamps that make up the water supply of Zambia have many functions and uses.

Functions/importance/uses of rivers, lakes and swamps

Transportation:

- Most lakes are used by locals as a means for transportation of people and domestic goods for their own use, as well as for exports to other countries.
- Many Zambian families who live near rivers and lakes use small boats as a form of transport as part of their daily lives, such as for going to school or to work.
- Lake Tanganyika for example, is used to transport sugar and cement to the Great Lakes region of Rwanda and Burundi, as well as to Tanzania.

Farming:

- Some rivers and lakes provide water for irrigating a wide variety of crops farmed in Zambia, as well as water for cattle and poultry to drink.

Scanned with AnyScanner

Fishing:

- Fishing is an important industry, both in the form of catching fish occurring naturally in rivers and lakes and fish farming.

Power generation:

- Hydro-electric power stations make an important contribution to Zambia's power supply by using the power of falling water to generate electricity.
- Hydro-electric power stations are found at Lake Kariba and at the Kafue Gorge on the Kafue River.

For domestic use:

- It includes washing, cooking, drinking, bathing and other domestic use.

Tourism:

- Tourists from all over the world enjoy observing the rich wildlife along Zambia's waterways.
- But they do not always realize the dangers that water animals such as hippos and crocodiles present to both visitors and local people who make use of the Countries Rivers and lakes.
- Hippos are responsible for more deaths in Africa each year than any type of wild animal.

Rivers of Zambia

The country has four main rivers:

1. Zambezi River
2. Luangwa River
3. Kafue river
4. Chambeshi-Luapula River

1. Zambezi River

- The Zambezi, the river that has given our country its name, is the fourth largest river in Africa.
- The source of the Zambezi is in the kalene hills near mwinilunga in the far northwest of Zambia.
- The river starts small, flowing deeply down a deep, narrow valley and winding its way around the slopes of hills.
- The upper Zambezi leaves Zambia and enters eastern Angola, then re-enters Zambia near chavuma.
- The river then flows through the flatter Kashiji plains and the Barotse (also known as the Bulozi) floodplains, on the plains, the rivers flows more slow over sand that washed down the river and settled on top of an impermeable clay layer.

Scanned with AnyScanner

- The impermeable clay layer causes the area to become waterlogged during the rainy season, which results in shallow swamps or floodplains.
- As the Zambezi flows further south, it flows through an area where Zambia meets up with Namibia, Botswana and Zimbabwe, to the best known feature of the river: the Victoria Falls.
- As the river flows further through Zambia, it is joined by various tributaries, such as the Kafue and Luangwa Rivers.
- On the last part of its course through Zambia, the Zambezi has been dammed at Lake Kariba, on the border between Zambia and Zimbabwe. You will find out more about Lake Kariba on the Lakes of Zambia.
- Soon after the river enters Mozambique, it enters the Cahora Bassa dam, before it eventually flows into the Indian Ocean on the coast of Mozambique.

NOTE:

- The Victoria Falls on the border between Zambia and Zimbabwe is recognized by UNESCO (the United Nations Educational, Scientific and Cultural Organisation) as a world Heritage site.

2. Kafue River

- The Kafue River is one of the tributaries that flow into the Zambezi.
- It has its source on the Zambezi-Congo watershed.
- It flows south then Southwest towards Lukanga swamp in central province. From there it flows westwards, then southwards, entering the Kafue flood plains.
- It then winds its way down to a narrow gorge were it has been harnessed for power before it joins the Zambezi River near Chirundu.

3. Luangwa River

- The Luangwa River is also one of the tributaries of the Zambezi.
- Its source is on the Luangwa/Lake Malawi watershed in the Mafinga hills.
- It joins the Zambezi River in the Luangwa District.
- The north and south Luangwa National Parks that lie along the river are popular tourist attractions.

4. Chambeshi –Luapula River

- This is one river with two names. In the Northern Province it is called the Chambeshi.

Scanned with AnyScanner

- The same river is called Luapula in Luapula province.
- This river flows towards the northern side of the Congo-Zambezi watershed: Its source is in the Mbala highlands, from where the Chambeshi River enters the Bangweulu swamps.
- It then flows from Lake Bangweulu as the Luapula River before entering Lake Mweru.
- From Lake Mweru it joins the Luvua River, which is the tributary of the Congo River in the Democratic Republic of the Congo.

Lakes of Zambia

- Any body of water that collects in a depression or low-lying inland area is called a Lake.
- The size of lakes can vary from a few square metres to a hundreds of square kilometers. Lakes can be formed in different ways. These ways include: Artificial or man made, earth movement and erosion

Artificial or Made lakes:

- People build dams across streams and rivers, resulting in artificial lakes varying in sizes.
- This is done to use water resource either for generating electricity or for irrigating farmlands.
- Examples are Lake Kariba (shared by Zambia and Zimbabwe) and Cabora Bassa in Mozambique. Both these lakes were created by the building of dams on the Zambezi River.

Earth movements or Rift valley lakes

- The earth's outer layer, also called the lakes crust, has two main movements.
- Forces of compression, where the crust is flexible, results in the earth's crust bending or warping to form Fold Mountains.
- Tension forces occur where two parts of the earth's crust are moving or pulling away from each other, causing deep fractures in the earth's crust.
- Water is then collected in these deep fractures forming lakes.
- These lakes are called rift valley lakes.

Erosion or Depression lakes

- Lakes could also be formed by erosion caused by the action of wind or water.
- Lakes formed in this way are usually not very deep. Lake Bangweulu may have been formed as a result of wind erosion.

Scanned with AnyScanner

- River erosion occurs after the stream cuts a new path straight through a bend in the river, called a meander. The lake formed by this type or erosion is called an oxbow lake. Oxbow lakes are often found on the Balozi floodplains during the dry season

1. Lake Kariba

- One of the world's largest artificial lakes is Lake Kariba, found on the Zambezi River along the Gwembe valley in the southern province of Zambia.
- The lake is shared by Zambia and Zimbabwe.
- Lake Kariba was created was created by the building of the Kariba dam, mainly for the generation of hydro-electric power by Zambia and Zimbabwe on the south bank of the Zambezi River.
- Another power station has since been built on the north bank by Sinoh Hydro Power Company.

2. Lake Tanganyika

- Lake Tanganyika lies in the northern province of Zambia.
- The lake forms part of the East African Rift valley. It is believed to be the second largest, and also the second deepest, freshwater lake in the world.
- The lake is shared by Zambia, Tanzania, Democratic Republic of Congo and Burundi.
- It forms an important waterway that provides transport connections by boat and ferry between these countries.

3. Lake Mweru

- Lake Mweru is a depression lake that lies on the border between Zambia and the Democratic republic of Congo (DRC).
- The Luapula River flows into the lake from Zambia. It is the only one of the four largest rivers in Zambia that flows northward from the Congo-Zambezi watershed.
- On the DRC side, the Ruvuma River flows from the lake, from where it later joins the Congo River.

4. Lake Mweru-wantipa

- This is a smaller depression lake than the bigger Lake Mweru.
- It lies in the Northern Province of Zambia and is not shared with any other country.

1. The lake is also known for swamps that lie around it.

Scanned with AnyScanner

5. Lake Bangweulu

- You have already learnt that the Chambeshi River flowing into this lake is the same river as the Luapula River that flows from the lake.
- The lake mostly lies just above 1000 metres above sea level.
- The Luapula River probably got its name because in the local Bemba language *ukupula* means ``pass through``, like the river passing through Lake Bangweulu.
- The lake is almost surrounded by the Bangweulu swamps.

Swamps of Zambia

- Swamps are wetland areas, usually found near lakes or rivers.
- These are land areas that are not totally under water as in the lakes or rivers themselves, but they remain wet and soggy all year round.
- Trees and other plants such as reeds grow very well in these swamps, and they provide a home to a large variety of birdlife and other animals.
- Swamps act like giant sponges that trap water, while at the same time the act like filters to purify the water.

Examples of swamps found in Zambia.

- Bangweulu swamp
- Lukanga swamp
- Mweru-Wa-Ntipa swamp
- Luena flats
- Kashiji plains

Scanned with AnyScanner



A map showing drainage pattern of Zambia.

CULTURAL FEATURES OF ZAMBIA

- **Cultural features** are man made features and they include roads, railway lines, bridges, buildings, dams and some lakes.

Zambia's road, railway network, and bridges

- Zambia is criss-crossed by a network of roads and railway lines, with bridges across rivers and valleys on the major road routes and railway lines.

Road network and bridges

- Zambia has more than 90 000 km of roads, of which only around 20 000 are paved. Only about 7 000 km of the roads are trunk or main routes.
- Many of the untarred roads in Zambia become impassable during the rainy season.
- In the 1970s, Zambia used to have one of the best highway networks in Africa, but the high cost of maintaining these roads led to many becoming badly neglected, the

Scanned with AnyScanner

government is however working on improving the road network through the introduction of a road fund levy on fuel and with international aid.

- Bridges are expensive to build and maintain. Therefore, on smaller roads, pontoons and ferries are still used as an alternative ways of crossing rivers as part of the road network in the country.

The main tarred road routes in Zambia include the following (main bridges also indicated):

Lusaka-Copperbelt road:

- The most used highway between provinces.

Ndola-Kitwe Road:

- (Four lane divided highway) the most used inter-city highway.

Great North Road:

- In the north this road links Zambia with Tanzania (Chirundu Bridge over the Zambezi; Kafue Bridge). The most northern part is known as the TANZAM highway. In the south, this road links Zambia with Zimbabwe.

Great East Road:

- Lusaka-Chipata-Malawi-Mozambique (Luangwa Bridge)

Great West Road:

- Lusaka-Mongu (Kafue Hook Bridge); extension to Kalabo and Angola via the Barotse floodplain causeway is being considered.

Copperbelt-Solwezi-Mwinilunga-ANGOLA Road

Livingstone Road:

- Kafue Bridge-Mazabuka-Choma-Livingstone-Zimbabwe (Kafue Bridge, Victoria Falls Bridge over Zambezi)

Livingstone-Sesheke Road:

- Linking Zambia with Botswana (Kazungula ferry over to Botswana, planned to be replaced by a bridge) and Namibia (katima Mulilo Bridge over Zambezi under construction to replace ferry).

Railway network and bridges

- The rail system connects landlocked Zambia with harbors in various neighboring countries.

Scanned with AnyScanner

- This ensures various routes for exports such as mining and farming products. Passenger transport is also available on some of the routes.

Zambia Railways:

The national railway of Zambia operates most of the railway routes in Zambia.

- The Victoria Falls bridge connects the Zambian rail network to the Zimbabwe rail network, and then to ports in Mozambique (Beira and Maputo) and Durban in South Africa.
- The Copperbelt railway line links up with Lubumbashi in the Democratic Republic of Congo via Ndola and Sakania. A line connected to the Benguela railway through Angola has not operated since the 1970s.
- *A rail link between Malawi and Zambia to allow access to the port of nacala via Chipata* is not used much because there are few facilities available at Chipata.

TAZARA:

- (The Tazara railway) is a separate railway system linking Zambia and Tanzania.
- It links up with Zambia Railways at Kapiri-Mposhi just north of Lusaka, and provides a link to the Tanzanian port of Dar es Salaam.
- It was completed in 1976 by Chinese construction crews to give Zambia an alternative export route for copper that did not depend on South Africa during the apartheid.

Revision questions

1. Name four major rivers found in Zambia stating their sources.
2. State the importance of rivers, lakes and swamps.
3. What is the difference between physical and cultural features?
4. Give examples of physical and cultural features.

Scanned with AnyScanner

WEATHER AND CLIMATE

Weather

- Weather is the average atmospheric condition of a place at a specific time or for a short period of time.
- It can also be said to be the state of the atmosphere at a specific time and place is called ***weather.***
- Weather conditions are made up of different elements, such as sunshine or rainfall.

Climate

- Weather is the average atmospheric condition of a place over a long period of time usually the minimum being 30 years.
- The word climate refers to the average weather over a long period of time, such as over 30 years.
- Climate is therefore the variation in weather in elements, such as temperature or rainfall, for a given area over a much longer time period than in the case of weather.

The difference between weather and climate

- The words weather and climate are sometimes used as if they mean the same thing, but there is a difference between them.
- Both refer to the conditions of the atmosphere; that is, to what is happening in the layer of air that surrounds the earth.
- The difference lies in the time period that each word refers to, as explained below

Elements of weather

- Temperature
- Rainfall
- Humidity
- Pressure
- Cloud cover and sunshine
- Wind direction and strength.

These elements are measured and recorded at a place called **weather station or meteorological station.**

- A weather station is a place where the elements of weather are measured and recorded as accurately as possible.

Scanned with AnyScanner

- Each station has a Stevenson screen which contains four thermometers all hung from a frame in the centre of the screen.
- These are the **maximum thermometer, minimum thermometer, wet bulb thermometer, dry bulb thermometer.**

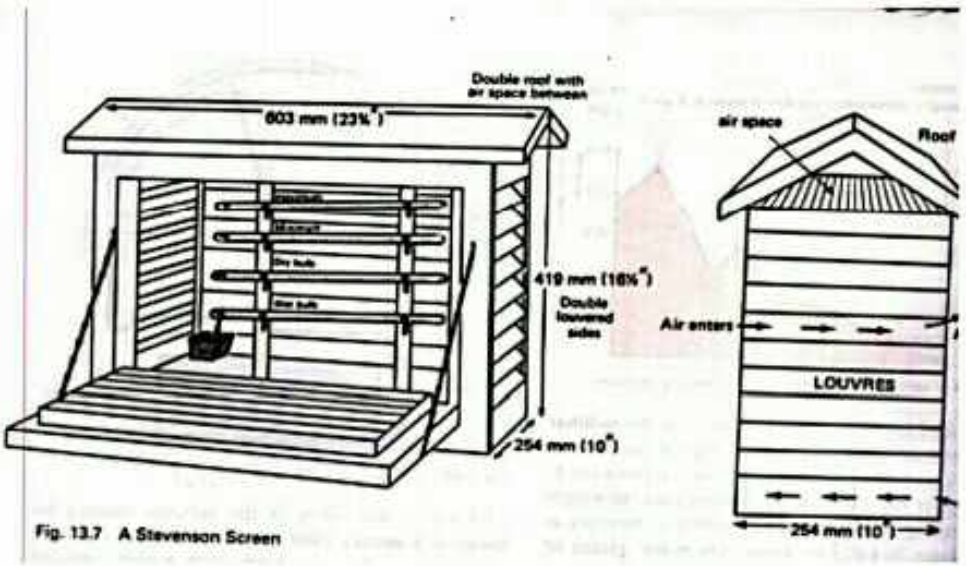


Fig. 13.7 A Stevenson Screen

The screen has the following features

- It is built so as to measure the shade temperature of the air.
- It has louvered sides of allow free entry of air.
- The roof is made of two wooden layers to form a bad conductor of heat
- The screen is painted white so as to improve insulation.
- The screen is placed on a stand about 121 cm above ground level.
- One side of the screen is hinged and it acts as a door.

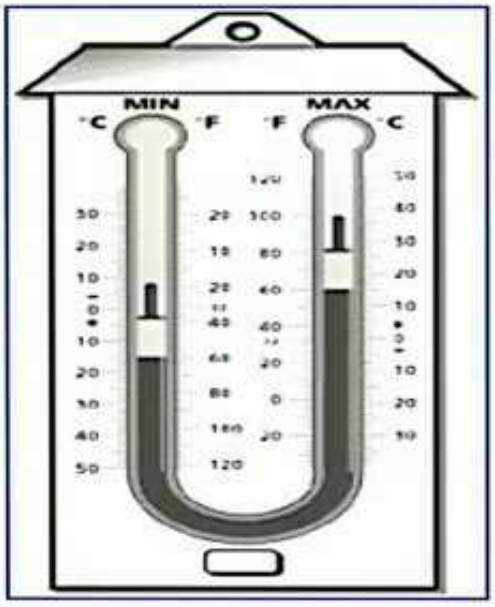
Atmospheric temperature

- **Temperature** is the degree of hotness or coldness of something. It is how hot or cold something or an object is.
- Temperature is measured using an instrument called **thermometer.**
- Temperature is observed by **measurering** the highest (maximum) and lowest (minimum) temperatures of a day
- Temperature is measured in degrees centigrade (°c) or degrees Fahrenheit (°F)
- The Celsius or centigrade scale is commonly used on this scale 0°C represents freezing point of water, and the 100° represents the boiling point of water.
- On the Fahrenheit scale, the freezing point of water is 32°F and the boiling point is 212°F.

Measurement of temperature

- Maximum and minimum temperatures are measured by the maximum and minimum thermometers
- These are in form of separate thermometers or joined in a U – Shaped tube called a six's thermometer.

Scanned with AnyScanner



Maximum and Minimum Thermometer

To measure maximum temperature

- Mercury in the glass tube expands when the temperature rises. This pushes the index in the right hand limb up to maximum
- The end of the index nearest the mercury gives the reading of the maximum temperature this is 30°C in our example
- To reset the index for next day's reading; draw it back by a magnet.

To measure minimum temperature

Minimum temperature probably occurs early in the morning when temperature falls.

- The alcohol in the left – hand limb contracts.
- The mercury flows in the reverse direction.
- The index is pushed up along the left hand limb.
- When temperature rises, the alcohol flows past the index leaving it where it was pushed
- The end of the index farthest from the bulb gives the reading of the minimum temperature.
- This is 10°C in our example
- To reset the index draw it back by a magnet.

Temperature Record

The following are used to keep a temperature record;

Mean daily temperature:

- This is the average of maximum and minimum e. g (30°C+10°C) ÷ 2 = 20°C

Daily or Diurnal Range:

- This is the difference between the maximum and minimum temperatures of a day. e.g. (Max 30°C- Min10°C) = 20°C

The annual temperature:

- This is the difference between the mean temperature of the hottest month and that of the coldest month.

The mean annual temperature:

Scanned with AnyScanner

- This is the sum of mean month temperature for one year divided by 12 months.

The mean monthly temperature

- This refers to the sum of mean daily temperatures for one month divided by the number of days in that month.
- On weather maps places having the same temperature are joined by a smooth line. Such a line is called an **isotherm.**

Rainfall

- Rainfall is caused by the effect of solar radiation over land and water bodies.
- Solar radiation refers to the energy from sun.
- This energy gives rise, to various types of weather and climate.
- Solar radiation over sources or bodies of water causes evaporation.

The process of evaporation

- Solar energy causes water to be transformed into vapour. This vapour enters the atmosphere by: Evaporation from sea and land surfaces and transpiration from plants
- The combined total of evaporation and transpiration is termed **Evapotranspiration.**

The rate of evaporation depends on the following factors:

- The temperature of evaporating surface. Evaporation is higher if the temperature of evaporating surface is higher than that of the air.
- Relative humidity of the air evaporation is also highest if air is relatively dry.
- Wind speed. It is also high if winds are strongest evaporation is greater in summer than in winter.
- It is also higher in tropical latitudes than in winter. It is also higher in tropical latitudes than in temperate and polar latitudes.

Condensation

- When warm air rises, it is cooled and its capacity to hold water vapour is reduced
- Condensation will occur if the rising air contains water vapour
- The water molecules will pass into a liquid state and subsequently retum to land and sea as precipitation, condensation may take the form of minute droplets of clouds, rain, mist dew or fog.
- Water of oceans, atmosphere and land moves in a great cycle
- This involves evaporation from sea and land, condensation to form clouds and precipitation in form of rain or snow
- This exchange is called the water cycle or hydrologic cycle.

Types of rainfall

There are three major types of rainfall and these are:

1. Convectional rainfall

2. Orographic or relief rain

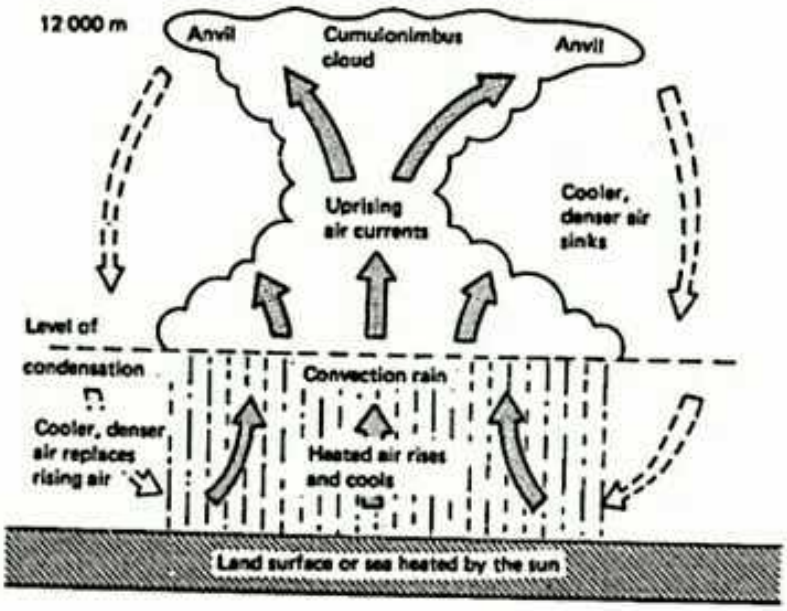
3. Cyclonic or frontal rain

Scanned with AnyScanner

Convectional rainfall.

- This type of rainfall is most common in regions that are intensely heated, either during the day, as in the tropics, or in the summer, as in temperate interiors
- When the earth's surface is heated by conduction, moisture-laden vapour rises because heated air always expands, and becomes lighter
- Air rises in a convection current after a prolonged period of intense heating
- When ascending, the water vapor condenses into cumulonimbus clouds with a great vertical extent
- This probably reaches its maximum in the afternoon when the convectional system is well developed
- Hot, rising air has great capacity for holding moisture, which is abundant in regions of high relative humidity

  As the air rises, it cools and when saturation point is reached, torrential downpours occur accompanied by thunder and lightning.



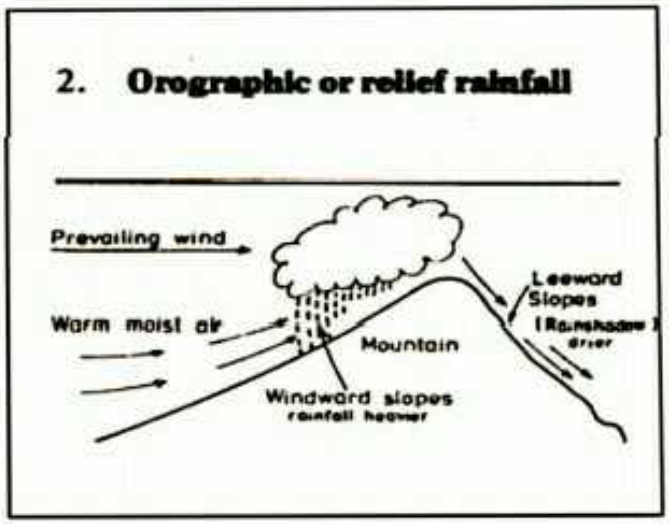
Conventional Rainfall

2. Orographic or relief rain

- Unlike convectional rain which is caused by convection currents, orographic rain is formed whenever moist air is forced to ascend a mountain barrier
- It is best developed on the windward slopes of mountains where the prevailing moisture – laden winds come from the sea
- The air is compelled to rise and is thereby cooled by expansion in the higher altitudes and the subsequent decrease in the atmospheric pressure

Scanned with AnyScanner

- Further ascent cools the air until the air is completely saturated (relative humidity is 100 per cent)
- Condensation takes place forming clouds and eventually rain
- Since it is covered by the relief of the land it is also known as relief rain
- The other side of the mountain where there is little or no rainfall is called the leeward slope
- The wind is dry and does not bring rain
- The area is termed the rain shadow e.g. the Luangwa valley in the lee of the Muchinga Escarpment.



Cyclonic or frontal rain

- This type of rainfall independent of relief or convection
- It is purely associated with cyclonic activity whether in temperate regions (depressions) or tropical regions (cyclones)
- Basically it is due to the convergence (meeting) of two different air masses with different temperatures and other physical properties
- As cold air is denser, it tends to remain close to the ground
- The warm air is lighter and tends to rise over the cold air

Scanned with AnyScanner

- In ascent, pressure decreases, the air expands and cools, condensation takes place and

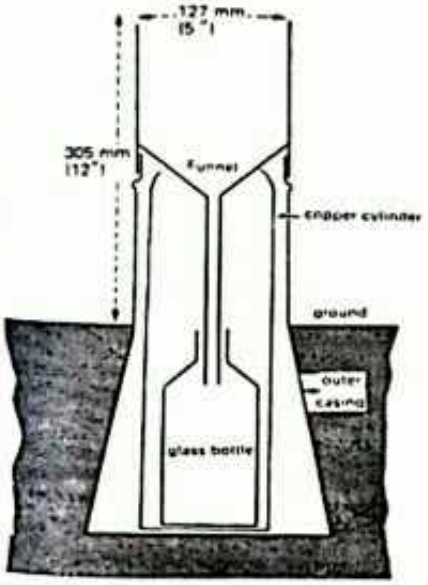


Fig. 13.1(a) A rain gauge

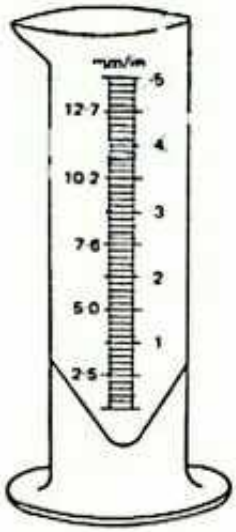


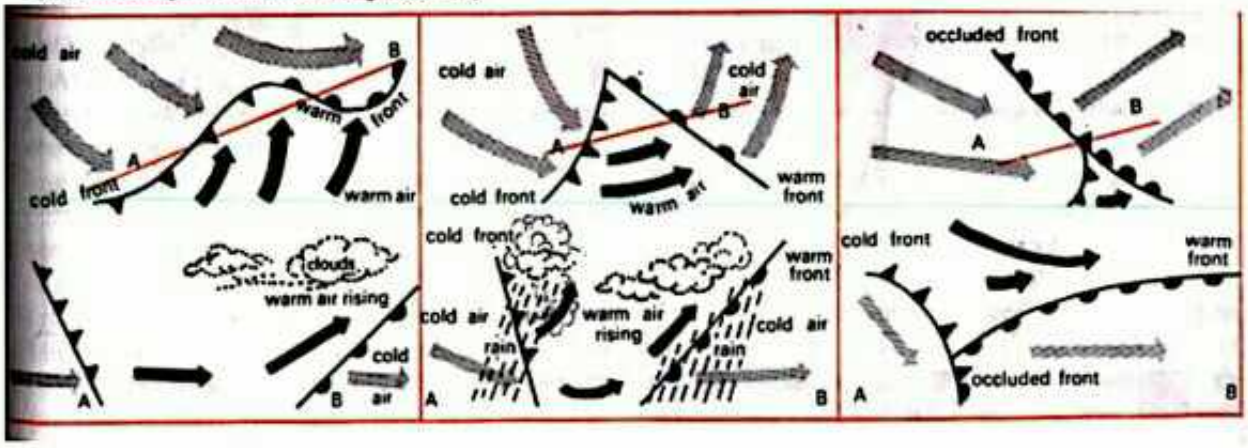
Fig. 13.1(b) An ordinary measuring cylinder



Fig. 13.1(c) A calibrated taper measure

- Light showers called cyclonic or frontal rain occur.

Cyclonic or frontal rain (depression)



Measurement of rainfall

- An instrument called a **rain gauge** is used to measure rainfall. Rainfall is measured in **millimetres or inches.**

A rain gauge consists of the following parts;-

a. A metal or plastic container
b. A funnel
c. A graduate jar or measuring cylinder.

- Rain falling in the funnel trickles into the jar or measuring cylinder shown above
- Measurements are taken every 24 hours.

Scanned with AnyScanner

- The reading obtained is the depth of rain that has fallen over area equipment to the top of the funnel.

Position of rain Gauge

- It must be sunk into the ground level. This is to prevent rain from splashing into the funnel from the g round.
- It must be sunk into the ground to prevent excessive evaporation of rain water from the jar
- It must be placed in an open space. This is to prevent run - off water from buildings and trees from entering the funnel.

Recording rainfall

- On weather maps all places having the same quantity of rainfall are joined by a line known as **isohyets.**

Humidity of the air

- **Humidity** refers to the amount of water vapour that may be present in the air.
- This amount of watervapour varies from what air can hold at a given temperature and the actual amount of water vapour in the air is very important.
- This is called **relative Humidity** (R. H.). It is expressed as a percentage (%).

Example:

- If R. H. is 60% a temperature of 30°C, then air is only holding $6/10^{th}$ of the water vapour it could hold at that temperature.
- There is a limit to the quantity of water vapour that can be held by the air.
- This limit is known as the **saturation point.**
- This means that the air is saturated when the R. H. is 100%.

Humidity and temperature

- The amount of water vapour air can hold depends on temperature. When temperature rises air can hold more vapour.
- When temperature falls it cannot hold as much wate4r vapour.
- When relative humidity is at 100% the air cannot cont6ain excess water vapour.
- Any further addition will cause condensation to occur.
- Condensation may take the form of; Minute droplets of clouds, Rainy, mist, Dew or fog

NOTE: The critical temperature at which the air is fully saturated is called the **dew point.** Below this point condensation will take place.

Measurement of humidity

- An instrument called a **Hygrometer** is used to measure Humidity.
- This consists of a wet bulb and dry bulb thermometers.

Scanned with AnyScanner



The hygrometer

The wet and dry thermometers, (also called hygrometers) allow the calculation of the humidity of the air

- When air is not saturated water evaporate from the container and the muslin become wet.
- This cools the wet bulb and caused the mercury to contract.
- The dry bulb is not affected and so the two thermometers show different readings.
- The difference between the readings of the two thermometers is an indication of humidity in the air.

Thermometer reading	**Amount of Humidity**
• Large difference	low humidity
• Small difference	High humidity
• No difference	air is saturated

Atmospheric air pressure

- Air exerts weight on the earth's surface.
- This weight is called atmospheric pressure.
- A column of air 1sq cm in cross sectional areas extending from the sea level to the top of the atmosphere weights 1. 034 kg.
- Hence at sea level the atmospheric pressure is 1.034 kg per sq cm or 14.7 ibs per sq in.
- Pressure is made up of a number of mixed gases and has weight.
- It therefore exerts a pressure on the earth's surface which varies from place to place and from time to time.
- On the maps places of equal pressure are joined by lines called **isobars.**
- Atmospheric pressure varies with both temperature and altitude.

Scanned with AnyScanner

Temperature and air pressure

- High temperature causes air to rise.
- This lessens pressure acting on the surface. Hence;

a. High temperature areas are associated with **low pressure** (e.g. Equator belt). Regions of continuous low pressure belt are known as **doldrums areas.**

b. Low temperature areas are commonly associated with high pressure. This is because air is always descending.

Altitudes

- This is the height above sea level
- Air is compressible; Air which lies lowest is most greatly compressed, and is therefore densest.
- Upwards both density and pressure fall rapidly

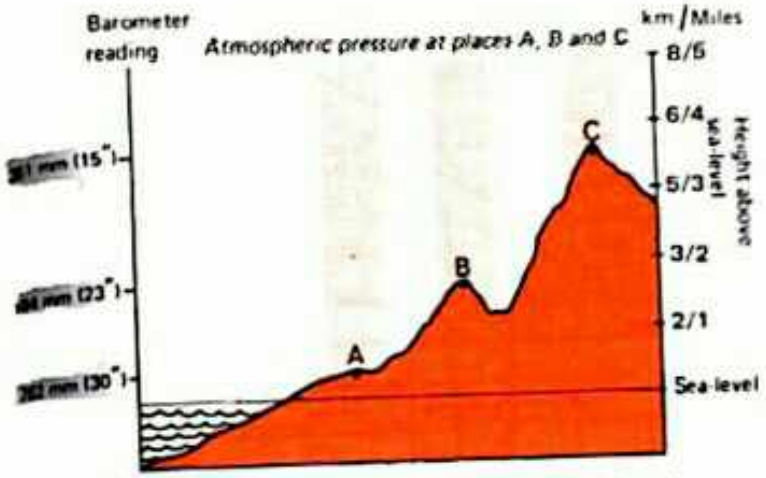


Fig. 13.5 Pressure decreases with increasing altitude

Measurement of pressure

- Air pressure is measured in a unit known as **millibar (mb)** and instrument that measures atmospheric pressure is a **barometer.**

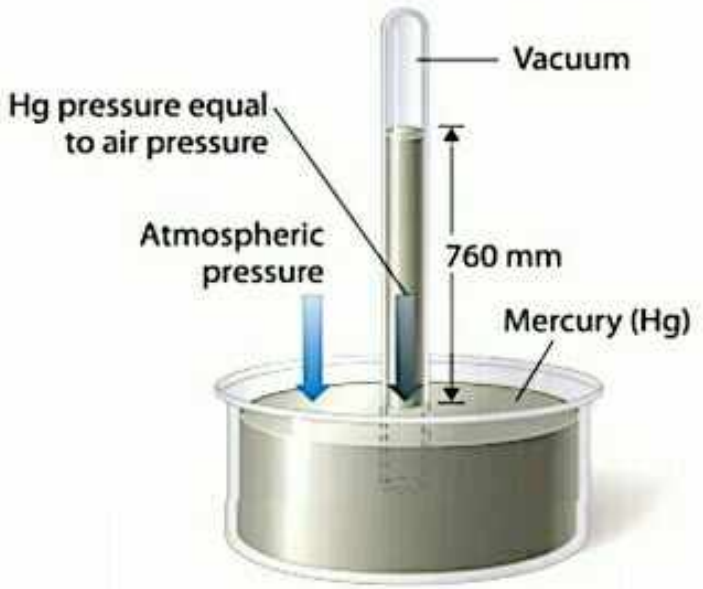
These are two types of barometers. These are:

1. **The Mercury barometer**

- This is a very accurate although cumbersome instrument.
- In this instrument pressure is read in inches or in height of mercury in the glass tube balanced by the atmospheric pressure.

At sea level this is 29.92 inches or 76 cm (760 mm) in metric units

Scanned with AnyScanner

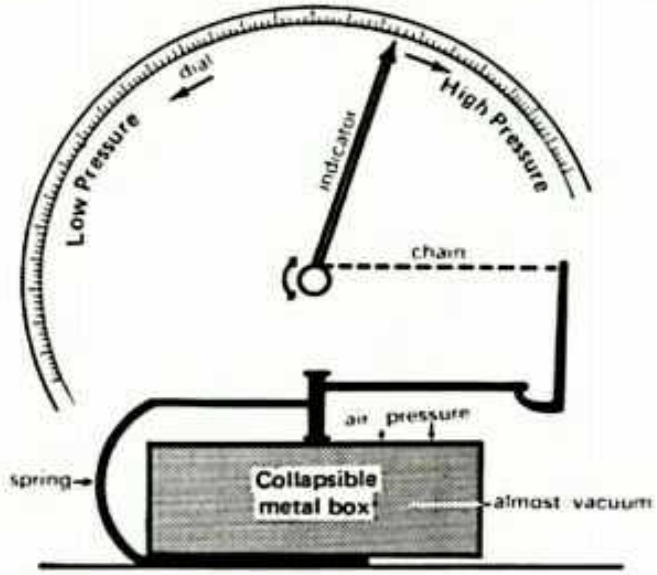


A Mercury Barometer

- A mercury barometer is an inverted tube which has a vacuum at the top, the open end is placed in mercury bath.
- The pressure of the air forces the mercury up the tube and the height of the mercury gives the air pressure, this is often quoted as 'inches of mercury'.
- This varies with the weather. Low air pressure usually suggests changeable weather, whereas high pressure usually means stable weather.

2. The Aneroid Barometer

- This instrument consists of a hollow metal box which contains very little air.
- The top of the box is flexible so that it expands and contracts according to changes in atmosphere pressure outside the box.
- This movement operates a hand which is read against the graduated circular dia.



Aneroid Barometer

Wind direction and

speed

- Wind is air in motion and has both direction and speed.
- The instrument widely used for measuring **wind direction** is a **wind vane** or **weather cock.**
- As wind direction is always deflected by trees and tall buildings weather cocks and wind vanes need to be created in an exposed position to get a true direction.

It is made up of top two parts. These are:

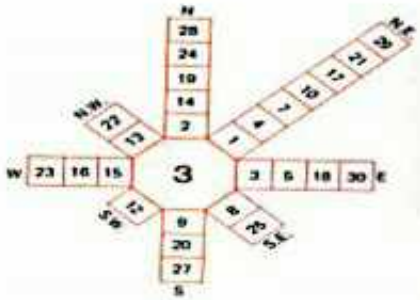
- One part is an arrow or vane on the top, which is free to move with the prevailing wind.
- The other part with the four compass points is stationery and shows in which direction the wind is moving
- Winds are always named from the direction they blow; an east wind is one that blows from east to west and a south –west wind is one that blows from the south to west.



Wind vanes

Wind rose

- It is used for recording the direction of prevailing winds of a place over a period of a month.
- It consists of an octagon with the eight compass points.
- Each of the rectangles represents the date in which the wind comes from that direction (e.g.) on the fourth of the month, the wind is north east.
- These days which are without any wind is recorded in the box of the **calms,** and the number of calm days are indicated in the centre of the octagon e.g. 3 days in that month.



A wind rose

Scanned with AnyScanner

Anemometer

- It is used to measure the speed of wind.
- It consists of three or four semi – circular cups attached to the ends of horizontal spokes mounted on a high vertical shaft.
- Metal cups are fixed to the ends of the arms, and they do rotate when there is wind.
- The movement operates a meter which records the speed of the wind in km per hour.



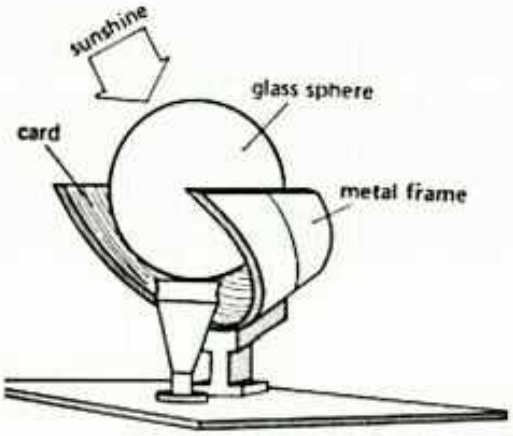
The Anemometer

- Since an anemometer is not easily available, a little practice of local wind observations will help us to assess the speed can be said about the strength of winds.
- The best guide is obtainable from the Beaufort wind scale

Sunshine

- The amount of sunshine a place receives depends on the seasons a factor determined by latitude and by the position of the earth in its revolution around the sun.
- In the tropics sunshine is abundant and at the poles there is less or no sunshine in the metrological station, sunshine duration is recorded by a **sun dial,** 102 mm (4inches in diameter, through which the sun's rays are focused upon a sensitized card graduated in hours.
- An instrument which is used to measure sunshine is called **sunshine recorder.**
- On the maps places with equal sunshine duration are joined by **isohels.**

Scanned with AnyScanner



Sunshine recorder

Clouds Cover

- When air rises, it is cooled by expansion.
- After dew point has been reached cooling leads to **condensation of water vapour** in the atmosphere.
- Tiny droplets of water vapour which are too small to fall as rain or **snow** will be suspended in the air and float as **clouds.**
- Their form shape, height and movements tell us a great deal about the sky conditions and the weather we are likely to experience.
- The amount of cloud cover in the sky is expressed in **eights or oktas** (e.g. $^{2}/_{8}$ is quarter covered $^{4}/_{8}$ is half covered; $^{6}/_{8}$ is three quarters obscured and $^{8}/_{8}$ is completely overcast).
- On the maps places with an equal degree of cloudiness are joined by lines known as **isonephs**

Factors influencing weather

- Different factors influence the weather in different parts of the world, and therefore also cause the climate to be different in different parts of the world.
- These factors include seasons, latitudes, altitudes and prevailing winds from the sea

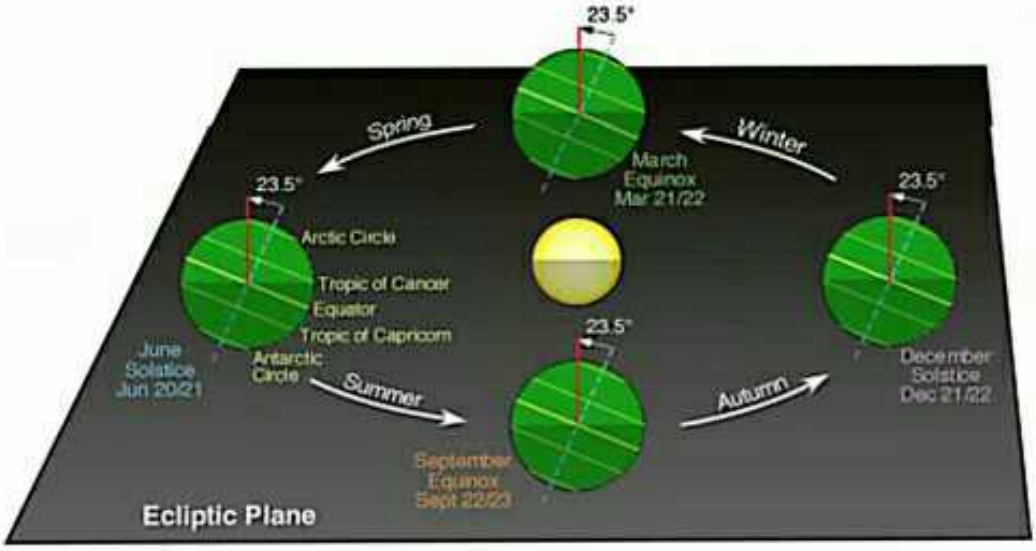
Seasons

To understand seasons, we need to understand that the earth moves in two ways:

- The spins or rotates on its axis (an imaginary line down its centre), like soccer player spinning a ball on his or her fingertip.
- This rotation of the earth cause day and night.

Scanned with AnyScanner

- While the earth is rotating on its axis, it also revolves or moves in a fixed path called an orbit around the sun.
- One revolution of the earth around the sun takes $365\frac{1}{4}$ days.
- The earth's is title at $23\frac{1}{2}$ degrees. This tilt is why we have seasons.
- When the axis points towards the sun, it is summer for that hemisphere.
- When the axis points away from the sun, that hemisphere will have winter.



Altitude

- Altitude refers to how high or low a place is above sea level.
- Generally places at a higher altitude are cooler than places at a low altitude.
- When we look at the climate of Zambia in the next section, we will see how the effects of altitude and latitude (discuss on the next page) together affect the temperatures in different parts of the country.

Latitude

- Latitude refers to how far north or south of the equator a specific place is. Since the earth is round and not flat, the sun's rays fall unevenly on the land and oceans on different parts of the earth:
- The sun's rays are direct near the equator.
- It is hotter closer to the equator.
- The polar region at the top and bottom of the globe, however, at such an angle to sun that they get little or no sunlight during the winter, causing much colder temperatures.

Prevailing winds and distances from the sea

Global air movements

- The differences in temperature between parts of the world at different latitudes create a movement of air and water in great swirling currents.
- These movements distribute heat energy from the sun across the planet.

Scanned with AnyScanner

- When air in one region is warmer than the surrounding air, it becomes less dense and begins to rise, drawing in more air underneath. Cooler, denser air sinks, pushing air outward to flow along the surface and complete the cycle.
- These movements of air create winds that blow from a certain direction at certain times of the year for different places.
- We refer to these typical wind patterns as the prevailing winds for a certain area.

Ocean currents

- Ocean currents also distribute heat energy around the planet.
- The position and distance from the sea of a certain place also therefore affect its weather.
- For example, temperature of places along the coast is affected by ocean currents.
- Along the east coast of southern Africa, there are the warm agulhas and Mozambique currents.
- On the west coast of southern Africa, there is a cold current called the Benguela current.
- Temperatures along the east coast of Africa are therefore higher than along the west coast.
- When winds blow in from the sea, they contain more moisture than winds that blow fro, inland areas.
- The distance and position of a place relative to the sea will therefore also affect its rainfall.

Climate of Zambia

Zambia's tropical climate

- Zambia lies in the tropical areas near the equator, and therefore has a tropical climate.

A tropical climate has the following characteristics:

- Summers have high temperature and rainfalls in the summer.
- The rainfall is usually in the form of thunderstorms.
- Winters have low temperature and have on rainfall.
- Winter temperatures are not as low as in areas further away from the equator, so it does not snow in the tropics (except on some very high mountain peaks, such as mount Kilimanjaro in Tanzania)

Seasons in Zambia

- Because of its tropical climate, Zambia does not experience seasonal changes between spring, autumn and winter as in areas further away from the equator. There are three main seasons in Zambia:

1. Hot, dry season (August to November)
2. Rainy season (mid November to April)
3. Cool season (May to August).

Zambia's temperature and rainfall characteristics:

Temperature

Temperatures in different parts of Zambia are influenced by two factors:

Scanned with AnyScanner

Latitude:

- This means the distance away from the equator. It is hotter near the equator because the sun is are more direct throughout the year.
- Example: Mwinilunga is hotter than Lusaka because it is closer to the equator.

Altitude:

- This means how high or low a place is above sea level.
- It is generally cooler at higher altitudes, such as on highlands or mountains, than at low altitudes, such as valleys.
- Example: Mbala lies at a high altitude and is therefore cooler than Chirundu in the low-lying Zambezi valley.

Relationship between altitude and temperature

Town	Latitude	Altitude	Hottest month	Coldest month	Mean Annual Temp(°C)	Annual Temp Range (°C)
Mwinilunga	11°40'S	1334	22.4	15.8	19.9	6.6
Chirundu	16°39'S	394	30.4	19.8	24.0	10.6
Livingstone	17°59'S	948	27.1	16.2	22.2	10.9
Mbala	8°52'S	1632	22.0	17.5	19.5	4.5

- In terms of temperature, Zambia can generally be divided into two regions: the hot lowland region and the warm highland region.
- However, there are intermediate regions in between these two general region where temperature patterns differ from the general patterns.

Hot lowland region

- Hot low land regions include the Zambezi and Luangwa valleys
- Hot low regions have about 8 months of maximum temperature of over 26°C
- Hot low regions are usually very days and warm nights
- Temperature decreases a little during rainy season, but with high humidity.
- There is a very short period of cool weather.

Scanned with AnyScanner

Warm highland region

- The plateau and highlands areas make up the rest of the country is the warm region.
- Most towns in Zambia fall in this region
- The highland region has generally pleasant climate
- Average annual temperature ranges from 18•C to 21•C.

Effect of climate on human activities

- It affects our health, behavior, eating habits, choice of clothes and recreation
- It affects our farming system as farmers depend on weather factors
- It affect how people live as people wants to live in areas with pleasant weather
- The type of houses people live in are also influenced by climate.
- It affects population distribution, places with good climate are popular and vice versa.

Impact of human activities on climate

- The effects of human on climate are often negative.
- Three processes are related to understanding the effects of human activities on climate
- These processes are: climate change, global warming and Greenhouse effect.

Climate Change

- Climate change" is a broader term that refers to weather trends observed over relatively long periods of time (many decades or longer)
- Climate change can include many variables (temperature, precipitation, wind direction, wind speed) and different geographic scales (over a continent, within an ocean, for the Northern Hemisphere, for the planet

Global Warming

- Global warming" refers to the increase of the Earth's average surface temperature due to a build-up of greenhouse gases in the atmosphere
- The measurable increases in the average temperature of Earth's atmosphere, oceans, and landmasses.
- The rise in the temperature of the earth's atmosphere due to natural causes and human activities.
- Example of natural causes: emissions from volcanic eruptions.
- Example of human activities: burning of fissile fuels and destruction of vegetation cover.

Scanned with AnyScanner

- Scientists believe Earth is currently facing a period of rapid warming.
- Warming brought by increasing levels of heat-trapping gases in the atmosphere.
- These gases are known as greenhouse gases.
- Earth has warmed and cooled many times since its formation.
- This has led to global climate change.

Reasons for global climate change:

- Massive volcanic eruptions, which increased carbon dioxide in the atmosphere.
- Changes in the intensity of energy emitted by the Sun.
- Variations in Earth's position relative to the Sun, both in its orbit and in the inclination of its spin axis.
- Variations in Earth's position, known as Milankovitch cycles, combine to produce cyclical changes in the global climate.
- These cycles are believed to be responsible for the repeated advance and retreat of glaciers *and ice sheets during the Pleistocene Epoch.*
- During this period (pleistocene Epoch), the Earth went through regular cycles of colder "glacial" periods and warmer "interglacial" periods.
- Eras of colder "glacial" periods are known as ice ages. This led to formation of different kinds of landforms of erosion and deposition in Canada and USA.
- In interglacial periods, greenhouse gases (e.g. carbon dioxide and methane) naturally increased in the atmosphere.
- The increase was from increased plant and animal life.
- Since 1750 (Industrial Revolution) greenhouse gases have increased dramatically.
- This is due to rapid growth of human population together with developments in technology and agriculture.
- Human activities now a major cause of global warming and climate change.

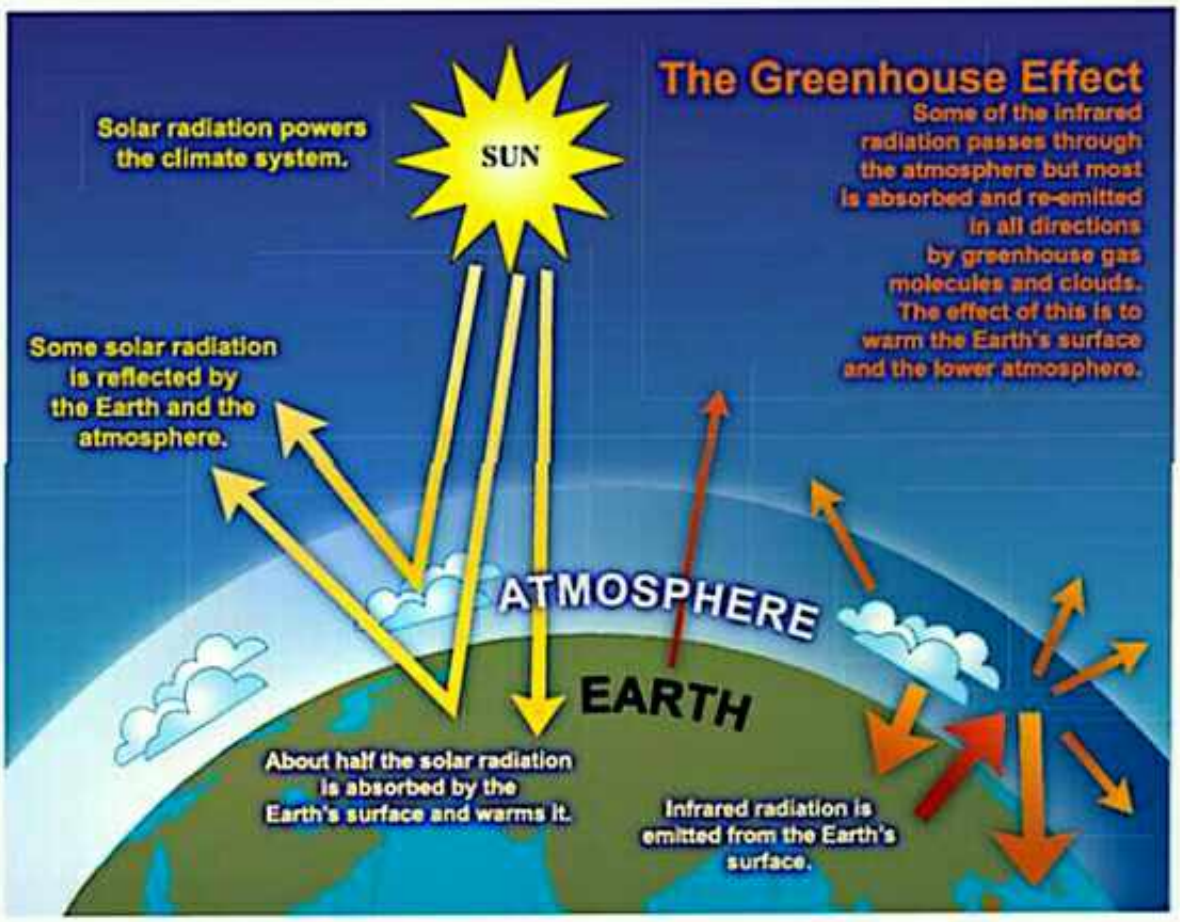
The Greenhouse Effect

- When sun's rays pass through the atmosphere, certain gases trap some of the sun's heat.
- This causes the earth to warm.
- This natural way of warming the earth is known as **green house effect**.
- Greenhouse gases occur naturally, and without them the planet would be too cold to sustain life.
- Since the beginning of the Industrial Revolution in the mid- 1700s, human activities have added more greenhouse gases into the atmosphere.
- For example, levels of carbon dioxide, a powerful greenhouse gas, have risen by 35 percent since 1750.
- The rise is largely from burning of fossil fuels such as coal, oil, and natural gas.

How it takes place

- Solar energy enters the atmosphere and is absorbed by the earth.
- The energy is reflected back through the atmosphere.
- Some of the energy is (one third) is trapped by greenhouse gases.
- This increases the warmth of the atmosphere.

Scanned with AnyScanner



- **Examples of greenhouse gases:** Carbon dioxide. Methane. CFCs. Nitrous Oxide.
- Water Vapor is the most abundant greenhouse gas.
- It reaches the atmosphere through evaporation from oceans, lakes, and rivers.
- The amount of water vapor in the atmosphere is not directly affected by human activities.
- Carbon Dioxide is the second most abundant greenhouse gas after water vapor.
- It is released into the atmosphere from natural processes and human activities.
- Carbon Dioxide Natural sources include: Eruptions of volcanoes.
- Respiration of animals, which breathe in oxygen and exhale carbon dioxide.
- Burning or decay of plants and other organic matter.
- Carbon Dioxide: Human Activities
- Human activities are causing carbon dioxide to be released to the atmosphere faster than
- Earth's natural processes can remove it.
- Carbon dioxide can also remain in the atmosphere a century or more before nature can dispose of it.

Adverse effects of global warming and climate change:

- Increase in sea level.
- Decrease in water resources.

Scanned with AnyScanner

- Change in ecosystems.
- Change in landscapes.
- Change in vegetation zones.
- Increased risk of drought and fires.
- Increased risk of floods.
- Increase in disease levels.
- Increased migration pressures and conflicts.
- More stronger storms and hurricanes.
- Increased economic loss and damage.
- Higher temperatures.
- A decrease in global food production levels.

Solutions to Global Warming

- Reduce methane emissions.
- Reduce emissions of nitrous oxide and ozone Preserve the carbon dioxide sink.
- Reduce greenhouse gases.
- Replace fossil fuels; Replace fossil fuels with cleaner sources of energy.
- Replace with solar power, wind power and hydrogen cells.
- They do not emit any greenhouse gases.
- Preserve and plant trees, Trees absorb carbon dioxide. Need for re-forestation and re-afforestation.
- Recycle paper, Recycle paper and buy recycled products.
- Recycling paper saves trees. Recycling paper also saves energy.
- Reduce use of CFCs, use of new chemicals to replace CFCs.
- The substitutes include hydro chlorofluorocarbons (HCFCs), hydro fluorocarbons (HFCs), and per fluorocarbons (PFCs).

Revision questions

1. What is the difference between weather and climate?
2. List the elements of weather and climate.
3. State and explain factors which influence climate.
4. Define climate change.
5. Describe the causes and effects of climate change.
6. Suggest the solutions to global warming.

Scanned with AnyScanner

FORESTS AND THEIR PRODUCTS

Meaning of forest

- It is the caring and planting of trees
- It is done by the forestry department which is under the ministry of environment and natural resources

Types of vegetation in Zambia

- The natural vegetation (types of plants) found in Zambia is referred to as tropical grasslands or savanna.
- This means that the veld has a mixture of grasses and trees, and that there are also areas with denser forests of trees.

1. Open forests

- Forests are large areas covered with trees
- Open forests consists of trees which do not form a dense canopy such as acacia and monape trees.
- This allows sun-loving smaller bushes and tall grasses to grow under them.
- These open forests make up part of the savanna grasslands that cover most of Zambia.
- These areas are also called woodlands.
- In some parts of the higher plateau, fires have destroyed many woodland trees.
- The fires are sometimes caused by lightning or other natural causes, but are always caused by human activities, such as burning trees to clear land for planting crops.
- In these areas grasslands have taken over the veld.

2. Closed forests

- Closed forests are very dense that they form a canopy, blocking out the sun from the ground.
- The trees may grow naturally or maybe planted by people.
- Where trees have grown naturally, it is called a natural forest.
- If trees have been planted by people, such a forest, it is referred to as a forest plantation.

3. Swamps

- Here the vegetation mostly consists of grasslands and logs that can survive the waterlogged soil conditions.

Types of tree speices

- There are two groups of forests that are under the forestry department and these are **exotic forests** and **indigenous forests**

EXOTIC FORESTS

- These are planted by people inn forest plantations for the purpose of using the wood, or trees from other countries growing in gardens or parks in cities.
- Example pine trees.
- These are plantations that have been established by the forest department in all

Scanned with AnyScanner

- The districts in Zambia
- They are made up of the foreign types of trees like the pine, eucalyptus, fir and
- cedar
- most of these trees are soft wood trees except the eucalyptus, they have a fast
- growth, grow in pure stands, are of a timber value and are evergreen
- They are also resistant to diseases
- They grow straight

INDIGENOUS FORESTS

- There are trees naturally found in forests and woodlands in Zambia example is mopane trees.
- These are forest reserves that have been established throughout the country
- These are reserved for research and future use
- They are mainly found on stream banks and catchment areas
- They are made up of the local type of trees
- The trees are deciduous, have an umbrella shape, do not grow in pure stands, hard to work on have a slow growth and very few types are of timber value

3. **Indegenous forests and tree species**

- Natural forests include the Livunda dry evergreen forests south of Kabompo River in North-Werstem province. and the dry evergreen forests bordering in dambo (westlands).
- They also include swamp forests in high rainfall areas in the copperbelt, and the mopane forest of the Nyika plateu and Makutu mountains.
- Natural forests are also found along the upper escarpments of the Luangwa and Luapula Rivers.

Trees of the savanna woodlands

Savanna woodlands cover most of the country and consist of three types:

1. **Milombo woodlands** cover about 70% of the country.
2. **Kalahari woodlands** are found in the sandy areas of the Western province.
3. **Munga woodlands** consist of acacia trees.

- All these woodlands are made up of trees with grasses growing beneath them.
- The savanna woodlands consist mostly of deciduous trees.
- This means that the trees lose their leaves during the dry season.
- The trees have adapted to survive dry conditions in different ways.
-

Scanned with AnyScanner

Main tree species in the woodlands

1. **Msasa trees** are the most common trees in the savanna woodlands.
   - These trees can grow up to 18 meters high in areas with higher rainfall, such as in Northern and North-western provinces.
   - The grasses growing in msasa woodlands provide good grazing for cattle and wildlife.
2. **Mopane woodlands** are found in hotter and drier areas. Mopane trees can resist fires, but are sensitive to frost that might occur when night temperatures drop suddenly.
3. **Baoba trees** are also found in mopane woodlands.They have thick trunks to store in water.
4. **Acacia or thorn trees** are umbrella-shaped to shade their roots from the hot sun.
5. **Mukusi (Zambian teak) trees** are found in denser decidious forests in dry areas.

Evergreen forests

- Evergreen forests occur in high rainfall areas, such as in some highland areas.
- There is enough rainfall for the trees to grow new leaves and appear green throughout the year.
- Evergreen forests are made up of taller trees that can grow as tall as 25 to 30 metres.
- There is a lower layer of smaller trees growing beneath the taller trees.
- Common trees in the evergreen forests include mupundu, kayimbi and mukwa.
- A type of evergreen forests called riverine forests are found along rivers and swamps, and in areas that get flooded seasonally.

2. Exotic tree species and forest plantations

- Forest plantations are found in all the provinces of Zambia.
- They are planted by the forestry department to provide alternative sources of wood so that Zambia's indigenous tree species and can be preserved.
- The largest is the Chichele plantation in the copperbelt.
- Pine trees are the most common type of exotic tree planted in forest plantations.
- Other exotic tree species include eucalyptus trees.
- Some exotic trees and plants can be invasive and take over the natural vegetation.
- It is therefore important for exotic to be controlled to prevent this.

Forest products and their uses

- Trees and forests provide a range of benefits.
- The most important of these is that forests act as the "green lungs" of the planet.
- Trees absorb carbon dioxide which they use in making their own food through the process of photosynthesis.
- Oxygen, which humans and animals need to breathe in to stay alive, is then released.
- Forests provide many products that we use in our everyday lives.

IMPORTANCE OF FORESTS

- Construction materials for homes and public buildings like schools and hospitals
- Countries to oxygen production in the atmosphere through photosynthesis
- Fire wood for cooking and heating

Scanned with AnyScanner

- Food for both animals and human beings
- For production of charcoal
- Good scenery especially in highland areas
- Grass and fibres for mats and baskets, building houses and shelters
- Protection of the catchment areas from soil erosion.
- Protection of the soil from drying up
- Raw materials for industries like sawmills, pulp and paper

Constraints on forestry

- Chitemene system which has contributed to deforestation in most parts of Zambia
- Forest fires which destroys the trees especially late burning
- Lumbering and charcoal burning which has contributed to the finishing of trees.
- Overgrazing by animals
- Pests and diseases which attacks the trees

Deforestation

- Deforestation means that forests are cleared for various purposes at a faster rate than the forests can grow again.

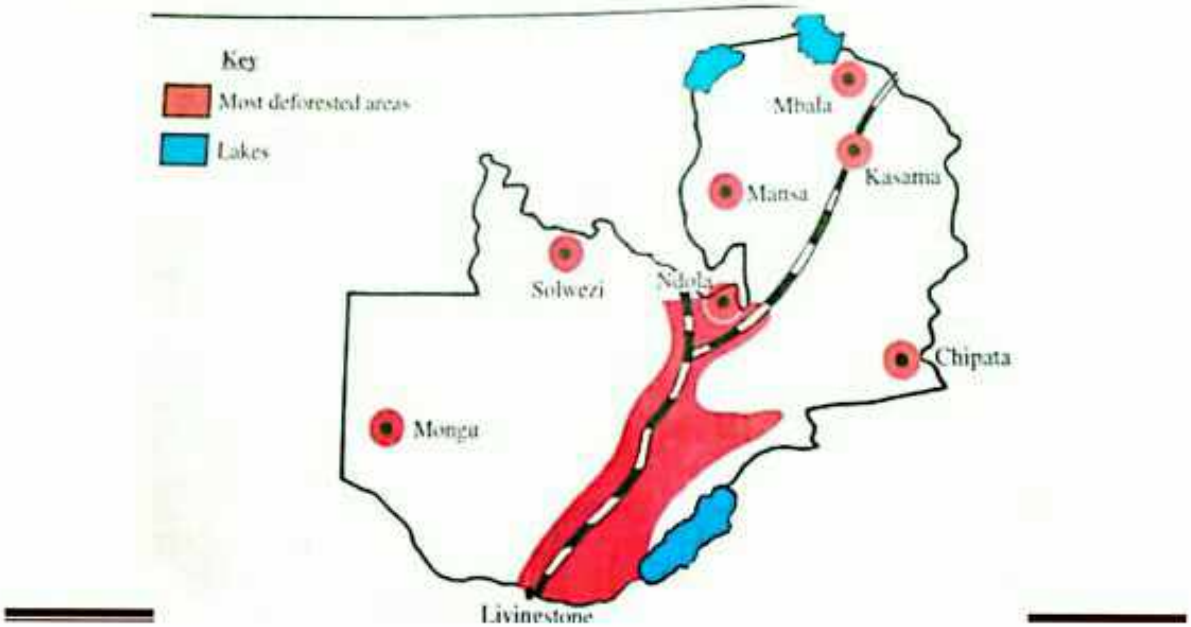
Causes of deforestation

- Clearing forests for commercial farming practices that require and burning of trees for farmland.
- Commercial logging for timber.
- Cutting of trees for charcoal and firewood.

Negative effects deforestation.

- Destruction of biodiversity and changes in climate patterns all over the world.
- It can lead to desertification, with useful forests turning into useless deserts.
- Migration of animals and birds to other areas for shelter
- Shortages of wood fuel.

A map showing deforested areas in Zambia.



Scanned with AnyScanner

Forest conservation

- Forests can be conserved and preserved through dedicated efforts by all citizens and government.

Ways to conserve forests:

- Commercial forestry programmes for timber to protect our natural forests.
- Control and regulation of bush fire.
- Control and regulation of charcoal burning.
- Control of commercial logging.
- Educating communities on the importance and values of forest resources.
- Tree planting programmes
- Using renewable sources (wind, solar and water energy) instead of burning wood.

EFFORTS MADE BY THE GOVERNMENT TO BOOST FORESTRY

- By allowing the non-governmental organizations support the forestry industry
- Delinking of ZAFFICO from the forest department in order to improve efficiency
- Educating the communities on the importance of caring for forest resources
- Embarking on rural electrification which may reduce on use of wood fuel
- Encouraging people to plant trees during the tree planting day
- Establishment of forest reserves and plantations throughout the country by the forestry department.
- Establishment of the forestry department to control forestry
- Fire controls which may destroy trees is being done by the GOVT.
- Giving of licences to all those willing to do forestry and lumbering
- Introduction punishments to all those found disturbing the forests
- It has embarked on afforestation and reafforestation programmes
- The forestry department is promoting agro-forestry.

Revision questions

1. Give the importance of forests.
2. Define deforestation and state its causes and effects.
3. State the ways of conserving forests.

Scanned with AnyScanner

AGRICULTURE/FARMING IN ZAMBIA

- **Agriculture** is the growing of crops (arable farming) and the keeping of domesticated animals (pastoral farming) as well as the keeping of birds (poultry farming) either for sell (commercial farming) or home consumption (subsistence farming).

Factors affecting Agriculture

- Climate
- Distance from the market
- Soils
- The role of the government
- Transport facilities

Importance of Agriculture

- Brings in foreign exchange through exports like tobacco, coffee and cotton
- Generates 22% of the Gross Domestic Product (G. D. P) in Zambia.
- It contributes to food security, income and economic growth.
- Provide raw materials such as cotton, Soya beans and sugar cane for industries
- Provides food for people and livestock
- Source of income for the majority of people in rural Zambia

Types of Agriculture

There are three types of agricultural systems practiced in Zambia and these are:

i) Subsistence/Traditional Agriculture

- It is the cultivation of crops and the keeping of animals as well as birds for home consumption with little or no surplus for sale.
- The intention of the farmer is to grow crops to feed the family.
- This is also called **small scale** farming

ii) Emergent Agriculture

- This is also called **semi commercial** farming.
- It is the growing of crops and the keeping of animals as well as birds enough to feed the family and sell the extra food.
- It is different from traditional farming in that, farmers use modern methods of farming e.g spraying crops with chemicals.

iii) Commercial Agriculture

- This is the growing of crops, keeping of animals as well as birds on large scale for sale.

Subsistence/Traditional Agricultural system

Characteristics

- Farms are small
- Mainly food crops such as maize, millet, cassava, beans, groundnuts, sweet potatoes e.t.c are grown
- Simple tools are used e.g. axes, hoes, pangas and even sticks

Scanned with AnyScanner

- The yields are low
- They do not use chemicals and fertilizers

Types of Subsistence farming

There are three kinds of subsistence farming systems in Zambia and these are;

- The Chitemene system
- The Mambwe-Lungu-Namwanga system
- The Lozi System

1 .The Chitemene system of Agriculture

- This system of agriculture is practiced among the Bemba peaking ethnic group of Northern and Luapula Province.
- It is also practiced in various forms in Central, North-Western, Western and Copperbelt Provinces.
- The term '**Chitemene**' is a Bemba word which means **cut-over area.**
- In North-Western Province it is called '**Ntena**'

How Chitemene is done

- Between May and August, small trees and branches of large trees are chopped down by men and boys
- Smaller trees are chopped about a meter above the ground.
- In September/October, women carry branches and pile them up in circular stacks (heaps) within the cleared area.
- Around October/November, at the onset of the rains, the stacks are burnt to produce an ash bed.
- The ash-covered patch is then cultivated
- Sowing/planting is done in November/December.
- After using the piece of land for 3-4 years, it is abandoned and then the farmer shifts to a new piece of land (normally virgin) as the old one has lost fertility (hence the name **shifting cultivation**).

Crops grown include;

- Millet, maize, cassava, pumpkins, myungu, cowpeas, sweet potatoes, sorghum, groundnuts e.t.c

Factors favouring (encouraging) Chitemene system

a) Physical factors

- High rainfall of about 1000-1600mm makes the soil leached and acidic.
- Burning it turns to neutralizes the acidic soil to make it fertile
- Poor, infertile soils
- Presence of heavy rainfall which encourage the growth of trees.

b) Social factors

- Bembas are not traditional cattle-keepers
- Low population densities in places where Chitemene is practiced

c) Economic factors

Scanned with AnyScanner

- The farmers are poor and cannot afford to buy farming inputs e.g. pesticides, inorganic fertilizers e.t.c

Advantages of Chitemene

- Cheap labour (family members provide labour)
- It is not time consuming as it avoids stumping which is time consuming (slow)
- Makes constant weeding unnecessary as most weeds are burnt
- No need to buy fertilizers (ash acts as fertilizers)
- Soil is not disturbed by deep ploughing

Disadvantages of Chitemene

- Although a large area is cleared and so much labour invested, production is low
- Encourages soil erosion by cutting down trees and burning the surrounding grassland.
- It is very wasteful of trees and encourages deforestation
- Nitrogen is lost in the atmosphere by burning
- The Eco-system is disturbed.
- The habitat (homes for living things) is destroyed.
- Useful soil bacteria's are destroyed by heat from the fire

Reason for the decline of Chitemene

- The government is educating people on the importance of trees and the dangers of deforestation.
- There is decline in the amount of woodland or forests
- There is population pressure due to an increase in the number of people in the areas where Chitemene is practiced.
- Transport network to the market has been improved.

2. The Mambwe-Lungu-Namwanga system

- This is another traditional system of farming in Zambia.
- It is also called **fundika**
- It is practiced by the Mambwe speaking people.
- While Chitemene depends on availability of trees, the Mambwe-Lungu-Namwanga system evolved due to population pressure and exhaustion of the trees.

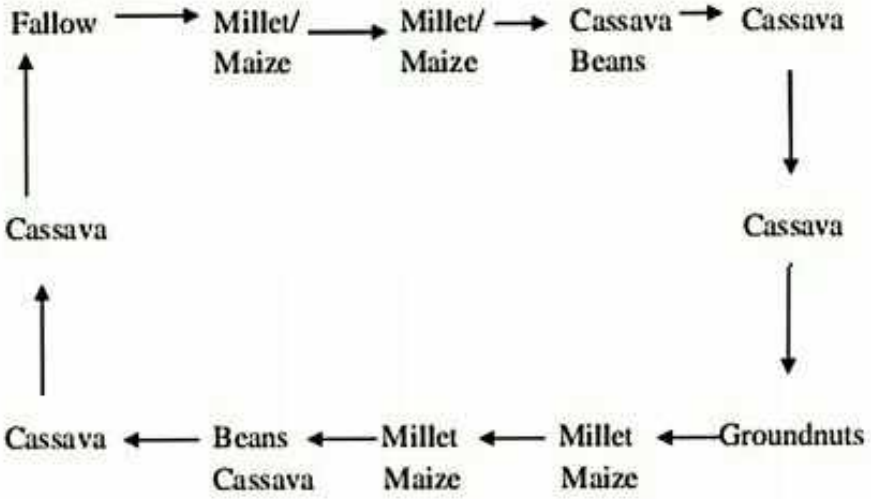
How it is done

The system involves:

- Making mounds towards the end of the rainy season, between May and April.
- A grass patch is usually chosen so that the covered grass can serve as manure.
- Opening of the mounds and spreading the manured soil at the beginning of the rainy season, October/November.
- Sowing of millet which is the main staple food crop interspaced by maize, pumpkins and myungu.
- After the first harvest of millet, stubbles are collected in heaps and covered with soil to make mounds for the second year.
- When these are opened up another crop of millet can be planted.

Scanned with AnyScanner

Below is a rotation system employed by the Namwanga



Advantages of the system

- Trees are not destroyed as fields are made over grassy patches and uses grass as fertilizer
- Allows for intensive cultivation of crops such as millet, beans, cassava, maize, and groundnuts.
- Maintain soil fertility through grass manuring and crop ration.
- Requires no use of chemical fertilizers.
- Can support large population settled on permanent basis.

3. The Lozi system

- The system is practiced by the Lozi people
- It is practiced on the upper Zambezi flood plain
- The seasonal movement of the Lozi people and their animals from the flood plain when it gets flooded to the upland and back is referred to as **transhumance**

The Lozi system includes:

a) Litapa (Silapa)

- Done in plains with large shallow depressions which receives annual flooding
- Sometimes crops are flooded before they become mature

b) Mazulu (Lizulu)

- Involves cultivation of crops on raised mounds in the flood plains.

c) Lishango (Sishango)

- It is practiced at the edge of the plain which has constant seepage of water from the plateau.

d) Matongo (Litongo)

- This is practiced at the edge above the Lishango zone
- Most villages are located in this area because it is suitable for human settlement.

e) Matema (Litema)

Scanned with AnyScanner

- These are found on the Barotse sands of the plateau
- Fields cultivated are large because soils are not fertile.

Advantages of the system

- It allows the growing of a variety of crops
- It allows the growing of crops throughout the year.
- It provides rich and productive grazing land for cattle throughout the year.

Problems associated with subsistence farming

- Soil erosion – This is the removal of topsoil by agents such as rain, wind or running water.
- Diminishing yields – This is the decrease in production mainly due to unsustainable methods of farming e.g. Chitemene.
- Deforestation – Due to cutting of trees which help hold soil together. This can lead to soil erosion and desertification.
- Bush fires – This is due to early burning of fields and hunting.
- Lack of capital – No money to purchase inputs or machinery.
- Lack of inputs e.g. fertilizers and seed etc.
- Lack of education – e.g. environmental awareness.
- Unreliable climatic conditions – rainfall and droughts.
- Mono cropping – leads to soil impoverishment.
- Pests and diseases – e.g. Tripanosomiasis and corridor disease.
- Poor buying capacity – market leading to poor sales.
- Poor transport – especially the impassable roads.
- Long distance to markets especially to urban areas.

Effects of agricultural practices on the environment

- Soil erosion
- Deforestation
- Destruction of natural homes of plants and animals
- Displacement of wildlife due to cleared land
- Desertification caused by cutting down of trees
- Pollution caused by **burning**

Soil conservation measures and sustainable agricultural practices

- Contour ploughing – to retain moisture and avoid erosion.
- Strip cultivation – protects the soil from erosion.
- Crop rotation – to restore and replace nutrients.
- Terracing – to retain moisture and check the flow of water downhill.
- Mulching – covering the soil to retain moisture.
- Ploughing – across the slope to avoid erosion.
- Controlled grazing – to allow for land regeneration.
- Soil additives – adds nutrients to the soil.

Scanned with AnyScanner

- Cover cropping – retains moisture and protects soil from erosion.
- Afforestation – replaces cut down trees.
- Fallowing – Allows soil to regenerate
- Irrigation – Supplies additional water especially during droughts.
- Organic farming – Use of leguminous plants to fertilise soil e.g. velvet beans, peas and other legumes.

Government measures to improve subsistance farming

- Provision or creation of co-operatives.
- Creation of resettlement schemes.
- Provision of extension services to educate the farmers.
- Construction of feeder roads.
- Use of drought animals e.g. donkeys in the southern province.
- Provision of rural information services.
- Distribution of inputs like fertilizers by government agents e.g. NGOs.
- Purchasing and collection of harvested crops by Zambia Army and ZNS.
- Fixing of purchase price of maize to avoid briefcase traders.

Ways to improve food security

- Improve marketing and storage facilities by Food Reserve Agency.
- Production and distribution of seed by such as Zamseed, Pana Seeds.
- Increase food production.
- Improve crop research to have improved varieties of seeds e.g. drought resistant.
- Improve transport especially feeder roads.
- Providing credit facilities to small scale and emergent farmers.
- Educating the farmers on sustainable methods of agriculture.

Commercial agriculture

- This is the growing of crops and raising of livestock for sale.

Characteristics of Commercial Farming

- Involves inputs such as fertilizers, certified seeds, pesticides e.t.c
- Involves large capital investment
- Large farms
- Mainly monoculture type of farming is done annually.
- Uses large labour force both skilled and unskilled
- Uses machinery e.g. tractors, combine harvesters e.t.c

Types of Commercial Farming

a) Plantation farming (Estate)
b) Mixed farming
c) Market gardening
d) Horticulture

Scanned with AnyScanner

e) Irrigation farming

a) Plantation farming (Estate)

- Plantation or Estate farming is concerned with the growing of tree crops such as cotton, tobacco, sugarcane, coffee, cocoa, tea, rubber.

The main Estates include:

a) Nakambala sugar Estate in Mazabuka
b) Ngoli coffee Estate in Kasama
c) Kawambwa tea Estate in Kawambwa
d) Mununshi Banana Scheme in Luapula
e) Dunlop rubber plantation at Nchelenge.

Characteristics of estate/plantation farming

- Plantations are usually foreign owned by large companies.
- Processing of produce is done on site
- They are labor intensive, meaning they employ a lot of people
- They are usually export-oriented, meaning they mainly export their produce
- They require large capital
- They require large scale irrigation
- They require long term investment

b) Mixed Farming

- This is the cultivation of different crops and the rearing of livestock at the same time on the same farm.
- Crops grown are maize, wheat, Soya beans e.t.c
- Livestock reared are cattle, goats, sheep e.t.c

c) Market garden Farming

- This is the intensive growing of vegetables and mainly for sale near urban areas.
- It is also called **Truck Farming** (transportation)
- This is carried out near urban areas where transport is available and ready market for the products.
- The chief vegetables grown are potatoes, tomatoes, onions, cabbage, beans, egg plants, carrots, beet roots, lettuce and chili pepper.
- Fruits such as bananas, mangoes, avocado, guava and pineapples are produced seasonally.

d) Horticulture

- This involves the production of ornamental plants e.g flowers for sale locally and for export.

Scanned with AnyScanner

e) Commercial Livestock farming

- It deals with the keeping of animals and poultry for meat and eggs on large scale.

It includes

- Dairy farming for milk and milk products
- Ranching for beef and beef products
- Pig rearing for pork and pork products
- Goat rearing for meat and milk
- Poultry for meat and eggs

Factors influencing commercial livestock farming

- Diseases and pests
- Poor pasture especially during the dry seasons
- Water scarcity
- Market
- Traditions
- Thefts of livestock

f) Irrigation Agriculture

- This is the growing of crops in the dry part of the year by supplying water from rivers, boreholes, reservoirs e.t.c

Importance of Irrigation

- Irrigation transforms bare land into areas of green vegetation.
- It enables the farmers to use a piece of land to produce crops two three times in a year.
- It is one way of increasing food production to achieve household and National food security (self-sufficiency)

Methods of Irrigation

- Sprinklers
- Canals
- Flooding
- Over-head irrigation

Areas of Irrigation

- Areas around Lusaka for green maize, vegetables, flowers and wheat.
- Chisamba area for green maize, vegetables, wheat and flowers.
- Mpongwe area mainly for wheat but also coffee.
- Mazabuka area for wheat and sugarcane.

Factors which makes necessary to undertake Large scale Irrigation in Nakambala

- Its flat land which gently slopes towards the river is ideal for irrigation.
- The presence of Kafue river and its tributaries as fallows are made from there.

Crops grown by Irrigation

- Maize (sweet corn), cabbage, tomatoes, onions, Irish potatoes, rape, carrots and green pepper for local market.

Scanned with AnyScanner

- Also roses, gladioli, fillers and vegetables such as baby corn, paprika, green beans, peas and asparagus for the export market are grown.

Positive effects of Irrigation

- It transforms bare land into an area of green vegetation
- If the land is planted with tree crops like coffee, bananas and tea, this increases the land's retention of rainwater as ground water.
- Large scale growing of tree crops aided by irrigation makes the climate wetter in the long run.
- Growing crops twice or three times in a year increases food and raw material production in the country.

Negative effects of Irrigation

- Salination: when the land ids continuously used for irrigation, the fertilizer used make it saline and this reduce productivity.
- Water diseases: Irrigated areas have an increase I snails and mosquito populations which transmit bilharzias and malaria respectively.
- Fertilizers used on agricultural lands next to the river under irrigation will be washed into the river. This will lead to the growth of aquatic plants which may sometimes be obstacles to navigation on rivers.

Location of Commercial farms

Most commercial farms are located in the following areas:

- Along the line of rail: Areas near Livingstone, Choma, Monze, Mazabuka, Lusaka, Kabwe, Mkushi and also Copperbelt.
- Eastern Province from Petauke through Chipata to Lundazi.

Reasons why commercial farms are located along the line of rail

- The presence of large urban market e.g. Copperbelt and Lusaka has large number of people which translate into high demand for agricultural goods.
- There is suitable climate for farming as the areas experience moderate temperatures of between 15°C to 24°C and an average rainfall of about 1000mm. This type of climate is ideal for human settlement.
- Much of the line of rail is a plateau and free from tsetse flies.
- The soil along the line of rail is fertile as the area has loam soils.
- Availability of Hydro-Electric Power reduces the cost of farm production.
- There is availability of cheap railway transport.

Reasons why some commercial farms are located in Eastern Province from Petauke to Lundazi.

- Soils in Eastern Province are fairly fertile rich in humus.
- Road transport network is also fairly good as most roads can be used throughout the year.
- There is ready market.
- Favorable rainfall.

Environmental impact of commercial farming

Scanned with AnyScanner

- Pollution through the use of chemicals
- Increased soil erosion
- Deforestation
- Displacement of people and animals

Revision questions

1. State the importance of farming.
2. Give the characteristics of small scale farming.
3. Outline the advantages and disadvantages of chitemene system of farming.
4. List different types of farming systems.
5. What are the characteristics of estate farming?
6. What are the problems facing agriculture
7. Explain the efforts of the government to boost agriculture in the country.

Scanned with AnyScanner

FISHING IN ZAMBIA

- Fishing is an industry which deals with catching and processing of fish

Importance

- It brings foreign exchange through selling of fish to other countries
- It provides food to the people of Zambia
- It is a tourist attraction
- It is a basis for some industries which means there are some industries which depends on fishing
- It provides employment to the people of Zambia

Zambia's fishing areas or fisheries

- Fisheries are place where fish is caught. They include; lakes rivers, swamps, dams and fish ponds.

The main fishing areas are:

- Luapula river, Zambezi river, Kafue river, lukanga swamp, Luangwa river, chambeshi river
- Lake kariba, lake Tanganyika, lake Mweru, lake mweru wantipa

Lake Kariba fishery

- It is 280 km long.
- Fingerlings (baby fish) of Tilapia from Chilanga and Kapenta form Tanganyika were introduced.
- A fisheries training center was introduced at Sinazongwe.
- Fish caught include Kalongwe, Mutaba, bream, tiger fish, and Kachesa.

Kafue fisher

- It is 292 km from Kafue gorge to Itezhi-tezhi gap.
- Droppings from wild animals and cattle provide rich food for the fish.
- Gill nets, lines, spears, clubs, scoops and traps are used to catch the fish.
- Types of fish include bream, barbell, pike, bulldog and bottlenose.
- Lusaka provides a good market for the fish.

Lake Tanganyika fishery

- Zambia occupies 1/8 of the lake.
- Fish include Nile perch, Kapenta, and bream.
- Scoop nets and gill nets are used.
- Commercial firms like Sopelac and Chani operate here, using motor powered boats.
- Distance to the copper belt town for market is too far.

Bangweuru fishery

- This includes the lake and all the swamps around.
- Fish include bulldog, barbell, tiger fish, and bream.

Scanned with AnyScanner

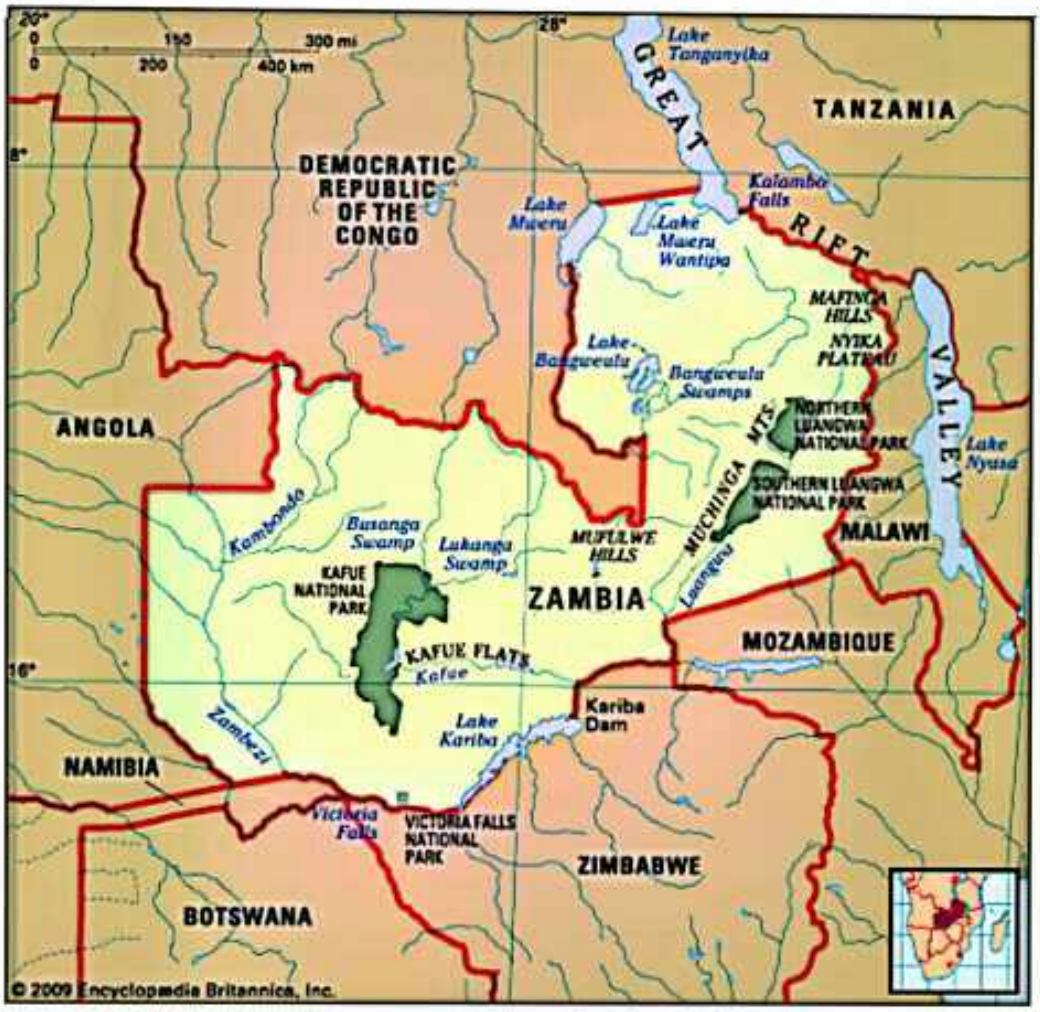
- Fishermen use gillnets, long lines, spears and baskets.
- Fish is marketed and dried due to long distance to markets.

Lake Mweru and mweru-ntipa fishery

- Extends from Mambilima to the edge of Lake Mweru.
- Gillnets, lines and baskets are used by fishermen.
- Fish caught include snout fish, tiger fish, mud suckers, catfish, barbell, and green-headed bream.
- Most fish is sold fresh

Other fisheries

- These include upper Zambezi and Lukanga in Central province.
- Fish include tiger fish, mud suckers and bream, etc



A map showing major fisheries of Zambia.

Types of fish

There are more than 300 types of fish found in Zambia and these are:

Scanned with AnyScanner

- Nile perch (buka buka)
- Tiger fish
- Pike
- Sardines(kapenta)
- Bulldog
- Barbel bream(umulonge)
- Green headed bream (pale)
- Bottle nose(umuntesa)
- Yellow berry bream (insuku)

Types of fish caught in major fishing areas

- From lake Tanganyika we have sardine and Nile perch
- In lake kariba we have sardines, breams and tiger fish
- Bull dog is common in lake bangweulu and Zambezi fisheries
- Kafue fisheries ,the chief type of fish caught is bream

Fishing methods

- There are two types fishing methods and these are: **Small scale and large scale fishing method.**

Fishing methods

Small scale

- This is the type of fishing done on all the rivers and lakes.
- These use traps, baskets, hooks and lines to catch fish for home consumption only.
- They also use dugout canoes and lamps to attract fish at night

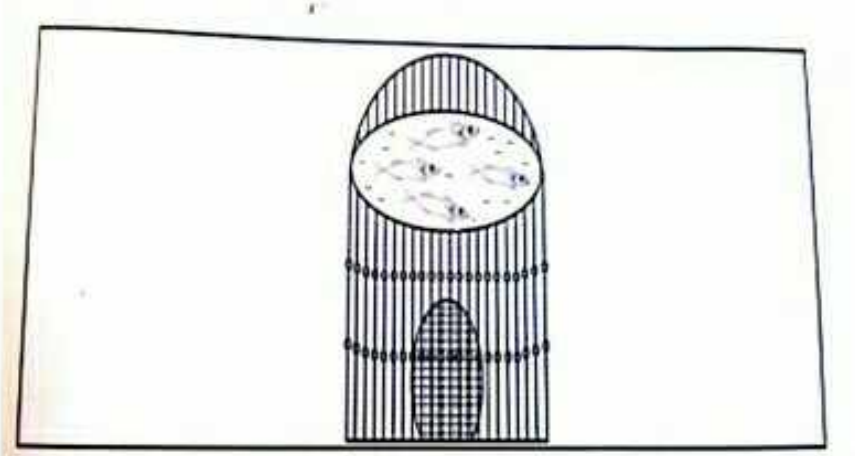


Fig. 3.3 A fish trap

Scanned with AnyScanner

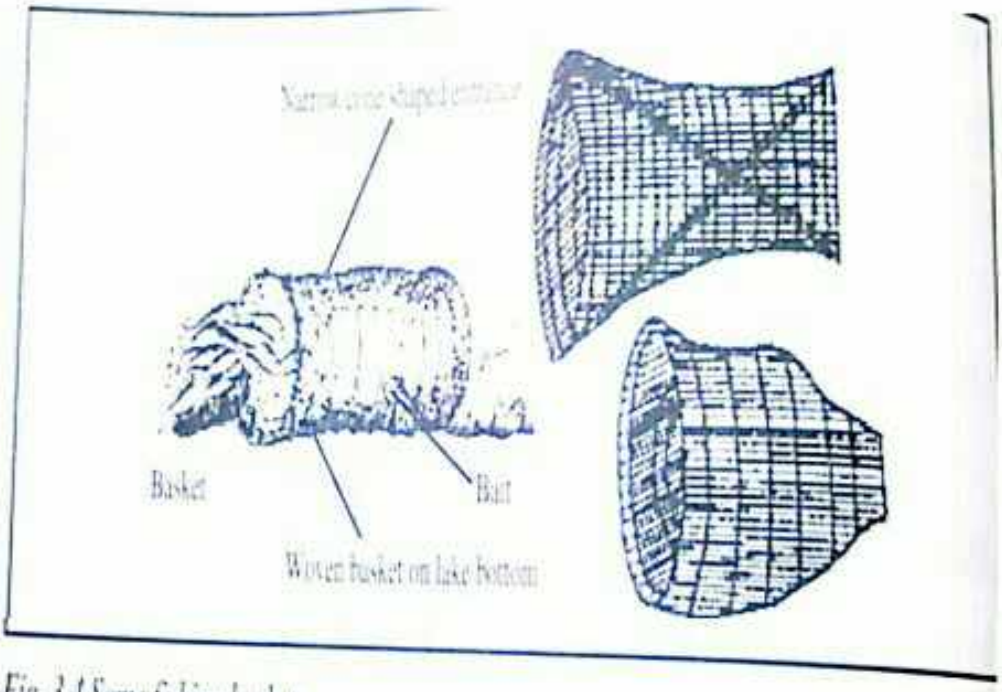
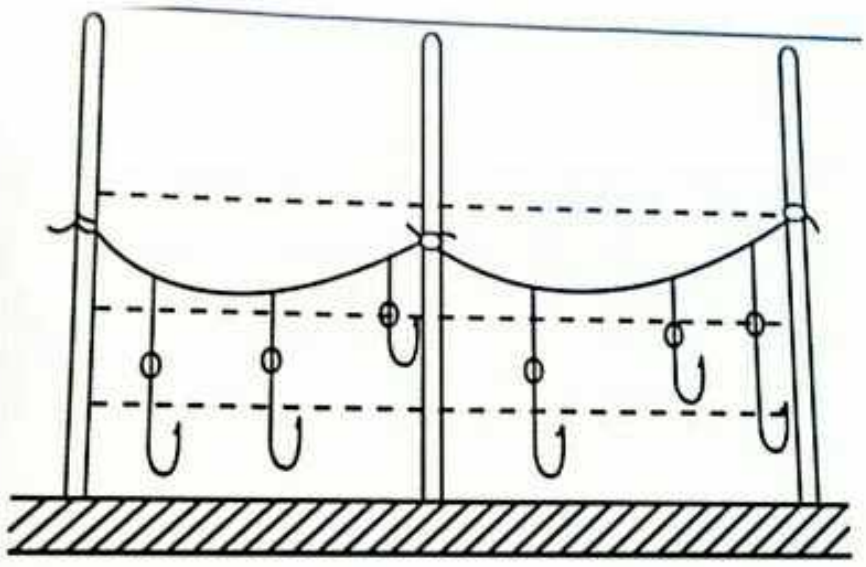


Fig. 3.4 Some fishing baskets



Line and hooks

Commercial fishing

- These are done by large-scale fishermen who catch fish mainly for sale.
- The three main types of nets are used namely: Gill nets, Seine or draw nets and hand nets

Scanned with AnyScanner

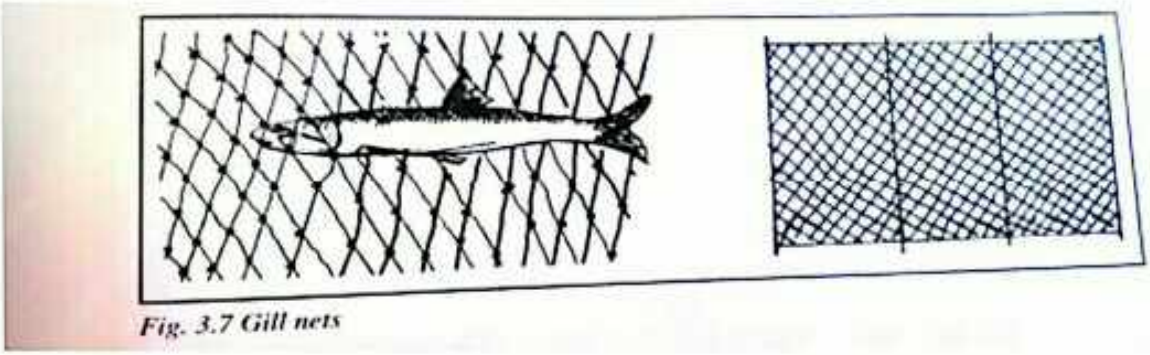


Fig. 3.7 Gill nets

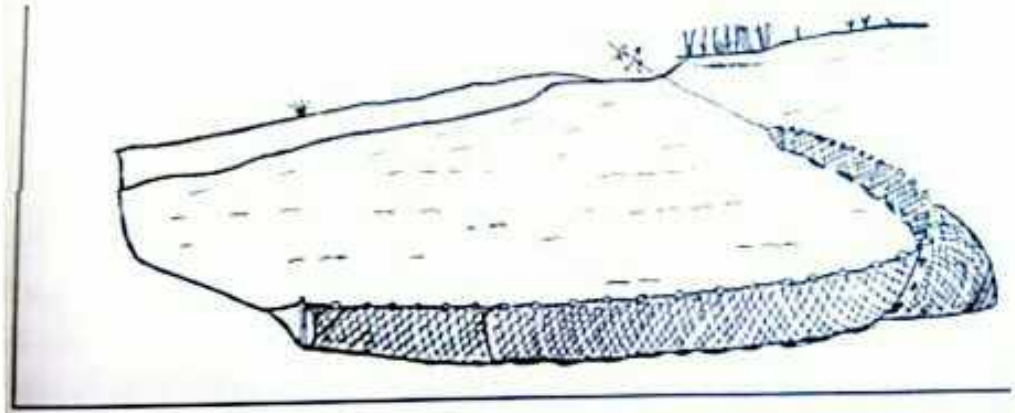


Fig. 3.8 A seine net

Hand nets

- These are scoop nets attached to a round or oval frame of wood used to catch Kapenta. Kit is locally called Lusenga, especially on Lake Tanganyika and also called Matope on Lake Mweru.
- Commercial fishermen also use motor powered boats e.g. gill net skiff pulled by boats.

Processing of fish

- It is the treatment which is done to fish before it is consumed by man and the methods used are
  a) Frozen
  b) Canned is when fish is cooked and some chemicals are applied to it so that it does not go bad and then it is put in tins
  c) Smoked is when fish is dried using smoke coming from un dry fire wood
  d) Salted is when salt is applied to fish and then it is either sun dried or smoked
  e) Sun dried is when fish is dried using sun shine is the method they use to dry the smallest type of fish like kapenta

Marketing of fish

- fresh and frozen fish is transported to the market by refrigerated vans to copper belt, Lusaka and other urban areas where demand is high

Scanned with AnyScanner

- major fishing companies have established retail outlets in Lusaka and copper belt
- establishment of cold rooms e.g. mpulungu, Kashikishi and Kariba

Problems affecting fishing industry

- Long distances to the market especially lake Tanganyika and lake Mweru wantipa
- poor transport especially in the rain season
- lack of storage facilities
- modern fishermen lack modern skills of fishing
- lack of capital to buy fishing equipment

Government efforts to promote fishing

- Building of a fishing training school in sinazongwe
- Building of ice plants in mpulungu and kashikishi
- Discourage people from doing over fishing
- Establishment of a net and boat making factory in Kafue
- Improvement of roads
- Introduction of fish bans to allow fish to breed
- Provision of loans for fish farming(keeping of fish)

The fisheries department

- It has its headquarters in Chilanga, Lusaka.
- It makes regulations to control and improve fishing industry.
- It enforces fishing regulations and provides facilities to train local people and improve their fishing methods.
- Also organizes fish farming programmes for fishermen.
- It teaches the people the importance of fish conservation.

Revision questions

1. Give the importance of fishing.
2. Name major fisheries of Zambia
3. State the problems being faced by the fishing industry.
4. Suggest the possible solutions to the problems being faced by the fishing industry.
5. Explain the functions of the department of fisheries.

Scanned with AnyScanner

TOURISM IN ZAMBIA

- Tourism is the movement of people from one place to another for leisure education, Religion
- A tourist is a person who travels to another place for leisure and recreation education within their own country

Two types of tourists

- **Domestic tourists** are those persons visiting tourist attractions within their own country.
- **International tourists, are those who travel to visit attractions in other countries**

Importance of tourism

- Brings foreign exchange to the country
- *Conservation means any wise use of vegetation and animals*
- It encourages conservation of wild life
- It helps people to maintain culture and historical sites
- It improves other areas of the economy like airports, hotels and transport
- It promotes cottage industry/ home based industries
- Provides employment to the people of Zambia
- Provides market for farm products
- Wild life means any wild animal and any kind of natural vegetation.

Different types tourism

Eco –tourism: Eco – tourism is aimed protecting the natural environment and at the same time enabling local people to share in and benefit from the tourism opportunities for attract eco – tourists who specifically want to visit places where the environment is protected.

Nature tourism: people from all over the world are fascinated by Africa's wildlife .birdwatchers travel from all over the world to observe the rich birdlife of Zambia.

Adventure tourism: these tourists look for opportunities to take part in adventure activities such as bungee jumping from bridges and white water river rafting.

Cultural and historical tourism: many tourists also enjoy finding out more about Zambian cultures of the countries that they visit .tourists visiting Zambia are interested in traditional ceremonies and historical sites.

- In addition to the different tourist attractions, Zambia offers tourists a warm, sunny climate and friendly people who make tourists feel welcome.
- The country is seen as a peaceful and stable place to visit.

Scanned with AnyScanner

Tourist attractions found in Zambia

a) National parks and game reserves

- National parks and game reserves are protected areas set aside for the preservation of Zambia's natural environment and wildlife.
- They include Kafue national park, south and north Luangwa national parks, liuwa national park, lower Zambezi national park, sumbu game reserve and luvushimanda game reserve.

Differences between game management and Game Park are:

- Game management area has people living in as well as people
- Game park is a place reserved only for animals
- A game management has few animals as compared to a game park
- A game management has a small area while a game park has a big area
- In a game management hunting is allowed while in a game park it is not allowed

b) **Historical sites**

- Historical sites include kalambo falls, n'gombe illede and the nachikufu rock paintings.
- Some tourits are also insterested in historical sites related to the colonial era.
- For example, the town of Livingstone is named after the British explorer and missionary, Dr David Livingstone.

c) Scenic beauty

These include:

1. Waterfalls such as the Victoria Falls, chishimba falls and musonda falls.
2. Lakes beaches along Lake Kariba, bangweulu, mweru and Tanganyika.
3. Mountain scenery, such as the muchinga escarpment and the mafinga and Makutu Mountains.

d) Museums

- Museums such as the Livingstone museum the motomoto museum and the railways museums offer tourists an opportunity to find out more about the history and culture of Zambia.

f) Traditional ceremonies

- They include the lozi kuomboka ceremony, which attracts many tourists.
- Other traditional ceremonies of interest to tourists, other traditional ceremonies of interest to tourists include mutomboko, n'cwala, kusefya pa ngw'ena and likumbi lya mize.

Scanned with AnyScanner

g) Sports

- Sports such as angling and golf attract many tourists.
- Adventure tourists especially come to Zambia for bungi jumping off Victoria falls bridge and to do white water rafting on the rapids of the Zambezi and other rivers.
- Water sports such as sailing and watersking are avaliable to tourists on Lake Kariba.

Advantages of tourism

Foreign exchange earnings:

- Tourists spend money on travel, accomodation and entertainment.
- Taxes from also increase government income.

Employment:

- People are employed in hotels and as tourist guides.
- Ohters find jobs as taxi drivers, coach drivers, airline staff, travel agents and sales staff in shops in tourist centers.
- Tourism also creates employment opportunities in other services industries, such as restaurants, hotels, motels and lodges, as well as fashion shops.

Infrastructural development:

- Tourism brings in foreign exchange taxes that help the government to pay for improving, such as roads and bridges.
- The development of tourism areas also helps to improve the general infrastructure, such as roads in many parts of the country.

Cultural exchange:

- Tourism helps to increase international understanding and relationships as tourists interact with people in Zambia.
- It also it helps with preservation and conservation of our cultural heritage of our cultural heritage, as tourists are interested in learning more about out traditions.
- Traditional crafts, such as woodcarving, benefits from also sales to tourists who want souvenirs to remember their trip.

Disadvantages of tourism

- Prostitution: tourist may encourage more women to engage in prostitution.

Scanned with AnyScanner

- Diseases: tourist interacting with prostitutes contributes to the spread of diseases such as aids and other sexually transmitted diseases.
- Trafficking in trophies: some tourists come to Zambia to hunt wild animals. They may also engage in buying trophies of endangered animals that have been pouched and killed illegally .this encourages the pouching and killing of endangered wildlife.
- Environment damage: if building of hotels and lodges for tourist are not planned in an eco-friendly way, they cause serious environment damage in protected natural areas.

Ways of addressing some of the negative impacts of tourism.

- Encouraging eco-tourism.
- Education to create awareness among tourists of the need to protect Zambia's natural and culture heritage.
- Employing more people in the protection and conservation of tourist attraction.

Importance of conserving tourism resources

- Cultural heritage: many of the tourist attractions are part of our cultural heritage which must preserved for future generation to enjoy.
- Recreation: both local and international tourists enjoy relaxing in natural environment that are unspoiled, clean and well cared for.
- Sustainable development: this means that development of tourism attraction must be done in a way that will protect the natural environment so that it can continue to sustain healthy tourism industry for many years to come .

Dangers to wild life

- Many animals are being killed by poachers
- Overstocking.(keeping of many animals on a small piece of land)
- Deforestation which means an necessary cutting down of trees
- Droughts
- Late bush burning which destroys trees or vegetation

Solutions to these dangers

- Stiff punishments must be given to poachers
- Game cropping must be done. This means selective killing of old animals which have become too many

Scanned with AnyScanner

- Afforestation which means planting of trees where the natural vegetation has been cleared
- Early burning must be encouraged

Problems faced by tourism industry

- Bad roads which goes to some tourist attractions especially in the rain season
- Un favorable or bad climate e.g. high temperatures
- Tourism industry is seasonal. It is active in the dry season
- Adoption foreign cultures from western countries like USA and Britain
- Very few tourist infrastructure like lodges
- Floods and droughts

Government efforts to boost or promote tourism

- The GOVT has formed the Zambia National Tourist Board to control tourism in Zambia
- Encourage people to invest in tourism
- Encourage people to conserve or protect tourism
- Employment of game guards to protect wild animals
- Introducing stiff punishments to poachers
- Banning of selling of ivory
- Improvement of community facilities of people living in Game management areas
- Catering of foreign foods

Revision questions

1. State the importance of tourism.
2. What are the challenges facing the tourism industry.
3. Suggest the possible solutions to the problems facing the tourism industry.
4. Give government efforts to boost the tourism industry
5. What is the impact of tourism on the environment?

Scanned with AnyScanner

DEVELOPMENT IN ZAMBIA

MINING IN ZAMBIA

- Mining is the process of extracting minerals such as coal and copper
- Examples of minerals mined in Zambia are copper, zinc and lead, coal and manganese

History of mining in Zambia

- The mining industry in Zambia started in 1899, when an expedition led by George Grey discovered the first copper deposits at Kansanshi
- The first mining activities started at Bwana Mkubwa in Ndola in 1909.

Mining methods

1. Open cast mining method

- It is done where the mineral ores are found near to surface of the earth

Advantages of open pit mining

- It is cheaper because it does not require heavy and sophisticated machinery

Disadvantages

- It poses a danger to the environment. The mining may get flooded
- Humans or people are also displaced when such mines are opened
- Pollutes surface water and underground
- Causes landslides

Nchanga Open Pit Copper Mine in Chingola is the second largest open-pit in the world.

2. Underground mining or shaft mining

- It is done when the minerals are found very deep underground

Disadvantages of underground mining

- It is too expensive because it uses expensive and heavy machines

Examples of underground mines

- Most of the mining towns have shaft mine like Nkana mine in Kitwe, Konkola mine in Chililabombwe and Mufulira mine in Mufulira.

Note: Mufulira Mine in Zambia is the largest underground mine in Zambia.

Scanned with AnyScanner

Importance of mining in Zambia

- It has created employment to most Zambians
- Encourages tourism and investment
- It boosts the economy of Zambia
- It brings foreign exchange to the country. Copper/cobalt export contributes 75% of the export earnings
- It improves the standards of living of people in a country
- It leads to improvement of infrastructure e.g roads, houses, hospitals etc

MINING TOWNS

- Ndola – Bwana mukubwa mine
- Mufulira – Mufulira plant
- Kitwe – Nkana mine
- Luanshya – Baluba mine
- Chambeshi – Chambeshi mine
- Chililabombwe – Konkola mine
- Solwezi – Lumwana mine
- Mansa – Manganese and is not in operation
- Maamba -Maamba coal
- Chilanga –limestone

Trade and Marketing

- Copper is sometimes sold and used locally
- Sometime it is sold to Europe and Japan
- Copper is exported to other countries using TAZARA railway line, Great North road and Zambia Railways

Recent development in mining sector

- The MMD government introduced the structural adjustment programme (SAP) to privatize the mines
- Privatization of mines led to the resuscitation of some closed mines

Results of privatisation of mines

- Many people have lost employment and it has brought suffering on many Zambians

Scanned with AnyScanner

- Vandalism of infrastructure and facilities has reduced the life span of most mines
- Many mines have tuned into white elephants
- Most of the miners have not received their packages

Governments' efforts to boost mining

- Protect the local companies and industries by reducing taxes and support them with loans
- Scrutinizing the investors who are coming in Zambia and making sure that they followed rules
- Passing the environment protection and pollution act which led to the formation of the environmental council of Zambia
- Formation of the environmental council of Zambia controls the environmental pollution

Major minerals mined in Zambia

COPPER

Zambia is the largest producer of copper in Africa and seventh in the World.

- It is used for making electric wires
- It is used for making water pipes
- Used also for making car radiators
- It is used for making bullets ornamental things

COBALT

- It is obtained as a by-product of a number of minerals
- It used to make cutting tools and magnets
- Cobalt has many industrial uses, especially in dykes
- Cobalt produces a bright blue colour that is used in glass and ceramics

COAL

- Coal is used to generate heat and electricity

LEAD AND ZINC

- The mine was found in Kabwe but it has been closed

At first mining was done using open cast mining method and the later it was done using underground mining method.

The mine was closed in 1994 due to depletion of the ores

- Lead is used for making plates of electric storage batteries
- Lead is used as protective shield against radiation

Scanned with AnyScanner

- Lead is used in covering cables in white lead acid for paint, bullets and for roofing materials
- Lead is used as an alloy
- Zinc is soft, white metal which resists fats and is malleable
- Zinc is used in alloys of brass

USES OF MANGANESE

- It is used as an alloy and as a cleaner in extracting minerals

LIMESTONE

- Large deposits are found around Lusaka and in the southern part of Central Province
- It is a white mineral used in manufacture of cement: Limestone and clay are crushed and mixed with water and then burnt in a large oven. A mineral called gypsum is added and the mixture is crushed to fine powder. The powder is cement which is used in the building industry

Precious Stones found in Zambia include: **Emeralds, Amethyst, Aquamarine and Diamond.**

Impact of mining on the environment

- Land degradation. It means that the quality of land declines.
- Displacement of people and animals where mines are opened
- Deforestation due to clearing of land before mining starts and where mine dumps are
- Loss of biodiversity. Some animal and trees species become extinct when large areas are cleared.
- Pollution of soil and groundwater due to high concentration of toxic chemicals from mines.
- Air and noise pollution, heavy equipment used in mining especially in open-pit mining causes noise pollution

Effect of Pollution on health

- Sulphur dioxide in the air around mines can get into the lungs and cause **respiratory** diseases.
- Lead and arsenic pollution causes infertility and miscarriages in pregnant women, skin problems, and decreased immunity.

MANUFACTURING AND FOOD PROCESSING INDUSTRIES

Scanned with AnyScanner

- An industry is any activity that enables man to earn a living.

Types of Industries

- **Primary industries**
  These involve the extraction and production of raw materials from the environment. Examples of these industries are farming, mining, forestry and fishing
- **Secondary industries**
  These are industries that use machinery to change raw materials into new products by adding value to the items made and they are divided into the following industries:
  a) Processing industries: They prepare primary produce before they can be used for example maize into mealie meal.
  b) Manufacturing industries: It changes raw materials into new products e.g. sugar cane into sugar.
- **Service or tertiary industries**
  It is an industry which provides services like education, banks, health, security and transport.

Factors influencing the location of industries

There are a number of factors that affect the location of an industry: **transport, raw material, labour, power, market, government policies**

- An industry needs to be located near cheap **transport.** To get raw material to the factory and to get manufactured goods to the customer
- **Raw materials** are processed close to where they are found in order to cut on transport. Perishable raw material must be processed as quickly as possible
- **Abundant labour** includes both skilled and unskilled labour force and is needed in an industry
- **Power** is needed for most industries to operate properly
- **Government policies** encourage the establishment of industries in all parts of the country in order to ensure equitable
- **Market:** industries need to sell the products that they produce. Nearness to market helps reducing transport costs.
- **Government policies:** Governments may encourage industrial development in some areas and restrict it in others. Multi-facility Economic Zones (**MFEZs**) are special industrial zones. They are one of the government strategies aimed at achieving economic development by attracting domestic and foreign investment.

Types of manufacturing industries

- **Steel making** and processing of other metals(such as the smelting and refining of copper)
- **Textile** industries that manufacture materials and clothes
- **Leather** industries, for example making shoes
- **Furniture making**, and the making of other wood and paper products

Scanned with AnyScanner

- **Brick/building** block making for the building industries
- **Chemical** industries, including making plastic and rubber products.

Types of food processing industries

Food processing is how ingredients are changed into a form of food that can be eaten by humans or animals.

It includes industries such as the following:

- **Canning** of fruit, vegetables, fish and meat
  e.g. Freshpikt in Lusaka produces canned fruits and vegetables
- **Milling** of maize and grain for flour and maize porridge
- **Confectionery** that make sweets and cakes
- **Beverage** industries that make cool drinks
  e.g. Lynx Zambia Ltd in Ndola produces fruit juices, squashes, cordials
- Sugar **refineries** that turn sugar cane into sugar
- Meat and fish **packing** industries for fresh frozen products.
  e.g. Capital fisheries in Lusaka Packages fresh, frozen and dried fish

Manufacturing centres of Zambia

Most of the industries in these are located in these areas, Copper belt and Lusaka due to:

a) Copper belt

- Good network of transport by road or rail
- Cheap and plenty hydroelectric power from Kariba and Kafue gorges
- Cheap and plenty of labour
- Ready market provided by many people who are in copper belt

b) Lusaka

- Good network of transport
- Its centrally located
- Nearer to areas of raw materials
- It has access to hydroelectric power
- Large population improves the marketing of goods and even provides cheap labour

Challenges faced manufacturing and processing industries

Secondary industries in Zambia face a number of challenges:

1. High energy costs especially to electricity whose rates increases frequently

Scanned with AnyScanner

2. Long routes to sea make the transportation of goods expensive
3. Many industries depend on imported raw materials
4. Stiff competition from cheap imported products.
5. Frequent depreciation of the currency.
6. Cost of raw materials: raw materials are expensive.
7. Technology: manufacturing requires more advanced technology to keep up with international competition, adding to production costs.
8. Storage: costs of storage and suitable storage facilities, especially for perishable goods, affect these types of industries.

Scanned with AnyScanner

POWER AND ENERGY

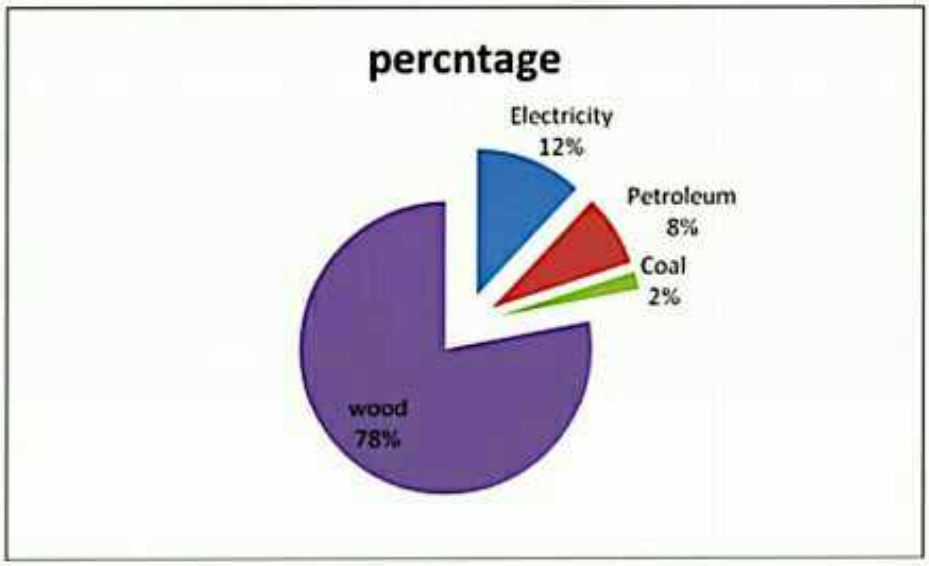
- Energy makes things work.
- We need energy for almost everything we do each day. We need energy for lighting, for moving our vehicles, for cooking and heating, and for running machinery and equipment in the kitchen, office, industries and mines.

Importance of Power and Energy

- It has stimulated both small and heavy industries
- It has stimulated commercial agricultural activities
- It has created employment
- It has stimulated demand for electrical appliances
- ZESCO exports power to neighbouring countries and earns foreign exchange

Sources of Power and Energy

There are a number of different sources of energy as shown below in the pie chart:



Pie Chart showing sources of energy

The majority of people (61%) live in rural areas in Zambia. and their main source of energy is wood. Charcoal and electricity are the main sources in urban areas, while 75% use wood fuel.

All energy sources can be divided into one of two groups.

i. **Non-renewable energy source.**
ii. **Renewable source.**

Non- renewable source of power and energy

Scanned with AnyScanner

- Non-renewable energy comes from source that will run out or cannot be replaced for thousands or even millions of years. This includes FOSSIL FUELS (which are coal, crude oil and natural gas) and uranium.
- Most fossil fuels are burned to create energy and electricity. More electricity is generated from coal than from any other fossil fuel.
- **CRUDE OIL** is a liquid fossil fuel. It is re fined and used in car, aeroplanes and motorbikes.
- **NATURAL GAS** can be piped into homes and for gas ovens and stoves.
- **URANIUM** is a non-renewable resource. It is a heavy metal that occurs in rocks. Nuclear energy is created by splitting uranium atoms. The energy is then used to generate *electricity*.

Coal

- The mined coal is used to generate thermal electricity power at a number of thermal power plants in the country.

Crude oil and natural gas

- Zambia has none of its own natural gas or oil reserve.
- Crude oil or petroleum is imported from the Middle Eastern countries and mainly used in the transport industry in Zambia, the agricultural industry, as well as for the generation of electricity.
- Besides takers, an oil pipeline from Dar es Salaam is used to transport petroleum to Ndola.
- There it is refined by the Zambia National Oil company (ZNOC) into petrol, liquefied petroleum gas (LPG), diesel, aviation fuel (for aeroplanes) and kerosene for the Zambian market . There are plans to import oil from Angola.
- In, Zambia the main companies that market petroleum products are: **Puma, Total, Petroda, Mobile Engen, Mount Meru and Oddys.**

Uranium

- Uranium is used in nuclear power plants to generate electricity.
- Uranium is at this stage it is not being mined in Zambia. It also does not have any nuclear power plants. However, some of our neighbouring countries do use this type of non-renewable energy e.g. South Africa.

Disadvantages of using fossil fuels as energy sources

- Mining crude oil, uranium core damages the environment and also may be dangerous to the health of workers.

Scanned with AnyScanner

- Fossil fuels are non-renewable energy sources. Their supply is limited and they will eventually run out.
- Mining and processing fossil fuels produces harmful waste products, and releases large amounts of pollutants into the air and water system.
- When fossil fuels are burnt, they give off carbon dioxide, a greenhouse gas which is the main cause of global warming.
- They also emit sulphur dioxide, which combines with moisture in the air to form acid rain. Acid rain destroys mountains and buildings. It also affects the soil and the crops that grow in it.
- The mines may scar the landscape, particularly if they are open pit mines. Mine dumps destroy the landscape and may give off poisonous gases.
- Burning coal at thermal power stations produces large amounts of pollution, as well as large amounts of solid waste.
- Nuclear power stations could lead to major nuclear disasters if damaged.

Renewable sources of energy and power.

- Renewable energy comes from natural resources that can be replenished, unlike fossil fuels which take millions of years to form.
- This includes **sunlight, winds, tide, geothermal heat, water** and various forms **biomass.** Biomass can include biological materials that come from living, or recently living organisms, such as wood, paste and alcohol fuels.

Wood fuel

- Most rural communities in Zambia depend on wood fuel for cooking and heating. Household energy supply in urban areas is mainly based on charcoal.
- Most of the charcoal produced in Zambia is for domestic energy use, especially for cooking. The high demand for wood fuel has resulted in deforestation of many Zambia's forest ecosystems.
- Charcoal is commonly used in urban areas than wood, as it is easier to transport and produces less smoke and sulphur. Most charcoal produced in rural regions and used in urban areas.

Hydroelectricity

- Hydroelectricity is generated by water. Zambia is blessed with plenty of water recourses, which make up 40% of all the fresh water in the southern Africa region.
- Hydroelectric power (HEP) is the second most important energy source in Zambia (after wood fuel). About 10% of the natural energy supply comes from hydroelectricity.
- More than 99% of Zambia's electricity comes from hydroelectricity.
- Zambia exports power to Zimbabwe, DRC, South Africa Botswana and Namibia and there are plans to export to Tanzania, Mozambique, and Malawi.

Scanned with AnyScanner

Production of hydro electricity

- Dam or reservoir stores water
- Water flows in steep slope pen stock
- Fast running water turns turbines
- The turbine turns the generation
- The generator produces electricity which goes in a transformer
- Electricity produced reaches homes

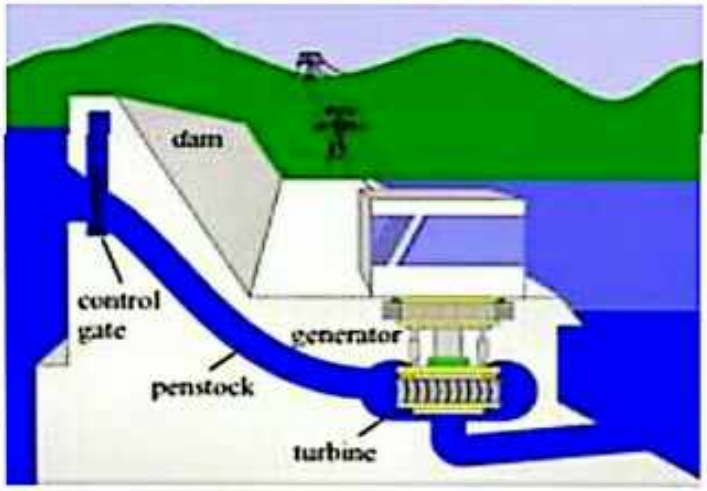


Diagram: H.E.P Production

Advantages of hydro electricity

- It is a renewable resource
- It is clean and does not cause pollution
- It is easily transported through cables
- It has a broad range of uses in modern households and agriculture
- It is cheaper as compared to thermal
- Ease to use, it is a matter of a flick

Disadvantages of hydro electricity

- High cost of building a power station
- It is affected by drought
- It cannot be stirred like petroleum
- Leads to re allocation of people when constructing

There are number of hydroelectric power stations in the country were hydroelectricity is generated. This includes: Kariba north bank power station, Kafue gorge power station, Victoria Falls power station, Lunzua in Mbala, Lusiwasi in Serenje, Chishimba in Kasams, Musonda in Mansa power station. And Shuangandu in Chinsali power station

Scanned with AnyScanner

Government's effort to increase HEP production

- The itezhi-tezhi hydro power plant project is expected to be completed in February 2015 and the Kafue gorge lower hydro project will be completed in 2017.
- Another new project is the construction of Kabompo gouge project. These new developments will ensure a more constant power supply and make Zambia as regional supply of electricity.

Solar power

- Solar power is a cheap and clean source of renewable energy.
- Solar energy comes from sunlight. Humans have used the sun for thousands of years for heating, removing salt from sea water, and cooking food.
- Nowadays the sun can be used to create electricity. This can be done in two ways:
  - **I.** Directly by using photovoltaic (PV). PV converts light renege into electricity by photoelectric effect. PV cells can be used to power portable devices such as calculators. Large number of PV cells are put together to create solar panels.
  - **II.** Indirectly, by using concentrated solar power (CSO). Concentrated solar power systems use lenses or mirrors and tracking systems to focus a large area of sunlight into small beams.
- Zambia is a very sunny country so solar power has a great potential. Currently, however, solar power is rarely used in Zambia.
- A number of companies have entered the Zambian market to supply and install solar operated equipment's. These include **Muhanya** solar limited, **Suntech, Davis** and **Shirtliff** and **sun beam**. Most of them are based in Lusaka.

Wind

- Farmers use wind power to pump water from underground into farm bams.
- Wind mills are the simplest form of wind energy: the wind turns the blade of the wind mill which then drives a mechanical pump. This pump pumps water from underground boreholes
- Wind can be used to generate electricity. Wind turbines are like giant windmills. They convert wind energy to electricity for distribution. The wind makes the rotors rotate, which drives generators produce electrical energy.
- This electricity can be transmitted via a power grid. Using wind to generate Power is not widely used in Zambia. Some farms use wind power to pump water, but there are no wind turbines is Zambia.

Geothermal power.

- Geothermal power uses energy stored within the earth.

Scanned with AnyScanner

- Deep within the earth temperatures may reach over 5000 degrees salacious. This heat is called geothermal energy.
- Geothermal power plants use heat from deep inside the earth to generate steam to make electricity.
- They are normally built in areas that have a lot of hot springs, geysers, or volcanic activities, because these are places were the earth is practically hot just below the surface.
- The steam spins the turbine, which is connected to a generator to produce electricity. Then the steam cools off in a cooling tower, condenses back to water and pumped back into the earth for the process to start again.

Biogas.

- Biogas is a fuel produced by fermentation of organic matters.
- Biogas is any fuel that comes from decay of organic matters, such as food peelings or manure. Basically, it means rotting plants produce gas, which is then collected.
- Biogas is composed mainly of methane, with some carbon dioxide and other trace gases
- Biogas can be produced by processing waste from livestock (such as dang and uneaten food), food production (such as fruits and vegetable wastes) and effluents from industries as well as municipal waste water treatment plants.
- In Zambia, this source of power production has not yet seen much production.

Companies involved the development of biofuel

1. The biofuels association of Zambia,
2. Copper belt energy cooperation (CEC)
3. Thomro investments limited
4. Black power investments set up a bio fuel refinery plant in Zambia in 2011.

Scanned with AnyScanner

POPULATION

- Population can also be defined as the number of people living in a particular given area at a given time

Important concepts in the study of human population

Census

- It is the official counting of ALL people in a country
- This is normally done by the government every after 10 years because it is very expensive since it covers the whole country
- The census enables us to know the number of people living in an area. It gives us information about the age, sex (male or female), race/tribe, nationality, birthplace, education, occupation, marital status, number of children, and the number of dependants in a given country.

Importance of the census

It gives information to the local and central government so that:

- For good planning in order to provide facilities like hospitals, houses and schools to citizens
- They can provide resources e.g. agriculture materials like fertilizer and seeds
- They can know whether the population is increasing or reducing because such knowledge is needed for future planning
- They can know unemployed so as to create jobs

Birth rate

- It is the number of babies born in every 1000 people of a population. Example; if 30 births occur, this means that 30/1000* 100 = 3%, and is considered to be high.
- Fertility rate refers to the reproductive performance of the population

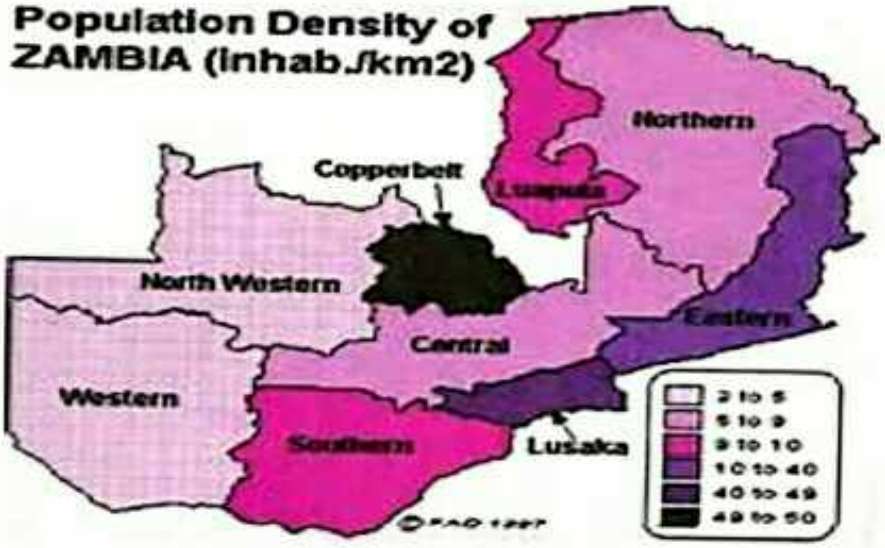
Population density and Population distribution

- It is the number of people living in a square kilometer area. It is calculated by dividing the land area by the number of people lining in the area.

e.g. Population density = $\frac{\text{Number of People in an area}}{\text{Kilometers squared}}$

Lusaka is the most densely populated area in Zambia followed by Copperbelt

Scanned with AnyScanner



Map showing: the population density of Zambia

Mortality rate and life expectancy

- **Mortality Rate** is the number of people who die per 1000 people in one year.
- **Infant mortality rate** (IMR) is the number of deaths of infants under one year old per 1000 live births
- **Adult mortality** rate is the probability of a 15 year-old dying before reaching age 60.
- **Life expectancy or life span:** This is the average number of years a person is expected to live from birth to death.
- **Life expectancy** is affected by several factors such as the prevailing mortality trends and the standard of living of the people.

Population Growth Rate (PGR)

- It is the rate or percentage at which the population increases
  e.g. PGR = Birth Rate – Death Rate * 100

Factor leading to rapid population growth in Zambia:

- Early marriages.
- Lack of family planning.
- High fertility rate
- Poverty
- Improved nutrition
- Inadequate education

Population migration in Zambia

Scanned with AnyScanner

Migration is the movement of people from one is to another. This could be within the country (internal) or between countries (international).

- Migration into a country is called **Immigration**
- Migration out of a country is called **emigration**
- **Internal migration** is the movement from one area to another within a country's boarder.

Types of internal migration

There are four types of internal migration

- Rural-urban
- Rural-rural
- Urban-rural
- Urban-urban

Rural-urban migration: this is the movement of people from rural areas to urban areas. The factors that cause this movement fall into two groups

i. **Push factors** force people out of rural areas.
ii. **Pull factors** attract people to urban areas.

PUSH FACTORS

- Lack of rainfall
- Witchcraft
- Hunger, poverty, drought,
- Lack of good schools and health facilities etc.

PULL FACTORS

- Good medical facilities,
- Good transport,
- Good schools
- Urban blight etc.

RESULTS OF URBANISATION

- Overcrowding in urban areas
- Poor substandard of housing
- Inadequate municipal services that characterize life for many arrivals to urban centers.

Rural-rural migration: this is the movement from one rural area to another.

Reason:

Scanned with AnyScanner

- maybe due floods or droughts or better opportunities

Urban-rural migration: this is the movement from urban area to rural

Reasons:

- older Zambian may retire to their village
- It may be safer to live in rural areas where there is less crime
- City life may be stressful and people may want a slower, less stressful life

Urban-urban migration: movement from urban to another urban area

Reasons:

- This may due to the transfer of the head of the household or resettlement

Impact of HIV and AIDS on the population

Zambia has one of the world's worst HIV and AIDS epidemics. About 14% of Zambian adults have HIV. It is estimates that each day there are 225 new adults' infections and 25 new child infections

The number of People with HIV is higher in urban areas (20%) that in rural areas (10%).

Effects of HIV and AIDS on Zambians

1. HIV and AIDS makes life expectancy to drop or go down
2. Cause more deaths or population reduction
3. HIV and AIDS weakens the economy
4. Reduces productive of workers
5. Food security is affected

Factors affecting the population distribution

- **Climate**: Most people have settled in areas the climate is favoured for human habitation. Such areas receive adequate rainfall and temperatures are moderate. Areas where people are able to grow a variety of crops.
- **Relief**: very few people live on hilly areas and rift valleys because these areas are mostly composed of stone soils which are not suitable for farming.
- **Availability of Water**: people tend to settled where the water is readily available, for example near dambos, rivers, valleys, mashes and lake shore areas.
- Soils: fertile soils attract people due to farming opportunities.
- **Availability of resources**: Most people settle in areas where there is enough resources to exploit. E.g mine areas
- Most people tend to settle in areas where there are good **health facilities**.

Scanned with AnyScanner

- Most people tend to settled in areas where there are good **education facilities.**
- **Employment:** employment opportunities are an attracting factor that leads to population increase in a given area.
- **Transport and communications:** Most people tend to settle in areas where there is good transport and communications. This has led to an increase in the population along highways (roads leading to cities) and developed areas.

Measures to address population increase

- Education of communities on the importance of family planning.
- Provision of health services to the people in order to reduce mortality rates and improve the health status of the people.
- Promotion of sensitization of the public on the population related issues such as inter relation between population, environment and economic resources,
- Provision of adequate social services.
- Improving agricultural production to promote food security.
- Building more schools, to carter for the population increase.

Scanned with AnyScanner