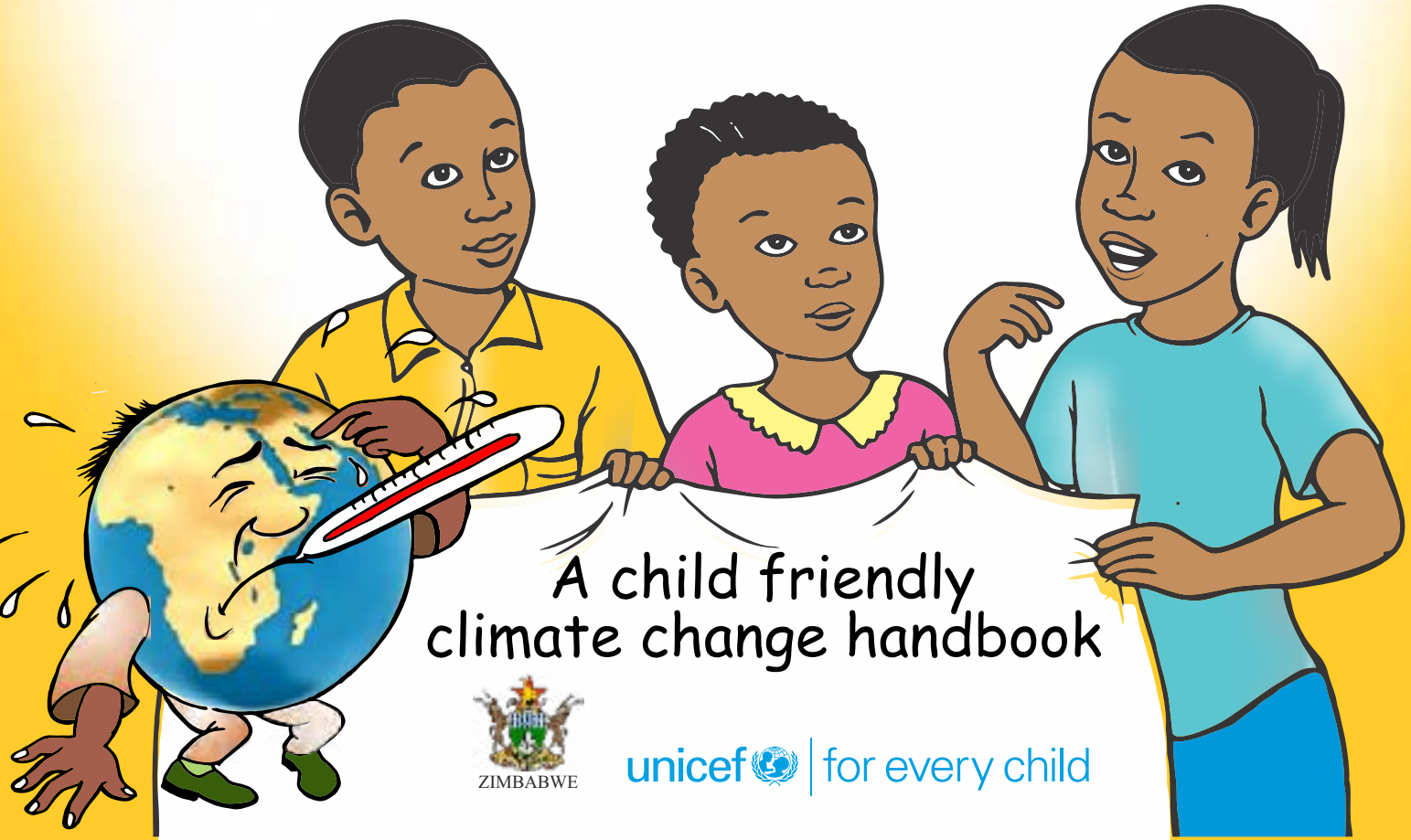
Our Changing Climate



A child friendly
climate change handbook

ZIMBABWE

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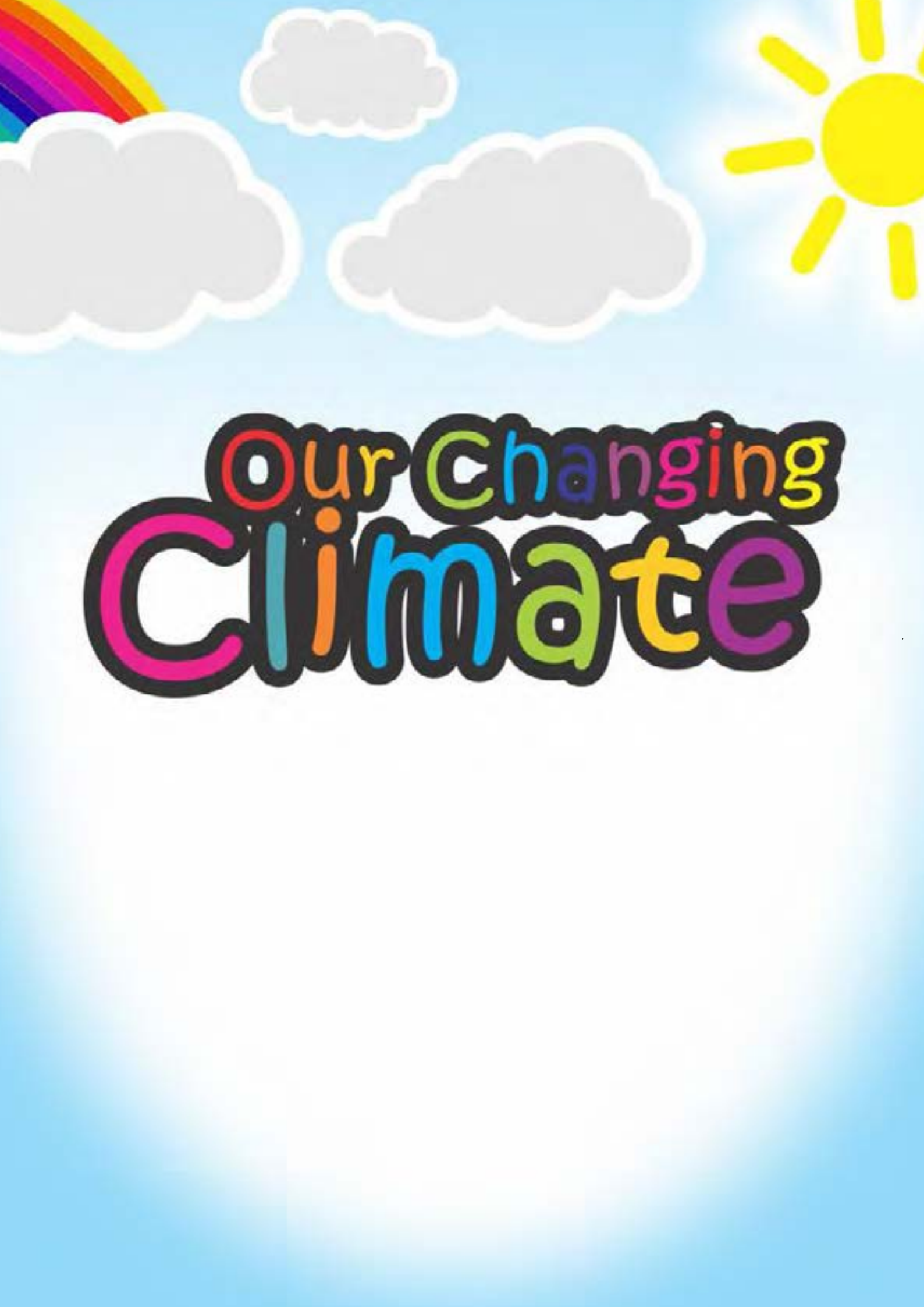
Our Changing
Climate

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About This Book

This book is a learning guide on climate change and how it is affecting everyone. It is our hope that after reading it, users will have learnt the following:

1. **What is climate change?**
2. **How is it affecting us?**
3. **How best can we deal with it?**

Cartoons and inforgraphics have been used in the book as a way of capturing the imagination and interest of children

Foreword

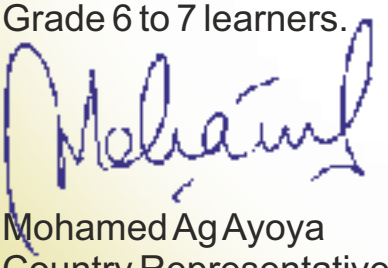
This book is a child friendly handbook meant to explain the concepts of climate change in an easily understandable manner and language. It aims to link behavioural choices to the changes observed in our climate.

The Children and Climate Change in Zimbabwe study of 2013 highlighted the gap in learning on the subject of climate change. Many children who participated in the study could identify changes in their climate but lacked the knowledge on what to do about it. Thus they were powerless to change their circumstances. The country also underwent a curriculum review process during the same period where the Primary and Secondary School curriculum was changed for the first time since independence. The new curriculum is more holistic and thus climate change and the environment take prominence as they affect the well being of children in many ways. This therefore presented opportunity to develop resources for children on various topics previously limited in the curriculum including climate change.

The *Climate Change Handbook* is about building a culture of environmental stewardship from an early age. In this way it is aligned to the new curriculum which focuses on developing Learner Exit Profiles by developing different skill sets and attitudes through learning. As UNICEF we hope children will be able to use this handbook to help them learn more about climate change. We hope they will also be encouraged to share the information and take action together with their communities to keep our environment clean, safe and healthy.

Our Changing Climate: A Child-Friendly Climate Change Handbook was developed with the participation of children through pretest exercises. It was developed to be fun and engaging yet highly informative. This book has been approved by the Ministry of Primary and Secondary Education as additional teaching and learning resource, under the subject environmental studies. We therefore take this opportunity to thank all the children, adults and the technical team including colleagues from the Curriculum Development Technical Services, a unit which helped in developing this handbook.

This *Child Friendly Climate Change Handbook* book is appropriate for use by Grade 6 to 7 learners.



Mohamed Ag Ayoya
Country Representative
UNICEF Zimbabwe

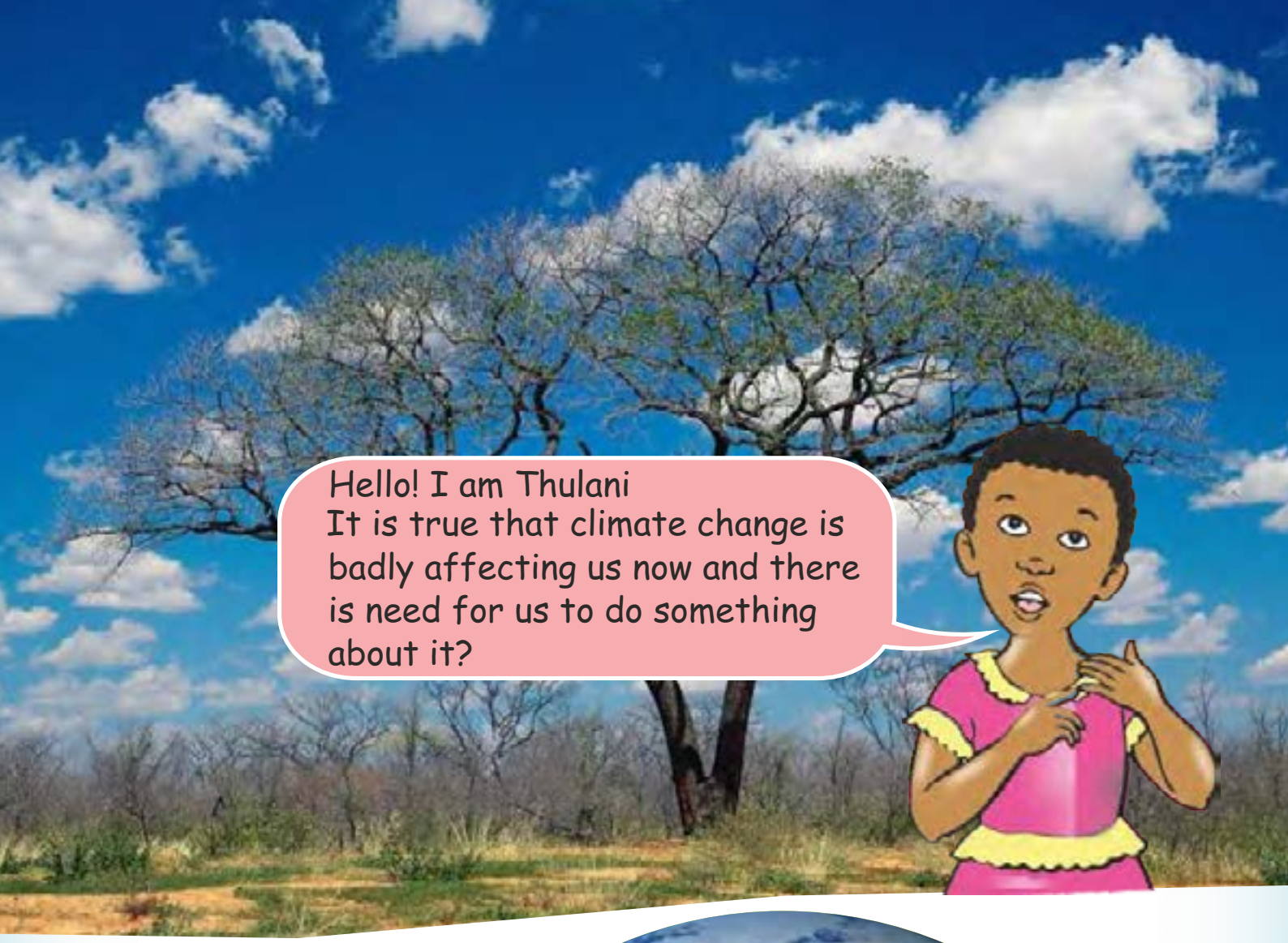
CONTENTS

Greetings

Hello everyone! My name is Chido and these are my friends Sam and Thulani. We are climate change activists in our community.

That's right! An activist is a person who campaigns for some sort of social change activists in our community

Thank you for joining us in this book. I hope we will learn more about climate change and how it is affecting us.


Hello! I am Thulani
It is true that climate change is badly affecting us now and there is need for us to do something about it?


Hello! My name is Sam. In order for us to know more about climate change let s start by looking at the earth and its climate.

Welcome to Chapter 1

The Earth and its Climate

In this Chapter you will learn more about the following topics:

1. The atmosphere and how it relates to the earth
2. The atmosphere and what it is made up of
3. The difference between the weather and climate

At the end there will be a short activity to help you remember what you have learned.

Skills

The intended skills to be developed in Chapter 1 include the following:

1. Content Mastery
2. Recognition of national symbols
3. Critical thinking

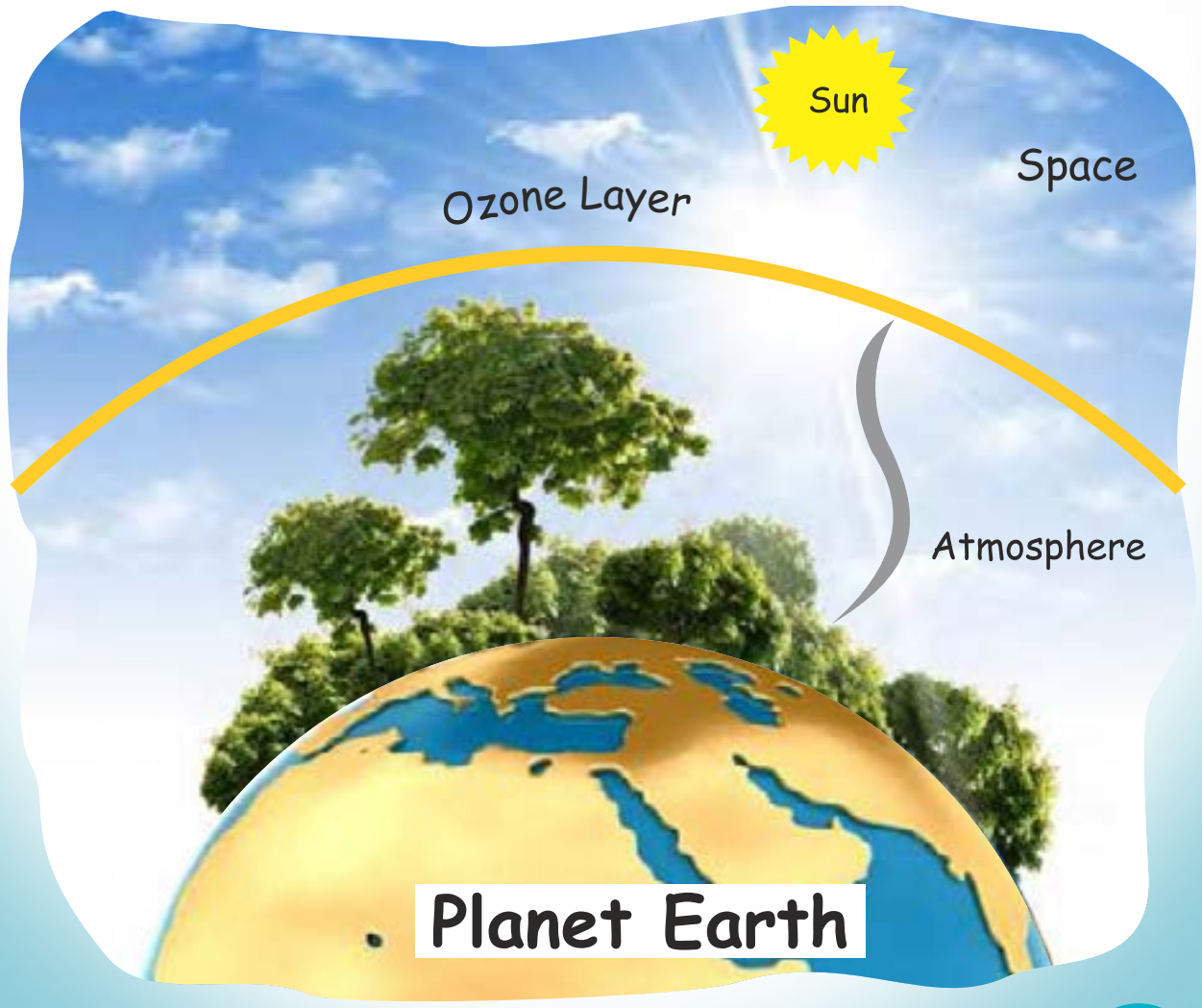
The Earth & its Climate

Earth is a planet in which we live. It is one of several planets such as Mercury, Venus, Uranus, Mars, Jupiter, Saturn, Neptune and Pluto.

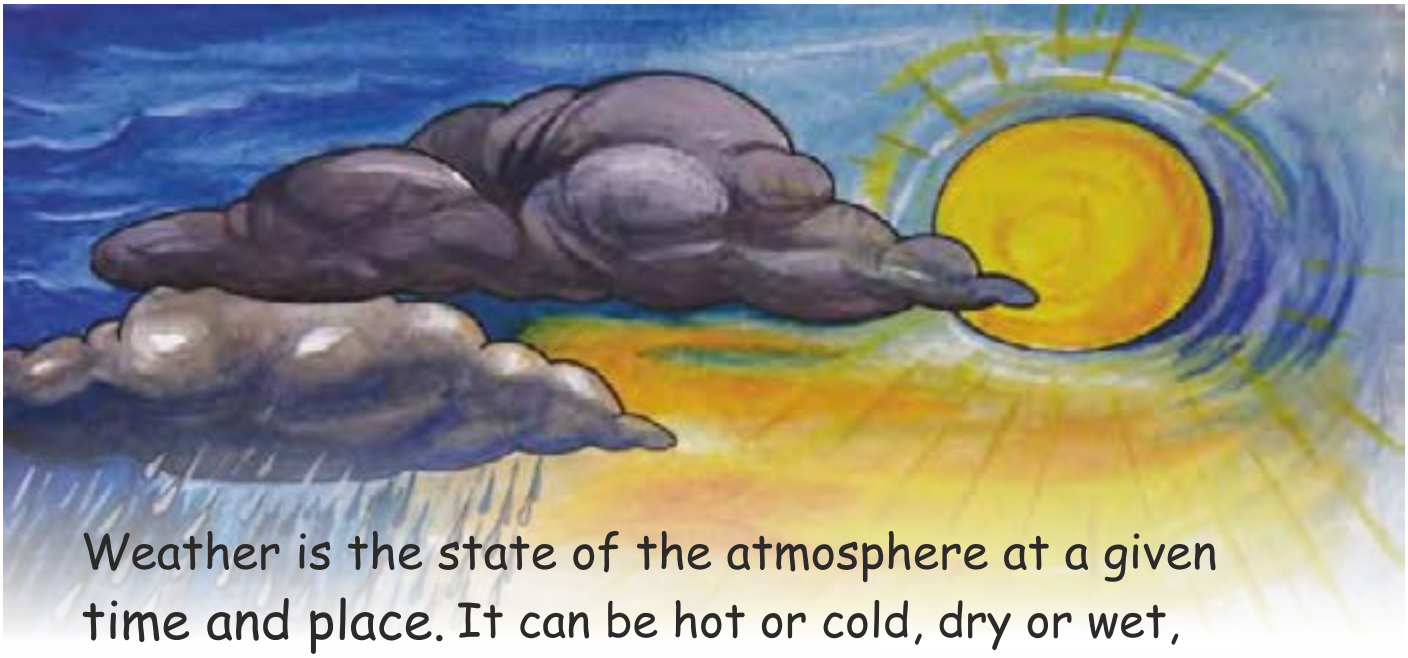
Out of all the planets, it is only mother Earth which has life. One of the reasons there is life on Earth is because there is an **atmosphere**.

Atmosphere

The **atmosphere** is the air that surrounds us. It covers hundreds of kilometres. The atmosphere has many natural and man-made gases in it. There is also a layer of gases called the **Ozone layer** which surrounds the earth. The Ozone layer is important. It helps to maintain life on earth.



Weather



Weather is the state of the atmosphere at a given time and place. It can be hot or cold, dry or wet, clear or cloudy. It can be sunny in the morning, raining in the afternoon and cold in the evening.
Weather is made up of temperature, rain, pressure, wind, humidity and many more.

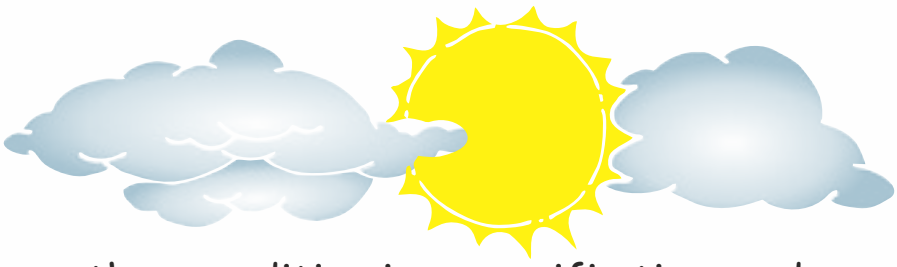
Sunny weather

Rainy weather

Cold weather

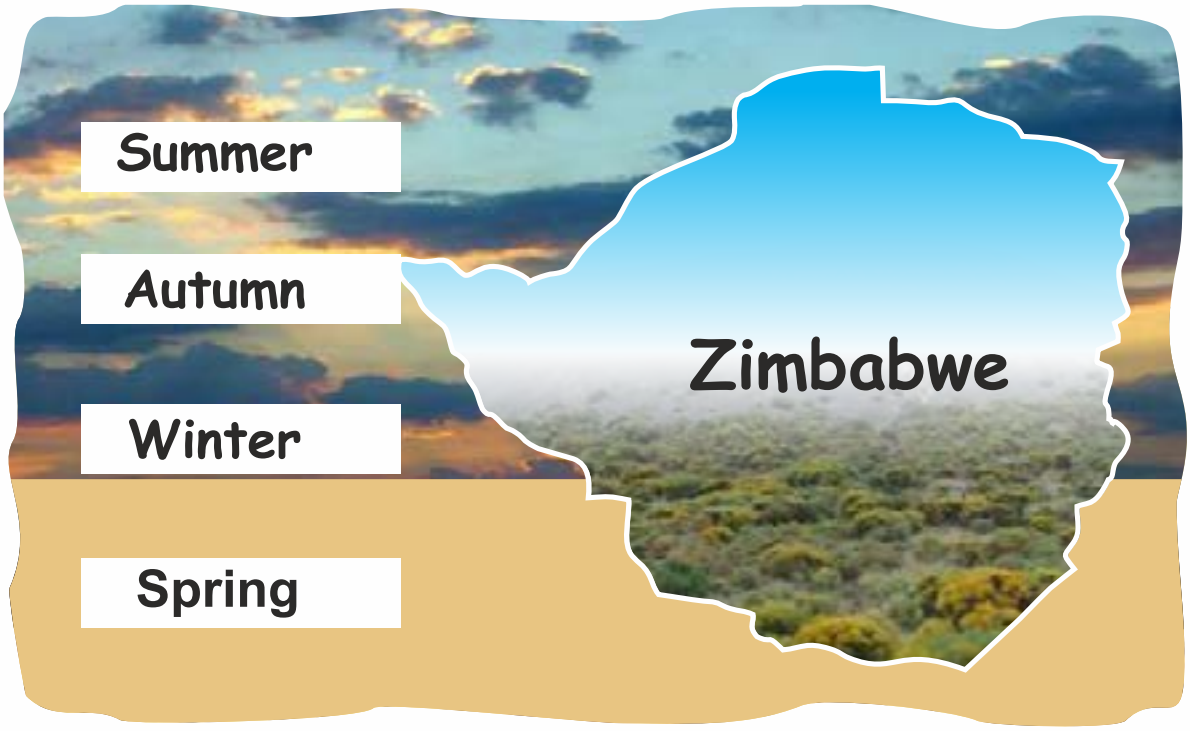
What is the weather like where you are today?

Climate



Climate is the average weather condition in a specific time and place. It is usually measured over a 30 year period. Seasons such as summer, autumn, winter and spring are used to describe climate.

Overall climate in Zimbabwe



For example, Zimbabwe is generally sunny with a warm wet summer and a cold dry winter.

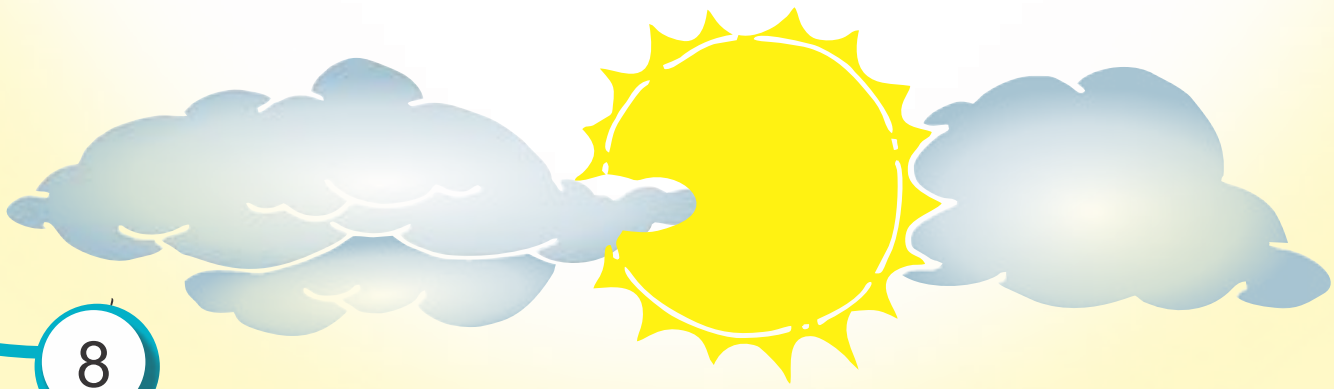
I hope you can see the difference between weather and climate. Weather is the state of the atmosphere over a short period of time. Climate is the average weather over 30 years. Let us now look at a few things that tell us more about past and present climates.

Activity Page

The Earth and its Climate – The true picture!

Answer True or False

1.	Climate and weather are the same thing.	True/False
2.	Zimbabwe's climate is generally cool throughout the year.	True/False
3.	The air we breathe is part of the atmosphere.	True/False
4.	The climate is the long term state of the atmosphere.	True/False
5.	Wind, rain and temperature are elements of weather.	True/False
6.	The Earth is the only planet known to have life.	True/False



Welcome to Chapter 2

Past and Present Climate

In this Chapter you will:

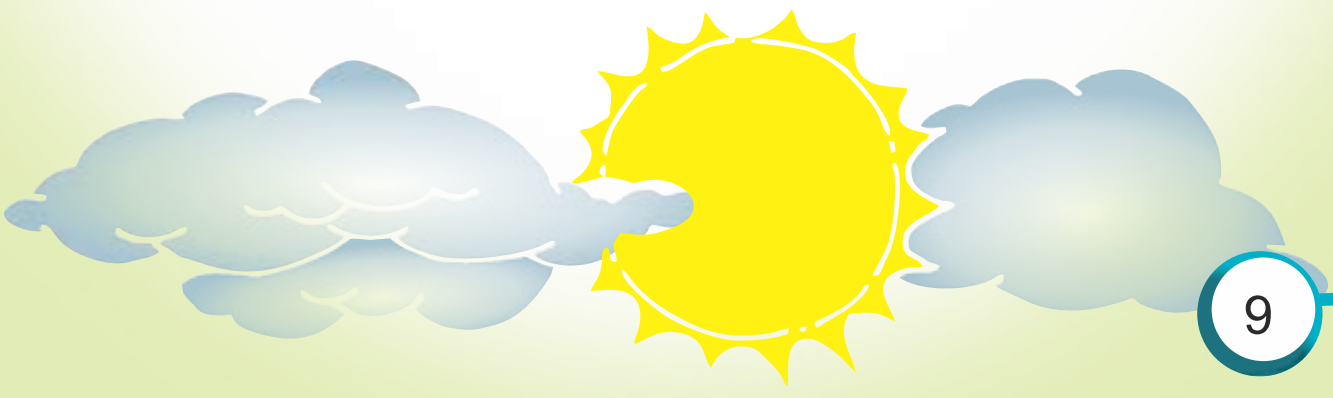
1. Learn more about how rain and temperature, water supply, food supply, trees and vegetation cover can be used to show a changing climate.
2. Be able to compare the past and present climates

At the end of this Chapter you will have a chance to develop your investigative skills and draw conclusions in a short activity.

Skills

The intended skills to be developed in Chapter 2 include the following:

1. Critical thinking
2. Problem solving
3. National Identity



Past & Present Climate

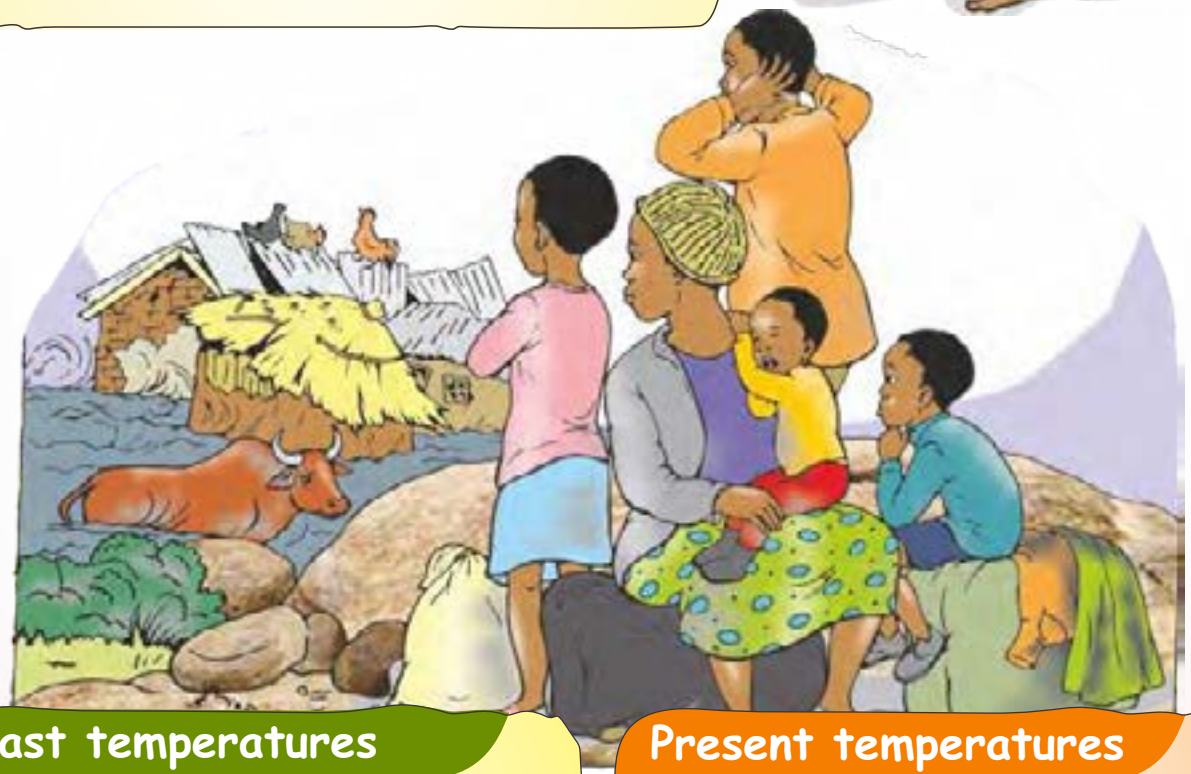
1. Rain & Temperature

Past rainy seasons

1. The main rainy season began in October and ended in December.
2. Post rainy season began from February and ended in April.
3. Winter showers began in May and ended in July.

Present rainy seasons

1. Unreliable rainfall patterns.
2. Little rain in a short period of time which sometimes come once in a year.
3. Very harsh rains accompanied by thunderstorms and floods.



Past temperatures

1. Hot summers
2. Cold winters
3. Predictable temperatures. We could tell before hand what the temperature would be at a certain time in the year

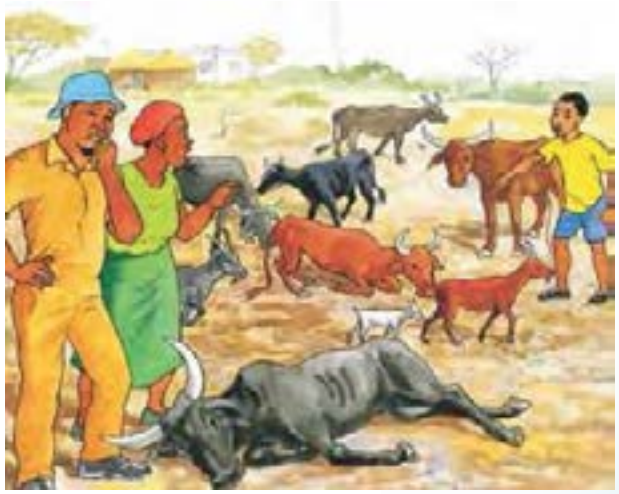
Present temperatures

1. Extreme temperatures
2. Heat waves now common
3. Hot days and very cold winter nights

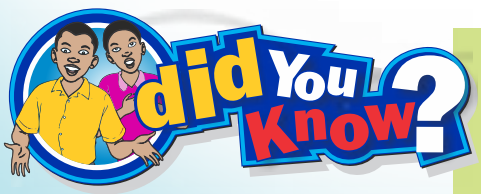
2. Water Supply

In the past, rainfall was enough to meet the needs of people and animals. Rivers flowed throughout the year.

Nowadays water for domestic and commercial use is a serious problem.
Domestic (for the home)
Commercial (for business)

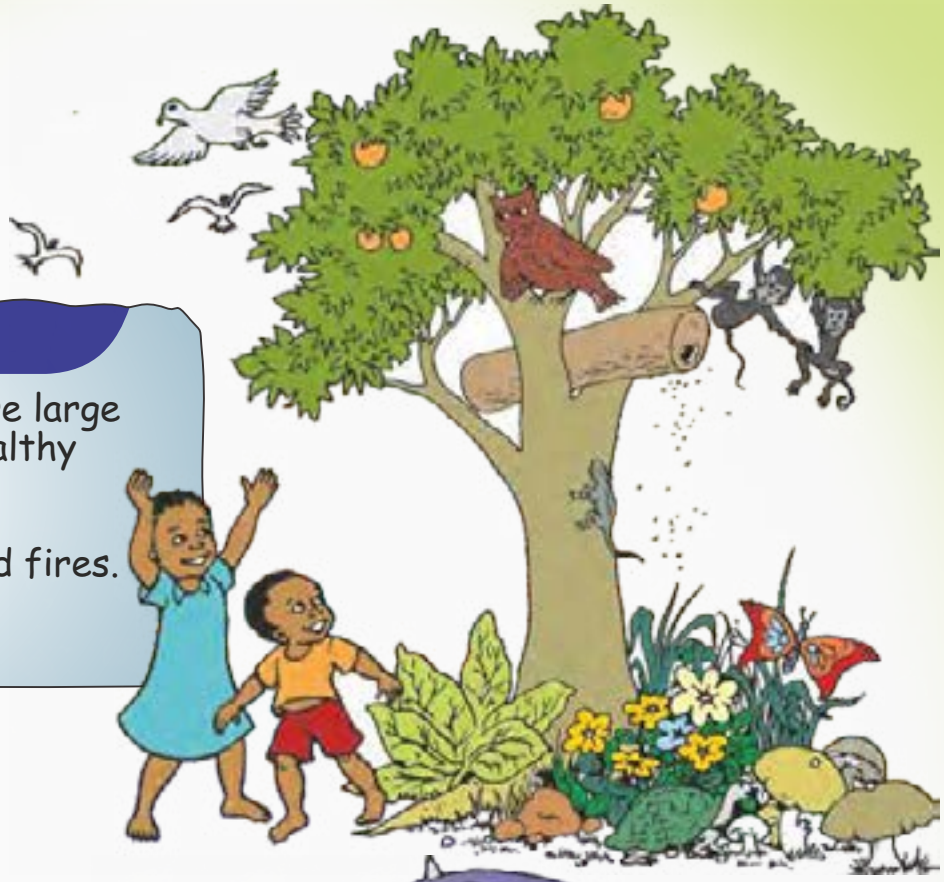


Livestock and wildlife are also affected.



2015 was one of the worst drought years in Zimbabwe. A large number of cattle, domestic animals and wildlife died due to shortage of water.

4. Trees and Vegetation Cover



Past Vegetation

1. In the past there were large forests with big and healthy trees.

2. There were fewer veld fires.

Present Vegetation

1. There are more veld fires taking place in the country.

2. There are more areas without vegetation cover nowadays.

By looking at the past and present conditions, we can see that there are changes in our climate. These changes are affecting our environment.

What are some of the changes taking place where you live?

3. Food Harvests

In the past, people harvested more food on the same piece of land than they do now.

Currently families are failing to harvest enough to take them to the next harvest.

Activity Page

Past and Present Climate – Back in time!

It is easier to see changes over many years. The older the people are in our community, the more they have seen and experienced. This is true even for climate change. For this activity identify at least 3 relatives from 3 generations (a generation represents all the people born and living at about the same time). In this case we will look at these generations:

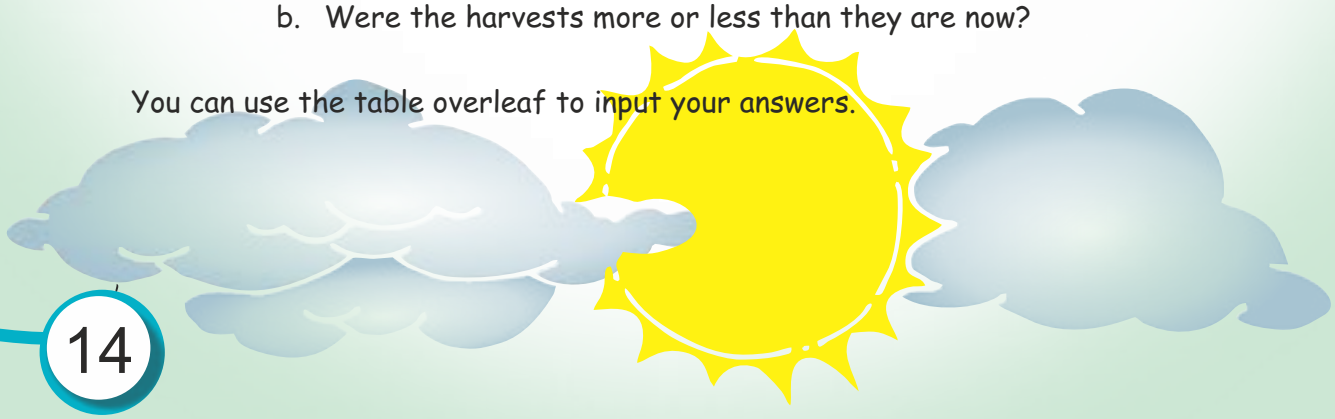
a. Your grandparents age group
b. Your parents age group
c. Your age group

Ask all three of them the following questions and write the answers down.

Questions for the three relatives

1. **Temperature**
    a. What were the temperature conditions in winter when you were my age?
    b. What were the temperature conditions in summer when you were my age?
2. **Rainfall**
    a. In which month did it start to rain and in which month did the rains end.
    b. Did you have floods? If yes how often?
    c. Did you have droughts? If yes how often?
    d. Was the rain more or less than it is now?
3. **Vegetation and animals**
    a. Which wild fruits and plants did you eat and are they still found?
    b. Which insects and animals did they hunt and can you still find them now?
4. **Harvests**
    a. Which crops did you grow and eat when you were my age?
    b. Were the harvests more or less than they are now?

You can use the table overleaf to input your answers.



Climate change trends

	Grandparent	Parent	My age
Winter Temperature			
Summer Temperature			
Rainfall start			
Rainfall end			
Floods: How often?			
Droughts: How often?			
Wild fruits and plants that you ate?			
Animals and insects that you ate?			
Crops that you grew and ate?			
Were harvests more or less than they are now?			

Compare the answers from the 3 people interviewed and answer the following questions.

1. Has climate changed from the time your grandparents were young children?
2. How reliable do you think this information is?

Welcome to Chapter 3

Global Warming

In this Chapter you will learn more about:

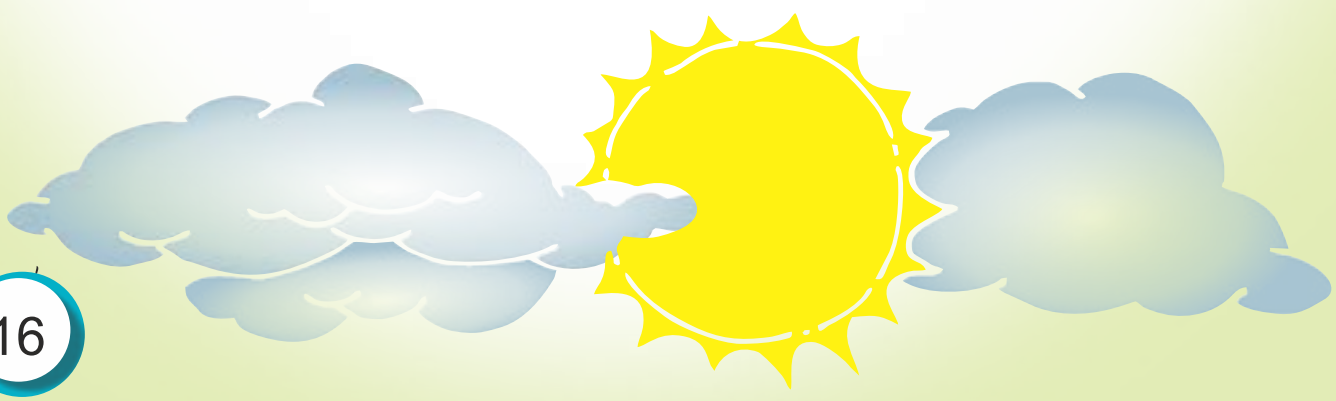
1. What global warming is and its causes
2. Greenhouse gases and the greenhouse effect.
3. The role of human activities in Global warming.

At the end you will have a couple of activities to jog your memory and test your comprehension of the topics covered.

Skills

The intended skills to be developed in Chapter 3 include the following:

1. Content Mastery
2. Critical thinking skills



So what is causing these changes to our climate?

Global Warming

Scientists have discovered that changes to our climate are being caused by what is known as **Global Warming** which has always been there.

Global warming is the average increase in the Earth s temperatures.

There are 2 kinds of Global Warming.

1. Global warming from natural causes
2. Global warming from human activities

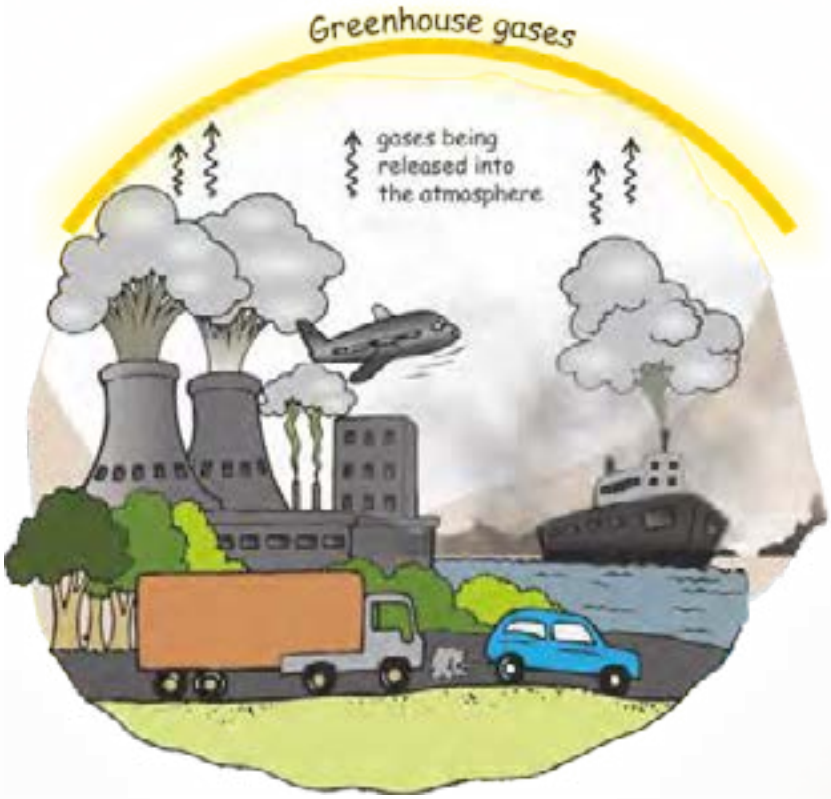
Global warming from natural causes

Volcanic eruptions and natural fires are natural events which have always happened. They helped to keep the Earth warm.

Global warming from human activities

Human activities are the main cause of the increase in global warming. The industrial revolution which began in the 18th century resulted in the use of a lot of fossil fuels. Use of fossil fuels released a lot of gases into the atmosphere. As a result this has led to the Earth getting warmer.

Human Activities



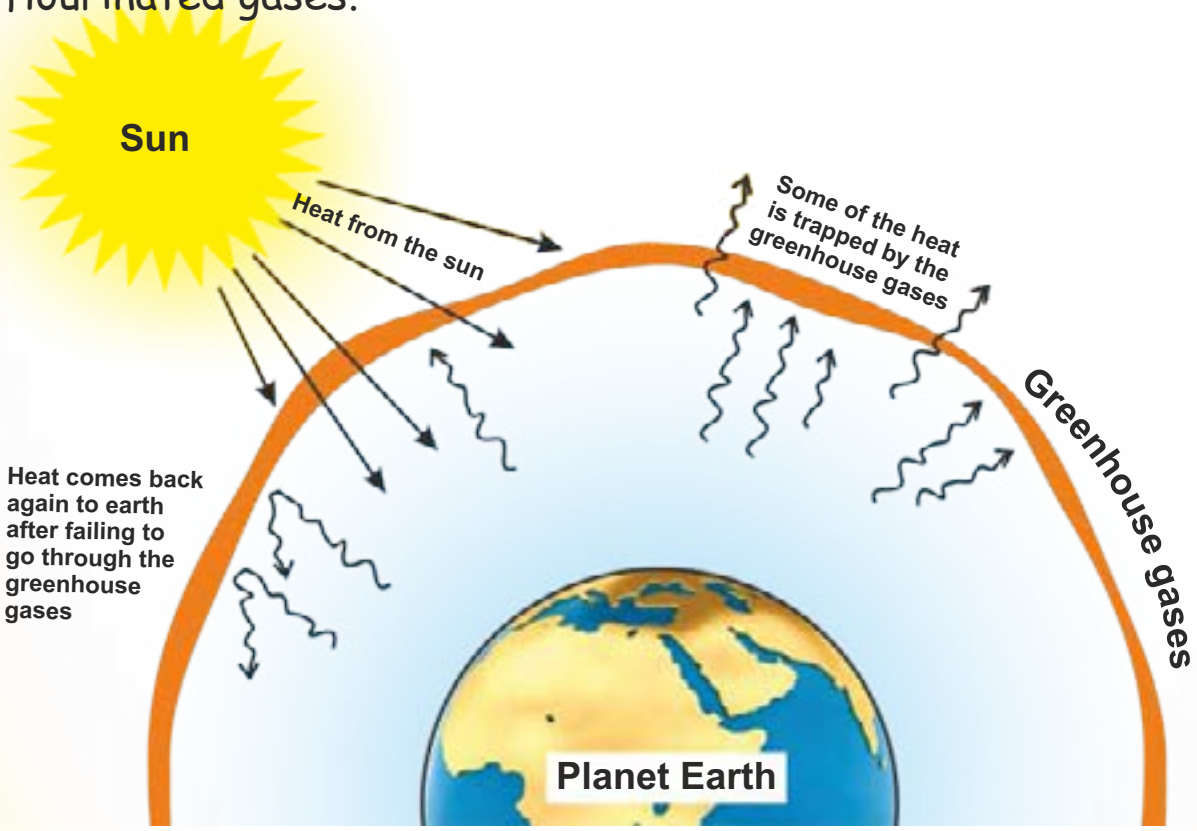
Fossil fuels are fuels that form when organic material (the remains of once-living things) is buried under great pressure and temperature over millions of years. They take ages to form but only a little time to burn.

But how does adding gases into the atmosphere result in global warming?

For us to understand global warming, we need to understand the greenhouse effect and what Greenhouse gases are.

Greenhouse Gases

Greenhouse gases are found in the ozone layer. They are sometimes known as heat trapping gases. Examples of greenhouse gases are, water vapour, carbon dioxide, methane, nitrous oxide and flourinated gases.



Greenhouse gases are natural or manmade gases in the atmosphere. They act like a protective blanket around the Earth. They trap heat to keep the Earth warm and this process is known as the **greenhouse effect**.

- Water Vapour is the most abundant greenhouse gas in the atmosphere

The Greenhouse Effect

The greenhouses used by farmers help us to explain the greenhouse effect. Have you ever seen a green house? In some areas farmers build a plastic house to plant crops in. It is built so as to allow the sun's rays to enter. The purpose is to prevent the heat inside from going back into the atmosphere.

In a way the Earth is like this plastic house. The plastic on the greenhouse traps heat causing the temperature inside the greenhouse to increase. In the same way the greenhouse gases trap heat in the Earth's atmosphere causing the earth's temperature to increase. This increase in temperature is called **Global warming**.

Since these gases act like a blanket on earth, without them the earth would be too cold to live in. They give life to earth. However human activities are adding too many greenhouse gases to the atmosphere making the blanket thicker. As a result, the earth is becoming warmer and warmer.

Carbon dioxide is the leading cause of the global warming happening today. This gas is produced when people and animals breathe out and when certain fuels are burned. It is also used by plants for energy.

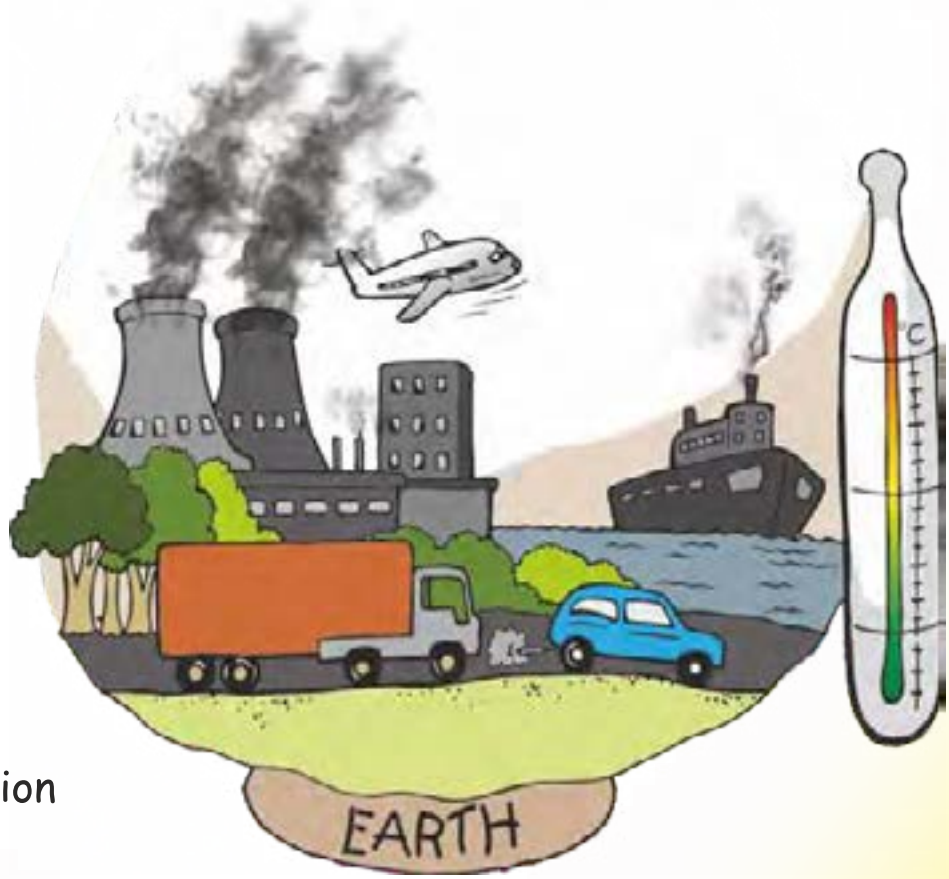
Causes of Global Warming

So how are human activities the main cause of Global Warming?

When we burn fossil fuels, biomass and other harmful chemicals, greenhouse gases are released into the atmosphere. These gases add to the greehouse effect causing additional warming to the earth.

The following contribute to global warming;

- Aircrafts
- Ships
- Cars
- Trains
- Industries
- Veld Fires
- Waste Dumping
- Oil Drilling
- Energy Generation



Activities that add to Global Warming

1. Deforestation

When we cut down trees to clear land for agriculture and other activities, we reduce the **carbon sink** available.

Anything that acts to absorb carbon from the atmosphere is called a **carbon sink**.

Trees are the most common carbon sink. When they are cut down:

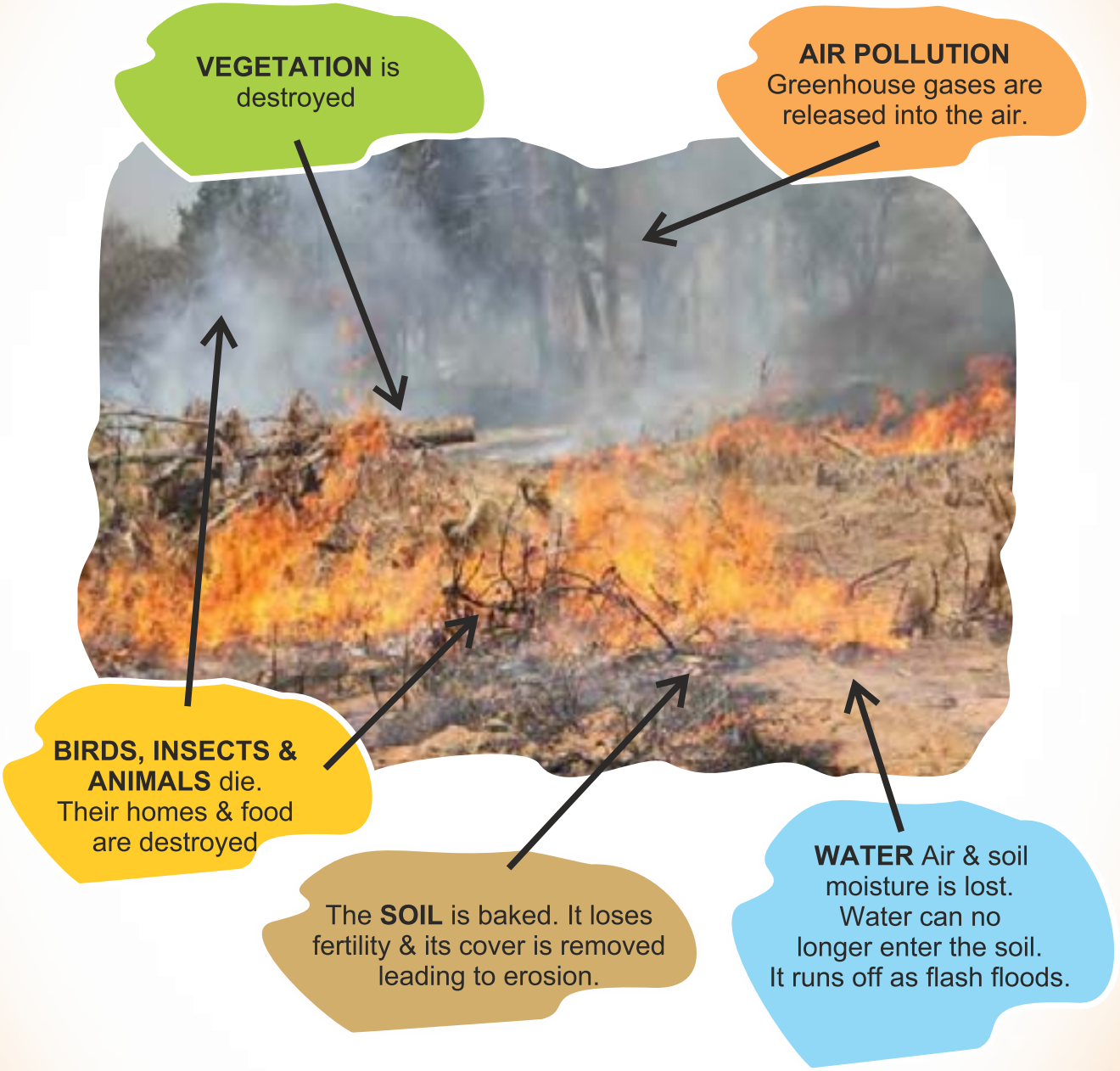
(a) Carbon dioxide increases in the air as it is no longer absorbed by trees.

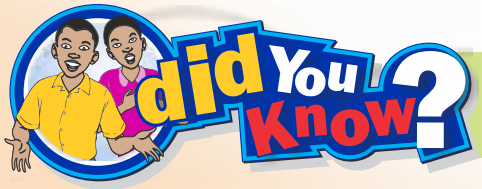
(b) Air temperature rises as heat is no longer absorbed.

Trees are therefore very important and play a major role in supporting life.

2. Veld fires

Veld fires and the use of wood for energy release carbon dioxide and other greenhouse gases back into the air. Veld fires also damage the carbon sink and the environment.





In Zimbabwe 88 people died from veld fires between 2008 and 2009

3) Open Fire Burning

Most people in Zimbabwe cook on open fires. They mainly use firewood. Burning wood on an open fire releases a lot of gases into the air as smoke.

The smoke from open fires contains gases that cause illnesses such as;

These gases also contribute to Global Warming.

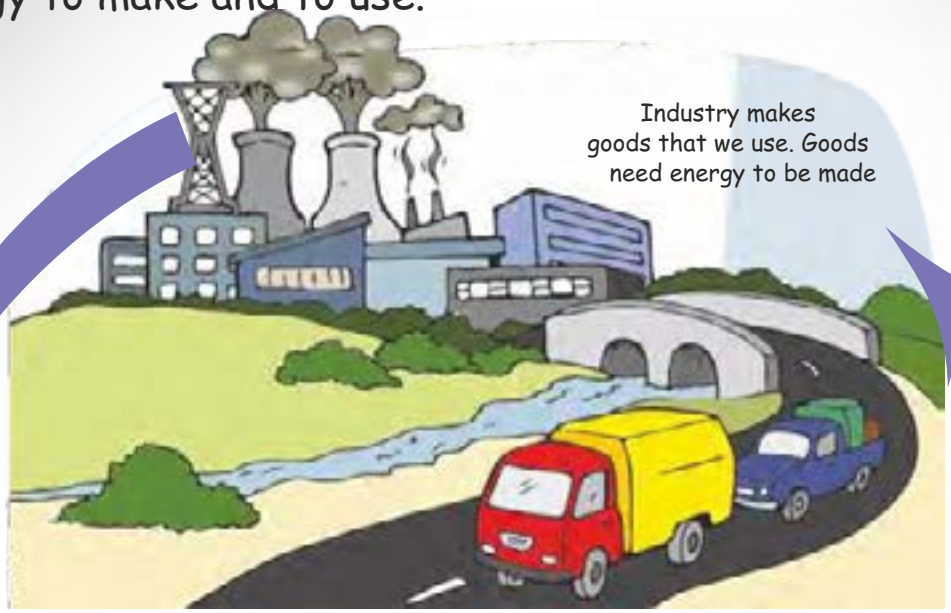
Most of us love *gochi gochi* or *tshisa nyama*, but the amount of firewood used in such places is leading to deforestation. This is contributing to global warming by releasing large amounts of greenhouse gases.

When we cook on open fires, a lot of heat is lost before it gets to the pot. It means we need more firewood to cook. This makes it an **energy inefficient** way of cooking.

Energy efficiency is making use of the total energy produced.

4) Industries

We add to global warming by buying goods which use a lot of energy to make and to use.



Industry makes goods that we use. Goods need energy to be made

Goods are delivered to shops and get sold

The more we buy and use these goods, the bigger the demand for more goods to be manufactured by industries. Which means demand goes back to the manufacturer.

We buy and take home the goods sold in shops

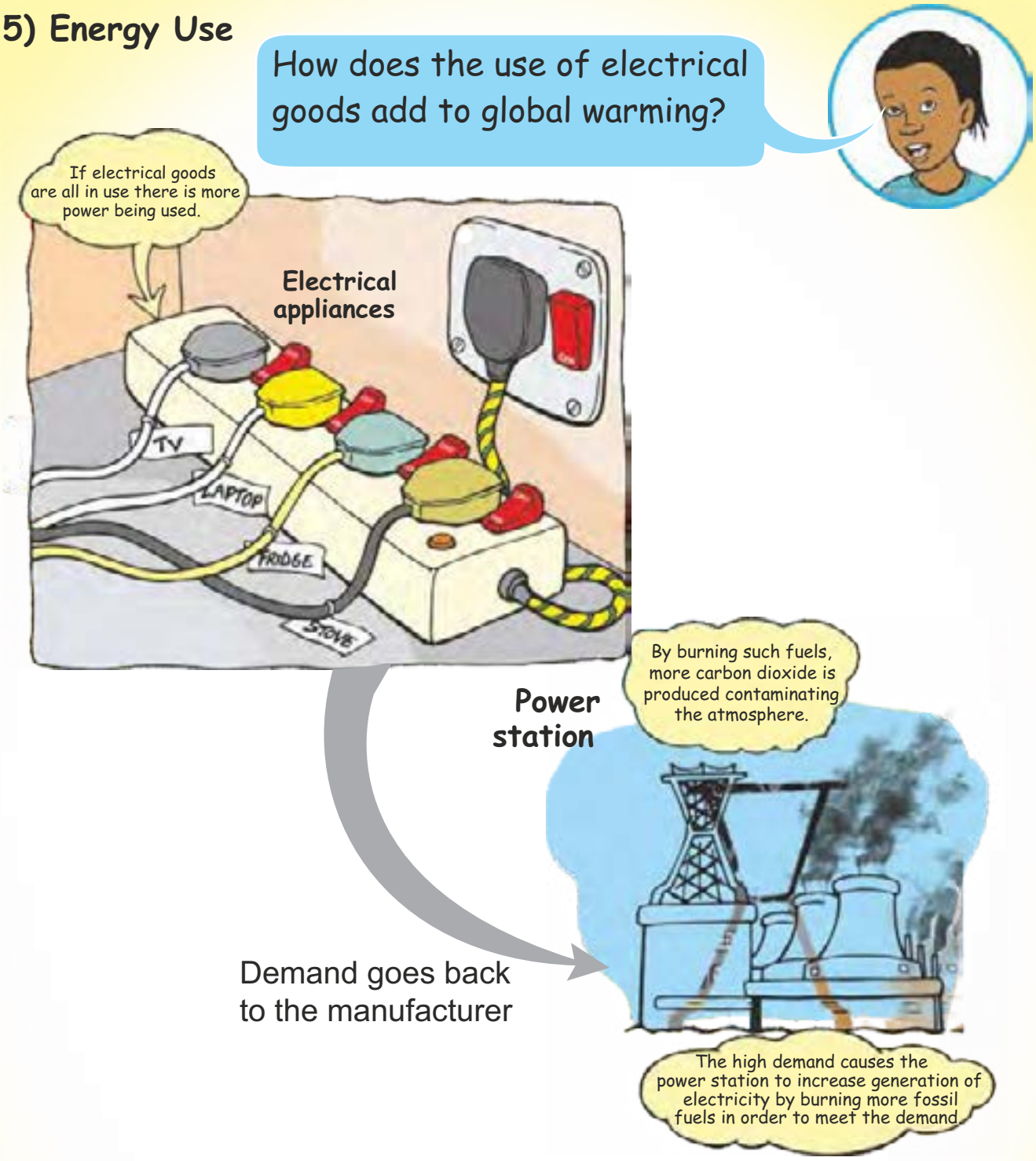
Many industries are energy inefficient. They waste energy when manufacturing goods.

Goods need energy to work

Below are some examples of goods that use electricity to run in our homes.

Some electrical goods that we use require too much power to run. These goods are not energy efficient. By using these inefficient electrical goods we are indirectly adding to Global Warming.

5) Energy Use



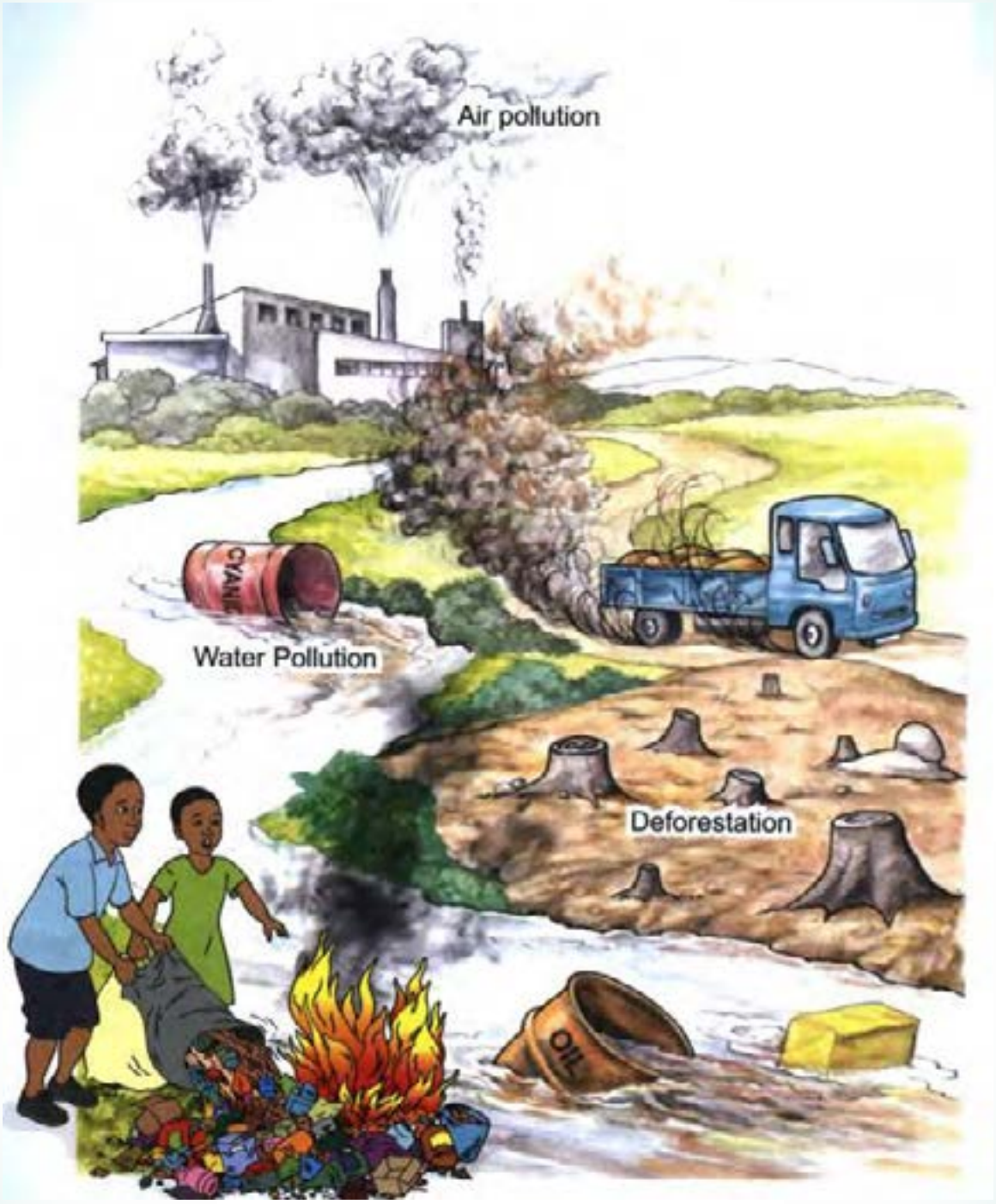
In Zimbabwe some of our electricity comes from Hwange Thermal Power Station which uses coal.

Therefore when demand for electricity goes up more coal is burnt in order to generate more electricity.

As a result, more greenhouse gases are being released into the atmosphere because of the high demand for electricity.

6) Poor Waste Management

Waste dumping and burning add to global warming as greenhouse gases are released into the atmosphere.



A lot of waste that ends up in dumpsites is plastic which is made from crude oil which is a fossil fuel. Burning this waste at low temperatures with little oxygen results in the release of greenhouse gases. This adds to global warming.

Global Warming Activity

Answer True or False

1. The use of coal in power generation does not lead to global warming. **True / False**

2. Trees are carbon sinks. **True / False**

3. Global warming is causing changes to our climate. **True / False**

4. The greenhouse effect is normal. **True / False**

5. Global warming is the average increase in the Earth's temperature. **True / False**

6. Climate and weather are the same thing. **True / False**

7. The most abundant greenhouse gas is Oxygen. **True / False**

8. Human activities do not cause global warming. **True / False**

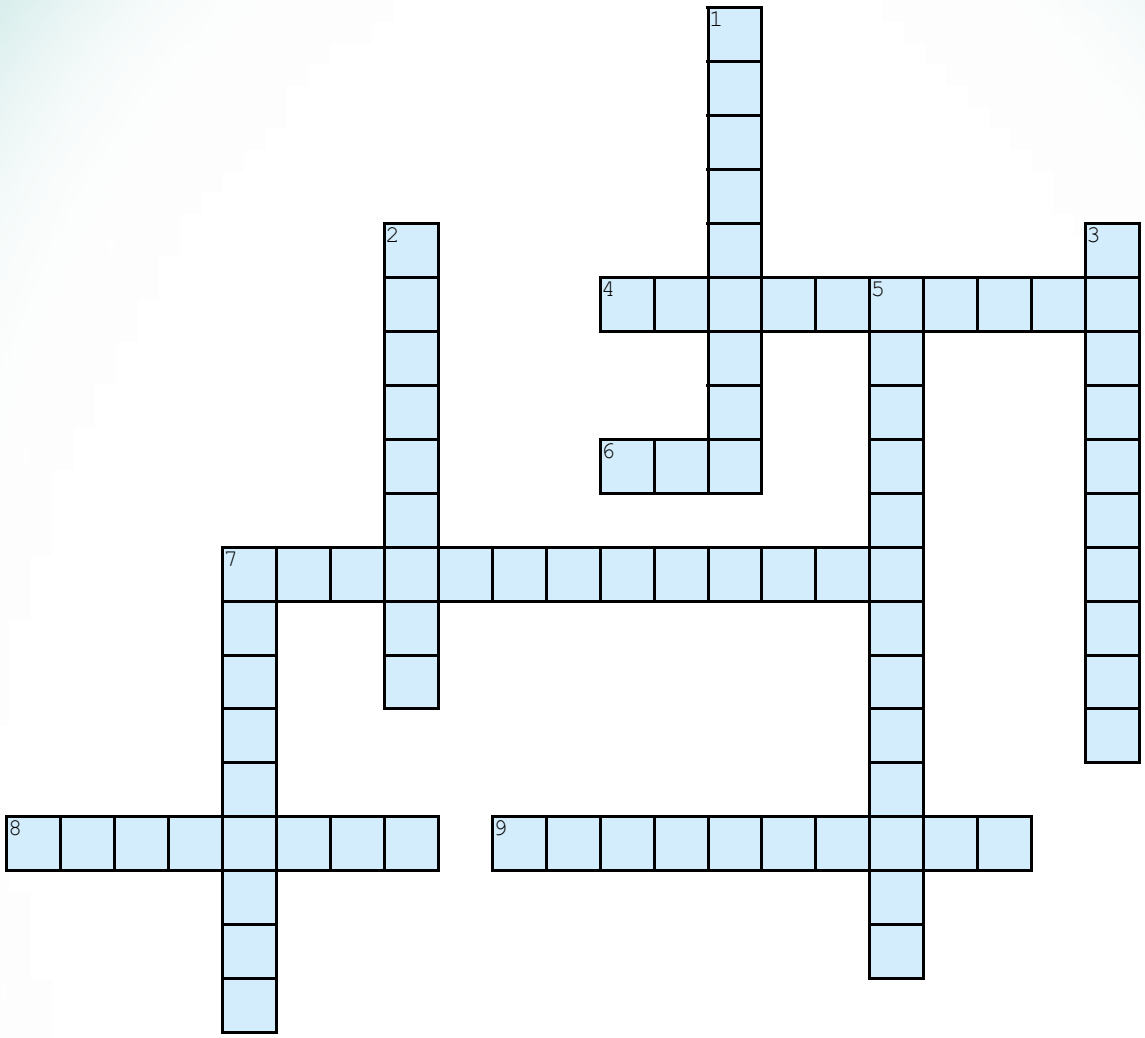
9. People in the past harvested more food than today. **True / False**

10. Energy efficient activities cause global warming. **True / False**

11. Burning waste releases greenhouse gases. **True / False**

12. Global warming is a good thing. **True / False**

Global Warming Crossword



Across

4. Condition of the person who cannot cope with changes brought by climate change.
6. The acronym of a clean fuel that burns with a blue flame and does not pollute.
7. Trees absorb this greenhouse gas and use it to make food.
8. Zimbabwe's Development Agenda
9. Action taken to reduce the effect of climate change.

Down

1. Using waste to make new products.
2. Energy found from natural sources which does not pollute.
3. The ability to live with changes brought by climate change.
5. Planting trees to make a woodlot or forest in an area that had trees removed before.
7. A way of making use of organic waste.

Welcome to Chapter 4

Climate Change

In this Chapter you will:

1. Explore the link between global warming and climate change.
2. Look at the climate change impacts at local and global level
3. Learn about how to fight climate change and what is being done locally.

You will find some fun activities dotted throughout the Chapter which will test your comprehension skills as well as a fun activity at the end of the Chapter to help you to make a self-assessment and take action in relation to climate action.

Skills

The intended skills to be developed in Chapter 4 include the following:

1. Content Mastery
2. Critical thinking and leadership skills
3. Values of discipline and Unhu/Ubuntu
4. Self-management skills
5. Initiative and problem solving skills

So why is Global Warming a problem?

Climate Change

Global warming is a problem because it causes changes in our weather leading to climate variability and over a long time causes our climate to change. This is what is known as **climate change**. Climate change includes major changes in temperature, rainfall or wind patterns among other effects.

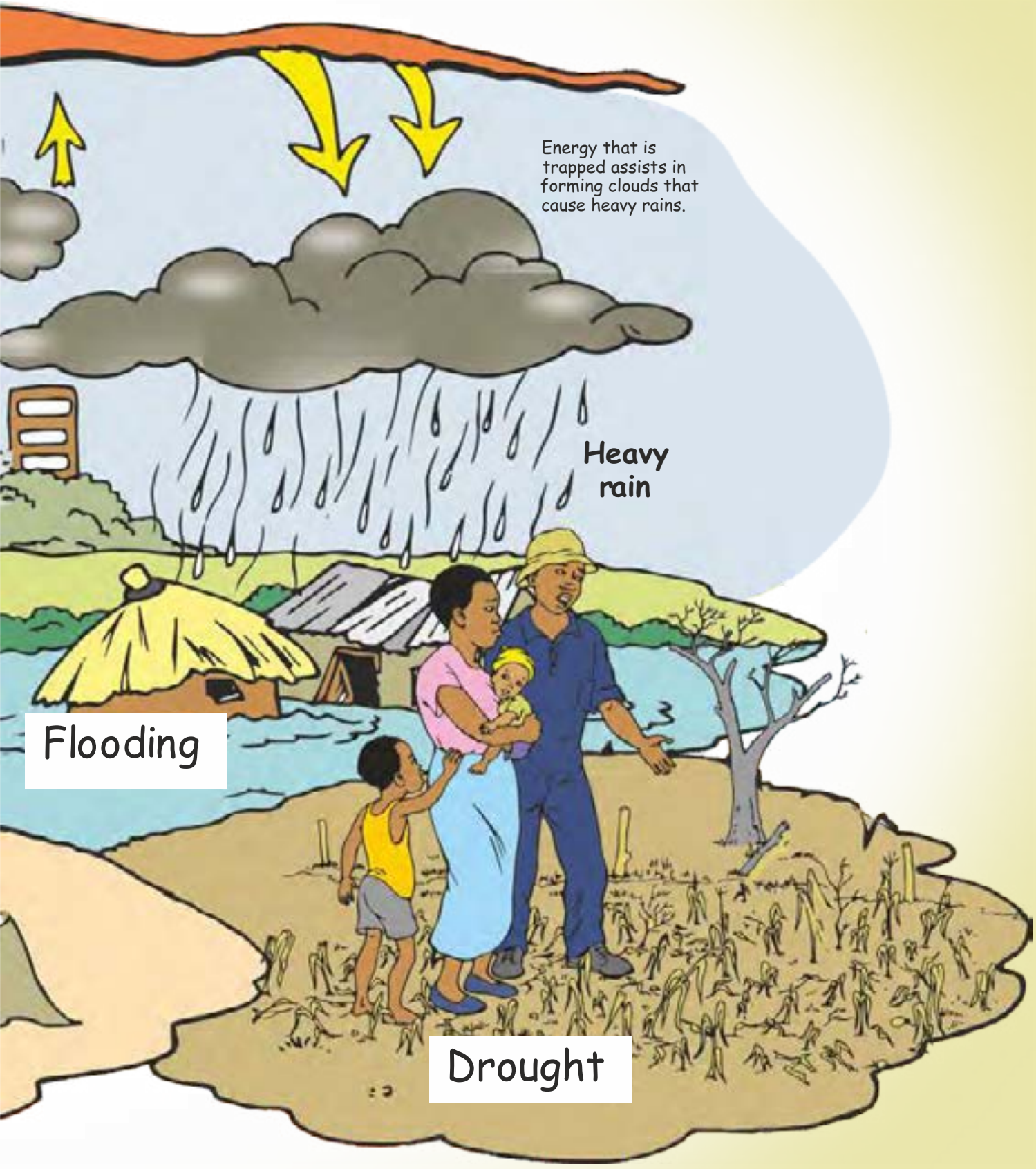
Small changes in the average temperature can result in big changes to the weather patterns and to the climate. As a result weather patterns are changing due to climate change leading to:

- increased temperatures;
- increased incidence of extreme natural events such as
- droughts and flooding;
- a gradual shifting of seasons;
- a changing of the worlds landscape.

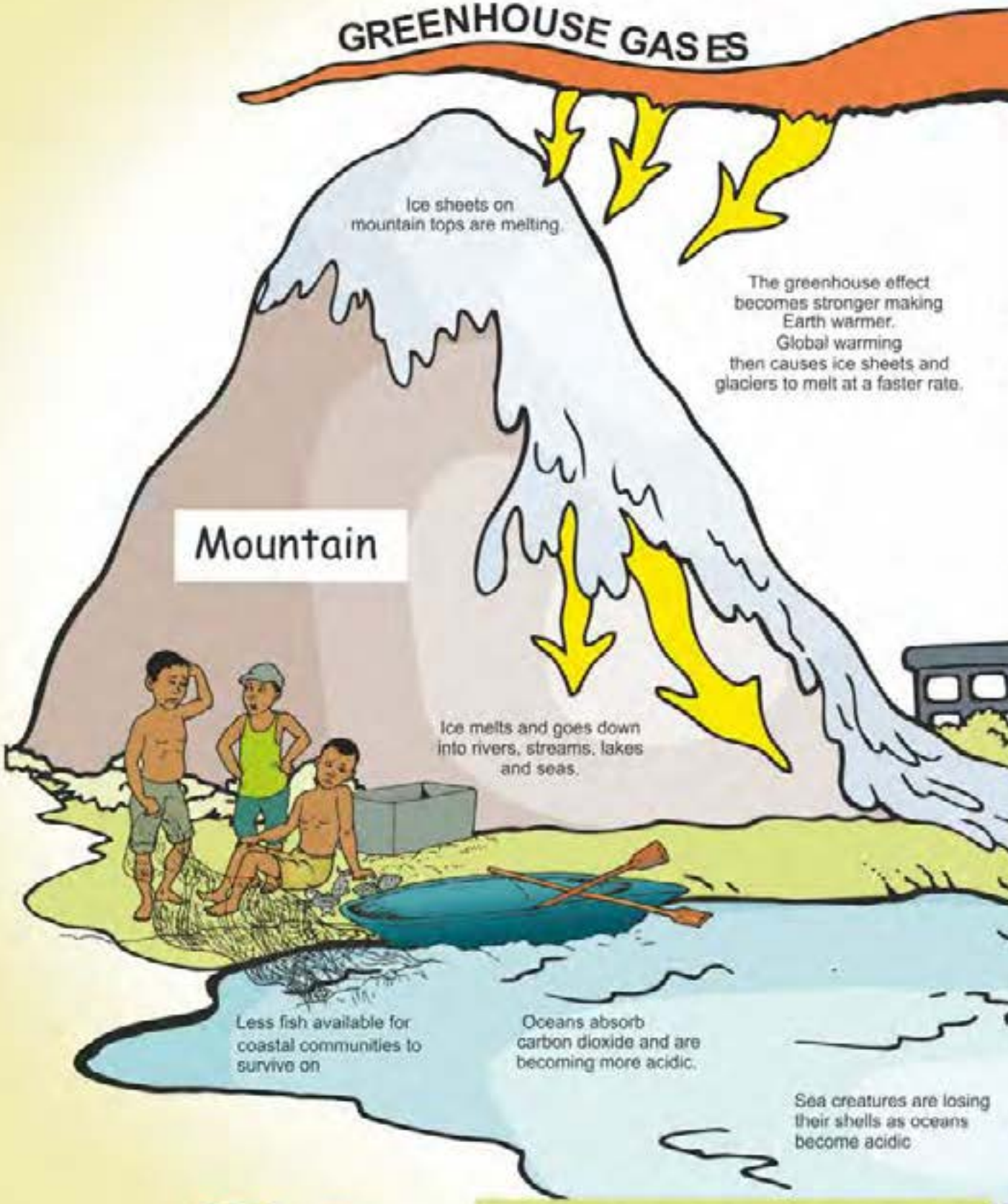
In 2016/2017 rainy season flooding occurred which damaged more than 75 schools in Zimbabwe.

How is Climate Change

affecting us in Zimbabwe?

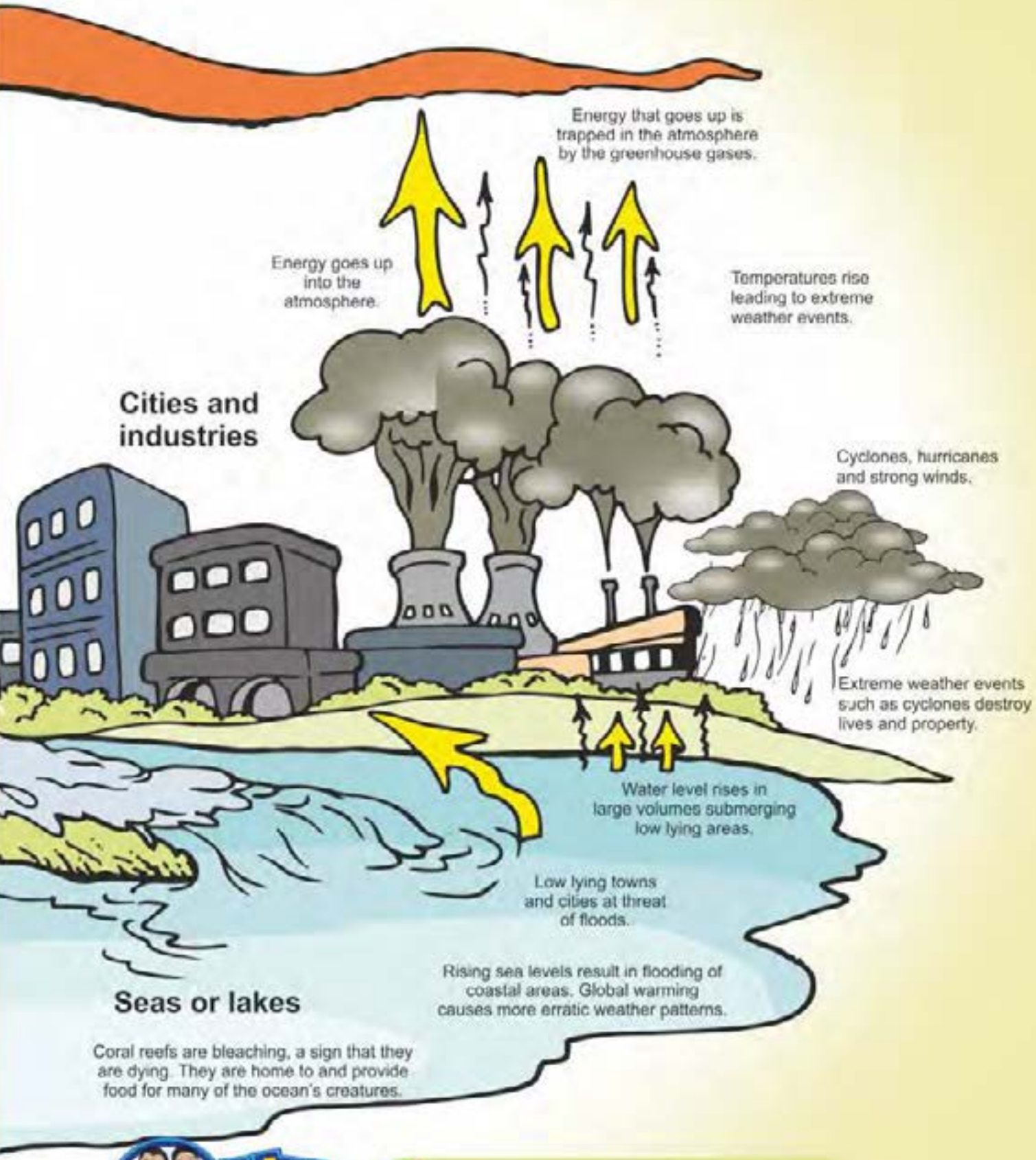


How is **Climate Change** affec



In 2016 five islands in the Solomon islands in the Pacific ocean were completely covered by the rising sea. These islands had tropical vegetation that was at least 300 years old.

ting other parts of the world?



When sea level rises, costal lands are destroyed. The people are forced to move inland causing conflict.

Climate Change impacts

Climate Change affects many areas of our lives as follows:

1. Agriculture

Due to the changes in weather patterns, climate change is affecting agriculture. This is because of the change in rainfall patterns. There are more frequent droughts and floods which are affecting farming activities. This leads to food shortages.

The shortages lead to conflict as people fight over the little available food.

Food shortages also lead to malnutrition which exposes people to diseases especially children.

2. Water Supply

Climate change causes repeated droughts and flooding. Flooding damages water supply facilities resulting in less clean water available. Droughts mean less water is available meaning people turn to sources that are not safe.

The lack of clean and adequate water affects the health of people. It leads to outbreak of water borne diseases such as ringworm, cholera, typhoid, anaemia, diarrhea and bilharzia.

People need to drink water from safe sources so that they don't fall sick.

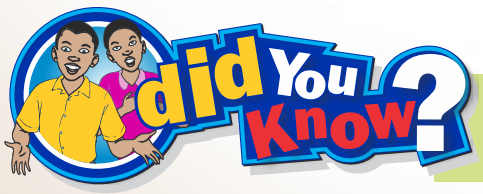
3. Extreme Temperature

Climate change causes extreme temperatures which result in some of the following problems:

a) Heat Waves

Extreme temperatures result in repeated heat waves which affect our health.

Heat waves are caused by very high temperatures. They make us suffer from heat exhaustion or tiredness, breathing difficulties, headaches, body rashes and other illnesses.



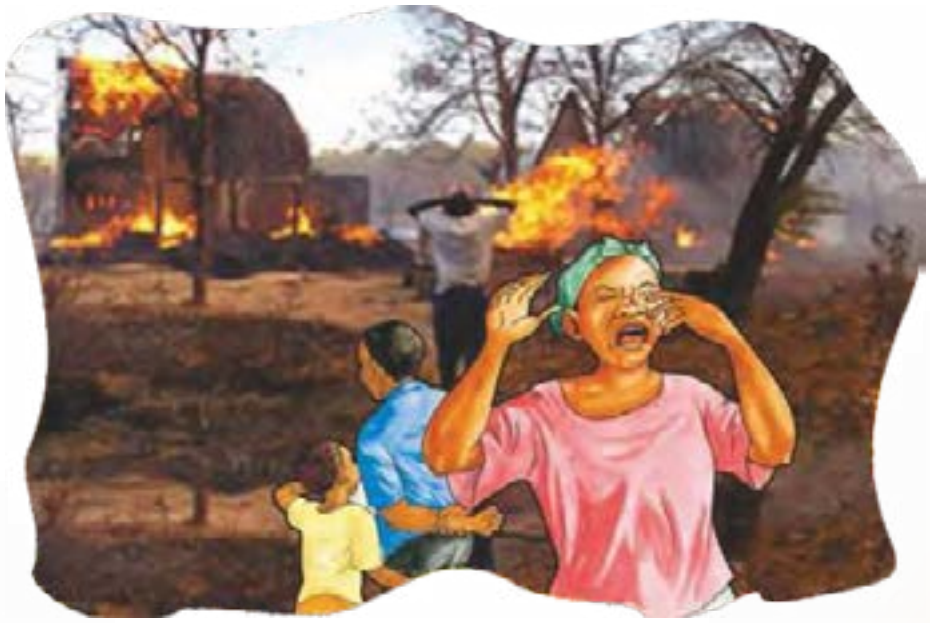
In 2015, Air Zimbabwe failed to land in Kariba due to a heat wave.

b) Distribution of pests and disease changes

Extreme temperatures are causing the spread of pests and diseases. Pests such as mosquitoes, army worms and locusts are now being found in areas they were not seen before, leading to repeated disease outbreaks.

c) More Frequent and severe Veld Fires

People start veld fires. Due to extreme temperatures, veld fires become difficult to control. These are harmful to people, animals and property. People have lost their lives in veld fires, even children. They also lead to more climate change as they release stored carbon as greenhouse gases.



In 2016, 3 adults in Chitomborwizi, Mashonaland West died whilst fighting veld fires.

Activity Page

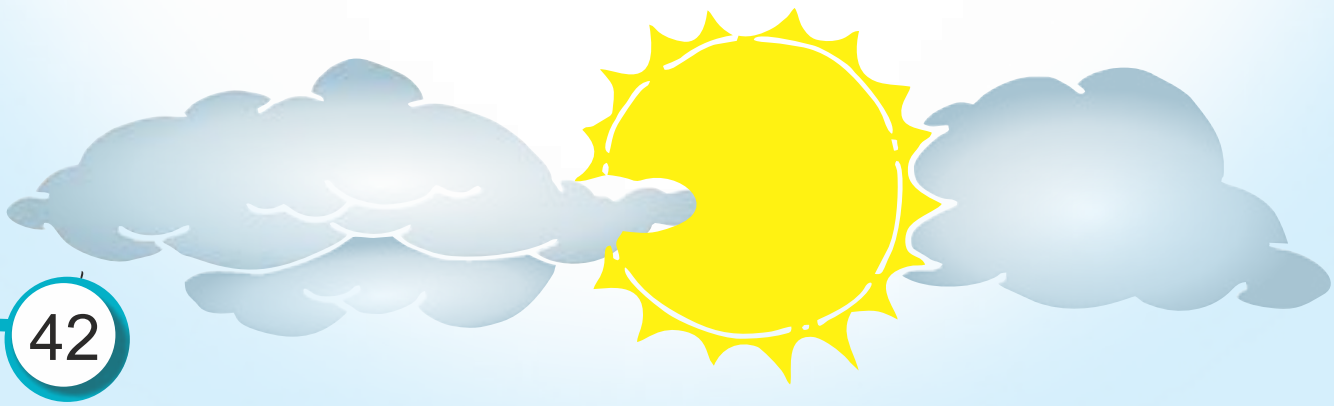
Climate Change Impacts

Complete the Sentence

Use the words in the list below to complete the sentence

infrastructure pests
vulnerable food
temperatures safe
resilient water disease
conflicts

1. Climate change affects farming which leads to _____ shortages.
2. Droughts mean less _____ is available for people to use.
3. Flooding damages water facilities and this means water may not be _____ to use.
4. Lack of clean and adequate water leads to _____ outbreaks such as cholera.
5. Increase in temperatures leads to spread of _____ and diseases.
6. Extreme _____ make veld fires difficult to control.
7. People who are _____ are not able to cope with climate change.
8. People who can adapt to the changes brought by climate change are _____
9. Climate change results in _____ as people fight for food, land and other resources.
10. Climate change destroys _____ such as roads and schools.



Vulnerability and Resillience to Climate change

The people of Zimbabwe are vulnerable to climate change. This means that they suffer from whatever climate change brings.

Vulnerability

When people are vulnerable it means that they are not able to cope with the changes brought about by climate change. The people of Zimbabwe need to become more resilient to climate change.

Resilience

Climate resilience is the ability of people, animals and plants to continue living a normal life even if there are problems like droughts, water shortages, heat waves and little or no rainfall. When people have resources which they can use to adapt to climate change they are referred to as being climate resilient.

It is projected that in the future Zimbabwe will have less rainfall and become hotter due to climate change.

That is serious as most people in Zimbabwe and their industries rely on rainfed agriculture for survival.

This shows us that Zimbabweans must become resilient to climate change.

But how can people become resilient to Climate Change?

Since people are responsible for causing climate change they can take action to reduce it.

That is true! People can take action at the international, national or local level.

Fighting Climate Change

1. International Level

How is the World fighting climate change?

a) Paris Agreement

Countries took action to fight climate change and together came up with the 2015 Paris Agreement. This agreement sets targets for people to reduce emissions and help them to cope with the changes brought about by climate change.

PARIS2015
UN CLIMATE CHANGE CONFERENCE
COP21·CMP11

b) The Sustainable Development Goals

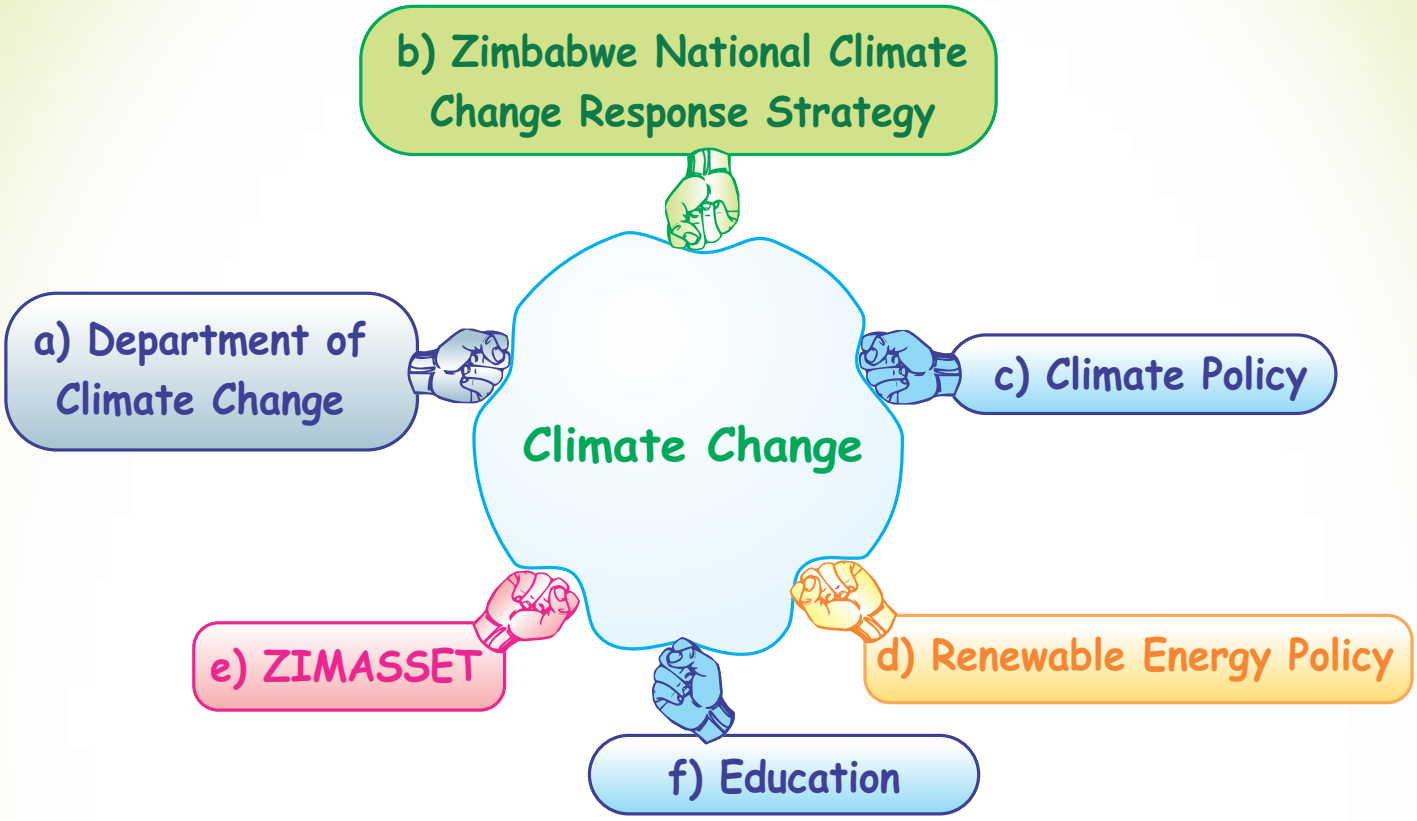
The Sustainable Development Goals are another way the world is tackling climate change. They guide how countries should carry out development in their countries so as to meet development goals. Climate change is an important goal in the Sustainable Development Goals.

Goal number 7 says:
Ensure access to affordable, reliable, sustainable and clean energy for all.

Goal number 13 says:
Ensure urgent action to combat climate change and its impacts.

2. National Level

How Zimbabwe is fighting climate change



a) Department of Climate Change.
Zimbabwe has a department responsible for climate change in the Ministry of Environment, Water and Climate. Having a full department is important as it means there are dedicated staff working on climate change. It also means government is willing to set aside a budget to deal with issues pertaining to climate change.

b) National Climate Change Response Strategy
The country has a climate change response strategy in place since 2014. The strategy shows the plan for responding to the threat of climate change for the country.

c & d) National Policies

The country is developing policies which guide how sectors work. They guide the formation of law and guidelines for those working in the different sectors.

The country is in the process of developing and finalising the renewable energy and climate policies. These will guide climate change action in the country.

e) ZIMASSET

Zimbabwe's development agenda makes fighting climate change a priority. Zimbabwe's Agenda for Sustainable Socio-Economic Transformation (ZIMASSET) is a plan of action to guide development in all the country's social and economic sectors.

It makes climate change a priority for the nation as it affects development.

f) EDUCATION- The Curricullum Framework for Primary and Secondary Education 2015 - 2022

The Ministry of Primary and Secondary mainstreamed the teaching and learning of climate change concepts as 'cross-cutting themes' in all the learning areas. Helping learners to be innovative, creative and responsible citizens in their socio-scientific approaches in dealing with climate change issues. Learners are also becoming pro-active participants in reducing and mitigating climate change through the curriculum. Schools have become centers for climate change information which will eventually be transmitted to parents through learners.

3. Community Level

How are communities taking action to fight climate change?

Communities have also come together to fight climate change in many ways. School environmental clubs which are actively involved in fighting climate change are a good example.

4. Individual level

How are individuals fighting climate change?

Individuals are also being encouraged to take action to fight climate change. That is because fighting climate change is everyone s responsibility including children.

There are two ways to deal with climate change. These are:

a) Adaptation
b) Mitigation

Adaptation and Mitigation

Adaptation

In Zimbabwe, we are already experiencing changes due to climate change. **Adaptation** is a way of coping or taking action to live with the changes it brings about.

For example, adaptation to drought can be the growing of drought resistant crops and using irrigation farming.

Do you know of any other adaptation methods used in your area to cope with the changes brought about by climate change?
What are they?

Mitigation

Mitigation is any action taken to reduce or remove the causes of climate change. It involves action that

a) removes greenhouse gases from the air or,
b) prevents more greenhouse gases from getting into the air.

Mitigation prevents further climate change from happening. One example of a mitigating action is the use of solar energy as a source of electricity in the home. This avoids the burning of fossil fuels for electricity generation hence preventing further climate change.

Do you know of any mitigation methods for preventing climate change that are used? What are they?

Action to fight Climate Change

Here are some adaptation and mitigation ways of fighting climate change. As we have learned it is possible for us to take action against climate change. Let us look a bit more at some of these ways of fighting climate change and why they are important.

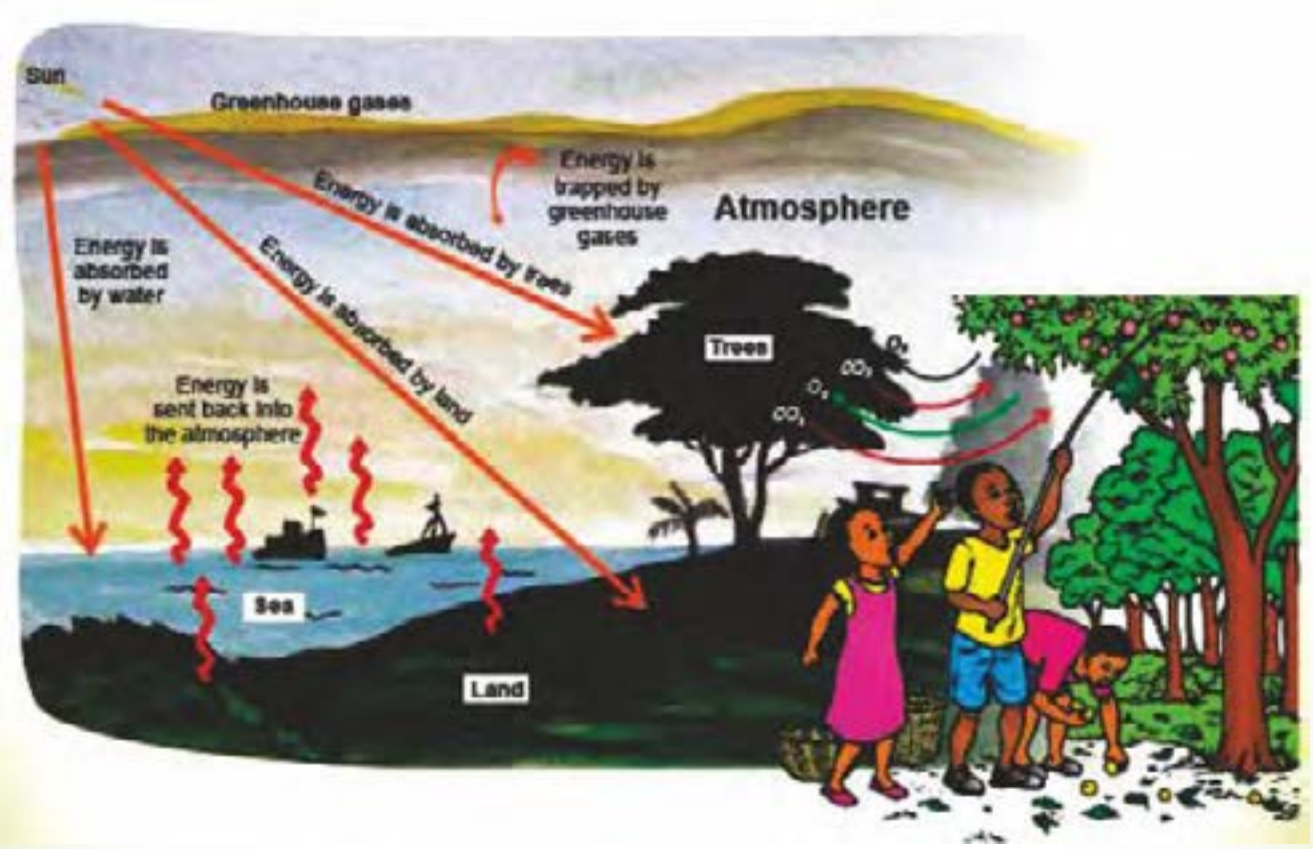
1. Planting Trees

We need to plant more trees than we cut down. Anyone can plant a tree. Even you!

Tree seedlings make very good presents and gifts to your loved ones.

Importance of Trees

- Trees are important because they help to cool the air. They do this by absorbing excess heat from the atmosphere. This lowers the temperature of the atmosphere.
- Trees absorb carbon dioxide and other gases during evapotranspiration. This reduces the amount of greenhouse gases in the atmosphere.
- Trees store carbon as they grow.
- Trees release oxygen into the atmosphere which is necessary for life.



Is planting trees an adaptation or mitigation method of fighting climate change?

2. Prevention of Veld Fires

Veld fires destroy large areas of vegetation. This reduces the carbon sink and prevents trees from growing. They must be prevented.

Landowners must have fireguards and communities must have firefighting committees.

WARNING! children should not play with fire. They must never try to fight any fires. They must run to safety and inform an adult of any fires.

Is preventing veld fires an adaptation or mitigation method of fighting climate change?

A standard fireguard of 9 metres helps to stop a fire from crossing to new area.

Before starting a fire one should inform Environmental Management Agency (EMA) officer or relevant authorities in your area.

3. Renewable energy

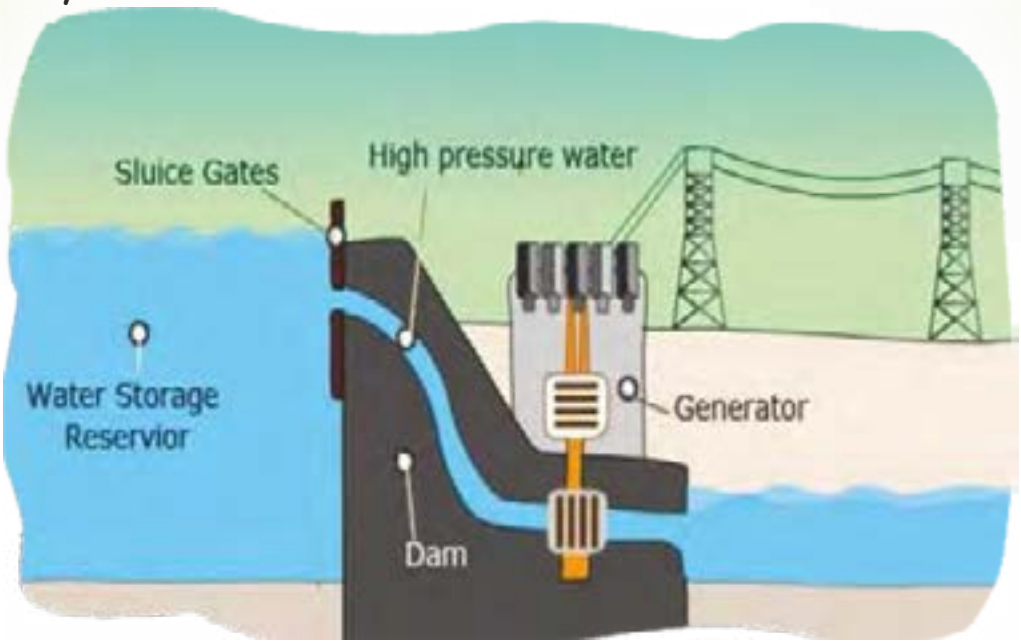
Renewable energy is made from clean sources that are replaced. Renewable energy does not release harmful greenhouse gases into the atmosphere. For example energy from the sun, wind and water is renewable clean energy.

(a) Solar Energy

Energy from the sun is called solar energy. Solar energy can be changed to electricity and used to power many things that we use in our homes, schools or industries.

(b) Hydro electricity

Hydro electricity is energy made from the power of flowing water. For example Kariba Power Station is a hydro-electricity power station. It uses the water in Kariba dam to generate electricity.



(c) Wind Power

Wind power can be used to generate electricity and to pump water.

Do you know of any other sources of renewable energy? What are they?

Is using renewable energy an adaptation or mitigation method of fighting climate change?

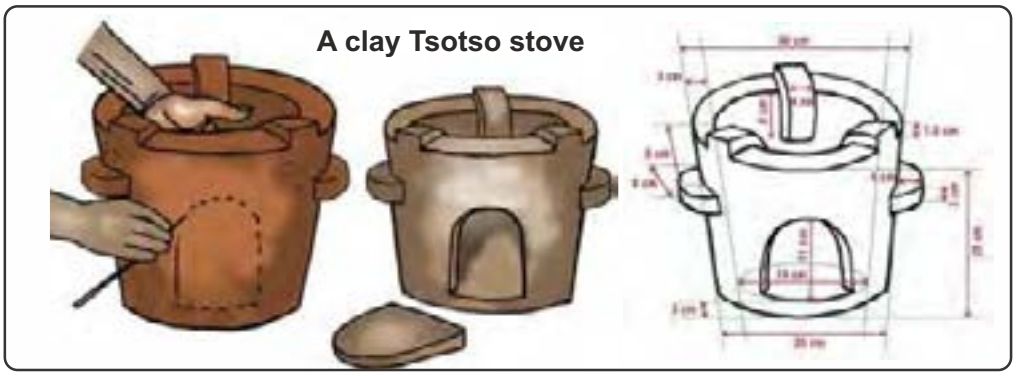
4. Energy Efficient Cooking

There are many ways of saving the energy used for cooking.

(a) Use more efficient stoves

Efficient stoves are built so that they get the most energy out of as little fuel as possible. They are also built so that energy is not lost during cooking. This means they use less fuel, they pollute less and cook longer.

An example of such a stove is the tsotso stove which is made from clay. They are easy to make and affordable. They use twigs to cook the same meals that are cooked on open fires or electricity stoves.



A clay Tsotso stove

There are different kinds of efficient cookstoves that are affordable to most people. Some like the clay Tsotso stove you can make yourself.

(b) Use cleaner fuels

Cleaner fuels are fuels that release less greenhouse gases during cooking. For example Liquid Petroleum Gas (LPG) is a clean fuel.

Many people are still afraid of using the LPG gas stoves but if they are used correctly they are a very safe way of cooking. They are also environmentally friendly.

Is saving energy an adaptation or mitigation method of fighting climate change?

5. Fuel Saving

It is important to save the fuel used by machinery and industries as it is mostly coming from fossil fuels. This is very true for vehicles. Saving fuel can be done in many ways which include cycling, walking, sharing vehicles or travelling by bus.

Sharing vehicles also known as car-pooling reduces the number of cars on the road. When there are less cars on the road it means less fuel is being used. As a result this means less greenhouse gases are being released into the air.

Less fuel is also used when people cycle or walk.

6. Correct Disposal of Waste

Correct waste disposal is important so as to reduce the amount of greenhouse gases released into the atmosphere.

All waste from our homes, school or elsewhere must be thrown away correctly. This can be done in many ways depending on whether the waste is organic or inorganic.

(a) Compost organic waste

Organic waste is waste from once living material. Composting organic waste generates biogas. Biogas is a fuel produced by the breakdown of organic matter in the absence of oxygen. The solids that remain after biogas is produced can be used as manure.

Biogas is a renewable energy source that can be produced from raw materials such as agricultural waste, manure, municipal waste, plant material, sewage, green waste or food waste.

(b) Reduce, Reuse, Recycle inorganic waste

Reducing, Reusing and recycling waste saves the amount of energy needed to make new goods. It also reduces pollution by making sure that the amount of waste being thrown away is reduced. You can reuse plastic bags or use a single bag for shopping

Green Bag Recycling

- PLASTIC
- PAPER
- GLASS
- CANS

Black Bag General

- GENERAL WASTE
- COMPOST

Do you know some of the items that can be recycled in Zimbabwe? What are they?

7. Save Electricity

Make sure that all things that use electricity are switched off in all rooms before leaving. By saving electricity we reduce the demand for power coming from the power station. This means less fossil fuels are burned to generate electricity.

8. Save Water

Saving water is important. We can do more things with less water. Saving water can be done in many ways. For example the water we rinse our plates with can be used to water our plants. Recycle and reuse water.

Remember, water is life and every drop counts! In a small way you too can save water.

Is saving water an adaptation or mitigation method of fighting climate change?

What are some of the things that you can do to save water?

Activity Page

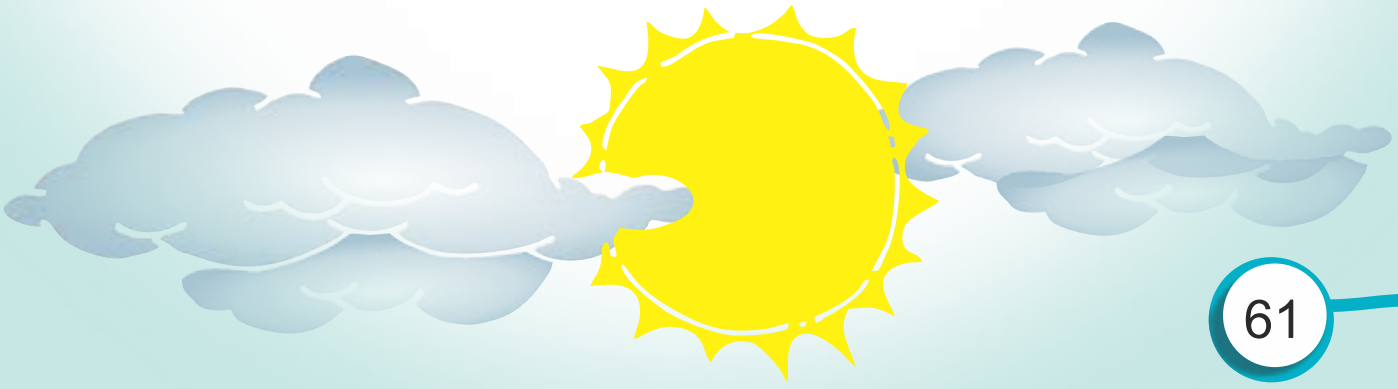
Carbon Footprint- Walking the talk!

Let's see how much carbon we are adding to the air.
As we have seen in chapter 4, we can add to the carbon released into the atmosphere by the choices we make every day. The **carbon footprint** is a measure of how much carbon we add to the atmosphere through our daily choices over a period of time.

The carbon footprint helps us to see where action is needed to reduce the amount of carbon we release into the air. When we know where much carbon dioxide is released we can find ways of cutting the amount of carbon we release into the air.

In this exercise we will look at your choices related to food, cooking, lighting, transport and waste. We will see how much carbon dioxide is added to the air on a scale of 1 to 4. The lower your number the less carbon you add to the air. The bigger the number the more carbon you add to the air.

Use the template overleaf to calculate your carbon footprint. Take note of the energy you use for each activity and whether or not the energy is from clean sources. You are free to add to the different classes if what you use is not included. Simply use what is given as a guide to help you see where to place your activity or appliance.
Let's go ahead and calculate!



Calculate your carbon footprint![1]

Activity	1	2	3	4	My Score 1/2/3/4
Where does your food mostly come from?	Local (near your dwelling)	Mostly local (within the country but not grown or produced near you.)	Mostly Regional (neighbouring countries)	International (food is transported by sea or air)	
What do you use for cooking most times?	LPG Gas, Biogas,	Main grid electricity[2] Gasifier stoves	Clean Cookstove (tsotso, jengetahuni, chingwa stove)	Paraffin stove Open fire	
What do you use for lighting?	Solar	Main grid electricity Gas lamps Battery Torches	Candles	Paraffin lamps, Open fire	
What is your daily mode of travel?	Walking Cycling	Public transport (Bus, commuter omnibus)	Shared private car (carpool)	Private car	
How do you dispose of your waste?	Mostly reuse, recycle and compost	Mostly collected by Local Authority	Mostly bury waste	Mostly burn waste Dump in open space	
Total	**5 Very Small Carbon footprint**	**6-10 Moderately small carbon footprint**	**10-15 Moderately large carbon footprint**	**16-20 Very large Carbon Footprint**	

Enter your score on the right hand column and then sum up to get the total.

1. How big is your carbon footprint?
2. What actions will you take to make sure it goes down?

[1] Please note that this is a simplified version of an actual carbon footprint assessment.

[2] Please note that in Zimbabwe Main Grid Electricity is not totally clean as some of it is produced using coal which is a fossil fuel.

Benefits to the community

How does it benefit the community when children learn more about Climate Change?

When children learn about climate change, it is an investment into the future of Zimbabwe.

Fighting climate change presents opportunities for:

1. **Strengthening the agricultural sector** - using efficient farming technologies.
2. **Reviving the local industry** - less greenhouse gases.
3. **Creation of Green Jobs** - these are jobs that contribute to preserving or restoring the quality of the environment.

When communities take action to fight climate change, they reverse global warming and its bad effects. By reducing climate change, communities move closer to the goal of living in a

clean, safe and **healthy environment.**

Welcome to Chapter 5

Why Learn About Climate Change?

In this Chapter you will

1. Learn more about the importance of learning about climate change
2. The role of children in fighting climate change
3. Where to get more information about climate change

The intended skills to be developed in Chapter 5 include the following:

Skills

1. Communication and teamwork skills
2. Leadership, technological and problem solving skills
3. Initiative and self-management skills
4. Volunteering and manifestation of patriotism
5. The values of Unhu/Ubuntu, discipline and honesty

Why Learn about climate change?

The Role of children

It is important for children to learn more about climate change. They can do this in many ways including:

1. Having school environmental clubs that share knowledge and carry out projects
2. By inviting experts who know about climate change to come and share what they know in schools
3. Holding debates, discussions and shows on climate change
4. Learning from other areas and schools how they are fighting or living with climate change

With knowledge, children are able to share with friends, family and community members what climate change is all about. In this way communities are empowered to become resilient to climate change.

That is true! By taking Action to fight climate change you too can become Climate change activists in your community just like us.

Where to Get Information

We can get more information about climate change from the following:

- Ministry of Environment Water and Climate
- The Environmental Management Agency (EMA)
- The United Nations Framework Convention on Climate Change (UNFCCC)
- The United Nations Development programme (UNDP)
- The United Nations Children's Fund (UNICEF)
- Meteorological Department
- Intergovernmental Panel on Climate Change (IPCC)

Activities

Climate Change

Answer True or False

1. Climate change is happening in Zimbabwe only. **True / False**

2. Mitigation stops further climate change. **True / False**

3. Children can fight climate change. **True / False**

4. Education on climate change makes communities vulnerable to climate change. **True / False**

5. Planting trees prevents further climate change. **True / False**

6. Resilient communities are not affected by climate change. **True / False**

7. Adaptation does not help people to live with changes caused by climate change. **True / False**

8. Switching off lights in a room helps to fight climate change. **True / False**

9. Climate change does not lead to the spread of any diseases. **True / False**

10. Renewable energy produces greenhouse gases. **True / False**

Climate Quiz

Let's test ourselves and see what we remember about climate change.

1. **Which greenhouse gas is most abundant in the Earth's atmosphere?**
   a. Water vapour
   b. Nitrogen
   c. Carbon dioxide
   d. Biogas

2. **Fossil fuels come from where?**
   a. Dead animals and plants
   b. The atmosphere
   c. The fuel station
   d. The garden

3. **What is a greenhouse gas?**
   a. A gas found only in greenhouses
   b. A green gas
   c. A gas that reflects the sun's rays back into space
   d. A gas that stops heat from the earth returning into space

4. **Why is it a good idea to turn off lights and other electronics when you are not using them?**
   a. Because the electrical company said so
   b. Because they continue to use energy even when on standby which is bad for the environment
   c. Because they like to be watched and so they might complain
   d. Because then they will never die

5. **50% of the sea level rise is due to:**
   a. People dumping things in the ocean
   b. More fish giving birth
   c. The water getting hotter due to global warming and causing it to expand
   d. The water cooling

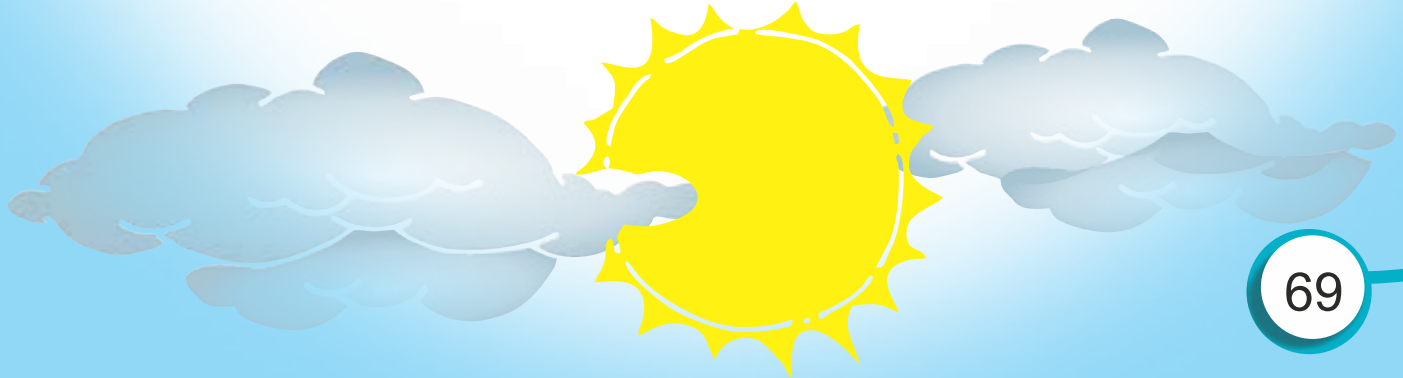
6. **Clean energy is:**
   a. Energy from a polished appliance
   b. The energy you get from using legal money
   c. Energy that does not make you dirty
   d. Energy that does not pollute the air

7. **There is one way here which does not save energy. Which is it?**
   a. Have each member of the family drive their own car to the same function
   b. Get a bus
   c. Travel together in one car
   d. Cycle or walk

8. **Without the greenhouse effect:**
   a. We would all turn green
   b. We would be very cold
   c. The Earth would not be able to support life
   d. There would be no greenhouses

9. **Global warming is causing the ocean to get warmer, resulting in:**
   a. Precooked fish
   b. The ocean becoming a steam bath
   c. Increase in sea species
   d. Loss of coastal lands

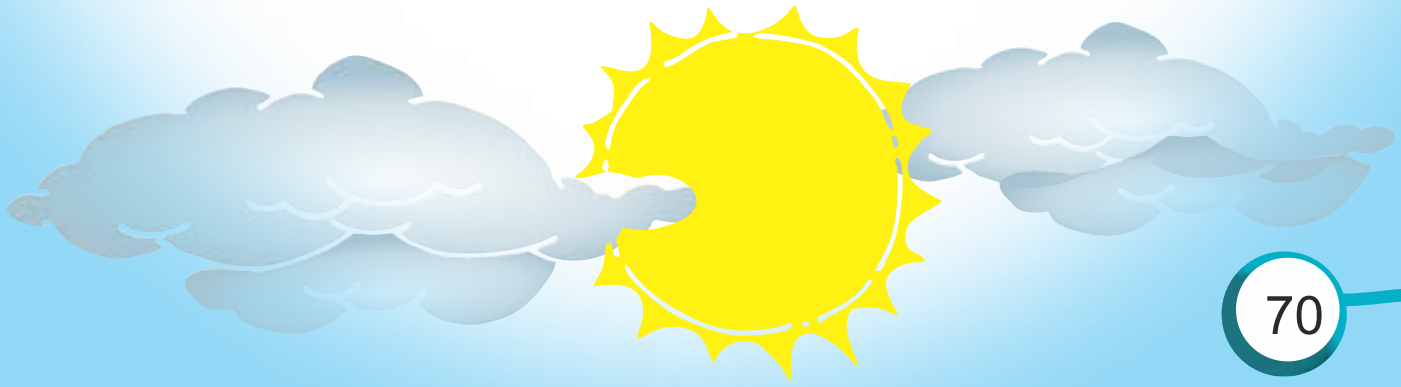
10. **Trees help us fight climate change by:**
   a. Putting on boxing gloves
   b. Drinking water
   c. Absorbing carbon dioxide and storing it
   d. Shedding leaves



Action Against Climate Change Scrambled!

Unscramble the words below to find some interesting ways of 'Taking Action against Climate Change'

1.	SGBIAO	Energy from inorganic waste.
2.	RRADFGUEI	Helps reduce the spread of veld fires.
3.	RUCEED	Buying less so as to produce less waste.
4.	GTOOMCNISP	Using organic waste to produce manure.
5.	LPOROAC	Sharing vehicles to save on fuel.
6.	EFETFNICI	Getting the most energy from as little fuel as possible.
7.	WNLIAGK	Using ones own energy to get from one place to another.
8.	ECLNA	Energy which does not pollute.
9.	NFAFERTSAOOIT	Planting trees in an area where there were no forests.
10.	ROSAL	Energy from the sun.



Causes of Climate change

R U U N S R M C A T C N Q N P J F U P C
L T Y O N I S E R I F B K T V Y M S R X
N B C I S J N O B R A C H V L J F A P Z
Y F T T K B B O N W F E J F B F R L C I
X J E A I I Y P L P R B T F P W U E F K
C H C T O O W O F M Z B X G F P F P L A
T N X S I M I L A H F S I B K N A H F W
B F L E V A W L U V Q O N F O S S I L S
B Z Q R R S W U L U O V E Y X R R F L W
N Y I O E S S T Z I Q D F Z G E J V I E
L I M F W G B I J J I K F D S R G D U B
N F Z E O M L O A X X O I Y J D P K E V
G C O D P C Y N O K G G C H K D G Z A O
F D A Q P J R I D W W C I P L D P L D Z
L F V Q A R D K G H A R E V Y F V T X D
V L Y V K D E F E N H S N T N U G W H O
Q Y P B S G I P I O F Z T U D E R U C F
J F K T S T G S I V Z N X E A L P H D Q
A G C R Q U O C Q D H X C P M S E O W Z
X W A I Y E F J C Y G M F L G U F V A Q

BIOMASS
CARBON
DEFORESTATION
DIOXIDE
FIRES
FIRES
FOSSIL
FUELS
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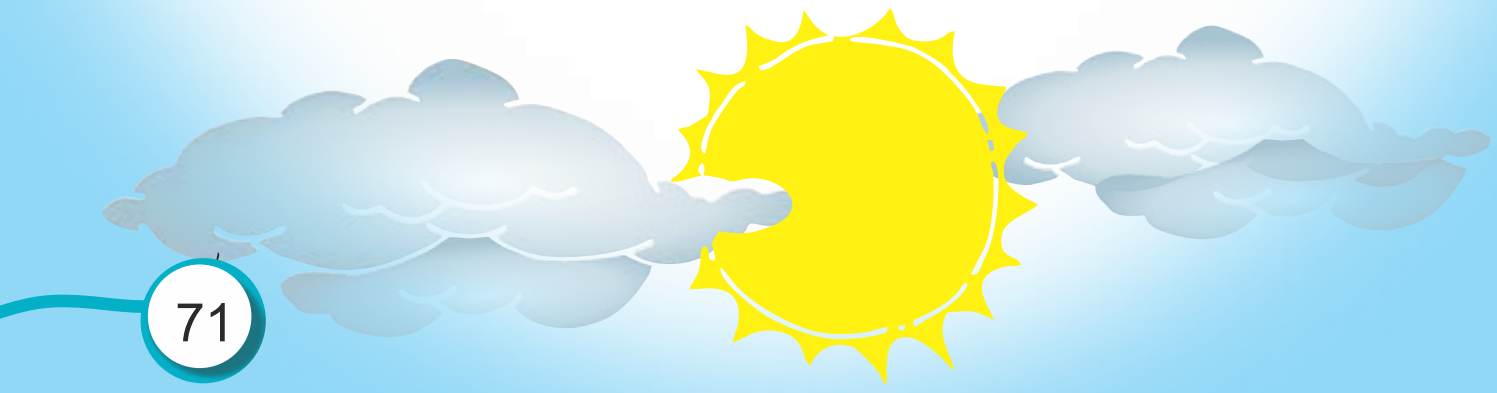
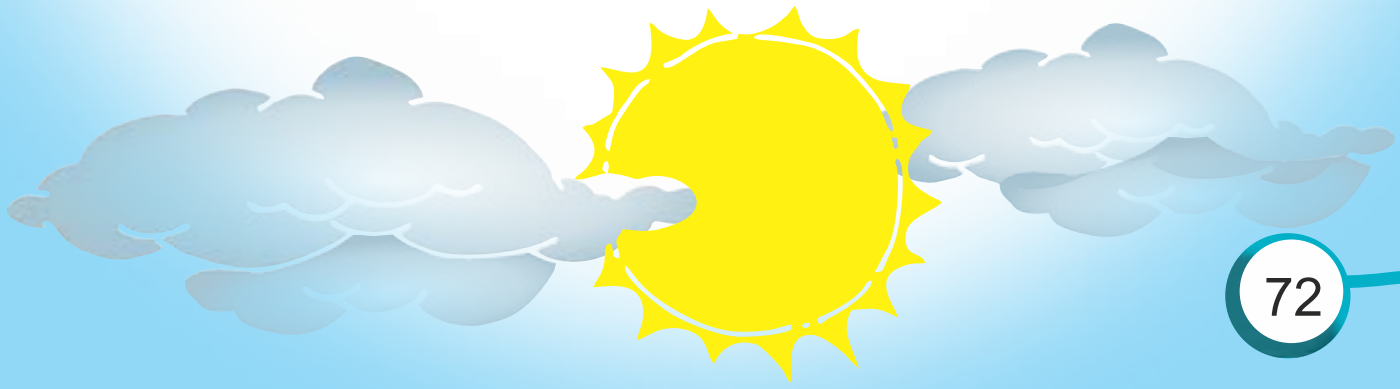
OPEN
POLLUTION
POWER
THERMAL
VELDT
WASTE



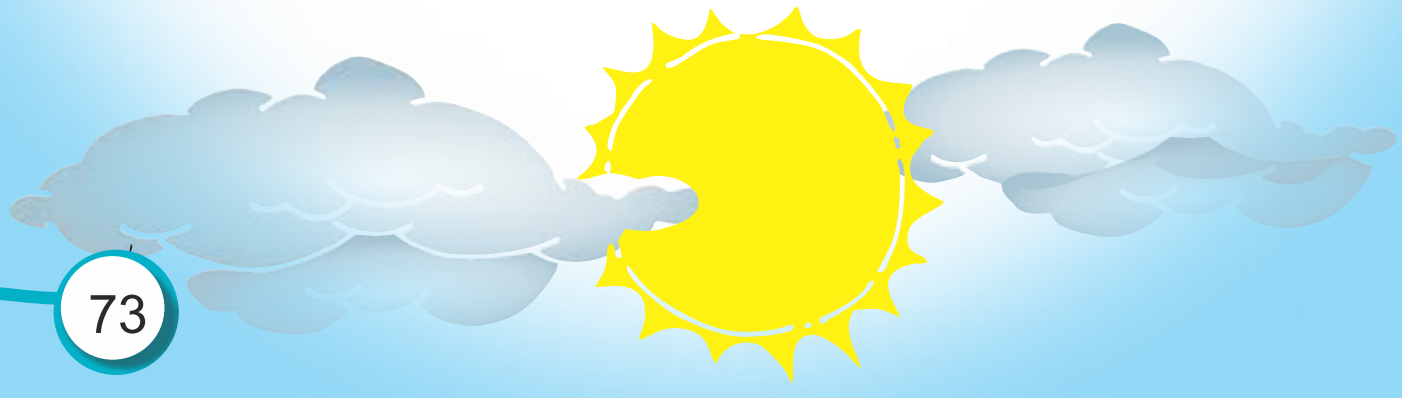
Key Terms

ADAPTATION	Adjusting to new conditions brought about by climate change. It is a way for people to cope with changes already present while developing and implementing ways of removing the causes of climate change. Adaptation allows people to maintain the same quality of life even though there are changes.
ATMOSPHERE	The air surrounding us made up of different gases and stretching for hundreds of kilometres into space. It supports life and performs many functions including regulating the Earth's temperature.
BIOGAS	A mixture of different gases produced by the breakdown of organic matter in the absence of oxygen. Biogas can be produced from raw materials such as agricultural waste, manure, municipal waste, plant material, sewage, green waste or food waste. Biogas is a renewable energy source and causes minimal damage to the environment.
BIOMASS	Biomass is organic matter derived from living, or recently living organisms. Biomass can be used as a source of energy and it most often refers to plants or plant-based materials which are not used for food or feed. The most common biomass form is firewood which is still the main source of fuel for 60% of the population in Zimbabwe.



Key Terms (continued)

CARBON DIOXIDE	A gas that is produced when people and animals breathe out or when certain fuels are burned and that is used by plants for energy. It is a heavy colourless gas that does not support combustion and is used in the carbonation of beverages
CARBON SINK	Any area that removes carbon dioxide from the atmosphere. The most common carbon sinks are forests but water bodies are also carbon sinks. Carbon sinks are important in fighting climate change.
CORAL	Tiny soft bodied animals with a stony skeleton found in shallow warm seas.
CORAL REEFS	Coral reefs are masses of dead and living coral and other substances that form ridges, the top of which is usually just above or just below the surface of the sea. They help to protect coastlands from the damage of the sea. They are home to numerous plant and animal species and are a source of food for many coastal communities. Damage to coral reefs means the coastlands are prone to damage and erosion. It also means that many communities only source of food is destroyed.
DEFORESTATION	Cutting down of trees so that they are not replaced. Deforestation removes the carbon sink necessary for removal of greenhouse gases from the air.

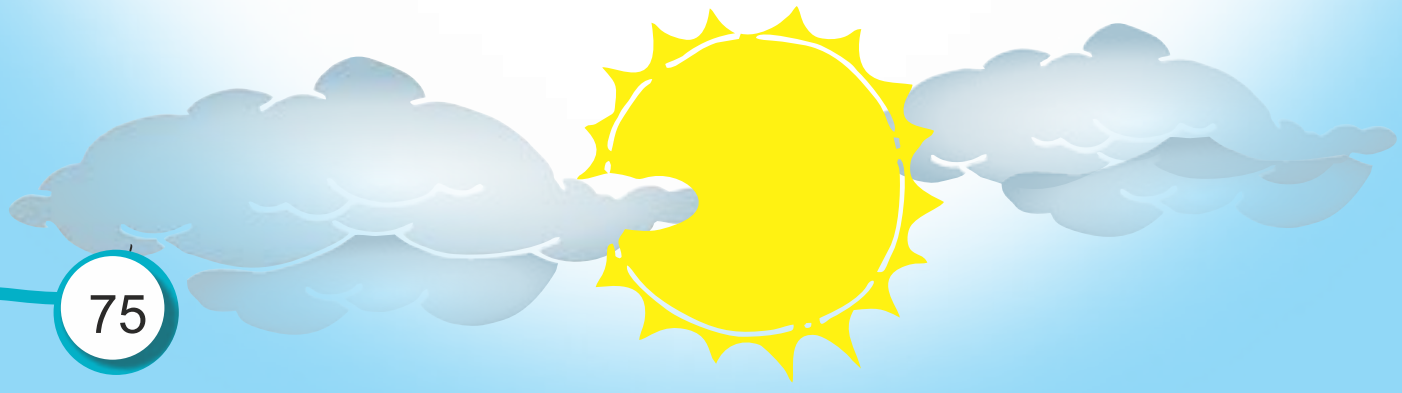


Key Terms (continued)

DROUGHT	A drought is a period of below-average rainfall in a given region, resulting in shortages in its water supply.
ENERGY EFFICIENCY	This is the use of technology that uses less energy to do the same function or work. For instance LED lights are more energy efficient compare to conventional light bulbs as a 3watt light bulb could provide the same light as a 50watt conventional light bulb. Energy efficiency also tries to minimise the amount of energy lost when doing work or performing a function as in the case of improved wood cookstoves which use less wood to cook the same amount of food in a shorter time.
FOSSIL FUELS	Fossil fuels are oil and gas that form when organic material (the remains of once-living things) is buried under great pressure and temperature over millions of years. They take a long time to form but only a second to burn.
FLOOD	Overflow of water from a lake or other body of water due to excessive/more rainfall or other input of water.
FLUORINATED	Treated or reacted with fluorine or hydrofluoric acid.

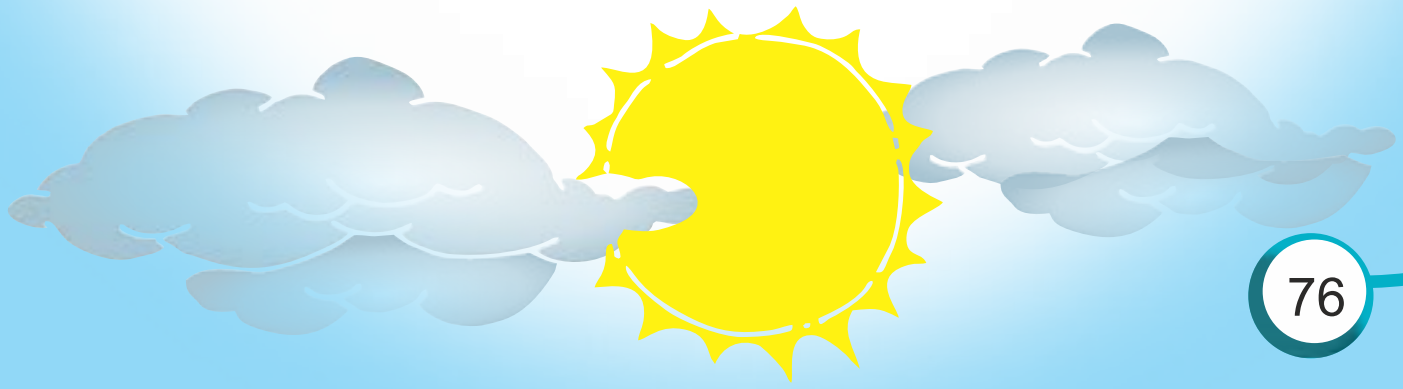
Key Terms (continued)

GLACIERS	Large bodies of ice which flow under their own mass downhill. Glaciers flow like very slow rivers and are a source of water for many downhill communities in warmer areas. They have for a long time kept water out of the seas and oceans as it remained frozen.
GLOBAL WARMING	The average increase in the Earth's surface temperature. It is commonly used to refer to an increase in the Earth's surface temperature as a result of human related activities which release greenhouse gases into the air.
GREENHOUSE GASES	Gases that trap heat in the atmosphere are called greenhouse gases. The primary greenhouse gases in Earth's atmosphere are water vapour, carbon dioxide, methane, nitrous oxide, and ozone.
GREENHOUSE EFFECT	This is used to explain how greenhouse gases in the atmosphere act like the glass in a greenhouse to trap heat and keep earth warm. The greenhouse gases allow the rays from the sun to pass and reach earth but do not allow most of the heat waves from the earth to go back into space. In this way the earth maintains a warm temperature which can sustain life. However when the heat trapping gases increase in number they trap more heat and lead to Global warming.



Key Terms (continued)

METHANE	Methane is a greenhouse gas which is released during natural gas production and distribution.
NITROUS OXIDE	A gas found in the atmosphere which is an oxide of nitrogen.
MITIGATION	The prevention of climate change or removal of the causes of climate change. Mitigation mainly looks at reducing greenhouse gas emissions and removal of greenhouse gases from the air as they are the main driver of climate change.
SUSTAINABLE	Able to be maintained at a steady rate without damaging the environment or without finishing the resource.



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