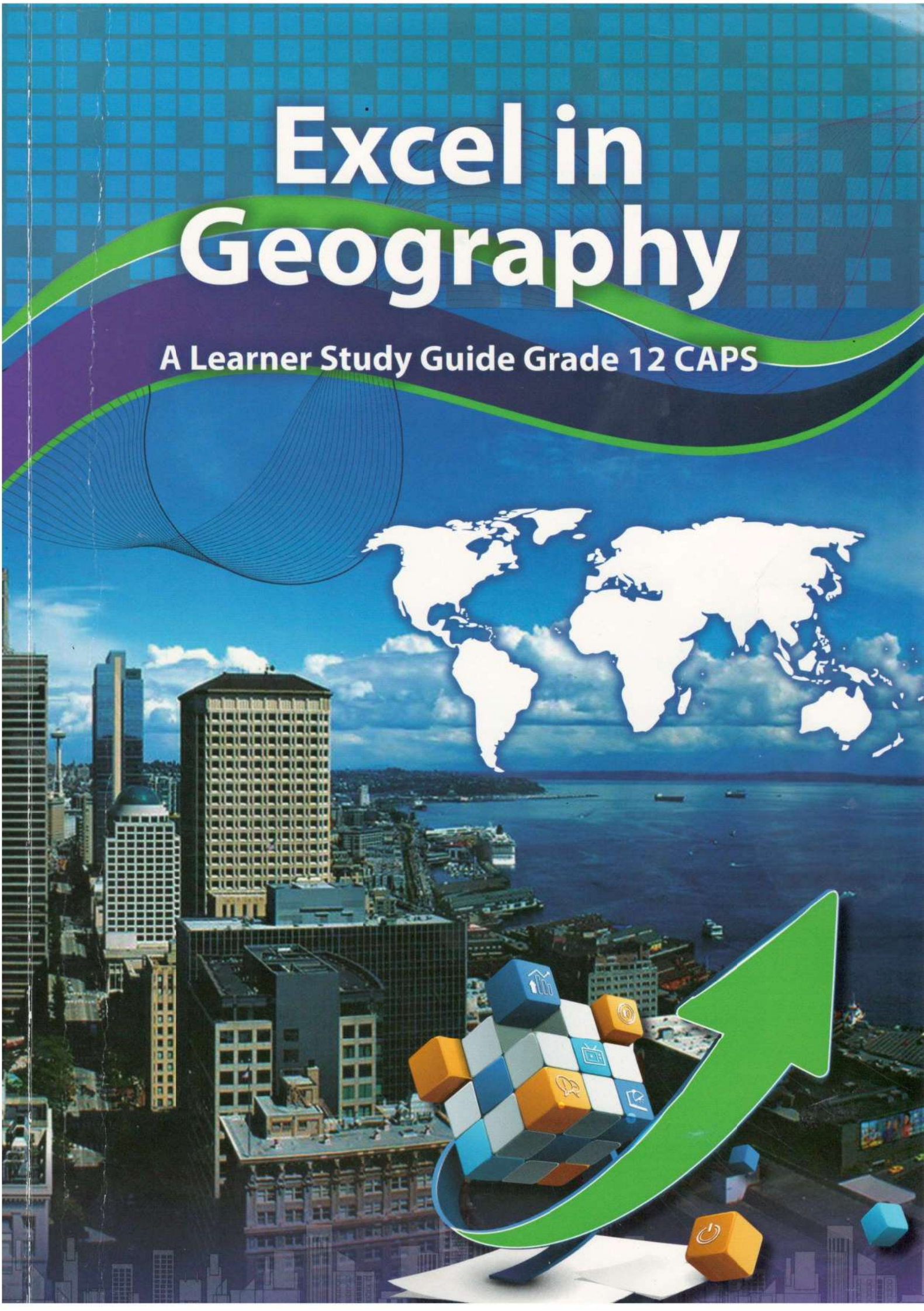
Excel in Geography

A Learner Study Guide Grade 12 CAPS



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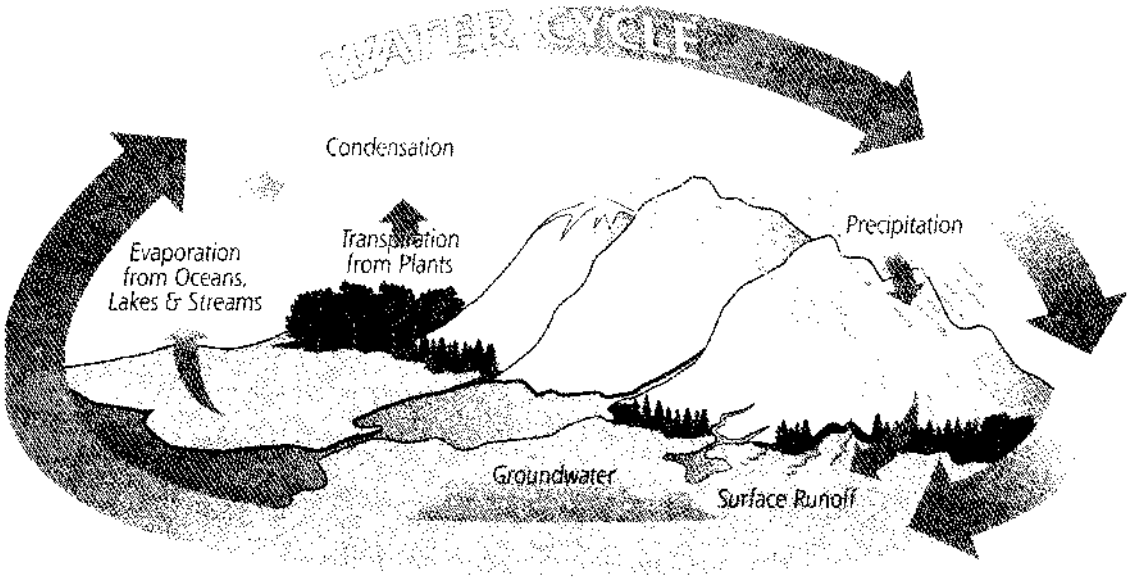
Learner Guide: G12

EXCEL in Geography



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This guide contains everything that you need to be successful in your geography exams.

- It has been carefully written and presented to cover the CAPS syllabus in geography.
- In depth activities that will prepare you for your final exams are included.
- Every topic is clearly organised and explained in simple language.
- The most important facts and ideas are highlighted in the form of a table at the beginning of each module.

An important phrase in this guide is

Sustainable Development.

Sustainable development meets the needs of today's population without harming the ability of future generations to meet their own needs.

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New format for Examination papers

PAPER 1

1. The mark allocation for this paper is 150 and it is a 3-hour paper.
2. The question paper consists of two sections, namely SECTION A and SECTION B:
   SECTION A: Climate and Weather and Geomorphology (Theory)
   SECTION B: Geographical Skills, Techniques, Application and Interpretation and GIS (Mapwork)
3. SECTION A consists of **TWO** questions of 60 marks each and SECTION B consists of **ONE** question of 30 marks. [Total **150 Marks**]
4. All **THREE** questions are compulsory.

PAPER 2

1. The mark allocation for this paper is 150, 3-hour paper.
2. The question paper consists of two sections, namely SECTION A and SECTION B:
   SECTION A: Settlement and Economic Geography of South Africa (Theory)
   SECTION B: Geographical Skills, Techniques, Application and Interpretation and GIS (Mapwork).
3. SECTION A consists of **TWO** questions of 60 marks each and SECTION B consists of **ONE** question of 30 marks. [Total **150 Marks**]
4. All **THREE** questions are compulsory.

Note: Module 4 has rotating topics (as presented below). Please confirm with your educator the primary economic activity topic, core industrial area / IDZ and SDI for the current year of your study.

AGRICULTURAL	Mining	Core industrial area
Cattle/Beef	Coal	PWV (Gauteng) South Western Cape
Sugar Cane	Gold	PWV (Gauteng) Durban-Pinetown (eThekwini)
Maize	Platinum	PWV (Gauteng) Port Elizabeth-Uitenhage (Nelson Mandela Metropole)
IDZ / SEZ		**SDI**
Saldanha Bay		West Coast
Dube Tradeport		Maputo Corridor
Coega		Wild coast

NB – The PWV Core industrial area is compulsor

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MODULE 1

CLIMATE AND WEATHER

This module includes the following topics:

- Mid-latitude cyclones
- Tropical cyclones
- Subtropical anticyclones
- Valley climates
- Urban climates
- Interpretation of synoptic weather maps

KEY CONCEPTS

Anticyclones	High pressure systems/cells.
Convergence	Flow of air into a low pressure system.
Cyclones	Low pressure systems/cells. Also called depressions.
Dissipation	Decay of a low pressure system or cyclone - when it ceases to exist.
Divergence	Flow of air out of a high pressure system.
Heat island	An area of higher temperature surrounded by lower temperatures in a city.
Mid-latitude Cyclones	Frontal low pressure system that forms in the westerly wind belt between 30°- 60° N/S.
Moisture Front	Zone along which warm, moist air meets with cold, dry air and is uplifted. Line thunderstorms occur along the moisture front.
Polar Front	The boundary between the warm sub-tropical air and cold polar air around the 60° latitude
Cyclone families	Refers to a group of mid-latitude cyclones that pass over an area.
Synoptic Weather Map	Summary of weather conditions of a place/region for one day.
Tropical cyclones	Intensely developed low pressure systems associated with severe storms.
Berg winds	Hot, dry and gusty wind that is local to South Africa.
Anabatic Winds	Winds that are forced upslope in a valley by descending cold air (day).
Aspect	Angle at which the sun's rays strikes a slope.
Katabatic Winds	Downslope flow of winds in a valley due to the force of gravity at night.
Radiation Fog	Low level condensation in valley due to temperature dropping below DPT.
Temperature Inversion	Increase in temperature with altitude (warm air rises to lie above cold air).
Micro climate (local)	Study of climate in a small area e.g. a valley
Dust dome	Pollutants, dust, soot and smoke that subside over the city at night.

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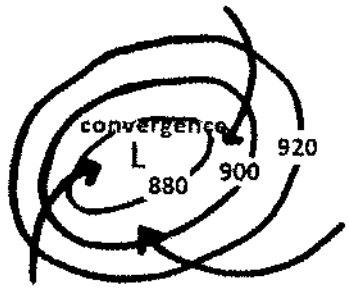
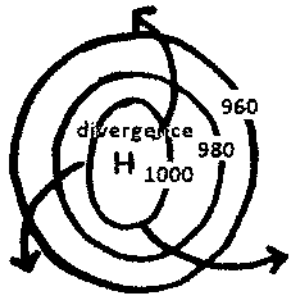
Origin of low and high pressure cells

They originate due to differences in the way that land and water masses heat or cool at different latitudes. This then causes high and low pressure belts to break up into pressure cells.

Pressure cells are generally represented by circular isobars on synoptic weather maps.

Low pressure cell (Cyclone)	High pressure cell (Anticyclone)
	
• **Associated with warm, rising air** (summer) • Convergence[1] occurs in a low pressure cell. • Lowest pressure is found in the centre. • Air moves in a **clockwise direction in the southern hemisphere** and in an anticlockwise direction in the northern hemisphere. • Associated with **unstable weather** conditions (rain, wind).	• **Associated with cold, subsiding air** (winter) • Divergence[2] occurs in a high pressure cell. • Highest pressure is found in the centre. • Direction of air movement is **anticlockwise in the southern hemisphere** and clockwise in the northern hemisphere. • Associated with calm, clear and **stable weather** conditions.

- **Low pressure cells** can be identified by the letter **L** in the centre **or** the lowest pressure reading in the centre.

- **High pressure cells** can be identified by the letter **H** in the centre **or** the highest pressure reading is found in the centre.

[1] Convergence: movement of air into a low pressure cell
[2] Divergence: movement of air away from a high pressure cell

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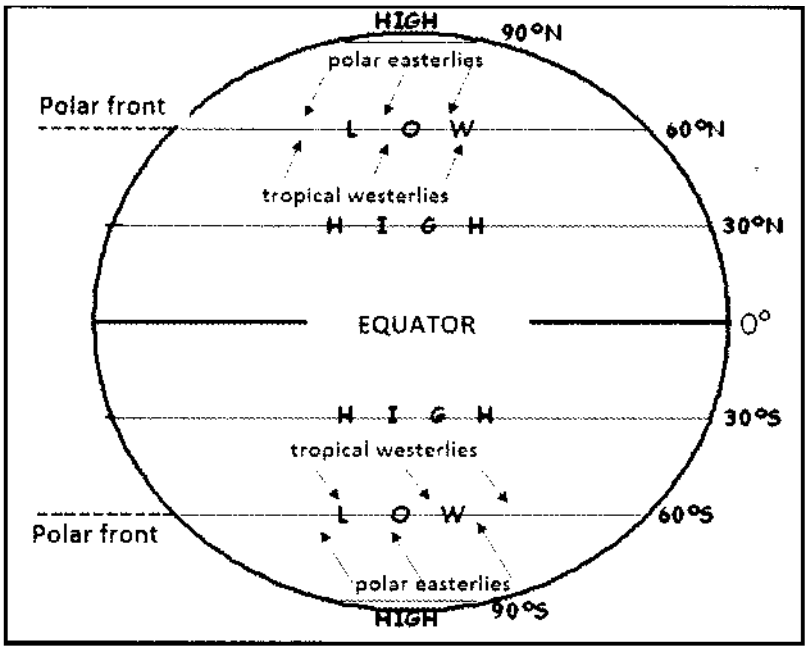
MID-LATITUDE CYCLONES

Origin

They originate when **warm tropical westerly winds** (30°N/S) meet the **cold polar easterly winds** (90° N/S) at the **polar front**.

The **polar front** occurs at the 60° N/S latitude.



Alternate names

Temperate cyclones, frontal depressions and extra-tropical cyclones.

General Characteristics

- They **occur between the 30° to 60° N/S latitudes**.
- **Move from west to east** or eastwards
- **Steered by the westerlies** in the westerly wind belt.
- Temperate cyclones consist of fronts – **(warm and cold fronts)**.
- **Size**: They are very large cyclones- with a diameter of about 1 000 km.
- Occur throughout the year but **affects South Africa mainly in winter**.
- It lasts between 4 to 14 days.

Conditions necessary for Formation

1. **Warm** sub-tropical air (from 30° N/S) meets with **cold** polar air (from 90° N/S) at the Polar Front (60° N/S).
2. Both air masses move parallel to each other in **opposite directions**.

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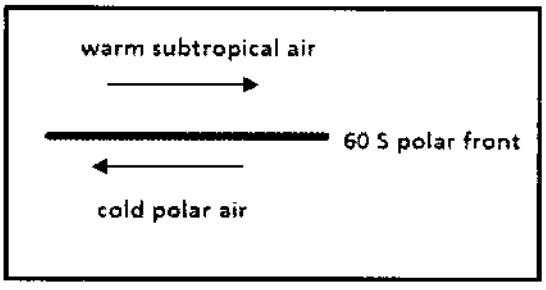
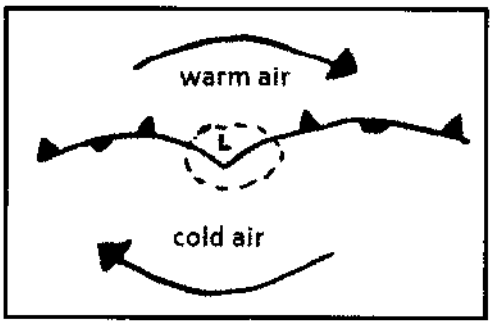
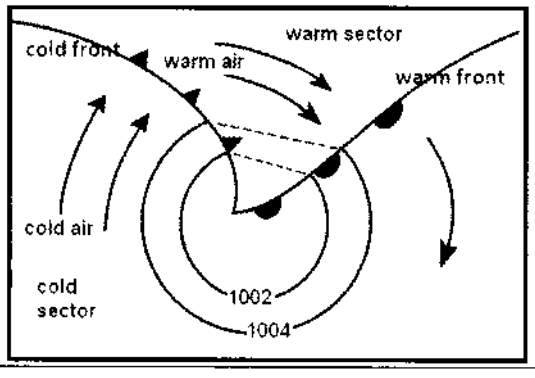
3. **Frictional drag** between the air masses causes them to **interact** with each other. This frictional drag occurs as a result of:

    a. differences in the speed at which both air masses move
    b. an uneven surface over which they move
    c. **temperature differences between land and sea surface.**

Stages in the Formation of Mid-Latitude Cyclones

Cyclogenesis refers to the various stages of development of a cyclone. F**our stages** occur.

1. Initial Stage  	• Warm tropical air from 30° S and cold polar air from 90° S converge at polar front (60°S). Coriolis force deflects both air masses in the southern hemisphere towards the **left** causing them to move parallel to each other in opposite directions. **NB.** The polar front is also referred to as the **stationary front.**
2. Wave Formation  	• The wave stage occurs when frictional drag takes place between the two air masses. • A **wedge of warm air begins to be uplifted by the cold air.** • Fronts begin to form as air converges in a clockwise direction in the Southern hemisphere towards the low pressure centre. **What is a cold front?** It is the leading edge(front) of a moving body of cold air. **What is a warm front?** It is the leading edge of a mass of moving warm air.
3. Mature Stage  	• The wave deepens or intensifies and isobars at the fronts become disturbed and point away from the low pressure. • The **cold and warm fronts** and sectors are fully developed in a **well formed V shape.** • Cooling, condensation, cloud formation and rain are associated with the rising air. • The cold front is associated with towering cumulonimbus clouds and the warm front with a broad band of stratus clouds.

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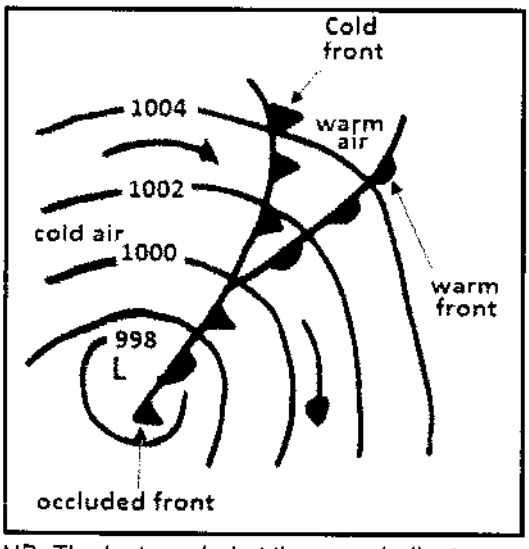
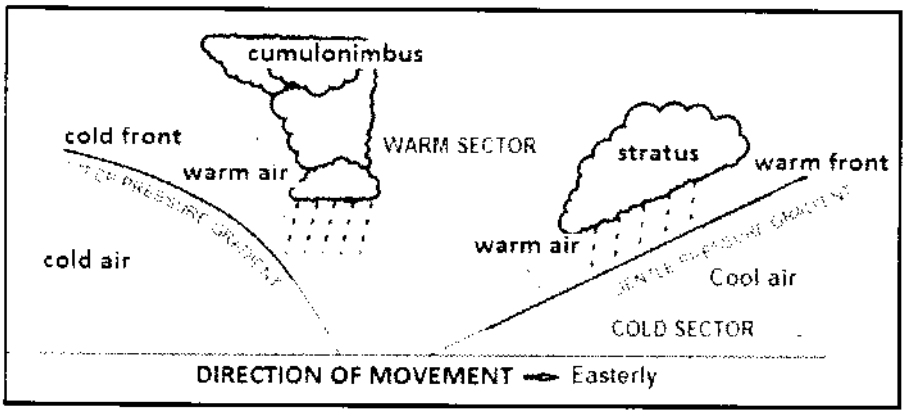
4. Occlusion Stage



NB: The last symbol at the apex indicates a cold/warm front occlusion

- This stage is reached when the **cold front catches up with the warm front** at the apex. It occurs because the cold air (heavy, dense) moves faster than the warm air.
- **Occlusion** starts at the **apex** because it is the **shortest distance between the two fronts**. An occlusion can either be a warm or a cold front occlusion.
- A **cold front occlusion** takes place when the coldest air is found **behind** the cold front, and this causes the warm air to be uplifted along the cold front. The cold front undercuts the warm front.
- A **warm front occlusion** takes place when the coldest air is found **ahead** of the warm front and this causes the cold air to be uplifted along the warm front.
- When all the warm air has been uplifted the cyclone is in the dissipating or degenerating stage

Cross section through a mid-latitude cyclone



Cumulonimbus clouds form at the cold front because of a steep gradient which results in the intense uplift of air (updrafts). The cold air is heavy and sinks, thus forcing the warm air to rise.

Weather associated with the passage of a mid-latitude cyclone

As each sector of the mid-latitude cyclone moves over an area, there is a change in weather.

In **winter** the mid-latitude cyclone migrates northwards (with the apparent movement of the sun) thus having a greater impact over the land. In **summer** however, they migrate southwards and have very little or no impact on the weather over the land.

The **warm front** generally has little effect on SA because it moves too far south of the country. When the **South Atlantic High ridges** in behind the cold front, more cold air is brought in and this results in very heavy showers and snow.

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Note:

- A change in wind direction in mid-latitude cyclones to the left (anticlockwise in SH) is called **backing** and a change to the right (clockwise in the NH) is called **veering**.
- When the cold front passes an area the **pressure drops** because the air to the rear (back) of the front is colder than the front.

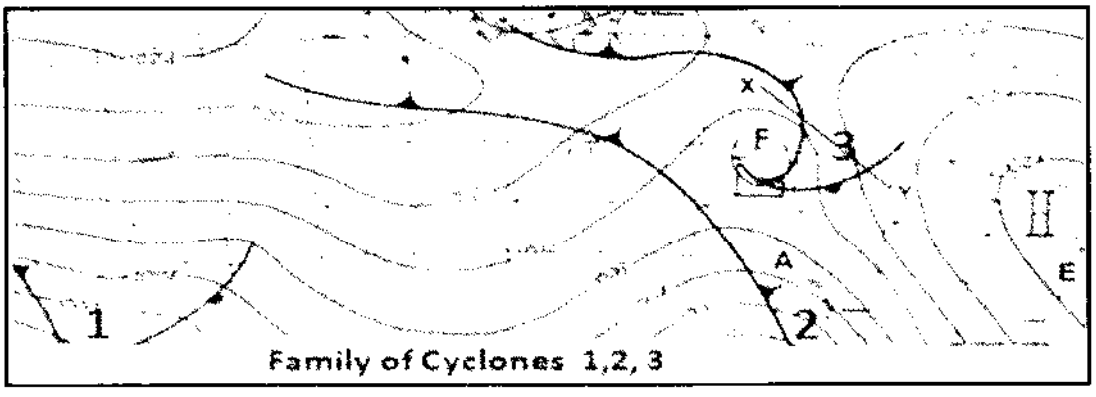
Element of weather	Cold front approaches	Warm front approaches	Occluded front
Temperature	Drops rapidly	Temperature rises	Temperature drops in a cold front occlusion and rises in a warm front occlusion.
Winds	Strong ,gusty and backs	Wind increases, but not as strong as cold front	
Air pressure	Steep rise in pressure	Pressure drops rapidly	The weather in a cold front occlusion is similar to the cold front.
Humidity	Decrease in humidity	Humidity increases	The weather in a warm front occlusion is similar to the warm front.
Precipitation	Thunderstorms and hail are common	Soft rains occur	

How does an occlusion occur?

- When the leading edge of the cold front catches up with the warm front at the apex, or when
- Cold air undercuts the warm air and it is displaced and uplifted.

Cyclone Families

Mid-latitude cyclones do not occur in isolation. They form in groups in the west wind belt and move eastwards. Some times as many as four or five pass through a certain area in quick succession and are visible on a synoptic weather map. These are called '**cyclone families**'.



Family of Cyclones 1,2, 3

Impact of Mid-latitude cyclones

Socio-economic

- The cold front brings **winter rainfall** to the South Western Cape and this is ideal for **vineyards and deciduous fruit** cultivation. Allows for planting of winter crops.
- Sometimes the heavy downpours associated with the approaching cold fronts cause serious **floods that damage** property and crops.

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- When the cold front approaches it may result in the formation of **snow** on the Cape Fold Mountains. Crops are damaged and livestock killed. However, snowfalls over the mountains **attract tourists** thus boosting the economy.
- During frontal storms, strong winds and high seas occur posing a **hazard to fishermen** in the South Western Cape. Fishing vessels cannot go out and this results in a shortage.
- Soil erosion results from heavy rains and damages the environment.
- **Insurance claims** increase and has a negative impact on the economy.
- **Allows for dam** levels to increase.

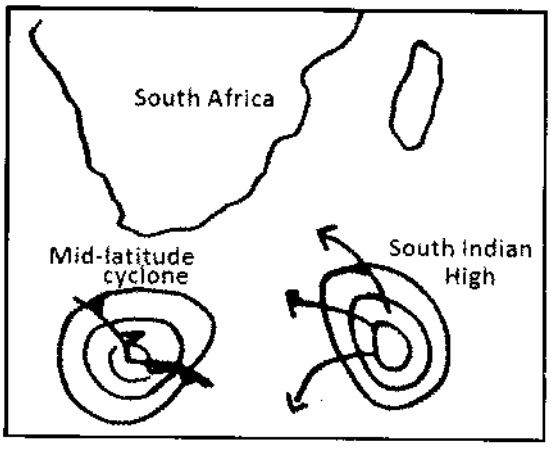
Environmental

- Melting snow is a source of water for dams and rivers
- Erosion from heavy thunderstorms
- Replenishes underground water

Precautionary and management strategies

- Construction of houses and infra-structure should be avoided **in low-lying areas** to prevent the threat of floods.
- An **efficient drainage system** in urban areas will reduce flooding risks.
- **Livestock,** e.g. sheep, should be placed in a kraal, shed or any other enclosed area to prevent losses during severe snowfalls.
- Farmers should have **sufficient grain and fodder** to minimise/prevent livestock loss.
- It is important to keep **updated on weather conditions** in winter before planning hikes and other outdoor activities
- Do not venture out into the open sea during frontal weather. **Secure fishing vessels** to the harbours and keep track of the weather via TV or radio before attempting to go out.
- As **visibility is very poor**, minimise driving and remain indoors until weather clears (cold front passes).
- Danger from **rock falls** is also increased at this time resulting in loss of life, injury and damage to property.
- **Stock up timorously on essentials** (batteries, food, fuel, medication) as electricity blackouts, loss of communication channels and shorter trading hours is common during this time.

Effect of the South Indian High on the passage of the mid-latitude cyclone



The general direction of movement of the mid-latitude cyclone is **west to east or easterly**. However, sometimes the South Indian High may be in the path of an approaching mid-latitude cyclone.

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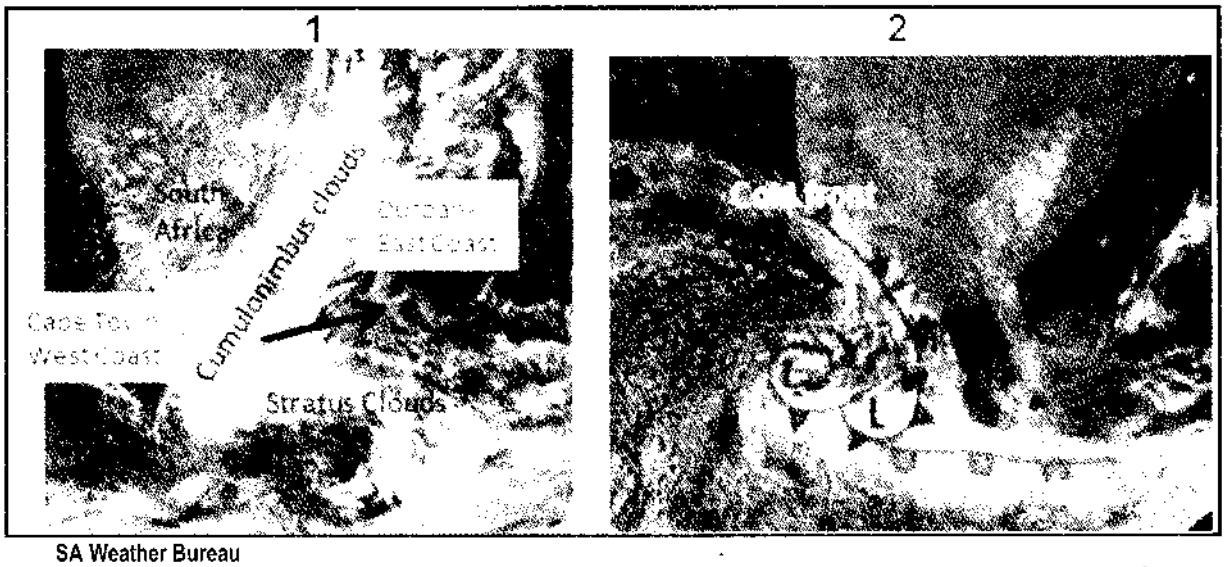
This causes the cyclone to move further south, and later towards the east where it dissipates over the Indian Ocean. In this instance the South Indian High is known as a **blocking high**.

Why the cold front has a steep gradient/slope? It forms because fast moving, dense cold front runs into a warm air mass (friction), the warm, moist air is then pushed upwards quickly to form a steep slope. Forms cumulonimbus clouds.

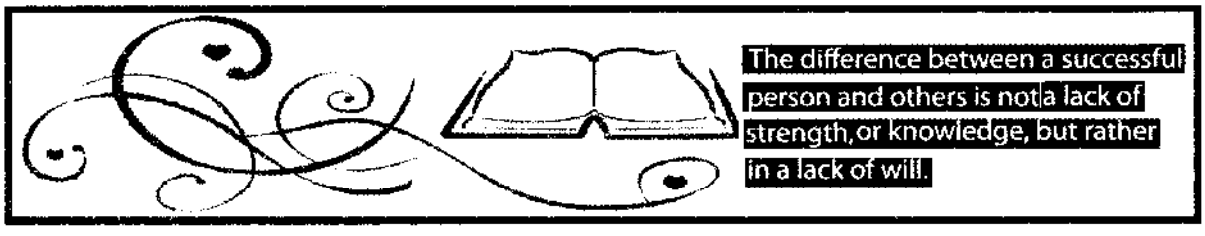
Why do warm fronts have a gentle gradient/slope? Warm fronts have a gentler **slope** and generally move more slowly than **cold fronts**, so the rising motion along warm **fronts** is much more gradual. This slow process results in a gentle gradient and the formation of a thin band of stratus clouds.

Satellite image of mid latitude cyclone over South Africa

Can be identified by clouds that are roughly V-shaped which indicates the presence of the cold and warm front



SA Weather Bureau



Activity 1.1

State whether the following statements match a high or low pressure cell:

1. Pressure cell that gives rise to unstable weather conditions.
2. Air movement is anticlockwise in the southern hemisphere.
3. Associated with cold, subsiding air.
4. Air converges into this pressure cell.
5. Associated with summer conditions.
6. The lowest pressure is found in the centre of the cell.

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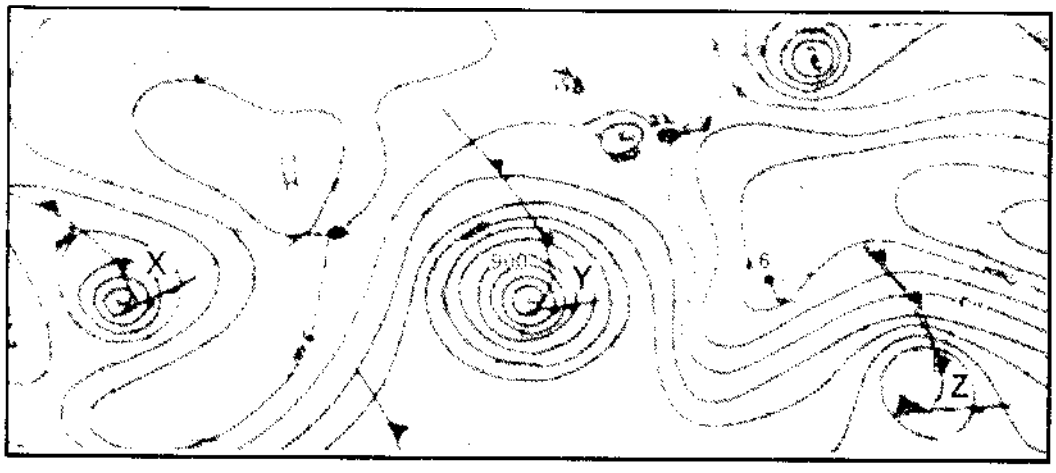
7. This pressure cell is dominant over the land in summer.
8. Air movement is anticlockwise in the northern hemisphere.
9. Also known as a cyclone.
10. This cell is associated with air divergence.

Activity 1.2

Stages in the development of mid-latitude cyclones



1. What is the term used to describe cyclones that follow one another?
2. What evidence suggests that **X** is the more recently developed cyclone as compared to **Y** and **Z**?
3. What evidence suggests that **Y** is in the mature stage?
4. Name the stage that cyclone **Z** is in?
5. When is this stage reached (answer to Q 4)?
6. Why do mid-latitude cyclones move in an easterly direction?
7. Provide evidence why South Africa is unlikely to be affected by the cyclones in the season represented.

Activity 1.3

Make reference to the simplified synoptic chart.

1. Name the fronts labelled **C** and **B**.
2. Differentiate between the formation of fronts **C** and **B**.
3. Differentiate between the impact of **C** and **B** on the weather of SA.
4. What evidence on the diagram indicates that **L** is a rapidly deepening low pressure?
5. Describe the predicted change in temperature and pressure that Cape Town will experience when front **C** passes over.
6. Account for the type of cloud that is found at **C**.
7. Why have beach goers been warned to stay clear of the beach?
8. How can the residents of the Cape area reduce the impact of the cold front?
9. Draw a fully labelled cross section between points D and A.

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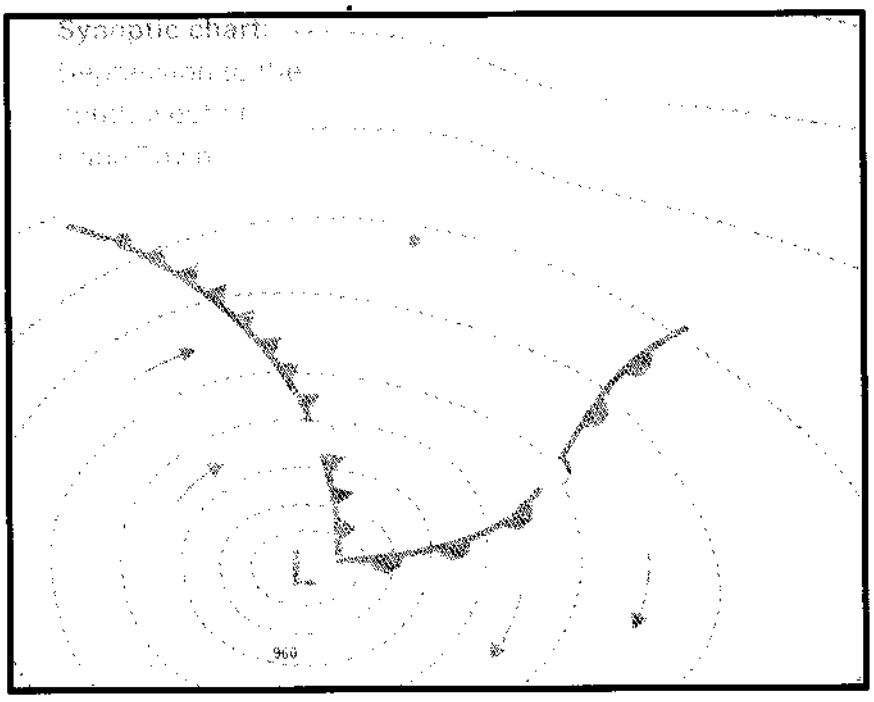
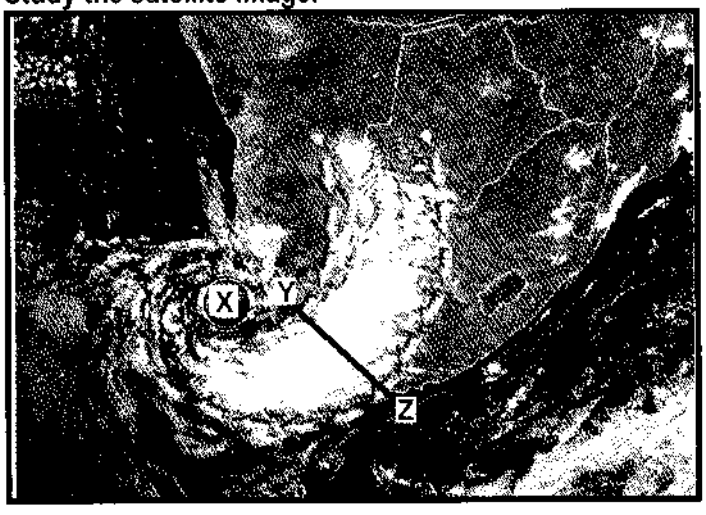


Activity 1.4

Study the satellite image.



1. Name the weather system shown in the satellite image.
2. Give evidence from the satellite image to support your answer to QUESTION 1.
3. Account for the direction in which this cyclone moves.
4. Why does it have a greater impact on South Africa in winter only?
5. Sketch a labelled cross-section of the front **C**.
6. Explain how this cyclone has a positive impact on the economy of Cape Town.
7. Why does the cold front have a steeper pressure gradient than the warm front?
8. Account for the formation of cumulonimbus clouds along front **C**.
9. Why do these cyclones start dissipating at the apex?

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TROPICAL CYCLONES

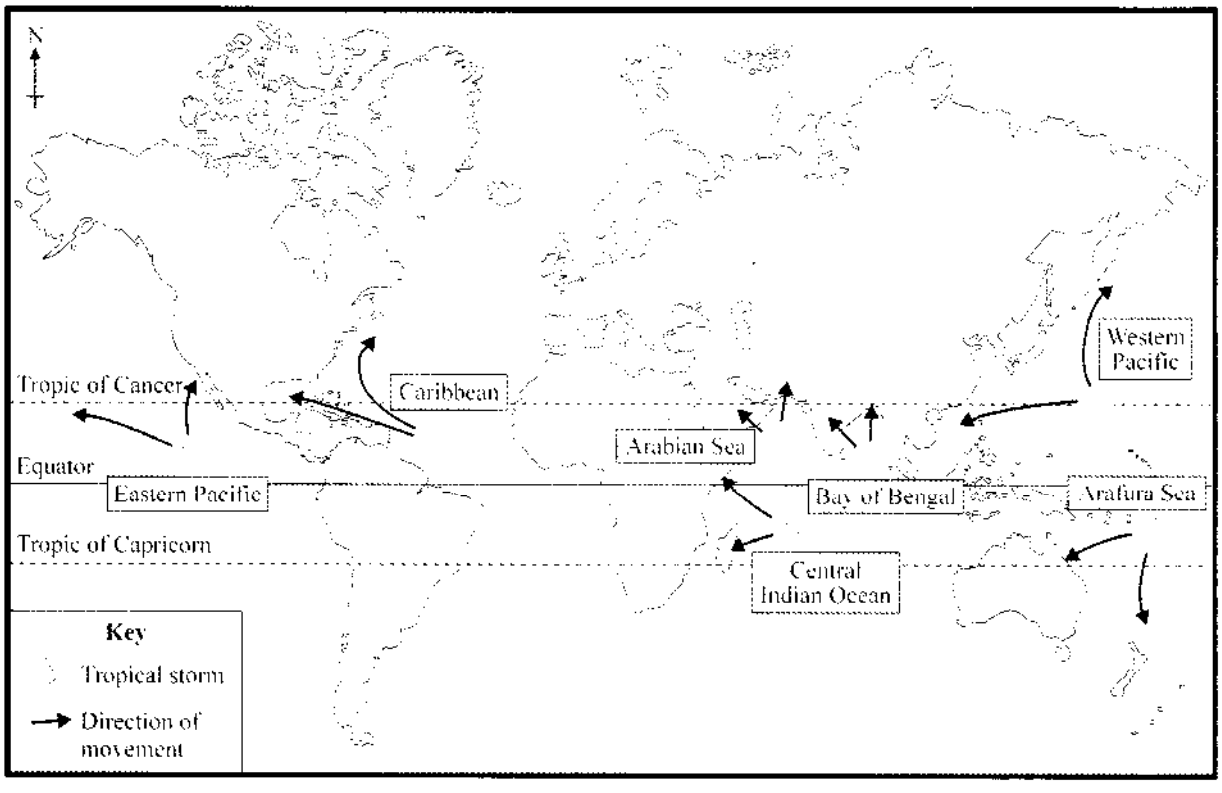
They are small, **intensely developed low pressure systems** associated with severe storms and heavy winds

General Characteristics

- Represented by circular isobars enclosing an intense low pressure.
- They originate over **tropical (warm) oceans** between 5° N/S to approximately 25° N/S of the equator.
- Ocean temperatures must be 27° and over to develop the intense **low pressure**.
- They develop in the east wind belt region (called the easterlies).
- They **move from east to west and are steered by the easterlies.**
- They are associated with **clockwise** wind circulation in the southern hemisphere, and **anti-clockwise** circulation in the northern hemisphere.
- Size: They average between 300 km and 500 km in diameter with the eye being about 30 km in diameter.
- They follow **erratic paths** thus making it difficult to predict their movement. This is a result of temperature differences over the oceans that cause them to curve away from the equator.

Location of tropical cyclones

They are known by alternate (**local**) names in different regions of the world:



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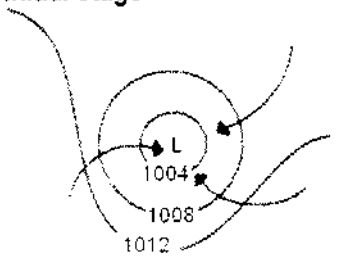
Local name	Place
Hurricanes,	North America
Willy Willies	Eastern Australia
Typhoons	S.E. Asia
Tropical cyclones	Madagascar and South Africa
Cyclones	India and Mauritius

Conditions necessary for the formation of tropical cyclones

Condition	Reason
Sea surface temperatures of 26.5°C and over.	• This promotes **high evaporation** rates. • The high temperature is necessary for the formation of the low pressure cell and rising air (convection). • **Friction over the sea is minimal** which also assists rising air. • The water vapour content over the ocean is greater, **contains latent heat** and this forms the **trigger** for the full development of the cyclone.
Unstable atmospheric conditions	• Necessary for convection and for the release of latent heat as the air rises.
Forms between 5 °and 25° N/S latitudes	• At less than 5°N/S (closer to the equator) the **coriolis force is too weak** to promote the formation of the vortex (spiral). • At latitudes 5° to 25° N/S, the temperature is high and strong, spiralling convection currents develop.
Calm conditions	• Strong winds prevent the formation of a vortex thus several days of **calm conditions are needed for the convergence of air** and the formation of Cumulonimbus clouds.
Upper air divergence	• This is necessary to maintain a low pressure on the surface and to promote surface convergence.

Note: The dangerous semi- circle originates due to intense winds in the cyclone meeting with the force of the entire cyclone moving forward. Wind shear at lower altitudes also intensifies the quadrant.
The position of the dangerous quadrant is to the left in the southern hemisphere and to the right in the northern hemisphere.

Stages in the formation of a Tropical cyclone

Initial stage  	• During this stage pressure is above 1000 millibars at the centre. • **Isobars are far apart and some are open.** • The eye begins to form as warm air **converges** towards the centre of the storm. • Cirrus and cumulus clouds produce light rain. • Gale force winds occur up to 50 km from the eye.

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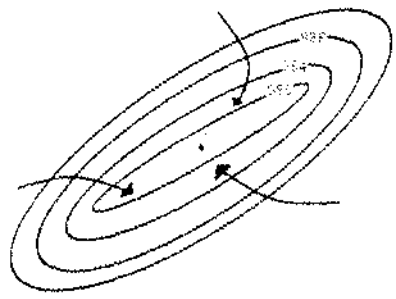
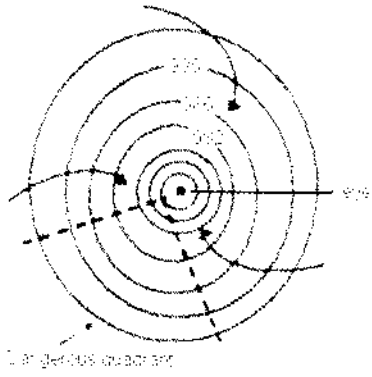
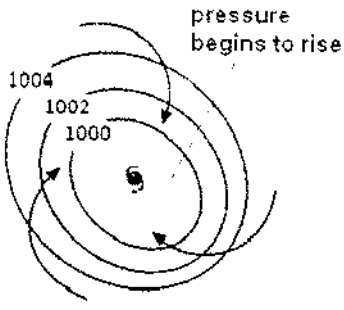
Immature stage 	• Pressure at the centre drops to below 1000 millibars. • **Eye** intensifies as the air continues to converge and rise around (spirals) the centre. • Winds reach **hurricane strength**. • Diameter is about 100 km. • Cumulonimbus clouds form around the eye.
Mature stage 	• **Pressure at centre is far below 1000mb** and stops dropping. • Isobars are close together (steep pressure gradient). • Reaches maximum diameter of about 300km to 500km. • **Dangerous semi-circle** forms in the forward left - hand quadrant of the cyclone and experiences the most intense weather conditions • **Towering cumulonimbus clouds form around the eye**. • Winds at hurricane strength:120+ km/h.

Dissipating stage
 
	• It **dissipates** or decays when pressure begins to increase to above 1000 millibars.
	• This occurs when the cyclone
	  ○ **Encounters land surfaces**: there is less moisture and more friction on the land. The friction decreases wind speed.
	  ○ **Enters cold ocean waters**: moisture supplies are reduced due to less evaporation.
	  ○ **Is in the path of an advancing cold front**: temperatures drop and pressure increases.

Weather associated with the mature stage of the tropical cyclone

As the cyclone approaches	In the eye	As the storm moves away
• Air pressure decreases • Towering cumulonimbus clouds appear • Torrential rain, hail, lighting and thunder • Wind speed increases (hurricane strength120km/h).	• Calm, no wind • Clear, no rain • Lowest air pressure • Subsiding air **Reason:** The upward spiralling movement of air creates an artificial wall around the centre. This prevents surface air from rising and cooling therefore no condensation occurs to produce clouds or rain.	• Weather is similar to that of the approaching cyclone • Air pressure rises • Wind speeds are high close to the eye and decreases outwards. • Rainfall decreases outwards from the eye

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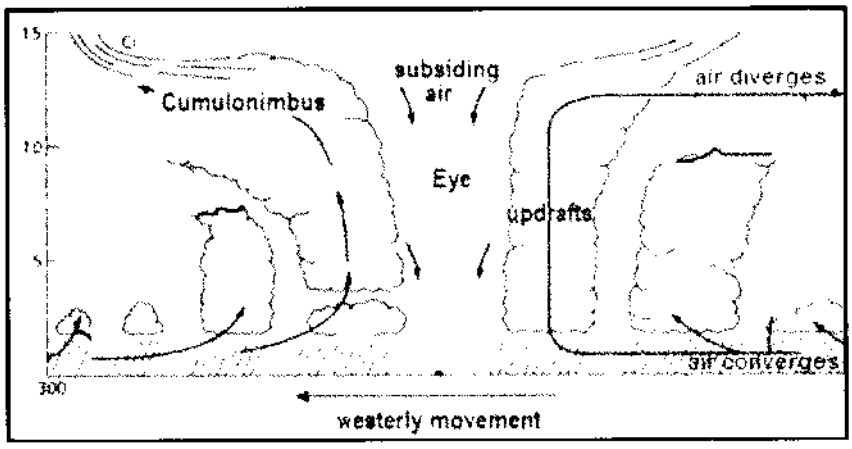
Cross section through a tropical cyclone



Impact of Tropical Cyclones

Socio- economic impact

- **Flooding in low-lying areas** cause damage to property, loss of stock and human lives.
- Strong winds causes **storm surges** that result in ship wreaks and flooding of coasts.
- **Destruction of agricultural land** and crops leads to food shortages.
- **Ecosystems are disrupted** since food chains and food webs are destroyed.
- **Coastal erosion that** impacts negatively on tourism.
- **Destruction of transport** and communication structures like roads, rail and airports.
- Silt is washed into dams thus reducing their water holding capacity. Dredging becomes necessary but this is costly.
- **Insurance companies suffer heavy losses** due to large amounts of money being paid out.

Environmental Impact

- Can give rise to storm surges that reshape the coastline.
- Soil erosion
- Landslides and rock falls on steep slopes
- Uproot trees and destroy vegetation
- Flooding of rivers
- Destroy ecosystems

Precautionary and management strategies to manage the effects of tropical cyclone activity

- Stock up on **canned foods and water supplies**.
- Organize a first-aid kit and batteries for transistor radios, lamps and torches.
- Move cattle and other stock **to higher ground.**
- Place **sandbags** along rivers and coastal areas to reduce the impact of flooding.
- Erect wooden shutters on windows and educate people to stay away from windows and doors during the storm.
- **Evacuation plans** must be set out, especially for people in low-lying areas.
- There must be rescue teams to rescue people from flooded areas
- A good forecasting system is essential to track and predict the path of a tropical cyclone and to issue warnings.

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Note: Tropical cyclones may be classified on a scale of 1 to 5. Most cyclones only reach level 3 before dissipating. Level 4 and 5 cyclones cause the most damage, e.g. Cyclones Rita and Katrina that occurred in the USA in 2005.

Identification and interpretation of satellite images

What is a satellite image?

- **Satellite images are photographs of the earth** (land and sea) **taken** by satellites in orbit **above the earth's atmosphere**. Images are created via a satellite scanner which numerically records radiation as numbers before transmitting them to a receiving station. At the station the information is converted by computers to pixel-based images.

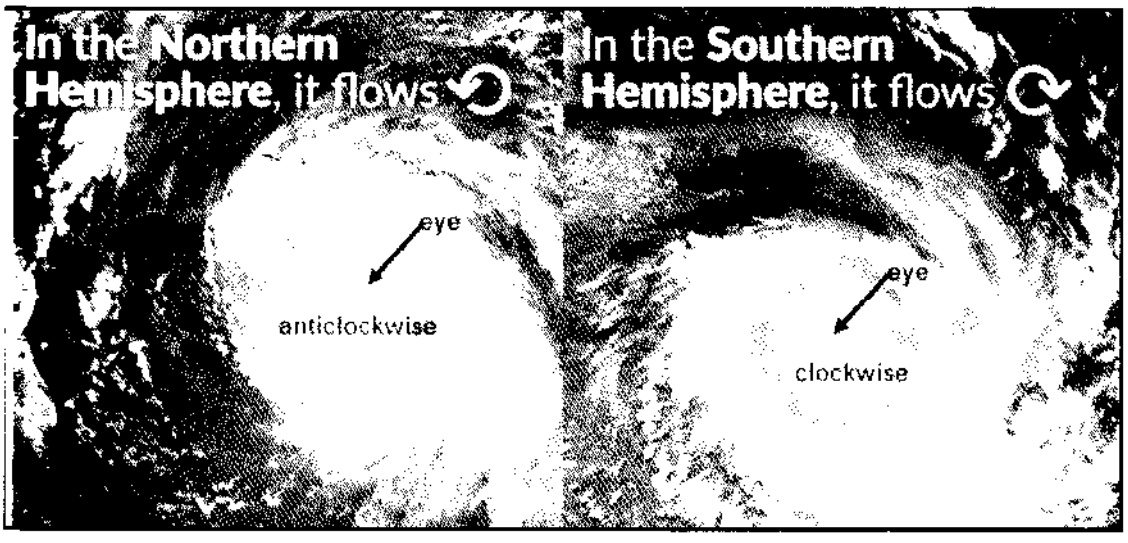
- **Meteosat** is the satellite that gathers the information for our weather reading in South Africa. This information is collected every 30 minutes from space to our stations on earth. This makes it possible to receive data on cloud cover, temperature and moisture content of the air at any particular time.

Advantage of using satellite images to track cyclones

- Can be used to predict the path of the cyclones based on trends. This can help in preparing for the arrival of the cyclone.
- Can take images of inaccessible areas and larger areas than a camera.
- Data can be received in real time.
- Allows for regular updates on the cyclones movements.

Satellite image of tropical cyclones

Note: Tropical cyclones can be identified by a swirling circular mass of cloud and presence of the eye.



Satellite image of cyclone in the Northern Hemisphere. Notice the convergence of air in an anti-clockwise direction around the centre of low pressure- the EYE	Satellite image of cyclone in the Southern Hemisphere. Air is converging in a clockwise direction around the centre of low pressure- the EYE

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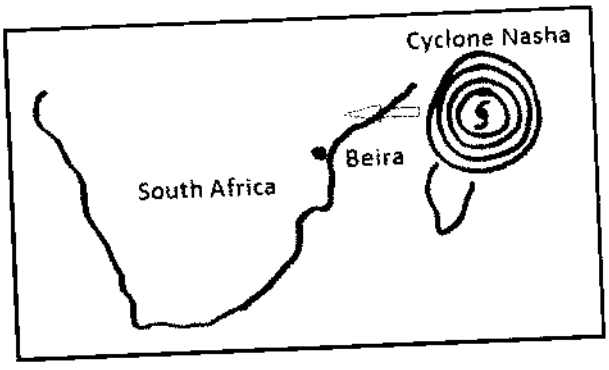
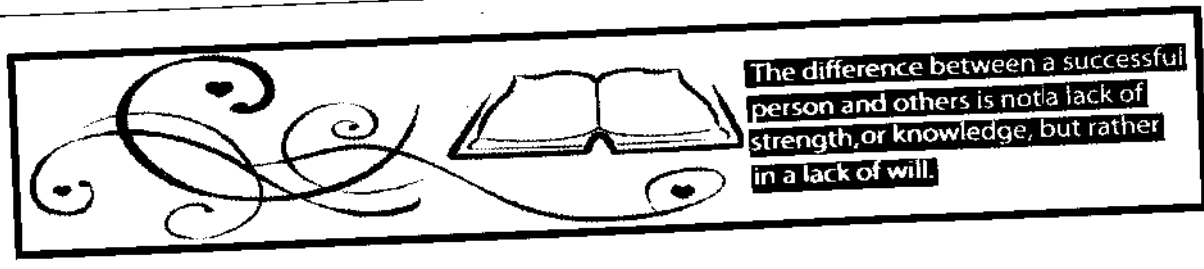
Identification of tropical cyclones on synoptic weather maps

- The name of the cyclone, e.g. Nasha.
- The symbol of the 'eye' - .
- Closed isobars around a cell of very low pressure (below 1000 millibars) between 5^0 to approximately 25^0 N/S.
- Season represented by the synoptic map will be late summer or early autumn.



Differences between Tropical and Temperate Cyclones

Characteristics of tropical cyclones	Characteristics of mid-latitude cyclones
• Move from **east to west** or westwards • Steered by the **easterlies** in the east wind belt. • They originate between **5° and 25°** N/S. • They are named alphabetically at the beginning of the cyclone season. • Has an **eye** at the centre. • Small cyclones with a diameter of between 300km to 500 km. • Form over warm oceans and are associated with warm tropical air masses. • Dissipate upon reaching land or cooler waters. • Associated with destructive weather conditions. • Only form in late summer and early autumn	• Move from **west to east** or eastwards. • Steered by the **westerlies** in the westerly wind belt. • Originate between the **30°** to **60°** N/S. • Large cyclones where the diameter may exceed 1000 km . • Consists of **warm and cold fronts.** • Occur throughout the year but affects South Africa mainly in winter. • It lasts between 4 to 14 days. • Has a gentle pressure gradient.



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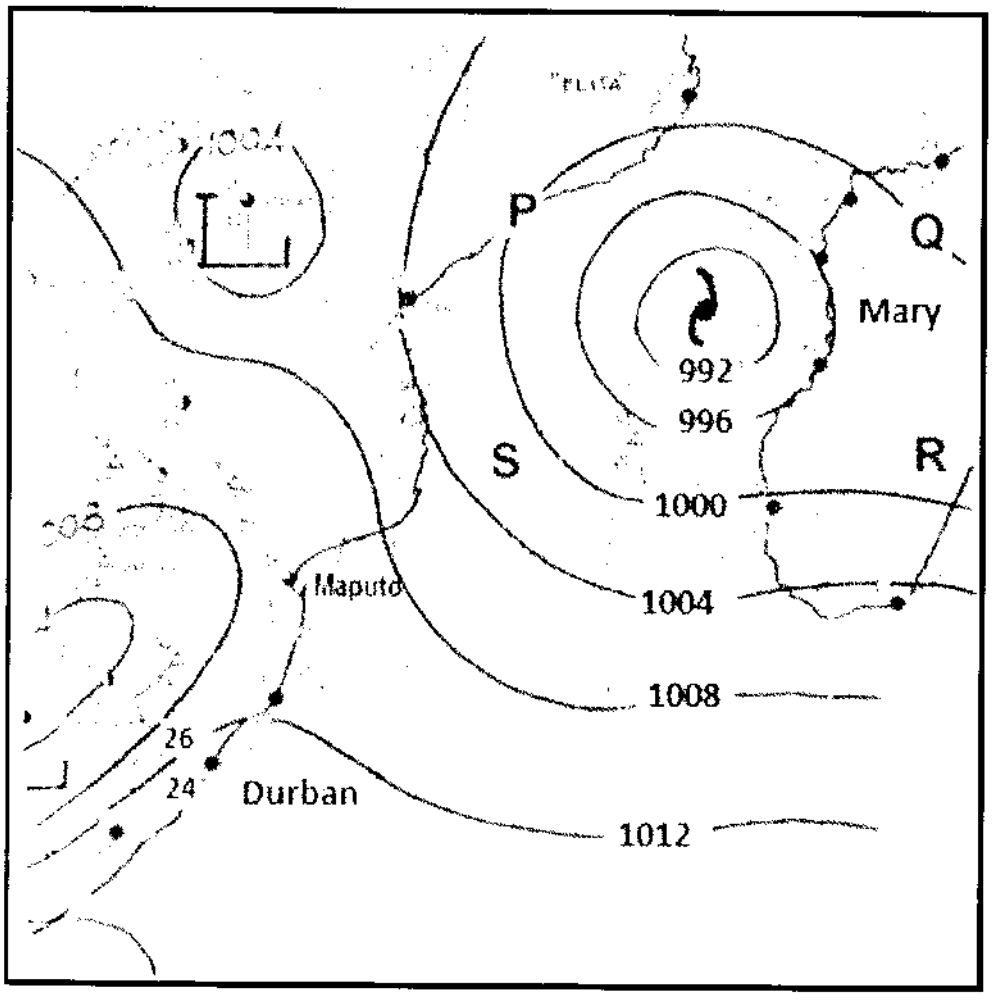
Activity 1.5

Below is a section of a South African synoptic chart.



1. What evidence on the synoptic chart indicates that Mary is a tropical cyclone?
2. Which letter, **P**, **Q**, **R** or **S**, represents the dangerous semicircle?
3. In which stage of development (developing or mature), is tropical cyclone Mary? Give ONE reason for your answer.
4. Explain one condition that would have favoured the development of this tropical cyclone.
5. What is the direction of the movement of a tropical cyclone? Give a reason for your answer.
6. Use the sub-headings below to explain the changes in weather conditions that Maputo will experience when the tropical cyclone passes over:
   - rainfall
   - cloud cover
   - wind strength
7. Suggest TWO reasons for the dissipation of the cyclone once it moves over land.
8. Mention the possible effect of tropical cyclone Mary on people living along the coast.

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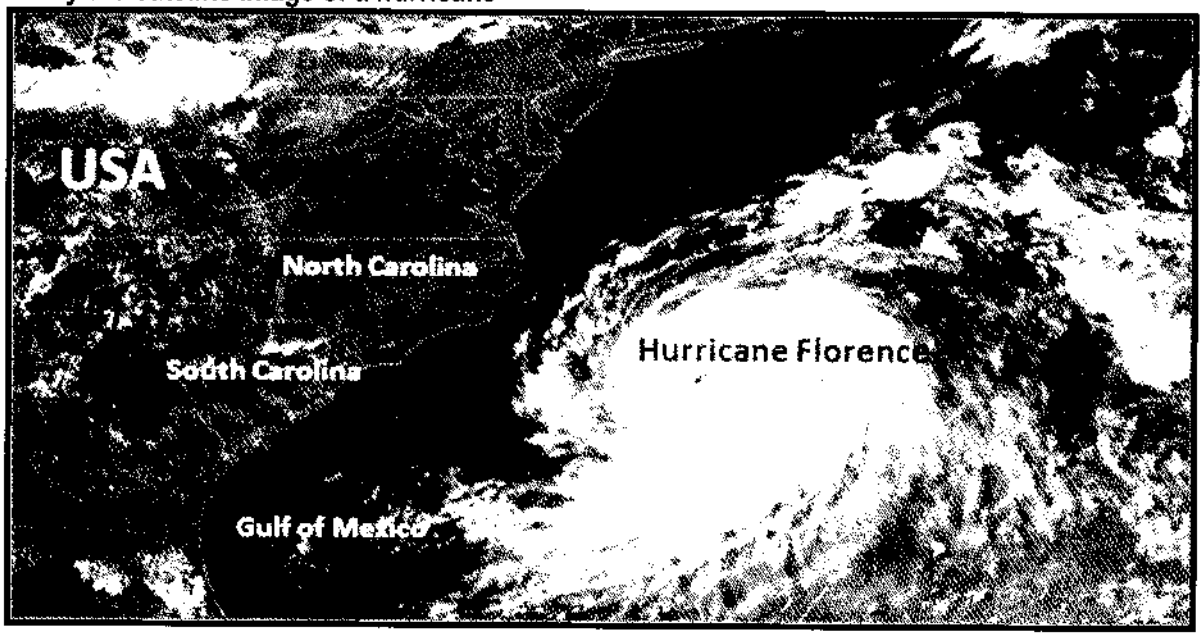
Activity 1.6

Study the satellite image of a hurricane



1. Provide a name for the next hurricane that will form in the above region during the current year.
2. What evidence indicates that the hurricane is taking place in the northern hemisphere?
3. Give two reasons to support which stage of development Hurricane Florence is in?
4. Account for the lack of clouds in the eye.
5. State the height of the clouds around the eye?
6. What is the source of energy that drives this cyclone?
7. State the local names of hurricanes in:
   a. The Mozambique Channel
   b. Northern Australia
8. Explain how the following contribute to hurricane-formation:
   a. warm oceans
   b. the Coriolis effect
9. What advice can you give to dwellers off the coast of Carolina to improve their safety over the next 12 hours.

Activity 1.7

Study the cyclone track and the extract provided.

1. How many tropical cyclones occurred in the east Pacific region before Manghut?
2. Describe one condition that led to the formation of the tropical depression on 7th September.
3. Explain how the depression would have 'strengthened' between the 7th to 12th Sept.
4. Why did the PAR reclassify the depression as a category 5 super typhoon after the 12th?
5. State the reason for the strengthening of the system from category 2 to 3 before it reached Taiwan.
6. Describe the conditions that could have caused the cyclone to dissipate after the 14th Sept.
7. In a paragraph of eight lines explain the impact of these storms on insurance companies and the environment.

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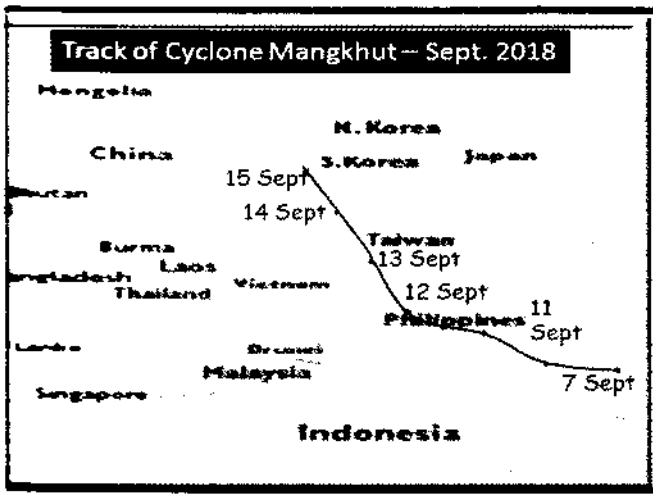

Legend / Saffir-Simpson Scale

Tropical Depression – up to 62 km/h
Tropical Storm – 63 – 118 km/h
Category 1 – 118 km/h – 153 km/h
Category 2 – 154 – 177 km/h
Category 3 – 178 – 208 km/h
Category 4 - 209 – 251 km/h
Category 5 - ≥252 km/h

[illegible] September 2018, a tropical depression formed near the Marshall Islands. Late on the same day the system strengthened into a tropical storm and was named Mangkhut by the Japan Meteorological Centre (JMC). By 11th September, Mangkhut became a typhoon. The JMC noted additional strengthening on 12th Sept. as it entered the Philippine Area of Responsibility (PAR), and it was reclassified as a super typhoon. There were sustained winds in excess of 285 km/h, and this forced the Philippine Government to initiate evacuations for residents in its expected path. While moving further inland, it weakened to a category 4, then a 3 and then down to a 2. It strengthened briefly to a category 3 before reaching Taiwan until its final landfall occurred over Guangxi in China where it displayed characteristics of a category 1 depression and finally dissipated. Estimated damages are in the region of US$335 million in the Philippines alone.

Activity 1.8

Study the **extract of a tropical cyclone.**

Tropical cyclone Ava not expected to have any impact on the Zululand coastal regions.

[illegible] 2018

The South African Weather Service (SAWS) has issued a cyclone alert as the first tropical cyclone of the season, called Ava, is sitting off the northeastern tip of Madagascar. While Ava is unlikely to affect our region, it will dominate the weather in the south-western Indian Ocean over the coming days, and expected to affect parts of the Mozambican Channel early next week. The system is expected to make landfall over Madagascar, bringing with it forecast wind speeds of up to 150km/h.

Once Ava makes landfall, her speed is forecast to decrease to 50 knots (92km/h) by tomorrow evening, thereafter decreasing more during the course of the weekend and early next week.

'Newly formed tropical cyclone Ava is expected to bring life-threatening impacts to Madagascar into this weekend,' said Accuweather Meteorologist, Eric Leister.

1. Explain why 'Ava' is an appropriate name for the first cyclone of the season.
2. Why is Ava unlikely to impact on the Zululand coast?

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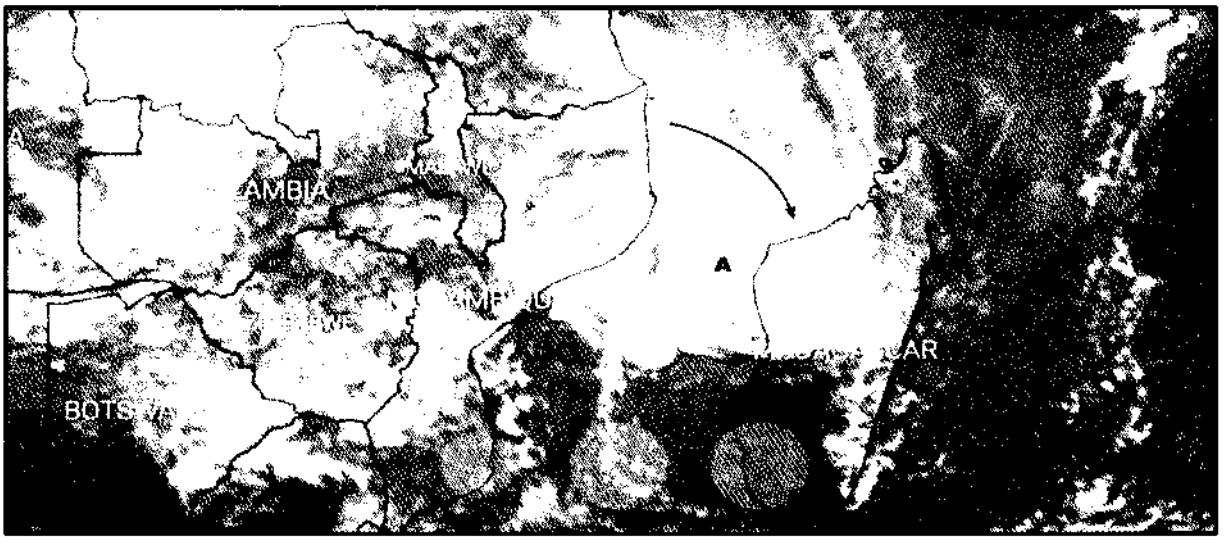
3. Suggest TWO reasons for the speed of Ava reducing when it makes landfall.
4. Discuss the reason for the life threatening impact expected from cyclone Ava.
5. Explain sustainable measures that farmers in Madagascar can take to reduce the impact of cyclones.
6. What are some of the challenges that people face in underdeveloped countries after a cyclone makes landfall?

Activity 1.9

Study the satellite image of Tropical Cyclone Eloise in the Mozambique Channel – January 2021.



1. What is a tropical cyclone?
2. How do you know Cyclone Eloise is taking place in the southern hemisphere?
3. How many tropical cyclones occurred before Eloise in this region in the current cyclonic year?
4. Account for your answer in QUESTION 3.
5. Describe two factors that may have contributed to the formation of Tropical Cyclone Eloise?
6. In which stage of formation is Cyclone Eloise? Provide a visible reason for your answer.
7. In which direction will the cyclone move? Why do you say so?
8. Describe two factors that could cause Eloise to dissipate upon reaching Mozambique.
9. Suggest precautions residents of Mozambique should take in order to minimise the effects of Cyclone Eloise. Give reasons for your suggestions.
10. Explain why countries like Mozambique find it difficult to cope with such disasters.

The disasterous effects of Cyclone Eloise

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Activity 1.10

Match the terms in column B with the statements in column A.

COLUMN A		COLUMN B
1.	Forms when the cold front arm of a mid-latitude cyclone is cut off from the rest of the cyclone	A. Ridging
2.	A weak low pressure associated with drizzle and unstable weather conditions along South Africa's coastline	B. Saddle
3.	Forms when warm moist air from the Indian ocean is undercut by cold dry air from the Atlantic ocean	C. Line thunderstorm
4.	Indicated by elongated isobars from a high pressure cell	D. Kalahari High
5.	The inversion layer is above the plateau in this season	E. Cut-off low
6.	The temperature at which air condenses	F. Summer
7.	Pressure cell that causes clear and stable conditions over the interior of the country in winter	G. Coastal low
8.	Zone of constant pressure between two cyclones or anticyclones	H. Dew point
		I. Winter

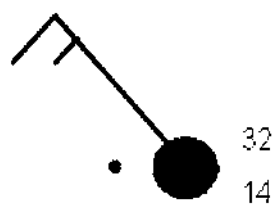
Subtropical Anticyclones (high pressure cells) and the resultant weather over South Africa

What is a synoptic weather map?

It is a summary or synopsis of weather conditions collected from various weather stations throughout South Africa. The SA weather service organises and displays the information received on synoptic weather maps.

Weather station

Information about the weather conditions at a place can be obtained by examining a weather station on a synoptic map.



Air temperature: 32°C
Dew point temperature: 14°C
Wind Speed: 15 knots/hr
Wind Direction: north - westerly
Cloud Cover: overcast
Precipitation: Rain

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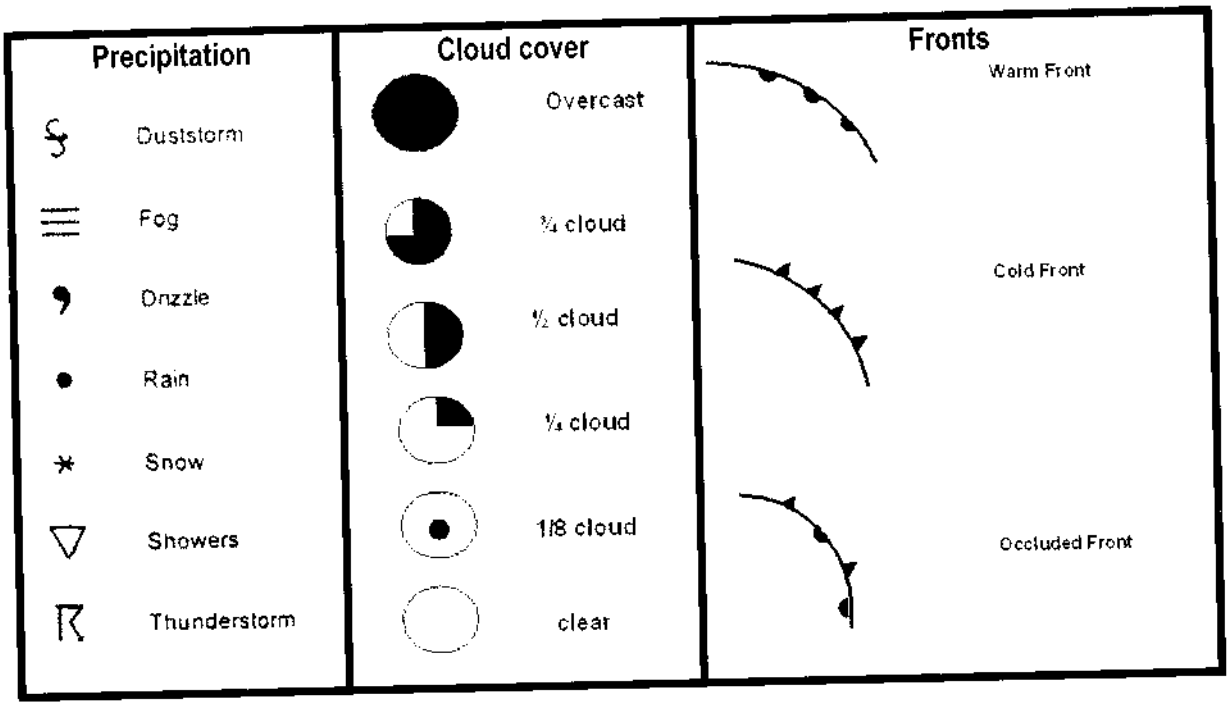
Symbols on a synoptic weather map

The following symbols are used on synoptic weather maps internationally.



Weather Condition	Possible reasons
Air temperature: Indicates how hot or how cold the air is.	High temperatures can result from air heating adiabatically as it descends. In summer and due to terrestrial heating. Low temperatures can result from the cooling of the land in winter, oblique rays of the sun.
Dew point temperature: The temperature at which air condenses. A big difference between the air temperature and dew point temperature means that the air is dry and there is little chance of rain.	In summer warm, moist air that rises results in a high dew point temperature. In winter there is less evaporation. Also subsiding air reduces the humidity levels.
Wind speed: Shown by a "feather". A long feather represents 10 knots and a short feather denotes 5 knots.	Isobars that are close together indicate a steep pressure gradient and strong winds Isobars that are far apart indicate a gentle pressure gradient and gentle winds
Wind direction: Winds are named according to the direction from which they blow.	Air diverging from a high pressure – anticlockwise Air converging into a low pressure – clockwise
Cloud cover: Indicated by the shading of the circle.	In winter very limited cloud cover In summer more cloud cover and likely to have overcast conditions after midday.
Precipitation: Indicated by symbols	Thunderstorms and rain in summer Snow in winter.
Humidity: Amount of water vapour in the atmosphere (%)	Air masses with higher temperatures can hold more water vapour

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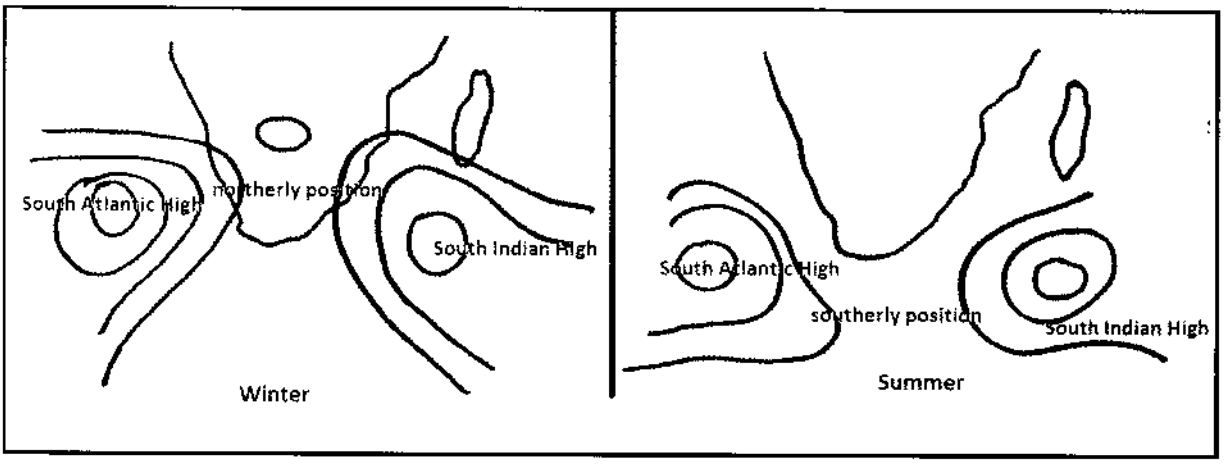
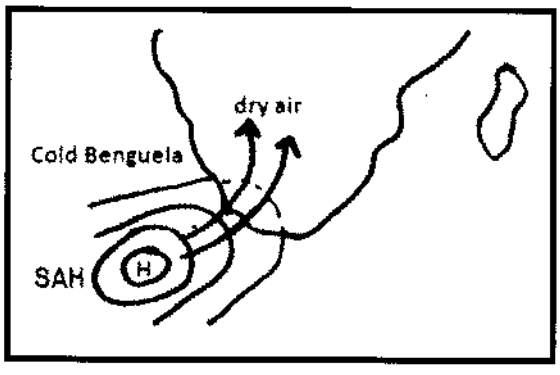
SUBTROPICAL ANTICYCLONES AND THE RESULTANT WEATHER OVER SOUTH AFRICA

HIGH PRESSURE SYSTEMS OVER SOUTH AFRICA



- The South Atlantic High and the South Indian High are semi-permanent and stationary cells that change their positions in summer and in winter.
- In **winter** these two cells lie **north** and are **closer** to the land since they migrate with the apparent movement of the sun.
- In **summer** these two cells lie **south** and are **further away** from the land since they migrate with the apparent movement of the sun.

The **South Atlantic High (St Helena High)**



- This high is located off the west coast of SA over the Atlantic Ocean.
- *The system produces clear, dry and stable weather conditions along the west coast (Namib desert) for the following reasons:*
  - *Winds that diverge out of this system are dry since there is little evaporation over the cold ocean.*
  - *Cold air over the Atlantic Ocean is also associated with strong subsidence that prevents surface air from rising and cooling to produce rainfall.*
- The main type of precipitation on the west coast is **fog** and **mist**.

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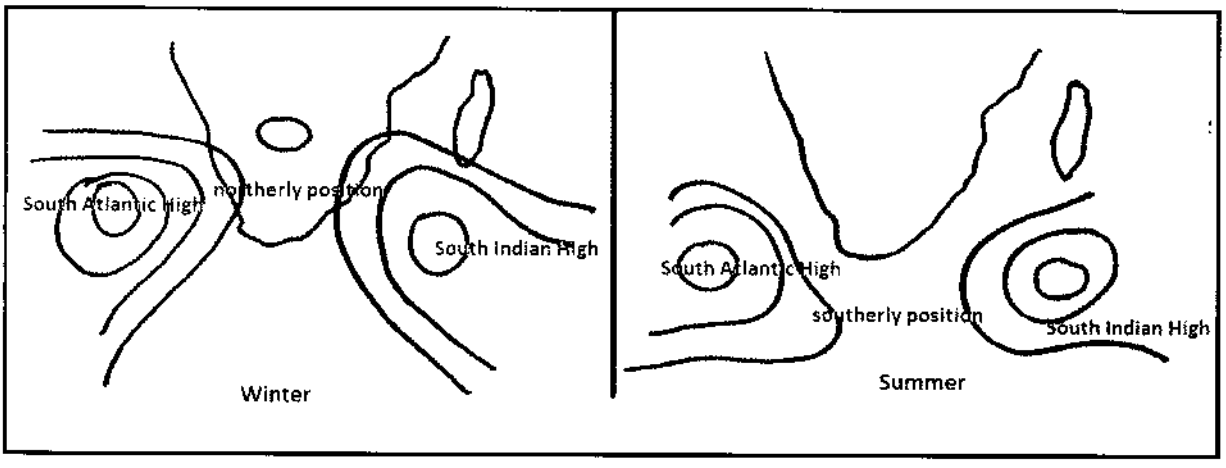

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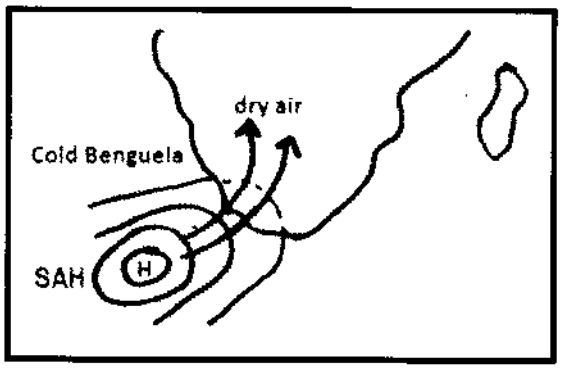

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- The main type of precipitation on the west coast is **fog** and **mist**.

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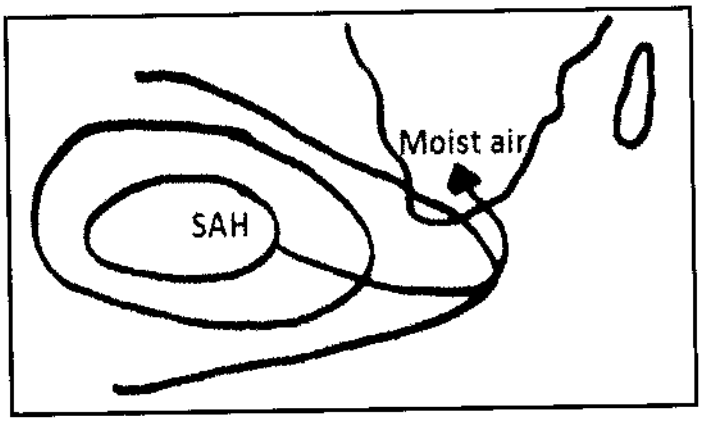
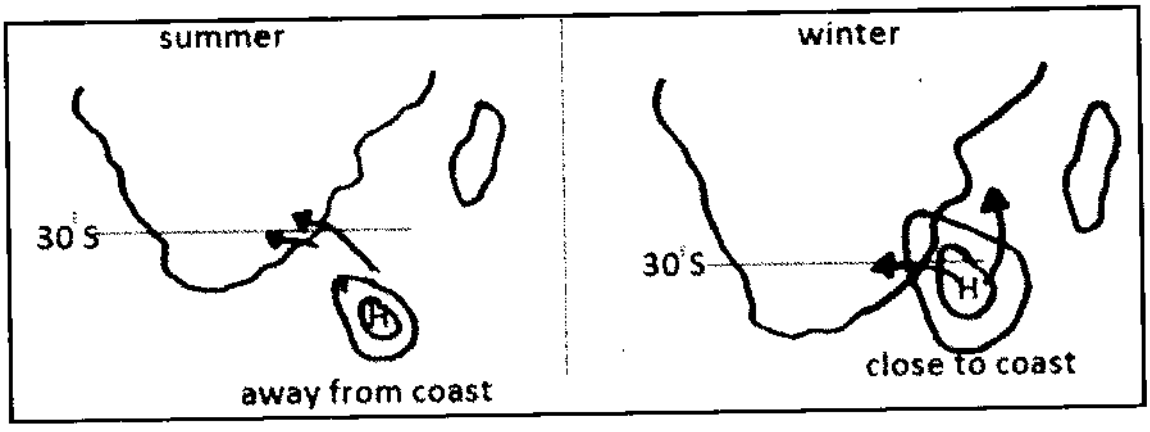
Ridging of the South Atlantic High



- In summer the South Atlantic High sends out a tongue or ridge of high pressure that extends along the south-east coast of the country.
- Ridging is indicated by elongated isobars from a high pressure cell.
- Ridging of the SAH diverts moist air from over the Indian Ocean onto the land.
- General rain occurs along the south east coast and eastern plateau.

The South Indian Anticyclone (Mauritius High)



- This high is located off the east coast of SA over the Indian Ocean.
- During summer it is found away from the land and further south. On-shore winds carry moisture over the east coast and into the interior. The eastern part of South Africa receives most of its rainfall in summer.
- During winter it is found closer to the land and further north. Since the wind has a small fetch it carries little moisture onto the east coast and into the interior. The greater part of the country is dry in winter.
- Sometimes this anticyclone may lie in the direct path of a mid-latitude cyclone, causing the mid-latitude cyclone to move towards the south before continuing eastwards. The South Indian high in this position is known as a **blocking high.**

The Kalahari High (Continental High)

- The Kalahari High is found over the interior of the country.
- It dominates the land in winter but shrinks in summer.

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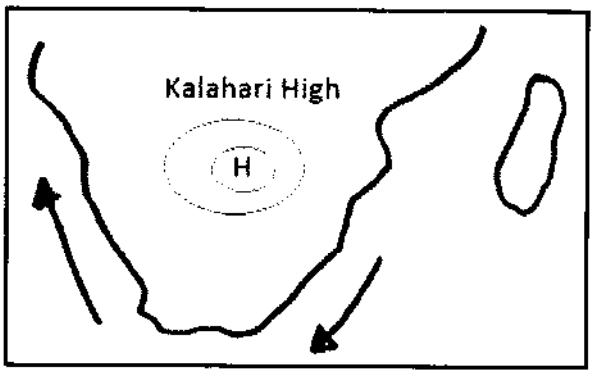
- The Continental high and the South Indian interact to influence the climate of the country differently during winter and summer.



Seasonal positions of the anticyclones affecting South Africa

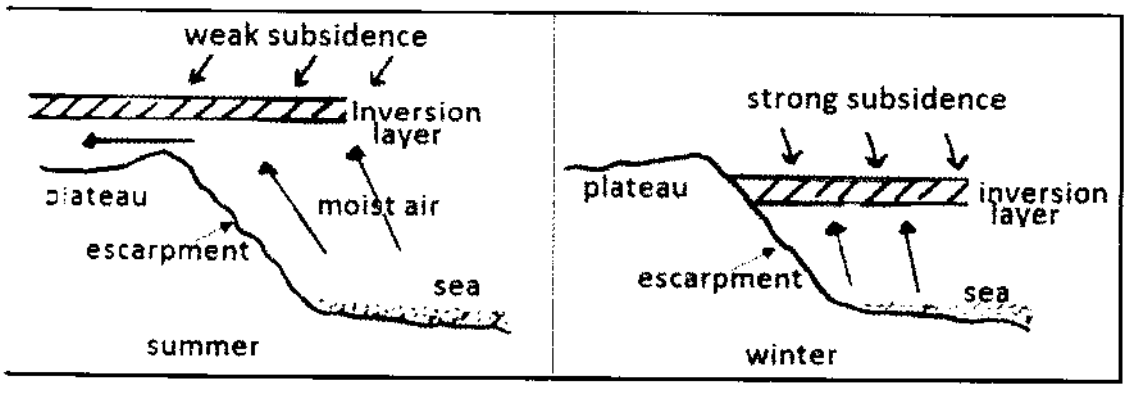
- All pressure systems move with the apparent movement of the sun.
- In the southern hemisphere in summer, the subtropical anticyclones and the mid-latitude cyclones move south of their mean positions, and in winter both cyclones and anticyclones move slightly northwards.
- Seasonal changes in their positions affect the weather of the country accordingly.

Identification of cyclones and anticyclones on the map:

- Indicated by **L (cyclone)** and **H (anticyclone)**.
- Isobars are more or less concentric decreasing in value towards the centre for a cyclone and increasing in value for an anticyclone.

The weather of South Africa is influenced by the following:

The plateau



- The plateau is an extensive high lying area that covers thousands of square kilometres and lies at an average height of 1200 metres above sea level.

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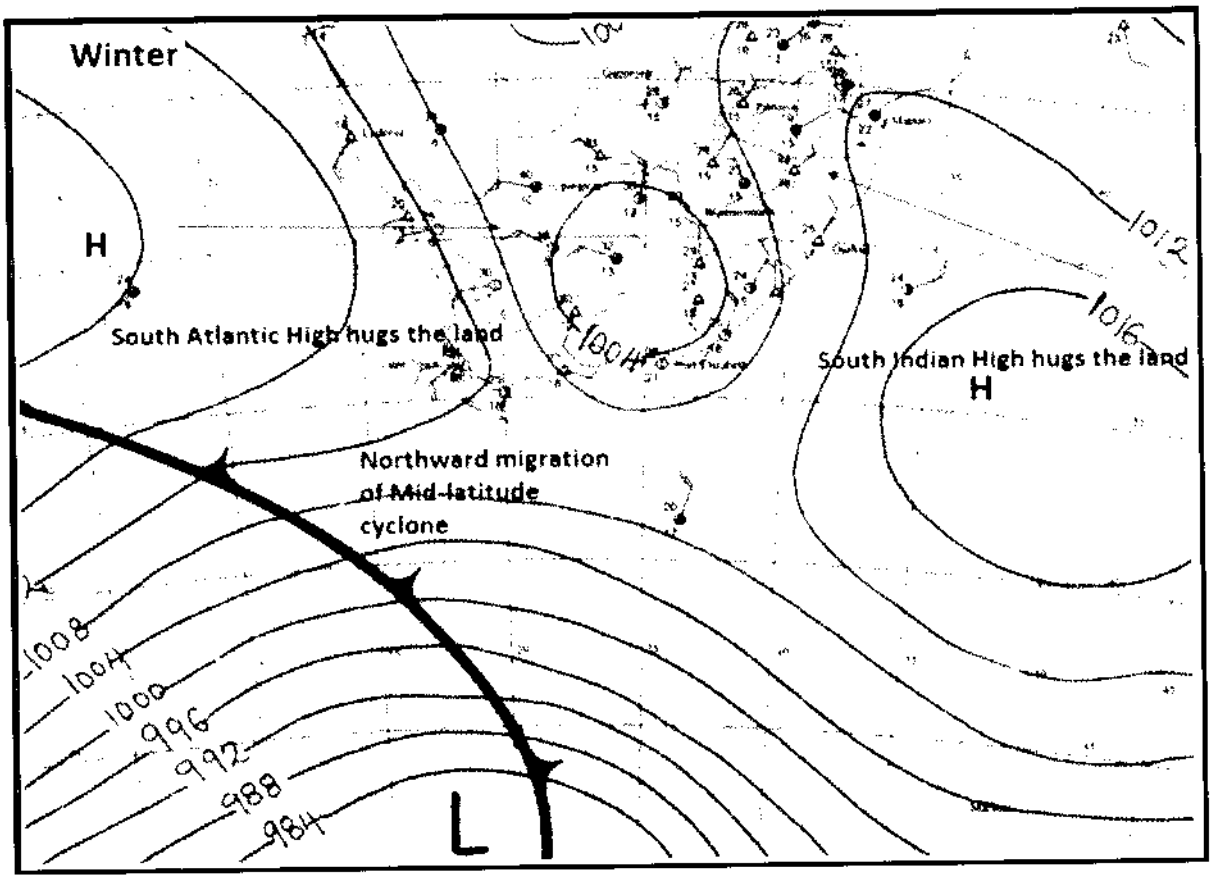
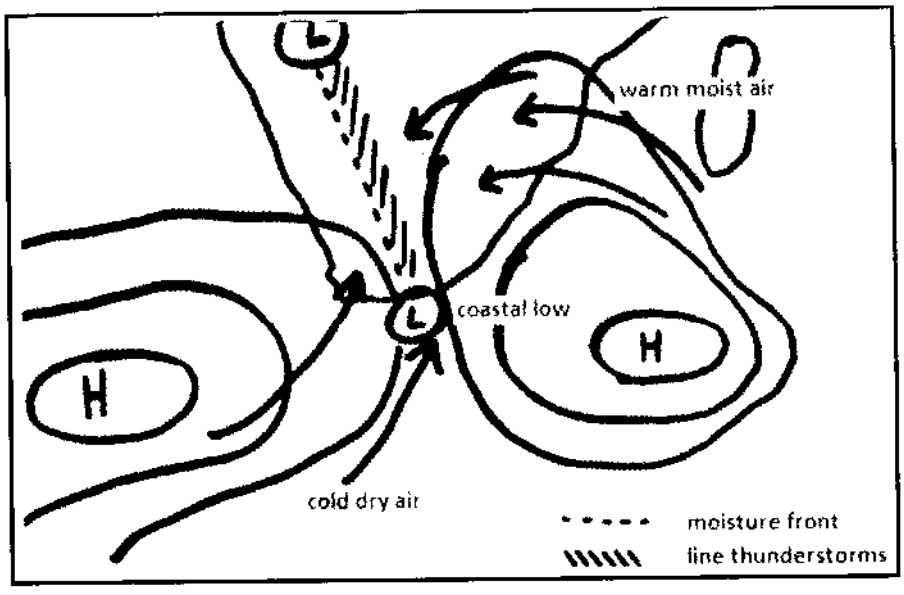


Travelling Disturbances associated with anticyclonic circulation

Moisture front and line thunderstorms



- **Moisture front**: a zone between two air masses with different moisture content.
- **The line thunderstorm forms** over the interior where cold and dry air masses from the Atlantic Ocean meet the warm and moist air masses from the Indian Ocean.

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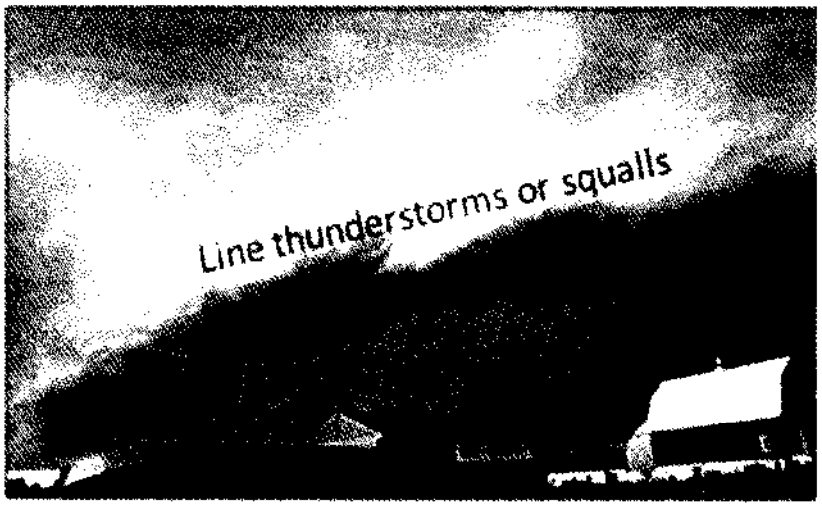
- **Line thunderstorms move** in a north-easterly direction and this causes the Kalahari High to shift.
- The two contrasting air masses do not mix but meet at the moisture front (trough of low pressure) which extends from north- west to south- east.
- The cold, dry south westerly winds sink and the warm and north easterly winds rise along the front.
- The air cools, and condenses forming cumulonimbus clouds that produce heavy rainfall on the east of the moisture front.
- Often line thunderstorms cause flash floods.
- When strong, gusty winds occur along the entire cold front it is called **a line squall (see diagram below):**



Warm, moist air (e.g. from Indian Ocean) is undercut by cold, dry air (e.g. from Atlantic Ocean), uplifted rapidly to condense into dense cumulonimbus clouds at the front. This results in **squalls** or line thunderstorms.

Impact of line thunderstorms on farmers

- Torrential rain that damages crops
- Soil erosion that results in fertile soil being washed away
- Loss of income due to crop loss
- Gale force winds also destroy crops
- The rain will fill dams and can be used for irrigation.

Strategies to reduce the impact of severe thunderstorms

- Have an emergency evacuation plan for safety of people and animals
- Train workers on how to protect themselves during lightning
- Have ample feed and water supply for emergencies
- Outreach programs to reduce the vulnerability of small scale farmers
- Store seeds and feed in waterproof bags

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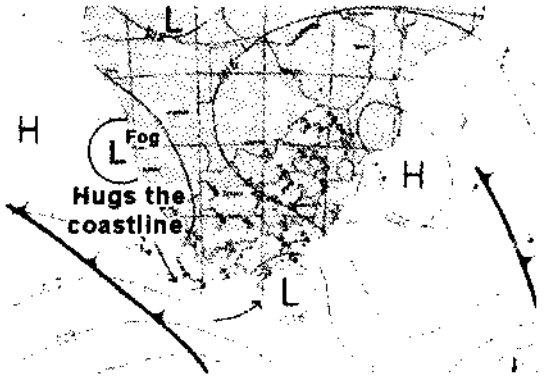
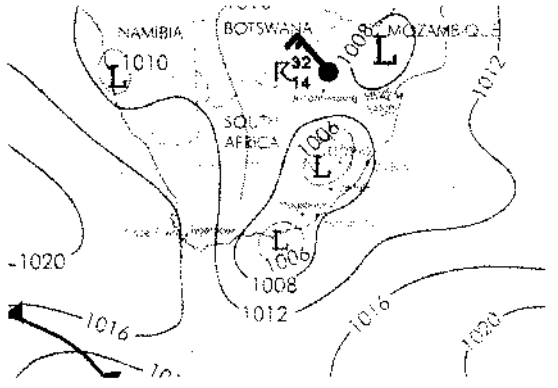
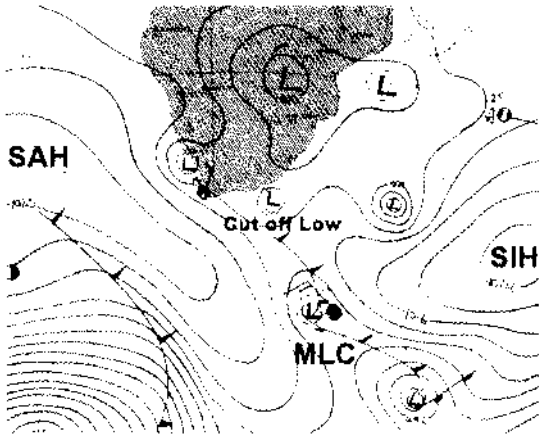
Low pressure systems over South Africa

In addition to the low pressure cells/systems already discussed in this module, there are three other cyclones that influence the weather of the country.

They are:
1. **Coastal lows**
2. **Heat / thermal lows**
3. **Cut-off lows.**

Cyclone	Characteristics
1. Coastal low pressure 	• **A small, weakly developed cell** with a diameter of 100 kilometres. • It develops along the west coast, moves southwards and thereafter to the east coast. • Produces fog on the west coast and drizzle and unstable conditions on the east coast. • The interaction between the coastal low and the Kalahari High results in **berg winds**.
2. Thermal /Heat low 	• Occurs in **summer** when the land is heated intensely over the central interior. The air in contact with the earth's surface heats and converges towards a low pressure centre. • Cumulonimbus clouds cause **convective** thunder storms over the interior. • Usually there is more than one of these heat lows over the interior.
3. Cut-off low 	• The ridging of the South Atlantic High and the South Indian (blocking effect) prevents a mid-latitude cyclone from moving eastwards. • A cut off low forms when the **cold front arm of a mid-latitude cyclone is cut-off from the rest of the cyclone** forming an extension over land. This is a temporary condition. • This causes moist air from over the ocean to be drawn onto land and leads to rainfall for several days.

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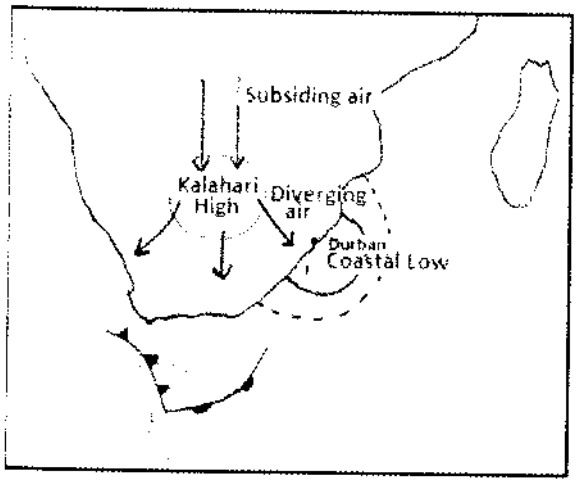
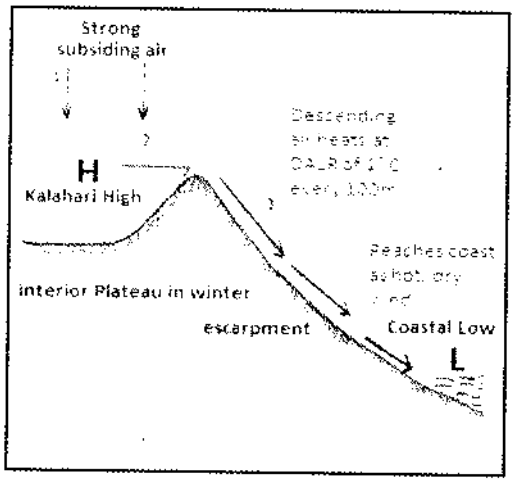
Berg winds

Berg winds are hot, dry and gusty local winds that blow from the interior of the country to the coast during the winter months of April to September. They are called berg winds because they blow down a mountain or "berg".

- Berg winds will occur when the following pressure cells are present:
  - **Continental High / Kalahari High**
  - **Coastal low**
- Air diverges in an anticlockwise direction from the Continental high towards the coastal low pressure cell. As this air descends down the escarpment of the Drakensberg, it heats at the dry adiabatic lapse rate (1 °C/100m). Hot winds **raise the temperatures** of coastal areas.
- These offshore winds are **dry** because they originate over the interior where there is little moisture.
- **Note**: The dry, hot weather is sometimes followed by cooler, rainy weather when the berg winds blow into the low pressure centre of a mid-latitude cyclone. As the cold front approaches cold and wet weather occurs.





The effects of berg winds

- The dry and gusty winds create conditions that favour the igniting and spread of fires rapidly thus destroying valuable pastures, sugar cane fields and forests.
- *The aged and young children experience respiratory problems owing to decreasing humidity levels.*
- Animals like poultry in enclosed surroundings find the high temperature unbearable thus leading to livestock deaths.
- Workers become lethargic and productivity decreases. For example construction workers tire easily under these oppressive conditions.

The impact of fires on people/environment

- Destruction of ecosystems
- Poor visibility – accident rate increases
- Soil erosion – reduces natural vegetation

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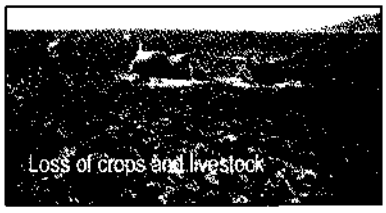
- Pasturage is destroyed resulting in financial loss
- Damage and loss of crops contributes to food insecurity
- Injury and loss of life – human and livestock
- Damage to property incurs expenses



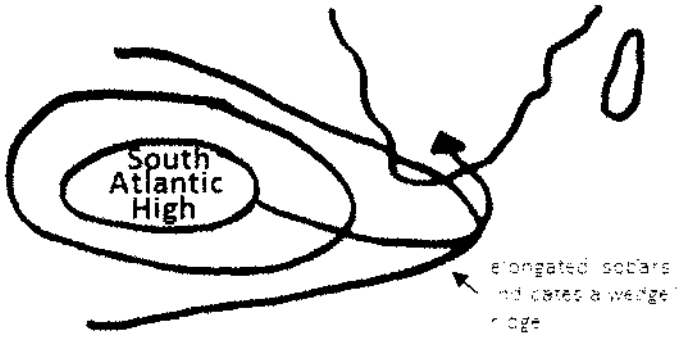
Why are Berg winds linked to fires?

- Lack of moisture makes it easier for grass to burn
- Winter – vegetation is dry due to low or no rainfall
- Gusty winds that fan the bush (veld) fire
- Unusually high temperatures in winter

How to reduce the impact of Berg winds

- Awareness and education on hoe cigarette butts and ash from domestic fires etc can cause the spread of fires
- An effective fire management strategy, including available fire fighting equipment
- Stay indoors and hydrated
- Installing sprinklers to reduce burning of crops
- Watch towers to scan for fires, as early detection minimizes the impact.

Isobaric patterns

Ridge/wedge 	Outward curve or elongation of isobars away from a high pressure cell
Trough	Outward curve or elongation of isobars away from a low pressure cell.

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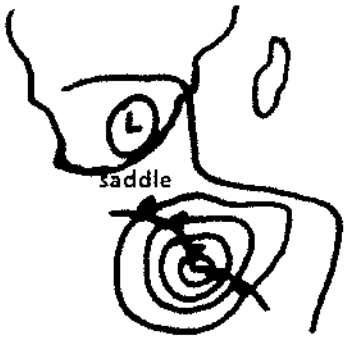
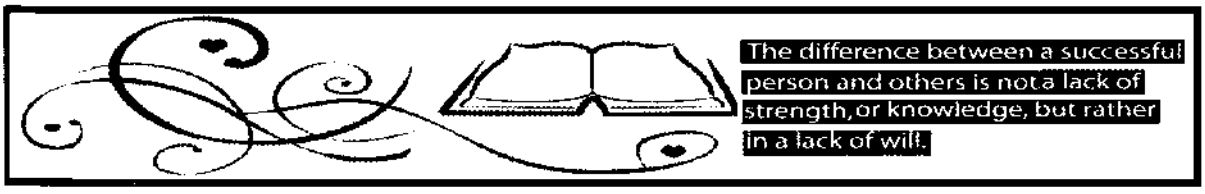
Saddle 	Zone of constant pressure between two cyclones **(lows)** or anticyclones **(highs).**

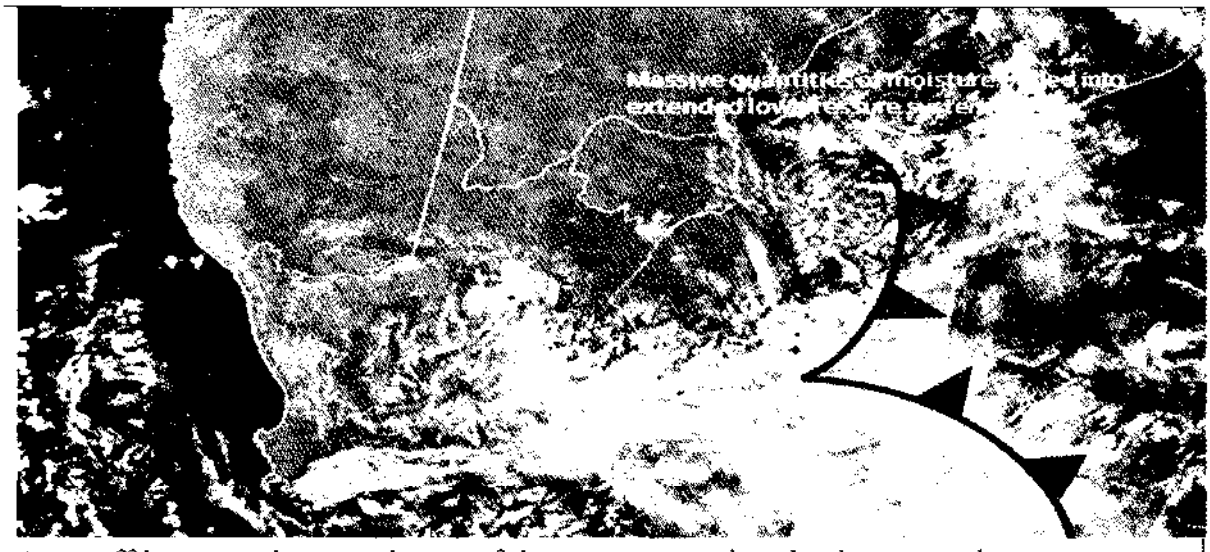


Activity 1.11

Refer to the newspaper article below and then answer the questions set:

More bad weather expected in KZN

DAILY NEWS / 9 OCTOBER 2017, 4:51PM / THOBEKA NGEMA



A cut-off low over the central parts of the country, moving slowly eastwards.

Durban - The South African Weather Service has issued a warning on the possibility of severe thunderstorms which they have observed over Western parts of KwaZulu-Natal, moving south-east.

Earlier, the weather service said an intense cut-off low system will affect the eastern parts of the Western Cape, south-eastern Northern Cape, Eastern Cape and KwaZulu-Natal on Monday and only the Eastern Cape and KwaZulu-Natal on Tuesday.The weather service also said that there is an 80% probability of rainfall which may be accompanied by hail, strong wind gusts and heavy downpours.

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"There is, however, a strong likelihood that gale force winds of a damaging nature as well as rough to very rough sea conditions may develop along the Wild Coast and KwaZulu-Natal on Thursday."
These extreme weather conditions were due to the development of an intense trough (an extension of a low pressure) in the upper portions of the atmosphere, which was expected to move over the country on Wednesday, they said.

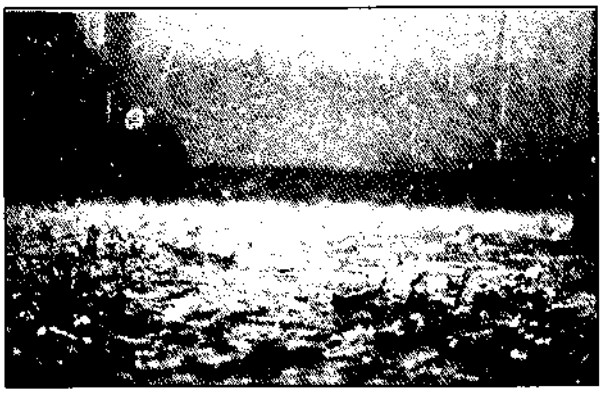
By Friday, this weather system is expected to exit the country, when rainfall will be restricted to the eastern extremities of the country, heralding a return to dry, settled weather this weekend.

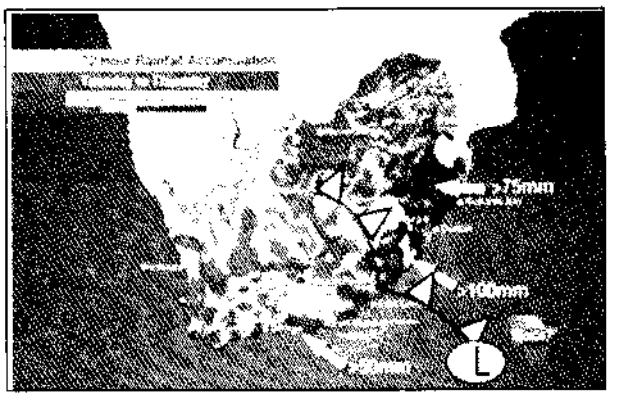
The weather service advised the public and small stock farmers that very cold conditions are expected over high lying areas. Moreover, snowfall is expected over the Drakensberg from Monday evening to Tuesday morning.

1. Explain what a cut-off low pressure cell is.
2. Describe briefly how a cut-off low forms.
3. State which other low pressure cell is associated with this weather phenomenon.
4. In which direction will the cut-off low move? Give a reason for your answer.
5. Explain how such a phenomenon may impact coastal provinces like KwaZulu-Natal.
6. Why would this system 'lose' its effect on the eastern parts of South Africa by Friday?
7. How are small stock farmers likely to be affected by such weather conditions?
8. Describe a few precautions that such farmers can engage in to survive the cut-off low weather conditions.
9. Explain why disaster management officials need to be on 'full alert' when such weather conditions prevail.
10. Suggest measures to officials and community members on ways to manage such conditions in order to minimise loss of life, injuries and loss of property.

Activity 1.12

Study the source materials provided and then attempt the questions set:





Another spring cut-off low is set to affect all of the country over the next few days. An approaching trough system deepens into a low over the Cape provinces and will sweep across South Africa between today and Thursday.

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Unusual Weather?

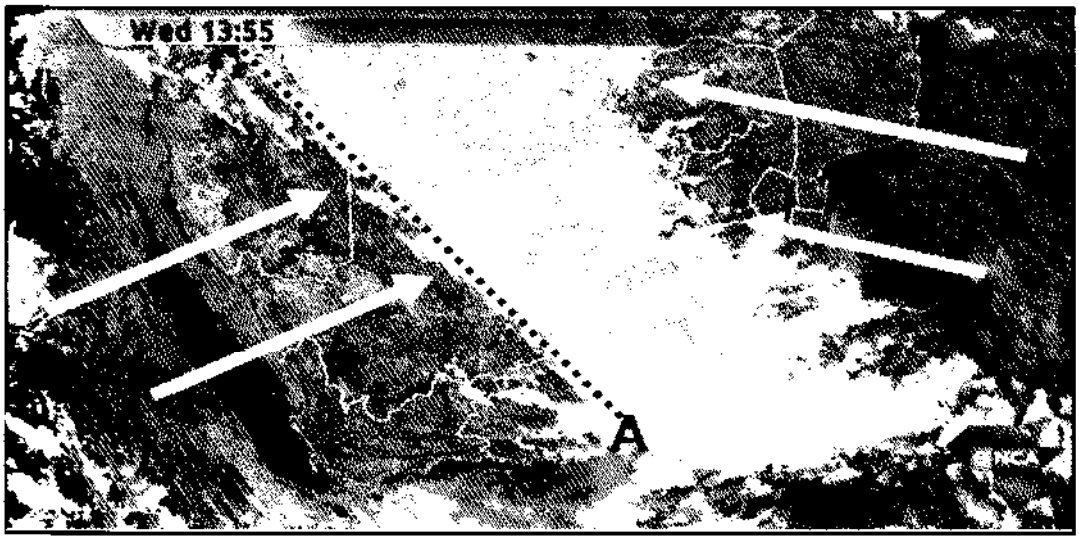
Severe weather conditions can always be considered to be out of the ordinary, but the transition seasons (autumn and spring) often bring turbulent weather conditions to most parts of the world and South Africa is no different. These are also the times of year when cut-off lows are most frequent. They are one of our most prolific rainfall producing systems but can also result in a number of severe weather phenomena, affecting vast areas over several days and these types of weather systems have even been known to bring rare mid-summer snowfalls to the Drakensberg Mountains.

eNCAWeather

1. Identify the weather system that is affecting South Africa above.
2. From which direction will the system identified above "sweep across South Africa between today and Thursday"? Give a reason for your answers.
3. Explain why these systems are 'rainfall-producing'?
4. State a condition that may lead to higher amounts of rainfall (75mm to +100mm) being experienced over the eastern parts of the country?
5. Describe the "severe weather phenomena" associated with such systems.
6. These systems may be viewed as both a blessing and a curse to farmers in South Africa. Explain this statement.
7. By late October to early November residents should begin packing their warm clothing away. Do you agree? Substantiate your answer.

Activity 1.13

Study the sketch depicting a line thunderstorm.



1. Name the season during which line thunderstorms occur.
2. Name the TWO high-pressure systems responsible for the formation of line thunderstorms.
3. Name TWO weather conditions associated with line thunderstorms.
4. Give a reason for the shifting of the Kalahari High-Pressure Cell during a line thunderstorm.
5. What is a moisture front / trough line (A)?
6. On which side of the moisture front do line thunderstorms develop? Explain your answer.

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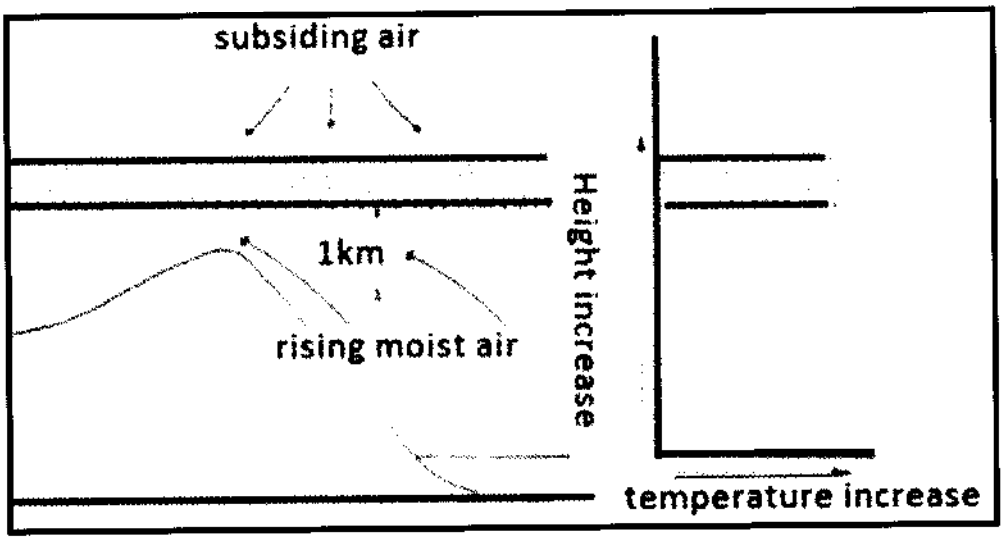
7. Name the cloud type that is associated with the development of line thunderstorms.
8. Are line thunderstorms typically frontal / cyclonic or convectional thunderstorms? Give ONE reason for your answer.
9. In a paragraph of approximately EIGHT lines, evaluate the impact of line thunderstorms on farmers in the interior of South Africa.

Activity 1.14

Refer to the inversion layer below over the east coast of SA.



1. What is an inversion layer?
2. Does the sketch represent winter or summer conditions? Give a reason for your answer
3. Describe TWO weather conditions that one could experience in the interior of South Africa during the season mentioned.
4. Name the pressure cell that is likely to dominate the land in this season.
5. Why is the air moving from the ocean onto the land?
6. Account for the air being moist.

Activity 1.15

Refer to the synoptic map provided.

1. Is this a typical summer or winter map?
2. Give TWO pieces of evidence from the map to support your answer to question 1.
3. What evidence suggests that Charlie is the third cyclone to strike the coast of Maputo.
4. Draw a cross section of Charlie from G to H indicating all air movements.
5. Identify the low pressure cell labelled **E**.
6. Why is pressure cell E associated with light rain along the east coast?
7. Indicate why the surface winds that diverge out of cell **A** are dry and cold.
8. Refer to the weather station D:
    a. State and account for the wind direction.
    b. Suggest a reason for the low temperatures although it is summer.
9. Account for the position of cyclone G.
10. Evaluate the following statement: "the economic advantages of mid-latitude cyclones outweigh the disadvantages to the Western Cape economy".

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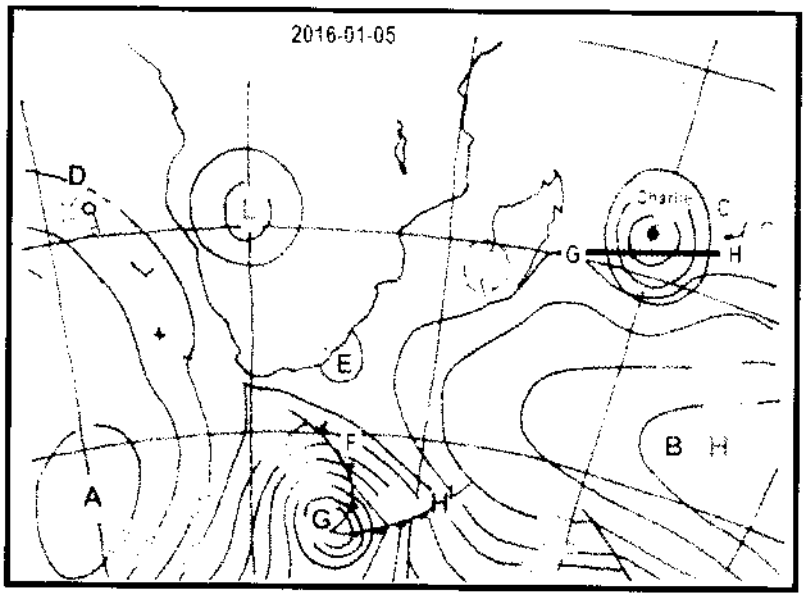
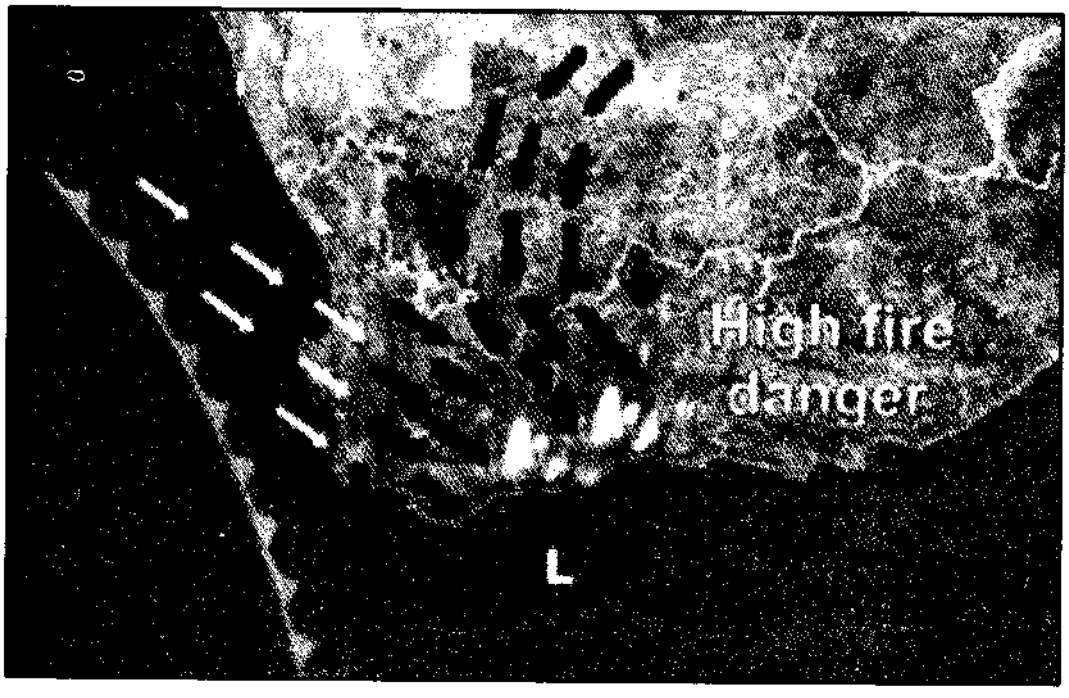


Activity 1.16
Berg wind conditions.



1. Name the high-pressure cell that is causing subsidence over the plateau.
2. How does the berg wind affect the weather along the southeast coast of South Africa?
3. Explain the impact of berg winds on farming and the health of humans.
4. State possible measures that can be introduced to reduce the impact of berg winds.
5. During which season do berg winds mainly affect the weather along the southeast coast of South Africa?
6. Account for the berg winds being 'hot and dry'.
7. How does a steep pressure gradient influence South African berg winds?

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LOCAL CLIMATE

This refers to the study of climates over a small area such as within a valley or in a city.

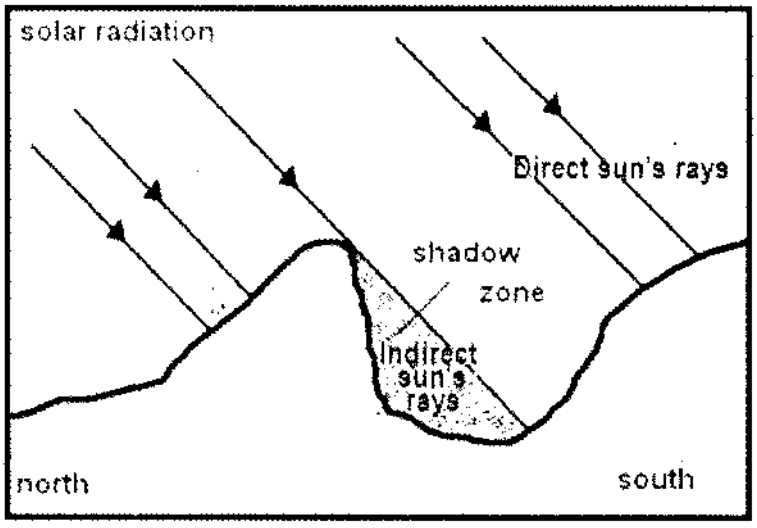
VALLEY CLIMATE

Valley climate refers to the specific micro climate[3] occurring in valleys.

Slope / Aspect

The situation of mountain or hill slopes in relation to the sun's rays is known as aspect. The angle at which the sun's rays strike the slopes will determine the climate within the valley.

- Slopes facing the equator receive direct insolation and are warmer.
- Slopes facing the poles receive oblique insolation and are cooler.
- In the southern hemisphere :
    - the north facing slopes are warmer as these receive direct insolation
    - the south facing slopes are cooler because of oblique sunshine.



- In the northern hemisphere the north facing slopes are cooler and the south facing slopes are warmer.
- The shaded area represents the shadow zone.

The influence of aspect on human activities and the environment

Economic activities:

- In mountainous areas slopes facing the poles are suitable for forestry.
- Fruit farmers grow grapes for wine making and table grapes on the warm north facing slopes because they require sunlight to ripen and sweeten. Citrus fruit that have thick skins are cultivated on the cooler south-facing slopes.

[3]Weather conditions such as temperature, wind and humidity are confined to small areas such as a valley.

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Settlement:

- In the southern hemisphere people prefer to settle on the warmer north facing slopes. Property values are high and these sites are occupied by high income residential areas.

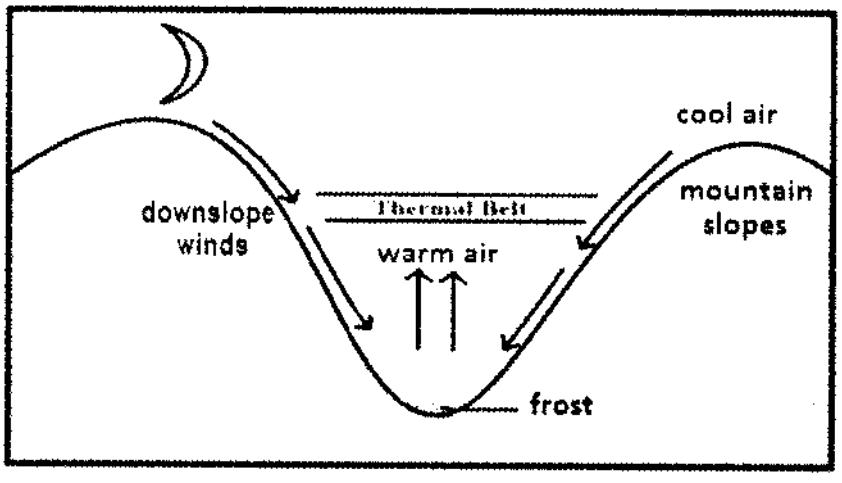
Vegetation:

- Dense vegetation such as forests, shrubs and ferns flourish on the south facing slopes which have cool and moist conditions.
- Sparse hardy vegetation such as grass and succulents are found on the warm and dry north facing slopes.

Valley winds:

Katabatic winds

- Katabatic winds refer to the down slope movement of air in a valley.
- These occur at night when the valley slopes cool through earth radiation. The air in contact with the slopes also cools and sinks under the influence of the force of gravity to the valley floor.
- This cold air forces the warm air within the valley to rise resulting in an inversion. (Temperature increases with height in the valley).



- The zone where the warm air accumulates midway up the valley is called the **thermal belt (warmest part of the valley).**
- When the temperature of the cold air drops to below freezing point **frost**[4] forms on the valley floor, and is called a **frost pocket**.
- When the air in a valley cools to below dew point temperature, condensation occurs and **fog**[5] forms. This is referred to specifically as **radiation fog**. Occurs at night only under the following conditions:
    - Calm conditions or a light breeze
    - Clear skies
    - Stable atmospheric conditions
    - Relatively high humidity

[4]Frost: ice particles formed when temperature drops to below zero degrees.
[5]Fog: a form of stratus cloud lying close to the ground.

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The influence of katabatic winds on:

Farming

- Farmers locate citrus farms (oranges) on the floor of the valley because the cold conditions suit the maturing of the crops before harvesting and destroys insect-pests.
- Deciduous fruit farmers (apples and pears) plant on the middle slopes as the warm temperatures favour the ripening of the fruit and there is less risk of the fruit blossoms being destroyed.
- Frost resistant crops are grown on the valley floor e.g. tubers
- Soil is kept moist by melting snow

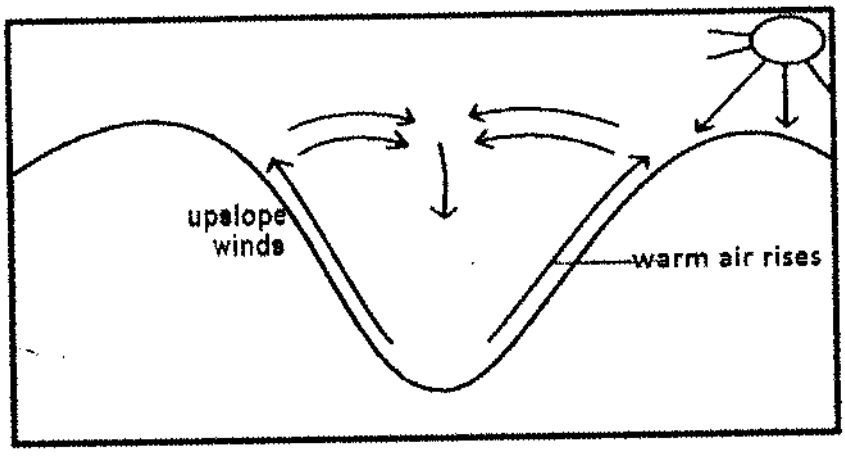
Settlement

- Land and property values are higher on the warmer middle slopes which lie within the thermal belt.
- Katabatic winds trap pollutants released by heavy industries within the valley at night. **Smog**[6] forms and this leads to respiratory problems such as asthma and wheezing.
- The valley floor is generally cold and damp and is not suitable for settlements.

Transport

- Fog occurs on calm, cloudless nights within the valley and this reduces visibility. Motorists are particularly affected and this leads to an increase in accidents.

Anabatic winds



- Also known as upslope winds.
- Occurs during the day when the slopes are heated causing the warm air to rise against the slopes.
- It is a gentle movement of air up the slope.

Significance of anabatic winds

- The smoke released during the day into the lower atmosphere by industries located within the valley is carried away by anabatic winds.

[6]Smog: mixture of fog and pollution.

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CITY OR URBAN CLIMATES (HUMAN-MADE)

- Large urban areas develop their own climatic characteristics in comparison to the surrounding rural regions.
- The shape and structure of the urban area are generally responsible for the city's micro-climate.

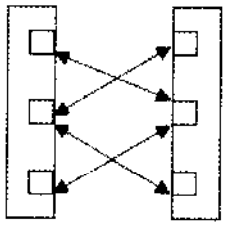
General differences between urban and rural areas

Climatic element	Urban vs rural	Reasons
Cloud cover	More clouds in a city	High levels of pollution from cars, factories etc. produce more condensation nuclei.
Precipitation	More rain in a city	More clouds will result in higher rainfall. Fog occurs more often, mainly in winter.
Relative humidity	Lower humidity in a city	The lack of vegetation and water surfaces limit evaporation. Drainage systems channel water away from a city.
Wind speed	Lower wind speeds	Buildings obstruct air flow but at the same time increases turbulence.
Temperature	Higher temperatures in a city	Reasons are discussed below.

Factors contributing to higher city temperatures

- **Geometric shapes of building:**
  - Buildings are tall thus causing the sun's rays to be reflected and deflected between the buildings.
  - This causes a larger surface area to absorb the sun's heat and the heat remains closer to the earth's surface for a longer period leading to higher temperatures.

- **Artificial substances:**
  - Concrete and metals are used in the construction of buildings therefore more heat is retained.
  - Many modern buildings are made of glass and mirror and this leads to the **multiple reflection** of heat which raises the temperature.
  - Soil and vegetation absorb less heat in rural areas.



- **Urban activities:**
  - Cities have more heat-generating activities such as restaurants, hotels, businesses and offices that produce heat.
  - Vehicles and industries increase the production of pollutants such as dust, soot and greenhouse gases that absorb and retain heat for longer.

- **Building density**:
  - The large number of tall buildings reduces the flow of air (wind) in the city centre and temperatures remain high.
  - Heat is also trapped between the buildings because of the building density.

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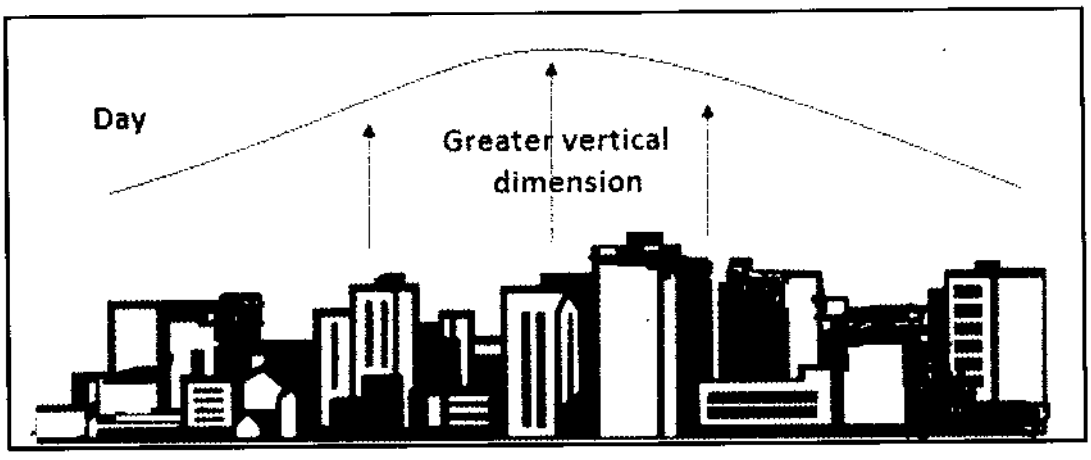
- **Efficient drainage system:**
  - Tarred surfaces and underground drainage systems remove water from the surface quickly and efficiently, reducing the rate of evaporation thus causing the atmosphere to be hot.

- **Higher population:**
  - Large numbers of people enter the city during the day and contribute to the higher temperature.
  - People also use many conveniences, for example air conditioning, heaters, geysers, cooking apparatus, etc. that produce heat.

Heat Island

This refers to an area of **higher temperatures in an urban area surrounded by lower temperatures** in the rural areas.

- Occurs during the day.
- Indicated by **isotherms** which are lines that join places with the same temperature on maps. The isotherms (shape) have a greater vertical dimension because of warm rising air during the day.



- **Factors that alter the shape of a heat island:**

1. Industrial and commercial decentralisation in a city alters the shape of a heat island.
2. A cluster of high rise buildings e.g. hotels.
3. River or dam will have a cooling effect.

Pollution dome (Dust dome)

A pollution or dust dome consists of an accumulation of soot, dust, smoke and other pollutants that forms over a city due to the high level of pollutants released by cars, industries, etc.

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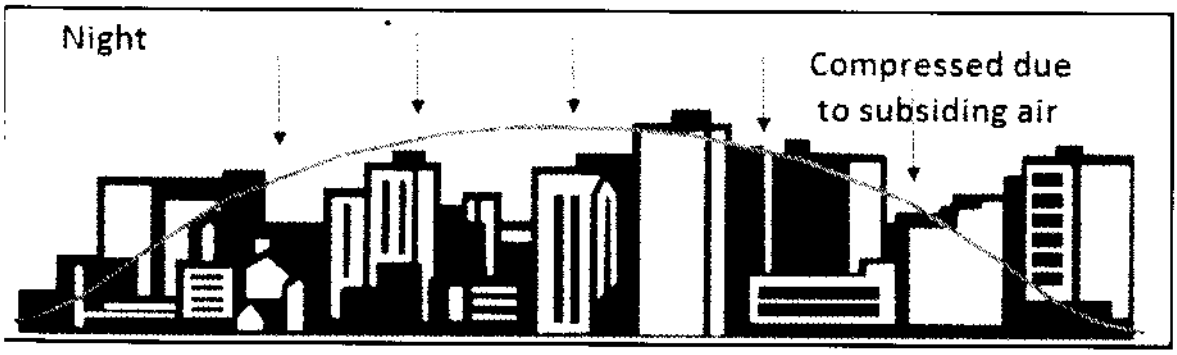
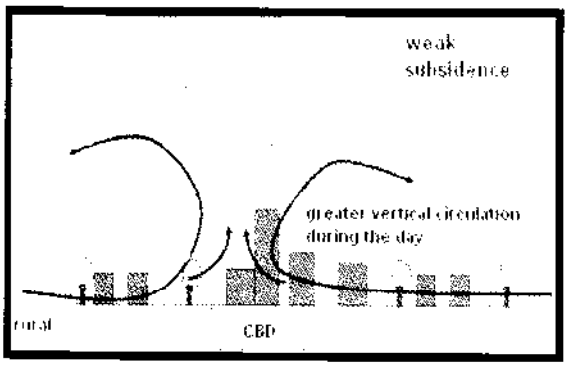
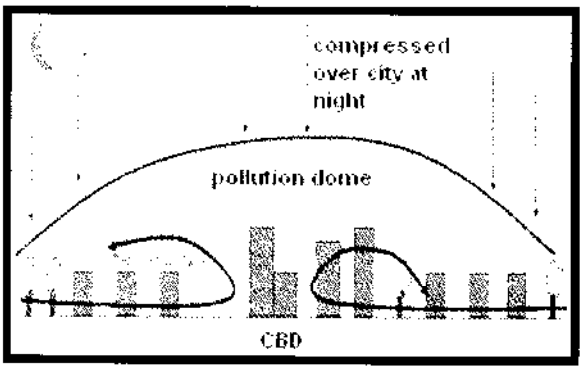


- It is more concentrated at night and is dome shaped.
- Subsiding cold air over the city at night traps and prevents the pollutants from rising into the upper atmosphere
- The pollution dome is compressed over the city due to cold subsiding air at night.
- It is most pronounced during winter months because the low temperatures produce strong inversion conditions causing pollutants and heat to be trapped.
- A pollution dome can be dispersed by strong winds or rain.
- Associated with acid rain. Acid rain stunts the growth of plants and corrodes buildings.

Difference between the urban heat island and pollution dome

Day (summer)	Night (winter)
• The heat island is dominant during the **day** due to higher temperatures. • Has a greater **vertical dimension** and is not well defined.	• The dust dome is strongly developed at **night** due to cooler temperatures and subsiding air • Well defined and **compressed (dome shaped)** over the city.





The effects of heat islands or pollution domes

- People suffer from **respiratory diseases** such as asthma because of exposure to increased amounts of pollution.
- The quality of life of people is lowered since pollutants result in urban inhabitants suffering from allergies, for example **irritation of their eyes** and skin disorders.
- Heat stress may result in heart ailments that could result in death amongst the elderly.

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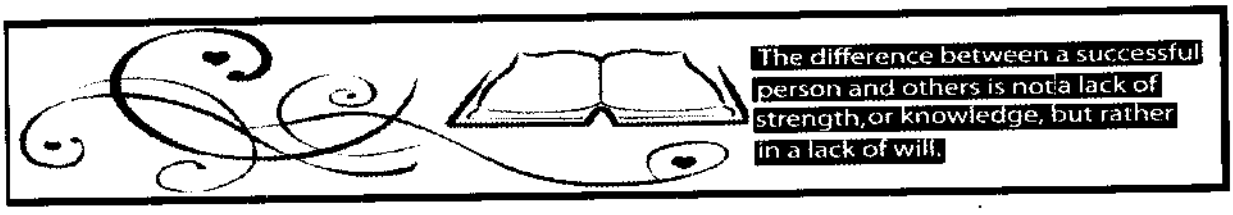
- **Acid rain**[7] stunts the growth of plants and corrodes buildings.
- **Smog and fog reduces visibility** increasing the incidence of accidents amongst motorists.
- The presence of large quantities of hygroscopic nuclei like dust and soot particles promotes condensation which causes more rainfall over a city.
- Dust domes contribute towards global warming as terrestrial radiation is trapped by the pollutants that hang over a city.
- Decrease the number of vehicles that enter the CBD.

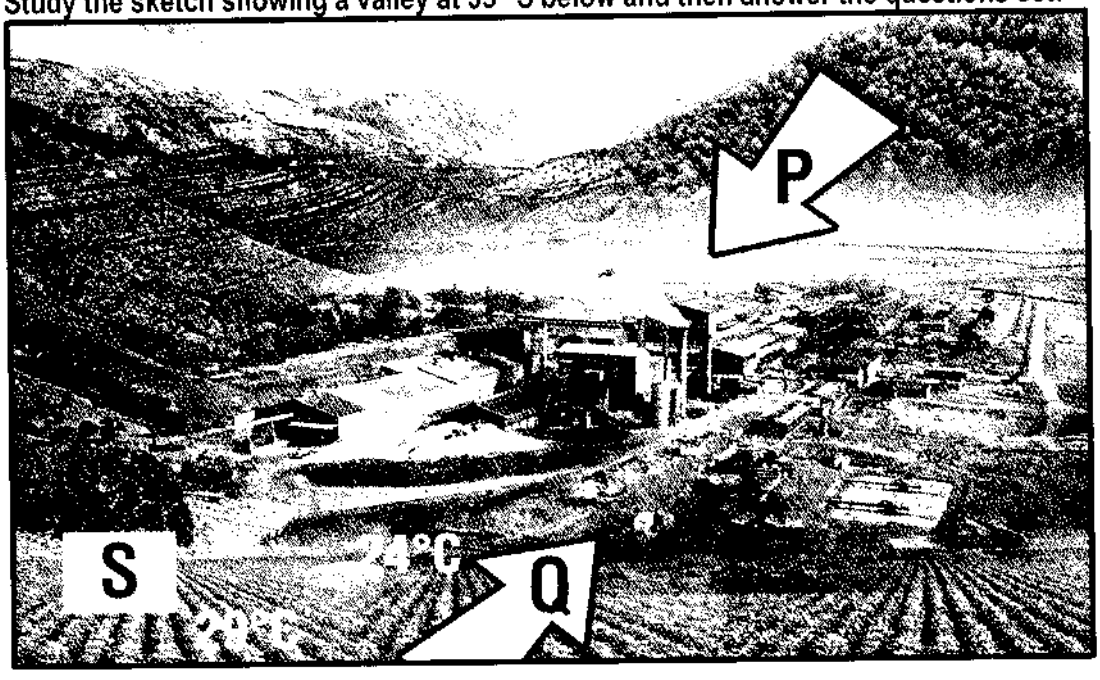
Reducing the effects of heat islands or pollution domes

- Planting more trees in urban areas helps to absorb carbon dioxide which is responsible for trapping heat.
- The roof spaces on high rise buildings are used to establish roof gardens which prevent metallic or concrete roof surfaces from absorbing and retaining large quantities of solar energy.
- The use of building materials such as reflective paints that are more reflective prevents heat from entering the lower atmosphere.
- Industrial and commercial decentralisation result in large numbers of shoppers and workers moving to outlying areas.



Activity 1.17

Study the sketch showing a valley at 35° S below and then answer the questions set:



[7]Rain that has pollutant gases such as sulphur and nitrogen oxides that are released from the burning of fossil fuels.

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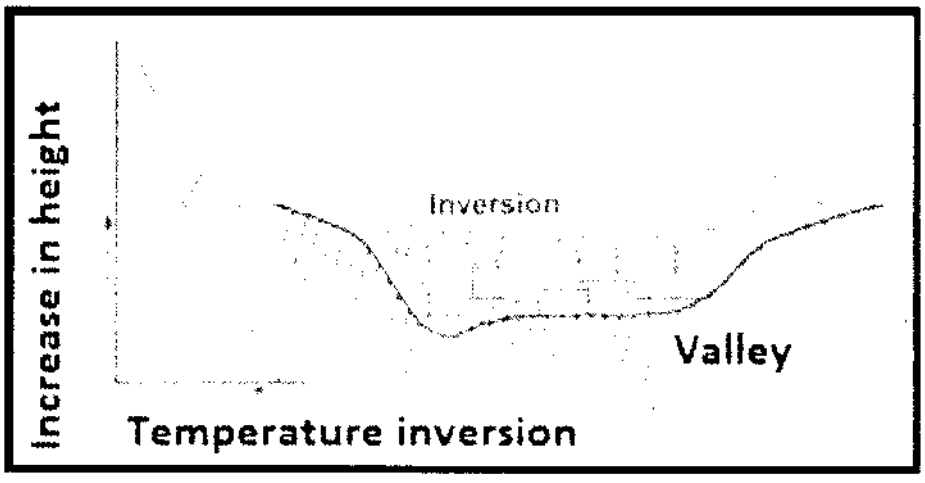
1. Slope Q is the (equator, polar) facing slope.
2. Compare, with reasons, the temperatures of both slopes P and Q.
3. Explain how the difference in temperatures will influence settlement and cultivation on these slopes.
4. S has been earmarked for a high-income residential development. Is this a good choice for such a development? Substantiate.
5. Describe how temperatures at night can impact negatively on residents on the valley floor.
6. Describe the advantages and disadvantages of locating the sawmill on the valley floor.
7. Winds that blow up the slope of the valley during the day are termed (anabatic, katabatic) winds while winds that form at night are termed (anabatic, katabatic) winds.
8. Using simple sketches, describe briefly the formation of anabatic and katabatic winds.
9. Explain why farmers in the valley prefer to plant frost-resistant varieties of crops in the valley and frost-sensitive crops on the equator-facing slopes.

Activity 1.18

Below is a large city that has developed on the valley floor.

1. The sketch depicts an example of local climate. What is local climate?
2. Explain why it will be difficult for pollutants to escape from the illustrated valley.
3. How will the presence of pollutants in the valley affect the temperature of the city? Explain your answer



4. Mention TWO effects of an increase in pollutants on humans.
5. Provide TWO possible solutions to reduce pollution in this valley.

Activity 1.19

Study the sketch before answering the questions set:

1. What is a heat island?
2. Describe how a heat island forms.
3. Name the part of the urban area (**A**) that records the highest day-time temperatures.
4. State THREE factors that contribute to the high temperatures in area A.
5. Suggest TWO reasons for the drop in temperature being experienced at **B**.
6. Comment on the unusual shape of the isotherm at **C.**

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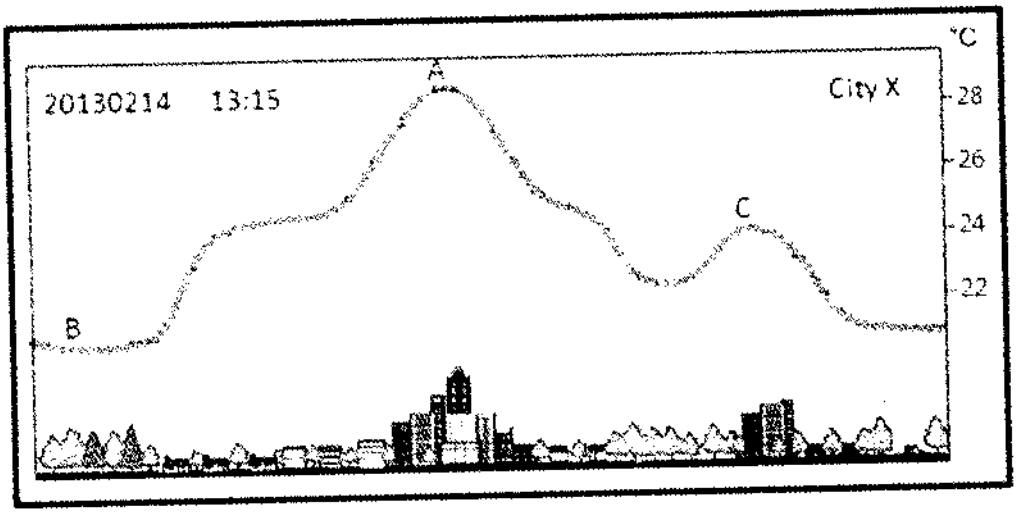
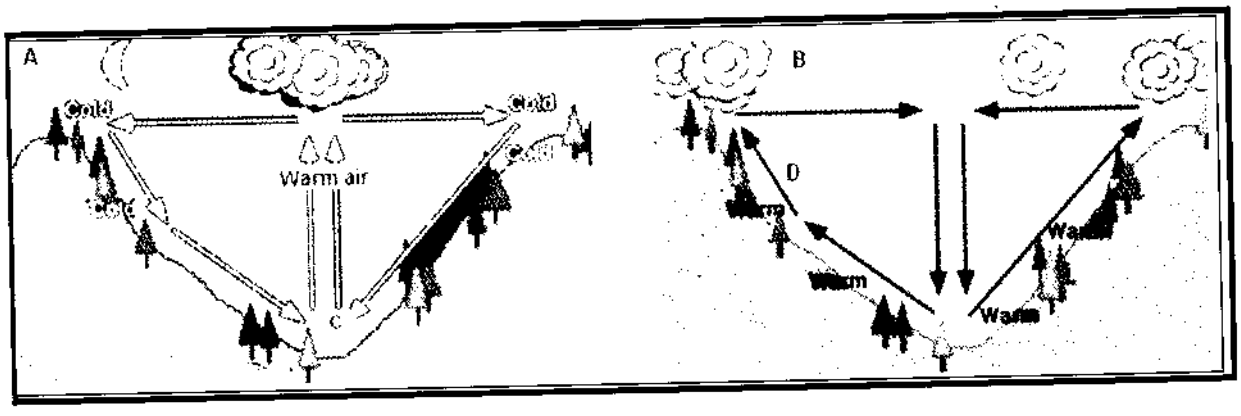
7. Describe two ways in which city planners are designing urban centres to reduce the urban heat island effect.
8. Explain the impact of heat islands on:
   a. Water supply
   b. Electricity usage



Activity 1.20

The winds illustrated below are common in mountainous areas.



1. Name the type of winds blowing in:
   valley **A**
   valley **B**

2. State the approximate time that each air movement is likely to take place.
3. Suggest a reason for the difference in the direction of air movement in valley **A** and **B**.
4. If temperatures drop below 0^0 overnight what form of precipitation will occur at **C**?
5. Settlements are more likely to locate at point **D** on a valley slope. Explain.
6. Tabulate two differences between the winds being experienced in valley **A** and **B**.
7. Why do temperatures increase with height in valley **A**?
8. How do the winds in valley **A** contribute to respiratory problems?
9. How do the temperatures experienced at **C** influence farming?

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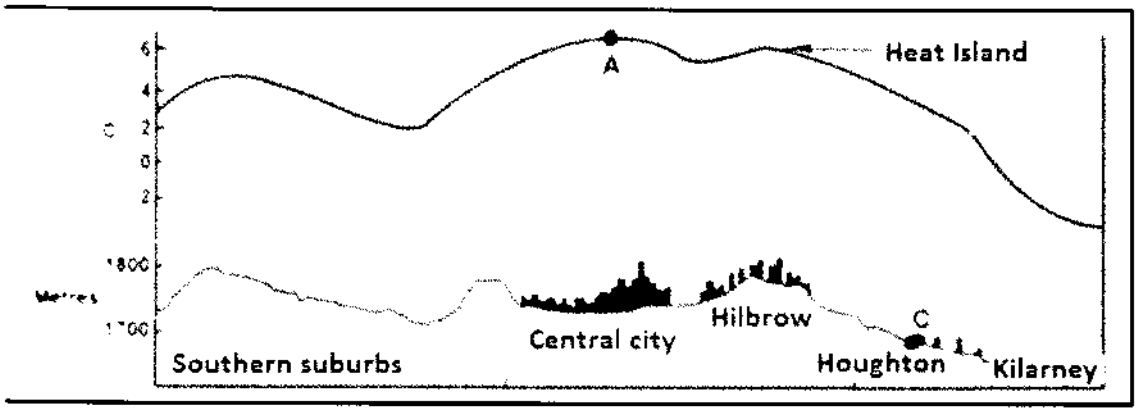
Activity 1.21

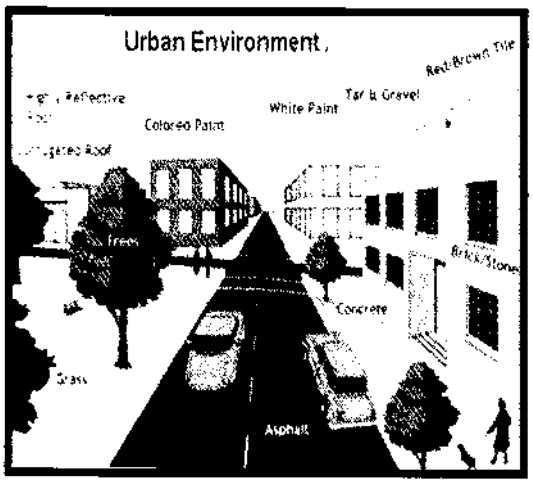
Study the sketch on urban climates.



- Name the lines on a map indicating equal temperature.
- State the approximate altitude (height) of Hillbrow.
- State the temperature above the city at the point labelled **A**.
- What aspect of micro-climate is indicated in the sketch?
- State and explain any THREE factors that are responsible for the higher temperatures over the city.
- Explain how the conditions shown in the sketch may influence the health of the people living in the city.
- Provide TWO possible solutions to the problem mentioned.
- Explain how commercial decentralisation will impact on the heat island effect.
- Why is the concentration of pollutants greater during the night over the city as compared to the day?

Activity 1.22

Read the excerpt and examine the sketch before attempting the questions that follow.



The increased heat of our cities increases discomfort for everyone, requires an increase in the amount of energy used for cooling purposes, and increases pollution. Each city's urban heat island varies based on the city structure and thus the range of temperatures within the island varies as well. Parks and greenbelts reduce temperatures while the Central Business District (CBD), commercial areas, and even suburban housing tracts are areas of warmer temperatures. Every house, building, and road changes the microclimate around it, contributing to the urban heat islands of our cities.

1. The range of temperatures experienced within a city varies. Name two factors from the sketch that increases temperature and two factors that decrease temperature.
2. What concept describes the difference in temperature being experienced between rural and urban areas?
3. Dust domes are associated with urban activities:
   - 3.1 What is a dust dome?
   - 3.2 Name TWO urban activities that cause dust domes.

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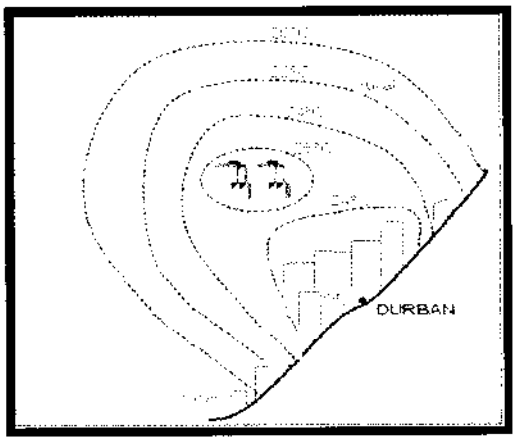
3.3 Why are dust domes more intensely formed over the city in winter?
3.4 What impact do these domes have on the health of people?

4. As a city planner what measures would you put in place to reduce the temperatures in a city?

Activity 1.23
Study the sketch

1. Identify the concept represented by the concentric isotherms in the sketch.
2. Give a reason for the high temperatures in the city of Durban.
3. What is the relationship between temperature and precipitation in the city?
4. How do industries and motor vehicles contribute to the higher levels of precipitation in the city?
5. Explain how this rainfall may harm crops in nearby farms.
6. As a municipal officer, how can you reduce the effect of this rainfall on our food crops?
7. Illustrate a night-condition of air circulation in the city. Label the air movements.



Examples of paragraph type questions

1. In a paragraph of approximately 8 lines, write down the strategies to be implemented to reduce the heat island effect in urban areas.
2. In a paragraph of approximately 8lines, explain the impact of the thermal layer of warm air on human activities in a valley.
3. Write a paragraph of approximately 8 lines explaining the influence that katabatic winds has on the location of settlements and farming activities.
4. In a paragraph of approximately 8 lines, evaluate the impact of line thunderstorms on farmers in the interior of South Africa.
5. Evaluate in a paragraph of approximately 8 lines the impact that approaching cold fronts would have on the fishing industry of the South-Western Cape.
6. In a paragraph of 8 lines explain the development of a cold front occlusion.
7. Write a paragraph to explain the economic and environmental impact of tropical cyclones.
8. In a paragraph of approximately 8 lines explain why less economically developed countries (LEDCs) are more severely affected by tropical cyclones than more economically developed countries (MEDCs).
9. Write a paragraph of 8 lines to account for the weather associated with the passage of a cold front.
10. Suggest in a paragraph of 8 lines some of the dangers associated with cold fronts and the precautionary measures that can be taken.
11. Write a paragraph to explain why berg winds are seen as being damaging to the economy.

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MODULE 2

GEOMORPHOLOGY

This module includes the following topics:

- Drainage Systems in South Africa
- Fluvial Processes
- Catchment and River management

KEY CONCEPTS

BASE LEVEL	The lowest level to which a river can erode
COURSE	The path taken by a river
DRAINAGE BASIN	Area drained by a river and its tributaries
DRAINAGE PATTERN	Surface pattern formed by a river and its tributaries
IMPERMEABLE	Hard rock that does not allow water to pass through
KNICK POINT	A break in the profile of a river
TRIBUTARY	A smaller river that feeds into a larger river
CATCHMENT AREA	Area from where a river gets its source of water
SOURCE OF RIVER	Starting point of a river
MOUTH OF RIVER	Point where the river enters the sea
CONFLUENCE	Place where two rivers join
WATERSHED	High lying land separating two drainage basins
LONGITUDINAL PROFILE	Side view of a river from its source to its mouth
CROSS PROFILE	View of a river from bank to bank
PERMANENT RIVER	Flows all year round
SEASONAL RIVER	Only flows in the rainy season
STREAM ORDERING	Method used to classify streams
REJUVENATION	A river that regains its energy and erodes vertically again
RIVER CAPTURE	When one river robs another of its headwaters
SUPERIMPOSED STREAM	A river that is younger than the underlying rock structure through which it flows
ANTECEDENT STREAM	A river that is older than the underlying rock structure through which it flows

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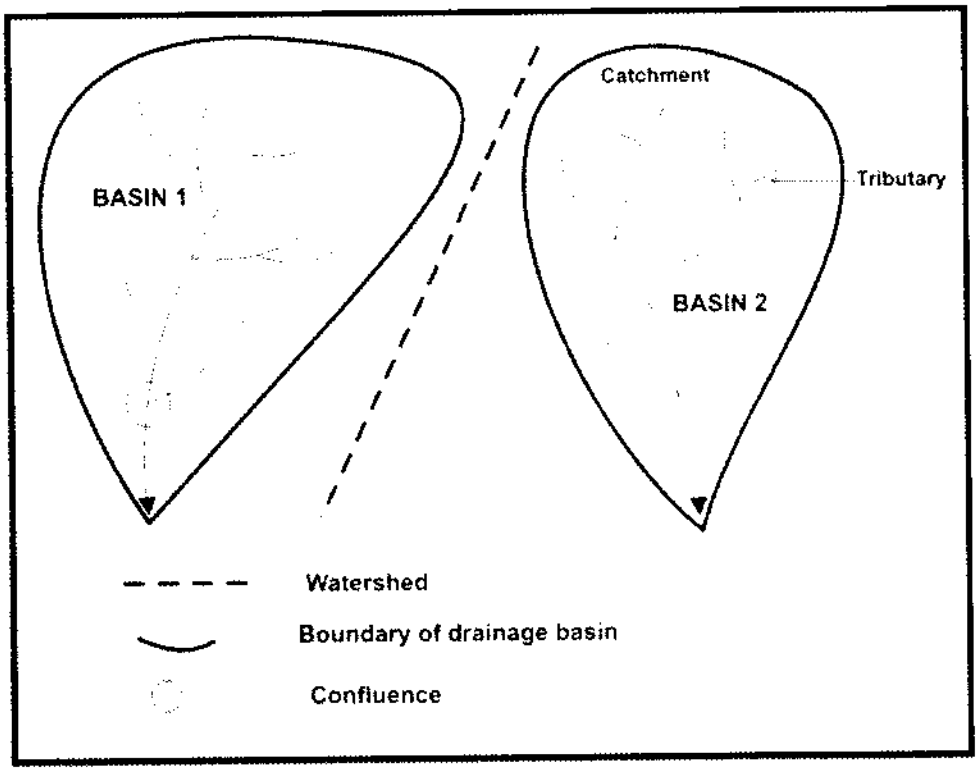
DRAINAGE SYSTEMS IN SOUTH AFRICA



Important Concepts

Drainage basin: Area drained by a river and its tributaries.

Catchment area : Refers to the upper reaches of a drainage basin which supplies a river with water, example, the Drakensberg Mountain is a catchment for many South African rivers.

River system: Refers to the main river and its tributaries.

Watershed: It is a high lying area (spur, mountain, ridge) that separates two different drainage basins.

Interfluve: Land that separates streams in the same drainage basin.

Tributary: Smaller streams that join the main stream

River mouth: Point where the river enters the sea,

River source: Starting point of a river

Confluence: Point where two or more rivers join or meet.

Surface run off: water that flows on the surface after it rains

Infiltration: Water that seeps into the ground after it rains

Ground water: water found within the earth's surface

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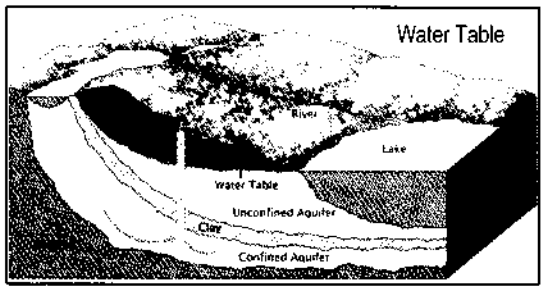
Water table

- Refers to the **upper limit** of water that is found **underground**
- The water table tends to be higher in summer because of higher rainfall. Other factors that give rise to a higher water table include: natural vegetation that traps surface water and increases infiltration, gentle slopes, permeable rocks and moist soils.
- The building of bore holes and wells would decrease ground water levels.

Types of rivers



a. Permanent

- Flows all year round.
- Associated with high rainfall areas.

b. Periodic/seasonal

- Flows only in the rainy season.
- Characteristic of area with high summer rain and dry winters.

c. Episodic

- Flows only after a heavy rainfall or thunderstorm.
- The river flows for a few hours.
- Characteristic of arid areas
- Also occurs in areas where soil evaporation is high, and ground water is low

d. Exotic

- Originates in areas of high rainfall but flows through dry areas e.g. the Orange River. These types of rivers commonly occur on the west coast of South Africa.

Types of drainage patterns

Pattern	Description	Underlying rock structure
Dendritic	• **Resembles the branch of a tree** • Tributaries join the main river at acute angles	• Occurs on rocks that have a **uniform/equal resistance to erosion** • Associated with horizontal sedimentary and massive igneous rocks.
Rectangular	• **The main streams have 90⁰ bends** along its course • The tributaries join the main stream at 90⁰	• Forms on **igneous rocks that have many joints** • Also forms in horizontal sedimentary rocks with many joints and faults

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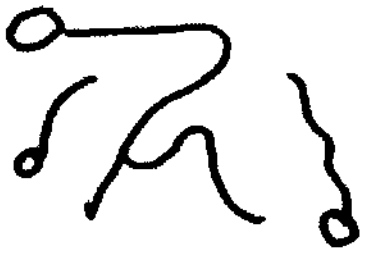
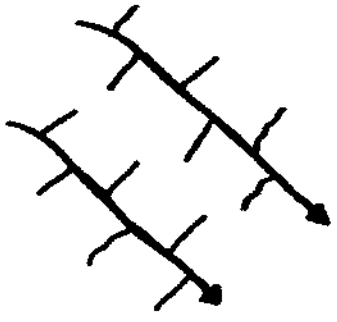
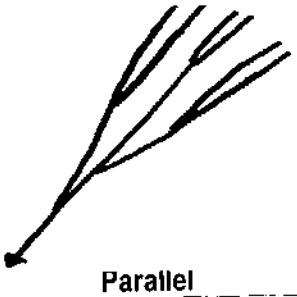
 Radial centrifugal	• Rivers flow away from a central point such as a volcano or a dome • It **resembles the spokes of a wheel**	• It forms in areas where **domes and volcanoes** occur • It is associated with massive igneous rocks
 Radial centripetal	• Rivers **flow towards a central point or depression** • The central point could be a lake, a pan or a basin	• **Associated with massive igneous rocks**
 **Deranged / intermittent**	• It has a **haphazard pattern** • There are many lakes and swamps • Develops from the disruption of a pre-existing drainage pattern	• It forms in areas that have been recently exposed or formed (**geologically young**)
 **Trellis**	• The **main streams are parallel to each other** • Short tributaries join the main river at right angles • Tributaries often flow from gaps or ports.	• Forms on rocks which has **varying resistance to erosion** • Found in fold mountain regions and areas of inclined strata • Associated with sedimentary rocks which has alternate layers of hard and soft rock
 **Parallel**	• Tributary streams tend to stretch out in a **parallel-like** fashion following the slope of the surface.	• It occurs in areas of **major faults.** • Areas of steeply folded bedrock. • Resistant rock bands

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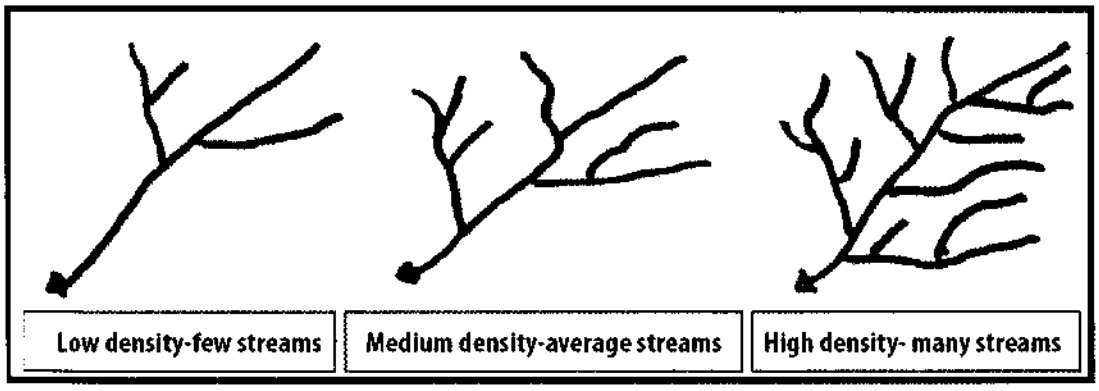
Drainage density

Drainage density is a measure of the total length of streams per unit area. The greater the number of streams in a basin, the higher the drainage density will be.

- A drainage basin can be described as having a low, medium or high density.



Factors influencing drainage density

Drainage density varies from area to area. There are several factors which influence drainage density. The same factors that affect **runoff, infiltration and the depth of the water table**:

More infiltration will cause fewer streams to occur, causing a low drainage density, high water table.
More runoff will cause more streams to occur, causing a high drainage density, low water table.

Factors influencing drainage density	Low drainage density	High drainage density
Amount of rainfall (precipitation)	Density is usually lower in places that experience a dry climate, e.g. the arid region of the Karoo	Density is usually higher in places that experience a wet climate, e.g. East Coast of South Africa
Gradient (slope)	Gentle slopes increase the amount of infiltration into the ground thus resulting in lower density	Steeper slopes increase the amount of runoff into streams causing higher density
Permeability	Permeable rocks allow more infiltration. Therefore less surface streams develop and density is low. For example chalk and limestone	Impermeable rocks promote runoff. Therefore more surface streams will develop and density is high. Example on basalt and granite
Porosity	Rock that is porous will allow more infiltration, and less surface streams will develop therefore density is low	Rock that is non-porous promotes runoff, therefore more surface streams will develop and density is high

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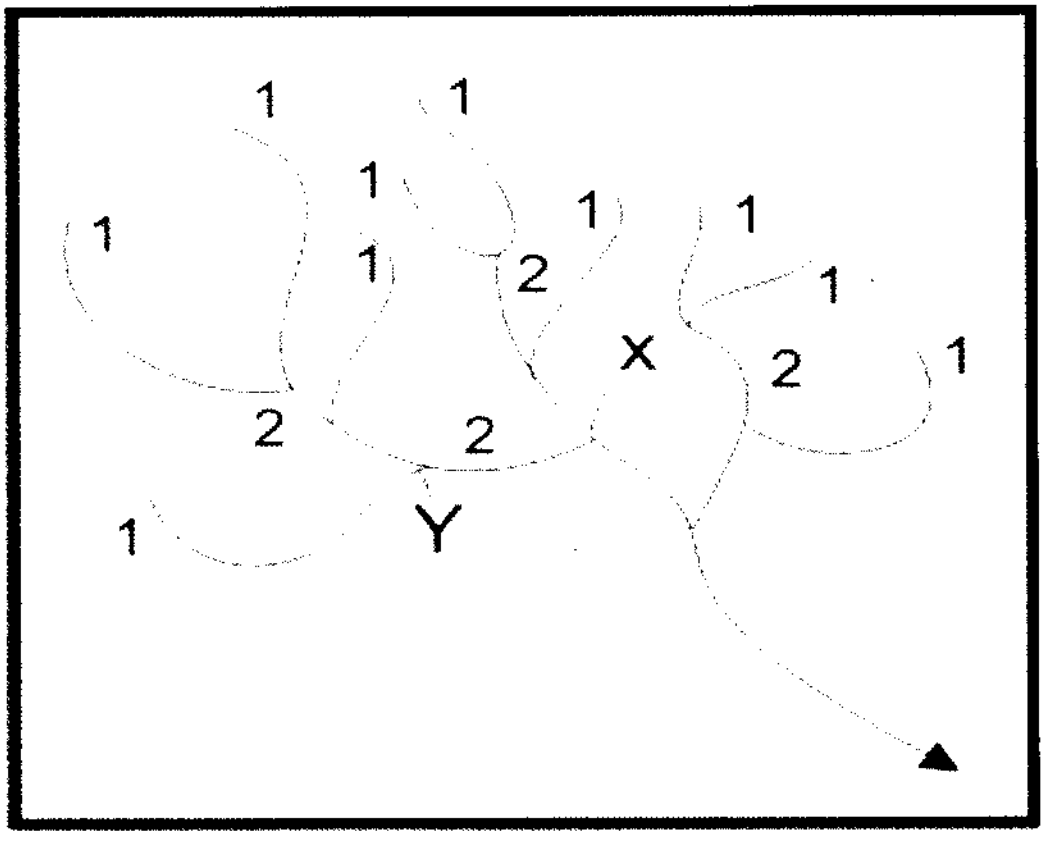
Soil moisture	Dry soils absorb water therefore stream runoff is reduced and drainage density is low.	Infiltration is low in soils that have high moisture content. More channels form due to greater surface run-off and drainage density is high.
Vegetation	Lots of vegetation cover results in greater infiltration into loose soils. This leads to lower drainage density.	In areas where the vegetation has been removed by soil erosion, the formation of gullies is promoted therefore resulting in higher drainage density.

Stream ordering

This is a **method of classifying streams** so that the size of drainage basins can be compared.



- The smallest streams (**finger-tip** tributaries) are classified as first order streams.
- When two first order streams meet at a confluence they form a second order stream.
- When two second order streams meet they form a third order stream.
- The order of the stream will continue to increase in the manner described above provided that two streams of the same order meet (**X** on diagram).
- The order does not change when two different order streams meet. For example, when a first order tributary meets a second order stream, the stream will remain an order two stream (**Y** on diagram). The value of the higher order stream is retained.

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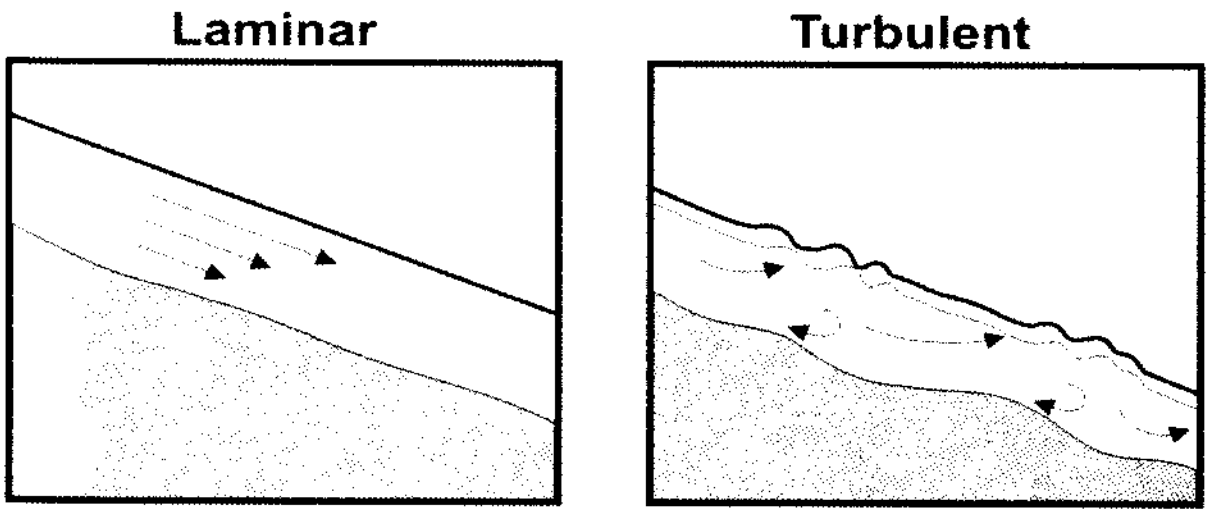
Discharge of a river

Refers to the flow of water in a river
The down-slope flow of water in a river under the influence of gravity is either smooth or turbulent. The flow within most rivers is turbulent in the upper course and laminar flow usually occurs in the lower course.



Laminar flow

- Water flows in **thin layers** that glide smoothly over each other.
- There are no rocks and boulders to cause friction between the water and the rocks.
- Occurs when the river bed is even and gently sloping
- Has a low rate of erosion

Turbulent flow

- Water goes in **complex tumbling circular** movements.
- Rivers have a rough and uneven bed.
- More energy is required to overcome these obstacles.
- Has a high rate of erosion

Impact of urbanization on stream flow

- Removal of vegetation to construct buildings, increases surface run-off and results in higher discharge over a short space of time. Water flow tends to be more turbulent.

- **Concrete surfaces and tar reduces the infiltration of water into the ground** and thus more water runs off the surface.

- Urban activities such as building dams, hydro-electric power plants and weirs also influences the flow of water

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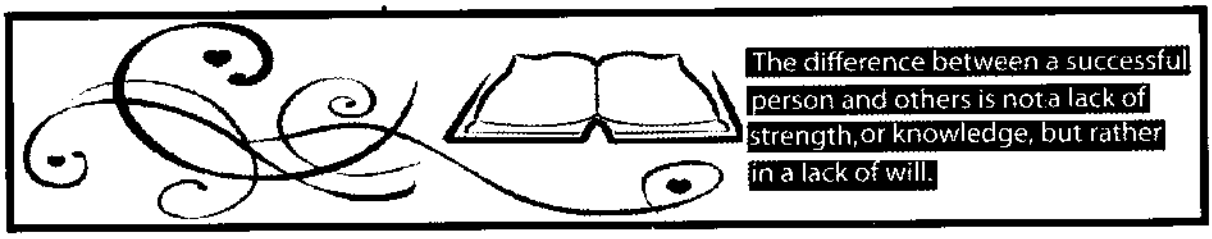
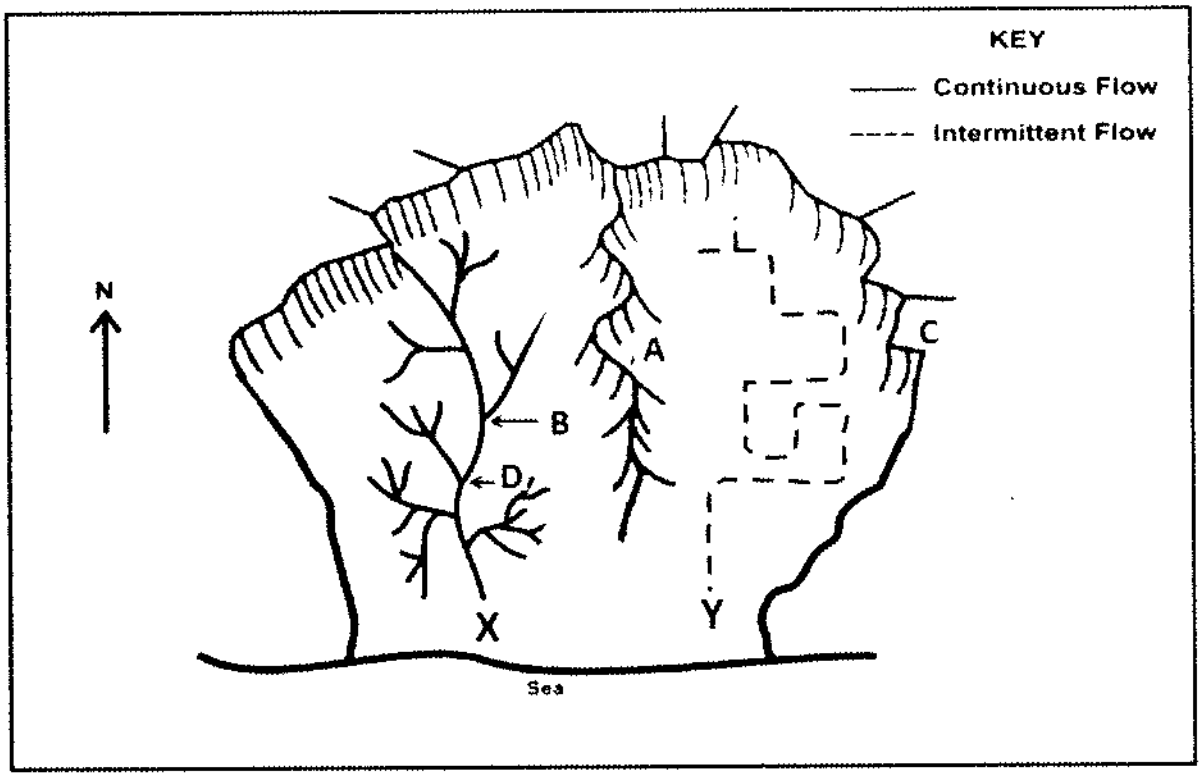


Activity 2.1

DRAINAGE BASINS



1. Explain the term drainage basin?
2. What term is used to describe the "upper reaches" of a drainage basin?
3. Match the features **A, B** and **C** with one of the statements given below.
   a) the meeting point of two streams.
   b) high-lying area that separates river systems in different drainage basins.
   c) land surface covered by a river system
4. Refer to river systems **X** and **Y** respectively.
   a) Identify each drainage pattern associated with river systems **X** and **Y.**
   b) Describe the rock type over which each river system flows.
5. What type of a river is **X**?
6. In which direction does river system **D** flow? Give two reasons for your answer.
7. Determine the stream order at point **D**.
8. Give two possible reasons for the presence of more streams in the lower course than the upper course of river system **X**.

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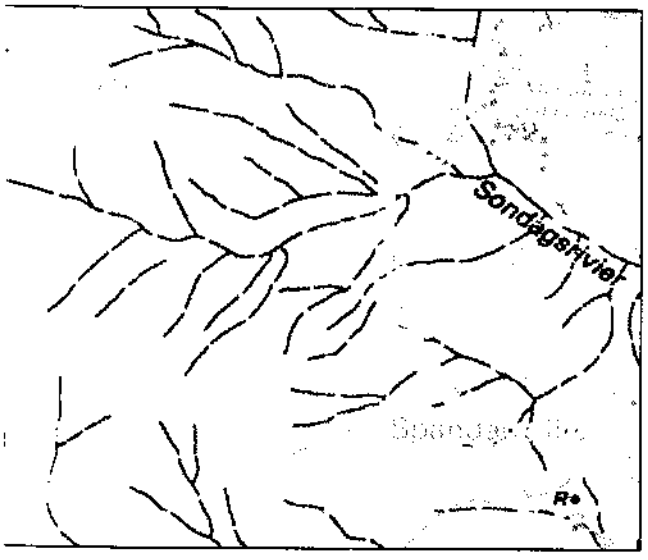
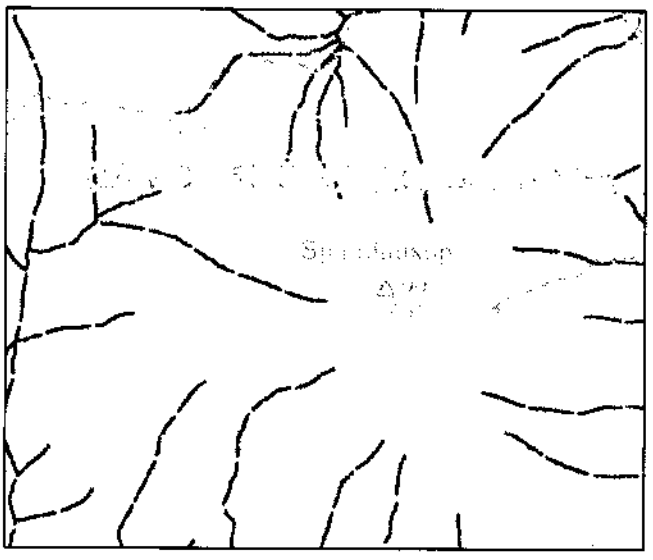
Activity 2.2

Study the sketches showing drainage patterns and answer the questions set.

SKETCH A



SKETCH B



1. State whether each statement below is true or false.
   a. A dendritic drainage pattern is shown in sketch **A**.
   b. In sketch **B** the streams flow away from a central area which is lower than the surrounding land.
   c. Rocks of varying resistance give rise to the stream pattern in sketch **A**.
   d. The stream pattern in sketch **B** is associated with volcanic domes.

2. Which letter in sketch A represents a
   a) watershed
   b) interfluve

3. What is the term used to describe the joining of two or more streams?

4. Determine the stream order of the river system labelled Y.

5. The drainage density in sketch A will be high.
   a) Explain the term drainage density.
   b) Outline two factors that contribute to a high drainage density.

6. Evaluate the impact of drought on fingertip streams.

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FLUVIAL PROCESSES

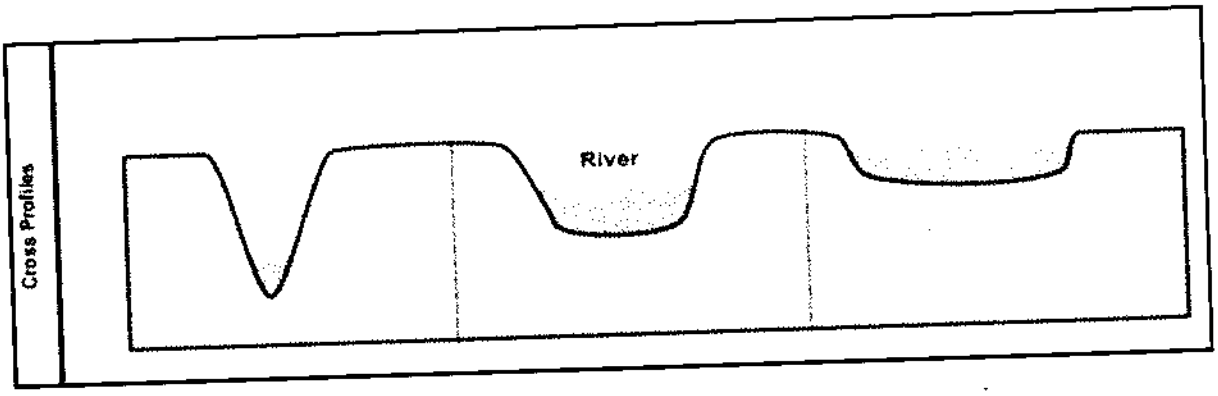
River profiles

There are two types of river profiles, the cross profile and the longitudinal profile. The shape of these profiles will vary according to the different stages of the river.

Cross profile /Transverse

Shows a **view of the river from bank to bank**. Two views can be seen:

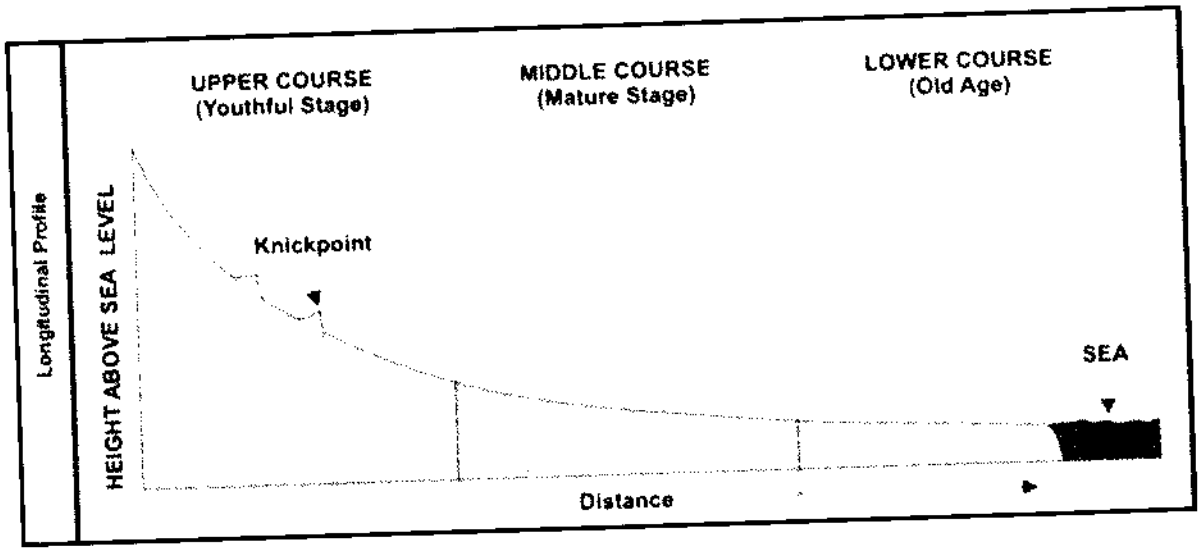
- depth of river
- width of river



Longitudinal Profile

It shows a side **view of a river from the source to the mouth**. It indicates the

- gradient
- length of the river



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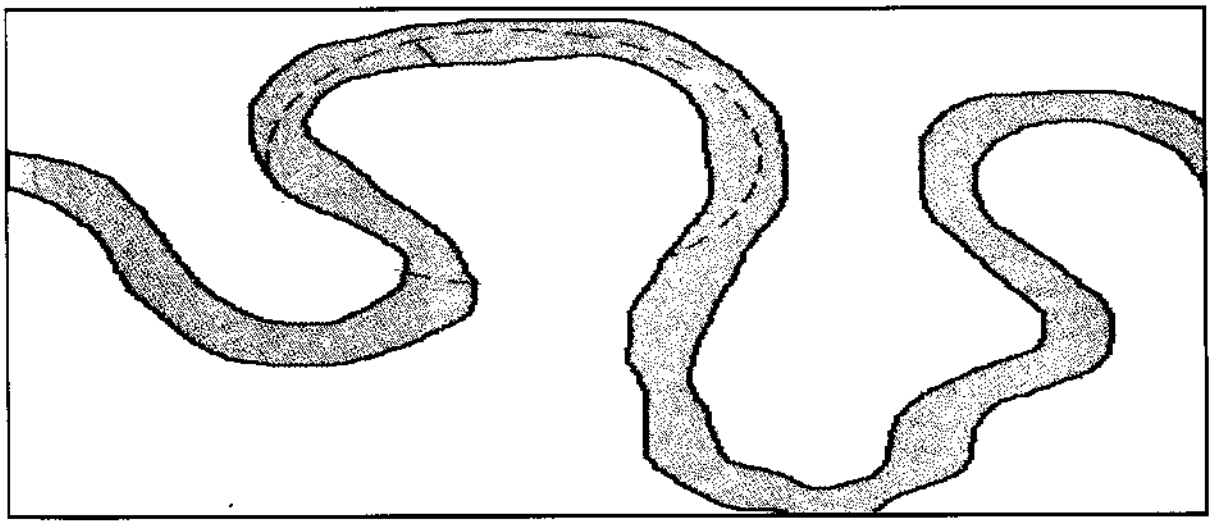
Plan View river profile

Refers to a view of the river as seen from above



Characteristics and Landforms

UPPER COURSE	MIDDLE COURSE	LOWER COURSE
• **Valley** is v-shaped (narrow, deep and steep sided) • Turbulent flow • Volume is low • Vertical erosion dominant because of down cutting • **Waterfalls and rapids** are found	• Valley is now an open v- shape with more gentle slopes • Flow is less turbulent, becoming laminar • Volume and load increases • Vertical erosion slows down and lateral erosion begins to dominate. • Larger streams may meander • Small flood plains may be found • Rivers begin to meander	• The valley is very wide and gently sloping • Laminar flow with greater volume • Lateral erosion dominates • Some features include meanders, ox-bow lakes, flood plains, braided streams, levees

Identification and description of fluvial landforms

Meander

- **A meander is a curve or bend found along the course of a river**
- It generally occurs in the lower course of a river because it flows slowly and the river begins to wander.

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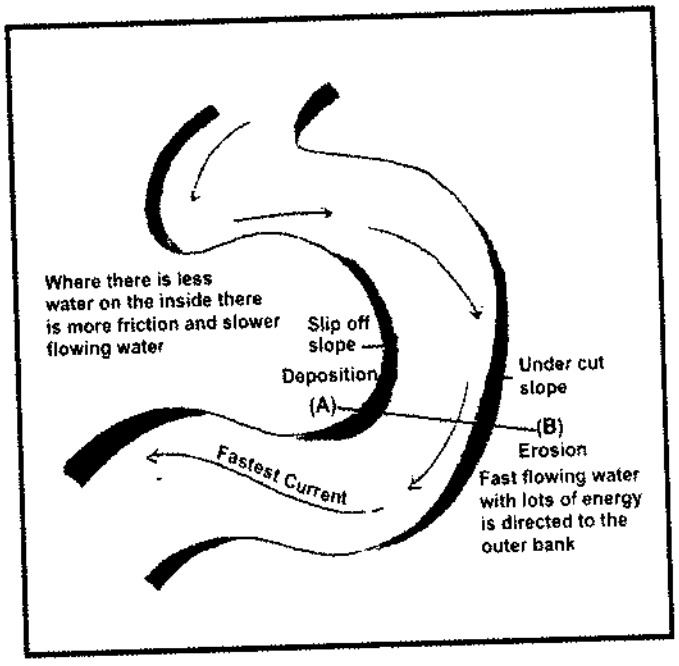
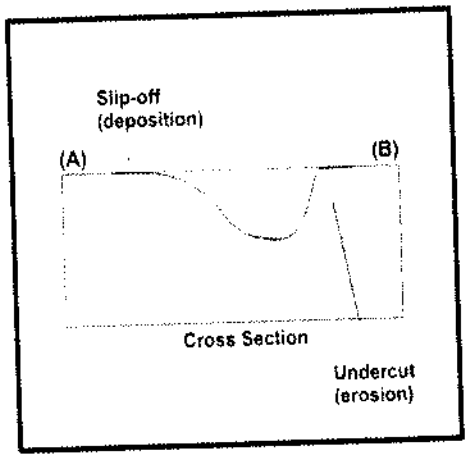
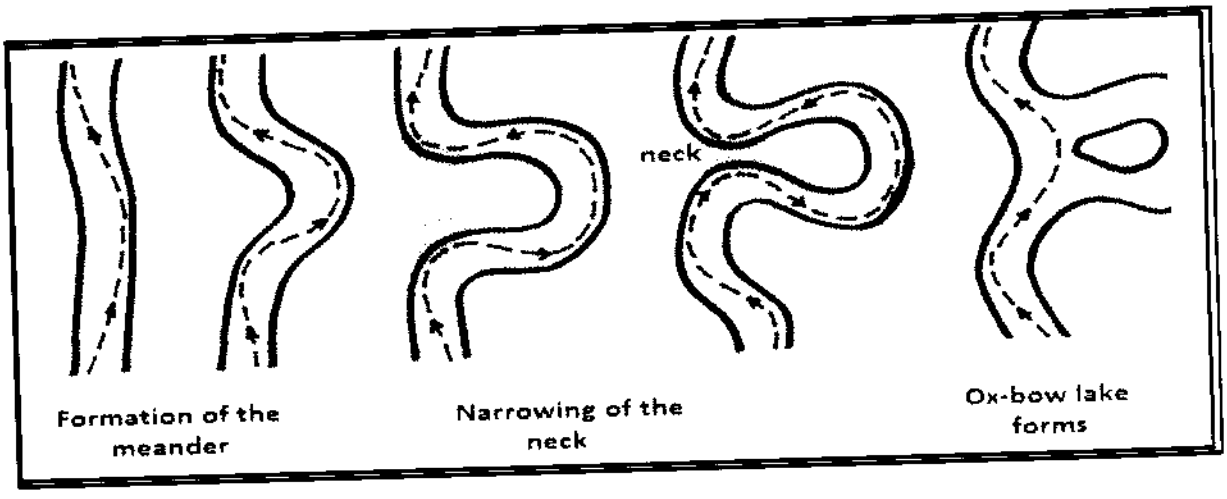
- The outer bank of the meander is called the **under- cut slope.**
- The inner bank of the meander is called the **slip off slope.**
- Meanders migrate downstream.





Slip-off slope	Undercut slope
The water is slow moving on the inner bank and thus more deposition occurs. It forms a gentle convex shaped slope	The water flows more rapidly on the outer bend of the meander resulting in higher levels of erosion. The shape of this slope is concave. The slope is steep.

Ox-bow lake



- Ox-bow lakes form from a meander loop that is cut off from the main stream.
- Erosion on the outer bank and deposition on the inner bank of the meander results in the meander neck becoming narrower.

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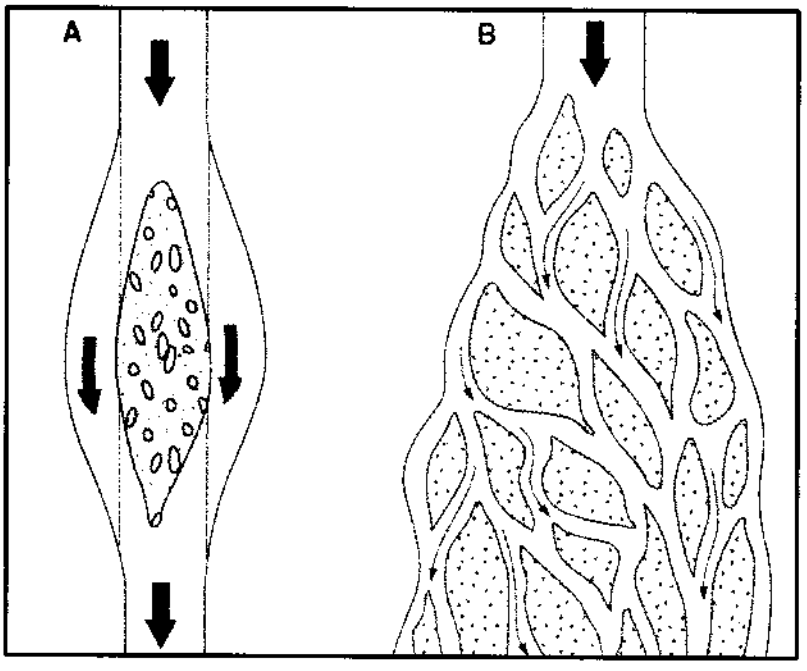
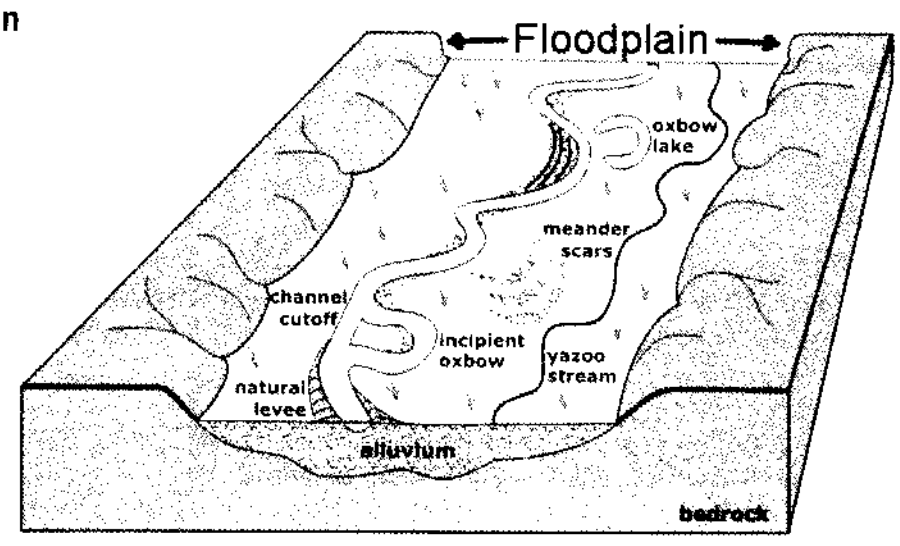
- During times of flood the water cannot negotiate the meander loop and flows straight. This results in the meander loop being cut off from the main river to form an ox-bow lake.
- The ox-bow lake will eventually dry up to form a meander scar because it does not have a water supply.

Braided stream



- **Forms when a river deposits its load and blocks its own path and is forced to split into smaller channels.**
- This feature is formed by a seasonal river that has an abundance of bed load which is deposited in the lower course.
- The gentle gradient in the lower course and the decreased river flow during the dry season, slows down the river forcing it to deposit its load within its channel.
- Continued deposition causes sand islands to be built on the bed. In this way the river obstructs its own path and it branches into smaller channels (distributaries) that weave their way around the deposited material

Flood plain



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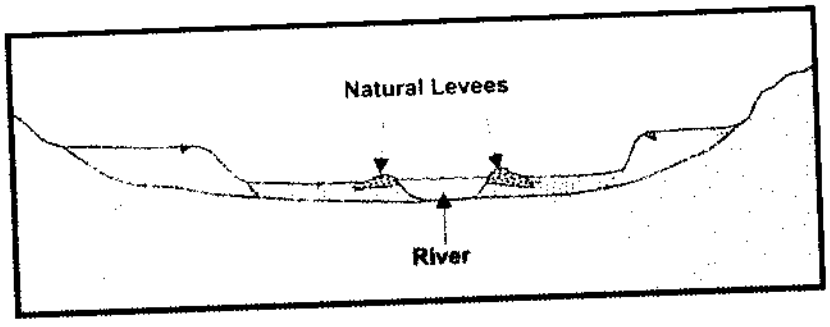
- It refers to **flat land that is found on the banks of a river**. It is made up of deposits of silt that has been built up after being subjected to repeat flooding.
- **Floodplains are useful to man because:**
  - It is extremely fertile and can be intensely cultivated.
  - The land is flat and encourages the use of machinery.
  - The river provides a regular supply of water for cultivation.
  - In areas that are not prone to flooding settlements develop because it is easy to construct roads and buildings

Natural Levees



- **Refers to the naturally raised banks of a river**
- These form on the banks of rivers that have been subjected to repeated flooding.
- After the flood waters have receded it leaves behind gravel, sand and silt which builds up to form **raised bank**, which is referred to as a levee.
- It raises the level of the river higher than that of the flood plain.

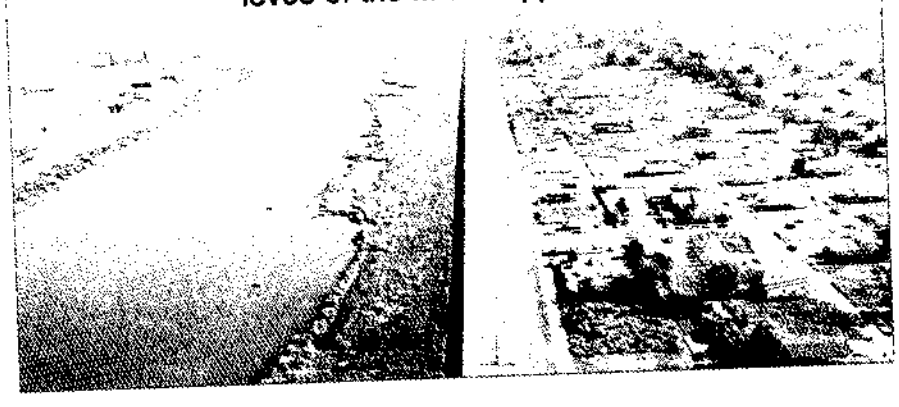
Positive impact of levees

- It reduces flooding of the floodplain and thus loss of crops and equipment
- Prevents fertile soils from the floodplain washing back into the river
- Increases the carrying capacity of the river

Negative impact of levees

- Tributaries that flow towards the main stream are not able to join it because the levee forms an obstacle. These tributaries then flow parallel to the main stream and are called **yazoo streams.**
- Irrigation becomes more difficult and expensive
- Reduces deposition of silt on the flood plain, affecting productivity

Development of New Orleans adjacent to the levee of the Mississippi River



Note: The wall built along the Mississippi to prevent flooding of the lower lying floodplain where New Orleans has been developed.

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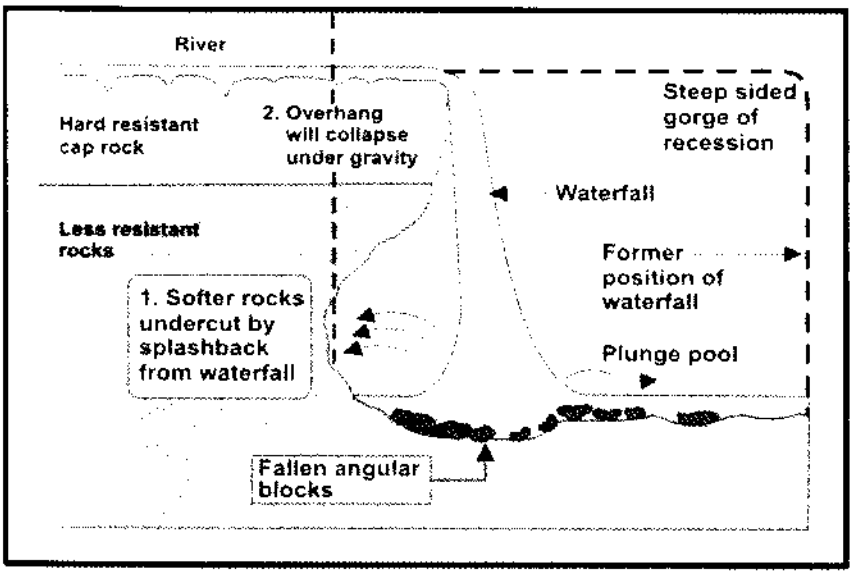
Waterfalls



- A common landform found in the upper course of a river.
- This is a **vertical or near vertical drop along the course of a river.**
- The waterfall can range in size from a few metres to hundreds of metres dependant on the size of river and the factors that led to the fall being created, e.g. Victoria Falls.
- Waterfalls commonly occur where hard rock overlies softer rock. (It can be horizontal, vertical or inclined).
- When a waterfall retreats due to head-ward erosion it can result in the formation of a gorge (this is a very deep valley with very steep sides)
- A plunge pool forms at the base of a waterfall due to the force of the falling water and debris which erodes the base to form a depression.

Significance of waterfalls

- They form tourist attractions.
- Can be used to generate hydro-electricity.
- It creates an obstacle along the course of the river and makes it impossible to use for navigation and recreational activities such as canoeing
- Danger from fast flowing water (drowning)

Rapids

- Rapids are sections of **rough turbulent** (white water) water.
- They are normally in a river's upper course and are formed where there are layers of hard and soft rock. The layers of soft rock erode quicker than the layers of hard rock.
- This makes the bed of the river uneven creating rough turbulent water.

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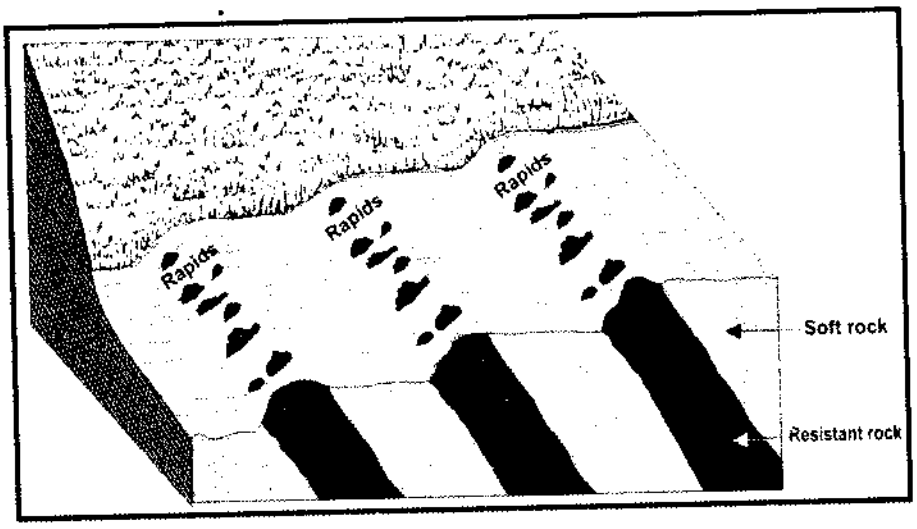
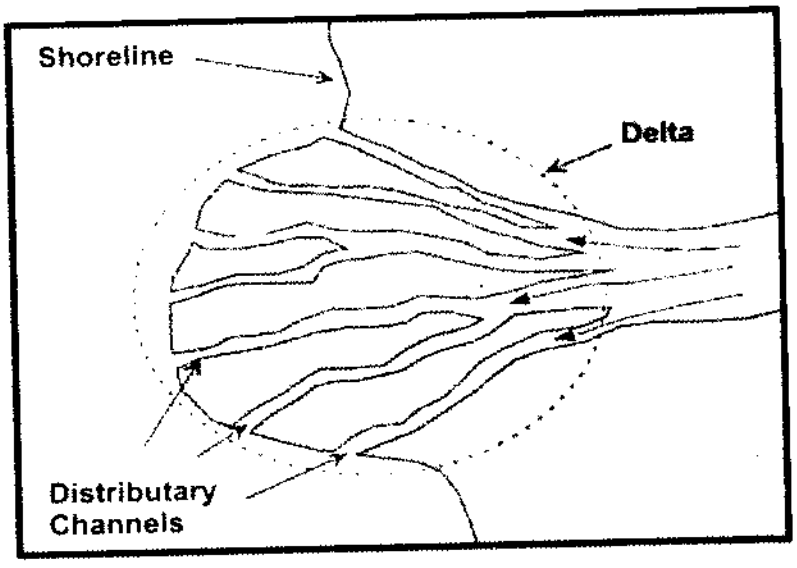


Significance of rapids

- Rapids can become popular with tourists who want to raft down-stream.
- These features can cause problems with transport, ships cannot travel up and down rapids and it is very hard to build bridges across them.
- They are also extremely dangerous if people fall into them.

Delta



- **It forms at the point where the river enters the sea and deposits its load.**
- The current of the river keeps fine sediments such as clays and silts in suspension.
- The saline conditions in the sea cause fine clay particles to flocculate (stick together) making the particles larger and heavier which then sink.
- The deposited material accumulates to form a delta.
- Deltas build outward from the coastline, but will only survive if the ocean currents are not strong enough to remove the sediment.
- Rivers like the Nile, Mississippi, Niger, Ganges, etc. have very large deltas created, which are used for human settlement and activities such as farming and fishing.

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Conditions necessary for deltas to form

- The river must have a large amount of sediment.
- The sea must have weak currents and a small tidal range.
- The sea must be shallow at the river's mouth.

Advantages of deltas

- The fertile land for farming, especially crops like rice
- Plenty of water for fishing or aquaculture. This can feed families or provide an economic income.
- Abundant drinking water
- Water for cooking, washing, etc.
- Tourism opportunities e.g. Nile Delta
- Good transport links, possible to trade

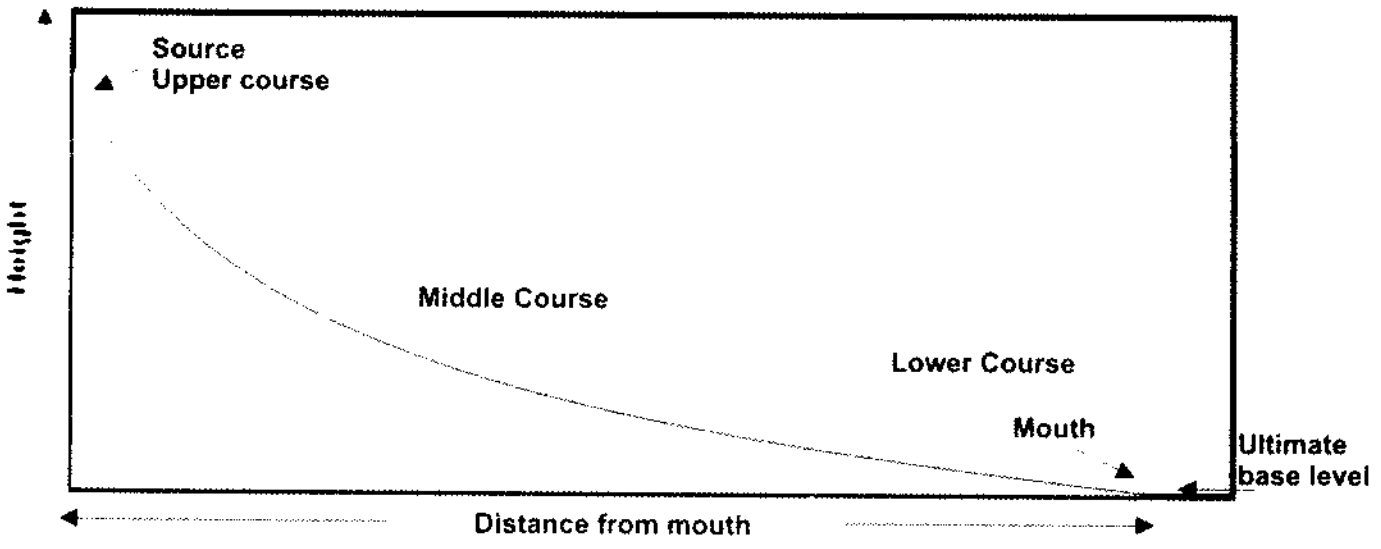
Disadvantages of deltas

- Hard to make transport links by roads – costly to build bridges
- Areas are at constant risk of flood
- Vulnerable to rising sea levels
- Water is often dirty and polluted (industry, agriculture, sewers)
- Mosquitoes are attracted to water (malaria)
- Storm surges from tropical storms destroys settlements and farming on deltas

River grading

1. Graded river profile

It has a **smooth concave profile**. (note: that there are no obstacles on the profile)
Graded streams develop over time as a balance between gradient; discharge, flow velocity, channel shape, and sediment load is reached.



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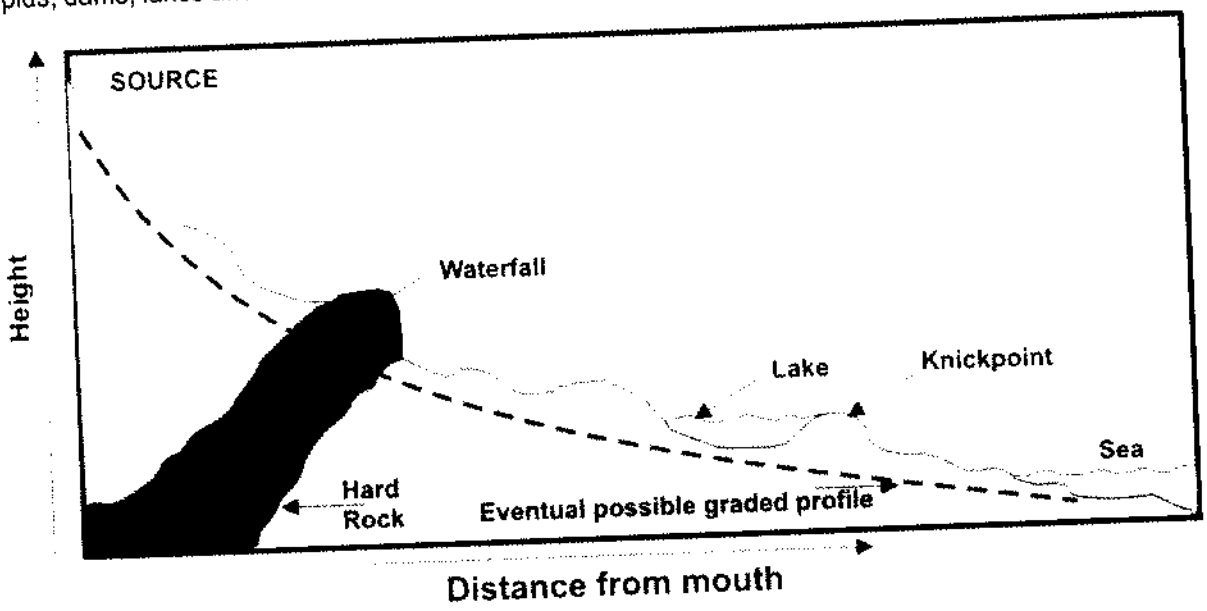
2. Ungraded river profile

It has an **uneven river bed and has many obstacles** along the course of the river, e.g. waterfalls, rapids, dams, lakes and resistant rocks. The profile is not smooth.



Base levels of a river

- **Permanent or ultimate base level**: The sea is regarded as the permanent or ultimate base level. It is the lowest level to which a river can erode.
- A **temporary base level** occurs when a river flows into a dam, over a waterfall, into a lake, etc. These features temporarily prevent the river from further vertical erosion.
- The base level of a river changes when the sea level rises or drops.
- When the sea level drops it results in the gradient of the river becoming steep, the speed of the water increases and the rate of erosion increases. This process is called rejuvenation.

Process that a river undergoes to be graded

- In the **upper course**, downward erosion takes place to result in a steep slope.
- Head-ward erosion removes temporary base levels of erosion such as waterfalls.
- Rapids are removed by **downward erosion**.
- The stream carrying capacity increases in the **middle course**, and obstacles such as lakes are filled with the rivers load. More **lateral erosion**.
- In the **lower course** more **deposition** takes place because the gradient is gentler. This results in a gradual gradient.
- The steep slope in the upper course, which gradually drops to a gentle gradient in the lower course results in a concave shape.

Rejuvenation of rivers

This is the process where a river which has reached base level, **regains energy and begins to erode vertically** (downwards) once again. The erosive power, speed and carrying capacity of the river is renewed.

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Reasons for rejuvenation

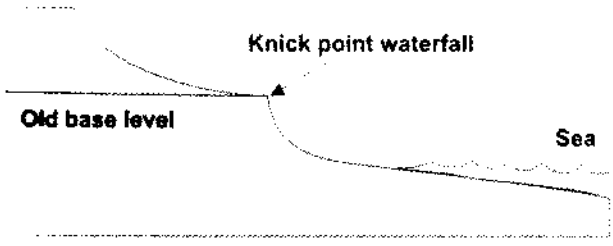
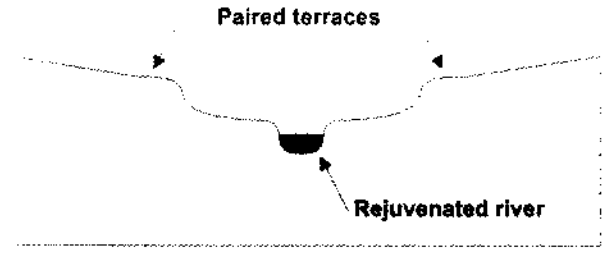
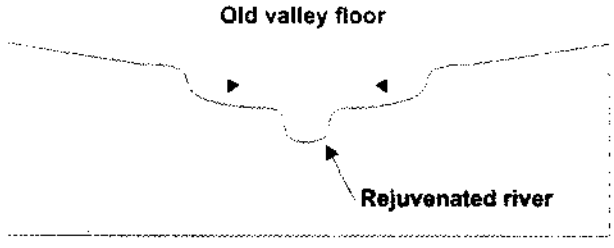
The causes of rejuvenation are:

- **Uplift of the land** due to internal movements such as isostatic uplift.
- **Volume of water** in the river increases because of river capture.
- **Higher rainfall** increases the erosive potential of the river.
- **Sea level drops** and the river has to erode to a lower level (refer to diagram below).

Is this landscape suitable for human activity?

- It is associated with steep slopes and deep gorges which will not be suitable for human activity.
- The construction of roads, railways and bridges will be expensive.

Features associated with rejuvenation

Feature	Description
Knickpoint: 	• The point where the old erosion level meets with the new. Sometimes waterfalls are formed where there is a sharp change in gradient.
Paired Terraces: 	• It forms as a result of downward erosion (down-cutting) • The floor of the old valley forms a terrace on either side of the river.
Valley within a valley: 	• A new valley is carved into the old valley.

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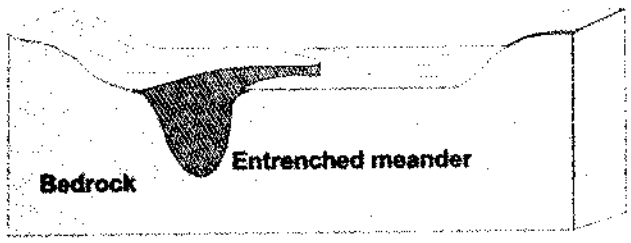
Entrenched / incised meander  	• It forms from a meandering river that has cut a deep valley into the underlying bedrock.

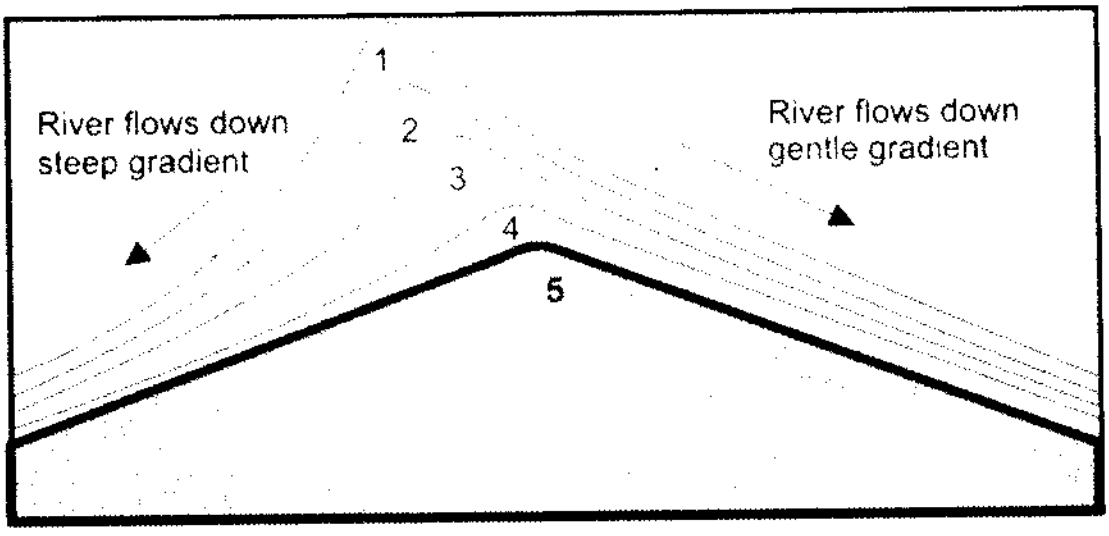
River capture (Stream piracy)

This is **where one river captures/robs the headwaters of another river** and so increases the size of its drainage basin.

Related concepts

- **Captor stream-** Refers to the river that has captured the water of another river through headward erosion.
- **Captured stream-** Refers to the river that has its water diverted into another river.
- **Headward erosion-** Refers to a river cutting backwards into the watershed towards its source

Abstraction of a drainage basin



- **Abstraction is a process of the watershed changing its position.**
- It occurs when the watershed is steeper on one side as compared to the other.
- Rivers that flow down the steeper side erode the landscape faster, thus changing the position of the water shed.
- Eventually the gradient of the watershed is the same on both sides as in position 5.
- Abstraction can give rise to river capture. The river flowing down the steeper gradient will capture the water of the river flowing down the gentler gradient because of the shift in the watershed.

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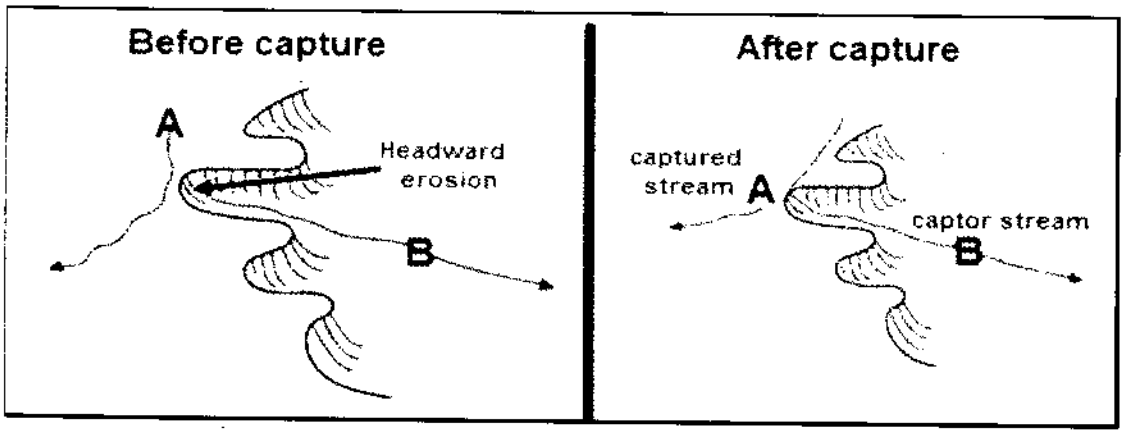
Process of River Capture



Note that after river capture, the flow characteristics of both the rivers will change.

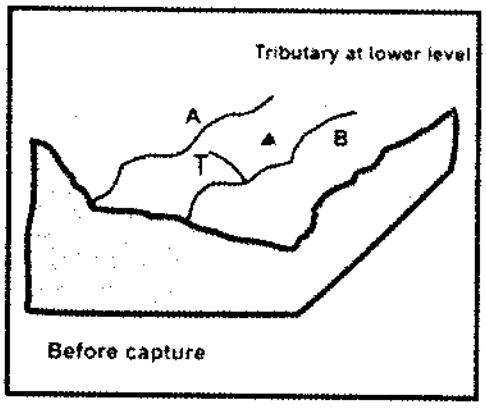
- The first sketch shows a river with a tributary (**T**) flowing at a lower level. It can be assumed that the tributary is flowing over softer rock (one of the conditions necessary for river capture) and it erodes headwards towards the second river (**A**) which is higher up.
- The second sketch shows the tributary intersecting with the river higher up, resulting in its water draining away into the lower river (**B**).
- **Note: The type of sketch used to represent the process of river capture will vary depending on the condition that gives rise to river capture.**

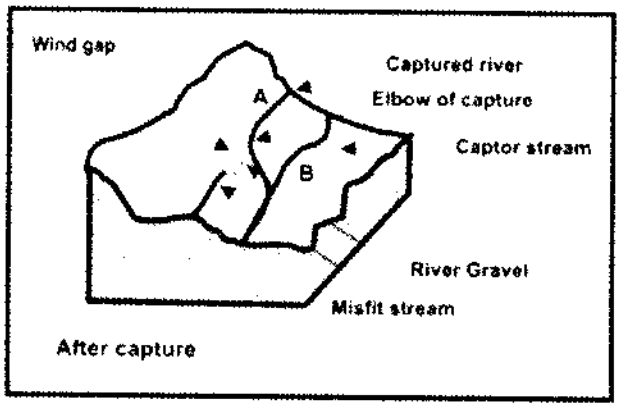
Conditions necessary for river capture

- **Steeper gradient**: the one river flows down a steeper side of the watershed so it will erode faster because it has more energy.
- **Greater rainfall**: the one river flows on the side of the watershed that receives more rainfall therefore it has a greater velocity and a greater erosive power.
- **Softer rock**: the one river flows on the side of the watershed that has less resistant rock (soft) so it erodes faster.

Note: If the above conditions are met then the river erodes **head-ward** and it shifts in the direction of the less energetic stream. This movement of the watershed is called **abstraction**.

Features of river capture





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a. **Misfit river / beheaded stream -** It refers to a stream that has too little water for the valley within which it flows.

b. **Elbow of capture -** It is generally a right angle bend which indicates the point where one river captures another.

c. **Wind gap / dry gap -** It refers to a dry river valley that is found immediately below the elbow of capture.

d. **River gravels -** In the wind gap, boulders, stones and pebbles are left behind due to the decreased volume of water in the river and are referred to as river gravels.

The effects of river capture on the captor and captured stream

Captor stream	Captured stream
• Size of drainage **basin increases**. • Volume increases due to additional water being diverted into its channel. • Flows faster due to an increase in the volume of water. • **Erosive ability increases** due to increased flow. • The river could be rejuvenated.	• Size of drainage **basin decreases.** • Volume decreases due to it being robbed of its head waters. • Flows slower due to a decrease in the volume of water. • **Erosive ability decreases** due to decreased flow. • Deposition increases as the river has less energy due to less water.

The effects of river capture on human activity and ecosystems

The consequences of river capture on human activity and the environment will be different for the captor and the captured river. The effects are discussed with respect to the **captured river**:

- **Human activity** : people who are settled along the lower course of the **captured river** will be disadvantaged in the following ways:
    - Less water will be available for agriculture causing production to decrease.
    - If the river is used for the generation of hydro-electric power this activity will no longer be sustained.
    - Lower volumes of water will be available for domestic and industrial use in an urban settlement.
    - Increased possibility of pollution and poor water quality.

- **Ecosystems:** aquatic organisms perish since the supply of water is reduced. Food chains and food webs are disrupted and the ecosystems are thrown into a state of imbalance.

Note: the opposite effects will apply to the captor stream. (flooding, more erosion, greater volume of water, turbulence….)

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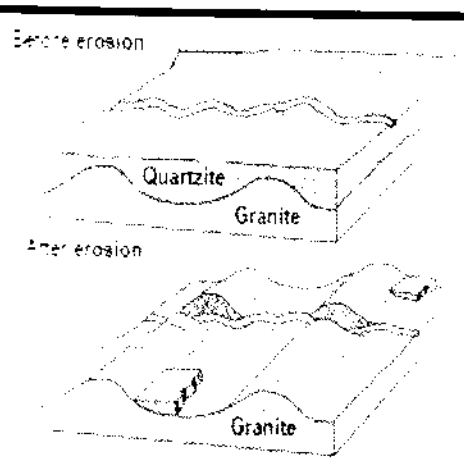
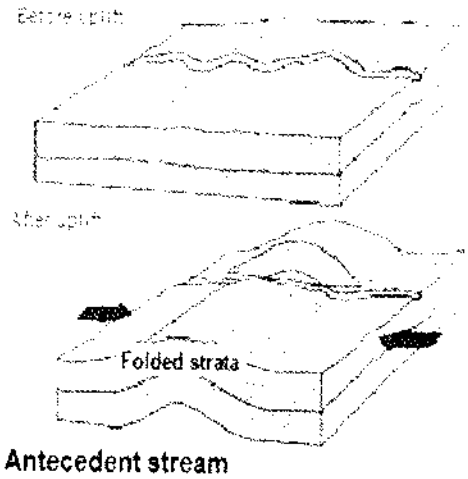
Superimposed and antecedent drainage patterns



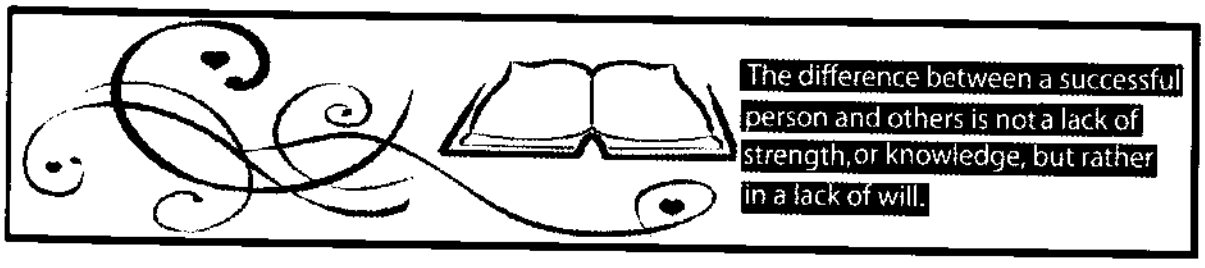
Superimposed stream

- It has a pattern that does not correspond with the structure of the existing surface that it flows over.
- The original rock structure is removed by erosion (e.g. quartzite) and the river maintains its pattern over a different rock structure (e.g. granite) that was previously buried.
- **The river is younger than the underlying rock structure through which it flows.**



Antecedent stream

- It is a river pattern that was formed on land before it was uplifted as a result of earth movements (folding or faulting).
- The river maintains its general course in spite of the land being uplifted.
- **The river is older than the underlying rock structure through which it flows.**



Activity 2.3

Rivers change as they flow from source to mouth. Read the list of statements below labelled A – J describing these changes and then indicate whether it falls into the **upper, middle or lower course** of a river.

A. the channel is small	H. more water flows into the main stream
B. the river deposits material	I. river erodes vertically
C. river flows down a steep gradient	J. river meanders on a gentle gradient
D. river has its source here	
E. river erodes laterally	
F. river forms flood plains	
G. there is tidal water	

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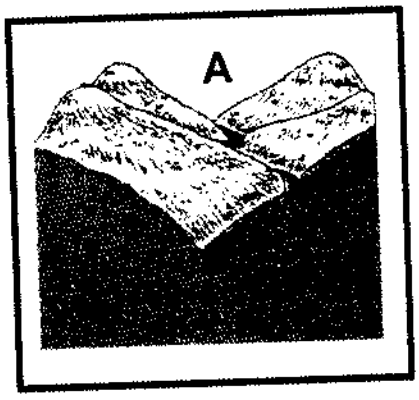
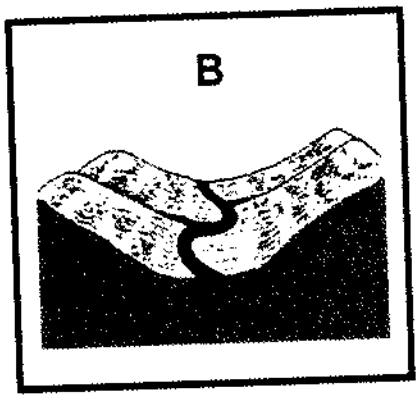
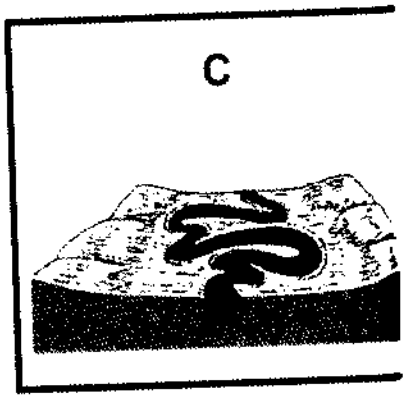
Activity 2.4

Refer to the sketches of a river's three courses and choose the correct answer from the alternatives provided.

1. Sketch **A** shows the .....of a river
   A. lower course
   B. middle course
   C. upper course
   D. straight course







2. The dominant / main type of erosion in sketch **A** is
   A. vertical erosion
   B. solution
   C. dragging
   D. lateral erosion

3. The valley in sketch **A** is
   A. narrow and deep
   B. wide and deep
   C. steep and wide
   D. wide and gentle

4. The cross profile of the river valley in sketch **B** shows its
   A. length and gradient
   B. width and gradient
   C. length and depth
   D. depth and width

5. Farming is best suited to the
   A. middle course
   B. lower course
   C. upper course
   D. upper and middle courses

6. The feature on which most farming would take place is a
   A. meander
   B. floodplain
   C. river terrace
   D. levee

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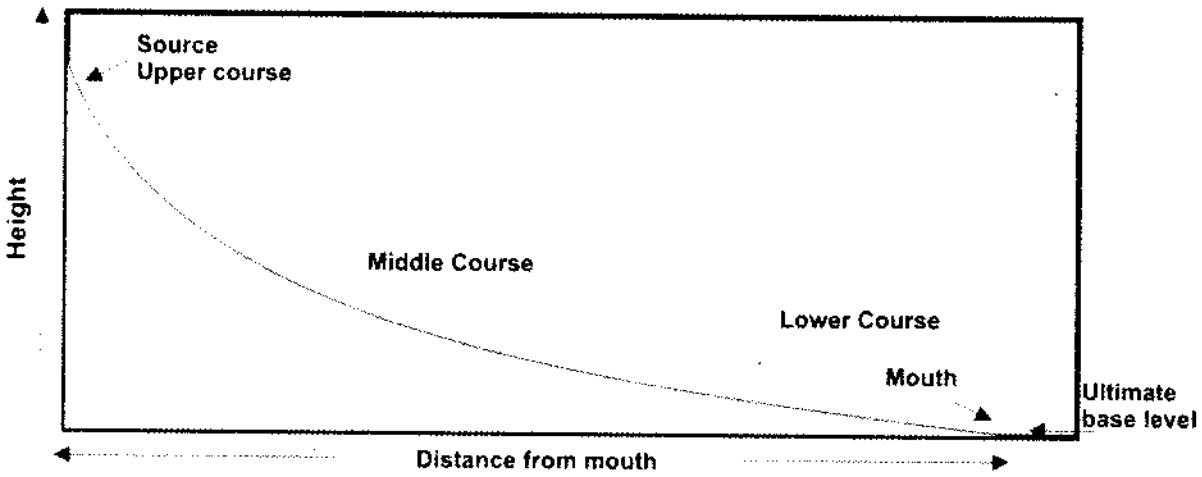
The meandering path of the river in sketch **C** is due to
A. deposits of silt
B. the gentle gradient
C. the increased speed of the river
D. the wide valley

Activity 2.5

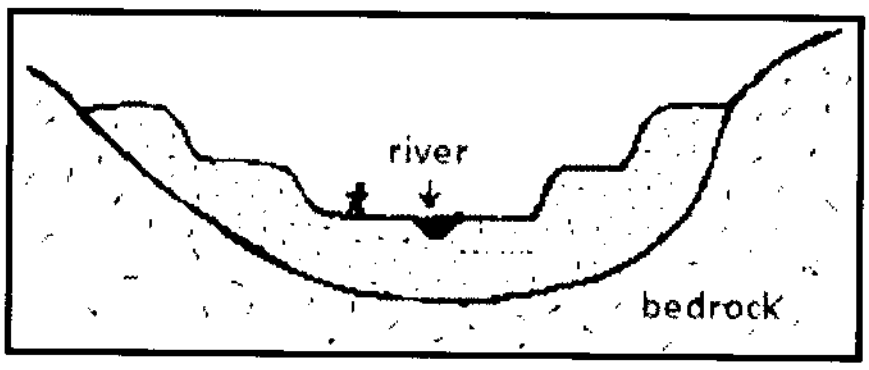
Study the longitudinal profile of a river below and answer the questions set.

1. What is a longitudinal profile?
2. What information would a longitudinal profile give a geographer?
3. Describe the valley that is likely to be found in the upper course of a river.
4. What type of erosion occurs in the lower course of a river and why?
5. Which is the lowest level to which a river can erode?
6. Is the profile graded or ungraded? Provide evidence from the sketch.
7. 7. Sketch two labelled diagrams of a cross-section to compare a valley in the upper and lower course of the river.

A LONGITUDINAL RIVER PROFILE



8. Assume that rejuvenation has occurred in the lower course.
   a. What can cause a river to be rejuvenated and actively erode again?
   b. State two land forms that can result from rejuvenation.



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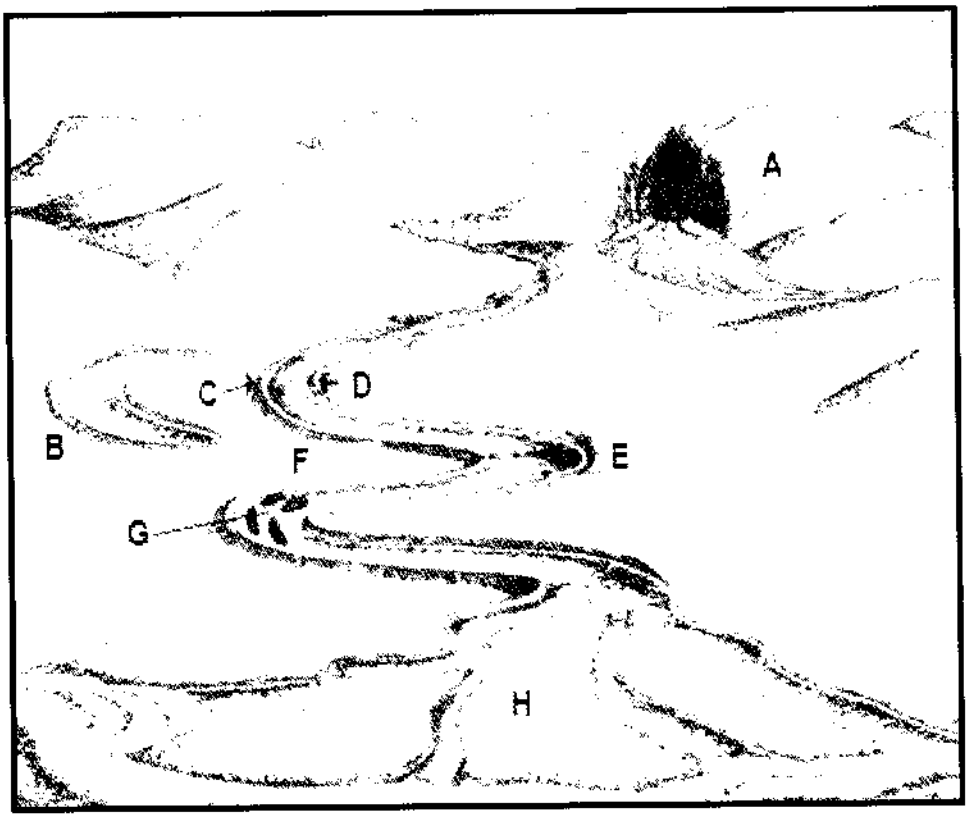
Activity 2.6

Study the sketch of a river system and answer the questions.

1. Complete the table below by making reference to the sketch.

Name of landform/feature	Forms due to erosion/deposition	One characteristic
A		
B		
C		
D		
E		
F		
G		
H		



2. A river and its associated landforms:

2.1. Give one advantage and one disadvantage of feature **F** to man.

2.2. The formation of feature **A** is clearly linked to the velocity of the river. Explain how the velocity influences the way in which the river lays down its load.

2.3. State two conditions necessary for the formation of feature **H**.

2.4. Which of the above features assists with the control of flood waters?

2.5. Why does feature **B** eventually dry up?

2.6. Fluvial landforms that develop along the various courses of the river are useful to humans in many ways. With the aid of examples explain the way in which these landforms can be used by humans

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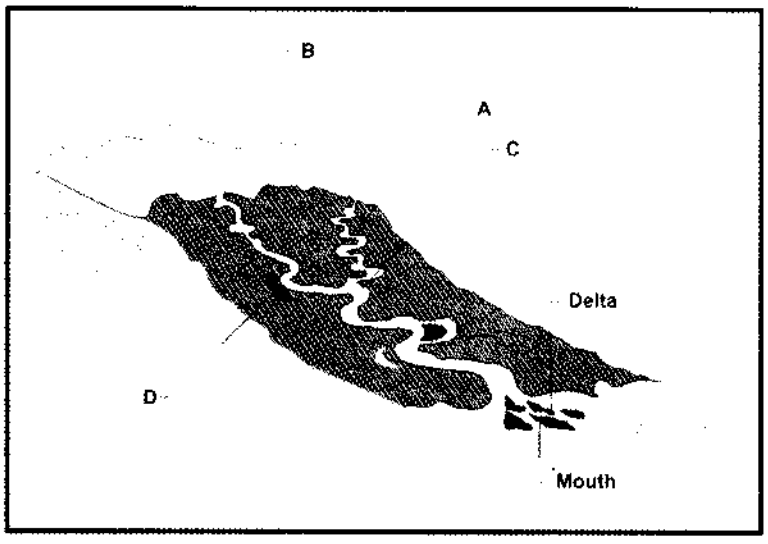
Activity 2.7

Study the sketch of a river system and answer the questions set.

1. What is a river system?
2. **State which letter in the figure represents:**
   a. the source
   b. confluence
   c. a tributary
3. **A longitudinal profile shows the side view of a river.**
   d. Draw a labelled diagram showing the river profile from the source to the mouth.
   e. Is the profile graded or ungraded? Explain your answer.

4. **The river valley in the upper course will be**
   a. Wide and gentle
   b. Narrow and deep
   c. Narrow and shallow



5. Name two river features that are likely to be found in the upper course of the river.
6. The lower course of the river profile has a delta.

   a. Explain how this feature formed.
   b. State two conditions that are necessary for the formation of a delta.
   c. In what way do people benefit from being in close proximity to the delta with respect to
      i. Agriculture
      ii. communication

7. a. Identify the river landform labelled **D**.
   b. Describe the relief of the area where a meander forms?

8. What do you understand by the term mouth?

9. Assess the negative impact that human activities have on rivers.

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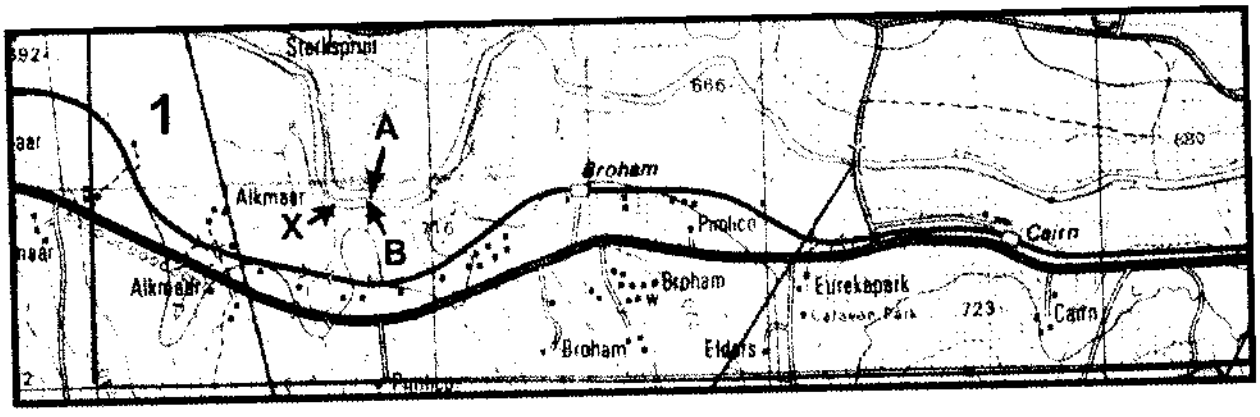
Activity 2.8

Refer to the topographic map extract and answer the questions set.

1. Will the extract be characteristic of the upper or lower course of the river?
2. Provide two pieces of evidence to support your answer in QUESTION 1.
3. Is the flow of the river most likely to be laminar or turbulent in this section of the river?
4. Give reason to support your answer in QUESTION 3.



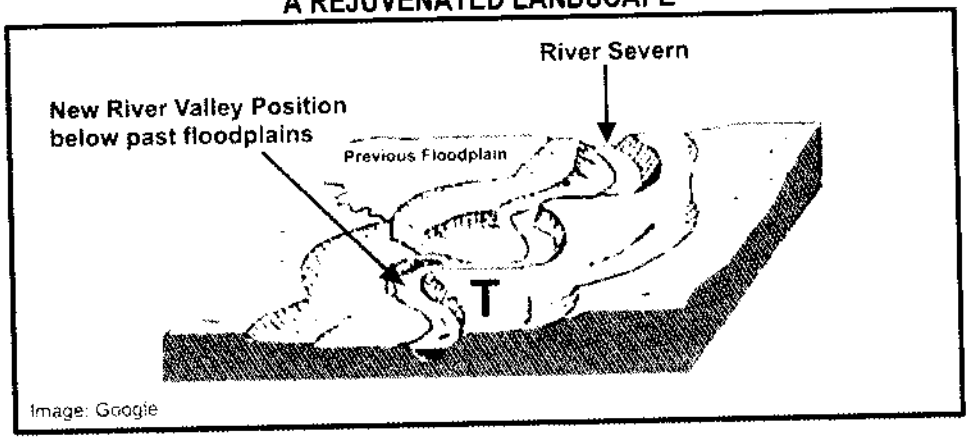
5. Refer to area 1:
   a) Identify the fluvial landform represented.
   b) Is erosion or deposition the predominant (main) geomorphologic process responsible for the formation of this fluvial landform.
   c) Give two reasons to support the statement that area 1 is favourable for intensive farming.
   d) What would be two disadvantages associated with cultivating crops in area 1?

6. Feature **X** represents a meander:
   a) Identify the slope elements **A** and **B**.
   b) Describe and account for the shape of each slope element in QUESTION 6(a).
   c) Draw a labelled cross-section of the meander from a to b indicating each slope element.
   d) What feature is likely to form when the neck of the meander is cut-off during a flood?

Activity 2.9

Study the sketch showing a landscape that has been exposed to a new cycle of erosion.

A REJUVENATED LANDSCAPE



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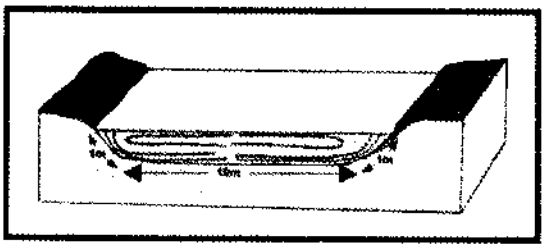
1. What term is used to describe the process when a river begins to erode the landscape again after reaching a state of grade?
2. State two reasons why a river can regain its energy.
3. Provide evidence that indicates that the stream had undergone periods of increased stream energy.
4. Has the landscape depicted been raised or lowered? Give a reason for your answer.
5. Why would the landscape be less valuable to farmers now compared to its importance before undergoing change?
6. Draw a diagram to depict this river in longitudinal profile.
   a. Label the knickpoint, the old river course and the new river course.
   b. Explain why the profile illustrated is not a graded river profile.

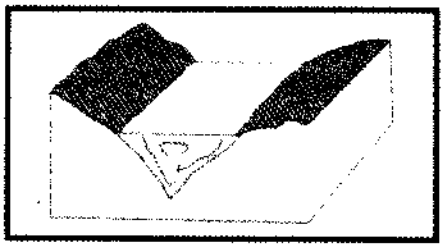
7. Refer to the slope of the river bank at T.
   a. Is the slope located at point **T** the undercut or slip-off slope.
   b. Does deposition or erosion occur along the river bank?
   c. Give a reason for your answer in QUESTION 7(a).

8. Study the profiles A and B below.
   d. Which of the sketches below represents the cross profile of the rejuvenated river?
   e. Provide ONE piece of evidence to support your answer to QUESTION 8(a).
   f. What two characteristics of a river valley are evident in a cross profile?
   g. Name the type of erosion responsible for the widening of a river valley.

A

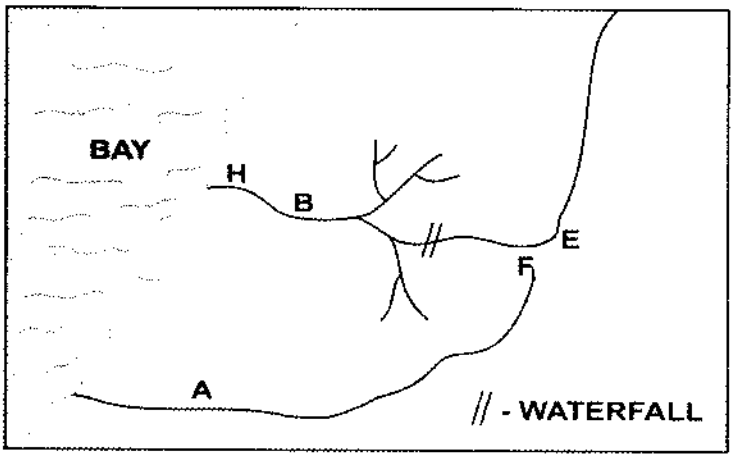


B



Activity 2.10

The figure below illustrates the concept of river capture / stream piracy.



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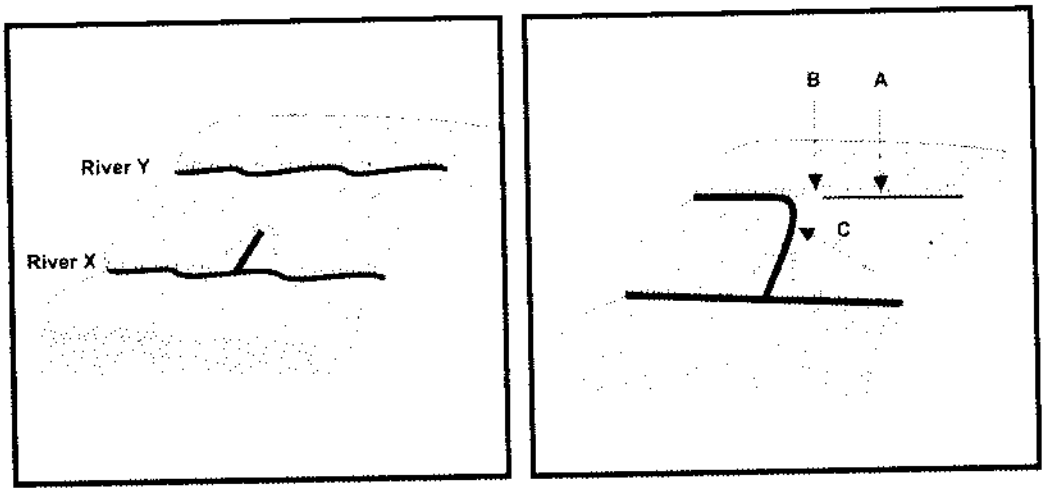
1. Explain the term river capture.
2. Is stream **A** or **B** more powerful?
3. Give ONE piece of evidence to support your answer in QUESTION 2.
4. With the aid of the sketch describe how river capture has taken place in this region.
5. Identify the landforms associated with river capture labelled **E** and **F**.
6. Why does river capture lead to a rejuvenated stream?
7. Identify the drainage pattern of stream **B**.
8. Describe the rock type over which stream **B** is flowing.
9. Determine the stream order of stream **B** at point **H**.
10. River capture brings about changes in both captor and captured streams. Explain some of the physical changes that will occur in captor and captured rivers respectively.

Activity 2.11

The illustration below depicts the tale of two rivers.



1. In the first diagram river **X** is engaged in head-ward erosion, rapidly cutting through the watershed.
   a) What is head-ward erosion?
   b) Give a reason for river **X** eroding rapidly through the watershed.
2. In the second diagram river capture has taken place.
   a) What does river capture mean?
   b) Which label represents the:
      i. captured stream?
      ii. captor stream?
   c) Name the landforms that result from river capture labelled **A**, **B** and **C**.
   d) River capture has a damaging effect on the captured river and those that depend on it. Explain the effect of this on:
      i. the ecosystem of the captured river.
      ii. a community that lives downstream of the captured river.

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CATCHMENT AND RIVER MANAGEMENT

Definition

Using river resources in a sustainable way so that it will be available for future generations

The importance of managing drainage basins and catchment areas

It is necessary to take care of drainage basins for the following reasons:

- Farming takes place on floodplains and deltas because of fertile silt that is found here. Water is also used from the river channel in irrigation schemes.
- Rivers are used to generate hydro-electric power.
- Transport of goods and people using boats and barges.
- Leisure activities such as fishing, canoeing and white water rafting.
- Rivers are also a tourist attraction especially when they have attractive features such as waterfalls and lakes.
- It supplies fresh water for domestic and industrial use.
- To ensure that ecosystems remain healthy and in balance.
- To control flooding especially in low lying areas.
- To protect water usage for present and future generations (sustainable use).

Impact of people on drainage basins and catchment areas

(Causes of poor river management)

Activity	Impact
Afforestation	Reduces stream discharge, but increases ground water level. More deposition in the lower levels.
Waste disposal	Pollution affects the quality of the water. Changes equilibrium of river and reduces river habitats. Health hazard, people can become ill.
Irrigation	Reduces water downstream. More deposition, reduces carrying capacity of river. Increases surface run-off and deposits harmful substances such as salts and pesticides in the river. This could also increase the growth of algae in the water.
Dams/canals/artificial embankments/cutting through meander loops	Affects the flow of the river. Holds back sediment which affects delta formation. Reduces fertile silt from moving further downstream.
Urbanisation	More artificial surfaces results in greater surface run off, increasing river discharge. Encourages flash floods and flood peaks.

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Mining	Acid levels in water increases due to acid mine drainage. Mines produce waste which increase minerals and the salt content of the rivers.
Overgrazing	The removal of vegetation in catchment areas reduces infiltration and thus the amount of ground water available in the dry season.
Wetlands	Many wetland areas are being used for farming, disposal sites and planting alien trees. They are also polluted by sewage and industry.
Water transfer schemes	This affects flow patterns and disrupts the ecosystems. On the positive side it prevents a river from drying up.

River pollution

Some of the ways in which the river is polluted include:

- **Domestic sewage**
  While sewage is treated in some countries before being released in rivers, in others it is released in raw form deliberately or due to leakages.
- **Agricultural waste**
  Pesticides and herbicides used by farmers enter the river through ground water and through flow.
- **Industrial waste**
  Industries pollute rivers by releasing industrial waste either accidentally or deliberately. Industries also use river water to cool machinery, thus unnaturally raising the temperature of the water.

Impact of pollution on rivers

- **Loss of oxygen**
  The breakdown of raw sewage in water uses a lot of oxygen. This reduces the amount of oxygen available to plants and animals living in the water and thus destroys them.
- **Eutrophication**
  This term describes an increase in nitrate levels in a river which results from agricultural wastes. It encourages the growth of algae which in turn uses up oxygen and decreases the amount of light entering the water. The water turns green and affects other life in the water.

Strategies to manage drainage basins/catchment areas

- Fines to be imposed for dumping into rivers.
- Create a buffer zone close to rivers to prevent industrial development being too close.
- Encourage the growth of vegetation and trees to trap surface run-off and decrease erosion.
- Frequent testing of water quality to prevent disruption of ecosystems.
- Encourage the recycling of waste rather than dumping into rivers.
- Awareness campaigns and legislation to prevent dumping in rivers.
- To educate farmers on sustainable practises.
- Wetlands must be conserved.

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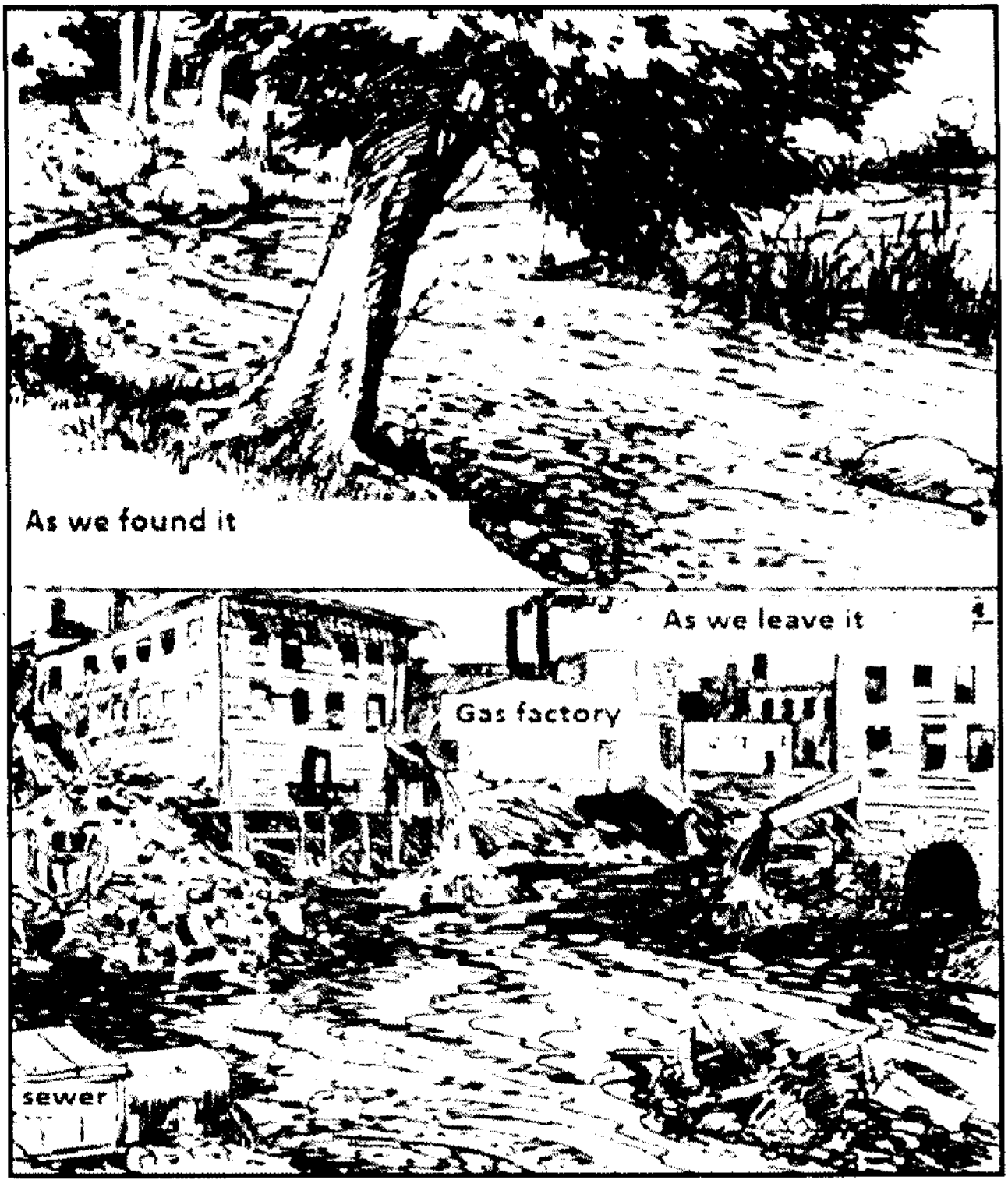
Activity 2.12

RIVER POLLUTION



1. Who is the cartoonist blaming for the pollution of rivers?
2. Name TWO ways in which humans pollute rivers.
3. What effect does pollution have on the health of rivers?
4. Why is it important to take care of our rivers?

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PARAGRAPH TYPE QUESTIONS

1. Write a paragraph (approximately 12 lines) analysing the physical and economic impact of river capture on the captured stream.

2. Analyse the possible impact of the pollution of the Vaal river on the cost of food and electricity supply in the future.

3. In a paragraph explain factors that influence the rate of infiltration and thus the discharge of a river.

4. Provide supporting arguments in a paragraph as to whether settlement and infrastructural development on floodplains is suitable.

5. With the use of examples explain fluvial processes that give rise to certain fluvial landforms forming in the lower course of a river.

6. Write a paragraph to account for the change in the shape of a rivers longitudinal profile from the source to the mouth.

7. Explain in a paragraph of 8 lines why deltas can be an important source of income fora country.

8. Evaluate the disadvantages of living on the banks of both a captor and captured river.

9. Suggest the impact of population growth on catchment areas.

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MODULE 3

RURAL AND URBAN SETTLEMENTS

TOPICS

- Study of settlements
- Rural settlements
- Rural settlement issues
- Urban settlements
- Urban hierarchies
- Urban structure and patterns
- Urban settlement issues

KEY CONCEPTS

Basic services	Services to meet the basic needs of people, e.g. water, transport, clinics, schools
Bridging point	Shallow point across a river which makes it easy to cross
Central Business District (CBD)	Commercial heart of an urban area
Central place	Settlement that provides goods and services to the surrounding rural area
Central place theory (Christaller)	Theory that describes the distribution of settlements (central places) according to the size and services they offer
Centrifugal forces	Forces that push people and their activities away from the urban centre (CBD)
Centripetal forces	Forces that attract people and their activities to the city
Decentralization	When people and functions move out of the CBD to the surrounding areas
Dispersed rural settlements	Farmsteads are found far apart or scattered
Nucleated rural settlements	Farmsteads are found clustered or close to each other
Dry point settlement	Settlement that locates away from water, on high ground because water is a threat
Hierarchy of settlements	Ranking of settlements from smallest to largest.
Settlement	A place where people live which includes buildings, economic activities and transport networks
Informal sector	Employment that is not regulated or registered, e.g. street traders
Inner city	Area near the city centre that is run down and showing signs of urban decay
Informal settlements	Unplanned settlements with no proper infrastructure and services.

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Land redistribution	To redistribute land to landless people, who are not eligible to claim land
Land restitution	To return land to people that were forced out during the apartheid era
Land tenure reforms	To secure the rights of people (tenants) that live under insecure conditions on land owned by others
Land use zones	Specific areas set aside in urban areas to fulfil particular functions e.g. residential
Morphology	Refers to the external physical appearance of a settlement
Multifunctional	Has many functions, e.g. urban settlements
Range	Maximum distance a person is prepared to travel in order to buy a product or service
Refugees	People that are forced to flee from their country
Rural-urban migration	Movement of people from rural to urban areas
Rural depopulation	Decrease in the number of people living in rural areas
Site	Actual land on which a settlement is located
Situation	Location of a settlement in relation to the surrounding physical features and places
Sphere of influence	Rural area that is served by a central place
Sustainable	The careful use and conservation of resources thus making it available for future generations
Threshold population	Minimum number of customers needed to make a business profitable
Uni-functional	Has only one main function, e.g. rural settlement
Urban profile	View of an urban area as seen from the side
Urban renewal	Improvement of parts of urban areas that are run down
Urbanization	Process whereby an increased percentage of people live in urban areas
Urban sprawl	Uncontrolled growth of urban areas in different directions
Wet point site	Settlements that locate close to a water source, because water is scarce

STUDY OF SETTLEMENTS

WHAT IS A SETTLEMENT?

It **is a place where people live which includes buildings, economic activities and transport networks.** The size and shape of settlements vary across the earth's surface. It can be as small as a single building or as large as a megalopolis.

SITE AND SITUATION OF A SETTLEMENT

SITE

It refers to the exact land (physical landscape) on which a settlement is built.

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SITE FACTORS

Below are some factors that influence the site of a settlement:

1. Water	• Access to water (spring, river, well) was an important factor in the location of early settlements. It is still important in the location of farms today. • With improvements in technology and the introduction of piped water over long distances the importance of water as a site factor has diminished for urban settlements. • Where water was scarce it gave rise to nucleated settlements. • Where water was easily available it promoted dispersed settlements.
2. Relief / micro climate	• Settlements locate on hill tops because of flooding or for defence reasons. • Some locate at the foot of hills or low lying areas to be sheltered from strong winds • Flat or gently sloping land is selected to make farming easier (can use machinery), and construction costs are lower. • In coastal areas seaward facing slopes are selected to get the cool sea breeze in summer
3. Soil	• Farmers choose well drained and fertile land because the quality of the soil is good for crops. • Flood plains generally have fertile soil. • Areas with fertile soil generally attract nucleated settlements as compared to areas with infertile soil.
4. Climate	• Areas with extreme weather conditions generally have dispersed settlements, e.g. arid and mountainous areas (low temperature). • In South Africa, north facing slopes are warmer than south facing slopes. Thus people prefer to settle on north facing slopes.
5. Accessibility and communication	• This was an important factor identified in early settlements due to a lack of technology. • In areas where there were no bridges to cross over rivers, settlements had to locate at a shallow point along the river.
6. Tradition	• In South Africa the site and pattern of rural settlements are influenced by tradition, e.g. the Nguni people live in dispersed settlements that are small in size.
7. Fuel, building material	• Access to wood and stone were important to build houses. Therefore people located close to these sources.

Note: Some of the above site factors are no longer as important as they used to be. Man can get around any one of them with modern technology. A good example is the City of Las Vegas which is built on an inhospitable desert where everything is transported in from water to golf balls.
Political and economic factors are now more important than site factors

SITUATION

It refers to the location of a settlement in relation to the surrounding area.

Some of the factors that influence the situation of a settlement include:

- Roads, railways, harbours, airports
- Distance to other settlements / markets
- Access to resources and services

Example: Durban - close to the harbour with links to international markets

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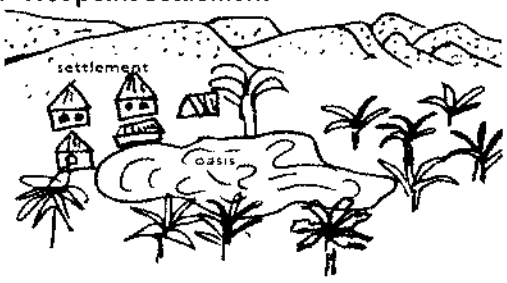
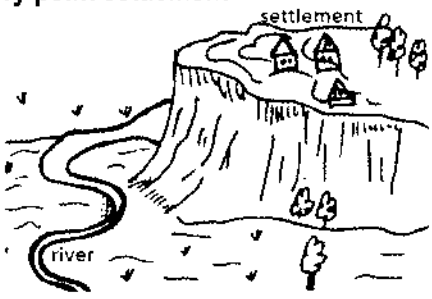
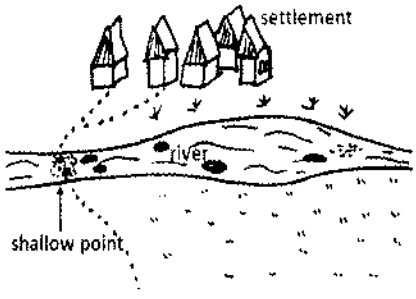
Influence of site and situation on settlements

1. Wet point settlement  	• These settlements are found in areas where there is a shortage of water (scarce). • **Settlements are located close to the water source** which can be a well, river, oasis, etc. • This is common in arid areas.
2. Dry point settlement  	• These are **settlements that are found away from marshy or flood prone areas because water is a threat.** • They locate on higher ground (tops of hills and mountains) because there is a possibility of flooding on lower ground.
3. Defense 	• Located on higher ground (hills and mountains) or in the loop of meanders for **safety reasons.** • Can also be at the foothills of mountains as it is sheltered and hidden.
4. Accessibility/communication **A**  • **Ford / Bridging point**: settlement locates at a shallow point along the river to make it easier to cross. **(A)**	**B** • **Gateway**-found in gaps between hills. It creates the potential for growth and to link to other areas. **(B)**

NOTE: The site and situation of a rural settlement will depend on its main function (economic activity).

- A dairy farm will be situated close to its market (urban area) because it produces perishable goods.
- An arable farm needs a site that has fertile soil and a water source.
- A livestock farm needs a site with good grazing ground.

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TYPES OF SETTLEMENTS

All settlements can be identified as being either **rural or urban**

RURAL:

The term 'rural' **usually refers to farmsteads, villages or hamlets where there is limited development and technology**. Rural areas generally rely on agriculture and natural resources as a source of living. The living conditions in such areas are also generally basic. These settlements are characterised by **primary economic activities** such as fishing, farming, forestry, mining and hunting.

URBAN:

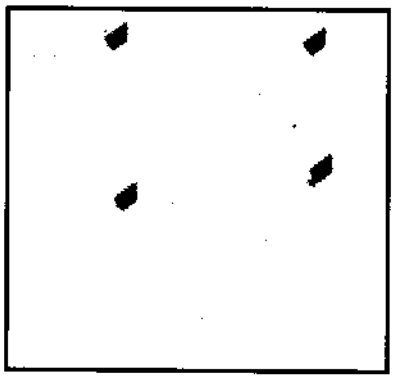
These are **densely populated settlements with a lot of man- made structures, and few open spaces such as towns and cities**.
Urban areas have many improved social facilities such as transport, business prospects, educational facilities and entertainment which results in a better standard of living. It is mainly characterised by **secondary, tertiary and quaternary activities**.

CLASSIFICATION OF SETTLEMENTS

Settlements can be classified in different ways:

1. Pattern (Shape)

The following basic settlement patterns can be identified:

1.1 Dispersed rural Settlement 	• **Houses or farms are far apart or scattered (isolated)** **Advantages**: • Farmers are independent and can experiment with modern methods and equipment • Dispersed farmsteads make larger profits. • Lots of privacy **Disadvantages** • Lack of social life due to it being isolated. • Easy target for criminals because of the isolation. • These farms require large amounts of capital to be sustained. • Basic services such as schooling are far away.

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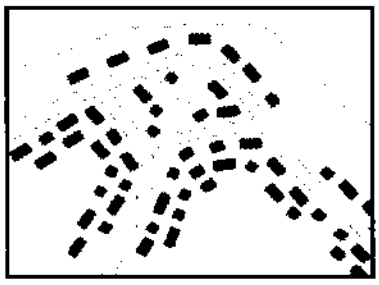
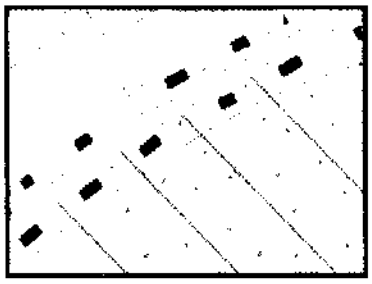
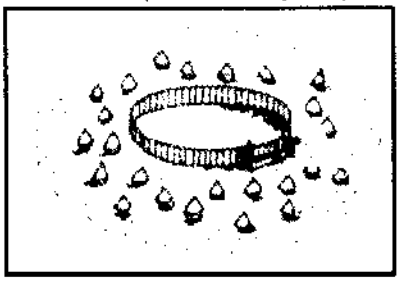
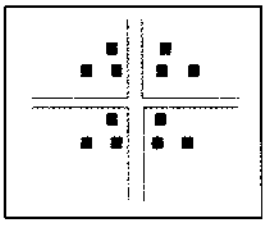
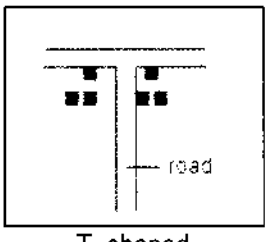
1.2 Nucleated rural settlement 	• **Houses or farms are found close together (clustered)** **Advantages:** • Sharing of farming equipment and ideas. • Community activities (social advantage). • Safety advantage because of larger numbers. **Disadvantages:** • Lack of privacy • Small profits • Time wastage should the farmer have fragmented plots of land.
1.3 Linear/ribbon development 	• **Houses are located in a line along a road, narrow valley, canal, river or ridge.** • Individual farmsteads (elongated, rectangular) in this pattern tend to have small frontages to gain direct access to the road or river.
1.4 Planned (round or square) 	• Houses are grouped around a market square, church, water source, village green or around animals to protect them, e.g. the Masai kraal or traditional Zulu village.

1.5 Crossroads

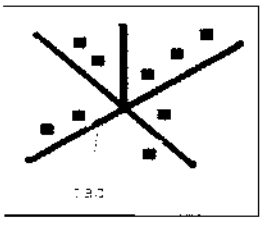
- Crossroad settlements **develop from the different ways in which the roads meet.**



Cross shaped



T- shaped



Star shaped

- Accessibility to transport is the main reason for settlements developing.
- Crossroad settlements can be T shaped, cross shaped or star shaped.
- A settlement resembles a star or stellar shape when development takes place along main roads that radiate in different directions away from a central point.

Note that as a settlement grows, growth cannot take place indefinitely along the roads. The gaps between the roads fill with development thus changing the shape to circular eventually.

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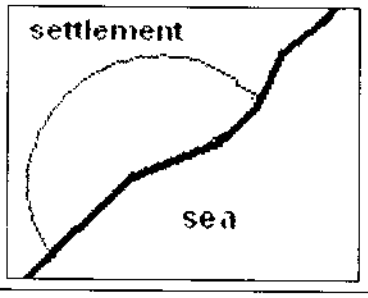
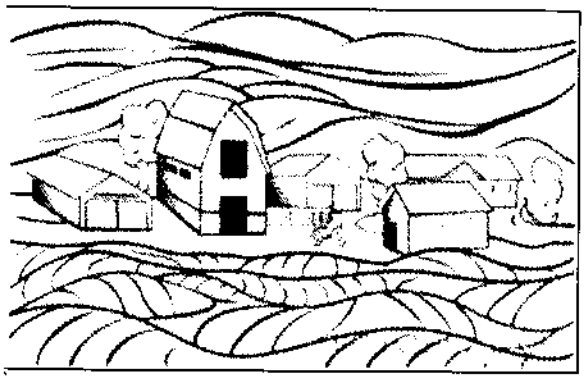
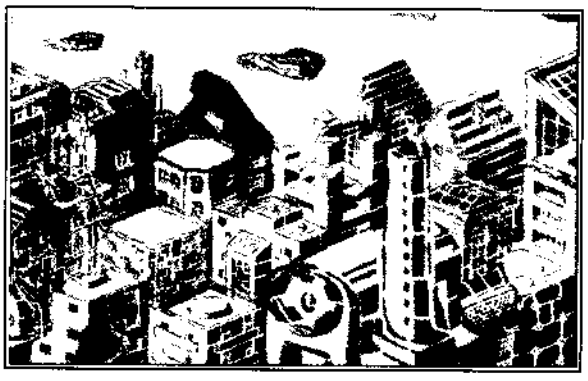
1.6 Semi-circular  	• Settlements that are located along the coast generally assume a semi-circular shape because the sea is a **physical barrier** to expansion. This shape could also develop along a river/lake/canal/mountain range.

2. Function of a settlement

The main factor that is used to differentiate between rural and urban settlements is its function





Rural	Urban
• **Uni-functional** (one function) • Associated with **primary activities** • It has one dominant function, e.g. agriculture, forestry, mining, conservation, quarrying • Farmsteads, hamlets and villages generally fall into the category of being rural • The settlement pattern may be **dispersed or nucleated.**	• **Multi-functional** (many functions) • Associated with **secondary, tertiary and quaternary activities** • Variety of functions such as shops, schools, place of worship, hotel, factories, post office, etc • Towns, cities, metropolis, conurbation and megalopolis fall into the category of being urban settlements • Urban settlements are always **nucleated.**

Note: Size and population are not realistic factors to use to distinguish between rural and urban settlements because some commercial farms cover a larger area than small towns. Some rural villages in India and Hungary also have large populations that exceed the number of people found in some towns in SA.

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LAND USE IN RURAL SETTLEMENTS

Land use in rural areas includes farming, forestry and conservation. Farming is practised at different levels.

A. Subsistence Farming

- The farmer mainly grows crops to meet his family's needs. May also keep livestock for milk and meat.
- It is small scale farming using traditional methods.
- Plant a variety of crops in small quantities.
- Does not contribute much to the economy of the country.

B. Commercial farming

- These are large farms that are capital intensive and the main purpose is to make profits.
- Generally plant one main crop.
- Use modern farming methods and technology.
- Farming can **be intensive or extensive.**

C. Intensive farming

- Every available piece of land is used.
- The yield per hectare is high.
- Generally capital and labour intensive.

D. Extensive farming

- Occurs on large tracts of land.
- Yield per hectare is low compared to the size of the land.
- Usually occurs in areas where land is less fertile or semi- arid. Sheep farming in the Karoo is an example of extensive farming.

3. Size and complexity

The smallest settlement is an isolated farmstead and it grows in size and complexity depending on the functions that it offers.

RURAL SETTLEMENT ISSUES

South Africa is characterized by high levels of poverty especially in rural areas. About 70% of South Africa's poor live in rural areas. Some of the main issues that affect them include:

- Income is limited - the rural economy does not provide them with many job opportunities.
- Cost of living is high because they spend more on basic food, water, shelter, energy, health, education and transport.
- Agriculture forms the basis for livelihoods as the poor infrastructure does not encourage the manufacturing sector.
- Traditional leaders retain more influence over the population, e.g. in land ownership, community projects.
- Because of past policies, there are densely populated areas where people live in abject poverty and are isolated from economic opportunities.

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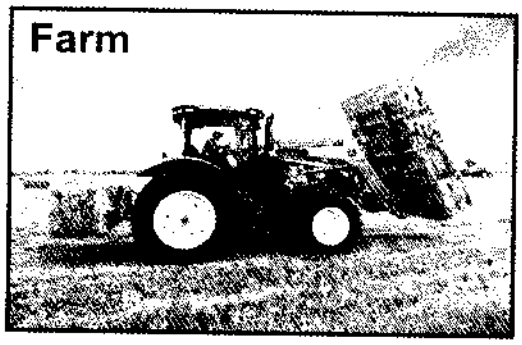
- Rural housing is often sub-standard or non-existent.
- In the past African farmers were suppressed in rural areas by being excluded from commercial farming. Only unskilled jobs were available to them and in many cases they were seasonal and temporary in nature, thus income levels were low.
- Unique in South Africa is the existence of rural areas which comprises of resettled communities. People were forced to move from their original areas in the apartheid era to homelands and hostels in mining towns.

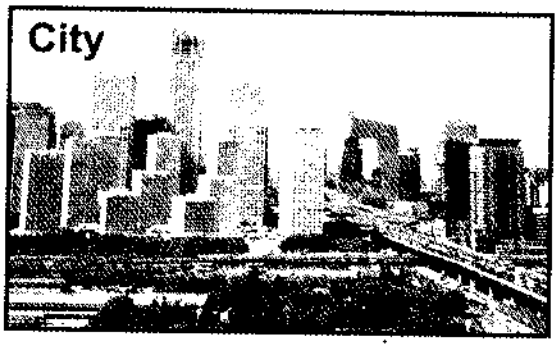
RURAL DEPOPULATION

It refers to the decreasing number of people that live in rural areas due to rural-urban migration.

Rural-urban migration

This refers to the movement of people from farms to urban areas.





Reasons for rural-urban migration:

Why people leave farms? (Push factors)	Why people are attracted to cities? (Pull factors)
• Hard work, long hours and **low pay** • Poor quality **housing** • Natural disasters - **floods and droughts** • Overgrazing and poor farming methods results in **soil erosion** and low production levels • Travel long distances to access education, health and welfare • Lack of electricity, running water and sewage services • Mechanisation has resulted in fewer jobs • Increased cost of living because goods/services are more expensive • Sparse population which means help is not close by • Farm killings (**crime**) • Bankruptcy, starvation and **poverty** • Crop or livestock diseases	• Greater variety of jobs with **higher wages** • Improved housing with services such as **water and electricity** • Improved **quality of life** and standard of living • Availability of doctors and **access to hospitals** • More reliable sources of food • Efficient transport system • The experience of living in a modern city and the lure of 'bright lights' • Greater access to entertainment • Food security • Access to sporting facilities • Variety of educational institutions (primary, secondary and tertiary) are accessible

Note: The rural migrant leaves home with a perception of city life based upon radio programmes, magazines, television, etc.

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Why is the reality different?

- The reality is often different, because migrants often have little money and they end up living with friends/relatives in informal settlements or on the streets until they establish themselves.
- Local government cannot meet the demand for housing.
- People earn low salaries and cannot pay for formal housing.
- Lack of job opportunities.
- Lack of qualifications to be competitive in the job market.

Consequences of rural depopulation

On Rural areas	On Urban areas
• Basic services such as **shops and schools close** due to decreasing numbers and this affects the economy of the area. • The economy is also affected because **production decreases** as there are more old people and fewer labourers. • Buildings and farms are abandoned giving rise to **'ghost'** settlements • The **young people** are more likely to **move to the cities** (especially young men), leaving behind a large older population. • Family units are broken, e.g. when parents leave children with grandparents to work in urban areas. • **Brain drain**[8]- has left people behind who are least educated and this slows economic growth. • Resources become under-utilised.	• Lack of housing leads to a growth of **informal settlements**. • Increase in levels of **crime** because unskilled people cannot find jobs • **Traffic congestion** and pollution increases • Insufficient services (medical, education, etc) to cope with large population • Waste management becomes uncontrollable • Hygiene is a problem in squatter settlements due to a lack of purified water and sewage facilities • Values, traditions and customs break down when people get caught up in city life • **Overcrowding** and lack of shelter leads to the rapid spread of diseases such as tuberculosis (TB)

WHY IS THERE A NEED TO MANAGE DWINDLING RURAL SETTLEMENTS?

- Rural settlements play an **important role in producing food** in a country.
- A decrease in food production will result in more imports and **higher food prices**.
- It will **influence the GDP** of a country.
- Shortage of raw materials for industries which will increase production costs.
- Will create more unemployment.
- More **ghost towns,** which results in services and resources that are under- utilised. There will be dilapidated buildings that are empty and may attract vagrants and criminal elements.

[8]Brain drain- skilled labour leaving the country or an area

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Sustainable strategies to manage dwindling rural settlements
(How to attract people to rural areas?)

- Use of farming practices that can cope with climate changes, e.g. **use of drought resistant crops**, efficient use of water, etc.
- Use scientific technology to monitor environmental conditions, get early warning systems for plant and animal diseases, etc.
- Reduce use of nitrogenous fertilizers which is harmful to the environment.
- Choose livestock breeds that are associated with a high production of meat and milk, thus reducing methane emissions.
- **Land reform** should be accelerated to enable the poor and landless to obtain land for farming.
- Communal ownership of land should be changed to individual ownership as it is not productive.
- **Improve roads and transport** facilities.
- Create **more job opportunities** through the decentralisation of industries from urban areas.
- Improve work conditions and salaries.
- **Provision of basic services** such as water, housing, health, etc. This will result in counter urbanisation.
- Improve access to capital for farmers.
- Provide training courses to **improve skills in farming**.

CASE STUDY OF RURAL DEPOPULATION

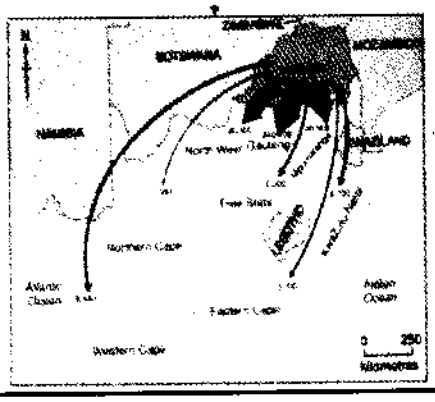
CASE STUDY - RURAL TO URBAN MIGRATION IN SOUTH AFRICA

URBAN CHANGE IN JOHANNESBURG
- Johannesburg is South Africa's biggest city
- Has a population of 1.5 million legal residents.
- Another 2 million live in informal settlements on the edge of the city, like Soweto in the west

Problems of life in Soweto
- High density housing;
- Lack of basic services such as clean water sanitation and waste collection;
- Nowhere for children to play safely
- People connect to electricity supply illegally which is dangerous.
- Roads are not paved so flood.
- Disease spreads quickly
- Large numbers of people die from AIDS;
- Mixture of small formal houses and large informal shacks built of sheet metal
- Large number of unskilled workers who can only get low paid jobs.

How is Johannesburg improving Soweto?
- Trying to replace informal housing with low cost social housing;
- Building 200 000 low cost homes each year.
- Roads have been paved
- Better water supply with 98% now have clean water;
- Street lights make it safer at night.
- Over 300 000 jobs created
- More police on streets so crime being reduced;
- New parks laid out to give a better environment and provide places for children to play.

WHERE DID PEOPLE MOVE FROM?
- Mostly Limpopo Province in the north of South Africa
- Some 250 000 people have moved mostly aged 20 - 30
- Most only move a short distance to Gauteng Province only 200 kms away.
- Most go to the cities of Johannesburg, Pretoria and Soweto



WHY DID PEOPLE LEAVE LIMPOPO?
(Countryside)
Push factors from Limpopo
- Few houses have electricity.
- Poor job opportunities.
- Lack of money - most people earn less than £100 a month
- Most people do not own a TV, computer or cooker.
- Low quality of life
- Mostly farmers on small farms that do not make much money;
- Rainfall is unpredictable so crop yields varies.

Pull factors of Johannesburg
- Better job prospects.
- Average earnings of £700 a month.
- Better quality of life.
- Better schools.
- Better health care.
- Higher ownership of goods like TV, computer and cookers.

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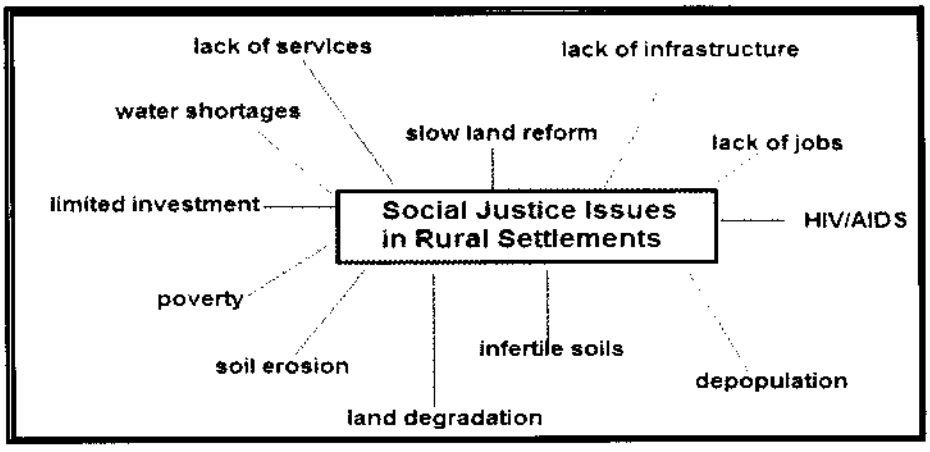
SOCIAL JUSTICE ISSUES IN RURAL AREAS

Social justice is about creating equal opportunity and meeting the basic needs of people.



LAND REFORM

The purpose of land reform in South Africa is to bring about equitable distribution and access to land. This rests upon three pillars in post -apartheid South Africa:

a. Land restitution

Is a process of **compensating people for the land they lost** due to forced removals. This done where they are given another piece of land or paid out.

b. Land Tenure Reform

It is designed to provide security to all South Africans in terms of land ownership. It recognis communal land rights and the rights of tenants on mainly White owned farms. It **prevents t unfair eviction of tenants** from land that they have occupied for a long time.

c. Land redistribution

This is aimed at **providing previously disadvantaged people with land** for residential a farming purposes. A state grant has been made available for this purpose.

Purpose of Land reform in post- apartheid South Africa

- To redress the injustices of apartheid.
- For **national reconciliation** and stability
- To promote **economic growth**
- To **alleviate poverty**

Challenges associated with land reform

- The **willing seller/buyer clause** causes delays in negotiating prices.
- It is a very **costly process**.
- It takes time to resolve land claim disputes.

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- There are **grey areas** (gaps) **in the land reform policies**.
- Lack of training and support for new owners.
- **Disagreement between government and traditional leaders** in terms of restoring land to communities.
- Land has been redistributed to some who have no interest or knowledge of agriculture.
- The anticipated move from subsistence to commercial farming has not taken place.
- Land reform has not stimulated the economic growth of rural areas and reduced poverty.

ACCESS TO RESOURCES

WATER

The main resources needed in rural areas are water and fertile land.
South Africa is recognised as a water-scarce country. The country's mean annual precipitation is 450 mm. This is well below the world average of 860 mm per year.

Currently, 19 percent of the **rural** population lacks **access** to a reliable **water** supply and 33 percent do not have basic sanitation services. This is an injustice as it impacts on the rural population in the following way:

- **Restricts farming and thus the ability to earn a living**
- **Creates a health hazard**
- **Water is a basic need for survival**
- **Outbreak of diseases such as diarrhoea**

Water shortages

Water demand in Southern Africa

Country	Demand in 1990	Irrigation	Demand in 2020	Total water available
Angola	1335	350	2757	78000
Botswana	120	20	336	230
Lesotho	118	70	268	2490
Malawi	1135	795	2578	4240
Mozambique	1967	1308	3210	132000
Namibia	265	108	538	740
South Africa	19295	9615	30168	28470
Swaziland	454	310	511	1160
Tanzania	5374	4560	12220	44000
Zambia	994	690	2192	60000
Zimbabwe	2524	2175	5737	7860
Total	35581	20001	60515	359190

Source: SARDC, Fact Sheet

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Reasons for water shortages in South Africa

Natural reasons

- Rainfall is **low and unreliable.**
- There are only a few natural lakes.
- Most rivers are non-perennial.
- Many rivers are silted from soil erosion thus making them shallow.
- **Evaporation rates are high** since the climate is hot and dry.
- There are few deep valleys and gorges, therefore the dams built are shallow with larger surface areas that promote evaporation.

Role of humans

- Dams that are built on non-perennial rivers dry up during the non-rainy season.
- **Domestic wastage of water**
- **Pollution of water** by use of insecticides / pesticides / fertilizers on farms.
- Lack of infrastructure to supply water in deep rural areas.
- Alien plants such as lantana pollute the water by invading and destroying the dam ecosystem
- Destruction of river catchments, caused by urbanisation, deforestation, damming of rivers, destruction of wetlands, industry, mining, agriculture, energy use and accidental **water** pollution.

CONSERVING WATER RESOURCES

Agriculture:

- Farmers should use water saving techniques. **Drip irrigation** saves 30% more water compared to spray irrigation and the production per hectare is greater.
- The mixing of fertilizers with the water fed to plants using drip irrigation is an added benefit. The slow release of the fertilizers also prevents pollution of groundwater supplies.
- Maintain irrigation equipment such as valves and sprinklers to prevent wastage of water.
- Switch to crops with higher yields per unit of water consumed or to crop varieties which use less water.
- **Use treated wastewater** from urban areas for irrigation on farms. South Africa only treats about 54% of its municipal wastewater.
- Use of **water tanks** to capture and store rain water for irrigation
- Use of **boreholes**.
- Harvest rainwater in a water tank and use for recycling to toilets, basins or irrigation.
- Water leaks account for 60% of wastage, building maintenance is important to check for water leaks for any water leaks.
- Implement products which help with water efficiency – for example taps with flow restrictors, dual-flush toilets, replacing toilets to reduce the flush size.

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Measures government can implement to assist:

- Increase the amount of wastewater that is treated and reused.
- Fix ailing wastewater treatment plants.
- Develop more efficient irrigation technologies.
- Implement tiered pricing structure and incentives to reduce consumer water consumption.
- Investigate infrastructure and reduce water leaks.
- Use of groundwater more intensively, particularly in the agricultural sector.
- Implement new technologies which have become affordable, such as desalination and renewable energy.
- Increasing the amount of energy generated from renewable sources will reduce industrial water demand, lower carbon emissions and minimise water contamination from industrial activity related to coal production.
- installation of solar-powered boreholes in our most underprivileged communities.

Rural Development Programmes to address social injustice issues

Strategy	Aim	Method
RDP- (Reconstruction and Development Programme)	This was implemented in 1994 to provide for the basic needs of people.	Basic needs included: food, sanitation, housing, water, access to health care and generation of employment.
IRDP (Integrated Rural Development Programme)	Introduced in 2000 to improve farming as well as meet the basic needs of people.	To improve infrastructure, provide training, use of irrigation, introduce cash crops, and change the communal tenure system.
Agenda 21	To promote sustainable development (2001) in smaller localities. It is about encouraging programmes that are planned, managed and organised by people in a local area.	• Consultation with local communities to identify their needs • Strategies to ensure sustainable use of resources • Incorporate indigenous knowledge into projects • Conservation must form an important part of sustainable development
CRDP (Comprehensive Rural Development Programme)	Introduced in 2009 to reduce rural poverty and food insecurity. Includes land reform and investment in infrastructure.	• Aggressive land reform policies • Skills development • Infrastructure development • Turning primary products into secondary products

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INVESTMENT AND INFRA-STRUCTURE IN RURAL AREAS

One of the most important differences between rural and urban environments is simply the infrastructure. The infrastructure that is usually taken for granted by people living in urban environments does not exist in the rural areas.

Rural municipalities and provinces have limited economic activity and a narrow tax base, which means that they rely heavily on central government for funding

Infrastructure needed for growth of rural areas

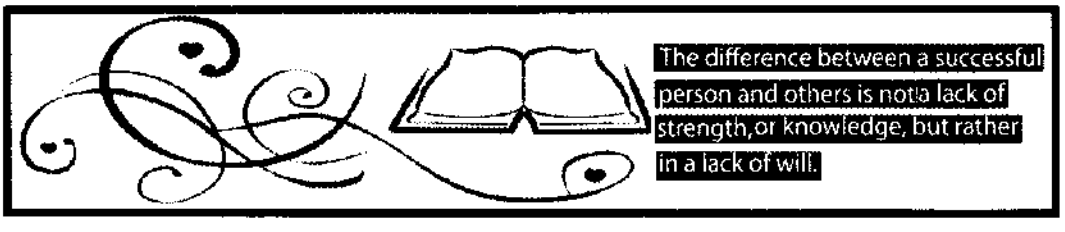
- Road infrastructure connects rural areas to urban centres and facilitates the mobility of goods and people within the area
- The supply of water infrastructure, depending on the nature and scale of technology, has great potential for stimulating small and large scale agricultural activities.
- Electricity infrastructure in rural areas not only improves the lives of people, it can facilitate small business development.

Possible reasons for lack of investment in rural areas

- For property development to take place in under-serviced areas, a key requirement is basic infrastructure.
- In rural areas, chiefs are custodians of rural land and when developers seek formal protection of their land rights by way of leaseholds, this creates tension between the rural community, the chiefs and the developers.
- Another obstacle in developing rural areas is the uncertainty that comes with land claims; this poses a great challenge for both developers and funders.

How to solve the challenges experienced in rural areas?

- promote rural economic development through the concerted provision of quality education and health care
- embrace community participation
- Public entities, such as state-owned companies (e.g. Eskom, Telkom) and development finance institutions (e.g. Land Bank, Industrial Development Corporation) have a responsibility to support rural development
- infrastructure – dams, roads and rail – has to be improved
- Government needs to create a business friendly and growth enabling environment in rural areas to attract investors, using rebates and incentives
- Providing support to rural small holdings to ensure sustainability and growth



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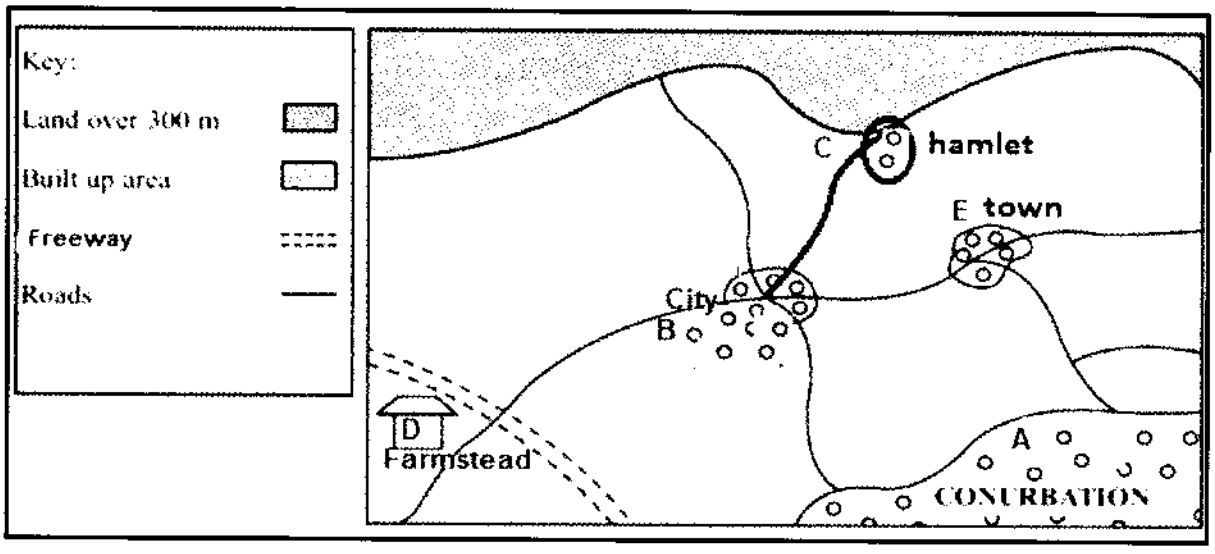
Activity 3.1

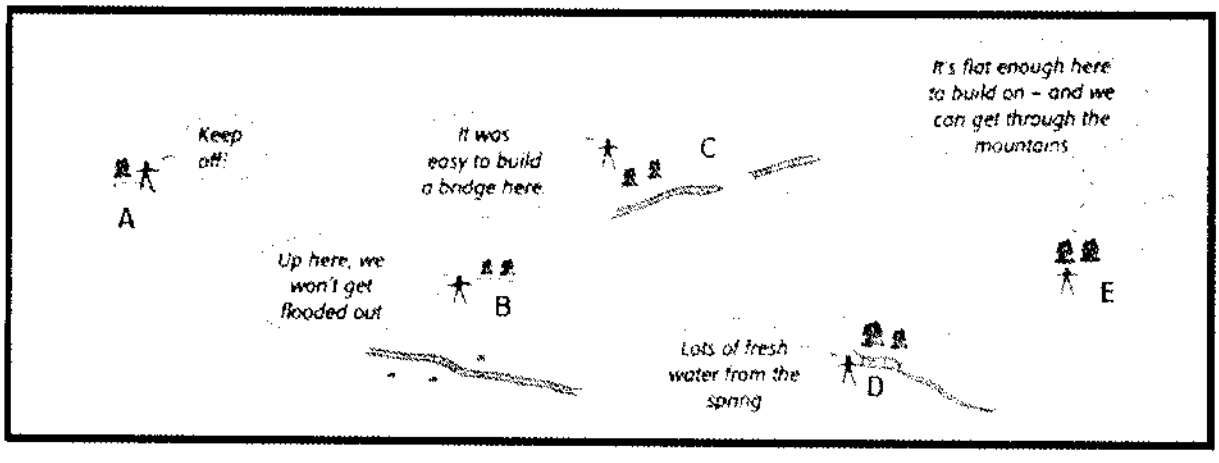
Refer to the sketch on settlements and answer the questions.



1. Give the term that describes the ranking of settlements from lowest to highest.
2. Name one disadvantage of the settlement labelled **D**.
3. Will the sphere of influence of settlement **B** or **E** be greater?
4. Give the name of the theory that explains the relative size and spacing of settlements.
5. Explain the origin of a conurbation.
6. Is settlement **B** or **E** likely to have a larger threshold population?
7. List TWO differences between settlement type **C** and **E**.
8. Suggest TWO factors that could have influenced the situation of settlement **C**.

Activity 3.2

Make reference to the sketch on settlement types.



1. Name each of the settlement types likely to be located at **B, C, D**, and **E**.
2. Suggest a reason for the location of each of the settlements labelled **A** to **E**.

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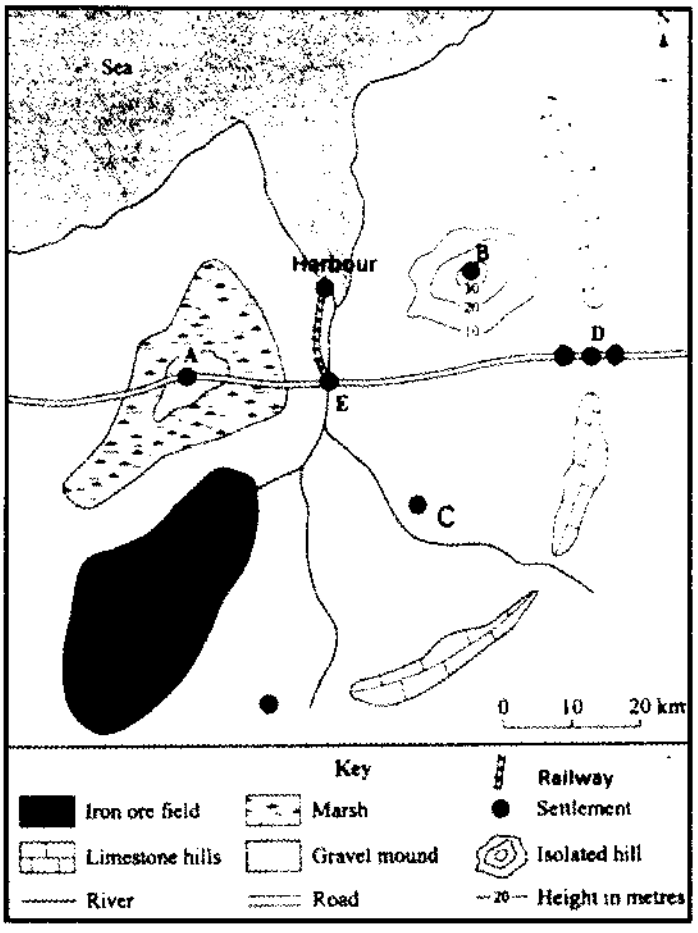
Activity 3.3

Study the sketch showing the influence of site and situation.



1. Differentiate between the terms site and situation.
2. Give a reason for the location of settlement **A**.
3. Why would settlement **E** be considered a break of bulk point?
4. Describe the shape of settlement **D**.
5. Suggest a reason for the shape it has assumed.
6. Label **B** and **C** as wet or dry point settlements.
7. Describe a dry point settlement.

Activity 3.4

Study the sketch on population movements.

1. What is the term used to describe an increasing number of people leaving rural areas?
2. List TWO reasons why people are attracted to the city.
3. Suggest TWO challenges that the city will experience due to an increase in population numbers.
4. Give one term for the movement of people from farms to cities.
5. Discuss TWO social justice issues experienced in rural areas.
6. Evaluate the impact of the movement (answer to 1) in promoting stagnation in rural areas.

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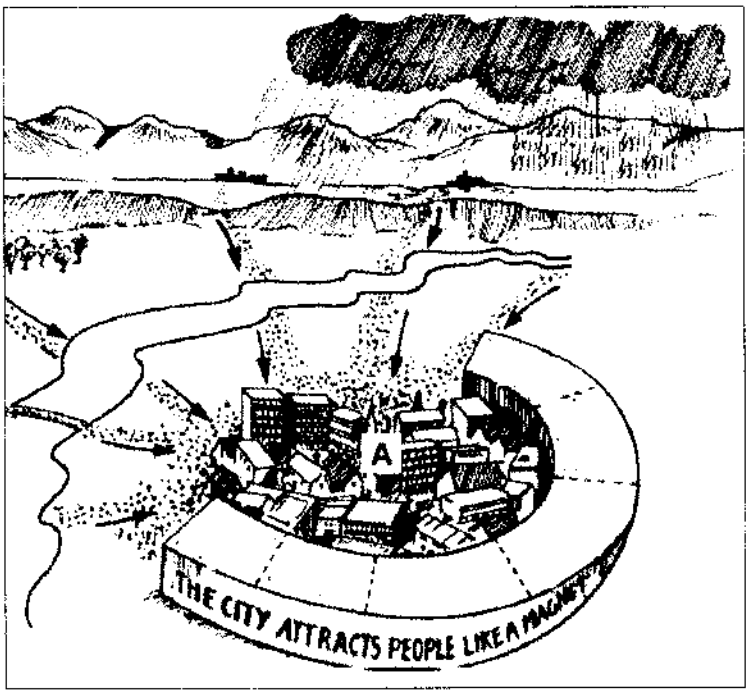
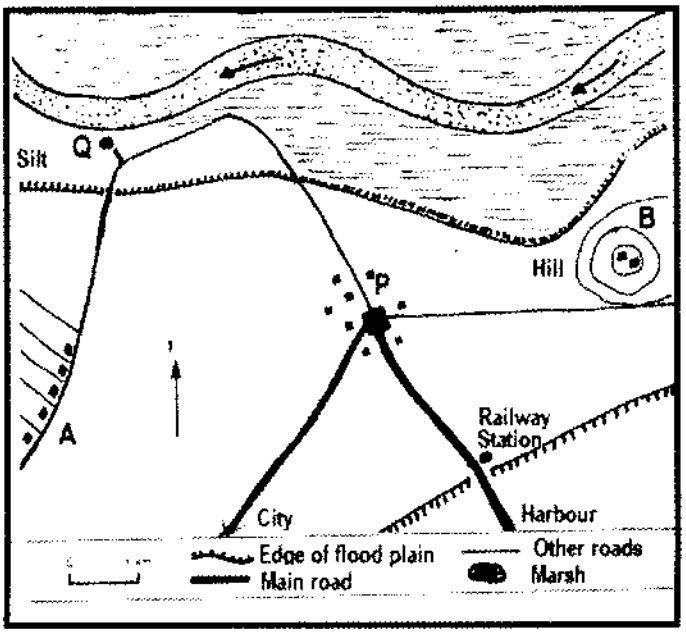


Activity 3.5

Study the settlement types.



1. Define the concept 'site'.
2. Identify a factor that could have influenced the site of settlement **Q**.
3. What type of settlement is **B**? Give a reason for your answer.
4. What advantage does settlement **A** have because of its linear pattern?
5. Suggest two reasons for the situation of settlement **P**.
6. Discuss two situation factors that have little influence on the location of modern cities.

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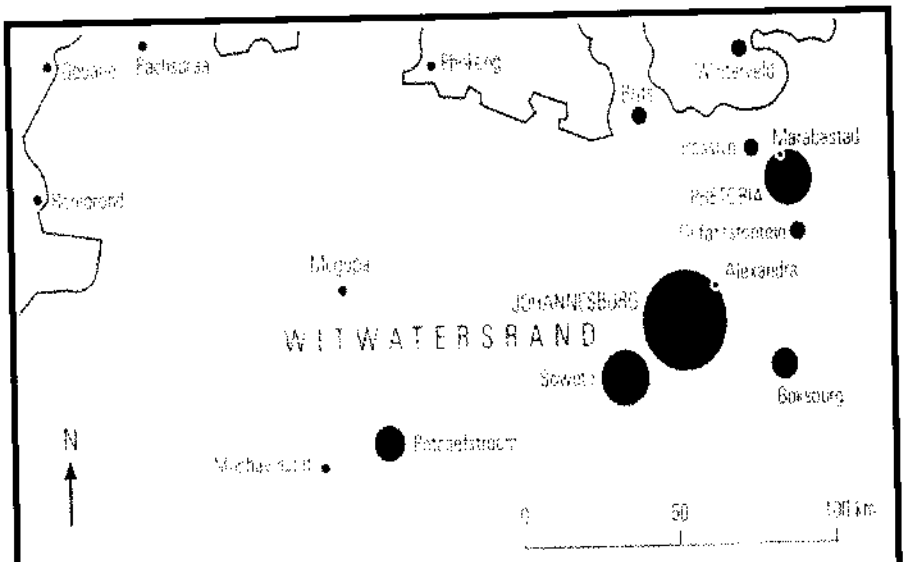
Activity 3.6

Study the source on land reform



What some Bakwena people say about their removal

"My people, the Bakwena, bought land at Magopa as long ago as 1913. It was our land, but it became part of South Africa set aside for whites. In 1984 we were forced to move to Pachsdraai.

"We did not want to leave but we had no choice. They knocked down our buildings and stopped paying our pensions. We had many donkeys, goats and cattle. We grew maize, beans and sorghum. We had stone houses, three schools, four churches, two water pumps and a reservoir. Now there are only ruins.

"Some people got R2 000 for their houses. In the new place we have nothing. We got no money for the land we left. Now we have no taps and no running water. A tanker comes to fill the drums outside our iron shacks. The nearest town is far away. We have no jobs and cannot feed ourselves."

Source: Living Geography Grade 9

1. Which Act forced the Bakwena people to leave their land?
2. In post-apartheid South Africa, which land reform process will allow for the land to be returned to the Bakwena people?
3. Identify two problems experienced by the Bakwena people when they were forced to leave their land.
4. At the end of the apartheid era the RDP programme was introduced. What was the purpose of this programme?
5. Why was land reform introduced after 1994?
6. Why has land reform not been as successful as anticipated?

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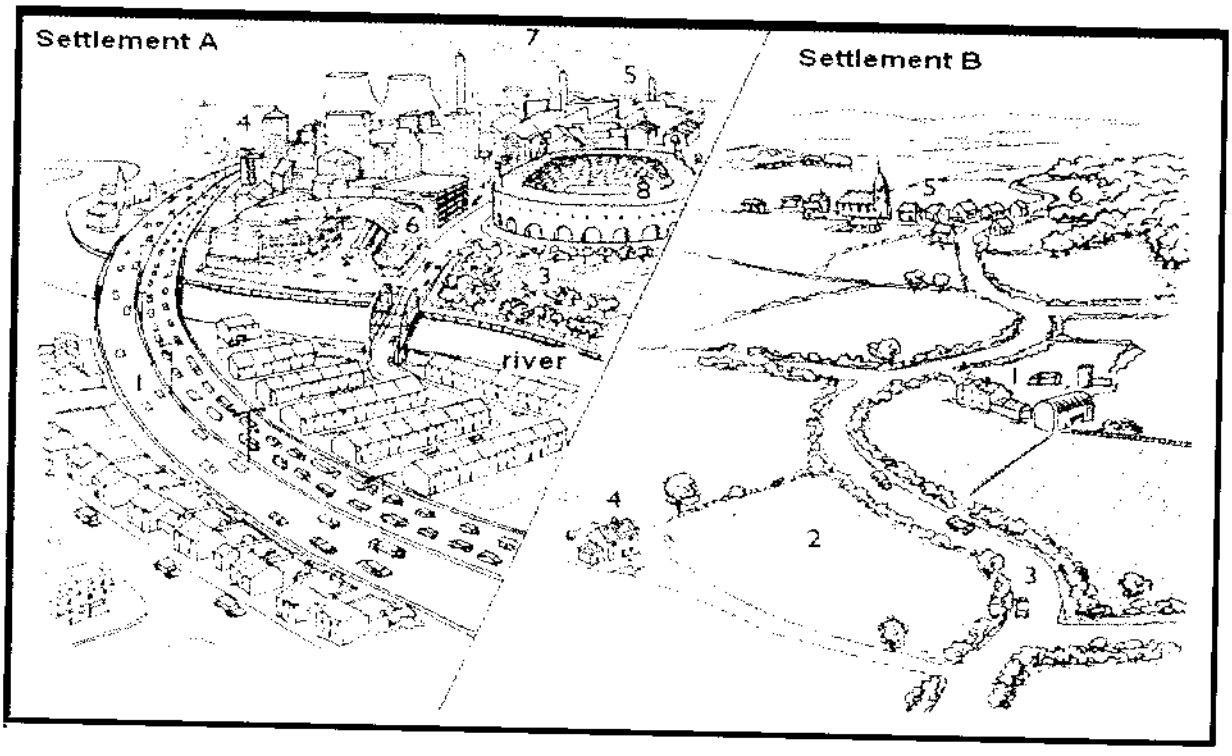
Activity 3.7

Refer to the sketches that follow showing two types of settlements.

1. Name the settlement types labelled **A** and **B**.
2. Compare the two settlements in terms of the functions they offer.
3. Suggest a possible reason for the original site of settlements **A** and **B**.
4. Name the land uses evident on sketch **B** labelled **2**, **4**, **5** and **6**.
5. In sketch **B** classify the farmsteads labelled **4** and **5** as being nucleated or dispersed.
6. Give two advantages each of settlements types **4** and **5** in sketch **B**.
7. Industrial activity occurs on the river bank in settlement **A**. How will this affect the river ecosystem?
8. Name two urban problems evident in sketch **A**. Suggest a solution to each problem.
9. What evidence suggests that **2** (in sketch **A**) is a low income residential area?
10. What purpose does the area labelled **3** serve in sketch **A**?
11. What term describes the movement of people from settlement **B** to **A**?



ORIGIN OF URBAN SETTLEMENTS

- The first major cities originated in Mesopotamia (currently known as Iraq), about 6000 years ago. This than spread to Egypt, Turkey and China,
- The origin of urban settlements until the 19th century is linked to providing goods and services to the surrounding settlement: trade (markets and shops), religion (to provide centres of worship), education, defence, and administration.
- The development of industries in the 19th and 20th century lead to large sprawling industrial towns and cities.
- In the late 20th century the growth of more economically developed countries is linked to the growth of services such as shopping, entertainment, finance, advertising, tourism.

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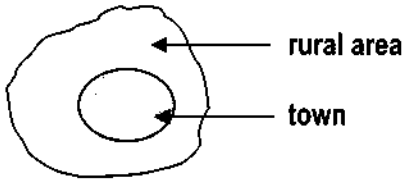
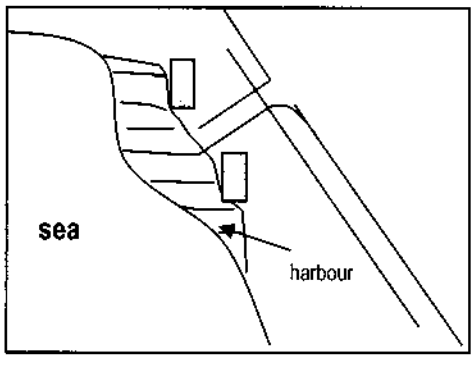
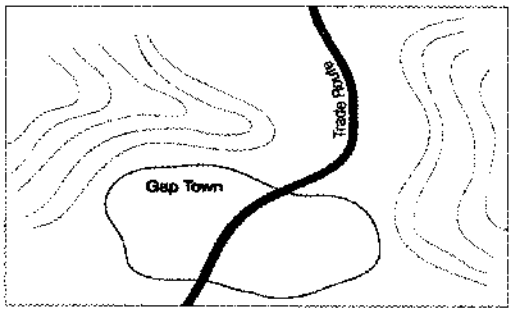
- Information and communication technology (ICT) is currently having a major impact on urba settlement growth. The growth of ICT means that many functions can take place anywhere i the world (globalisation).
- About 50% of the world's population is currently urbanised and this is expected to increase significantly especially in developing countries.

The original function that determines the location of an urban settlement could change over time. **Example**: Johannesburg used to be dominated by mining as a function but this has changed to industrialisation.

CLASSIFICATION OF URBAN SETTLEMENTS

Urban settlements are classified according to their dominant function.

1. **Central place towns/cities**  	• **Central places provide goods and servic the surrounding rural population** (econo religious, cultural, administrative and social • Most country towns in South Africa can be considered to be central places, e.g. Dunde Tongaat, Ermelo.
2. **Trade and Transport towns/cities** Three types can be identified: **2.1 Break of bulk point**  	• **These occur where goods are transferre from one form of transport to another** • An example would be Durban where many materials arrive via ship (water transport) a then transferred via road or rail to other par the country.
2.2 Gap / gateway settlement  	• **These originate where there are physica barriers, e.g. mountain passes.** • The location generally has a great deal of nodality, i.e. a number of routes converge a point, e.g. Worcester (Western Cape)

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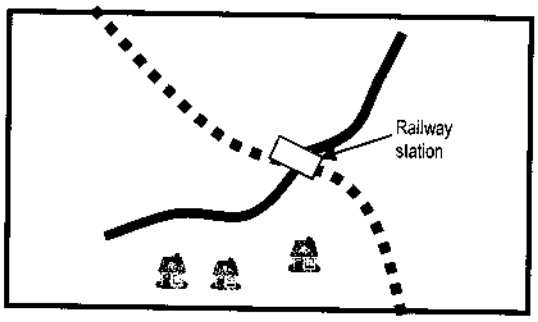
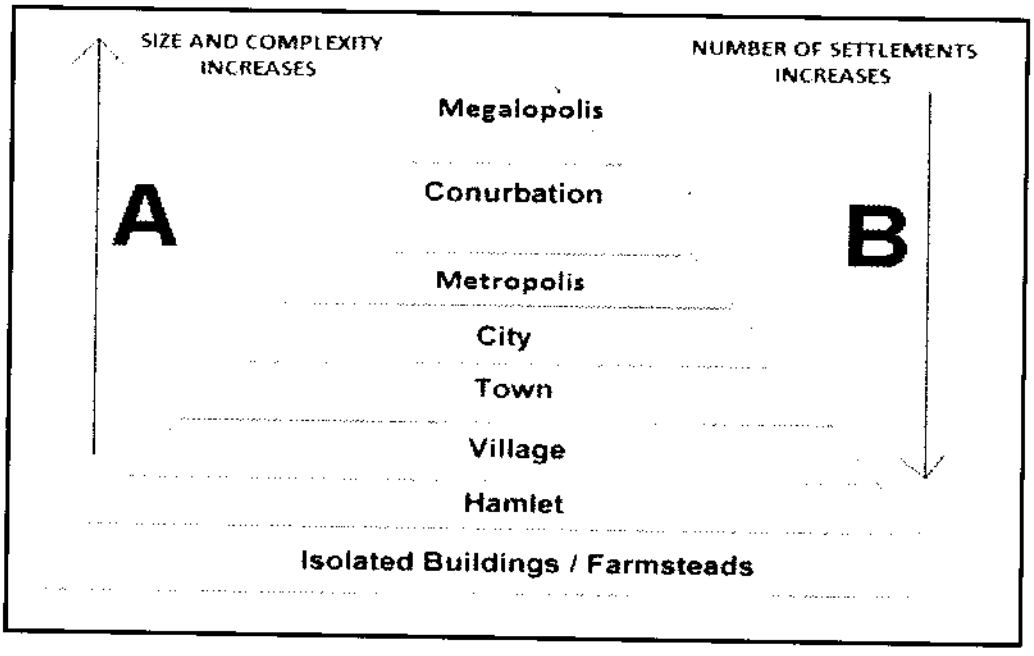
2.3 Junction Towns  	• These are located at important transport junctions which could be roads, river or railway junctions, e.g. De Aar (Northern Cape) **Note**: A junction is where transport routes converge.
3. Towns These include mining, resort, industrial, military and fishing towns. Examples: Mining - Sishen Military - Simonstown Resort - PlettenbergBay Industrial - Aston (fruit canning)	• These **are urban settlements with one dominant (main) function.** • The location is influenced by the occurrence of natural resources, attractive beaches, etc.

Urban Hierarchies



Hierarchy refers to the **arrangement of settlements in an area from the smallest to the largest** in the shape of a pyramid. The smallest settlement forms the base of the pyramid. The hierarchy is based on the functions that a settlement offers.

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- The hierarchy or ranking of urban settlements emerged as a consequence of the Centra Place Theory.
- The criterion used to rank settlements is **function** (which influences its size and complexit and population size).
- At the bottom of the pyramid is the smallest settlement (farmstead) and at the top is th largest settlement (megalopolis)
- The higher up the hierarchy a settlement is the greater its range and the number of service it offers.
- As the size of the settlement increases, the number of settlements per given area decrease Thus there are more small settlements in a demarcated area as compared to larg settlements.
- **Small towns have smaller populations, fewer services, a smaller range and more lo order goods and services**.
- **Large settlements such as cities have larger populations, more high order service and a greater range**.
- R. Davies used **function** to classify South Africa's urban settlements into a hierarchy (Refe to pyramid)

Size of Settlements

- **Megalopolis:** A gigantic urban area that forms when many conurbations join together, e.g Boston, New York and Washington
- **Conurbation:** Forms from the combination of many towns and cities that merge with each othe e.g. Johannesburg, Midrand and Pretoria
- **Metropolis:** Refers to a single city that is surrounded by many independent towns. e.g. Durba which is surrounded by towns such as Pinetown, Tongaat and Amamzimtoti
- **City:** A very large urban centre that offers a variety of services including specialized function such as judicial and financial
- **Town:** An urban area that does not offer an extensive range of urban functions and occupies smaller geographical area, e.g. Ladysmith
- **Village:** A settlement that can have both a rural and urban function (e.g. farming and shops)
- **Hamlet:** A small group of farmsteads
- **Farmstead:** Refers to a single farm which has a main building, and can have outbuildings fo labourers and sheds.

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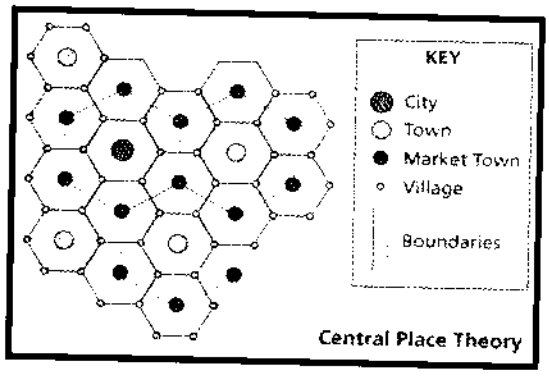
Central Place

It refers to **a settlement that provides goods and services to the surrounding rural population.** This is explained by means of **the central place theory.**

Note: We study this theory in spite of it not reflecting reality to get an understanding of what influences the location of settlements.

- Developed by Walter Christaller in 1933.
- It explains the relative size and spacing of settlements.
- According to Christaller the area that central places serve have a hexagon shape. This removes gaps or overlaps between one central place and another.
- It is not realistic as it does not take into account factors such as population density, soil fertility, topography, etc.



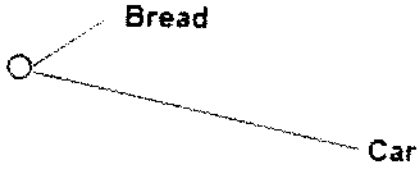
Assumptions of theory

- Population and resources are evenly distributed across the landscape.
- Goods and services are always obtained from the nearest place.
- The land is flat and easily accessible from all directions.

Source: http://wolf.readinglitho.co.uk/miscimages/centralplace.gif

Range

It is the **maximum distance that people are prepared to travel** to buy goods or services.



- The range for convenience/low order goods and services is small.
- Convenience goods are goods that are required on a daily basis, e.g. bread from a spaza shop.
- People are not prepared to travel great distances to purchase convenience goods as the cost of the item will be more than the transport cost.

The exception occurs when someone works a distance from their home and purchases convenience goods on - route.

- High order goods are not purchased frequently because they are more expensive e.g. cars. People are also prepared to travel greater distances for greater variety, lower prices, better quality and service.

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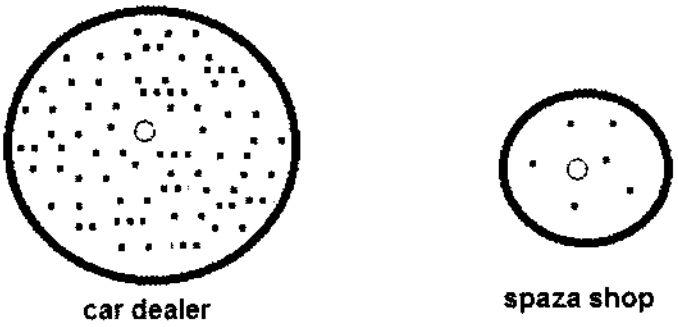
Threshold Population

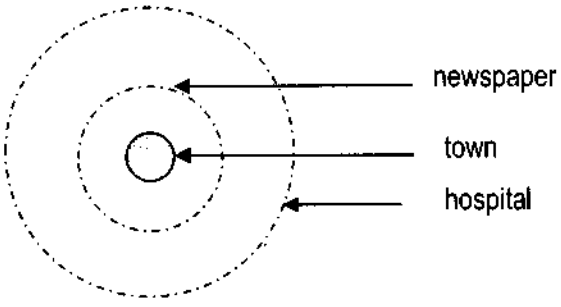
The **minimum number of customers needed to make a business profitable.**



- Shops selling low order goods need a low threshold population to remain profitable because people buy these goods frequently.
- Shops with high order/specialist goods need a larger population to be profitable because the goods are not required frequently.
- Settlements with high population densities have more specialist services and goods.

Sphere of influence/urban field

This is the **market or catchment area** from where an urban settlement draws its customers.



- Small towns draw customers from a smaller catchment area.
- Cities draw customers from greater distances and thus have a greater influence over the surrounding area.
- The sphere of influence of an urban centre depends on its size and the number of functions that it offers.
- Larger settlements offer more specialized functions and a greater number of functions compared to smaller settlements, therefore they have larger spheres of influence.

Services offered in urban settlements

- Services can be described as high, middle or low order depending on the frequency of its use.
- Examples of services include shops, schools, banks, sporting facilities, etc.
- Goods/services that are used on a daily basis are referred to as **low order**, e.g. milk, pharmacy, petrol station. Generally have a small range.
- Goods/services that are required infrequently are referred to as **high order**, e.g. consulting an attorney, cardiologist, high court. Generally has a large range.

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Low and high order centres

Low order centres	High order centres
• These are small urban settlements e.g. a service centre, minor country town	• These are large urban settlements e.g. a major town, city
• Offer mainly low order services and functions	• Offers a variety of services /functions including specialised services.
• Small threshold population	• Large threshold population
• Small market area(threshold population)	• Large market area (threshold population)
• Small range	• Large range

URBAN STRUCTURE AND PATTERNS

Morphology

- The layout of cities in more economically developed countries (MEDC) differs from those in less economically developed countries (LEDC).
- The physical development of South African towns and cities was strongly influenced by colonialism and apartheid laws.
- In order to understand the **external physical layout of a city** the following aspects are important:
    - Street patterns
    - Urban profile
    - Building density
    - Urban zones

Street patterns

- The influence of the Dutch and British settlers can be clearly seen on South African streets.
- The Dutch usually laid out a grid pattern which is a criss- cross network of streets that consists of rectangular blocks, e.g. Vryheid.
- The British settler on the other hand set out a varied network of curved streets with roads converging at the centre (spider web), e.g. Queenstown.
- Urban settlements have a combination of different street patterns. The following basic street patterns can generally be identified:

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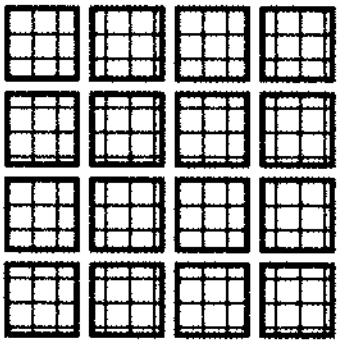
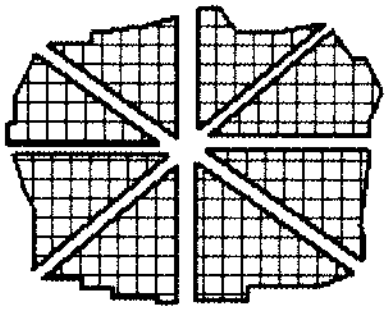
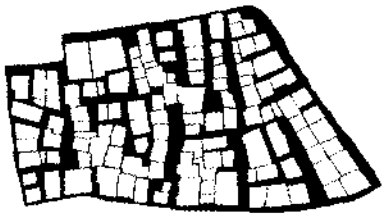
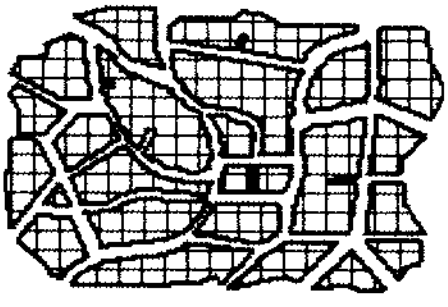
A. Grid iron 	• **Streets intersect at right angles** and are parallel to each other. • **Easy to plan** and layout on land that is flat or gently sloping. • Easy to subdivide into smaller plots • The regular shaped plots makes building easy. • Hampers traffic flow because it has too **many stops** (intersections). • Does not work on steep land as roads may be too steep in some parts. • Associated with old settlements or indicates the oldest part of a settlement, e.g. central Johannesburg.
B. Radial / spider web 	• Dates back to a time when European cities built walls around the city for security reasons, e.g. Paris. • **Roads radiate away from a central point** and are joined by ring roads. • Results in **traffic congestion** at the centre. • Ring roads allow traffic to bypass the city centre. • Example: Queenstown in South Africa.
C. Unplanned / irregular 	• It has a **maze of streets with no apparent order**. • No focal point. • It is associated with broken relief, e.g. Windhoek.
D. Planned / Irregular 	• It is a feature of new urban developments. • **Street lengths and blocks vary** so it can be easy to get lost. • It ensures a **smooth flow of traffic**, e.g. Sasolburg. • **Saves fuel** and travelling time. • Outer ring roads are common features of this pattern. • Characteristic of hilly relief.

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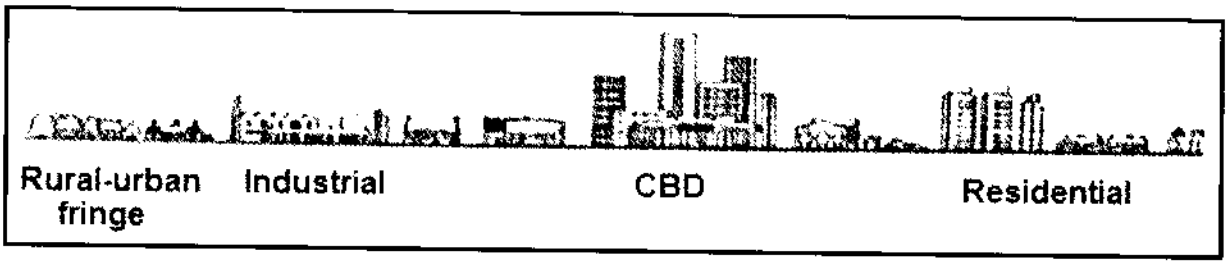
Urban Profile

It refers to the view of a city as seen from the side.



- An urban profile **shows the vertical dimension of a city**, i.e. the heights of buildings.
- The highest buildings are found in the city centre and it decreases outwards.
- Due to high land values tall buildings are constructed in the city centre to make maximum use of the land.
- Many cities, e.g. Durban, have a second concentration of sky scrapers away from the city centre consisting of hotels and flats (Golden Mile beach front area).

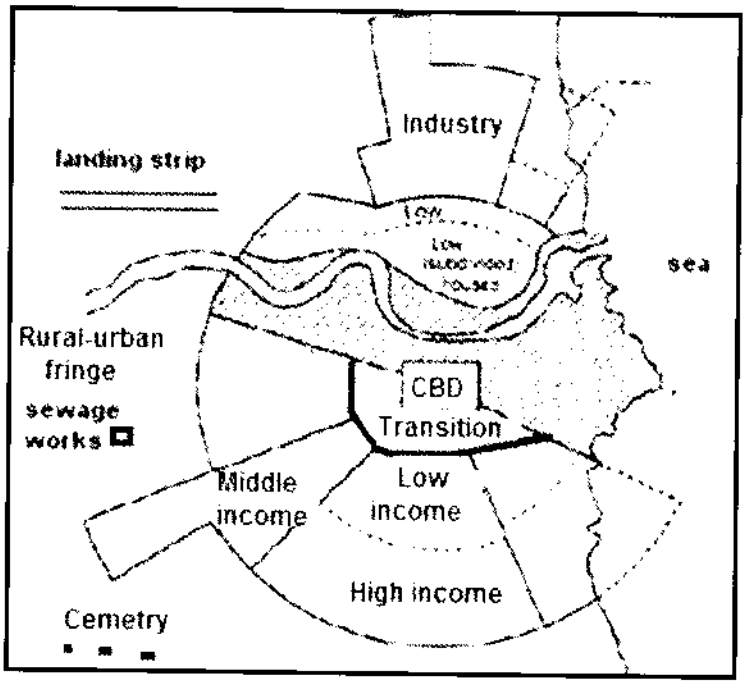
Building density

(This refers to the number of buildings per unit area)

- Building density **decreases from the city centre outwards**.
- Land values and rentals are high in the city centre therefore buildings are constructed close to one another.
- Buildings in the CBD constantly change with the new replacing the old, however many historically important buildings are preserved, e.g. Bo Kaap in Cape Town.

URBAN LAND-USE ZONES

- Urban areas are multi-functional. The land is used for a variety of functions, thus giving rise to various land use zones. A land-use zone is an area in an urban settlement that has one main function.



Examples of land use-zones in urban areas:

- CBD
- Transition
- Industrial
- Rural-urban fringe
- Residential
  - Low income
  - Sub divided
  - Middle Income
  - High Income
- Basic Services
  - Water Purification
  - Sewage Works

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Some factors that determine the location of land use zones are:

- **Accessibility**: Refers to how easily a place can be reached. The **CBD** generally has the **highest level of accessibility** because **roads converge** from different directions. Accessibility is also high at road junctions and where important transport routes meet. Heavy industries locate close to transport routes for the transport of raw materials and finished products.

- **Compatibility**: Refers to the **degree to which functions attract each other** or repel each other. High class residential areas do not locate close to industries because they are incompatible. However, recreational facilities and residential areas are compatible.

- **Specialised requirements**: The location of some land uses are determined by certain specialised requirements, e.g. industries tend to locate close to a source of water or on flat land which makes construction easier.

- **Land values**: The value of land determines where some land uses locate, e.g. the **high land values in the CBD discourage residences** but attract commercial functions because they make profits.

- **Centrifugal forces:** drive people and businesses away from the CBD. Example: high traffic congestion, urban blight and high land values.

- **Centripetal forces:** these are forces that attract people and businesses to the CBD. Example:

  - **Functional magnetism:** refers to that functions that benefit each other and therefore locate close to each other, e.g. cinema and food outlets.
  - **Functional convenience:** the CBD is highly accessible; therefore it is convenient to locate here, e.g. residential apartments in the CBD because it is close to work.
  - **Functional prestige:** certain sections of a city become well known for a specific function or service, e.g. the location of medical centres and pharmacies in Lorne Street in Durban.

1. Central Business District (CBD)

- It is usually **found in the centre of the city**/town.
- It has a **high degree of accessibility**, with routes entering from different directions.
- It has **the tallest buildings with a high building density** because of competition for space.
- There is a great demand for land which has resulted in small plots that are expensive.
- It offers a combination of low and high order goods, e.g. hair dresser, car dealer, corner café, furniture stores.
- It is the oldest part of the city and generally has a grid iron street pattern.
- It has high traffic congestion.
- The exodus of retail trade, cinemas and industries from the CBD is one of the most striking aspects of urban development in the recent decade.
- This reduces the importance of the CBD.

The CBD in many South African cities is losing its prominence due to high crime levels. Many businesses have moved outwards into business parks, suburbs and smaller commercial areas.
Example: From Johannesburg central businesses have moved to Sandton and Randburg, From Durban central businesses have moved to Umhlanga and Springfield.

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Commercial Decentralisation

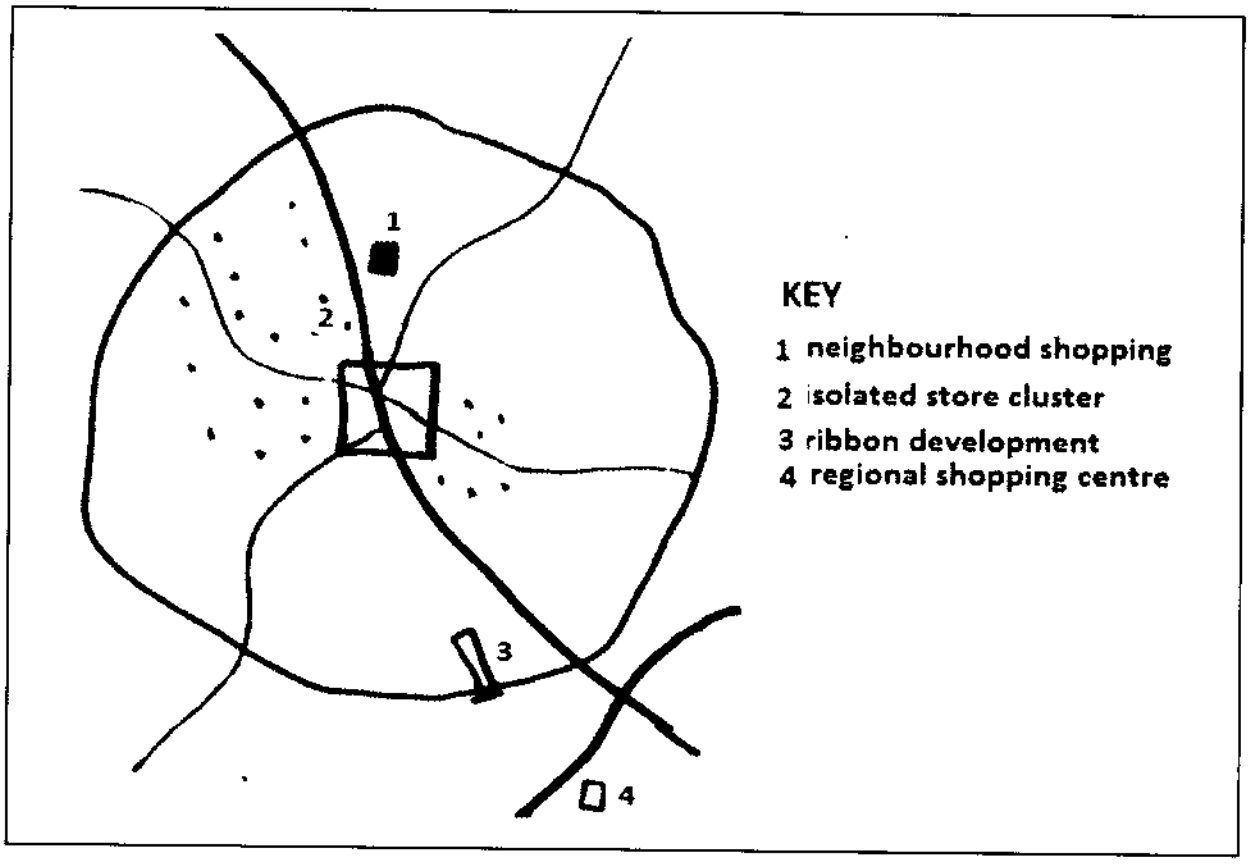
- **Refers to the movement of commercial functions out of the CBD**
- Due to the physical expansion of urban settlements, the distance between the CBD and suburbs has increased thus making CBDs more difficult to reach.

- To make shops more accessible, commercial decentralization has occurred.
  - Shops/services are moving away from the CBD to suburbs because of crime, decreased accessibility, traffic congestion, high rentals, lack of parking space, etc.
  - The **disadvantages of commercial decentralisation**: city is invaded by illegal immigrants, becomes dilapidated, buildings become vacant and neglected (ghost appearance), loss of jobs and tourists.

- Below are some of the ways in which commercial functions regroup themselves in the suburbs.

  - **Isolated store cluster**
    - Supplies low order goods.
    - Smaller grouping of shops found in suburbs, e.g. grocer, butcher, hairdresser, corner café.

  - **Commercial ribbon development**
    - Found along main roads with a constant flow of traffic to attract customers from passing traffic.
    - Example: car dealer, garages, convenience stores, chemists, dry cleaners.



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- **Outlying business centres**
  - In terms of size and importance it comes second to the CBD.
  - Groups of shops (high and low order) that developed without planning.
  - Located in high population density areas, e.g. Hillbrow or at important street junctions.

- **Planned neighbourhood shopping centre**
  - Found in residential areas.
  - Houses a number of shops in a single building.
  - One stop shopping in attractive surroundings with ample parking, e.g. La Lucia Mall in Durban, Liberty Mall in Pietermaritzburg or Lakeside Mall in Johannesburg.

- **Planned regional shopping centre**
  - Much larger than a neighbourhood shopping centre.
  - Close to major roads.
  - Massive parking space with a large variety of shops, e.g. Gateway in Durban; Sandton in Johannesburg.

- **Street trading/informal trading**
  - These are unlicensed businesses with no proper building structures.
  - Sell low order goods, e.g. fruit, clothing, food.
  - Includes weekend flea markets.

2. Transition zone (zone of decay)

- Located on the perimeter **(edge) of the CBD**.
- **Mixed land use zone** (office, storage, residential, wholesalers, light industries).
- **Buildings are old and dilapidated** because landlords do not maintain the buildings.
- Land values are high because it is the future expansion area for the CBD (redevelopment and renovation)
- In LEDCs the transition zone also forms part of the **inner city.**

Characteristics of the inner city:

- **Informal traders** on pavements
- Lots of street children
- Many foreigners/refugees live in this area
- **High levels of crime**

NB: All other characteristics of the transition zone apply to the inner city.

3. Residential zone

- Occupies the most amount of urban land in an urban settlement.
- Socio-economic status (wealth) is responsible for residential segregation.
- Variety of residential areas can be identified.

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1. **High income residential**
   - Away from the CBD and heavy industrial areas and is usually located on the outskirts of urban areas.

This does not apply to South Africa as the location of residential areas was determined by the then apartheid policies. Most of the high income residential areas were located close to the CBD.

   - **Generally located in areas with good views and sceneries**, with large plots of land and often close to the coast.
   - Large well maintained houses with a variety of architectural designs.
   - Have the highest land values of all residential areas.
   - Large gardens and recreational facilities (tennis courts, swimming pool, stables, etc.

2. **Residential estates / golf estates**
   - This is a growing trend in South Africa where houses are built in luxurious settings.
   - Residential areas are built around some feature, e.g. golf course.
   - Caters for very wealthy communities.
   - Offers **good security and controlled entry** (gated communities).
   - The style and size of the houses are pre-planned and specified to reflect a uniform community pattern.

N.B. This type of residential area is classified as high income residential.

c. Middle income

- Homes are of medium size and can vary from single storey to simplexes and duplexes.
- The location varies greatly.

d. Low income

- Generally **located near industrial areas, public transport** (train stations), undesirable land (dumps), etc.
- In most parts of the world it is found closest to the CBD, but in South Africa it is on the outskirts due to the influence of past apartheid laws.
- Consists of **small houses** found close together with the same design and style.
- It has no space for gardens and recreational facilities.
- Houses can be old and neglected.
- **High density housing**.

e. Informal / squatter settlements

- Often countries have their own names for informal settlements, e.g. India- bustees, Brazil- favelas
- Locate close to a water source (river), industries (work) and transport (main roads, public transport).
- **Totally unplanned with no order.**

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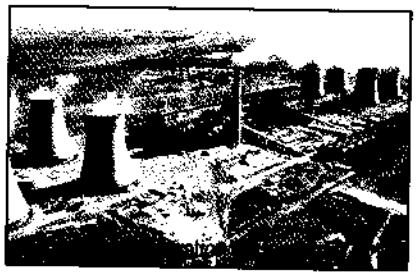
- Variety of building materials used in construction (cardboard, timber, plastic, iron).
- Lack basic services (water, sewage, electricity).
- **Land is generally illegally occupied.**
- Poverty, crime and unhygienic conditions are rife.
- No proper roads.
- Associated with less economically developed countries (LEDC).

f. Ghettos

- These are **slum areas that are found in the transition zone.**
- Commonly occurs in more economically developed countries (MEDC).
- It consists of old buildings that are densely populated and dilapidated.
- Houses people of similar socio-economic groups just as you would find in informal settlements in less economically developed countries.

4. Industrial zone

There are two types: light and heavy industrial zones.



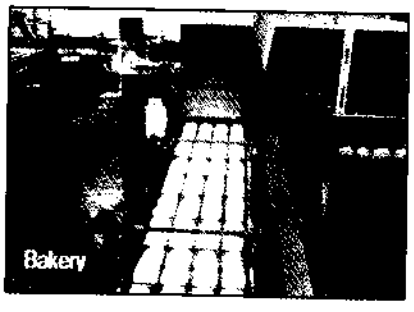
a) Heavy industrial zones (industrial estates / industrial parks)

- Associated with **noise and pollution**.
- Located **away from built up areas** and high residential areas.

The exception is where urban areas have expanded to such an extent that they have surrounded industries that were previously on the outskirts, e.g. the Isipingo / Merebank industrial complex in Durban.

- It **occupies large amounts of space** and therefore requires cheap land on the outskirts.
- Industries that **require heavy and bulky raw materials** generally locate close to the source of the raw material, e.g. sugar mills locate close to sugar cane farms.
- Locates **close to bulk transport facilities** e.g. Harbour, railway and roads.
- Buildings are elongated, single storey and have a saw tooth roof.
- Produces goods that are bulky and heavy.

b) Light industries



- The location varies from within the CBD to the transition zone and residential..
- It occupies **small spaces, and causes no pollution**.
- Locate near customers or workers e.g. bakery, furniture factory, clothing factory.
- Can be found on the upper floors of multi-storeyed buildings.
- Produces goods that are generally light and small

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5. Rural-urban fringe (peri-urban)

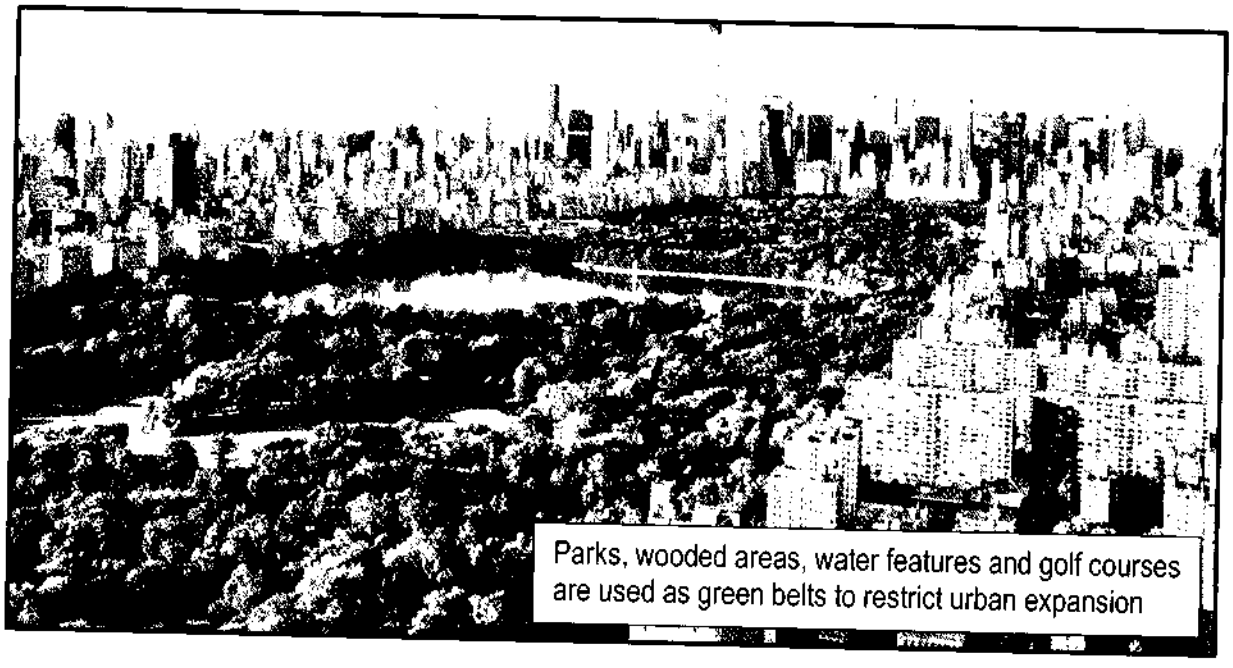
- **Found on the outskirts of a town or city.**
- It has a **mixture of rural and urban functions**, e.g. market gardening, golf estates, airport, shopping malls, cemeteries, sewage works, shooting range.
- **Land is cheaper** in this area as compared to the CBD.
- With the decline of the importance of the CBD (decentralisation) over recent years there has been mass development in rural-urban fringes.
- Some cities try to limit excessive expansion via the use of green belts.

Greenbelt (greenways / green wedges)

A greenbelt is used in land use planning as an invisible line marking a border around a certain area, thus preventing development of the area. The greenways / green wedges are more linear in shape but serve the same purpose.

The purpose of the greenbelt:

- Protect natural or semi-natural environments;
- To **prevent the uncontrolled growth of urban areas.**
- **Improve air quality** within urban areas;
- Ensure that urban dwellers have access to the countryside, with educational and recreational opportunities; and to protect the unique character of rural communities that might otherwise be absorbed by expanding suburbs.
- Lowers temperature of the CBD.
- Improves the aesthetics of urban environments.



Parks, wooded areas, water features and golf courses are used as green belts to restrict urban expansion

Green belts are often invaded by the urban rural fringe and sometimes, development continues over the green belt area, resulting in the creation of "satellite towns".

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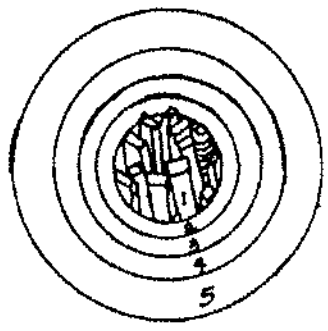
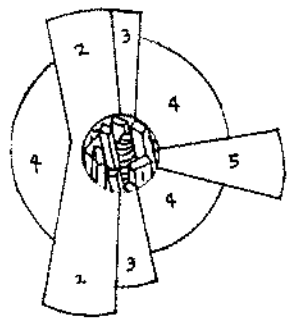
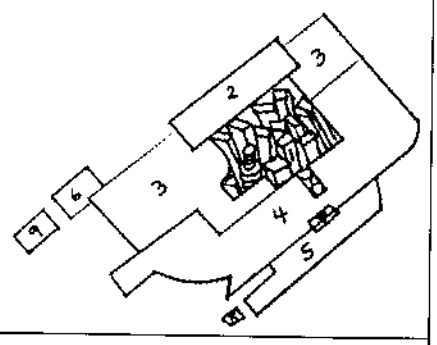
URBAN LAND USE MODELS

Geographers developed land use models to explain the location and relationship between different land use zones in a city. Earlier models were based on the layout of industrialised cities e.g. the Multiple nuclei model

Concentric zone model Burgess: 1925	Sector model Hoyt: 1939	Multiple nuclei model Harrison Ullman: 1945
		
Key: 1- CBD 4- Middle income housing 7- Outlying business district	2- Wholesale/light manufacturing 5- High income housing 8- residential	3- Low income housing 6- Heavy industries 9- Industrial suburb
• Land use zones are concentric in shape and grow outwards from the CBD. • The inner zones invade the outer zones in a process called invasion and succession • It is a limited model as it does not have all land uses. • It does not have commercial decentralisation. • It is unrealistic for all zones to have a circular shape. • It does not consider physical obstacles that will prevent a circular pattern.	• It has part of the concentric pattern with wedges / sectors expanding outwards. • The sectors develop along main transport routes. • It is unrealistic because it is not possible for a CBD to have a circular shape because of physical obstacles. • It does not cater for commercial decentralisation	• It has many nuclei (focal points) around which growth occurs. • The land use zone has a cellular pattern. • It is a more flexible model that resembles many cities in the developed world. • Makes provision for all land use zones. • It takes into account factors that affect land use zones. • It does not give a simplistic pattern of cities but shows that they are complex.

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The urban models that were developed in earlier years are no longer an accurate reflection of modern cities for the following reasons:

- Improved transport has led to urban sprawl
- Modern cities have many commercial centres and no single focal point.
- Land use zones have an irregular shape

Modern American Western City	Third World city	South African City
• An example would be the Urban Realms model (1964). Developed by James Vance to explain the development of the metropolis. • Multi-centred like the multiple nuclei model • CBD referred to as 'downtown' • Urban sprawl has resulted in a high level of commuting • Decentralisation of people and functions due to city problems • There is a clear separation between high, middle and low income residential areas. • People are hugely dependant on transport because of the separation between suburbs and work place. • Low income groups live close to the city centre and high income away. • Have sharply defined land use zones	• An example is the Griffin-Ford model (1980), developed by Ernest Griffin and Larry Ford. • Land use zones are mixed due to high levels of urbanisation • Growing informal settlements and slums • High levels of informal trading on streets • High income residential areas tend to be close to the city centre • Cities tend to be more compact like the concentric zone. • Cities have poor infrastructure • High influx of migrants • High level of social problems such as crime, lack of housing, unemployment	• Has been influenced by its colonial and apartheid past. • Land use zones in SA did not evolve naturally they were influenced by the Group Areas Act. • South African cities were divided into separate racial areas. • Whites were located close to the city centre (transport, good views, accessible) • Indians and Coloured on less favourable sites away from the city centre • Blacks were located in townships on the outskirts of the city • High class residential area are close to the city centre • Although apartheid has been abolished its influence can still be seen in the structure of SA cities. • From the 1990's income and not race determines where people live

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URBAN SETTLEMENT ISSUES

URBANISATION

Urbanisation is the process by which an increasing percentage of the world's population lives in urban areas.

- The fastest growing cities are in developing countries
- A city with over 10 million people is referred to as a megacity.

URBANISATION OF THE WORLD'S POPULATION

Today, 54 per cent of the world's population lives in urban areas, a proportion that is expected to increase to 66 per cent by 2050. Projections show that urbanization combined with the overall growth of the world's population could add another 2.5 billion people to urban populations by 2050, with close to 90 percent of the increase concentrated in Asia and Africa, according to a new United Nations report launched today.

The 2014 revision of the World Urbanization Prospects produced by the UN Population Division of the Department of Economic and Social Affairs notes that the largest urban growth will take place in India, China and Nigeria. These three countries will account for 37 per cent of the projected growth of the world's urban population between 2014 and 2050. By 2050, India is projected to add 404 million urban dwellers, China 292 million and Nigeria 212 million.

The urban population of the world has grown rapidly from 746 million in 1950 to 3.9 billion in 2014. Asia, despite its lower level of urbanization, is home to 53 per cent of the world's urban population, followed by Europe with 14 per cent and Latin America and the Caribbean with 13 per cent.

The world's urban population is expected to surpass six billion by 2045. Much of the expected urban growth will take place in countries of the developing regions, particularly Africa. As a result, these countries will face numerous challenges in meeting the needs of their growing urban populations, including for housing, infrastructure, transportation, energy and employment, as well as for basic services such as education and health care.

"Managing urban areas has become one of the most important development challenges of the 21st century. Our success or failure in building sustainable cities will be a major factor in the success of the post-2015 UN

Causes of urbanisation

1. **Rural-urban migration**

   - Encouraged by government policies promoting industrialisation.
   - It is also encouraged via the media promoting social and cultural events (refer to push and pull factors for a more comprehensive list).

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2. **Natural population growth**

- Younger people move to cities and since they are still at a child bearing age, this increases the population growth.
- Better health care facilities reduces the death rate and increase population growth.

3. **Immigrants and refugees from other countries**

- As the economic powerhouse of Africa, and also a country with a relatively stable political situation, South Africa represents an attractive destination for economic and political asylum seekers, not only from other countries in Africa, but from other developing nations around the world.

Region / Sub–Region		Frequency	Percent
Overseas Region		**601**	**46,8**
Sub-regions	Europe	305	23,8
	North America	25	1,9
	Central and South America	21	1,6
	Australasia	11	0,9
	Middle East	9	0,7
	Asia	230	17,9
Africa Region		**682**	**53,2**
Sub-regions	SADC	366	28,5
	East and Central Africa	213	16,6
	West Africa	90	7,0
	North Africa	13	1,0
Total		**1 283**	**100,0**

Source: Stats South Africa 2012

Counter-urbanisation

Is the **process by which people move out of cities to the outskirts**, to smaller urban settlements as well as rural areas.

Reasons for counter urbanisation

- Availability and efficiency of transport means that people no longer have to live where they work. The development of motorways/freeways has increased private car ownership and thus commuting.
- Growth of information technology (faxes, email, and video conferencing) means that some people can work from home (tele-working).
- Pollution and traffic congestion encourage people to live out of the city centre
- Housing is cheaper on the outskirts.

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Urban growth
It refers to an **increase in the absolute number of people** in urban areas

Urban expansion
It refers to the **physical growth** of an urban settlement.

Urban sprawl
Refers to the **formless (uncontrolled) expansion** of urban areas.

Level of urbanisation
It refers to the **percentage of people that live in urban areas**. In MEDC the level of urbanisation is higher than in LEDC.

Rate of urbanisation
Refers to the **percentage by which an urban population is increasing**. In MEDC the rate of urbanisation is lower than in LEDC.

Challenges of urbanisation in South Africa

- In South Africa, apartheid has made problems of urbanisation more complex.
- For generations, Black people were forced to live out of the main cities in areas that were first called Reserves, later Bantustans and then Homelands.
- The lifting of racial restrictions has resulted in a mass movement of people to cities in search of jobs.
- Squatter settlements (**informal settlements) have mushroomed** to accommodate the influx of people.
- Industrial expansion is not in keeping with the levels of urbanisation. This means more people are looking for jobs than what is available.
- Unequal pace between provision of services and urbanization.
- **Deepening poverty** and unemployment.
- **Increase in crime** and violence.
- Urbanisation brings with it many urban conflicts associated with demands being placed on land, water, housing, transport and employment.
- Social unrest and environmental pollution are also problems associated with urbanisation.

Poor living conditions and lack of basic services, lead to community protests in many parts of the country.

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Urbanisation patterns in South Africa

Urbanisation and Urban Growth in the SADC Region: 1995 to 2010				
Region/Country	Percentage average annual growth rate		Percentage average annual growth rate	
	(1990-1995)	(1995)	(2005-2010)	(2010)
World	45.2	0.63	52.8	2.36
LDCs*	37.2	3.62	46.8	3.01
Southern Africa	35.5	0.27	43.2	4.58
Angola	32.2	5.63	44.2	4.86
Botswana	30.8	6.30	46.9	4.61
Lesotho	23.1	5.61	35.3	4.78
Malawi	13.5	0.04	21.0	5.88
Mozambique	34.2	7.08	50.5	4.08
Namibia	30.9	5.15	42.1	4.78
South Africa	50.8	3.17	59.5	3.10
Swaziland	31.2	5.63	45.3	4.53
Tanzania	24.4	6.04	36.3	5.63
Zambia	43.1	3.33	49.7	3.84
Zimbabwe	32.1	4.94	43.9	4.28

*Less developed countries

Source: United Nations, World Urbanisation Prospects: The 1992 Revision, 1993

URBAN ISSUES RELATED TO RAPID URBANISATION

1. Pollution

Pollution refers to any harmful substances that cause problems in the environment. Various forms of pollution occur due to the over-concentration of people, industries and activities in urban areas

Types of pollution and causes	Effects of each type of pollution	Possible sustainable solutions
a) Air pollution • Carbon monoxide from vehicles • Sulphur from industries • Power stations • Domestic activities	• Health problems such as asthma and cancer • Acid rain stunts growth of plants • Additional costs for the economy • Destruction of ecosystems • Increases global warming	• A reliable and efficient public transport system will discourage the use of private transport and thus reduce number of vehicles on the road. • Electricity saving campaigns to reduce emissions from power stations. • Strict control by government on levels of pollution to keep it within safe limits, e.g. impose fines. • Use ozone friendly products • Create more green spaces and parks in cities. • Lead free petrol • Industrial decentralisation[9]

[9]Movement of industries away from core areas

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2. **Gentrification / chelseafication** - low cost houses are bought by the wealthy cheaply and modernised.

3. **Facadism**- involves preserving the front of the building while the rest is knocked down and re-built. This is done to preserve the heritage of a particular era.

4. Urban sprawl / Lack of planning

Refers to the **uncontrolled growth of cities**, where they expand into the surrounding rural areas. It has resulted from urbanisation, urban growth, **lack of planning** and access to transport.

Possible solutions

a. Urban consolidation

Is an attempt by some cities to contain urban sprawl by increasing the population density. It avoids environmental damage, reduces wastage of agricultural land and makes public transport and other services more efficient.

b) Green Belt
(open spaces, green spaces, parks and gardens)

These can be developed on the boundary of urban areas **to prevent the formless expansion of cities**, or intermingle with other land use zones to reduce noise and air pollution.

Advantages:

- Creates a pleasing environment, recreational area.
- **Controls greenhouse gases.**
- **Reduces** the effect of the **urban heat island.**
- Cleans the air by **absorbing carbon dioxide.**
- Reduces soil erosion and runoff.
- Muffles city noises and traffic sounds.
- **Controls urban sprawl.**
- Creates a habitat for other living organisms.

c) New towns

- These are towns developed outside a main city to help overcome problems associated with uncontrolled growth of a city.
- The towns are less congested and supply all the necessary services, housing and infrastructure to attract industries.
- These are towns that are designed in a manner so as to reduce overcrowding, congestion, pollution and other related problems experienced in an urban area.

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5. Service provision

- Some municipalities are struggling to provide housing, access to water, electricity etc. due to rapid urbanisation.
- Failure to meet the demands of communities for these basic services has resulted in service delivery protests.

6. Overcrowding and Housing shortages

- Shortage of living space due to rapid urbanisation has given rise to overcrowding and housing shortages. This is turn has promoted the development of informal settlements.
- The zoning of land-use in South Africa in the apartheid era put low income residential areas on the out shirts of built up areas.
- The impact of this can be seen in **high commuter traffic**, traffic jams and accidents.
- This has a ripple effect on the cost of living for the poor.
- Housing shortages has given rise to overcrowding and growth of informal settlements.
- **It has contributed to** service delivery protests.

Informal settlements

(shanty towns, squatter settlements)

- These **are illegally built settlements** by the poor who cannot afford proper houses.
- The shacks are **made from a variety of material**, including bits of wood, corrugated iron, zinc cardboard, plastic and mud. These materials are uses because: it is easily available, cheap, and easy to assemble and to dismantle if they have to move.
- **Lacks basic services** such as running water, electricity, toilets, drainage, etc.
- Commonly found in developing countries because housing for the urban poor cannot be met

Associated problems

- **Vulnerable in times of heavy rain which results in flooding.**
- The high population density, together with open fires being used for cooking and flammable building materials used for houses makes them a real fire hazard.
- Spread of diseases
- **Crime, drugs and poverty**.
- **Difficult to maintain hygiene** in these settlements.

- **Inaccessible for the following reasons:**

  No proper roads, therefore it is difficult to provide help in an emergency e.g. a fire
  No street names and numbers.
  Poor quality of roads (potholes, gullies, furrows)
  Service providers are afraid to enter because of crime.

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Possible solutions

1. **Relocation – build houses where land is available** and move people to these areas.
2. **Self- help schemes**
   - Involves giving squatters legal ownership of the land they are living on
   - The government and charities provide them with cheap building materials to construct houses.
   - Basic services such as water, sewerage and electricity are provided
3. **Site and service**
   - Squatters are given new plots of land with roads and basic services
   - Squatters **build their own houses** under supervision- encouraged to use their own skills

Names given to informal settlements in other countries

Basti in India, **Bidonvilles** in France, **Chabolas** in Spain, **Favelas** in Brazil and **Gecekondu** in Turkey

Case studies of informal settlements in other countries

Mumbai's Shadow City

Dharavi: An informal settlement in India By Mark Jacobson Photograph by Jonas Bendiksen

Some call the Dharavi slum an embarrassing eyesore in the middle of India's financial capital. Its residents call it home. **Dharavi is a teeming slum of one million people, where as many as 18,000 people crowd into a single acre (0.4 hectares). The maze of lanes are too narrow even for the putt-putt of auto rickshaws. Dharavi is routinely called "the largest slum in and remains unique among slums. A neighbourhood smack in the heart of Mumbai. Ask any longtime resident—some families have been here for three or more generations—how Dharavi came to be, and they'll say, "We built it."**

Stay for a while on the one meter lane of Rajendra Prasad Chawl, and you become acquainted with the rhythms of the place. The morning sound of devotional singing is followed by the rush of water. Until recently few people in Dharavi had access to water. Residents such as Meera Singh, a woman who has lived on the lane for 35 years, used to walk two kilometres to get water for the day's cleaning and cooking. At the distant point she would have to pay the local "goons" to fill her buckets. This is how it works in the twilight zone of informal housing. Deprived of public services because of their illegal status, slum dwellers often find themselves at the mercy of the "land mafia." There are water goons and electricity goons. In this regard, the residents of Rajendra Prasad Chawl are fortunate. These days, by DIY hook or crook, nearly every household on the street has its own water tap. And today, like every day, residents open their hoses to wash down the lane as they stand in the doorways of their homes to brush their teeth.

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FAVELAS IN RIO DE JANEIRO

- Over one million people live in over 600 favelas in Rio de Janeiro, for example Rocinha.
- The houses are constructed from any materials available, such as wood, corrugated iron and broken bricks.
- The accommodation lacks basic services such as running water, sewerage and electricity.
- The houses are often built on hillsides which means that, when it rains, flash floods can cause landslides. For example, in 1988 over 200 people died as a result of storms.
- Inhabitants of favelas have no legal right to the land on which they live, which means that they can be evicted at any time.

Crime

- Favelas are often associated with organised crime, violence and drug trafficking.
- Despite the fact that the residents claim that crime has decreased, many richer residents are trying to move out of the city.

Traffic

- Because the city is surrounded by the coastline on one side and the mountains on the other, traffic is channelled along a limited number of routes within the city.
- The high amount of traffic within Rio has caused severe congestion, pollution and noise.

Pollution

- Guanabara Bay is permanently covered in thick, industrial smog.
- Huge amounts of waste and rubbish are produced by the large population of Rio. This has resulted in pollution of the coast, beaches and the sea.
- Because of the polluted water supply and sewage in open drains, the local population is at risk from disease. For example, there was an outbreak of cholera in 1992.

Attempts to solve some of Rio's problems

1. Self-help scheme in Rocinha

   - A self-help scheme has been started by the local inhabitants of Rocinha.
   - Within Rocinha, local people have upgraded temporary wooden buildings to brick and tile. The local authorities have accepted these improvements and added electricity, paved and lit some of the steeper streets, and added more water pipes.
   - Local people have set up shops and small industries in Rocinha. This is known as the informal sector.
   - Improvements within Rocinha have been restricted by high-density housing and steepness of hillsides.

2. The local authority Favela Bairro project

   - City local authorities have set aside £200 million to improve the living conditions of some favelas, for example Favela Bairro.
   - The local authorities wish to transform the favelas by replacing buildings that are made of wood or built on dangerous slopes. Further, they wish to widen streets so that emergency services can gain access, and lay street pavements and concrete paths.

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- Within Favela Bairro, pipes have been laid for water and cables for electricity. Further changes have been made through improving sanitation, adding health facilities and providing sports areas for local people.
- During development of Favela Bairro, local residents have been used for labour so that they can develop and use new skills.

However, residents living in Favela Bairro are now required to pay tax to local authorities.

INJUSTICES IN URBAN AREAS

The term injustice means that **people or the environment are abused or treated unfairly** in some way. Different types of injustices can be identified.

Economic injustices

Economic injustices occur when **not all people have equal access to facilities**, services and resources found within a particular place.

1. Poverty

Causes of poverty

- **Lack of education**, skills and knowledge
- the lack of political will, the huge inequalities as well as the cultural barriers
- Average wages in agriculture are well below the minimum living level
- disempowered status of women
- **unemployment**

Solutions

- Basic Income Grant
- Labour-intensive technologies
- Increase support to small farmers
- **Skills programs**
- Minimum wages

Impact of poverty

- **Increased crime**
- Malnutrition
- Increased illness
- **Low standard of living**

2. Poor public Transport

About 60 to 70% of South Africans commute on a daily basis. Some of the problems experienced include:
Public transport is fragmented, it is expensive, bad driver behaviour, high crime and poor safety, crowding on buses, un- road worthy vehicles, not reliable to be punctual, taxi violence

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Impact of poor public transport

- High levels of **accidents**
- **High pollution** levels
- Traffic congestion
- Contributes to poverty levels increasing

Solutions

- Improve bus routing between informal settlements and key services
- Upgrading of taxi terminals
- Dedicated public transport lanes
- Offer **quality public transport** that is eco-friendly
- Providing subsidies to improve public transport
- To provide **mass rapid transport** systems

Environmental injustices

Pollution

Pollution refers to any harmful substances that cause problems in the environment. Various forms of pollution occur due to the over-concentration of people, industries and activities in urban areas

Refer to noise and air pollution under issues related to rapid urbanisation

Destruction of ecosystems

The balance between living and non-living organisms within an ecosystem is disturbed

Factors responsible for ecological destruction

- **Population growth**: our ever increasing population has created a greater demand for food supplies, paper and furniture. More trees are chopped to meet the world's increasing demand for these items.
- **Settlement:** as the population of the world has increased the demand for space for the development of towns and cities has also increased. Valuable forests have been cleared to meet this demand for living space.

Effects of ecological destruction

- **Soil erosion** is accelerated by the removal of natural vegetation.
- **Pollution** of our freshwater sources by chemical fertilizers, weed-killers and the dumping of industrial or toxic wastes, oil spills and sewage reduce freshwater supplies and harms aquatic living organisms.
- The release of pollutants into the atmosphere reduces the quality of the air. People suffer from respiratory diseases such as asthma. Other effects include global warming, melting of the polar ice-caps and the destruction of the ozone layer.

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Measures to address environmental injustices

The adoption of the following measures will lengthen the lifespan of our natural resources, promote an ecological balance and protect people from environmental hazards.

- **Legislation** protecting people from nuclear testing and toxic wastes that threaten their right to clean air, land, water and food must be introduced globally.
- All individuals have the right to participate as equal partners at every-level of decision-making to ensure their rights to a safe and healthy work and living environment.
- Protect the rights of victims of environmental justice to receive full compensation for damages as well as health care.
- **Educate individuals** about the importance of making wise decisions that will ensure the availability of resources for present and future generations.
- In Johannesburg central the government is offering tax incentives to encourage urban-renewal

SA hit by service-delivery protests

by Courtney Brooks

A wave of protests has erupted in townships across South Africa over shoddy housing and public services. Police fired rubber bullets on Tuesday to break up about 200 protesters in Thokoza township outside Johannesburg, where they stoned police cars in anger at their dire housing conditions. That followed a riot one week earlier in Diepsloot, also near Johannesburg, where two police cars were destroyed, buildings were burned and passing cars stoned in protest at moves to demolish shacks in order to build sewerage lines.

More worryingly, a protest in eastern Mpumalanga on Sunday took on anti-immigrant colours as shops owned by foreigners were looted and burned. "Part of the frustration is local government is very uneven, and that is often the level of government where things are most keenly felt and expressed."

The African National Congress (ANC) last weekend called for an audit into municipal services, with the aim of aiding - or sometimes pressuring - cities to improve their performance.

Fight against poverty

Since the end of apartheid in 1994, South Africa has made strides in improving housing while expanding access to clean water and electricity, building 2,8-million houses in 15 years.

But more than one million families still live in shacks without power, often sharing a single tap among dozens of households. The problem has heightened as South Africa is at the height of winter, with freezing temperatures in Johannesburg and other parts of the country.

A.F.P.

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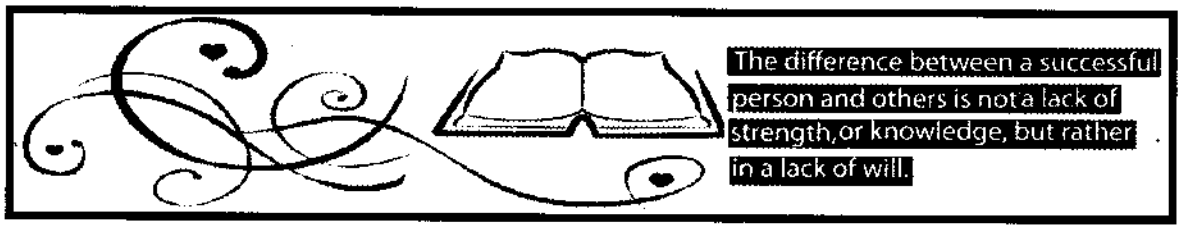
Social Injustices
(unequal access to services and resources)

Unequal access to services and resources has resulted in a number of protests in communities. The reason for the protests include:

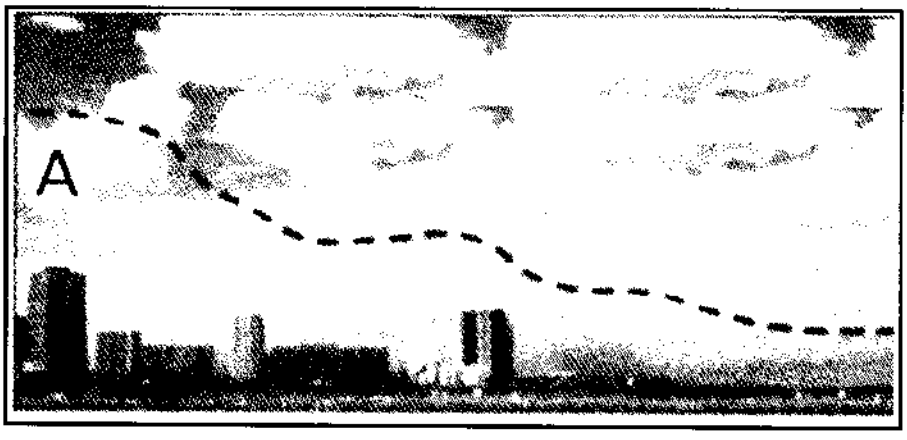
- **Unequal access to services** and resources (housing, schools etc).
- Protesting against lack of electricity, tarred roads, tap water, clinics and hospitals.
- Hopes and expectations were raised by the election of a democratic government in 1994.
- **Greed and corruption** of municipal employees.
- Allegations of rampant corruption and nepotism.
- Lack of participation and say by communities in local government structures.

Impact

- xenophobic attacks
- **violent protests**
- poor service delivery and time wastage
- **increase in crime**



Activity 3.8
Study the sketch of an urban profile



1. What is an urban profile?
2. Account for the decrease in the density and height of buildings from the city centre.
3. At point **C** there are a cluster of high rise buildings. Suggest a reason for this.
4. State TWO characteristics of land-use A.
5. Comment on the location of land-use A.
6. Suggest TWO reasons for commercial decentralisation from A.

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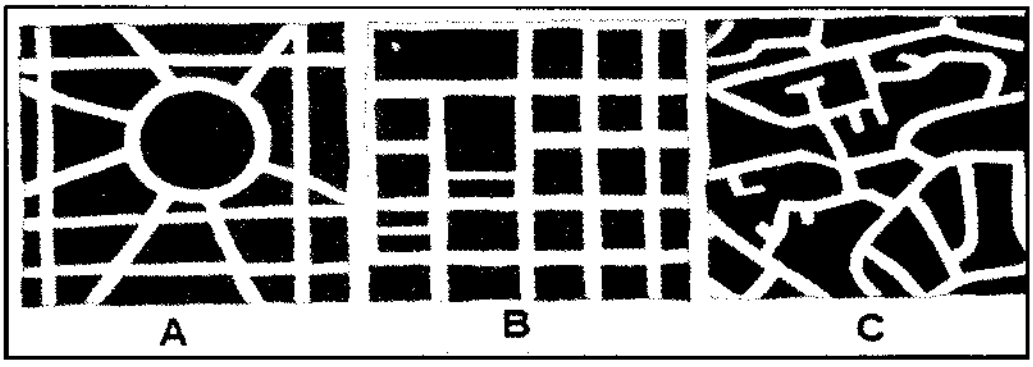
Activity 3.9

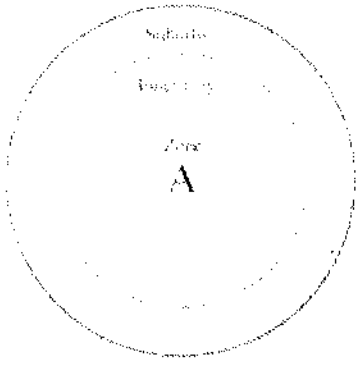
Below are street patterns.



1. Name the street patterns labelled **A, B** and **C**.
2. State TWO disadvantages of pattern **B**.
3. In what type of topography is pattern **C** likely to be developed.
4. Describe street pattern **A**.
5. Is street pattern **B** associated with an old or new settlement? Explain your answer.

Activity 3.10

Study the diagram below, which shows zones of an MEDC city.



1. From the following list which one best describes Zone **A**.

   rural urban fringe, central business district, shanty town

2. Give two features which are typical of the suburbs of an MEDC city.
3. Give two problems faced by people living in ghettos.
4. Describe what is meant by urban sprawl.
5. What is the rural–urban fringe?
6. Name two types of urban land use you would expect to find in the rural urban fringe.
7. Describe two features of an urban model of a city in an LEDC.
8. Explain why cities in LEDCs are growing rapidly.
9. What is the meaning of the term 'urban zone'?
10. What is the meaning of the term "settlement hierarchy"?

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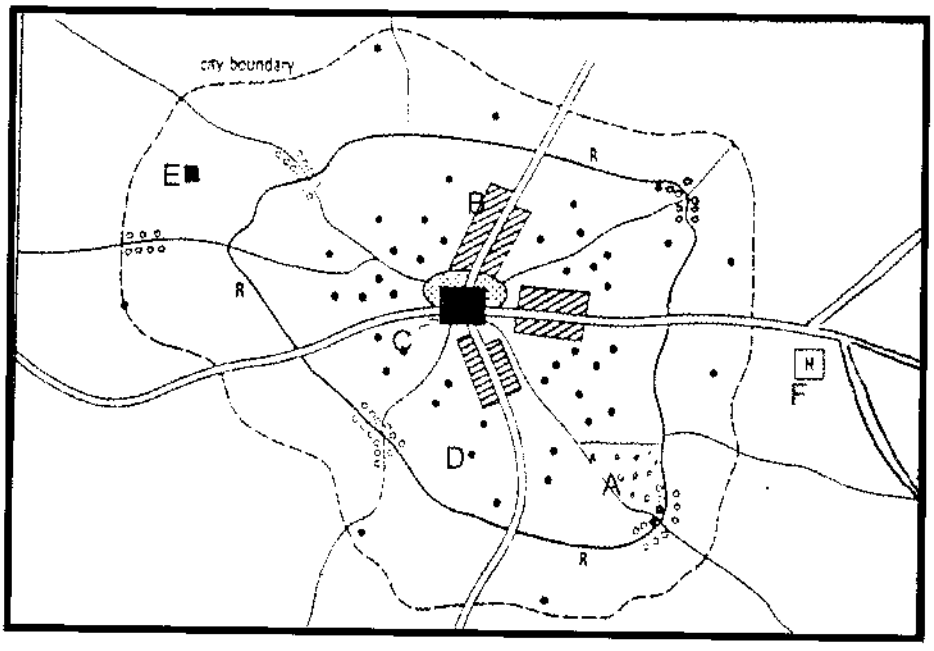
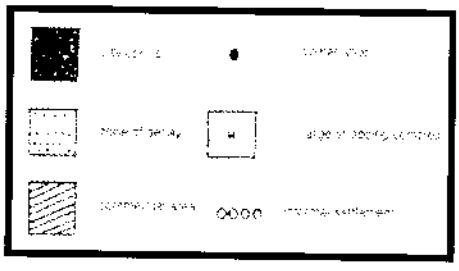
Activity 3.11

Urban areas have a number of commercial functions that are located in different parts of the city. Use the sketch map to answer the questions.

1. Label the commercial areas A to F on the map by matching them to the completed definitions below.

	Name of commercial area	Definition
A		Sells fruit, vegetables, etc. in an open area
B		A row of shops along a main road
C		The commercial heart of a city
D		Small groupings of shops selling low order goods
E		One stop shopping in suburbs all housed under one roof
F		Mega shopping complexes close to major routes on the outskirts





2.1 What does decentralization of commercial activities mean?
2.2 Explain why commercial activities have been rapidly decentralizing over the last few years.
2.3 In which zone are you likely to find the inner city area?
2.4 Describe two characteristics of the inner city.
2.5 What can the city council do to address the moral and social degeneration that occurs in the inner city?

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2.6 What evidence suggests that the city centre is accessible?
2.7 What impact do you think the accessibility of the city centre has on the density and height? of buildings in this zone?
2.8 Do you agree with the statement that making the city centre accessible has created more problems for urban dwellers? Explain.
2.9 State one advantage and disadvantage of renewing the inner city.

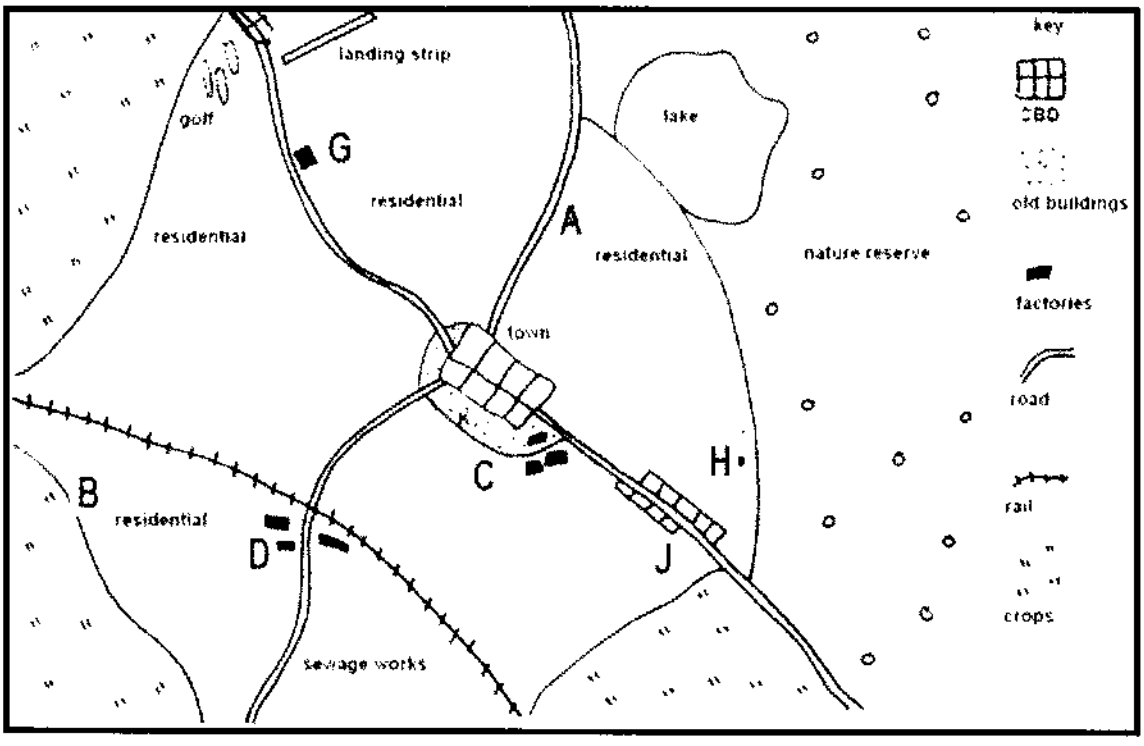
Activity 3.12

Make reference to the land-use map below before attempting these questions

1. The town on the sketch depicts a central place. What does this mean?
2. What evidence suggests that the town has a high degree of accessibility?

3. Refer to area **K**.

   3.1 Why is this area referred to as a transition zone?
   3.2 Give two reasons why this zone is associated with social decay.



4. Name two activities found on the rural-urban fringe.
5. What type of residential area is **A**? Give evidence to support your answer.
6. Give supporting evidence that indicates that the town centre is very old.
7. Is **C** or **D** likely to a heavy industrial site? Give a reason for your answer.

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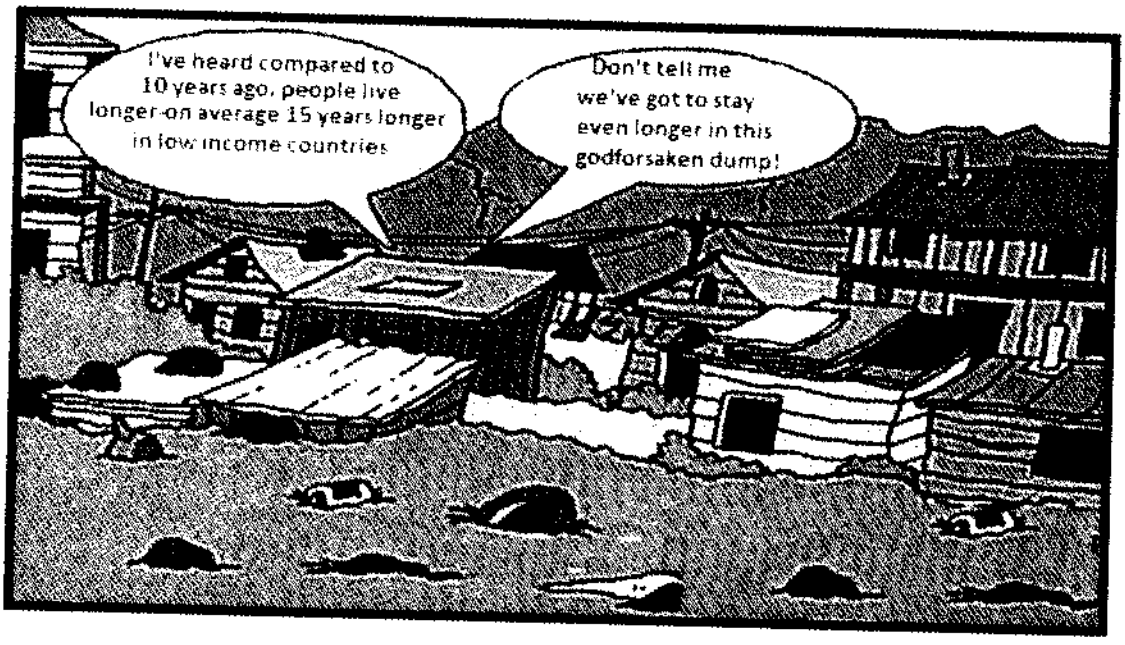
Activity 3.13

Shanty towns have become a common feature throughout the world. Study the cartoon below and answer the questions that follow.



1. What is a shanty town?
2. Give two reasons why shanty towns have grown more rapidly in less economically developed countries.
3. Why does the character in the cartoon refer to the shanty town as a 'godforsaken dump'? Complete the table below in answering this question.

Environmental problems	Socio-economic problems

4. What type of challenges do shanty towns pose to local authorities?
5. Discuss some of the ways in which these problems are being addressed by local authorities.
6. What is ironic about the statement "people on average live 15 years longer in low income countries?
7. Imagine that you have recently migrated to the city and live in a shanty town. Write a letter to your family back in the rural area to explain what life is like in the shanties.

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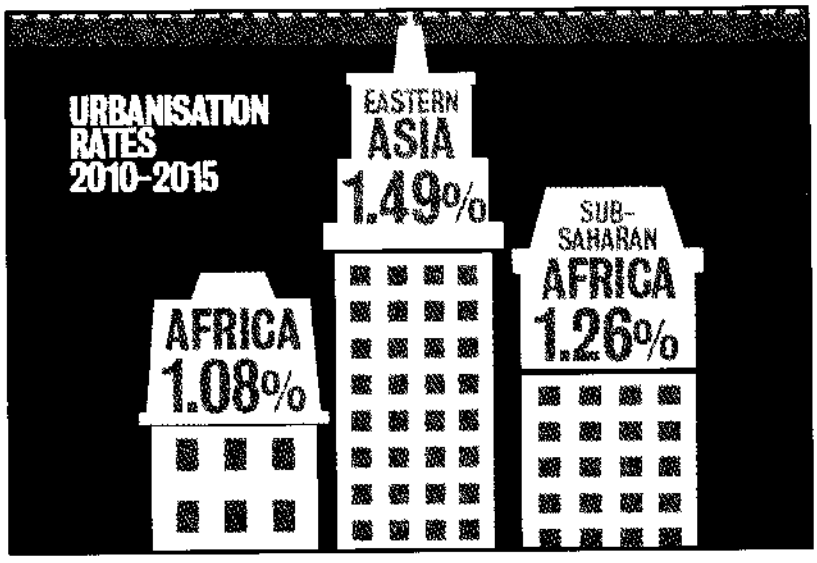
Activity 3.14

Study the graphs based on urbanisation.



1. What is urbanization?
2. Are the areas depicted in the figure developed or developing areas?
3. Which country in sub-Saharan Africa is experiencing the highest rate of urbanization?
4. Is urbanization greater in LEDCs or MEDCs?
5. Provide TWO reasons for rapid urbanization in some parts of the world.
6. Urban sprawl is closely associated with urbanization. Explain the concept urban sprawl.
7. Green belts have an important role to play in curbing urban sprawl. Explain the concept green belt and assess some of the advantages of establishing them in cities

Activity 3.15

Land use maps provide important information about the layout of a settlement. Unpack the accompanying map, based on the settlement of Ashton.

1. The letter **A** points to the town of Ashton, which serves as a central place. What is the function of a central place town?
2. Urban areas are associated with many social ills. Why is area **M** considered to be the origin of many of these social ills?
3. State two measures that local town planners can use to uplift an area like **M**.
4. Name the street patterns labelled **C** and **B**.
5. A historian wants to study the old architecture and layout of Ashton. Would you advise him to go to area **B** or **C** to gather information? Explain your answer.
6. Area K has an industrial estate. State two factors that favoured its location.
7. Describe two characteristics of industrial estates.
8. Residential area **G** is part of a golf estate. State one similarity and one difference between high class residential areas and golf estates.
9. Urbanisation is occurring rapidly in Ashton. To cater for this area **H** has been allocated for a shopping centre.
   a. In terms of its location what type of shopping complex will this be?
   b. How does urbanisation impact on the environment?
10. What type of rural settlement is evident in area **R**? Explain.
11. Area **P** can be an advantage and disadvantage to the town. Explain both points of view.
12. State the shape of settlement **D** and explain why it takes on this shape

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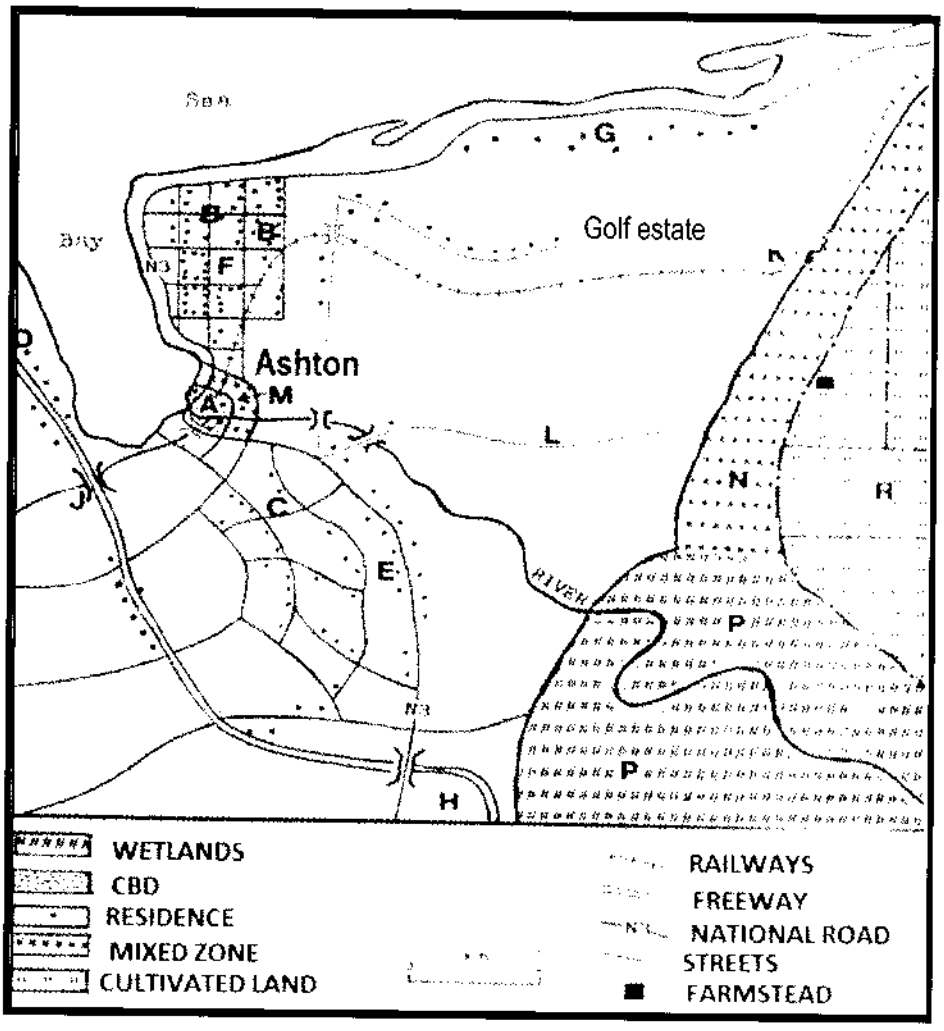

Activity 3.16

Refer to the source material on informal settlements in Sao Paolo.

1. What are informal settlements called in Sao Paola (Brazil).
2. Give one reason why Mauro left his farm.
3. What term is used to describe the movement of people from farms to cities?
4. Why does this movement result in the formation of informal settlements?
5. Describe two characteristics of informal settlements.
6. Suggest one way in which the government can contain the problems experienced in informal settlements.

People move to the cities in Brazil

Mauro Ramirez, 31, left his farm in rural Brazil to find work in the southern city of Sao Paolo. The rains had failed and his small farm could not support his family. Mauro and his wife found jobs in the city and were able to rent a room in a shack on the edge of a shanty town. It has running water and electricity which he has to pay for. "If only we had got some help we could have stayed on the farm and not come all this ways to the city", said Mrs Ramirez.

Source: Earthworks 3- UK

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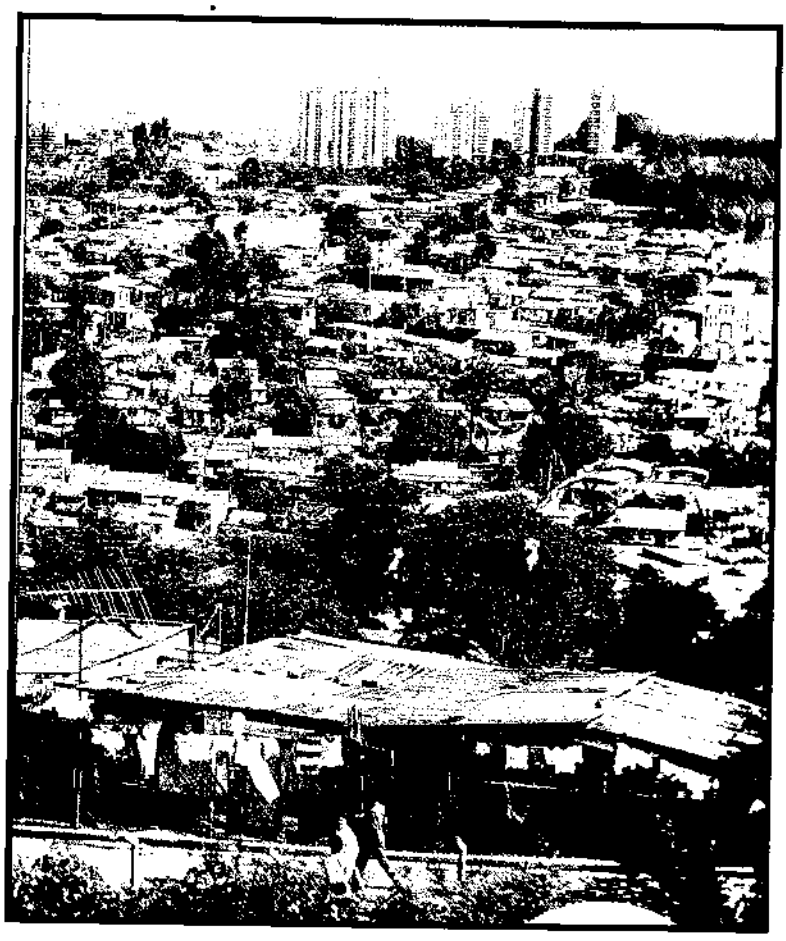

Activity 3.17

Most of the major cities in South Africa are trying to get rid of the grime and rot that is found in the inner city. The article provided captures the extent of the problem in the city of Durban.

1. Although the eThekwini Municipality is building about 16000 houses a year there is still a backlog. Give a possible reason for this.
2. How are landlords exploiting people that are desperate for a roof over their heads?
3. Give two reasons why accommodation in the inner city is referred to as a 'growing sewerhole' in the article.
4. Name two social problems associated with the inner city.
5. What possible reasons do landowners have for not maintaining the buildings in good condition?
6. Suggest two solutions to city officials to address the inner city problems.

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Daily News

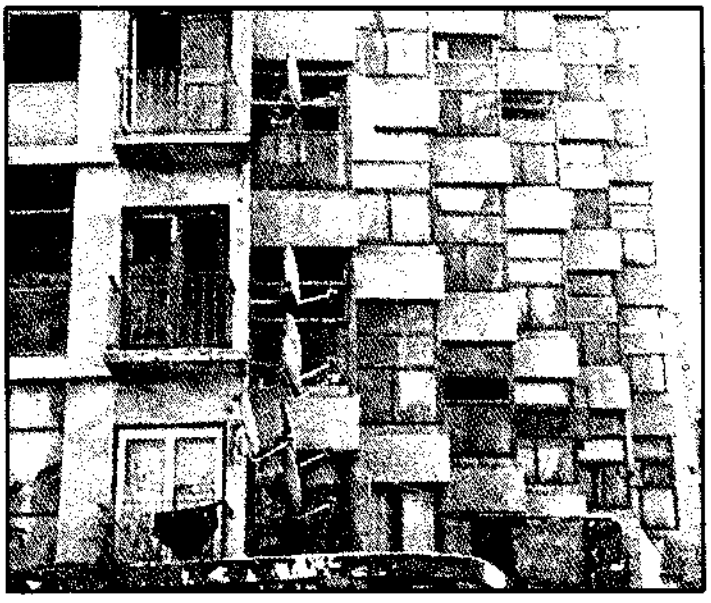
Fixing the city centre

Although the eThekwini Metro Council, acting as an agent for the government, is building less than 16 000 houses a year and plans to double that in the years ahead, there is still a serious backlog of housing in the city which has opened the way for unscrupulous landlords to exploit people desperate for a roof over their heads.

One result of this is the rapid deterioration of buildings in parts of the city, but particularly the CBD and Point areas. Here building owners have simply crammed as many bodies as possible into their buildings with little thought or care for the health or comfort of their tenants.

Because they are often too expensive to repair, lifts have been out of order for years in some buildings, forcing elderly tenants to climb several storeys in order to get in or out of their so-called flats. Stairs are chipped, dark and dangerous, where muggings frequently take place and in some blocks, water and electricity have been cut off completely, leaving them stinking hellholes.

Now the city council has set up a team of officials who will make it their business to identify dangerous and high-risk buildings so that appropriate action can be taken against owners.



A random sample in Durban by a member of the Rental Housing Tribunal found that 65% of Durban buildings had some fault with them. The shocking report also blamed faulty lifts for the deaths of at least 10 people in recent years.

This cannot be allowed to continue. Deteriorating buildings cause high-rise slums to the detriment of the city. Crime becomes a way of life in those areas, with prostitution and drugs becoming central to the economy of the slums.

The city must make owners responsible for their buildings and those that refuse must have their buildings confiscated and auctioned to those who will help bring back decent way of life to the city centre.

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Activity 3.18

Read the article on urbanisation. Provide solutions for people to remain in rural areas.

UN: Rapid urbanization a threat to sustainable development

New strategies are needed to address the impacts of rapid urbanization around the world, including increasing demands for energy, water, sanitation, public services, education and health, according to the 2013 UN World Economic and Social Survey.

The survey estimates that nearly 6.25 billion people will be living in urban areas by 2050 with more than half of them living in slum areas with little or no access to basic infrastructure and services such as water, sanitation, electricity, health care and education.

It also calls for changes in food consumption and production patterns around the world in order to reduce wastage, currently estimated at over 32 per cent of total global food production.

Patrick Maigua, United Nations Radio Geneva

1. Define the term urbanisation.
2. State TWO challenges associated with urbanisation.
3. Explain the statement 'changes in food consumption and production patterns'.
4. Suggest ways in which food production can be increased.
5. Suggest ways in which cities can become sustainable.

PARAGRAPH TYPE QUESTIONS

1. In a paragraph of 8 lines suggest sustainable solutions to improve living conditions of people living in informal settlements.
2. Suggest reasons for the stagnation of rural areas.
3. Propose solutions to the problem of rural stagnation.
4. In a paragraph explain why urban renewal has both a positive and negative impact.
5. The development of a regional shopping centre on the outskirts of the city will change the sphere of influence of the city. In a paragraph of approximately EIGHT lines, describe this change and explain the possible economic benefits for the city.
6. Write a paragraph of approximately EIGHT lines, to explain how the slow pace of land reform impacts on the economy and communities.
7. How will disinvestment in farming activities impact on population numbers and the economy of rural farming communities?
8. Evaluate the role that poor public transportation plays in traffic congestion in urban areas in South Africa.
9. In a paragraph explain why the inner city has deteriorated into slum conditions. Discuss THREE reasons why the CBDs of many South African cities are losing their importance as central locations.
10. Write a paragraph (approximately 8 lines) proposing some sustainable strategies to maintain expanding urban settlements.

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MODULE 4

ECONOMIC GEOGRAPHY OF SOUTH AFRICA

This module includes the following topics:

- Structure of the economy
- Agriculture
- Mining
- Secondary Sector
- Strategies for industrial development
- Tertiary Sector
- The Informal Sector

KEY CONCEPTS:

Agglomeration	Concentration of activities, usually industries close to each other.
Balance of trade	The difference in value between a country's imports and its exports.
Balance of payment	A financial statement showing the value of a country's transactions with the rest of the world.
Ecological destruction	The balance between living and non-living organisms in an ecosystem is disturbed.
Export promotion	The government attempts to increase the quantity and variety of goods and services that are exported by offering export subsidies and tax rebates.
Fair trade	Trade is equal and fair between consumers and economically disadvantaged producers.
Food security	People do not fear starving because they have access to enough nutritious food as there is a balance between supply and demand.
Food insecurity	People fear starving because they do not have access to enough nutritious food caused by an imbalance between supply and demand.
Formal sector	Recognized, registered businesses that occupy permanent premises and pay taxes.
Free trade	There are no barriers to the import and export of goods and services.
Gross domestic product (GDP)	The total value of goods and services produced in a country in one year.

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Gross national product (GNP)	The total value of goods and services produced in a country by the permanent inhabitants in one year.
Industrial centralization	Industries are concentrated in the one area (core area).
Industrial decentralization	Industries are located in the periphery or rural areas away from the core areas
Industrial Development Zones (IDZs):	Are purpose built industrial estates which aim to encourage economic growth by attracting new investment for industrial development and increasing exports.
Informal sector	Refers to business activities that are unregistered and which provide services without a license.
Import substitution	The replacement of goods which were previously imported with goods that are locally produced goods.
Investment corridors	Geographical areas specifically selected for business development and investment.
Multi-nationals/ transnational corporations	Large companies with branches that operate in several countries.
Primary economic activity	Concerned with the extraction of raw materials from the natural environment.
Protectionism	Restrictions are placed on trade between countries by using tariffs and quotas.
Secondary economic activity	Involves the processing of raw materials into goods that are more useful.
Socio-economic injustice	When all people don't have equal access to facilities, services and resources within a particular place.
Spatial Development Initiatives (SDIs)	Programme aimed atattracting infrastructure and business investments to areas that were neglected and underdeveloped due to political or historical reasons.
Tariffs	Refers to taxes placed on imported goods so that these goods become more expensive than the locally produced ones.
Tertiary economic activity	Involves the distribution of goods to the consumer and the provision of transport, banking and other services.
Trade	The exchange of goods and services between countries for monetary gain.
Trading blocs	Groups of countries that have common markets and that agree on favourable trade agreements.
Quotas	Restrictions are placed on the quantity of goods that can be imported.
Quaternary economic activity	The hi-tech sector of an economy that is linked to research and development.

NOTE: This module has rotating topics that you need to verify with your teacher.

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THE STRUCTURE OF THE ECONOMY

There are four main economic sectors:

Sector	Definition	Examples
Primary	Concerned with the extraction of raw materials from the natural environment.	• Farming • Fishing • Forestry • Mining • Stone quarries
Secondary	Activities that process and change raw materials into useful goods. Also referred to as 'value added goods'	• Ship building • Steel making • Food canning • Construction
Tertiary	Involves the provision of services to the wider community. Also known as the service sector or service industry.	• Services: trade, commerce and retail. • Personnel services : doctors, accountants, educators, lawyers • Transport
Quaternary	This is the hi-tech sector of an economy that is linked to research and development. Concerned with the collection, analysis and transmission of information.	• Scientists • Medical researchers, Technical specialists who develop better systems in industry, business and the computer fields.

Important economic concepts:

Gross domestic product (GDP): is the total value of goods and services produced in a country in one year.

Gross geographical product (GGP): is the contribution of individual provinces to the GDP.

Gross national product (GNP): is the total value of goods and services produced in a country by the permanent inhabitants in one year.

Economic challenges facing South Africa

South Africa is a less economically developed country (LEDC) and it is faced with many challenges such as:

- Poverty/ widening wealth gap
- HIV and Aids pandemic
- Skills shortage which means we have to employ people from other countries.
- High levels of unemployment which increases crime and discourages investors.
- An energy crisis as the cost of electricity rises and the demand is growing faster than the supply.

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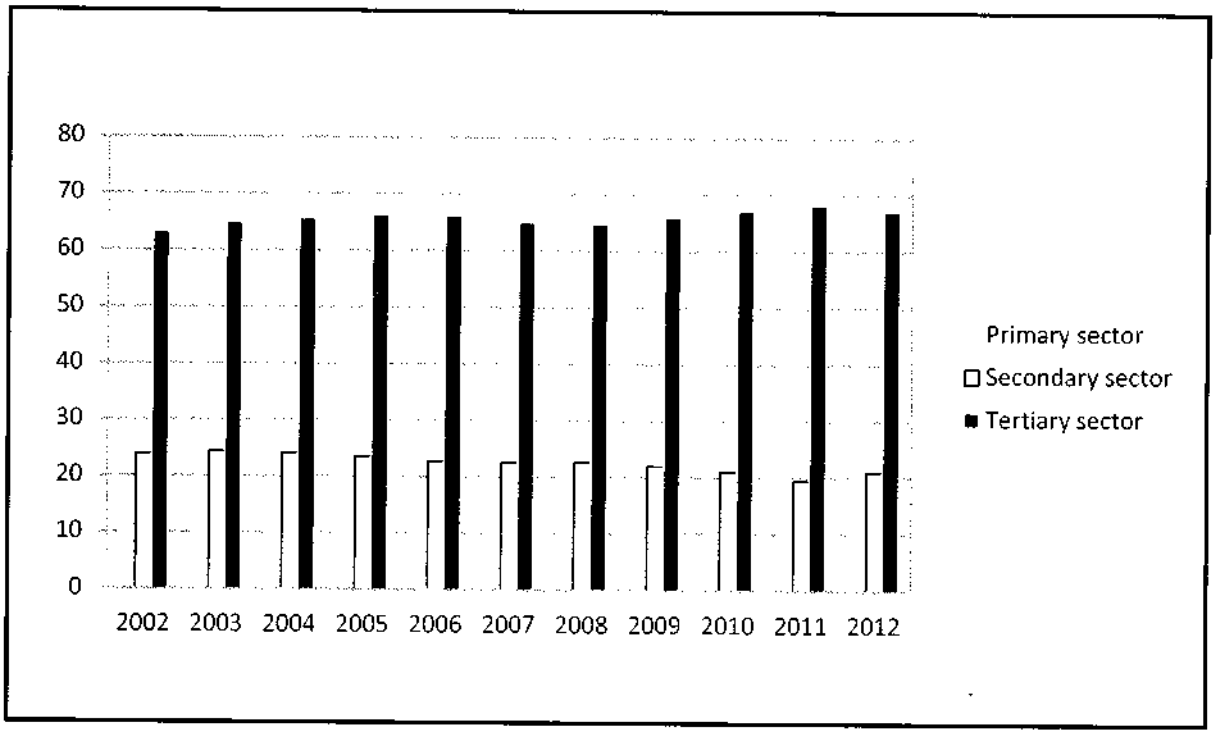
Contribution of economic sectors to GDP

While South Africa is mainly a LEDC, it has a dual economy as it displays characteristics of both a developed and a developing economy. The contribution of the primary, secondary and tertiary activities to the economy is constantly changing as the quaternary sector develops.



- Although the contribution of the **primary sector** is decreasing it still remains important to the development and stability of the country.
- Mining and agricultural activities play a leading role with forestry and fishing playing a minor role.
- We are a leading producer of genetically modified crops.

- **The contribution of the agricultural sector has declined due to:**
  - the high production costs of field crops
  - production is negatively affected by poor climatic condition, drought and declining soil fertility
  - other economic sectors are growing rapidly due to higher profits.
  - better levels of education have made it possible for people to seek employment outside agriculture.
  - using machinery has led to the replacement of many workers on farms.

- Metal processing and engineering industries which form a significant part of the **secondary sector** process minerals to produce automotive parts, fully assembled motor vehicles and electrical goods. There is a strong demand for these goods by domestic and international markets.
- The **tertiary sector** contributes over two thirds to the GDP and is constantly expanding. Growth in the sectors of commerce, communications, government, financial, real-estate and business have accelerated growth. South Africa is a leader in banking and financial services. South Africa also provides a competitive market for call centres due to the availability of human resources.

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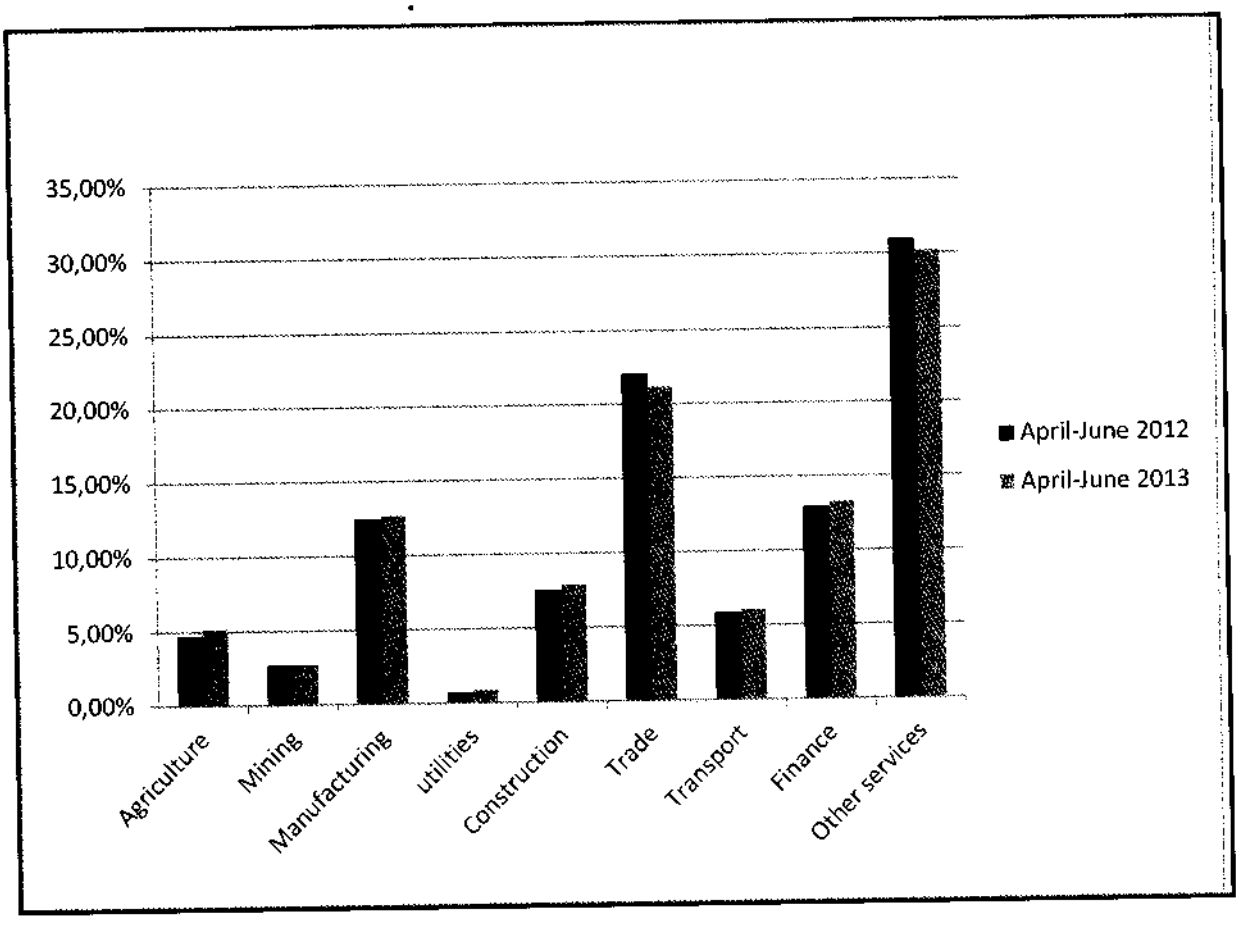

Comment on employment opportunities in the different economic sectors.

THE PRIMARY SECTOR

AGRICULTURE

Introduction

- While the use of scientific methods of farming over the last 30 years have contributed towards increased food production to meet the demands of the world's increasing population there are still millions of people in Southern African countries that are faced with malnourishment and famine.

- This situation is partly the result of a dual agricultural economy in most Southern African countries. A commercial sectorco-exists with a large number of subsistence farms in the deep rural areas.

- Some of the genetically modified crops produced on a large scale include: soya beans, cotton and yellow maize.

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Characteristics of farming systems in South Africa

	LARGE SCALE FARMING	SMALL SCALE FARMING	SUBSISTENCE FARMING
Definition	Production of crops for local and overseas markets to make a profit. Only practised on a commercial level.	Farming on smaller plots of land with the purpose of making a profit. Can be practised on a commercial or subsistence level.	Production to meet the needs of the farmer and his family.
Technology	Use scientific farming methods: chemicals, fertilizers, hybrid seeds, livestock, crop spraying, GM seeds, contour farming **Capital intensive** - use of high tech machinery.	Specialised farming: use of irrigation and small dams **Intensive farming**: every available piece of land is used	Traditional farming methods: use of oxen-driven ploughs. **Labour intensive**: - as farming is done manually by women, children and family members.
Yield	**High** per hectare Practise **monoculture:** cultivation of one main crop	**Medium** per hectare **Variety** of crops are grown	**Low** per hectare **Variety** of crops are grown
Size	**Extensive** farming on large plots of land	**Small plots**, single unit	**Small**, scattered plots of land.
Importance	To produce **large quantities** of food for local and international markets To provide **employment**	To reduce **poverty** in rural areas To reduce **rural-urban migration** To provide employment in rural areas To promote **food security** in local areas	Does not contribute to economy Contributes to food security of individual house holds
Problems	White commercial farmers **leaving** the country Problems that result from **climate change** Increasing **cost** of production, **labour** strikes Cannot compete with international prices, due to **lack of subsidies**	Poor **infrastructure** affects access to markets Getting **finance** and credit facilities from the bank Lack access to **training** and updating their knowledge **Property** rights	Lack of **funds** No access **to training** Affected by **natural hazards**

NOTE: Small-scale farming can be on a commercial or subsistence level.

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Main agricultural products produced

Home Market: Refers to products sold within South Africa. Also referred to as the domestic market.

Export Market: These are goods produced for selling in other countries. Some of our major export markets include: USA, Netherlands, UK, Japan and Germany

Import goods: These are goods that South Africa buys from other countries. We buy mainly from the UK, United Arab Emirates, China, Japan and Germany.

Value-added products: These are raw materials that have been processed thus its value increases e.g. grapes are processed into wine

	Exports	**Imports**
Unprocessed (raw)	Maize Fruit Sugar Soya beans Sunflower seeds Meat	Wheat Rice
Processed (value added)	Wine and fruit juice Wool Hides and skins Ostrich products Dried fruit and nuts	Tea Coffee Spices Oil Cereals

SUMMARY OF FACTORS AFFECTING AGRICULTURE

FACTORS HINDERING AGRICULTURE	**FACTORS FAVOURING AGRICULTURE**
• Climate change • Droughts and floods • Diseases/pests • Fluctuating prices • Wild fires • Crime • Labour strikes • Lack access to funding and training • Cannot compete with international markets • Subsistence farming	• Trade opportunities • Research • Climatic variation • High temperature • Available labour supply

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PHYSICAL FACTORS

Soils (negative)

- Generally soils are of a poor quality especially where the slopes are steep as increased runoff accelerates soil erosion.
- Poor farming methods such as overgrazing[10] and monoculture[11]contribute to soil erosion.

Rainfall (negative)

- Rainfall is low and unreliable over the greater part of the country with the average rainfall being less than500mm.
- The eastern half of the country receives more rainfall than the western half.
- High evaporation rates and low rainfall in the west limits agricultural production.
- Costly irrigation schemes such as the Orange River Project and the Vaal-Hartz scheme have been constructed to transfer water from one region to another.

Diseases and pests (negative)

- Insect pests such as locusts and stalk borers destroy crops and fruit. Stock suffer of foot and mouth disease and scab.
- The use of pesticides and insecticides to overcome these problems increase production costs.

Temperatures (positive)

- The relatively high summer temperatures are suitable for the cultivation of most crops especially maize and sugar cane. The low moisture content in maize allows it to be stored over long periods.
- The warm temperatures also favour the sweetening and ripening of fruit.

Seasonal climatic variations (positive)

- Different parts of South Africa experience a range of climates therefore a variety of agricultural products can be grown throughout the year.
- The South West Cape experiences a mild climate with winter rainfall (Mediterranean climate). This supports grapes, deciduous fruit and wheat production.
- The high summer rainfall in Kwazulu-Natal favours the growing of sub-tropical fruit and sugar cane.
- Few days with frost experienced thus there is a longer growing season.

SOCIAL FACTORS

HIV/AIDS (negative):

- The high prevalence of HIV and Aids lowers production on farms as valuable farming skills are lost due to ill health and death. Food production declines resulting in food insecurity.

Farmer attributes (negative)

a) Many farmers are subsistence farmers and they do not produce surplus crops that can be sold thus poverty levels remain high.
b) Subsistence farmers also lack access to agricultural research and are illiterate. This is a major obstacle to the development of commercial agriculture amongst them. Furthermore it is challenging to change the attitudes of farmers from traditional methods.

---

[10] Too many cattle are put to graze on a piece of land
[11]Planting the same crop year after year on the same ground

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ECONOMIC FACTORS

Fluctuating prices (negative)

- While there is a great demand for agricultural products both locally and internationally, demand is affected by world market prices.
- Farmers in MEDC's are heavily subsidised by their governments and it is difficult for farmers in developing countries to compete with the low foreign prices.

Dual agricultural system (negative)

- A dual agricultural system exists in the country. Unlike commercial farmers, subsistence farmers do not have capital to purchase farm machinery, fertilizers, hybrid seeds, insecticides and pesticides.
- Subsistence farms are small in size and these are over exploited.

Research (positive)

- Large sums of money are invested by governments on research and agricultural education to increase productivity.
- The use of scientific methods of farming such as the production of genetically modified crops, better farming methods, hybrid seeds, fertilizers and the control of pests and diseases improves yields.

Trade (positive)

- Well-developed harbours as well as international airports, including the Dube trade port in Durban.
- Trade agreements with EU and US thus having access to more markets.
- Deregulation of agriculture since 1994 has made farming more competitive.
- The northern hemisphere has the opposite season to us and this encourages exports of fruit and flowers.

POLITICAL FACTORS

Protective measures (negative)

- The use of tariffs, subsidies and quotas by MEDCs makes it difficult for LEDCs to compete with the MEDCs for major agricultural markets.
- Trade agreements and large trading blocs between MEDCs also restrict the LEDCs in selling their primary products.

CONTRIBUTION OF THE AGRICULTURE TO THE SOUTH AFRICAN ECONOMY

Food production:

- The agricultural sector produces sufficient food to meet the demand of our still growing population. This availability of food ensures peace of mind and general stability.
- The need to import food from other countries at high costs is reduced.

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Earner of foreign exchange

- Foreign income is earned from the export of fruit, nuts, grain, sugar, wool and maize. Agriculture makes up 10% of the country's total exports thus stimulating economic growth.

Contribution to the GDP

- Although the contribution has decreased, it still remains an important backbone of the economy.
- Farmers pay taxes to the receiver of revenue which is used to develop the country.

Job creation

- 10% of the labour force is employed by this sector.
- The mechanization of agriculture has resulted in large-scale on the job training of labourers.

Infrastructure development

- Agriculture has led to the development of infrastructure[12] in the country.
- Transport networks have been improved and water irrigation schemes developed. For example, the Dube trade port at La Mercy, was constructed to facilitate the export of agricultural products.

Industrial development

- Raw materials are supplied to industries thus stimulating industrial development. Food processing industries (wineries and fruit canning), textile industries (cotton) and sugar refineries (sugar cane) depend on raw materials produced by agriculture. These industries in turn create jobs.

NOTE: The positive and negative factors that affect agriculture and its contribution to the economy will apply to each of the agricultural products listed below:

CATTLE FARMING

- South Africa has an extremely well developed cattle industry. Cattle ranches are found mainly in the Eastern Cape, parts of the Free State and KwaZulu-Natal, Limpopo and the Northern Cape.

Some problems related to beef production specifically include:

- Communal farmers see cattle as a measure of their wealth and do not sell them
- Foot and mouth disease and tick problems
- Communal grazing land, soil erosion, overgrazing
- Variable price for beef
- Limited grazing as SA is a hot and dry country

Possible solutions

- Agricultural officers to assist small scale and new farmers
- Provide government subsidies and grants.
- Increase education and skills of farmers.
- Access to funding from banks.

[12]The roads, railways and services available to attract economic activities to an area

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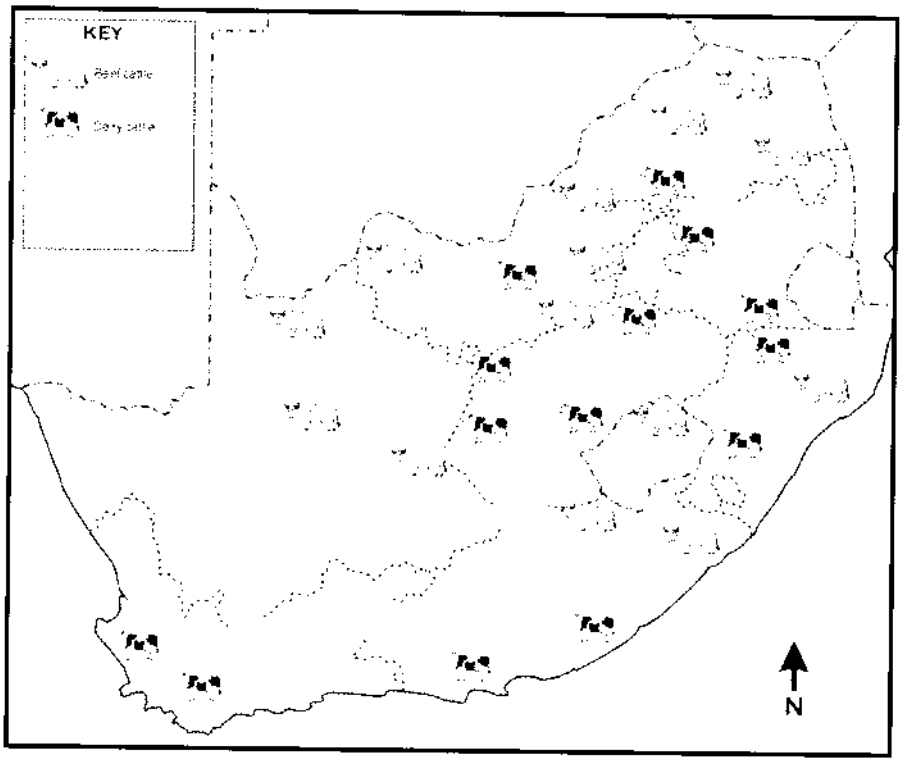
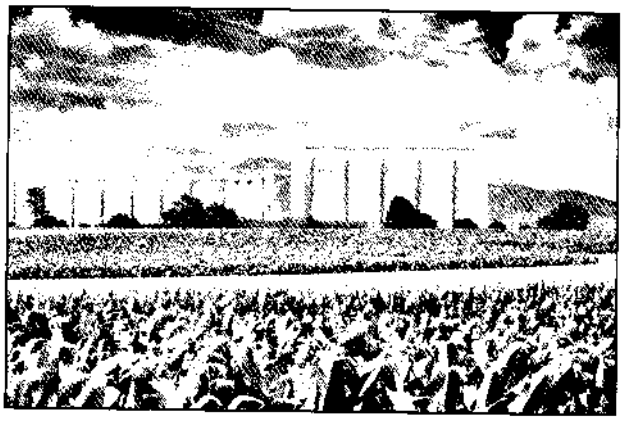
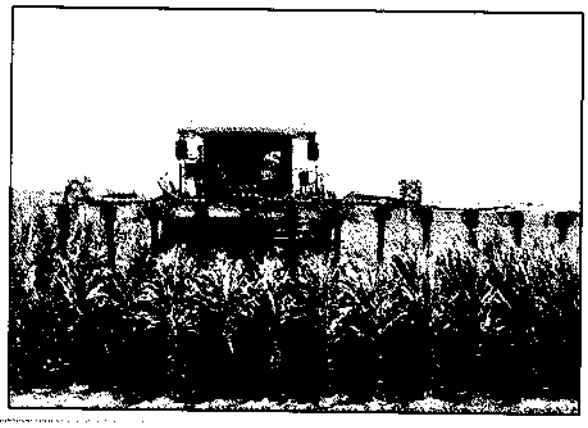


MAIZE FARMING

Maize is planted in the Highveld in South Africa

- Maize is undoubtedly the country's most important field crop and the staple food of the population
- The maize industry is an important earner of foreign exchange for the country through exports of maize and maize products.
- South Africa exports maize mainly to Japan, Iran, Kenya and Venezuela. Other important markets are Zimbabwe, Zambia and Malaysia
- Maize is produced by approximately 9 000 commercial farmers who provide direct employment for an estimated workforce of 128 000.
- In addition, work opportunities are provided in various industries relying on maize as a raw material. The maize milling, stock-feed, wet milling, poultry and dairy industries are directly dependent on maize for their survival and employ thousands of workers.





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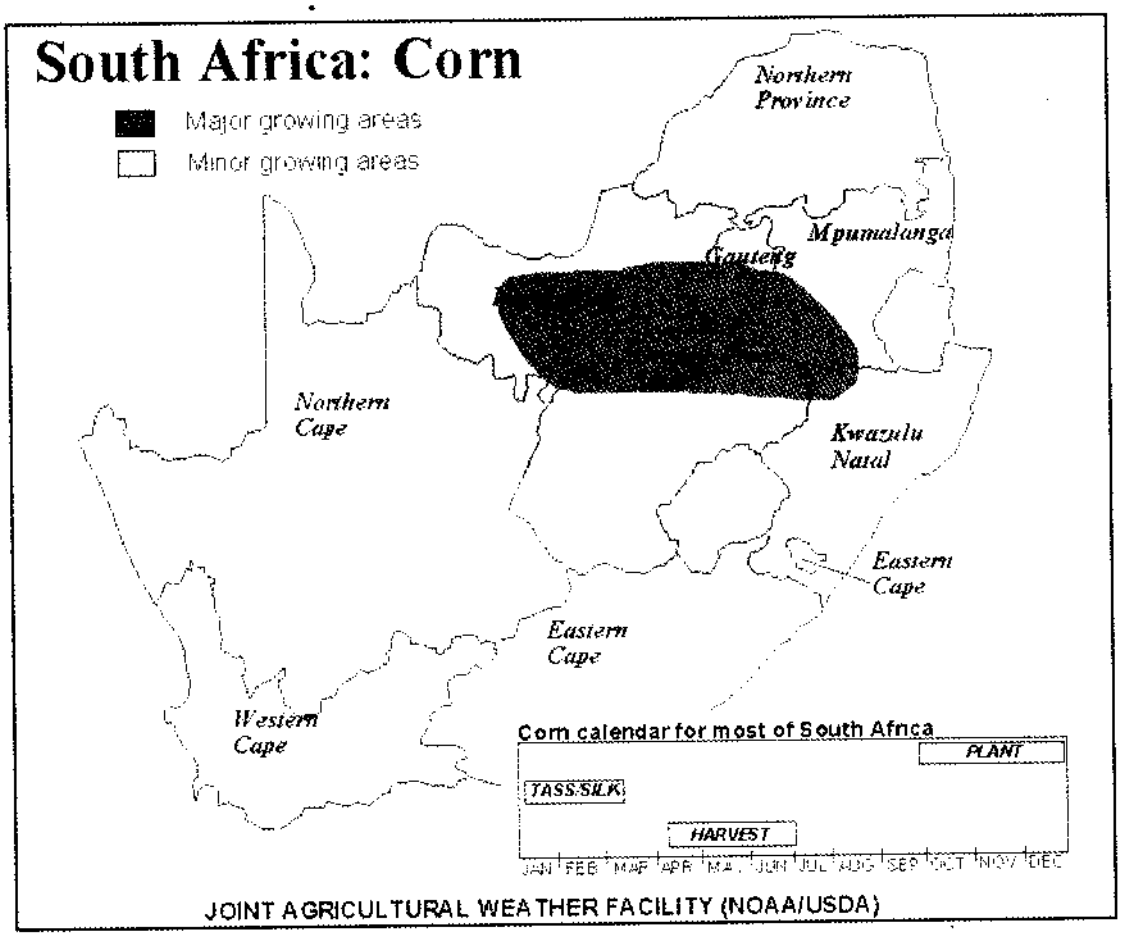

SUGAR CANE FARMING

- The South African sugar industry is one of the world's leading producers of high quality sugar and is the world's 11th largest sugar producer.
- Sugar cane is mainly farmed in KwaZulu-Natal, with some farms in Mpumalanga and the Eastern Cape.
- An estimated average of 2.2 million ton of saleable sugar is produced each season. Of this, 60% is marketed in the SACU (Southern African Customs Union). The remainder is exported to Africa, Asia and the Middle East.
- Three companies active in the processing of sugar in South Africa are Tongaat Hullett, Illovo and TSB.
- It provides significant employment opportunities, particularly in rural areas. Direct employment within the sugar industry is approximately 77 000 jobs, which represents a significant percentage of the total agricultural workforce in South Africa. Indirect employment is estimated at 350 000.
- The industry is diverse, combining the agricultural activities of sugarcane cultivation with the manufacture of raw and refined sugar, syrups, specialised sugars and a range of by-products.

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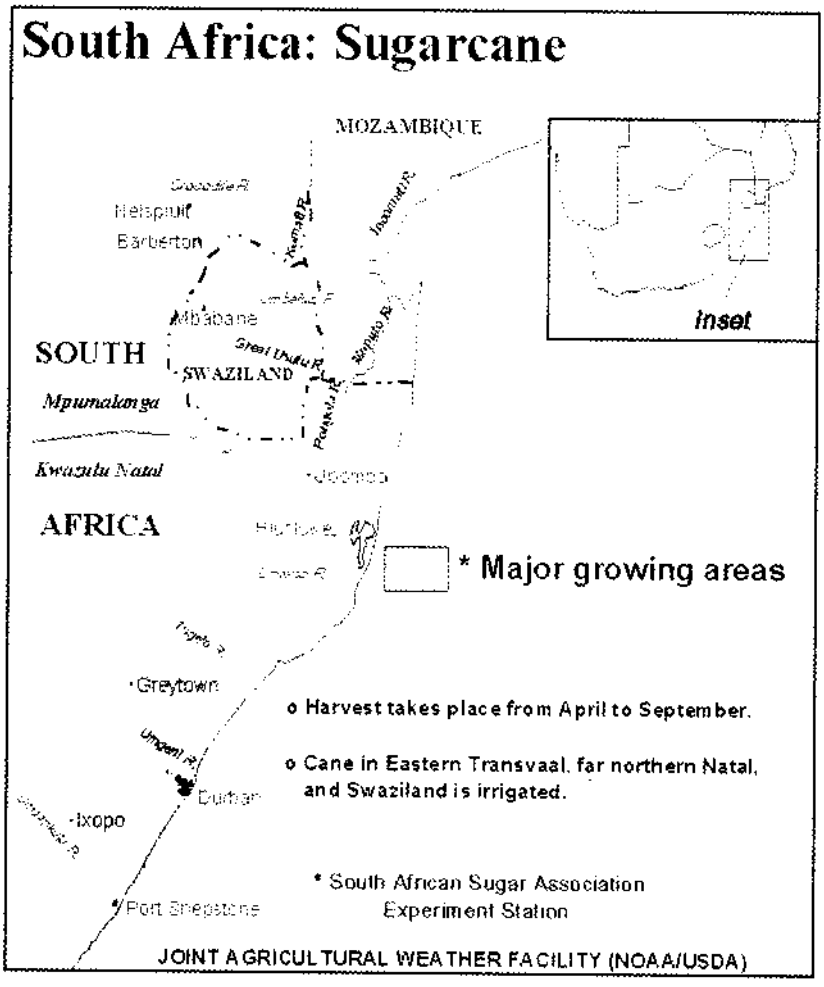
The "ideal" climate for production of maximum sugar from sugarcane is :

- A long, warm growing season with a high incidence of solar radiation and adequate moisture (rainfall) - the plant uses from 148 to 300g of water to produce 1.0g of dry substance.
- A fairly dry, sunny and cool, but frost free season for ripening and harvesting - moisture percentage drops steadily throughout the life of the sugarcane plant, from 83% in very young cane to 71% in mature cane, meanwhile sucrose grows from less than 10 to more than 45% of the dry weight.
- Freedom from typhoons and hurricanes



Use these questions as a guide to understand agricultural production:

2. How do agricultural products contribute to the economy of SA?
3. Discuss physical factors that hinder agricultural production.
4. Why has the demand for beef increased in SA?
5. Why does beef farming have a negative impact on the environment?
6. What are the possible solutions to improving maize production in SA?
7. Why is sugar cane production erratic?
8. What are the human factors that restrict agricultural growth?
9. What is the impact of a poor agricultural output for a particular year?

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FOOD SECURITY IN SOUTH AFRICA

Food security: occurs when sufficient(enough) food is produced to meet the needs of people. It results from a balance between supply and demand.

Food insecurity: occurs when people fear starving because they do not have access to enough nutritious food. It is results when demand exceeds supply.

Famine: A lack of food that gives rise to starvation and malnutrition.

Importance of food security

- Food security is important to maintain the good health of people
- It will prevent social uprisings
- To prevent hunger and famine
- Malnutrition can be prevented. It is associated with the stunted growth and death of children.

Negative factors affecting food security	Positive factors affecting food security
• **Soils are thin and infertile** in most regions • Environmental hazards such as **droughts, floods** • **Pests and diseases** • Damage to the environment such as soil erosion, deforestation • There is a **lack of capital** to invest in irrigation schemes, machinery, hybrid seeds, fertilizers and insecticides. • Farmers in MEDCs are subsidised by their governments thus African farmers are unable to compete with them. • In many rural areas, the road and rail network is poorly developed (not tarred, potholes, single lanes). • Do not have capital to invest in agricultural research which contributes to higher yields. • Shift from food production to biofuel production. • High level of HIV/AIDS which lowers productivity	• Greater variety of crops can be planted due to a variety of climatic regions. • **Government incentives** to small scale farmers. • Improved trade relations • Processing of raw materials (cottage industries) • **Land re-distribution** programme • Protection of the environment through sustainable agriculture. • Planting perennial crops that require less fertilizer and reduces erosion. • **Planting a variety of crops** to prevent soil exhaustion. • Planting **genetically modified** seeds. • Practising co-operative farming (a system where farmers pool their resources). An NGO called Technoserve assists farmers in SA in co-operative farming.

Use of Genetically modified crops to improve food security

- These are crop plants that are modified in a laboratory so that they are more resistant to herbicides and have a greater nutritional value. It is believed that the production of GM crops in developing countries will increase food security for the growing populations.

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Advantages of genetic modification

- They are more resistant to pests and diseases.
- They have a longer storage life.
- More food per hectare can be produced.
- They have greater nutritional value.
- They are able to survive in a greater range of climatic conditions.

Disadvantages of genetic modification

- GM seeds have been developed by a few multinational companies that have the monopoly over them.
- The long terms effects of genetic modification on man's health are unknown.
- New seeds have to be planted every year and this is costly.
- The effects on the environment, e.g. food chains, are not known.

Other methods to improve food security

- Reduce subsistence farming
- Education, training and skills development of farmers
- Improved scientific farming methods
- Planting surplus in good seasons
- Availability of funding for new and small scale farmers.

Case Study: Food Security in South Africa

August 2013

Pretoria - More than half of South Africans do not have regular access to enough food, according to a study released by the Human Sciences Research Council (HSRC) on Tuesday.

Overall, 45.6% of the population were food secure, said Professor Demetre Labadarios. The HSRC defines food security as access to food by all members of a household at all times, to enough food for an active and healthy life.

The food trends status in South Africa is classified under three sections - food secure, at risk of hunger, and experiencing hunger. "Measuring food security is not easy," Labadarios said "On a total national level, two out four households in the country are food secure, that is 45.6%.

"Regarding the food insecure, which is those that experience hunger, one out of four households experience hunger. The Western Cape, Gauteng, and the Northern Cape have low levels [of food insecurity] in comparison to other provinces."Labadarios said that while 26% of the population experienced hunger, 28.6% were living at the risk of being hungry. The number of citizens living "at the risk of hunger" had risen from 25% in the previous survey in 2008.

According to the 2012 study, the Eastern Cape, followed by Limpopo, had the highest numbers of citizens experiencing food insecurity. Food security was at its highest in the Western Cape. In comparison to the social attitudes survey done in 2008, national food security had declined from 48% to 45.6%.

- SAPA

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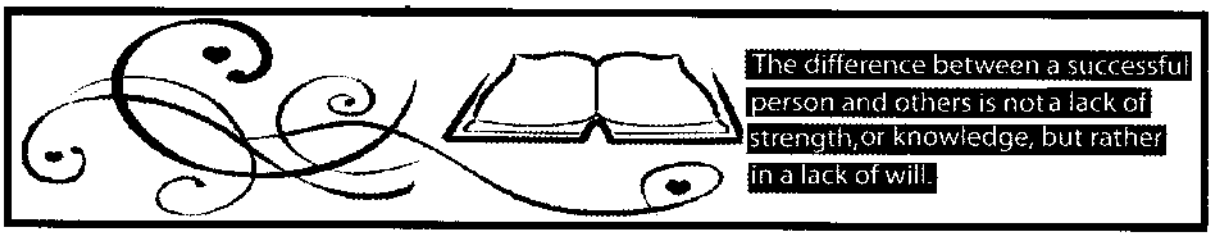


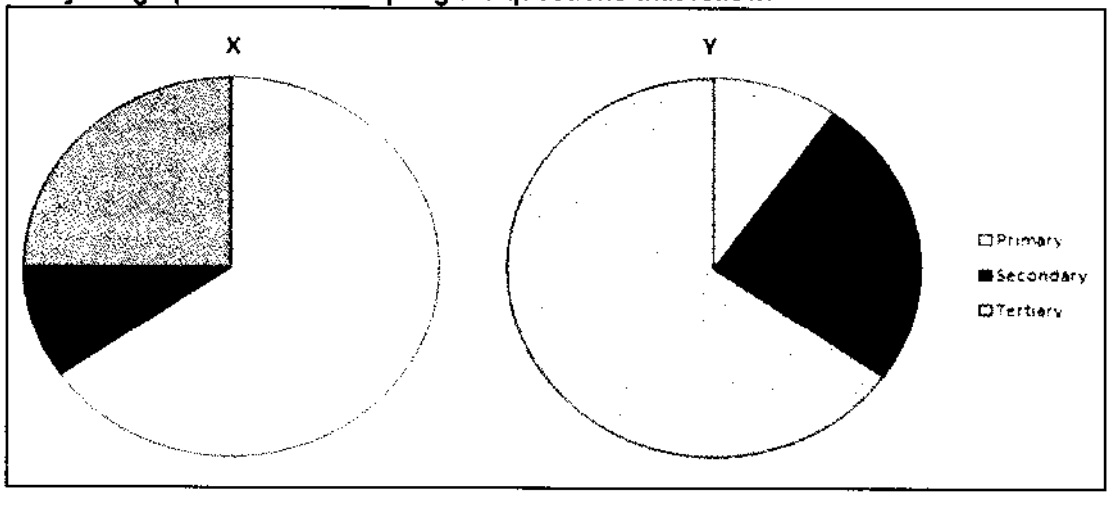
Activity 4.1

Choose a term from COLUMN B that matches a statement in COLUMN A.
Write only the letter (A-F) next to the question number 1 - 5) e.g. 6.G

COLUMN A	COLUMN B
1. Removal of raw materials from the earth.	A. Gross domestic product
2. Total value of goods and services produced by the permanent citizens of a country in one year.	B. Tertiary activity
3. Provision of services.	C. Gross national product
4. Processing of raw materials.	D. Primary activities
5. Value of all goods and services produced in a country in one year.	E. Economic activities
	F. Secondary activities

Activity 4.2

Study the graphs before attempting the questions that follow.



1. What is a primary economic activity?
2. How are primary and secondary activities linked?
3. Match graphs **X** and **Y** to:
   a. A more economically developed country
   b. A less economically developed country
4. Define the term GDP.
5. Explain why country **X** is likely to have a low GDP?

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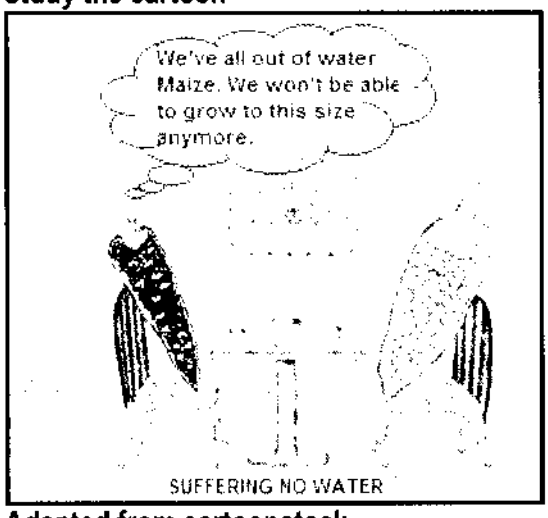
Activity 4.3

Study the cartoon



Adapted from cartoonstock

1. Name the problem being highlighted in the cartoon.
2. Discuss the implication of 'we are all out of water' on food security.
3. Why is maize production particularly important in SA?
4. Suggest methods that can be put in place to address the problem of water shortages in farming in the future.

Activity 4.4

Read the adapted newspaper article entitled "Exodus of Commercial growers a threat to South Africa's food security".

Exodus of commercial growers a threat to SA's food security

Agricultural experts are warning that the farming sector in South Africa is in trouble and have appealed to the government to act to prevent commercial farmers from leaving. Currently one dairy farmer is leaving the industry every week because they are not making money. They have become high-cost producers.

South Africa as a country is beginning to import more and more. The long term effect is that food will be more expensive. The poor will suffer as they spend 40 to 50% of their income on food. At a time when food security is a big issue in the world it is certainly a problem that South Africa's farmers are leaving the country.

Adapted from Sunday Times (Sipho Masondo)

1. Explain the concept food security
2. Africa has a very high percentage of subsistence farmers. Assess how this will impact on food production.

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3. Explain TWO factors (besides subsistence farming) that has led to food insecurity in Africa.
4. Genetically modified crops are seen by many as solutions to food insecurity. Argue some of the advantages and disadvantages of using this as a solution.
5. Explain the difference between small scale and commercial farmers.
6. Suggest ONE reason for South Africa becoming a high cost producer.

Activity 4.5

Study the table below:

1. Define the term GDP.
2. According to the table, which economic sector makes the greatest contribution to the GDP?
3. State why the informal sector is not represented in the table.
4. Suggest TWO reasons for the development of a strong informal sector in South Africa.
5. The need to regulate the informal sector in the near future is necessary although there are many challenges in this regard. Write a single paragraph (no more than 12 lines) to explain some of the problems experienced by informal traders and measures that can be put in place to address the issue

	2008	2009	2010
Primary sector			
Agriculture	**3.1**	**2.94**	**2.47**
Mining	**9.85**	**9.11**	**9.57**
Secondary sector			
Manufacturing	**16.66**	**15.18**	**14.63**
Tertiary sector			
Services	**22.72**	**24.66**	**25.17**
Transport	**9.21**	**9.15**	**9.14**
Finance	**21.63**	**21.46**	**21.24**
	Calculated from Stats SA		

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Activity 4.6

Refer to the table below

COUNTRY	GDP	PRIMARY	SECONDARY	TERTIARY
Japan	41000	8	33	59
Germany	30000	3	39	58
U.K.	19000	2	29	69
Canada	19000	3	26	71
Korea	10000	18	38	44
Brazil	5000	23	22	55
Mexico	3000	28	24	48
China	590	72	15	13
India	365	62	18	20
Kenya	330	80	7	13

1. Which country would you consider to be most developed and why?
2. Identify a country with the highest number of primary activities.
3. Describe two characteristics of the economy of such a country. (Answer to question 2).
4. List two ways in which secondary activities contribute to the economy of a country.
5. In the LEDCs only 40% of the people who are employed work in the formal sector of the economy. Outline some of the main differences between the characteristics of jobs in the formal and informal sectors.
6. Explain why jobs in the informal sector are important to the people and economy of LEDCs.
7. Trade is an important tertiary activity in South Africa. Explain how it contributes to the economy.

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MINING

Minerals mined in SA

Name of mineral	Ranking in terms of world production	Percentage of worlds reserves
Platinum	1	79%
Manganese	1	78%
Chromium	1	76%
Diamonds	2	24%
Gold	5	12.7%
Coal	7	7.4%
Iron ore	6	0.8%

Source: Department of mineral resources 2012

THE ECONOMIC IMPORTANCE OF THE MINING SECTOR

Earner of foreign exchange

- Foreign income is earned from the export of various minerals such as gold, iron ore, diamonds and coal. Almost 50% of South Africa's foreign exchange is earned via the export of minerals.

Contribution to the GDP

- Mining companies pay taxes to the receiver of revenue thus stimulating the growth rate of the country.

Job creation/skills development

- A large percentage of the labour force is employed by this sector. It contributes to the economy in the form of wages, taxes and salaries.
- Mines have also attracted workers with valuable skills from Southern African and other overseas countries.

Infrastructure development

- Mining has led to the development of the infrastructure of the country. Road and rail links have been developed to transport mining equipment, people and minerals. For example, the port facilities at Richards Bay were designed for the export of coal and the one at Saldhana Bay for iron-ore to major overseas markets.

Industrial development

- The mining industry created a demand for tools and machinery and thus factories were started to supply these.
- SASOL and MITTAL STEEL are examples of industries that have been established to process raw materials such as coal and iron ore respectively.
- Mining has contributed to a multiplier effect in the economy because the demand for goods and services by the mining industry has stimulated the growth of financial services (Johannesbueg Stock Exchange), engineering services, electricity services, infrastructure (ports and railways), foreign investment, etc.

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Settlements

- Mining has contributed to the rapid urbanization of the country. The discovery of mineral deposits led to the development of towns in Gauteng and in remote areas such as Barberton, Lydenburg and Virginia.

Social responsibility

- Mining contributes to the socio-economic development of the country
- Some mining companies offer bursaries to students who intend pursuing a career in the mining industry, for example geologists.
- In situations, where workers are retrenched due to the closure of mines they are assisted with finding new jobs and are advised on how to best use their retrenchment or pension packages.

Mining, according to the Chamber of Mines:

- Creates one million jobs (500 000 direct and 500 000 indirect).
- Accounts for about 18% of GDP (8.6% direct, 10% indirect and induced).
- Is a critical earner of foreign exchange at more than 50%.
- Accounts for 20% of investment (12% direct).
- Attracts significant foreign savings (R1.9-trillion or 43% of value of JSE).
- Accounts for 13.2% of corporate tax receipts (R17-billion in 2010) and R6-billion in royalties.
- Accounts for R441-billion in expenditures, R407-billion spent locally.
- Accounts for R78-billion spent in wages and salaries.
- Accounts for 50% of volume of Transnet's rail and ports.
- Accounts for 94% of electricity generation via coal power plants.
- Takes 15% of electricity demand.
- About 37% of the country's liquid fuels via coal.

Read more:
http://www.southafrica.info/business/economy/sectors/mining.htm#.VDpGrdgcTIU#ixzz3Fv8Ye8BM

Summary of factors that favour and hinder mining

Factors that favour mining	Factors that hinder mining
• Variety of minerals • Large mineral reserves • Production costs are lower where minerals are close to the surface. • Lower rock temperatures (geothermal gradient) allows for deeper mining. • Quality minerals found in high concentrations • Access to cheap labour • Government assistance	• Strikes and protests, labour relations, land claims • Minimum wages has increased cost of production • Transport costs because mines are located inland • Talk of nationalisation affects potential investors • Fluctuating prices of minerals due to foreign exchange • Mine disasters such as fires, floods, collapse of rocks • Exporting in an unprocessed form reduces profits

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PHYSICAL FACTORS

Mineral reserves (positive / negative)

- There is a great variety and large reserves of minerals such as gold, diamonds, coal, uranium copper and iron ore.
- Minerals however, are non-renewable and this makes it difficult to plan for the future. Therefore it is important that minerals are processed before being exported to ensure their sustainability.

Mineral deposits (positive / negative)

- Most mineral deposits are found close to the earth's surface thus making mining relatively cheap and easy as open pit mining can be practised.
- In some cases mineral reserves close to the surface have been exhausted and the use of vertical shafts to reach deeper mineral reserves increases mining costs.

Geothermal gradient (positive)

- The rock layers have a low **thermal gradient** (temperature increases gradually with depth) therefore less cost is incurred in having to cool the air using fans.

Mineral quality (positive)

- Production costs are generally low because wastage is minimal due to the excellent quality of the minerals and the high metal content of the rocks extracted.

Mine problems (negative)

- Mine problems such as flooding and fires force mines to close down thus decreasing production. The formation of sinkholes also impacts negatively on production.

Distance to markets (negative)

- Many mines are situated inland therefore the cost of transporting the minerals to the coast is high. This increases the price of the exported minerals making them uncompetitive against low foreign prices.

SOCIAL FACTORS

HIV/AIDS (negative)

- HIV and AIDS have resulted in many skilled workers being lost to this pandemic.
- Mining companies also have to deal with high absenteeism amongst workers and have to train additional workers at high costs to the mining companies.

Labour (negative)

- Strike action for better wages and the demand for health care, pensions, housing and food by mine workers has made some mines unprofitable thus forcing them to shut down.
- The mining industry employs many migrant workers who have different nationalities. Faction fighting occurs due to tribal differences and production is stopped.

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ECONOMIC FACTORS

Exports (negative):

- Countries that import our minerals prefer to buy these in an unprocessed form as this is cheaper. This export of unprocessed minerals decreases gross profits and reduces their sustainability.

Fluctuating prices (negative)

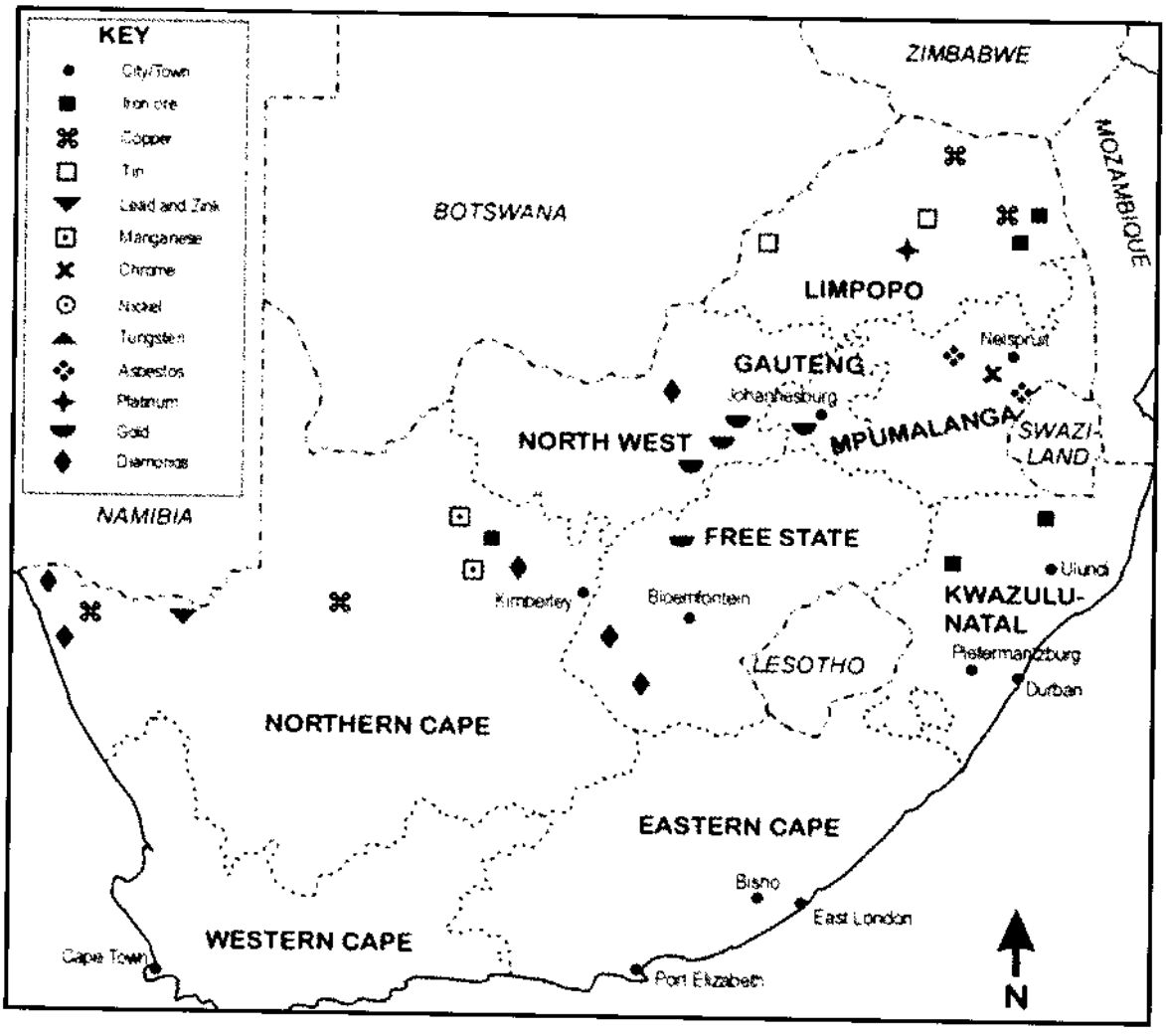
- Foreign market prices have led to the closure of marginal gold mines in Witwatersrand and the copper mines in the Northern Cape to close when prices fell too low.
- The fluctuating price of minerals also makes it difficult to plan for the future.

Environmental problems (negative)

- Mining companies have to set aside capital to prevent environmental problems such as dust pollution, collapsing sink holes and unhealthy smoke emissions from smelters result in high production costs.

NB: The case studies on coal, gold and platinum must be studied in conjunction with the general factors that favour and hinder mining. Note that 90% of the challenges are common to all types of mining.

Map of some minerals mined in South Africa



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Case study: Coal mining

- Most of South Africa's coal deposits are close to the surface thus it is easy and cheap to mine.
- Just over 90% 0f SA's electricity is generated from coal.
- There is also a large demand for coal from:
  ArcelorMittal (uses coking coal for melting of iron ore)
  SASOL for the production of synthetic fuel (coal is converted into petrol and diesel)
  Export (Germany, Spain, Japan)
  Domestic use.
- Coal is mainly exported through the Richards Bay coal terminal.
- The 2 mining methods used to extract coal is: open cast mining and shaft mining

CHALLENGES IN THE COAL MINING INDUSTRY

- Instability due to labour strikes
- Investors are hesitant to invest in the industry
- The call for the nationalisation of mines
- Coal resources are not infinite
- Environmental issues related to pollution and global warming. Coal, (mostly bituminous, with a high ash content), is the primary fuel produced and consumed in South Africa. Production and consumption of coal has serious effects on the environment, leading to air and water pollution, while also contributing to increasing concentrations of greenhouse gases in the atmosphere.

Case study: Platinum Mining

THE IMPORTANCE OF PLATINUM MINING AND PRODUCTION IN SOUTH AFRICA

The recent labour unrest in the platinum sector of the mining industry is said to have had a major impact on the South African economy. Economists predicted a noticeable reduction in the Gross Domestic Product (GDP) and said it was likely to have a negative impact in the form of lower state revenue and on employment.

Listed below are some things to know about this important strategic and scarce metal.

The word platinum is derived from plata the Spanish for "little silver" because of its silvery-grey colour. Platinum was first identified and mined in South America by the Spanish during the 1700s.

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Platinum is the rarest and heaviest of the precious metals. All the Platinum ever extracted and mined would fit into an average size living room. Annually, only about 133 tons of Platinum are mined compared to about 1 782 tons of Gold.

It takes ten tons of ore and several reduction and refining processes to produce an ounce of Platinum Bullion. This is the reason why Rock drill operations on the South African Platinum Mines are important.

More than 90% of all platinum supplies in the world come from Southern Africa and Russia. The entire South African output is approximately two-thirds of the global output and is mainly committed to industrial use .The Lonmin Group produces about 12% of the global Platinum output.

Platinum is also used as a catalyst in the production of various acids, chemicals and pharmaceuticals. It is a key part of devices to reduce motor vehicle and industrial emissions. Other applications are in electrical contacts and resistors as well as for dental work.

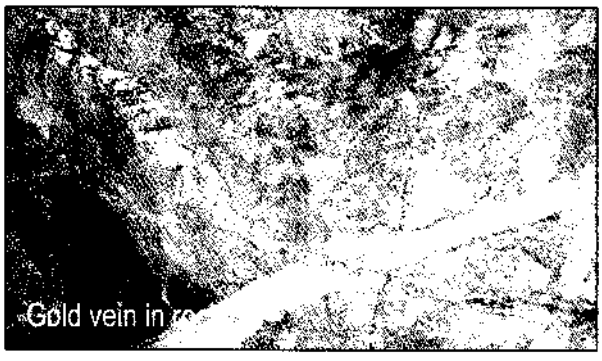
The platinum group of metals includes ruthenium, rhodium, palladium, osmium and iridium. Platinum and palladium are found in pure form and the rest in alloy form.

CHALLENGES IN THE PLATINUM MINING INDUSTRY

- The substitution of platinum by palladium; and the declining competitiveness of the sector.
- Labour strikes
- HIV/AIDS
- International investors have been put off by uncertain policies and unrest in labour market
- Disputes between unions and mine owners

Case study: Gold Mining

- Gold is the largest mineral foreign income earner in South Africa, contributing 27.4% in mineral revenues. The gold industry is also responsible for 56% of South Africa's mine labour force.
- Over 50% of all **gold** reserves are found in South Africa, where the Witwatersrand holds the world's largest gold reef deposit. The Wits sedimentary basin is massive and stretches through an arc of approximately 400km across the Free State, North West and Gauteng Provinces
- Gold occurs in seams embedded in rock strata, sometimes more than a mile below the surface. Deep shafts must be sunk, large amounts of rock must be blasted and brought to the surface, and the rock must be crushed and chemically separated from the gold. Some gold mines then pump processed mine tailings underground to serve as backfill. Mining and processing are costly, especially in deposits where the gold seam is extremely thin compared with the surrounding rock.


Gold vein in

Gold mining

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CHALLENGES IN THE GOLD MINING INDUSTRY

- Strikes for better salaries and unfair labour conditions
- An important concern within the South African mining industry is the rising infection of Tuberculosis and other diseases. Continual exposure to silica dust in mine shafts has resulted in a high prevalence of silicosis.
- Similarly, continued cramped, hot and poorly ventilated working conditions coupled with the spread of HIV infection has also increased tuberculosis infection. Asthma is also a similar concern.
- HIV/AIDS: the implications of this include increased expenditure on medical insurance and disability cover and higher indirect labour costs through reduced productivity, higher absenteeism, and the need to train and replace labour.
- The South African gold industry is mainly characterised by deep-level hard-rock mining. This has technical constraints and the use of labour-intensive mining. It has also resulted in gold mining requiring large capital investment and specialised equipment
- South Africa faces a number of critical environmental challenges ranging from land degradation to the loss of finite resources, but it is the problem of acid mine drainage (AMD) that may be its most dangerous hazard in terms of its impact.

South Africa is a country that has water shortages. Over the years highly acidic water has entered into the countries water system, endangering communities as well as ecosystems along the Vaal and Limpopo Rivers. This has placed undue stress upon the country's economy and water-strained environment, also impacting on the agricultural and industrial sector.

How to reduce strikes in mines?

- Engage in profit sharing with mine workers.
- Improve communication between mine workers and managers.
- Improve safety in the workplace
- Have skills development and training for workers.
- Invest in the education and social development of the community.

Additional questions to understand mining

- Unpack two physical factors that promote mining (gold, coal, Platinum) in SA.
- Explain two socio-economic factors that impact negatively on mining in SA.
- Why is mining not a stable source of income to the GDP in SA?
- What impact do labour strikes have on potential investors? Explain your answer.
- Do mine workers have legitimate demands during labour strikes. Evaluate this statement within the current economic climate of SA.
- How does mining stimulate the secondary sector?
- Explain how infrastructure development due to mining led to a snow ball effect in economic development.
- Evaluate the impact of exporting minerals in a processed form.

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THE SECONDARY SECTOR

INDUSTRY AS AN ECONOMIC ACTIVITY

This sector is concerned with the processing of raw materials.

Types of industries

Heavy industries	Light industries
Characteristics: • Large scale industries Located on outskirts of settlement • Occupy large areas of land • Associated with high levels of noise and air pollution • Close to bulk transport facilities (road, rail and harbours)	**Characteristics:** • Manufacture small products • Located close to or in CBD • Occupy small areas of land • Cause little pollution and congestion • Depend mainly on road transport
Examples: Steel, oil refining, chemicals, ship building, engineering	**Examples:** Electrical goods, clothing, Food-processing

Raw material orientated industries

- These are industries that **locate close to the source of raw materials** as they are bulky and expensive to transport.
- Example: A sugar mill locates close to sugar plantations, a saw mill will locate within a plantation

Market orientated industries

- These industries **locate close to the customer** (market) as the goods produced are perishable or due to high transport costs.
- Example: Cheese/yoghurt processing industry, home industries

Footloose industries

- The **location is not determined by access to markets** or raw materials.
- These are service orientated industries
- Operate through direct marketing e.g. email.
- Example: software companies, research companies

Ubiquitous industries

- **Can locate anywhere**
- Industries that provide services that are available 24 hours 7 days a week from any geographic location.
- Example: telecommunications and internet services, cell phone companies.

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Bridge / Break of bulk industries

- These industries are located in **between the source of raw material and the customer**.
- Also known as the break of bulk industry
- Example: oil refineries, sugar refineries

Factors that favour industrial development in SA

Raw materials

- Availability of a **wide range of minerals** that are mined in SA e.g. iron ore has led to the development of metal processing industries.
- Off shore gas deposits near Mossel Bay.
- The west coast has a thriving **fishing industry** due to the cold Benguela current.
- A **variety of crops** are available due to variable climatic conditions.
- **Availability of fruit** has led to wine, dried fruit and juice industries.

Energy supply

- Energy is a major cost factor for most industries therefore they are located close to the source of power. The abundant supply of coal in Mpumalanga and Gauteng has stimulated the development of many power stations. Easy access to cheap power produced by ESKOM has led to the development of many heavy industries.

Water

- Water is needed for either the processing of raw materials or the cooling of machinery.
- Water transfer schemes supplement water in areas with shortages e.g. the TUVA scheme and Lesotho Highlands project.

Transport

- South Africa has a well-established transport infrastructure.
- There is a **well-established road** network that makes easy access to domestic markets.
- The rail network connects SA to other sub-Saharan countries as well as the harbours.
- Over 90% of SA's exports leave by sea and there are **8 ports** to handle this. (Durban- busiest port in Africa, Richards Bay- largest bulk handling of coal in the world, Port Elizabeth, East London, Cape Town, Mossel Bay, Saldanha Bay and Ngqura- deepest container terminal in Africa)
- There are **four international airports** for the transport of goods including the Dube trade port at King Shaka airport.

Trade and competition

- Access to a large domestic market for trade.
- International trade is promoted by access to harbours for exports/imports.
- Free trade, which means there are no barriers to trading.
- Fair trade agreements so that even small industries are not disadvantaged.

Labour

- A large unskilled labour force is readily available.
- Availability of tertiary institutions to skill the labour force.

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Political (Government support)

- Government has rolled out a new industrial development plan called IPAP2 which is being funded through foreign investment.
- Policies that create favorable conditions for multi- national companies to locate in South Africa.

- At a national level the South African government has introduced many policies to provide manufacturers with incentives to establish industries in out-lying rural areas. These include the:
    - The Small and Medium Manufacturing Development Programme (SMMDP)
    - Spatial Development Initiatives (SDIs).
    - Industrial Development Zones (IDZs)

FACTORS RESTRICTING INDUSTRIAL DEVELOPMENT IN SOUTH AFRICA

Over concentration of industries in a few core areas (refer to notes on centralization)

- This has resulted in **traffic congestion** and decreased accessibility.
- **Higher rentals** because of the demand for land, this reduces profits.
- Higher salary demands in major urban areas.

HIV / AIDS

- The prevalence of this disease in any country is carefully considered before foreign investors set up industries in a country. A skills shortage resulting from high mortality rates or high absenteeism due to ill health reduces production.

Distance to foreign markets (transport)

- The major markets of Europe, North America and Japan which have populations with a high purchasing power are thousands of kilometers away.
- The cost of exporting goods increases making it difficult for local industries to compete with foreign countries that are in close proximity to these large markets.

Labour force

- The "brain drain" has resulted in a loss of many skilled technicians and managers making it necessary to attract such a labour force from other countries at high costs.
- The lack of funding to uplift educational standards amongst certain racial groups has also negatively impacted on skills development.
- Often workers resort to strike action if their demand for better wages and working conditions are not met. Production delays and high labour costs cause small businesses to close down.

Cheap imports and counterfeit goods

- Local industries cannot compete with goods being imported from countries such as China.
- Fluctuating value of the rand, creates instability.

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Air Pollution

- **Industries have the responsibility to reduce air pollution in accordance to international and local agreements.**
- The industrial sector is the prime contributor to air pollution. More than 90% of South Africa's electricity is generated from the combustion of coal that contains approximately 1.2% sulphur and up to 45% ash. This contributes to acid rain.
- South Africa's transportation and industrial sector energy consumption and carbon emissions have shown a significant rise over the past 25 years.
- Industrial pollution hurts the environment in a range of ways, and it has a negative impact on human lives and health. Pollutants can kill animals and plants, imbalance ecosystems, degrade air quality radically, damage buildings, and generally degrade quality of life. Factory workers in areas with uncontrolled industrial pollution are especially vulnerable e.g. the Durban South Basin.

Causes of Industrial Pollution

1. **Lack of Policies to Control Pollution:** Lack of effective policies and poor enforcement allow many industries to bypass laws – causes mass scale pollution affecting many lives.
2. **Unplanned Industrial Growth**: In most industrial townships, unplanned growth took place wherein those companies flouted rules and norms and polluted the environment with both air and water pollution.
3. **Use of Outdated Technologies**: Most industries still rely on old technologies to produce products that generate large amount of waste. To avoid high cost and expenditure, many companies still make use of traditional technologies to produce high end products.
4. **Presence of Large Number of Small Scale Industries**: Many small scale industries and factories that don't have enough capital and rely on government grants to run their day-to-day business often escape environment regulations and release large amount of toxic gases in the atmosphere

Water scarcity

- Water is a scarce resource in South Africa with controls in place for the consumption of water. Using more than 150,000l/d for industrial purposes requires to a permit from the Department. This impacts negatively on industries that use high amounts of water in processing. Production costs increase.
- Some large companies such as Sasol and Eskom recycle water.
- The Water Disclosure Report: The report notes that if no action is taken SA is expected to experience a 17% gap between water demand and supply by 2030, which means there will be a water shortfall of 2,7-billion cubic metres and that some of the country's most economically important catchment areas will be worst affected.
- In developing countries, close to 70% of all industrial waste is dumped untreated into waters where it pollutes the usable water supply

- **Some measures that industries need to put in place for the future:**

- Recycling and reusing water;
- Lowering toxic and other contaminants in all operations involving water;
- Changing production processes to be more water efficient
- Encouraging suppliers and purchasers up and down the supply chain to adopt best practices
- assisting small- and medium-sized enterprises to improve water management;
- Innovating - searching for new more efficient water treatment technologies.

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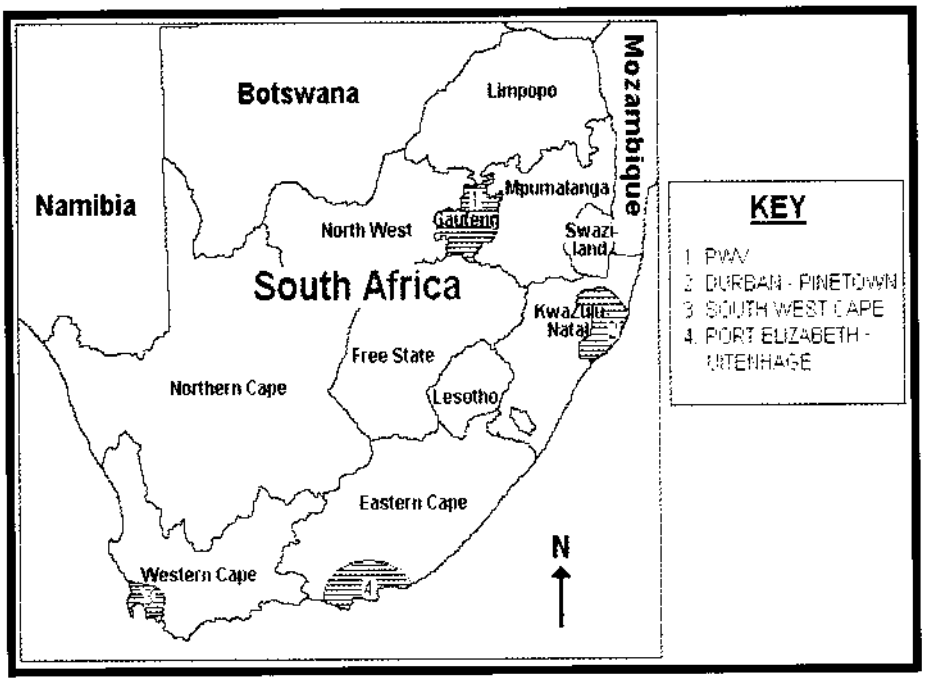
Raw materials

- South Africa's main imports are: fuel (24 percent of total imports), nuclear reactors, boilers, machinery and mechanical appliances (14 percent), motor vehicles and car parts (9 percent), telephone sets (3 percent), pharmaceuticals (2 percent), vegetables (2 percent) and live animals and animal products (1 percent).
- Use of imported raw materials impacts on production costs.
- The price of imported goods is also dependant on the exchange rate and this creates instability for industries.

THE FOUR CORE INDUSTRIAL AREAS IN SOUTH AFRICA



Factors favouring industrial location	The PWV Region (Gauteng)	Durban-Pinetown Region	South Western Cape	Port Elizabeth-Uitenhage
Markets	The population is dense and this creates a growing demand for a variety of goods. Have higher than average buying power.	The population is dense and there is a great demand for the manufactured goods.	There is a large market with a high purchasing power. The coastal location favours access to a large overseas market.	Importing of raw materials and the export of goods is facilitated by the presence of a harbour.
Transport	A dense network of roads and railways facilitates the distribution of the goods that are manufactured.	The presence of the harbour facilitates the export of goods. There is also good transport links to the rest of the country	Table Bay facilitates an excellent access for oceanic trade. The dense rail network provides a vital link to the interior.	An excellent transport system links this region to other places in the country.

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Labour	Large labour force as this region is densely populated.	There is no shortage of skilled and unskilled labour due to the large population.	The dense population provides skilled and unskilled labour.	Labour is readily available as this area is densely populated.
Raw materials	Abundant raw materials such as gold, iron-ore, maize and platinum are produced in close proximity to the industries.	A variety of resources such as sugar cane, dairy products, meat and sub-tropical fruit are produced in this area.	There is an abundant supply of deciduous fruit, grapes and fish. Many food processing industries have been established here.	Wool, sub-tropical fruit and cotton are readily available.
Water	This region lies in the eastern –half of the country which receives adequate rainfall. Water from the Vaal river is supplemented by the Tugela and Lesotho schemes.	There is an abundant water supply since it lies in the eastern half of the country which receives high rainfall. Many perennial rivers like the Tugela and the Umgeni supply water.	The shortage of water makes it difficult to establish heavy industries. Most rainfall occurs in winter.	This region is found in the wetter eastern half of the country.
Power	Electricity is relatively cheap since coal is mined in this area. Power is transmitted over short distances by Eskom.			
Relief	There is easy construction of transport networks and the industries since this area lies on the Highveld where the land is flat.	This region lies along the coast where there is flat land. It is easy to construct the transport networks and the industries.	This area is located on relatively flat land.	The region is located on fairly flat land.
Main industrial activities	Chemical industries, Iron and steel Metal processing Explosives	Oil and sugar refining, ship building, food and drinks, textiles, footwear, soap-making	Food processing, textiles, fish and fruit canning, wine, petrol refineries	Car assembly, leather goods, textiles.
Factors restricting industrial development in each province	Water in the Vaal River is being over utilized. Water and air pollution are major problems. Distance from nearest Port.	The capacity of the harbour to handle increased trade is limited. Hilly topography restricts growth around harbour.	Power is expensive as it is located far from the major coalfields. Water shortages linked to .periodic droughts. Few mineral resources.	Periodic drought in area. Has no coalfields so providing power is a challenge. A number of strikes and labour is more expensive.

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THE ECONOMIC IMPORTANCE OF THE SECONDARY SECTOR

Contribution to the GDP

- The secondary sector is an important pillar of our economy. It is responsible for 25% of the total production in our country. Money is generated in the form of taxes.

Foreign exchange

- South Africa exports many industrial products such as steel and heavy machinery.
- Foreign exchange earned is used to pay for products that are imported and is used for developing the country.

Job creation

- Secondary industries provide thousands of jobs to skilled and unskilled workers. This increases the purchasing power of people in the country thereby contributing to a better quality of life.

Markets

- Provides an important market for the raw materials of the primary sector. Fish and agricultural raw materials are processed into frozen products or canned food. There is a great demand for these products by the people of our country.

Foreign investment

- Large amounts of capital are invested in shares by various companies therefore boosting the growth potential of industries, for example MITTAL STEEL.

STRATEGIES FOR INDUSTRIAL DEVELOPMENT

Apartheid strategies	Post-apartheid strategies
• Counter urbanisation: to prevent the movement of workers to core areas • The Good Hope Plan: this divided the country into 8 major development regions • De-concentration points • Border industry nodes • Tax concessions and reduced service rates were offered to industries that located in isolated industrial development points.	• Reconstruction and Development Programme (RDP) – • Spatial Development Initiatives (SDIs) • Growth, Employment and Redistribution (GEAR) • Industrial Development Zones (IDZs) • Accelerated and Shared Growth Initiative for South Africa (Asgi-SA) • Special economic zones • The National Development Plan

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The Reconstruction and Development Programme (RDP)

This programme was adopted in 1994. The RDP aimed at addressing the many social and economic problems that faced the country due to apartheid. A key aspect of the RDP was that it linked reconstruction and development.

The main aims of the RDP plan:

- To use available resources to meet the basic needs of people such as food, drinking water, electricity and housing
- Improve facilities such as education and health care
- Provide jobs by creating a balanced economy
- Educate farmers about better farming methods, mechanization, irrigation schemes

Implementation was stopped in 1996 due a lack of:

- Money
- A good infrastructure
- Facilities to train people

Growth, Employment and Redistribution (GEAR)

This strategy was adopted in 1996 and is based on the RDP principles of meeting basic needs in underprivileged rural areas.

The plan aims to:

- Create jobs in the formal sector
- Increase exports
- Develop the infrastructure
- Attract foreign **direct investment**[13] by lowering taxes, inflation and trade tariffs.

According to a report published in 2001 GEAR has failed because:

- houses which have been constructed are of a poor quality
- many rural areas do not have access to piped water
- unemployment has increased – retrenchments in textile industries
- income is unevenly distributed, the middle and upper classes in all racial groups benefit the most.

Accelerated and Shared Growth Initiative for South Africa (Asgi-SA)

Asgi-SA is the government's most recent macro-economic strategy that was initiated in 2006 to halve poverty and unemployment by 2014.

[13]Foreigners bring money into a country

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Key objectives of Asgi-SA:

- The promotion of economic growth
- Development of better infrastructure
- Provision of quality education
- The improvement of the skills of people.

Special Economic Zones (2012)

These are established to attract foreign direct investment, diversify production and exports and reduce unemployment.
African countries have become attractive to global industries due to lower labour costs.

The National Development Plan

Has been developed to reduce poverty and inequality by 2030.

Industrial centralization

Refers to the over concentration of industries in a few core areas e.g. the concentration of industries in 4 core areas in South Africa. proximity reduces transport costs

Reasons for Industrial centralisation/agglomeration

- Reduces transport costs
- locate near one another to learn and to speed their rate of innovation
- the costs of moving goods, people, and ideas— can be reduced by industrial agglomeration
- can negotiate lower tariffs for services

Advantages of industrial centralization

- Densely populated areas with a readily available market.
- The infrastructure is well developed.
- An abundant supply of skilled and un-skilled workers
- Similar industries cluster and benefit from the multiplier effect.

Problems associated with industrial centralization

- Shortage of housing, which gives rise to the development of slums.
- Traffic congestion
- Water shortage
- Regional imbalances in development, declining rural areas
- Air pollution and environmental degradation
- Labour problems
- Over concentration of people and activities

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Industrial decentralisation

It is a process of moving industries to outlying areas that are underdeveloped.

Advantages associated with decentralisation

- Helps to keep people in outlying areas
- Improved infrastructure in outlying areas.
- Brings about balance in levels of development between different regions.

Industrial development zones and spatial initiatives

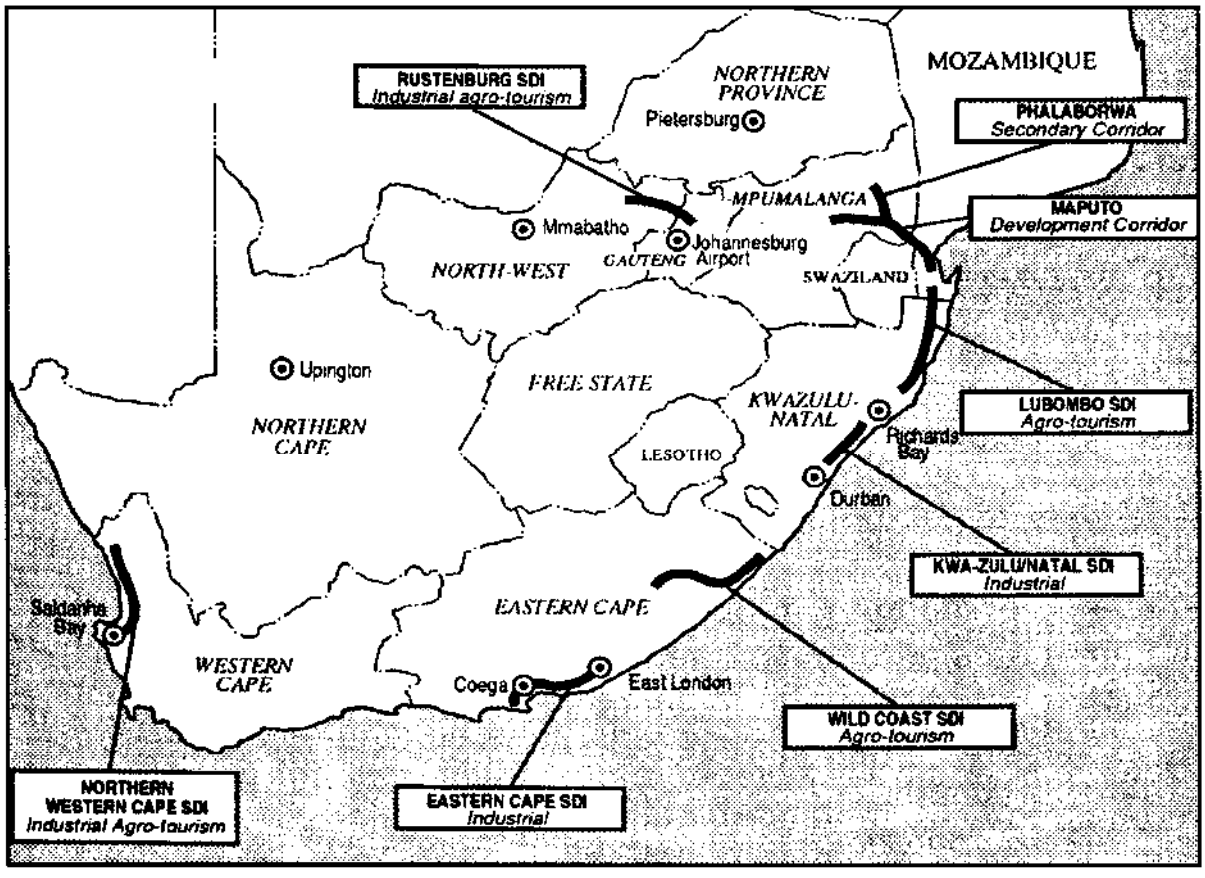
SDI'S and IDZ'S fall into the broad category of economic zones (demarcated areas set aside from the rest of the country's economic activities)

What is a spatial development initiative?

These are government programmes to encourage investment and job creation in untapped areas with high growth potential. They are normally linked to one or more natural resources that act as a stimulus for development.

What are industrial development zones?

These are focussed industrial development areas that form a key component of the SDI program to creating jobs and promoting exports. It is part of a government policy to make exports internationally competitive.



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Industrial Development Zones (IDZ)	Spatial Development Initiatives (SDI)
IDZs are generally located in industrialised or relatively well resourced areas. They are intended to create jobs rather than address underdevelopment.	SDIs are generally located in underdeveloped areas. Thus it is an attempt to redress inequalities between rural and urban areas
The industrial development zones (IDZs) offer: • direct links to an international port or airport • world-class infrastructure specially designed to attract tenants • government incentive schemes • reduced taxes and exemption for some activities or products • duty-free benefits on raw materials that are imported • zero rate on vat • purpose built industrial estates that are physically enclosed strategically linked to a port or airport	**Key objectives of Spatial Development Initiatives (SDIs)** • develop physical infrastructure such as roads, harbours and railways • stimulate economic activity in underdeveloped areas • create employment in underdeveloped areas • restructure the apartheid economy • encourage private sector and foreign direct investment develop spin-off businesses from investment
Examples of IDZ's: • Port Elizabeth (Coega IDZ) • East London (ELIDZ) • Richards Bay (RBLIDZ) • Gauteng (or OR Thambo International Airport)	**Examples of SDI's include:** • Mozambique corridor • Walvis Bay Development Corridor • Richards Bay-Empangeni SDI • The Fish River SDI • Wild Coast SDI • Maputo SDI

Note: An IDZ is now called an SEZ (special economic zone)

Incentives for IDZ and SDI investors

- Infrastructure subsidies
- Job training subsidies
- Wage subsidies
- Cost participation
- Incentives for transferring technology and know-how

What is the common aim of SDIs and IDZs?

- They produce for export
- To attract foreign investors

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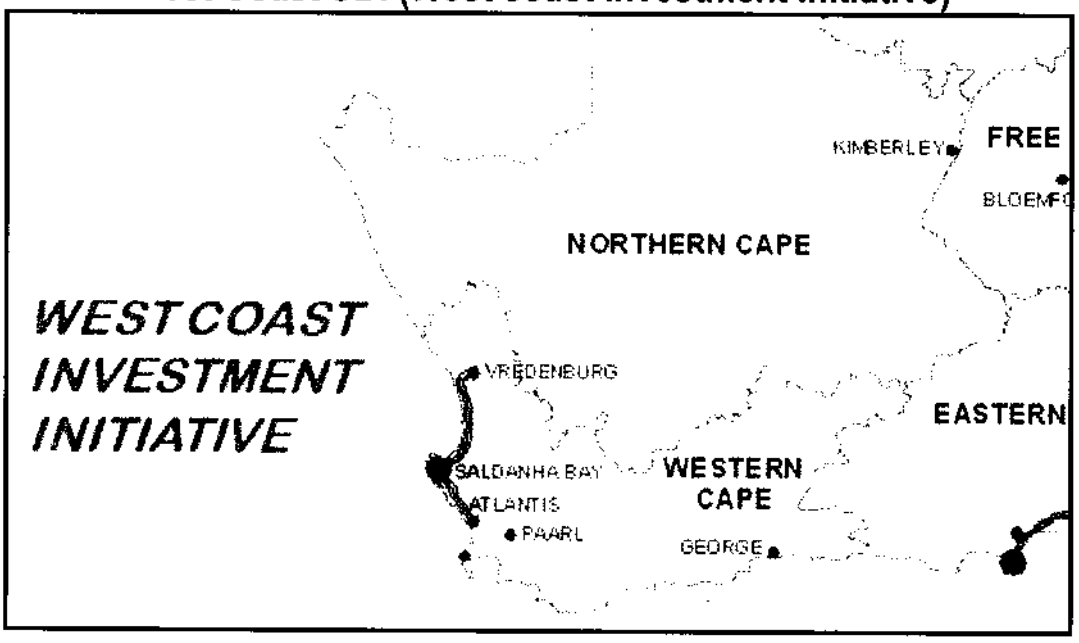
Impact of SDIs on tourism

- Makes travel to remote destinations possible, because of new infrastructure that will be developed
- Safer travel because of upgraded infrastructure and communication networks
- **Impact of SDIs on local communities**
- Local communities can sell their wares to tourists
- Creates job opportunities
- Better standard of living
- Improve transport and communication
- Reduce rural-urban migration

CASE STUDY OF SPATIAL DEVELOPMENT INITIATIVES

West Coast SDI (West coast Investment Initiative)



Location

The West Coast SDI is centred on the region around Saldanha on the Cape West Coast. It stretches from the border of Cape Town Metropole to the border of the Northern Cape.

Saldanha Steel was identified as the anchor project for the West Coast

Purpose of the West Coast SDI

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Some of the main industries in the West coast

- Mineral beneficiation
- mineral processing projects
- steel processing/manufacturing
- Gas power plant
- Tourism
- Fish processing and fishmeal industries

Resources in the West coast

- Lamberts Bay Waterfront Development The extraordinarily rich avarian resources of Lamberts Bay have led to the creation of Bird Island.
- Cultural Heritage Tourism
- Vibrant fishing industry
- Biodiversity and natural beauty of the area
- cultivation of export-grade fruit such as apples, table grapes, olives, peaches and oranges
- vacant land for expansion

Challenges experienced in the West coast SDI

- No industrial land was available till recently.
- Lack of technical skills
- difficult to attract Competitors to West Coast District for investment e.g. Atlantis
- Inadequate marketing
- Sand mining leaves scars which counter tourism e.g. Paardeberg wine farms.
- limited capacity of the N7, growing informal settlements and infrastructure needs
- Increased in-migration has created tension with locals, complicating the process of meeting local labour quotas and actually increasing the long-term unemployment rate.
- The nature of jobs created has also lead to complications, as expectations have not been met. Workers had minimal prior exposure to short-term contracts and sub-contracting. This led to worker anger and small-scale riots and vandalism

Impact on local community

- Employment opportunities in the fishing, farming and tourism industry
- Uplifts the skills of the local community
- Standard of living improves due to access to better services
- Earning potential increases

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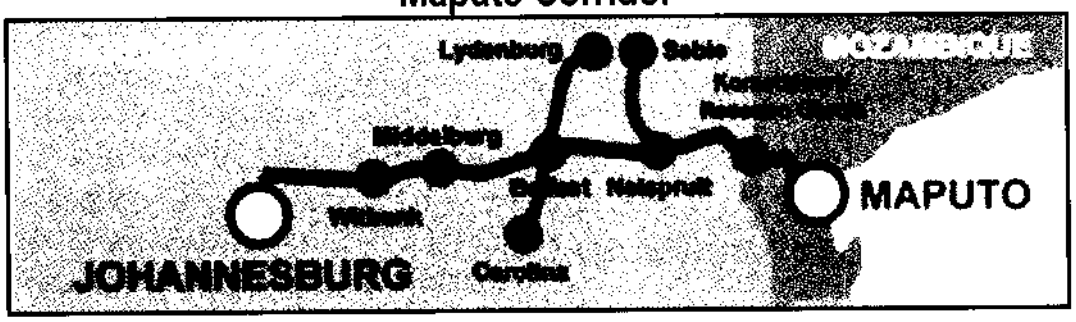
Maputo Corridor



- This is the largest development corridor in Southern Africa (584km).
- It connects Gauteng (South Africa) to Maputo (Mozambique)
- The Maputo Corridor is often mentioned as one of the most successful examples of the so-called Spatial Development Initiatives (SDI's) in Southern Africa SDI.
- is the shortest distance to the sea from the industrial belt in Gauteng province.

- substantial investments were carried out over the last five years mainly in large-scale infrastructure projects such as the toll road from Johannesburg to Maputo, as well as the rehabilitation of the Port of Maputo itself.

Purpose of SDI

- To link the economy of South Africa and Mozambique
- To initiate economic growth along the N4 which includes many underdeveloped areas?

Developments along corridor

- Linked to the Kruger national park and has thus encouraged tourism
- Upgrade of the N4 toll road
- Upgrade of the Port of Maputo
- A gas pipeline from Mozambique to Secunda

Strengths of the corridor

- Most established SADC corridor
- Established customers
- Shortest route from Northern Cape
- Offers road and rail linkages
- Accommodates bulk transport of goods

Weaknesses

- Port infrastructure is reaching capacity
- Road traffic congestion on corridor
- There is a high usage of berths in the port
- The road infrastructure in the Mozambican hinterland is still underdeveloped

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Weaknesses

- The local population lacks an entrepreneurial culture and business know how
- Petty corruption is a major stumbling block to economic growth.
- People are only skilled in terms of their agricultural roots and have also been delinked from the idea of engaging in self-employment.
- Lack of data about existing local economic activity meant that local enterprise was 'invisible' to planners and thus tended to be overlooked in SDI agenda-setting processes

How will this initiative benefit the locals:

- Employment opportunities
- Develop skills
- Improved infrastructure
- Better standard of living

Impact of SDI's on Tourism

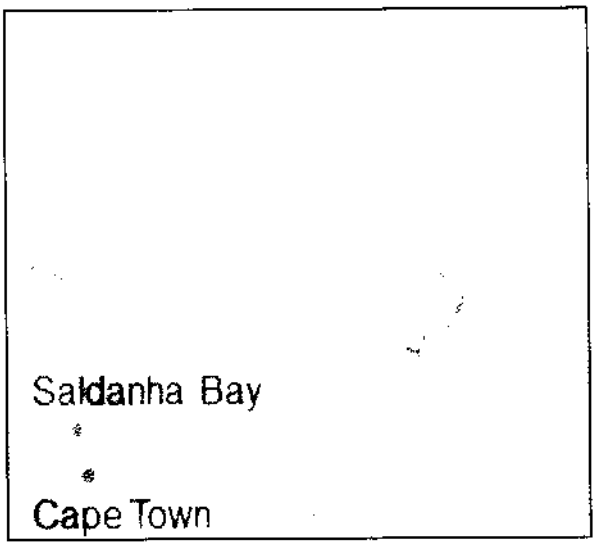
- Makes travel to remote destinations possible.
- New infrastructure in SDI's will attract tourists and can attract foreign investors.
- Safer travelling because of upgraded infrastructure and communication networks.

Impact of SDI's on local communities

- Local communities can sell their wares to tourists.
- Creates employment opportunities and increases productivity and wealth of these areas.
- Upgraded infrastructure.
- Reduces rural-urban migration.

CASE STUDY OF INDUSTRIAL DEVELOPMENT ZONES

SALDANHA BAY IDZ



Background: Situated approximately two hours north of Cape Town. The location is ideally situated to service East and West African sea traffic, providing a linkage point for both the African and international markets.

Saldanha Bay is seen as a marine engineering hub focused on the international Oil & Gas sector

Offshore gas creates options for gas turbines, cheap fuel / electricity exists. Saldanha could possibly become the supply hub of the west coast. Exploration of oil and gas could be an opportunity to build oil platforms in the local area.

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This IDZ serves as the primary oil, gas and Marine Repair engineering and logistics services complex in Africa, servicing the needs of the upstream Oil Exploration Industry and Production service companies operating in the oil and gas fields off Sub-Saharan Africa. The SBIDZ will include logistics, repairs and maintenance, and fabrication activities.

Its sheltered harbour plays an important part in the Sishen-Saldanha iron-ore project (connected by the Sishen-Saldanha Railway line) and helps boost the Saldanha Steel plant.

Concentration has occurred due to the location of the Saldanha Harbour. In addition, this area is located next to the Saldanha / Sishen railway line which transports raw mineral materials, from north of the West Coast Region and Sishen where the majority of these minerals are mined, to Saldanha

Examples of other industries in this IDZ

- The industrial companies on the West Coast range from iron and steel suppliers to fishing companies, from oil refurbishing to lumber suppliers.
- There is a concentration of heavy steel and mineral industries and supporting services within the Saldanha Bay Municipal area.

Strengths	Weakness
• superior natural and deep-water harbour, • its existing steel production capability, • its proximity to Cape Town • the abundance of available land for expansion. • PetroSA storage facilities are an important asset making the port more attractive to the Oil and Gas industry. • Well-established infrastructure • Strong potential for Oil and Gas Industry to develop on the West Coast • Airport • Number of railway lines connections • Various minerals, steel and other reserves	• Low level of skills in the local workforce, especially in terms of technical skills. • Harbour facilities need to improve / expand especially in terms of container loading/ facilities • Land availability – municipality owns no land within the proposed industrial development zone. • Fishing industry saturated in decline • Current bulk electricity supply capacity is limited • due to close proximity to Cape Town, there is a loss of labour • Concentration of heavy metal particles in the water in the bay affects the growth potential of the mussel / mariculture industry.

Impact on the local community

- Improved infrastructure
- Job opportunities
- The possibility of alternative water sources via:
  - Basin transfer from the Breede River
  - Artificial recharge of ground water aquifers
  - Water demand management
  - Desalination

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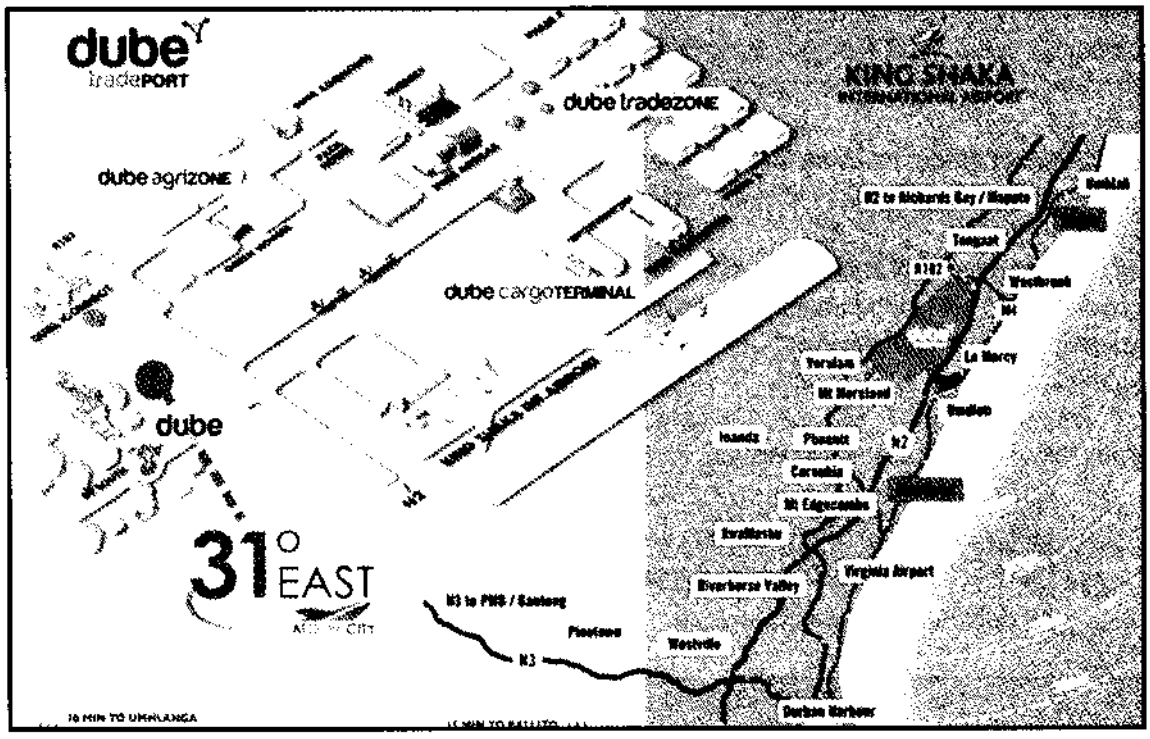
DUBE TRADEPORT



The precinct is strategically located 30km north of the important coastal city of Durban, in KwaZulu-Natal, on South Africa's eastern seaboard. This 2 940 hectare development is home to the state-of-the-art King Shaka International Airport . Dube Trade Port, a highly competitive business-operating environment, forms the heart of the emerging Durban Aerotropolis.

Aims:

- To drive the industrial development of South Africa by attracting both domestic and foreign direct investment.
- It stimulates the manufacturing of value-added products and offers incentives as well as other support measures, creating an ideal business environment.
- Provides an environment that allows existing local industry to increase value-added production, while also providing the platform for the creation of new industry. Thus it promotes and enhance the competitiveness of KwaZulu-Natal's manufacturing sector, to encourage the beneficiation of available resources.

Advantages

- Only facility in Africa combining an international airport, dedicated cargo terminal, warehousing, offices, retail, hotels and agriculture.
- Coastal location in KZN makes logistics a cost-effective proposition
- Access to numerous global destinations and linkages to SADC countries

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DubeTradePort comprises a world-class passenger and air freight hub and is surrounded by development zones, namely:

- **Dube Cargo Terminal**: A state-of-the-art cargo facility, purpose-built to be the most secure in Africa. With digital tracking and secure cargo flow through on-site statutory bodies, Dube Cargo Terminal prides itself on 0% cargo loss since inception in 2010;

- **DubeTradeZone**: In close proximity to Dube Cargo Terminal, this zone is ideally positioned for new-generation warehousing, manufacturing, assembling, air-related cargo distribution and more;

- **Dube City**: premium office, retail and hospitality space - all located within an ultra-modern, urban 'green' hub just 3 minutes from the passenger terminal;

- **DubeAgriZone:** Part of the IDZ, this zone provides world-class facilities and technical support for propagating, growing, packing and distributing high-value perishables and horticultural products through an efficient supply chain

- **DubeiConnect**: All these zones are supported by DubeiConnect, an IT and telecommunications provider and KZN's only locally-hosted cloud service, making it the premier offering for regional data recovery

Targeted priority sectors:

- Aerospace and aviation-linked manufacturing and related services;
- Agriculture and agro-processing, including horticulture, aquaculture, and floriculture;
- Electronics manufacturing and assembly;
- Medical and pharmaceutical production and distribution; and
- Clothing and textiles.

Supplementary sectors include:

- Freight-forwarding and aviation services;
- Warehousing and storage;
- Logistics and distribution;
- Light manufacturing and assembling;
- High-tech and automotive industries;
- General manufacturing;
- Renewable energy; and
- Cold storage.

DubeTradePort SEZ: A Prime Investment Location

DubeTradePort SEZ's strength as a leading South African investment destination is based on four founding pillars, namely :

Key Location:

The Dube TradePort SEZ is located within a strong economic region, is close to major complementary transport and freight links and boasts world-class infrastructure – the ideal investor and business platform for the expansion of global business and trade opportunities;

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- **Infrastructure:** As a secure, purpose-planned airport city and master-planned business environment, infrastructure has been designed in line with freight-orientation and cargo and is supported by the new King Shaka International Airport, whose infrastructure allows for the accommodation of the world's largest new generation aircraft;

- **Service Offering:** Dube TradePort Corporation is an enabler of tactical investment and with its team of skilled experts, links both investors and developers to various regulatory bodies, thus assisting to facilitate the development process.

- **Government Backing:** DubeTradePort enjoys solid Government support. It forms part of South Africa's National Infrastructure Plan. It is also aligned to the National Development Plan. Fully-owned and funded by the Provincial Government of KwaZulu-Natal, DubeTradePort is a key priority Infrastructural Development Project for the Province of KwaZulu-Natal.

Benefits of Investing in DubeTradePort SEZ

A range of benefits are offered to business enterprises operating within a Special Economic Zone. These benefits are designed to promote business growth, revenue generation, employment creation and the attraction of both foreign and local investment.

Special Economic Zones may be sector-specific or multi-product and the following categories of SEZs have been defined as per the SEZ Act No. 16 of 2014:

- **"Industrial Development Zone"** means a purpose built industrial estate that leverages domestic and foreign fixed direct investment in value-added and export-oriented manufacturing industries and services;

- **"Free Port"** means a duty free area adjacent to a port of entry where imported goods may be unloaded for value-adding activities within the Special Economic Zone for storage, repackaging or processing, subject to customs import procedures;

- **"Free Trade Zone"** means a duty free area offering storage and distribution facilities for value-adding activities within the Special Economic Zone for subsequent export;

- **"Sector Development Zone"** means a zone focused on the development of a specific sector or industry through the facilitation of general or specific industrial infrastructure, incentives, technical and business services primarily for the export market.

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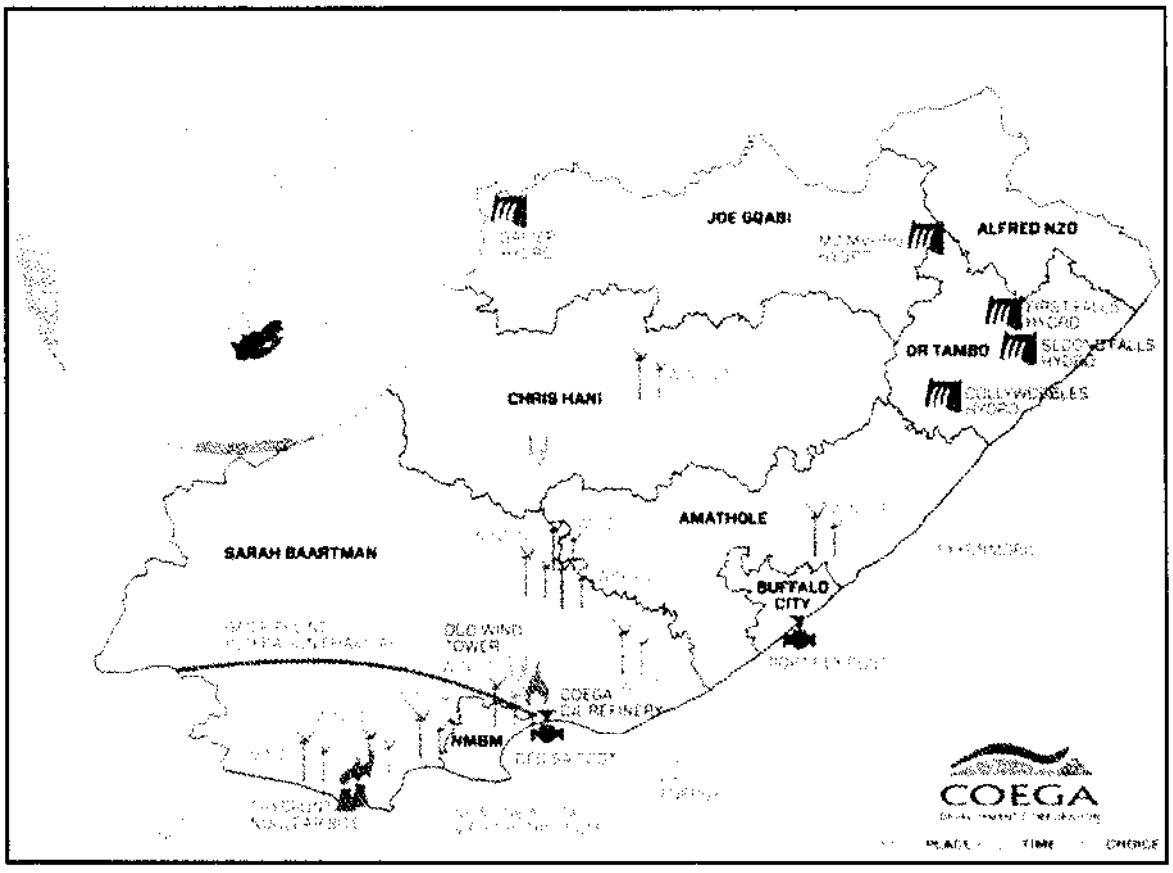
COEGA IDZ

Located in the Nelson Mandela Bay Metropolitan Municipality, the Coega Industrial Development Zone (Coega IDZ) is a world class infrastructure which provides the integration of services and industries with the rest of the African Continent and the World.

Main investments are in automotive industry, agro-processing, aquaculture, energy, metals, logistics and business processing services.

The Eastern Cape has become the country's top site for wind farms and the East London IDZ, using turbines made by a local manufacturer, Adventure Power, aims to bolster energy supply with its own 1.8 MW wind farm.

The Eastern Cape's beaches and natural beauty have been attractive to tourists for many years, but recent initiatives to expand the province's offerings are paying off. With a focus on events and "adventure tourism", visitor numbers are steadily growing.



Aim:

- to drive local and foreign direct investments in export-oriented industries, positioning South Africa as the hub for Southern African trade.
- converting raw materials into value-added finished goods for the export market (beneficiation).

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Advantages of locating in the IDZ:

- tax incentives,
- rebates
- duty-free zone land is divided into different zones and boasts power stations
- Abundant renewable energy supply – wind farms established and gas to power plants have attracted investments from both the domestic and international arenas
- Coega's partnering with ESCOM for a nuclear new-build programme has ensured sustainability of power production and capacity
- World-class infrastructure: road, water, telecommunications as well as rail network.
- 11 500 hectares of developable space
- Natural deep-water port – Ngqura port - managed by the SA Ports Authority as a gateway to global markets.
- Recruitment and selection, skills training and development to bolster productivity
- Business and leisure travel-related solutions that have earned international recognition (IATA).
- Provision of turnkey solutions to start-ups and establishes enterprises – appealing to new investors and major industrial players.
- Advanced telecommunication services.

Community benefits

- driver training programme,
- bursary scheme for chemical engineering post-graduates,
- an internship programme as well as a youth leadership development programme
- 66% of staff that were employed were from previously disadvantaged individuals
- job creation
- Job Creation (the national and provincial grants can be accessed concurrently)
- Black Business Development
- to create economic development and growth opportunities for the people of the Eastern Cape

Shortcomings of COEGA

- Poor domestic economic growth has resulted in very poor returns for both industrialists and the economy.
- Eskom's unreliable power supply has contributed to parts of the SEZ becoming a white elephant as investors seek more assured infrastructure services.
- Many entrepreneurs are consolidating in European countries at the expense of developing nations like S.A.
- Increase in competition between emerging economies have not resulted in meaningful benefits for the country and high input costs to establish the IDZ take a long time to recover.

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THE TERTIARY SECTOR

Involves the provision of services to the wider community

TRADE

Trade is the exchange of goods and services between countries. People are not self-sufficient in raw materials, goods and services therefore these are exchanged these to satisfy their needs. Trade involves:

Imports: goods which are brought into a country
Exports: goods which are sent out of a country

Role of International Trade in economic development

International trade allows a country to exchange goods and services produced with those of other countries

Benefits of international trade

- access to foreign currency
- greater variety of goods available for consumers
- better quality goods
- creates a pricing competition which benefits consumers
- Exchange of technical knowledge

Disadvantages of International trade

- Local production may decrease because the market is flooded with imported goods
- Imported goods are sometimes cheaper
- Job losses and closure of local industries
- South Africa is at the southern tip of Africa and major trading partners are in the north, thus the cost of delivering goods is higher

Role of transport in economic development

Transport is the movement of people, goods and information from one place to another

- Encourages domestic and international trade
- Increases competition by opening up new markets
- Improves business efficiency because of accessibility
- Efficient transport systems results in a multiplier effect such as better accessibility to markets, employments and investments
- Efficient transport reduces costs in economic sectors
- An efficient public transport supports commuters to be on time to work eg Gautrain, Reya Vaya Buses, Areyeng Buses

Trade in developed and developing countries

- Although economically powerful nations such as the United States, the United Kingdom, Australia and Japan are in favour of "free trade" certain rules in trade agreements (quotas, import tariffs) are used to protect their markets from competition from developing countries.

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- Developing countries continually make demands for **a fair trade** system. Fair trade occurs when trade is equal and fair between developed and developing countries. Developing countries cannot compete with large **trading blocs** (groups of countries) that have common markets and that agree on trade agreements that favour them.

- The main exports from developing countries are minerals and agricultural products. These fetch low prices thus the potential for economic growth is low.

South Africa's main import and export partners

- South Africa's most important export and import markets are countries such as Japan, the United Kingdom, the United States of America, Germany, Netherlands, Australia, Belgium, Spain, Switzerland and Italy. However recently South Africa's trade with African countries has increased greatly. The benefit of South Africa trading with African countries is that distances to these markets are shorter and this reduces transport costs. The countries in Africa also these have large populations that serve as potential markets.

- South Africa has rich mineral reserves and therefore exports a great variety of minerals which include gold, platinum, coal and diamonds. However minerals are exhaustible it is important that the economic activities within the country are diversified.

Balance of trade

- The balance of trade is the difference in value between a country's imports and its exports. The balance of trade can be either favourable or unfavourable:
    - **Unfavourable trade balance**: the value of the imports is greater than the value of exports
    - **Favourable trade balance**: the value of the exports is greater than the value of imports

Advantages of a favourable trade balance	Disadvantages of an unfavourable trade balance
• foreign capital flows into a country • economic growth is stimulated • jobs are created • standards of living improve	• foreign capital flows out of a country • economic growth is slowed down • workers are retrenched • standards of living decrease

Ways of correcting or improving an unfavourable trade balance

The measures outlined below assist countries in attaining a favourable balance. The benefits of a favourable trade balance have already been discussed above.

Export promotion: the government attempts to increase the quantity and variety of goods and services that are exported by offering export subsidies and tax rebates.

Import substitution: is the replacement of goods which are imported with goods that are produced locally. This is encouraged by using import tariffs and import quotas.

Protectionism: restrictions are placed on trade between countries by using import tariffs, quotas and regulations.

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THE INFORMAL SECTOR

Refers to small **business activities that are unregistered** or provide services without licenses. The informal sector is also referred to by other terms:

- **The second economy:** people within this sector create their own employment and play a vital role in improving their standards of living and quality of life.

- **The hidden economy**: the contribution of this economic sector to the economy of a country is usually not shown in "official figures" because the businesses are not registered.

Examples of informal trading

- Street or pavement-centred activities (flea markets, hawkers, street barbers)
- Home-based activities in rooms or backyards : (day care, garage workshops/repairs, hairdressers)

Formal sector
Refers to legal, registered businesses

Reasons for the development of the informal sector

- A **slump in the economy** has caused large scale job losses in the formal sector thus forcing these workers to seek casual work.
- Mechanisation of farming operations and the increased frequency of climatic hazards has caused many unskilled rural people to abandon farming and to go in search of jobs in the informal sector in urban areas.
- Many large businesses have contributed to the growth of the informal sector **by sub-contracting** to the informal sectors thus avoiding regulations related to job security and the provision of medical benefits and housing allowances to workers.
- During apartheid blacks were not permitted to trade in urban areas and were only granted licences for hawking and peddling which restricted traders to townships.
- **Immigrants are not able to find legal employment** and enter the informal sector to survive.

Characteristics of the informal sector

- Associated with casual labour and out-sourcing of work
- Workers are **self-employed**
- Women and children mainly involved in this sector
- **Little capital investment**
- Employs **unskilled or semi-skilled workers**
- Little potential to expand into larger businesses
- Small scale businesses that are operated by family members
- Money and barter are used for trading
- Mainly characteristic of developing countries
- **No job security** and benefits for the workers
- Unsafe and unhealthy working conditions
- **No contribution to the GDP** in the form of taxes

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Problems / challenges facing the informal sector

- Traders are **frequently harassed** by local authorities as informal sector activities are considered to be illegal.
- Hawkers **do not have access to proper trading facilities** therefore they are forced to rade on bare pavements and are exposed to the elements of the weather such as rain and high temperatures.
- Informal traders **do not have the skills and education** required to enter the formal economy.
- **Banks are reluctant to grant loans** to informal workers hence making it difficult for them to expand their trade into formal businesses.
- Informal traders borrow money from money lenders that charge high interest rates thus they always are in debt and have funds to improve their business operations.
- Local markets may be small and the high cost of transport of goods to large distant markets makes it impossible for the traders to enter such markets.

Measures to improve the informal sector

The contribution of the informal sector to a country's economy can be increased by adopting the following measures:

- Introduce licensing requirements **to regulate this sector**.
- Specific areas near stations, bus terminals and taxi ranks be allocated for informal trading.
- Partnerships between the private sector and informal vendors can be fostered. For example soft drink distributors can provide hawker carts and ice boxes to people that do not have refrigerators in their spaza shops.
- Local authorities **must provide infrastructure** such as hawker stalls and carts in areas that are zoned for informal trading.
- Small businesses can play an active role in providing training and improving skills through **learner-ship programmes.**
- Provide easier access to bank loans.
- Provide **storage facilities**

Importance of the informal sector

- Provides a **source of income for those that cannot find a job** in the formal sector.
- Reduces crime by creating employment.
- Goods can be purchased at a lower price

Why informal traders don't want trade permits?	Advantages of having trade permits
• **Don't want to pay taxes.** • Costly to apply for permits. • Many **are illegal immigrants** and will be caught. • Don't want to comply with regulations.	• **Can get bank loans** if business is registered. • Contribute to the tax base of the country • Allows for planning by local government. • **Can be protected**, safer environment.

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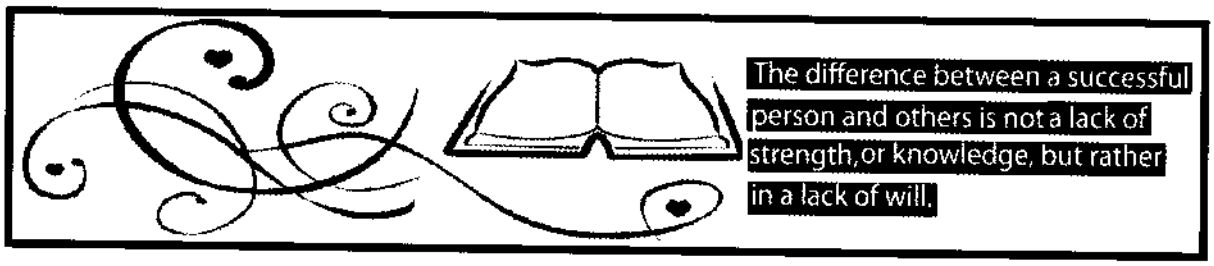
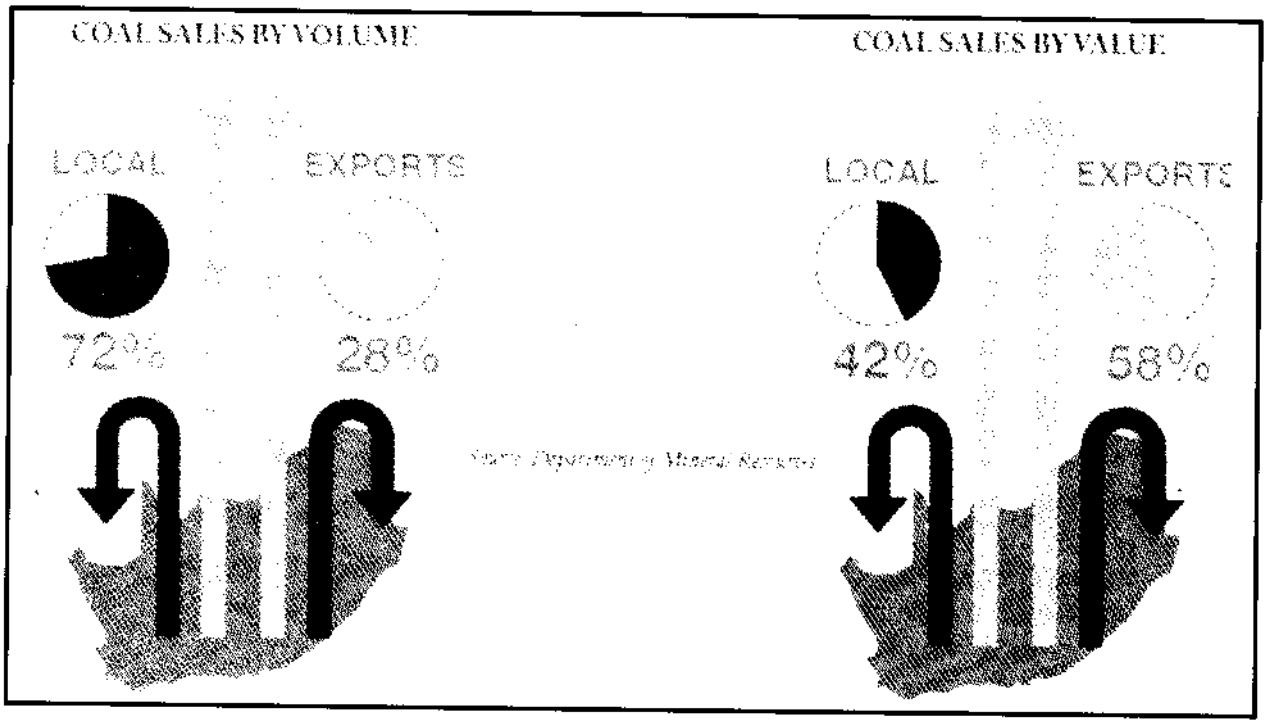


Activity 4.7



1. What percentage of coal is used locally?
2. Comment on the difference in the volume and value of coal produced locally.
3. Why is the export value of coal higher?
4. How do exports benefit the country?
5. Explain TWO ways in which coal contributes to the SA economy.
6. Evaluate why it is not wise for the SA economy to be too dependent on coal as a resource.

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Activity 4.8

Read the newspaper excerpt before attempting the questions.

Strike hits Amplats' South African mines

By Reuters
[illegible]

JOHANNESBURG – Fewer than one in five workers turned up for work at Anglo American Platinum's (Amplats) South African platinum mines around the city of Rustenburg, it said on Friday, in protest against planned job cuts. Amplats - part of global mining group Anglo American and the world's No 1 producer of the precious metal - said last month it would cut 4 800 jobs, laying off 3 300 workers and paying off the rest.

A National Union of Mineworkers (NUM) gold miners' strike in September lasted only three days, raising hopes that stoppages in other sectors may not be protracted. But AMCU is unhappy with the 8% gold miners' pay hikes and may call further action.

Amplats chief executive **Chris Griffith**, mindful of the impact strikes had on the company's bottom line last year, said stoppages could put more jobs at risk.

Job cuts are a sensitive issue in South Africa, where the unemployment rate is more than 25% and mine labour violence rooted in the NUM/AMCU rivalry has killed dozens of people over the past 18 months.

1. Why did the workers go on strike at the mine?
2. Why are job cuts a sensitive issue in SA?
3. Suggest THREE negative effects of strikes.
4. How does platinum contribute to the economy of the country?
5. Besides mine strikes, discuss TWO other problems experienced by mines.

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Activity 4.9

1. Match the descriptions from Column A with the term from Column B. Write down only the letter (A to G) next to the question number in your answer book.

COLUMN A	COLUMN B
1.1 Over-concentration of industries in a few core areas	A. Heavy industries
1.2 The largest industrial core area in South Africa	B. Footloose industries
1.5 Industries that can locate anywhere due to improved technology	C. Market orientated
1.4 Industries that produce perishable goods	D. Centralisation
1.5 These industries are associated with high noise and pollution	E. Durban-Pinetown
	F. Gauteng
	G. Decentralisation

2. **Industrial growth played a major role in South Africa's economic development during the second half of the 20th century. Industrial activities are concentrated in the PWV industrial region that houses almost half of all South Africa's industries.**

2.1 Why are industrial activities classified as secondary economic activities?

2.2 Discuss TWO factors that favoured industrial development in the PWV region.

2.3 Discuss TWO factors that hamper industrial development in the PWV region.

2.4 Name TWO heavy industries that one will find in the PWV.

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Activity 4.10

Special Economic Zones to boost growth

17 January 2012

A new Bill gazetted on Monday aims to boost job creation and industrialisation in South Africa's outlying areas through the licensing of Special Economic Zones (SEZs).

Briefing the media in Pretoria on the gazetting of the Special Economic Zones (SEZ) Bill for public comment, Trade and Industry Minister Rob Davies said special economic zones would expand on the work already done by the country's Industrial Development Zones (IDZs) and attract more foreign investment.

In particular, SEZs would help stimulate industrialisation outside of the country's main urban areas of Cape Town, Gauteng, Durban-Pietermaritzburg, East London and Port Elizabeth.

Focus on innovation

Davies said Industrial Development Zones would not be scrapped, but would continue to exist as SEZs under the new Bill.

He said that while the focus of the IDZs - based near ports and airports - had been mainly on export industries, the SEZs would expanded on this, and include a focus on innovation and regional development in areas such as science parks, industrial parks and sector development zones.

The department is working with various provinces, including Limpopo, Free State and the North West, and potential SEZs have been identified in areas such as light-manufacturing, agro-processing and platinum beneficiation.

The department's IDZ programme was initiated in 2000, and four zones had been designated, with three currently operational – namely Coega near Port Elizabeth, the East London IDZ, and Richards Bay.

A fourth IDZ at OR Tambo International Airport in Johannesburg has yet to come into operation, but the department is this year hunting for an international operator to run the IDZ.

Davies said the IDZs had so far involved 40 investors, that had invested a total of R11.8-billion and created 33 000 jobs through the construction of these zones and direct employment in firms based there.

1. What was the purpose of establishing special economic zones?
2. What would be the difference in the focus of SEZ and IDZ?
3. State TWO ways in which IDZ have assisted in the development of rural areas.
4. One of the reasons for the development of IDZ was to solve the problem of industrial centralisation. What does industrial centralisation mean?
5. With reference to an IDZ that you have studied explain how it has improved that particular community.

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Activity 4.11

Choose a description from COLUMN B that matches a term in COLUMN A. Write only the letter (A-L) next to the question number (1.- 10.),e.g.11.L

COLUMN A	COLUMN B
1. Trade	A. Industrial estates aimed at economic and new investment
2. Import	C. Buying and selling of goods and services
3. Decentralisation	D. Movement of activities away from overcentralised areas
4. Trading blocks	E. Commodity brought into a country
5. Industrial development zones	F. Movement of industries into core areas
6. Informal sector	G. Countries that are less developed in the world.
7. MEDC's	I. The trade involving businesses not registered with the government and occupying premises illegally.
8. Multi-national corporation	J. Company that has outlets/shops in different countries.
9. LEDC's	K. Countries that are more developed than others.

Activity 4.12

Informal employment in SA rises, formal employment falls

Growth in economic activity in the informal sector is rising in South Africa while official employment is under pressure.

Meanwhile, reductions in employment were seen in three key sectors, manufacturing, transportation and logistics, and construction together leading to a loss of 25 000 jobs.

Sharp goes on to say that with the informal labour sector currently representing 32.8% of South Africa's potential workforce, for some 6.2 million people, informal work has become the second-largest part of the labour market.

He says the process of in formalisation whereby formal jobs with contracts of employment become informal jobs with no contracts has long been taking place in South Africa, and points to two major causes.

"Firstly, the influx of around 1.5 to 3.5 million illegal migrants from neighbouring countries notably Zimbabwe, Malawi and Mozambique into South Africa's labour market. This has led to large-scale evasion of laws around minimum wages and basic working conditions.

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"Secondly, and more difficult to quantify, is the effect of high wages, heightened strike action and restrictive labour laws and regulations in South Africa which has rendered labour an unattractive alternative to employers who have opted to automate, mechanise, outsource and offshore these activities."

He outlines several features of the informal job market:

- An absence of contracts of employment, both written and verbal
- Non-payment of contributions to medical aids and/or pension funds by employers
- Non-payment of statutory deductions such as unemployment insurance and skills development levies by employers
- Lack of Pay-As-You-Earn (PAYE) reporting to SARS
- No recourse to formal labour dispute resolution mechanisms (CCMA, labour courts) by employees.

1. State ONE difference between the formal and informal sector.
2. Give TWO reasons why the informal sector in SA is increasing.
3. State TWO disadvantages that the worker in the informal sector experiences.
4. Why do migrants get involved in informal trading?
5. Name two countries that SA attracts migrants from.
6. Name the sectors of the economy that are losing jobs from the formal sector. Give a reason for this trend.
7. Explain the impact that an increasing informal sector is going to have on the economy.

PARAGRAPH TYPE QUESTIONS

- Evaluate the role of the wild coast SDI in contributing to the economic development of the Eastern Cape.
- Write a paragraph of approximately EIGHT lines in which you suggest measures that could be put in place to ensure that South Africa is food secure.
- In a paragraph of approximately EIGHT lines, discuss how informal trading influences the formal sector of the South African economy.
- Agricultural production makes an important contribution to the South African economy. Write a paragraph of approximately EIGHT lines, evaluating the importance of promoting agricultural development in South Africa as opposed to importing agricultural products.
- In a paragraph of (approximately 8 lines) discuss a few physical factors that have a negative impact on mining in South Africa.
- Explain the role that sugar cane farming plays in contributing to the economy of South Africa.
- Explain the cause of the erratic contribution of the mining sector to the GDP of SA.
- In a paragraph of 8 lines explain the rapid increase in informal trade in SA.
- Suggest the positive and negative effects of informal trade on the economy.

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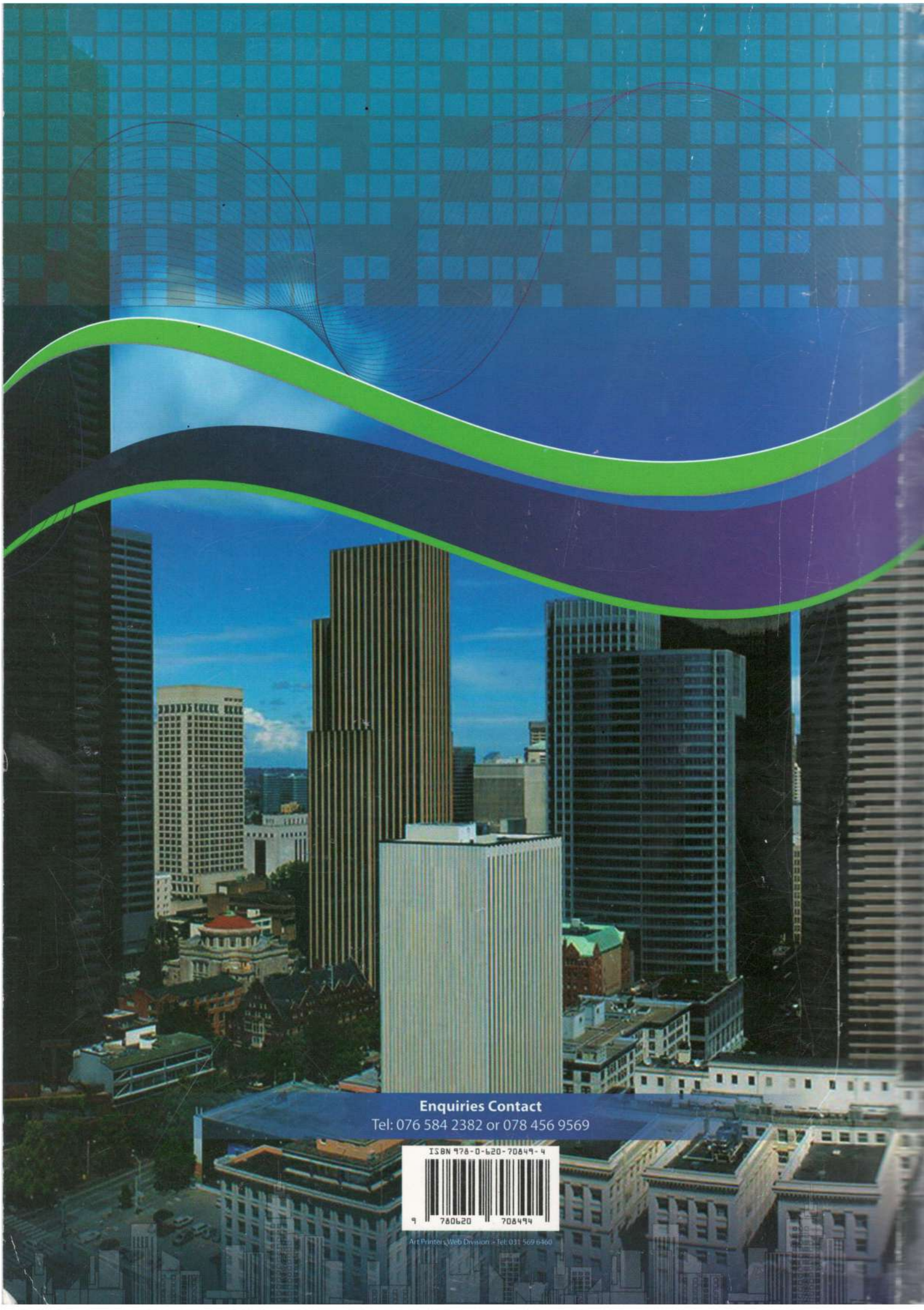

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