

Zimbabwe's frequently asked questions about climate change



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General questions

1. *What is climate change?*

To understand climate change we first need to know the difference between weather and climate.

Weather is the state of atmospheric conditions at a particular place and time (such as temperature, rainfall, humidity, wind and cloud cover).

Climate is the long term average conditions for an area (over a period which is usually 30 years or more).

Climate change is the shift in long-term average weather conditions for an area. In the last few decades the Earth's climate has been changing faster than it has done for thousands of years. The main sign of this change has been **global warming** – a rise in the average temperatures across the planet. This has led to changing rainfall patterns, changing seasons, droughts, flooding, violent storms and melting of snow and ice, causing sea levels to rise.

Zimbabwe's climate

Usually, Zimbabwe has a warm, sunny, dry climate with hot temperatures and rain from mid-October to mid-March and cooler temperatures with little rain between May and August.

It is normal for climate to vary for some years even without having a permanent shift. Zimbabwe gets different amounts of rainfall between years and some winters are colder than others. Some years we may have heat waves and droughts while other years may be wet. Variable rainfall in Zimbabwe is often caused by **El Niño**– a natural weather cycle occurring every few years. During the past century, as a result of climate change, Zimbabwe has experienced an increase in average temperatures of 0.4°C.

What is El Niño?

El Niño is a natural weather pattern that normally occurs every 2 to 7 years. It is characterised by warming in the Pacific Ocean. This warming is so strong that it affects the weather across the world, causing droughts in some areas (such as Zimbabwe) and floods in others. The opposite of El Niño is La Niña, which is characterised by cooling in the Pacific Ocean. During a La Niña year Zimbabwe often experiences heavy rainfall. By studying ocean temperatures scientists can warn us of upcoming El Niño or La Niña patterns.

Many scientists believe that global warming will increase the intensity of El Niño and La Niña.



Other places have experienced changes which are higher or lower than this figure. The number of hot days per year is increasing and the number of cool days is decreasing. There is also a decrease in the average rainfall we receive.

2. What is causing climate change?

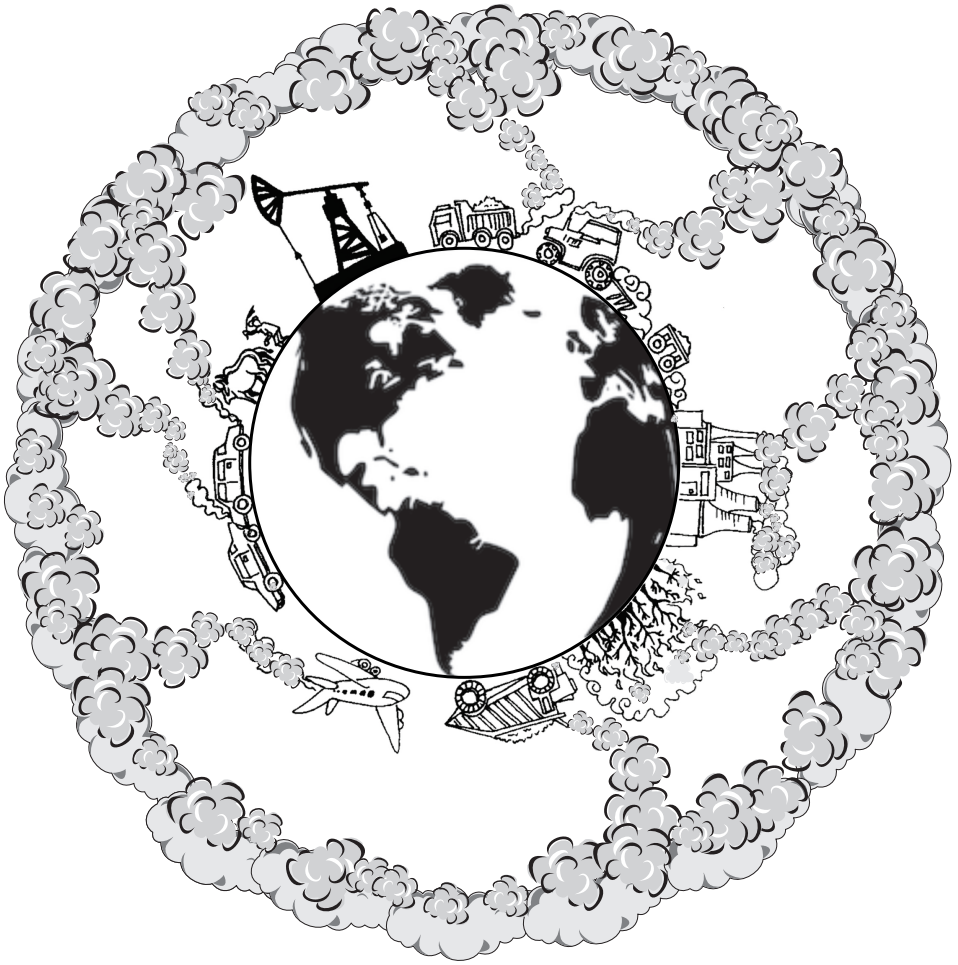
Scientists agree that the main cause of the rapid climate change that we are experiencing is the release of certain gases into the atmosphere by human activities. These gases prevent heat from leaving the atmosphere, causing global warming.

Greenhouse gases

The gases that cause global warming are called **greenhouse gases**. They include carbon dioxide, nitrous oxide and methane. Any activity that uses petrol, diesel, coal or natural gas causes greenhouse gases to be released into the atmosphere. They are also released by uncontrolled veldt fires, chopping down trees, clearing and, crop and livestock farming, burning wood, waste management (such as disposal on litter), certain chemicals used in refrigeration, and many industrial processes. The greenhouse gases that are released in one part of the planet affect the whole planet. Most of these gasses which are released into the atmosphere stay there for a long time.

Other Causes of climate change

Some natural factors, such as changes in the sun's energy and volcanoes, also change the climate but these influences are very small and do not explain the fast heating that we have experienced in the past hundred years. The release of tiny particles called **aerosols** (such as smoke from cars, factories, wood burning or from natural sources) can cool the atmosphere. However, aerosols give people serious health problems and they also alter wind and rainfall patterns.



As greenhouse gases are released, they form a layer (like a blanket) around the Earth. As the layer becomes thicker and thicker the Earth heats up more and more. This is the global warming that causes climate change.

The charts show the main activities that release greenhouse gases worldwide and in Zimbabwe. Energy production and agriculture are major contributors.

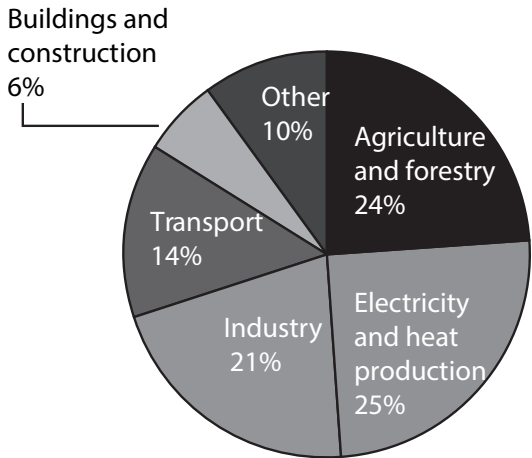


Figure 1 The main human activities that release greenhouse gases adapted from IPCC 2014.

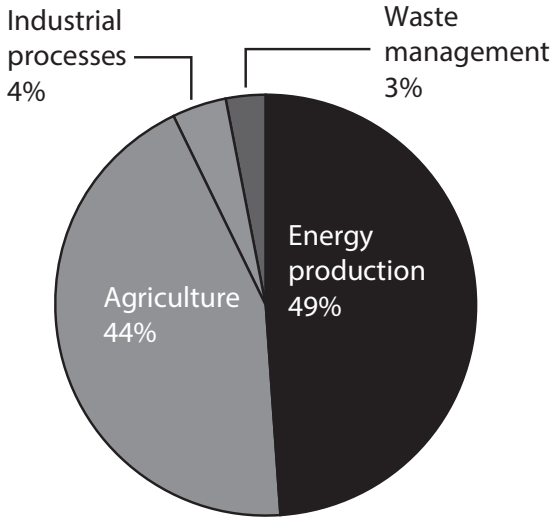


Figure 2 The main human activities in Zimbabwe that release greenhouse gases. Government of Zimbabwe 2016 Third National Communication to UNFCCC



Some people do not believe in climate change despite all of the evidence

3. Is climate change real?

Yes! Scientists have been collecting evidence of global warming for over 100 years. By collecting information from many sources, they have proved that during the period when human activities have released more and more greenhouse gases, the Earth's temperatures have increased.

While a small number of people disagree that human activities cause climate change, very few people deny that climate change is occurring. However, 97% of top scientists agree that climate change is occurring and that it is linked to human activities.

4. Who is causing climate change?

Developed countries in Europe, North America and Australia have historically contributed most to greenhouse gas emissions. Countries that are developing fast such as China, India, South Africa and Brazil are now also major contributors. At the moment, China is putting the most greenhouse gases into the atmosphere.

However, if we add up all the years of greenhouse gas emissions, the USA has contributed the most.

As the economies of Zimbabwe and other developing countries grow, they also contribute more to greenhouse gas emissions. Because of this all countries are looking for better ways to develop without increasing greenhouse gas emissions.

5. What are the impacts of climate change?

Climate change is already affecting many countries. In the last 100 years global average temperatures have risen by almost 1°C. This does not sound like a lot, but scientists tell us that when it rises more than 2°C agriculture will become impossible in many parts of Africa and mass starvation and human migration will be inevitable. At the moment, unless strong action is taken by governments, businesses and individuals to reduce greenhouse gas emissions, the Earth's average temperature is on course to rise by 3°C.



We are all responsible for climate change in different ways

We have already put such high levels of greenhouse gases into the atmosphere that some level of climate change is unavoidable. The results will include:

- **increased temperatures**, threatening human and animal health, agriculture and natural vegetation and increasing wild fires.
- **decreased rainfall**, leading to water shortages affecting human health, crop and livestock production, wildlife and natural vegetation.
- **increased weather hazards**, such as violent storms, heat waves and flooding.
- **rising sea levels**, causing loss of farm land and immersing some of the world's biggest cities.
- **expanding deserts**, reducing land available for agriculture and wildlife.

6. Who will be most affected by climate change?

The effects of climate change will be felt most in countries in Africa, Asia and South America. This is partly because these places already have warm, variable climates but also because most are poor hence unable to pay for ways to reduce the impacts of climate change. For example, if rising temperatures affect rich countries, they can afford to have air-conditioned buildings and vehicles. However, governments in most developing countries like Zimbabwe will not be able to afford this.

Because developed countries have contributed most to climate change and because they are wealthier, developing countries are asking them to help to deal with the impacts of climate change.



Women and children will bear the worst impacts of climate change

In Zimbabwe rural and urban communities will be affected differently. Rural communities, especially in the south of the country, will suffer the worst effects. This is because these areas are already hot and dry. Climate change will intensify these conditions. City dwellers will suffer from more intense heatwaves, as well as flooding. Extremes such as violent storms, hailstorms and strong winds are also set to intensify and affect new locations

Poor people will be severely affected because they cannot afford to protect themselves from the effects of climate change. For example, rich families can drill boreholes and construct water tanks to safeguard themselves against drought but poor families will not be able to do this. It is likely that rural women will be severely affected by climate change as they are already responsible for most agricultural activities and for collecting fuel wood and water. Climate change will make all this harder. While men can migrate to cities or to other countries to seek work in times of drought, women are usually expected to stay behind and look after the farm and care for children and disabled, elderly and sick people.

7. Can we prevent climate change and regain the original climate?

If the governments of all nations can cooperate and persuade individuals, and businesses act quickly to reduce all greenhouse gas emissions we have a chance to stop climate change from destroying agriculture, human settlements and natural areas. This will mean

- increasing renewable energy use
- reducing fossil fuel use
- changing systems of energy production, agriculture, transport, industry, building and construction and waste management
- inventing new technologies
- developing new laws
- creating financial incentives for making changes.

8. Will climate change cause conflict over resources?

If governments and communities do not act now to protect resources and help poor communities to adapt to climate change, violent conflicts over resources such as land and water as well as food are likely. These are already occurring in some areas especially over water access in parts of Zimbabwe and over pastures in parts of Africa. Conflict between humans and wildlife is also on the rise due to climate change and competition over dwindling resources.

9. Can the positive impacts of climate change outweigh the negative impacts?

No. The negative effects outweigh the positive effects. There may be some positive effects for example:

Increased levels of the greenhouse gas, carbon dioxide, can increase plant growth, but only with increased water and fertile soils. In some areas climate change will increase rainfall and these places will see an increase in the growth of crops and natural plants.

In cold places, such as Europe, new crops can be grown because temperatures will be warmer. For example, grape farms for producing wine have become more common in the UK in the past 10 years.



We must all work together to beat climate change

In some parts of the Eastern Highlands of Zimbabwe both rainfall and temperatures appear to be increasing. This could open up opportunities for new crops to be grown in these places. However, for most of Zimbabwe the impacts of climate change will be negative, particularly for agriculture.

One of the unexpected positive consequences of climate change could be to encourage communities and governments to work together to address this major problem, which some say is the greatest threat that humanity has ever faced. This could mean a new era of changing human societies for the better. Despite these the negative effects will still outweigh the positive ones.

What are the effects of climate change in Zimbabwe?

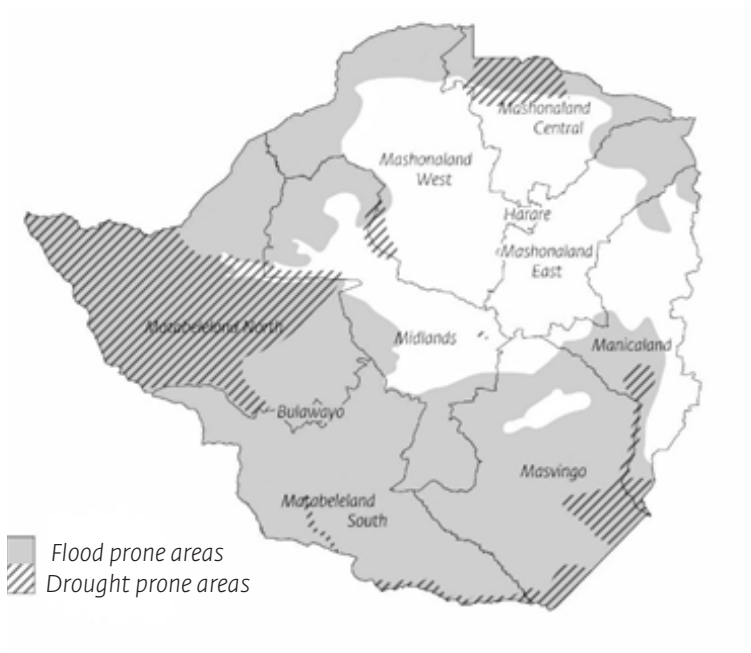
Climate change is already affecting Zimbabwe. Rainfall is becoming more erratic. Droughts are occurring more often. The beginning of the rainy season is often delayed and it is often ending earlier. During the season there are often long dry spells as well as more violent storms. The amount of rainfall received each year is becoming less. Flooding has also become more common.

The future impacts of climate change depend on:

- how much the climate changes;
- how quickly and effectively people can learn to cope with the new conditions (we call this **adaptation**)
- how much governments and people of the world can reduce greenhouse gas emissions (we call this **mitigation**).

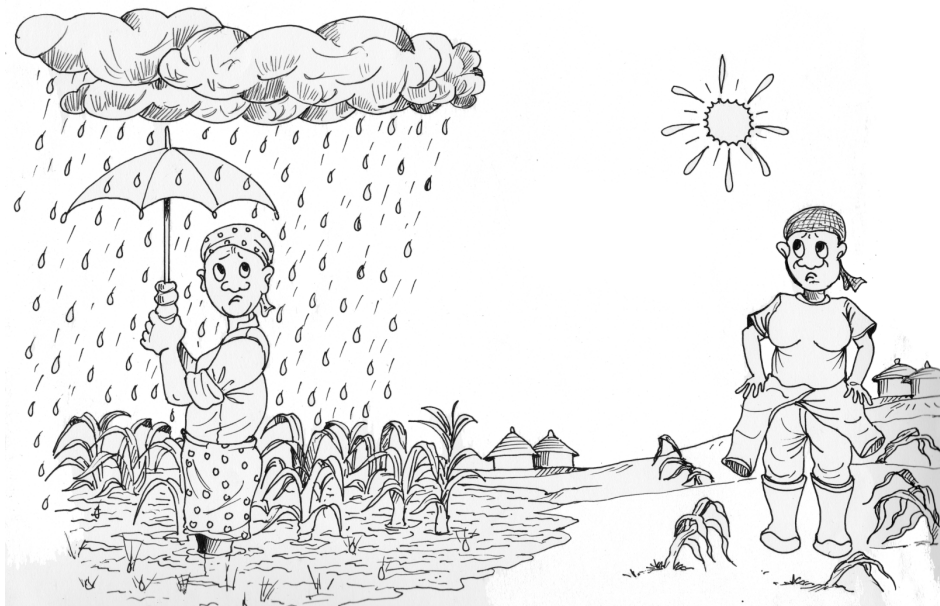
10. Which areas will be most affected?

The **south and west** parts of Zimbabwe (Matabeleland North and South) will be worst affected by climate change in future. This is because these areas are already hot and low-lying, and they receive less rainfall which is unreliable rainfall which makes rainfed agriculture challenging.



The areas of Zimbabwe that will be most affected by climate change

Climate change will make these conditions worse. It is likely that the Kalahari Desert will spread eastwards from Botswana into Zimbabwe, making parts of Matabeleland North even drier.



The distribution of rainfall will also become more variable. For example, in one season, in the same district, one ward may have good rains while an adjacent ward may have poor rains

11. How will Zimbabwe's climate change in future?

More research is needed for scientists to be able to say what other effects will occur in future. Using computer models scientists predict that by 2100 average temperatures are likely to **rise by up to 4°C** (or up to 6°C, if greenhouse gas emissions are not reduced) in parts of Zimbabwe. This means that Harare and Bulawayo will have a climate more like Kariba and Binga, while Kariba and Binga are likely to experience temperatures well over 40°C in the hot season.

How will rainfall be affected?

The computer models predict that the average rainfall of Zimbabwe is likely to decrease by between 5 and 18% with the highest decline in the south and south-west of the country. There may be an increase of rainfall in the north and east of the country.

How will the seasons be affected?

There will be more **heat waves** in the hot season and changes in the start and end of the rainy season as well as increased and longer **mid-season** dry spells.

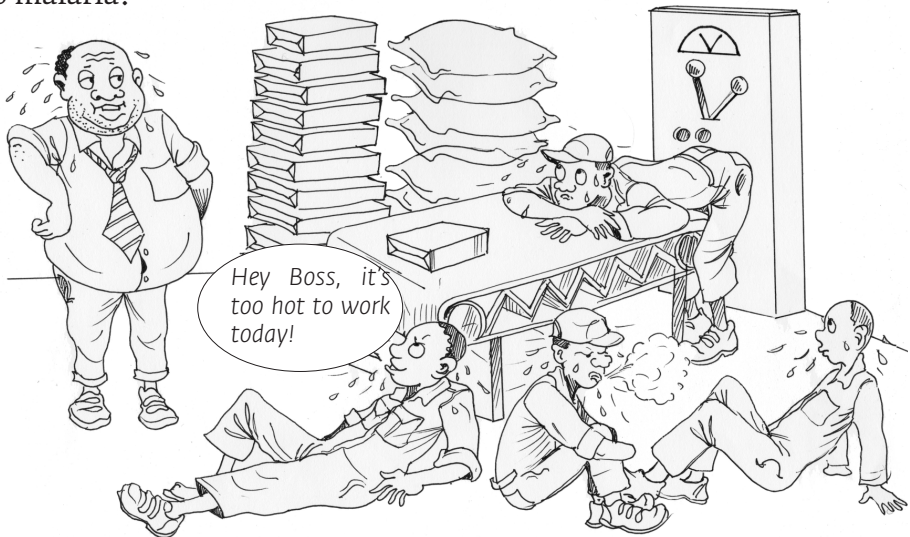
How will climate change affect El Niño? /La Niña

Climate change will probably increase the frequency and intensity of El Niño and La Niña so that the effects of El Niño will be higher. These include more droughts and possibly more flooding, in La Niña years.

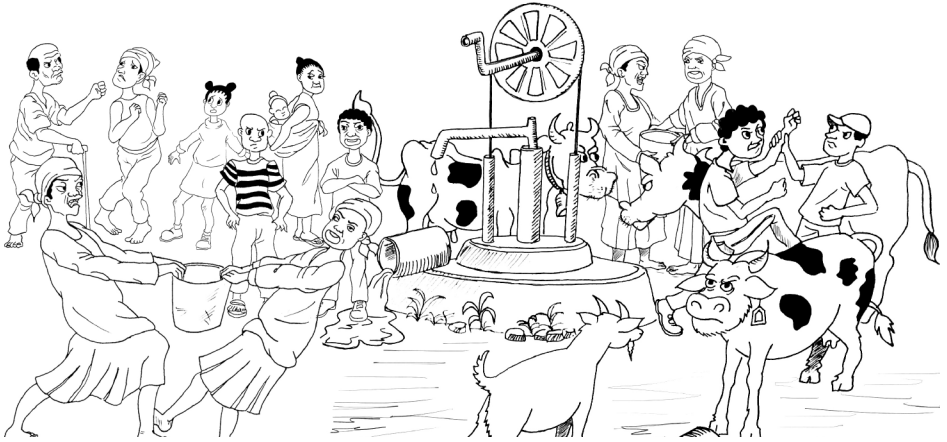
12. What will be the effects on people?

Increased temperatures

Increased temperatures will affect **human health**. The incidence of malaria will increase as malaria-carrying mosquitos (which require warm temperatures to survive) increase in number spread to new areas. By 2050 all areas except the Eastern Highlands could be prone to malaria.



Businesses that depend on human labour (such as mining, agriculture and many industries) will be affected because it may become too hot for people to work at certain times. Higher temperatures will increase the need for refrigeration and air conditioning.



Conflicts may occur at boreholes and wells as there may be competition for water between the needs of livestock, wild animals, crop production and people.

High temperatures increase crop and livestock **pests and diseases** and also reduce the fertility of the soil. This could force farmers to use more expensive chemical control methods and fertilisers.

Extreme heat increases the risk of **veld fires** that can destroy property, crop lands, grazing areas and forests as well as exacerbating soil erosion.

Vulnerable groups such as young children and sick and elderly people can be badly affected by heat waves. Deaths among these groups of people are likely unless they are protected.

Increased temperatures will reduce the area of **land** suitable for crop and livestock farming. Maize and sorghum are even more sensitive to high temperatures than they are to drought so farmers may have to switch to millet or livestock in some areas. Most cattle breeds are unable to tolerate high temperatures so in some areas farmers may have to switch to goats or even farm wild animals. This may reduce the food that can be produced in Zimbabwe, increasing our dependency on imported food.

Food prices in Zimbabwe will be influenced by global climate change. For example, a drought in China could destroy their rice crop, affecting the prices of imported rice in Zimbabwe, while crop destruction from flooding in Canada could affect wheat prices, so that the cost of bread in Zimbabwe rises.

Decrease in water resources

The decline in rainfall will lead to reduced underground and surface water sources, so there is less water in wells, boreholes, rivers and dams for domestic use, agriculture, industry, mining and tourism. Reduced water levels in Kariba and other dams and rivers could threaten hydro-electricity production. Water quality for fishing, agriculture and domestic use will also be reduced due to reduced rainfall.

Access to clean water for cooking and washing could become a problem, leading to increased incidence of diseases such as cholera and typhoid.

Less rainfall will also lead to changes in vegetation and the loss of food for livestock and wildlife.

Storms and flooding

In heavy rainfall years violent storms and flooding could destroy buildings, roads, dams, bridges, forests and fields as well as threatening lives. Some pests and diseases that affect humans, animals and crops thrive in wet conditions and so they are also likely to increase.



Climate change refugees

Migration

Due to the impacts on agriculture as well as conflicts over resources, it is very likely that people who live in certain areas will abandon them and move to other places to escape these hazards. Urban areas are likely to grow rapidly from increasing numbers of climate change refugees.

As people search for new livelihoods their activities could threaten sensitive protected areas such as wetlands, parks and forests thus increasing human-wildlife conflicts. There is a high likely hood of internal and cross border migration of people and animals which threaten regional security

What is being done about climate change?

Work is being done by the government of Zimbabwe, development agencies and communities to **adapt** to the new climatic conditions and prepare for future changes and threats.

Governments across the world including, Zimbabwe are working hard to develop ways to reduce greenhouse gas emissions and to take excess greenhouse gases out of the atmosphere (**mitigation**).

13. What are scientists and politicians doing?

The main organisation of scientists who study climate change is the Intergovernmental Panel on Climate Change (**IPCC**). The IPCC produces reports on the effects of climate change and projections of its future impacts in different countries. The IPCC and the United Nations say that a 2°C rise in global average temperatures will have very serious consequences and must be avoided at all costs.

Each year representatives from governments around the world meet to look at the new evidence from the IPCC and discuss what to do about climate change. These meetings are called Conference of Parties COP meetings or IPCC Sessions. In the past they have involved a lot of arguments, mainly about how much industrialised countries (who have caused the most greenhouse gas emissions) should assist developing countries (who have contributed little to emissions but will bear the major impacts).



The Paris agreement

The Paris agreement

In 2015 a breakthrough was achieved when most governments signed **the Paris Agreement**. Through this agreement countries promised to prevent global temperatures from exceeding 2°C. Developed countries also agreed to help developing countries tackle reducing emissions and put measures in place to adapt to climate change.

The Paris Agreement requires countries to produce statements (called nationally determined contributions or **NDCs**) showing how they will reduce their greenhouse emissions by 2030. Zimbabwe has signed the Paris agreement and submitted its first NDCs.

The Paris Agreement is a big step forward but many scientists and others argue that it is too weak and that governments and businesses will not keep their promises. In addition, the United States (one of the main contributors to climate change) says it will not uphold the agreement.

Unfortunately, scientists say that all the climate actions proposed and implemented so far will not be enough to limit temperature rise to the below harmful levels.

The government of Zimbabwe has developed a climate policy and climate change response strategy to guide the country in dealing with climate change. Zimbabwe has promised to reduce greenhouse gas emissions by 33% by 2030. The government has committed to manage climate change so as to reduce its negative effect on Zimbabwe's progress and development.

14. What is climate change finance?

There are many different sources of finance (including from government, banks and other organisations) targeting different aspects of climate change. International and local funds have been mobilised to increase **adaptation** and **mitigation**. The biggest of these is the Green Climate fund which is complemented by the Adaptation Fund, and the Global Environmental Facility Special Climate Change Fund.

You can get more information on climate finance from these websites:

<https://www.greenclimate.fund/home>

<http://africanclimatefinancehub.net/>

<http://ndcpartnership.org/funding-and-initiatives-navigator/africa-climate-change-fund-accf>

https://southsouthnorth.org/portfolio_page/southern-africa-climate-finance-partnership-sacfp/

www.climatechange.org.zw

The chapter on climate change finance in the book *Climate Change in Zimbabwe, Facts for Planners and Decision Makers*, 2nd Edition: https://www.kas.de/c/document_library/get_file?uuid=d26c2473-28e4-ee4d-fdef-ec12a72f0a09&groupId=252038

A **National Climate Fund** is being set up to help to pay for the costs of adaptation and mitigation. Zimbabwe is also getting finance from international sources. Individuals, groups, communities and businesses can all apply for finance for their adaptation or mitigation projects. In order to apply, we have to develop a sound project proposal that includes ways to monitor the project and has a clear financial plan.

15. How can Zimbabweans adapt to climate change?

Because of the changes in Zimbabwe's climate, individuals, communities and businesses will have to change the way they do things. **Adaptation** to climate change will involve many different actions, such as

- Enhancing knowledge on sectors' vulnerability and adaptation options
- using climate friendly designs and materials to make buildings cooler
- making bridges and roads stronger to withstand floods and extreme heat
- changing working hours so that people do not work in the middle of the day when it is hottest
- switching to drought-resistant, pest-resistant crops and livestock as well as adopting climate smart practices and irrigation
- distributing better weather information so that everyone can prepare for the changes in climate and weather patterns such as droughts, floods, storms and heatwaves.
- diversifying livelihoods and focusing on non-climate sensitive livelihoods.



Traditional leaders play an important role in protecting natural resources

Looking after natural resources

Since much of Zimbabwe's economy and people depends heavily on **natural resources**, adapting to climate change means looking after these resources. The effects of climate change will be much worse if we waste water, damage the soil, cause pollution and destroy natural vegetation and wildlife.

Resilient communities

Compared with most African countries, Zimbabwe has many advantages to help it adapt, including abundant natural resources, a well-educated population, good infrastructure (roads, settlements, grain-storage facilities, schools and hospitals) and a diversified economy (based on many sectors including agriculture, mining and tourism).

Resilient communities will be better equipped to avoid, cope with and recover from the shocks and hazards of climate change. If we develop communities of healthy, peaceful, cooperative people with intact natural resources (including fertile soil, clean water and abundant vegetation) and many sources of income, we will be better prepared to deal with climate change.

If we have communities of poor, unhealthy, stressed people and degraded resources then the problem of climate change will be much worse. There are many projects in Zimbabwe that are trying to build resilience. Most focus on helping women and young people, as these groups will bear the main burden of climate change. They also encourage men to support the vulnerable people in their communities.

The role of indigenous knowledge

Over the centuries Zimbabweans have accumulated a wealth of valuable knowledge on how to cope with a very variable climate, such as how to survive droughts and pest attacks. There are traditional ways to forecast the weather and traditional leaders have played an important role in protecting natural resources and solving conflicts. Combined with modern science and technology, much of indigenous knowledge holds the key to surviving climate change.

16. How can Zimbabweans reduce emissions?

Mitigation involves reducing greenhouse gas emissions and reducing the levels already in the atmosphere. To reduce greenhouse emissions

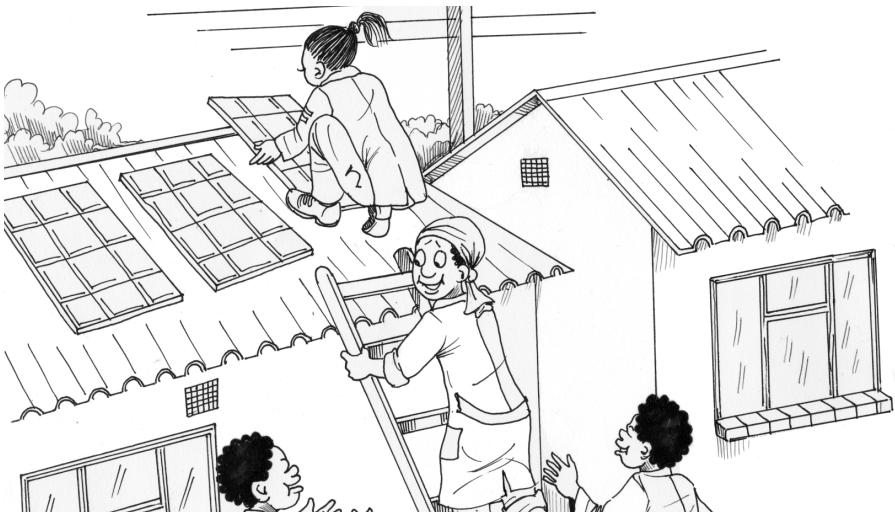


Older people have a lot to teach younger people about indigenous knowledge

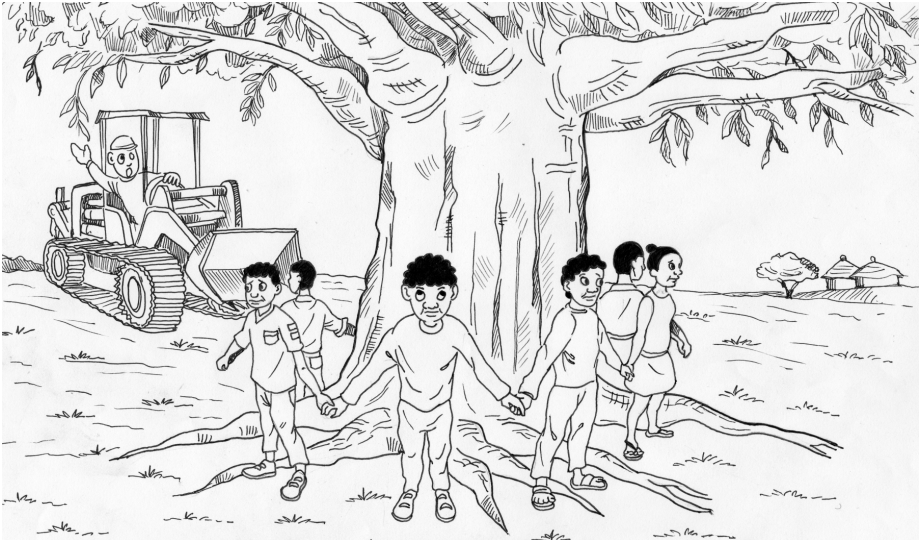
Zimbabwe will have to shift towards an economy that puts less carbon dioxide (one of the main greenhouse gases) into the atmosphere. We call this a **low carbon economy**. Zimbabwe will continue to grow and develop but will have to:

- Reduce use of fossil fuels such as coal, petrol, gas, diesel
- switch to clean/renewable energy sources (such as solar, wind and biogas) to produce energy, carry out industry and transport goods and people.
- develop more efficient technologies that create less pollution and waste and
- improve industry, agriculture and waste management.
- Reduce deforestation, land use change and veldt fires
- Grow more trees

This type of development is called **green growth** and it uses **clean development mechanisms** that do not contribute to climate change.



Installing solar systems reduces greenhouse gas emissions



We must protect trees from unnecessary destruction to reduce greenhouse gas emissions

Many adaptation measures also help to mitigate (reduce) greenhouse gases. For example, preventing deforestation and veld fires stops carbon dioxide from being released and keeps it stored in vegetation. Using conservation agriculture instead of ploughing prevents the release of carbon dioxide from the soil. Conserving wetlands (as opposed to draining them or building on them) also prevents the release of carbon dioxide into the atmosphere.

Removing greenhouse gases from the atmosphere with trees

Trees absorb carbon dioxide from the atmosphere and stores it. The more trees we plant the more carbon dioxide we remove. Trees also help to reduce temperatures and wind speed and increase soil and air moisture so they play a very important role in both adaptation and mitigation. Trees in both urban and rural areas are very valuable in the fight against climate change.

If we are to avoid a climate change catastrophe, mitigation must be carried out by each and every one of us (individuals, institutions, communities, businesses and governments).

Questions from rural Zimbabweans

Rural Zimbabweans will be greatly affected by climate change because they are very dependent on their environment as a source of food, fuel, water and general livelihoods. Temperature increases and changes to rainfall patterns and amounts received mean that farming systems will have to adapt or communities will have to diversify their livelihoods to options that are not dependent on agriculture or natural resources

17. How can farmers find out what kind of rainy season to expect?

Because the rainy season is becoming so unpredictable farmers need to have regular up-to-date information on expected weather and climate for their area. The Meteorological Services Department (MSD) is the most accurate source of up to date weather information. Other extension officers such as your Agritex officer should be able to give you a seasonal weather forecast to tell you the likelihood of normal, above normal or below normal rainfall in your area. They should also be able to advise you on what action to take in each case.

Weather forecasts

You can get a daily forecast from the MSD for free on WhatsApp by sending a message to the number 0778125911. You can also call or +263 242 778 178 or visit them any day including weekends and holidays. If you are able to access the internet you can also get daily forecasts from MSD (<http://www.msd.org.zw/>).

There are various mobile platforms which also issue weather information and advisory (at a cost) in partnership with the MSD. These include the Ecofarmer Club *144# and registering. This gives a range of information including weather information.



For small areas, farmers can use old plastic bottles filled with water and pushed into the soil next to plants. The water from the bottles will slowly seep into the soil watering the plant.

Mobile apps can be download such as Kurima Mari app which gives weather information and information about climate change adaptation for farmers.

The local radio and TV news bulletins usually end with a weather forecast.

18. What can farmers do to prepare for low rainfall seasons?

To prepare for the possibility of a low rainfall years or drought, farmers should put in land management systems that:

- increase soil moisture content;
- encourage water to sink into the soil and
- prevent water from being lost from the soil through evaporation.

Farmers can do this by adopting various climate smart technologies listed below:

Climate smart soil and water management

Avoid **unnecessary** clearing of vegetation and **cutting** of trees. Plant trees around fields and on contour ridges to act as windbreaks and provide fodder for livestock. Avoid veld fires.

Make water-harvesting structures such as dead-level contours, tied-ridges and infiltration pits to catch and sink rain water on sloping land.

Reduce fertilizers. Manufacture of artificial fertilizers contributes to green-house gas emissions. These fertilisers do not improve long-term soil fertility.

Use compost, **mulch** and crop rotation with legumes. These methods reduce greenhouse gas emissions and increasing the ability of soil to store nutrients and water.

Apply manure and then **mulch** (dry leaves or grass) to rows or beds. After harvesting the main crop leave the crop residues on the soil. If you feed crop residues to livestock, allow the animals to graze in the fields so they can apply manure to the soil.

Rotate the main crop (such as maize, sunflower, tobacco or cotton) with a legume: cowpeas, groundnuts or bambara nuts. These increase soil fertility and the residues can be left to cover the soil.

Reduce ploughing as this destroys the structure of the soil and causes loss of organic matter. This leads to the release of the greenhouse gas **carbon dioxide** into the atmosphere.

Practice **conservation agriculture** – where crops are planted in basins and ploughing is reduced to a minimum.

Plant a **cover crop** such as beans or pumpkin between the rows of the main crop. Cover crops protect the soil from the sun's heat and help rain to sink into the soil. Plant a **legume** such as sunhemp in strips between the main crop. The sunhemp can be slashed and left on the fields to decay.

Effective water management and irrigation

Irrigation systems will become very important to farmers as climate change causes rainfall to be more erratic. For successful irrigation, we must make the most of rainwater when it falls. Water in dams and ponds is quickly lost to the atmosphere through evaporation especially when the weather is hot and dry. Instead water must be encouraged to sink into the soil to recharge water stored underground. This will recharge wells and boreholes .

Appropriate irrigation methods

There are various technologies which conserve water and ensures availability of the resource to the plant.

When irrigation is used, drip systems are best although they are expensive. Farmers using buckets for watering can conserve water by:

- Mulching all garden soil
- Only watering in the morning and evening
- Using a watering rose which helps water sink into the soil
- Planting trees that give light shade (such as moringa) around the garden.
- Making a windbreak around the garden – since wind causes vegetables to dry out quickly



A conservation agriculture field with windbreaks around it

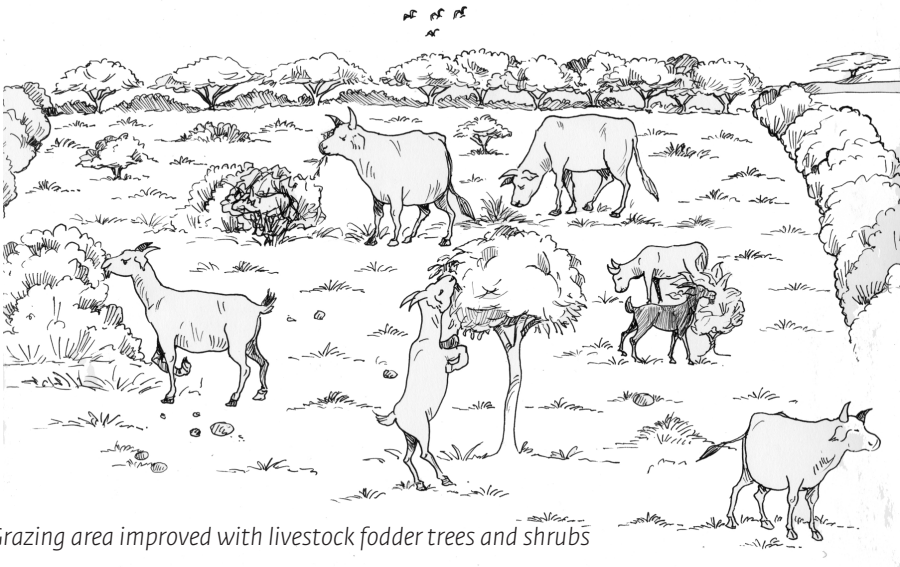
Climate-smart cropping guidelines

- Plant as many different types of crop as possible on your land to reduce and spread the risk of loss. This because different crops have different susceptibility to low rainfall
- In addition to cash crops, plant drought-tolerant food crops such as sorghum, pearl millet, finger millet, sweet potatoes and legumes (bambara nuts, cow peas, groundnuts and sugar beans). In flood-prone areas, in heavy rainfall years, rice and yams could be grown as opposed to maize.
- Plant early-maturing varieties and those that are tolerant to drought. If planting maize, choose short-season varieties.
- Carry out land preparation in good time so that at the start of the rains you can plant straight away and achieve high germination.

- Stagger planting of crops to minimise losses. Plant one third of the crops with the first effective rains, a third in mid-December and the rest in early January.
- Build effective grain storage facilities and take precautions to reduce post-harvest losses.

Climate smart livestock guidelines

- Choose the right breeds. Indigenous breeds are appropriate in low rainfall areas with high temperatures. Ruminants (including cows, goats, sheep and donkeys) produce greenhouse gases as a waste product of their digestion. Pigs and poultry do not have this problem however intensive production of chickens and pigs does produce a lot of greenhouse gases because of the buildings, heating and lighting, cleaning products, feed and drugs required.
- Avoid all unnecessary removal of trees and veldt fires in rangelands and forests.



Grazing area improved with livestock fodder trees and shrubs

- Put dead-level contours in your rangelands to ensure rainfall sinks into the soil and improves pasture.
- Plant crops for supplementary feeding such as rhodes grass, bana grass, cowpeas, lablab bean, velvet bean, pigeon pea and trees such as sesbania, acacia and leuceana. These can grow in strips around fields, on contour ridges or between crops

What about genetically modified organisms (GMOs)?

GMOs are plants or animals that have been produced using complex technologies. The companies that develop GMO crops claim that they have higher yields, are more nutritious, are drought tolerant or require fewer inputs than conventional crops.

Many people worry that GMOs could have negative impacts on consumers or plants and animals in the environment. Others worry that promotion of GMOs will lead farmers to become dependent on buying expensive GMO seed that is not necessarily adapted to their area and may not live up to the claims made by the companies selling them.

Currently GMOs are prohibited for sale or growing in Zimbabwe.

With the growing population, and increasing climate-induced food shortages, researchers need to develop high-yielding varieties and breeds that can withstand climate change hazards while limiting effect on humans, animals and the environment.

Other climate smart recommendations

Farmers should also insure their high value crops and livestock against weather and climate risks. They should also diversify their livelihoods so that they are not dependent on their farm for all food and income.

19. Is climate change increasing crop and livestock pests and diseases?

Yes. Rising temperatures are increasing the incidence of crop and livestock pests and diseases. Many pests and diseases thrive under hot, moist conditions and plants and animals are weakened by high temperatures making them susceptible. Examples are fall army worm in cereals, many tomato pests and tickborne diseases in cattle and goats. Other pest and diseases may become extinct due to climate change.

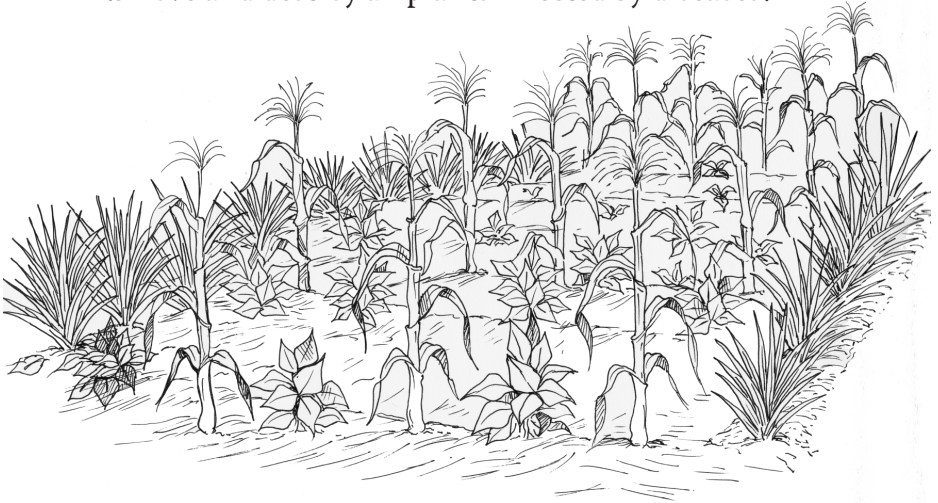
Crop and livestock pest and disease control chemicals are expensive and overuse creates resistance (the pest or disease stops being affected by the chemical).

Many pesticides kill beneficial insects which eat pests making the pest problem worse. Agriculture chemical manufacture causes greenhouse gases to be released. It is better for farmers to use other methods that provide long-term solutions and do not contribute to greenhouse gas emissions. Others may however become extinct

Reducing crop pest and disease attack in crops

- To reduce attack by pests and diseases in fields, orchards and gardens:
- Plant crops suited to your area and climate.
- Plant at the correct time of year.
- Practice crop rotation in fields and gardens.
- Make sure the soil contains enough nutrients, preferably using organic methods such as compost, manure and planting with legumes.
- Give plants adequate water but not too much as this attracts pests and diseases.

- Use traditional methods such as ash and pest repellents made from strong-smelling plants.
- Remove and destroy all plants infected by diseases.



Intercropping maize with cowpeas and planting napier grass around the edge of fields helps reduce fall army worm attack

Push-pull control of fall army worm (FAW)

Trials carried out across Africa have found very effective methods for controlling the fall army worm that do not rely on chemicals. Here are some tips for farmers:

Plant drought-tolerant legumes such as cowpeas between maize plants. These distract the worm preventing it from reaching the maize plant.

Plant the trap crop Napier grass around the edge of the field. The worms will attack the napier grass in preference to the maize.

Scout fields and maize plants for the presence of FAW eggs or adults. Squash any that are observed.

Use ash, lime or other powder in the leaf funnel of the maize plant.

Attract ants to your maize plants using a spray of sugar solution. The ants attack the worm.

Reducing pest and disease attack in livestock

To reduce attack by pests and diseases in livestock farmers should:

- Choose resilient breeds of livestock. Keep more than one type/ breed.
- Ensure that livestock have high quality feed and enough clean water.
- Maintain the condition of rangeland and pastures and grow crops and trees for supplementary feeding.
- Provide sturdy, hygienic housing/ shelter for animals.
- Practice vaccination and control of ticks.

Questions from urban Zimbabweans

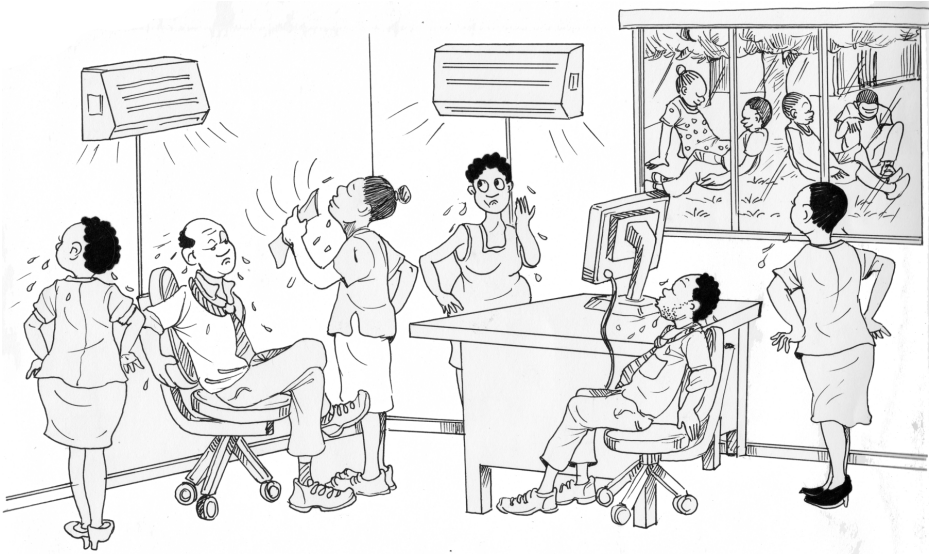
Since urban communities are the main users of **energy** (from coal, petrol, diesel and gas) and transport (using petrol and diesel), they are also major contributors to Zimbabwe's greenhouse gas emissions. Urban areas will need to adapt in specific ways to the impacts of climate change.

20. How will climate change effect towns and cities?

Urban areas will be particularly affected by temperature increases, flooding from heavy rainfall and water shortages. The impacts and pollution on structures such as roads, bridges and buildings are also set to increase as emissions increase.

Temperature increases

Because towns and cities have many buildings, lots of concrete and tarmac and less vegetation than rural areas, temperature increases will be higher. Urban areas are also more likely to experience heat waves – prolonged periods of very high temperatures which can threaten



Working in urban areas will be difficult without air conditioning

lives especially of children, the elderly and people with special health conditions.

The quality of the air in urban areas is already poor due to the presence of many buildings, air pollution from cars and machinery, lack of trees and limited air circulation. High temperatures will make air quality worse causing an increase in respiratory diseases such as asthma.

People who work indoors and those who work outside will be severely affected as high temperatures make it difficult or impossible to carry out their tasks.

High temperatures will lead to a higher energy demand through an increased need for refrigeration and air conditioning. This will increase greenhouse gas emissions unless new technologies can be found.

Flooding

In heavy rainfall periods, most cities are more likely than rural areas to experience flooding which can be worsened by poor waste management blocking storm drains. Because most of the soil in urban areas is paved-over, rain water is unable to drain away easily.

Building on wetlands increases this problem because wetlands provide natural drainage, reducing flooding while recharging underground water stores supplying boreholes. Climate change is likely to increase unsustainable use of wetlands as providers of livelihoods in dry periods. This will reduce their drainage ability.

Disasters and service delivery disruptions

Urban residents are more dependent than rural people on services supplying water, electricity and waste management. Climate change could threaten the delivery of these services making urban people more susceptible to delivery disruptions. This is likely to be from:

- violent storms which often affect electricity lines,
- flooding which contaminate water sources and cut-off certain communities and
- hailstorms which destroy of property by.

Increasing temperatures will increase fire danger as well as incidents of diseases.

Other problems

Because of hardships caused by climate change, urban people may be less likely to send money to their rural family. Similarly, droughts in rural areas are likely to increase food prices for urban people.

Droughts and possible conflicts over water and other resources in rural areas are likely to lead to migration of large numbers of people

to urban areas. This will put an extra strain on housing and delivery of services and could lead to health problems and increases in crime and conflict.

21. What can urban dwellers do to address climate change?

Urban people must put in measures to adapt to climate change and reduce greenhouse gas emissions.

Adaptation in urban areas

- **Planting more vegetation on streets and around buildings.** This can help to cool outdoor temperatures and increase the drainage of rainwater into the soil reducing flooding. Buildings can be cooled by planting trees, creepers and other plants to shade their windows and roofs. Vacant land could be used for food production as well as recreation. By planting more trees in these areas they will also have a cooling effect.
- **Protection of wetlands** is very important to increase drainage and to recharge underground water.
- **Identifying risks.** All businesses and households should identify risks posed by climate change and put measures in place to reduce these.
- **Water conservation** measures should be developed in all businesses and homes and efforts made to minimise water pollution to make it easier to recycle.
- **Adopt emission-reduction** approaches which make economic sense and increase independence from service delivery problems. These are discussed in detail in the next section.

Mitigation in urban areas

- **Adopting renewable energy systems** - including installing solar water heaters, solar energy and use organic waste or wastewater to produce biogas. These measures also ensure energy availability in times when the national electricity supply is not available. Excess solar energy can be fed back to the national electricity system reducing the energy bill through the recently introduced '**net metering**' programme.
- **Energy efficient technologies.** Businesses and households should change all light bulbs to energy saving or LED versions. They can also install technologies such as motion sensors to switch on lights, escalators, production line belts only when necessary. Variable motor speeds could also be used in addition to installing more efficient compressors and boilers.
- **Reduce waste** and improve waste management. This can include reducing plastic packaging and having packaging that can be reused or is biodegradable.
- **Use waste** products from one industry to become raw materials for another. Promotion of resource reuse and reduction of waste will reduce emissions, reduce impacts on the environment and increase profitability.
- **Use public transport** or cycle to work or school where possible. Also develop transport systems that run on renewable energy.
- **Use new building technologies** to reduce the need for air conditioning. Use external lighting such as translucent roofing sheets and window panels. Find alternatives to cement which is a major contributor to greenhouse gas emissions.

Investing in the green economy

These measures could provide new opportunities for businesses and employment as part of what is known as the **green economy** which has six main components:

- Renewable energy
- Green buildings
- Sustainable transport
- Water management
- Waste management
- Land management



A future Zimbabwean city with solar powered street lights,solar panels on top of buildings covered with plants for cooling,trees lining streets, crops growing on vacant land, solar powered buses and , people and goods being transported by bicycle vehicles.

This booklet aims to give Zimbabweans clear and simple answers to some common questions about climate change. To make this booklet we collected questions from Zimbabweans of all walks of life from both rural and urban areas. The booklet is divided into five sections:

General questions about climate change

Effects of climate change in Zimbabwe

What is being done about climate change

Questions from rural Zimbabweans

Questions from urban Zimbabweans

