



| Geography | | Grade 10 |
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| Term 1 | | Week 3 Lesson 3 |
| TOPIC | <ul style="list-style-type: none"> • Heating of the Atmosphere: • The greenhouse effect - impact on people and the environment; • Global warming - evidence, causes and consequences, with reference to Africa; • The impact of climate and climate change on Africa's environment and people | |
| AIMS OF LESSON | <p>Explain the greenhouse effect and how we contribute to it. Discuss the evidence, causes and effects of global warming. To demonstrate how climate and climate change impact on Africa's environment and people.</p> | |
| RESOURCES | Paper resources | Digital resources |
| | <p>Refer to your textbook. Read on the topic: <i>The greenhouse effect; Global warming; Impact of climate and climate change on Africa's environment and people.</i></p> | <p>https://youtu.be/SN5-DnOHQmE https://youtu.be/IHFd5kLAWNY https://www.youtube.com/watch?v=pNDQgE0dXEA https://www.youtube.com/watch?v=Ygpd7btcxlg</p> |
| INTRODUCTION | <ul style="list-style-type: none"> • What is the greenhouse effect and how do we contribute to it? • What is global warming? • How does climate and climate change impact on Africa's environment and people? | |
| CONCEPTS AND SKILLS | <ul style="list-style-type: none"> • Concepts: greenhouse effect, greenhouse gas, methane, global warming, deforestation, drought, climate change, deserts, floods, flash floods, infrastructure, landslides. • Identify the factors involved. • Know how these factors impact on the environment and people. | <p>CAN YOU?</p> <ul style="list-style-type: none"> • Explain the greenhouse effect and how we contribute to it? • Explain what global warming is; discuss the evidence, causes and consequences. • Explain what impact climate and climate change have on Africa's environment and people? • Explain how certain factors impact on the environment and people? |
| ACTIVITIES/ ASSESSMENT | <p>Complete the attached activities as well as those in your textbook.</p> | |
| ACTIVITIES/ ASSESSMENT | <ul style="list-style-type: none"> • Complete the activities • Study the diagrams and graphs to understand the factors involved and how they impact on the environment and people. • The information is important to be able to understand how climate and climate change impact on Africa's environment and people | |
| CONSOLIDATION | <ul style="list-style-type: none"> • It is important that the preservation of the Earth's atmosphere is essential to ensure sustainable living conditions. • Unless we respond, we will see catastrophic consequences, including rising sea levels, droughts and famines, and the loss of about one-third of the world's plant and animal species. | |

| 1. The greenhouse effect - impact on people and the environment. | | |
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| <p>What is it?</p> <p>The greenhouse effect is the process by which certain gases in the lower atmosphere absorb and trap long-wave radiant heat. The gases that absorb radiant heat are called greenhouse gases.</p> <p>Why is it there?</p> <p>The most important greenhouse gases are:</p> <ul style="list-style-type: none"> • carbon dioxide (CO₂) - from forest fires and the burning of fossil fuels • methane (CH₄) - from cattle leaving winds and rotting vegetation in swamps • water vapor. | <p>What is it like?</p> <div data-bbox="857 233 1511 632" data-label="Diagram"> <p>The greenhouse effect</p> <p>Solar radiation passes through the clear atmosphere</p> <p>Some solar radiation is reflected by the earth and the atmosphere</p> <p>Most radiation is absorbed by the earth's surface and warms it</p> <p>Some of the infrared radiation passes through the atmosphere, and some is absorbed and re-emitted in all molecules. The effect of this is to warm the earth's surface and the lower atmosphere.</p> <p>Infrared radiation is emitted from the earth's surface</p> </div> | |
| <p>What is the impact on people?</p> <ul style="list-style-type: none"> • Reduction of the amount of arable land • Loss of fertile agricultural land • Extreme weather conditions, such as stronger hurricanes and severe heat waves, can be life-threatening. • Other conditions such as rising sea levels • Food security risk for poor people and those without land. | <p>What is the impact on the environment?</p> <ul style="list-style-type: none"> • Up to 15% of the Nile Valley can flood • Salt levels will increase, affecting agriculture and coastal ecosystems • Floods and droughts affecting crop production • There will be longer growing seasons for crops that can have a positive impact. • Melting glaciers • Natural habitats of plants and animals will shift | |
| How should it be managed? | | |
| Ways to reduce greenhouse gases | | |
| The energy sector | The transport sector | Other greenhouse gases |
| <ul style="list-style-type: none"> • Introduce measures to save electricity • Higher standards for household appliances • Set carbon tax on electricity generation • Set an energy tax on combined heat and power <div data-bbox="185 1520 609 1808" data-label="Image"> </div> | <ul style="list-style-type: none"> • Expand public transport systems • Establish restrictions on carbon emissions for light vehicles • Reduce speed on roads • Conduct environmental assessments on transport plans and infrastructure investments • Purchase electric vehicles <div data-bbox="651 1625 1094 1843" data-label="Image"> </div> | <ul style="list-style-type: none"> • Reduce nitrogen fertilization for agricultural use • Expand methane extraction from waste dumps • Reduce CFC emissions and ban use as chemicals <div data-bbox="1122 1545 1511 1808" data-label="Image"> </div> |

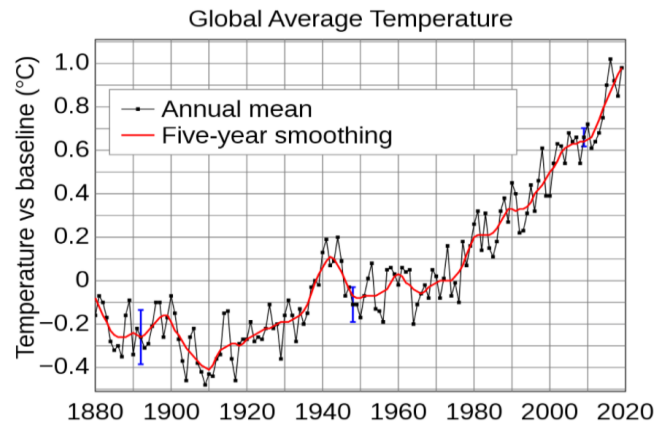
2. Global warming - evidence, causes and consequences

What is it?

Global warming is the slow rise in the average temperature of the earth's oceans and the lower layer of the atmosphere.



What is it like?



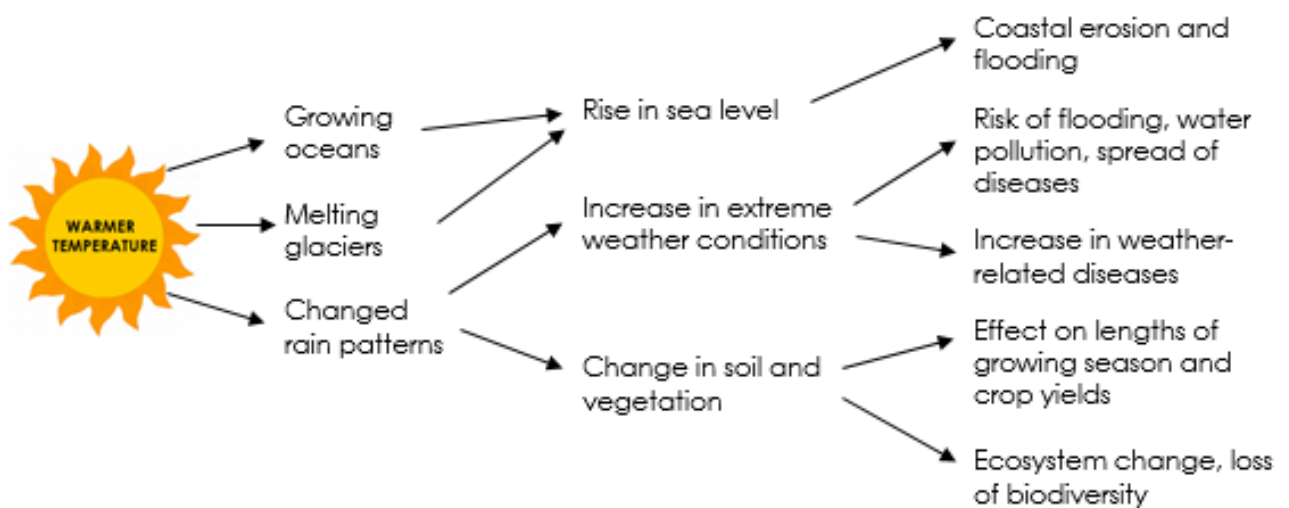
Evidence of global warming

- The Intergovernmental Panel on Climate Change (IPCC) suggests that an increase in greenhouse gases has caused most of the increases in global average temperatures
- The Earth's average temperature has risen by 0.8 ° C over the past 100 years, according to the Environmental Protection Agency.
- 97% of climate scientists agree that the rate of global warming is primarily the result of human activity.

Why did this happen? (Causes)

- Carbon dioxide levels have risen and are expected to rise further.
 - **Sources of greenhouse gas emissions are:**
 - the burning of coal to generate power
 - the combustion of fuels with an oil base for transport
 - Deforestation
- Methane levels are increased at a rate of 1% per year.
 - Sources of methane release:
 - large-scale, intensive cattle farming
 - large-scale cultivation of rice in rice fields

What are the consequences?



3. The impact of climate and climate change on Africa's environment and its people:

Climate change is the long-term change in weather patterns.

More than 30% of the world's drylands are found in regions of North Africa, the Sahel and the southern part of Africa. Dry land areas in Africa are threatened by deforestation, soil erosion, soil nutrient loss, frequent droughts and climate change. Africa is home to the poorest people on the planet and the population is growing at a rapid pace. Many people in Africa are subsistence farmers or live almost entirely on resources they harvest from the natural environment. Climate change will have serious consequences that will cause widespread famine and food shortages.

What is it? (Factors and impact)

(a) DESERTS: A desert is an area with infertile soil where little precipitation takes place and living conditions are harsh for plant and animal life.

Desertification: It occurs when soil turns into desert. This is the process where large areas that are on the border of deserts change from semi-desert to desert areas. It is caused by persistent drought and the way people use their environment.

Impact on the environment:

- The dry and arid climates of deserts limit farming to river valleys or to water sources such as oases.
- With climate change, deserts are expected to become warmer and even drier.
- In Africa, deserts spread rapidly and took over precious farmland and marginal (on the edge) areas such as the Sahel (area that stretches across Africa just south of the Sahara Desert to the denser savannah vegetation regions).

Impact on people:

- Deserts cannot support large numbers of people.
- Higher temperatures can threaten settlements in desert areas.
- Desertification could turn more areas around the Sahara into deserts and force populations to migrate.
- In recent years, millions of people in East Africa have suffered from consequent famine and disease.
- The poverty in the region will make it very difficult for the people there to recover and adapt to desertification.

(b) DROUGHTS: A long period of abnormally low rainfall in an area.

What is it like?



Map, Countries, Animals, & Facts ...
britannica.com



Map Of Africa: Deserts Of...
mapofafricanew.blogspot.c...



Africa: Sahel Region ...
afjn.org

Impact on the environment:

- Land degradation.
- Lower crop yields and crop damage leading to crop failure.
- Increase in livestock deaths.
- Increase in risk of veld fires.
- Increase in risk of water shortages.

Impact on people:

- Decrease in food security.
- Increase in risk of malnutrition.
- Increase in human and livestock deaths.
- Migration.
- High costs associated with disaster relief.



South Africa declares drought a ...
reuters.com

(c) FLOODS: A flood occurs when there is prolonged rainfall or a short period of heavy rain. Floods that happen very quickly are known as flash floods.

Impact on the environment:

- Areas that have more rainfall will experience floods.
- Damage to infrastructure such as roads, bridges and buildings due to landslides and flash floods.
- Decrease in agricultural productivity due to lost crops and soil erosion.

Impact on people:

- Increase in many types of human and animal diseases such as cholera, malaria, diarrhea, foot-and-mouth disease as well as waterborne diseases.
- Loss of human and animal life.
- Disruption of settlements, communities, trade, transportation and livelihoods due to floods.



South Africa Floods Leave at Least 60 ...
nytimes.com

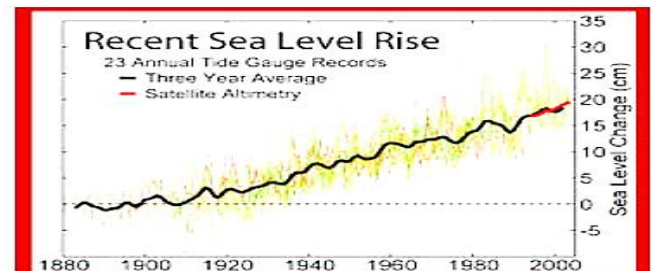


East Africa Floods Affects Six Million ...
africaotr.com

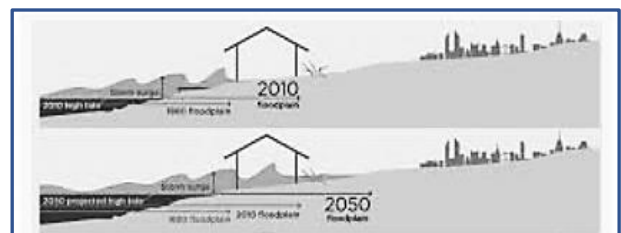
(d) RISING SEA LEVELS: Continuous global warming may melt large amounts of ice from the large ice sheets of Greenland and Antarctica. As a result, sea levels around the world could rise.



Impact on the environment:

- Warmer temperatures will melt the ice sheets and glaciers.
- Many coastal areas will experience floods, as well as coastal erosion, loss of wetlands and a flow of seawater in freshwater areas.



Climate Change and Sea Level Rise
windows2universe.org



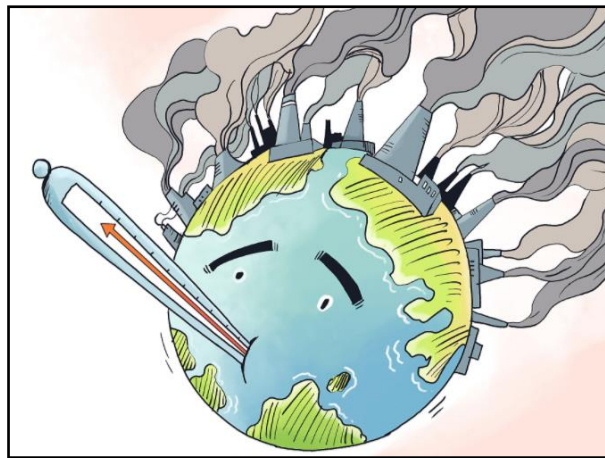
| | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> • Loss of coral reefs as the depth of the water increases and temperatures decrease. • Agricultural land, especially fertile river deltas and some islands, may be under water. <p>Impact on people:</p> <ul style="list-style-type: none"> • High sea levels will submerge some coastal cities and other populated regions. • Less land for people to live on and farm. • Floods of settlements along the coast give rise to large numbers of environmental refugees. • People will have to move to higher-lying areas. • Many nations in Africa that are most vulnerable to rising sea levels do not have the resources to prepare for them. • The increase in pressure on and demand for land may lead to conflict and war. | |
|  <p>Climate change impacts on Africa</p> <p>https://www.youtube.com/watch?v=pNDQgE0dXEA</p> |  <p>The impact of climate change in Southern Africa</p> <p>https://www.youtube.com/watch?v=Ygpd7btcxlg</p> |

Consolidation: Activity 1

1.1 Choose the term in COLUMN B that matches the description in COLUMN A. Write only the letter (A-E) next to the question number (1.1.1-1.1.5), for example 1.1.6 F.

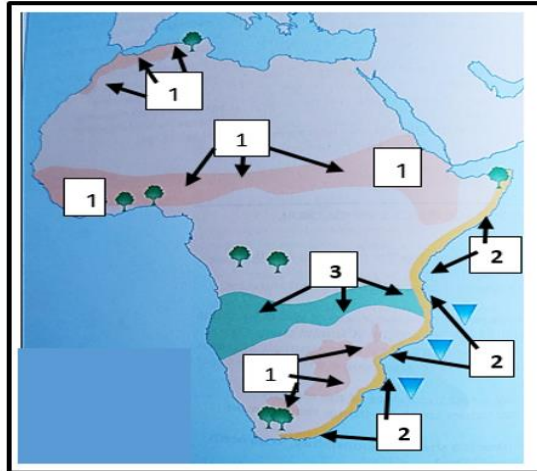
| COLUMN A | | COLUMN B |
|----------|--------------------------------------------------------------------------------------------------------------------------|---------------------|
| 1.1.1 | The capture of long-wave radiant heat by gases in the lower atmosphere. | A Climate change |
| 1.1.2 | The slow rise in the average temperature of the earth's oceans and lower layer of the atmosphere. | B Greenhouse effect |
| 1.1.3 | The long-term change in weather patterns. | C Drought |
| 1.1.4 | A long period of abnormally low rainfall in an area. | D Desert |
| 1.1.5 | An area with infertile soil where little precipitation occurs and living conditions are harsh for plant and animal life. | E Global warming |



1.2 Study the cartoon below of the greenhouse effect and answer the questions that follow.



- 1.2.1 What is a greenhouse gas?
- 1.2.2 Name TWO human activities that release greenhouse gas carbon dioxide.
- 1.2.3 Name TWO human activities that release the greenhouse gas methane.
- 1.2.4 Explain in a paragraph of approximately EIGHT lines the impact of increasing greenhouse gas emissions on people and the environment.

1.3 Study the map below and answer the questions that follow:

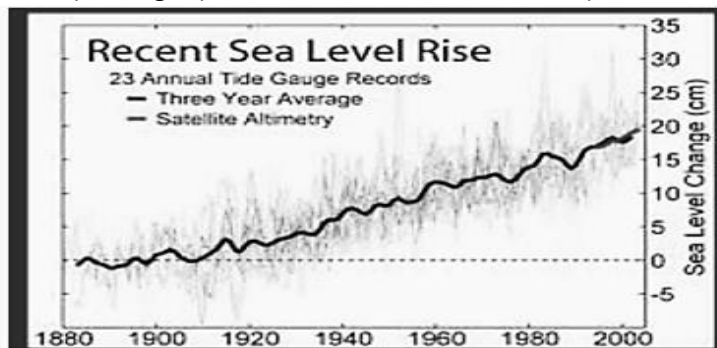


| Key | |
|------------------------------------------------------------------------------------|-----------------------------------|
| 1 | Areas with high draught risk |
| 2 | Areas where sea levels may rise |
| 3 | Wetter areas with high flood risk |
|  | Vegetation threatened |
|  | Risk of extreme climatic events |

(Answer questions 1.3.1 and 1.3.2 with the help of an Atlas and your textbook).

- 1.3.1 Identify TWO areas north of the equator and TWO areas south of the equator that may experience an increase in droughts.
 - 1.3.2 Name TWO areas that are not located along the coast that are at risk of experiencing more floods.
 - 1.3.3 How will an increase in drought affect rural communities? List TWO points.
 - 1.3.4 What effect will drought have on people in urban areas? List TWO points.
 - 1.3.5 Suggest THREE ways in which climate change can have a negative impact on the environment.
 - 1.3.6 In a paragraph of about EIGHT lines, describe the effects of climate change on Africa in particular.
- 1.4 For each of the following, explain ONE reason why climate change can cause:
 - (a) malnutrition and
 - (b) water scarcity in South Africa.

1.5.1 Study the graph below and answer the questions that follow:



- 1.5.1 Compare sea levels in 1900 and 2000.
- 1.5.2 Explain the rise in sea level on Earth.
- 1.5.3 Suppose you are an Environmental Impact Advisor. What long-term impact of rising sea levels will you be able to point out to countries at risk?