Climate Action Now!

Save the future

The Basics of Climate Change

environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

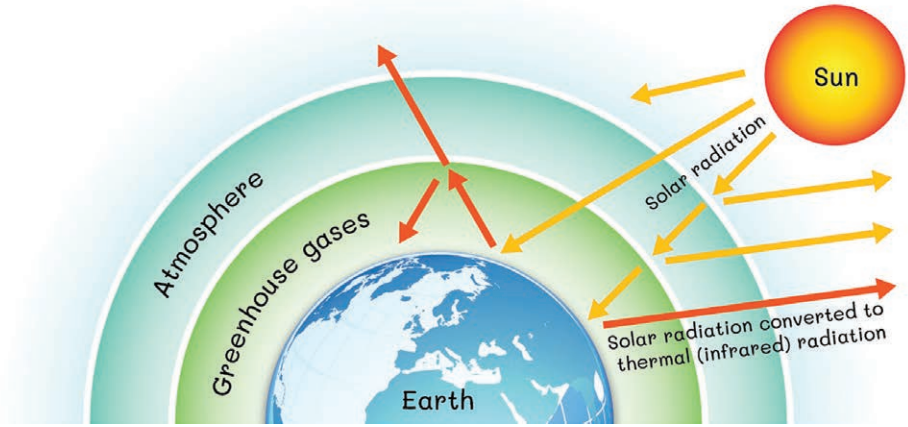
2030 NDP

WHAT IS CLIMATE CHANGE?

Climate change is different from changes in the weather. Weather can change from day to day and hour to hour, while climate is the average pattern of weather over a long time. Climate change is an alteration of the earth's general weather conditions. The most prominent part of climate change is the rising temperature at the earth's surface.

Apart from increasing average temperature, climate change also includes changes in rainfall patterns and an increase in extreme weather events that lead to phenomena such as floods and droughts.

THE GREENHOUSE EFFECT:



- When the sun shines on Earth, some of its solar radiation (in the form of light energy) is reflected by Earth's surface and the atmosphere.
- The rest of the solar radiation is absorbed by Earth's surface and atmosphere and is converted to heat energy (infra-red radiation) that warms Earth.
- The infrared radiation is emitted from Earth's surface again but not all of it escapes to outer space. Some of the radiation is absorbed and re-emitted in all directions by greenhouse gas molecules. These gases act like a blanket that keep Earth's surface and the lower atmosphere warm. This is called the natural greenhouse effect.
- Earth's average temperature is 14°C, a comfortable temperature to sustain life. Without the greenhouse effect, so much infra-red radiation would be lost that Earth would be an icy -19°C. At these frigid temperatures, life as we know it would not be possible.

GREENHOUSE GASES:

The atmosphere is a layer of gases that surround Earth. These gases are mostly nitrogen (78%) and oxygen (21%). There are also smaller amounts of other gases present in the atmosphere. Among these gases are the greenhouse gases that are responsible for trapping the sun's heat inside the atmosphere and keeping the planet warm. The most prominent greenhouse gases are water vapour (water in its gaseous phase), carbon dioxide, nitrous oxide and methane.

When plants, animals and bacteria from long, long ago became fossilised, the carbon inside them was buried as well. Over the years, they turned into fossil fuels namely coal, oil and gas. Humans started burning large amounts of fossil fuels during the industrial revolution in the nineteenth century and this started releasing the ancient carbon back into the atmosphere as carbon dioxide.

Humans have also been chopping down large forests, which reduces the Earth's natural ability to absorb greenhouse gases. Agricultural practises, in particular, have increased the levels of methane and nitrous oxide in the atmosphere. With an increase in greenhouse gases, Earth loses less heat, causing warming of the planet. This warming effect is called global warming but it leads to various changes in climate all over Earth, even making some places colder.

CLIMATE CHANGE IS REAL AND IS ALREADY WITH US. THESE ARE SOME OF THE ENVIRONMENTAL CHANGES THAT HAVE RESULTED FROM CLIMATE CHANGE:

- There is an increase in the average global temperature of about 1°C.
- A 0.19 m rise in the average global sea level has been observed.
- There is reduced snow cover in the northern hemisphere, melting ice sheets in Greenland and Antarctica and there's a 4% decrease in Arctic ice.
- Average precipitation over mid-latitude areas in the Northern hemisphere has significantly increased. There are more heavy rainfall events over most land areas. This leads to a higher risk of flooding in certain areas.
- Since the 1970s, droughts are longer and more intense. Drying in the Sahel, the Mediterranean, southern Africa and parts of southern Asia.
- Though some places have become colder, the general trend is a decrease in cold days and nights, with an increase in heat waves, as well as warmer days and nights.
- Over 30% of the increase in carbon dioxide has been absorbed by the oceans. The oceans are now 26% more acidic and in combination with warmer seawater, this is impacting marine life.

RISING TEMPERATURES:

The increase in global temperatures by 2100 is dependent on the extent to which action is taken against climate change. If extreme measures are executed, the increase would range between 1.1°C and 2.6°C. If large amounts of greenhouse gas emissions continue, the planet could be up to 4.8°C warmer. To put the effect of a change in a few degrees Celsius into perspective: a drop of just 6°C in Earth's temperature would plummet the planet into an ice age. Therefore, an average global increase of even 1°C has a colossal impact.

BIODIVERSITY: PLANT-LIFE

Climate change is having a serious impact on biodiversity and rising temperatures are a particular threat to plants that are slow to expand their range to cooler regions. South Africa has an extraordinarily rich heritage in terms of plant species and even has one of the six floral kingdoms – the Cape Floral Region – contained within its borders. Biomes are complex ecosystems that cannot simply relocate to a more convenient location. Due to climate change, there will be a much smaller suitable region for the Fynbos and Succulent Karoo biomes (which together make up the Cape Floral Region) to flourish by 2070, causing shrinkage of the biomes.

Commercial forestry is vulnerable as well because of increased frequency of wildfires and decreasing availability of water in the south-east of the country. Besides forestry, farms will also feel the impact as crops will have reduced yields due to water and temperature stress. Maize, for example, is expected to show a 5-15% decline in yield for every 1°C increase in temperature. This has a big impact on food security in the coming decades.

Land use change, reduces the earth's natural ability to store and absorb carbon dioxide. In 2015, South Africa published the first ever National Terrestrial Carbon Sinks Assessment, which estimated the national Carbon sink to be between 6693-16715 TgC (Source NTCSA, 2015).

BIODIVERSITY: WILDLIFE

Climate change is responsible for many factors that put the planet's diversity of life at risk. These include more frequent extreme weather events, longer and more intense droughts, spreading disease outbreaks and habitat destruction. These factors affect biodiversity across the globe and could drive many species to endangerment or extinction.

Marine biodiversity, particularly coral reefs, are at risk as seawater becomes warmer and more acidic. This does not only compromise the health of ocean ecosystems which are a major carbon sink and produce half of Earth's oxygen, but it also threatens the food security of the millions of people that depend on fish for food.

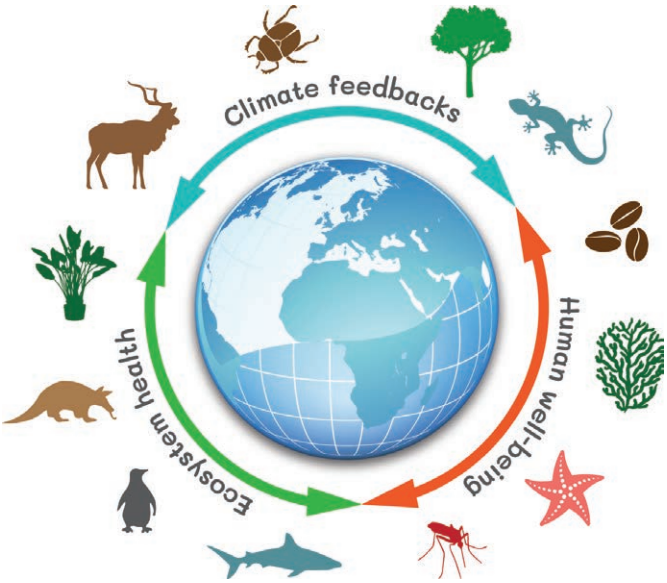
The Department of Environment, Forestry and Fisheries (DEFF) is working to better understand how a changing climate impacts wildlife. Importantly, the DEFF is prepared to manage biodiversity in a changing climate. They are actively seeking solutions to problems and then implementing them so that South Africa's biodiversity and the country as a whole can adapt to a very different world.

What needs to be done?

The climate change crisis needs to be addressed in two ways. First, drastic measures are needed to decrease greenhouse gas emissions and carbon pollution. Secondly, the consequences of global warming, (which are already taking place) need to be prepared for so that the damage is minimized.

The Department of Environment, Forestry and Fisheries aims to:

- educate and engage with businesses to reduce carbon emissions/ greenhouse gases
- help people and nature adapt to a changing climate
- advance policies to fight climate change



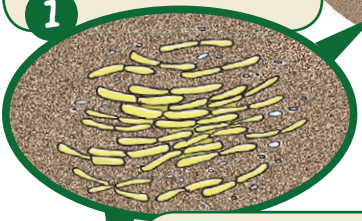
BIODIVERSITY:

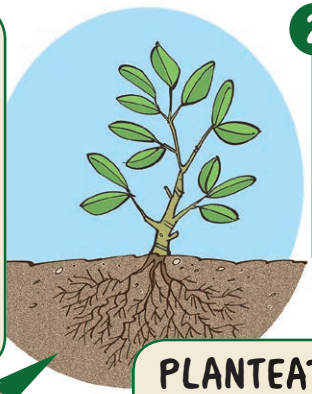
IN A HEALTHY ENVIRONMENT, MANY DIFFERENT PLANTS AND ANIMALS LIVE TOGETHER AND DEPEND ON EACH OTHER. HERE IS A SIMPLE FOOD CHAIN.

MICROBES

MILLIONS OF TINY MICROBES IN THE SOIL LIVE OFF WASTE MATERIAL AND THINGS THAT HAVE DIED. THEY PRODUCE SUBSTANCES THAT PLANTS NEED TO GROW.

1





2

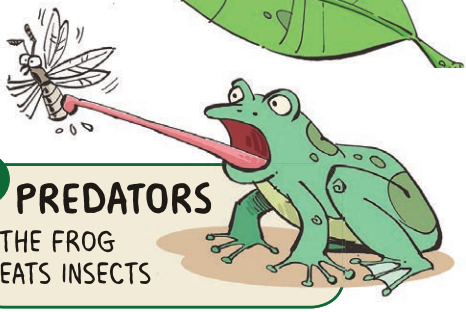
PLANTS

PLANTS USE SUBSTANCES FROM THE SOIL, AIR AND ENERGY FROM THE SUN TO MAKE FOOD.

PLANTEATERS

THE CATERPILLAR EATS PLANTS.

3



4

PREDATORS

THE FROG EATS INSECTS

5 WHEN THE FROG DIES HE BECOMES FOOD FOR MICROBES

IN NATURE THERE ARE MANY FOOD CHAINS LINKED TOGETHER TO MAKE A NETWORK. ALL THE LIVING THINGS DEPEND ON EACH OTHER, SO THE NETWORK CONTINUES YEAR AFTER YEAR. WE SAY IT IS SUSTAINABLE.

WHEN ANIMALS OR PLANTS ARE REMOVED FROM AN AREA, OTHER SPECIES THAT DEPEND ON THEM DIE. THIS REDUCES THE BIODIVERSITY OF THE ENVIRONMENT.

BIO- = LIFE

DIVERSE = DIFFERENT

BIODIVERSITY = NUMBER OF DIFFERENT LIVING THINGS THAT LIVE TOGETHER IN A SUSTAINABLE NETWORK

WHAT HAPPENS TO PLANTS IF THERE ARE NO MICROBES IN THE SOIL?

WHAT HAPPENS TO THE CATERPILLAR IF THERE ARE NO PLANTS?

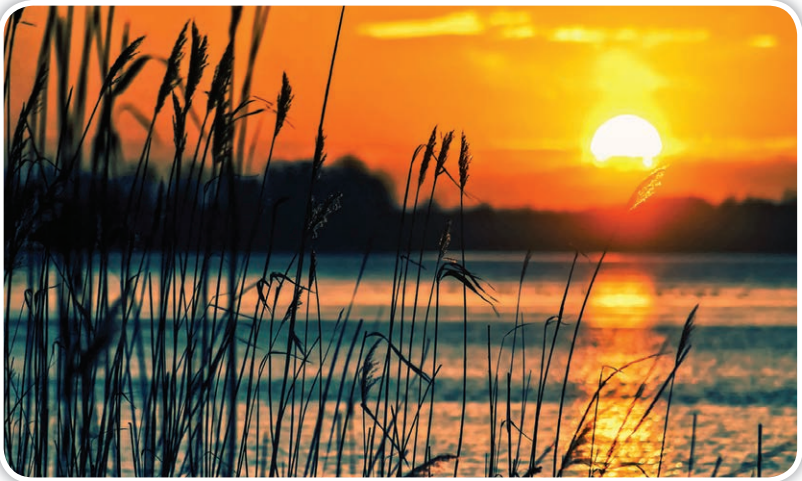
WHAT HAPPENS TO THE FROG IF THERE ARE NO INSECTS?

WHAT HAPPENS TO ANIMALS THAT EAT FROGS?

PLANTS AND WILDLIFE

Climate change has major impacts on biodiversity. Wildlife and plants will need to cope with:

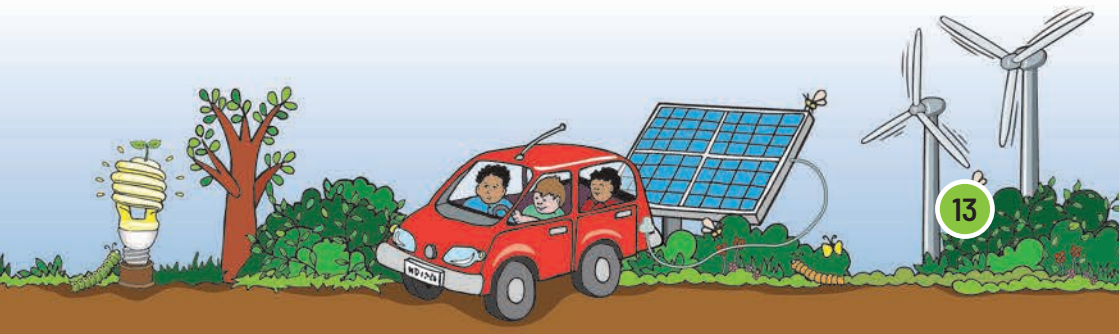
- Habitat destruction and extreme weather events.
- Changed timing of seasonal events such as breeding and migration. Important events could go out of sync – like flowering and pollination.
- Species could become extinct or move to cooler locations.
- Warmer, more acidic seawater kills sea creatures.
- Some species, like fish, are becoming smaller to cope with higher temperatures.



PEOPLE

Unhealthy ecosystems cannot protect people against climate change.

- They cannot capture as much carbon and keep it out of the air.
- They can't protect against the impacts of extreme weather events.
- If ecosystems aren't doing their job, the air we breathe and water we drink can no longer be cleaned properly.
- Excessive heat dries the soil, shortens growing periods and could increase weeds, pests and diseases. This could eventually result in complete crop failure.
- Extreme weather events and unpredictable rainfall affects crops that humans eat.
- Hotter conditions make it difficult to keep humans and livestock well-fed.
- More disease puts those living with HIV/AIDS at risk. Other health concerns include hunger, malnutrition, air pollution and heat stress.
- Many South Africans are living in poverty, have a high disease burden and inadequate housing. Because they are vulnerable, they can't cope well with extreme climate events.



THE ECONOMY

Very high temperatures are bad for the economy. A changing climate means a changing economy.

ENERGY
Hotter weather demands more electricity for air conditioning. Higher energy demand makes electricity prices climb.

FORESTRY
More disease outbreaks and fires threaten forests and plantations. These are not just responsible for removing large amounts of carbon dioxide out of the air but could replace fossil fuels as a fuel source.

FOOD
Food prices are increasing. Income from fisheries is declining due to smaller catches and destruction in coral reefs.

TOURISM
Tourism contributes to greenhouse gas emissions and has a massive carbon footprint.

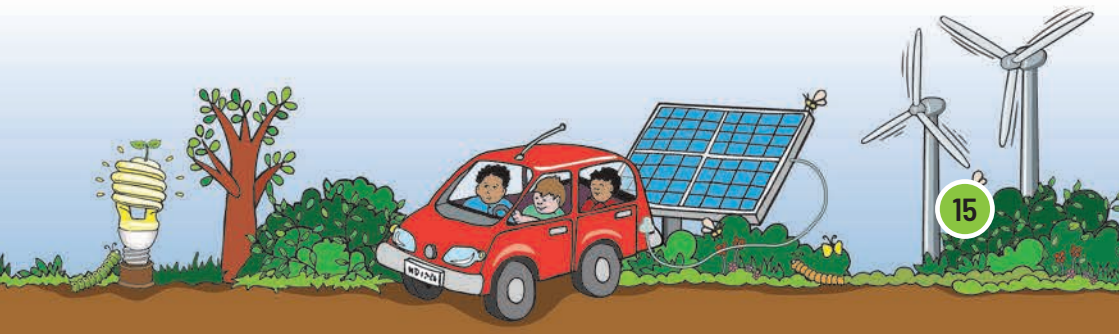
POVERTY

Climate change burdens the poor. The disadvantaged are the most vulnerable to climate change. Reasons include:

1. More food and water insecurity
2. Higher food prices
3. Loss of jobs
4. Negative health effects
5. Being forced to move

By 2050, climate change could force 100 million people into poverty. We can reduce these risks by taking climate action. This will result in:

- A global economic gain
- Cleaner air
- A safer climate
- Containment of diseases
- Millions of new low-carbon jobs



WHY SHOULD SOUTH AFRICANS BE WORRIED ABOUT CLIMATE CHANGE?

Climate change will affect South Africans in five sectors: health, bio-diversity, agriculture, water and cities.

Though the spread of malaria isn't expected to increase, cholera outbreaks will. As temperatures rise, farmers will need extra irrigation and maize, wheat and grape production particularly will be impacted.

It is uncertain what the outcome of precipitation will be, but the east coast and central interior are likely to get more water, while the Northern and Western Cape are likely to get less. Coastal cities may be threatened by higher sea levels. For example, Durban's sea-level could rise by 2.7 mm every year, making storm surges and coastal erosion worse. In general, as weather patterns become more extreme, fires, storms, flooding, and droughts are expected.

- Many South Africans are living in poverty, have a high disease burden and inadequate housing. This means that they are not able to deal well with extra pressures like extreme climate events since they are already in a vulnerable state.
- In some places, South Africa already has low and variable rainfall.
- Most of South Africa's surface water is already appointed to be used somewhere, so there isn't much extra.
- Agriculture and fisheries, which will be impacted, are important for food security and local livelihoods.

WHAT IS GOVERNMENT DOING ABOUT CLIMATE CHANGE?

During the National Climate Change Conference in 2005, it was resolved that climate change is real and is a significant threat to South Africa's development.

South Africa's Climate Change Response Policy embodies Government's commitment to:

- Make a fair contribution to stabilising greenhouse gas levels in the global atmosphere
- Protect the country and its people from the impacts of climate change, which is unavoidable
- Implement an effective climate change response and make a transition over the long-term to an economy and society which is able to cope with the changing climate and has low carbon emissions. This is driven by a vision the government has to ensure that there is sustainable development and a better life for all.

In 2015, the Paris Agreement represented a turning point in the way Earth's global climate is governed. Here, multiple countries allied to pursue a common goal. South Africa showed our commitment to curbing climate change by signing and ratifying the agreement. The agreement set global goals to:

a) keep global temperature rise well below 2°C above where it was before the industrial age began. Efforts are to be made to limit the increase to 1.5°C;

b) increase the ability to adapt; and

c) make money flow consistent with a pathway towards low emissions and climate-resilient development.

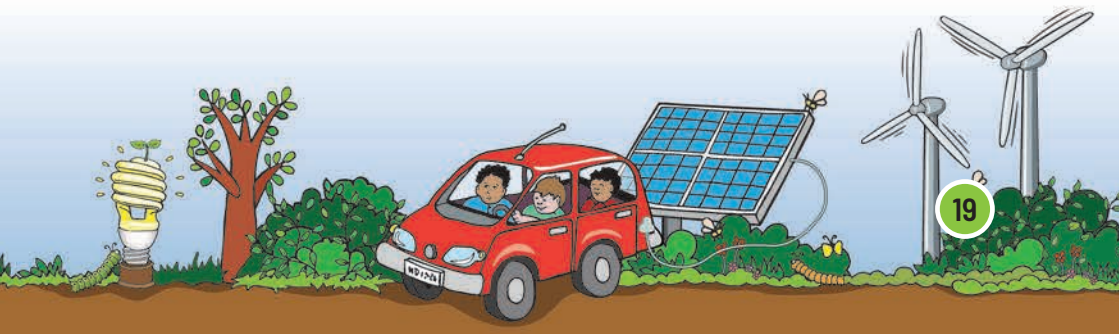
The Paris Agreement is premised on contributions determined by countries themselves, towards collectively agreed global goals. These nationally determined contributions are to represent countries' best effort, and to be progressively enhanced over time. It is premised on an understanding that we all have a common responsibility to act, whilst noting that nations over time have contributed to the problem differently, and have varied capabilities to respond. It is important for South Africa to play a leading role in ensuring that robust and credible multilateral rules, guidelines and procedures are adopted to allow for aggregation and comparability of national efforts in a system that largely leaves it up to sovereign States to determine their own Nationally Determined Contributions (NDCs) towards achieving global goals in the Paris Agreement.

The negotiations are about the degree of multilateral overlay, that Parties and - in particular the most powerful countries from the developed and developing world - will agree to. In the negotiations South Africa seeks to preserve and make operational and meaningful the Convention principles of equity and common but differentiated responsibility and respective capabilities (CBDR&RC) and to base decision-making at the United Nations and nationally as far as possible on what science indicates is required to address the climate challenge.

A climate-resilient and low-carbon economy and society must:

- Build resilience to the effects of climate change
- Reduce greenhouse gases

Having a plan to shield ourselves from the effects of climate change and reducing greenhouse gas emissions will work in South Africa's favour in the long run. It will help to redefine our competitive advantage and to transform the economy by shifting from an energy-intensive to a climate-friendly path. This forms part of a pro-growth, pro-development and pro-jobs strategy.



WHAT CAN I DO ABOUT CLIMATE CHANGE?

START A HOME GARDEN

YOU CAN **PLANT YOUR OWN FRUIT AND VEGGIES** IN A HOME GARDEN. YOU WILL BE HELPING THE ENVIRONMENT AND SAVING MONEY AT THE SAME TIME!

MAKE YOUR OWN COMPOST

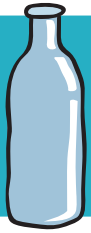
PUT LEFTOVER FOOD IN A **COMPOST HEAP**. YOU CAN USE COMPOST TO GROW NEW PLANTS. MAKING COMPOST ALSO REDUCES SPACE USED FOR LANDFILLS AND CREATES HEALTHY SOIL.

PLANT INDIGENOUS

PLANT **INDIGENOUS SPECIES** OF PLANTS. THEY USE LESS WATER AND PROVIDE FOOD AND HABITAT FOR ANIMALS.

DON'T USE PLASTIC

PLASTIC BAGS HARM ANIMALS AND THE ENVIRONMENT AND TAKE YEARS TO BREAK DOWN. USE YOUR OWN **CANVAS BAG** INSTEAD OF PLASTIC BAGS.



REUSE

USE A **GLASS DRINKING BOTTLE** THAT CAN BE WASHED OUT AND USED AGAIN. IF YOU USE ITEMS THAT CAN BE REUSED, THIS RESULTS IN LESS WASTE.

BECOME A WASTE PICKER

START **WASTE PICKING** TO MAKE MONEY. WASTE PICKERS COLLECT RECYCLABLE MATERIALS TO RESELL TO BUYBACK CENTRES.

SAVE WATER

SAVING WATER IS EXTREMELY IMPORTANT. ALL LIVING SPECIES NEED WATER TO SURVIVE. ALWAYS **TURN OFF YOUR TAP** WHEN YOU'RE FINISHED ANDFIX ALL YOUR PLUMBING **LEAKS**.

REDUCE POWER USE

WHEN YOU EXIT A ROOM, **ALWAYS TURN OFF THE LIGHTS**. USING ELECTRICITY CREATES POLLUTION. YOU WILL CREATE FAR LESS POLLUTION IF YOU SAVE ELECTRICITY.

Transition of South Africa's Climate Change Response

2016
- Ratified the Paris Agreement
- Nationally Determined Contributions (NDC)

2015
- Intended Nationally Determined Contributions (INDC)

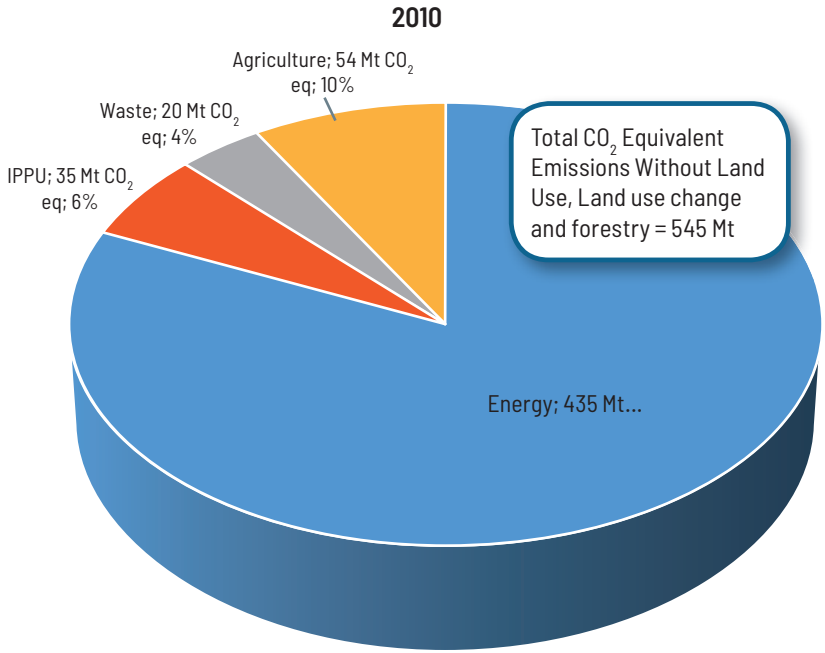
2014
- Mitigation Potential Analysis (MPA)
- National Climate Change Response Strategy for the Water Sector

2013
- Long-Term Adaptation Scenarios
- Green Economy Model

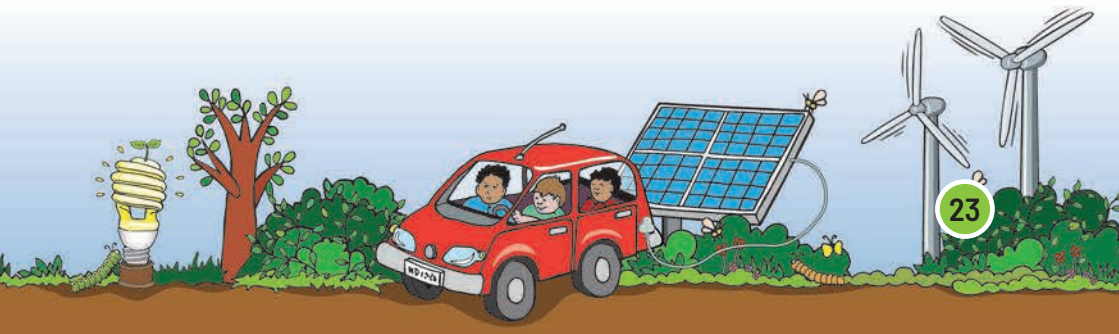
2012
- National Development Plan (NDP)

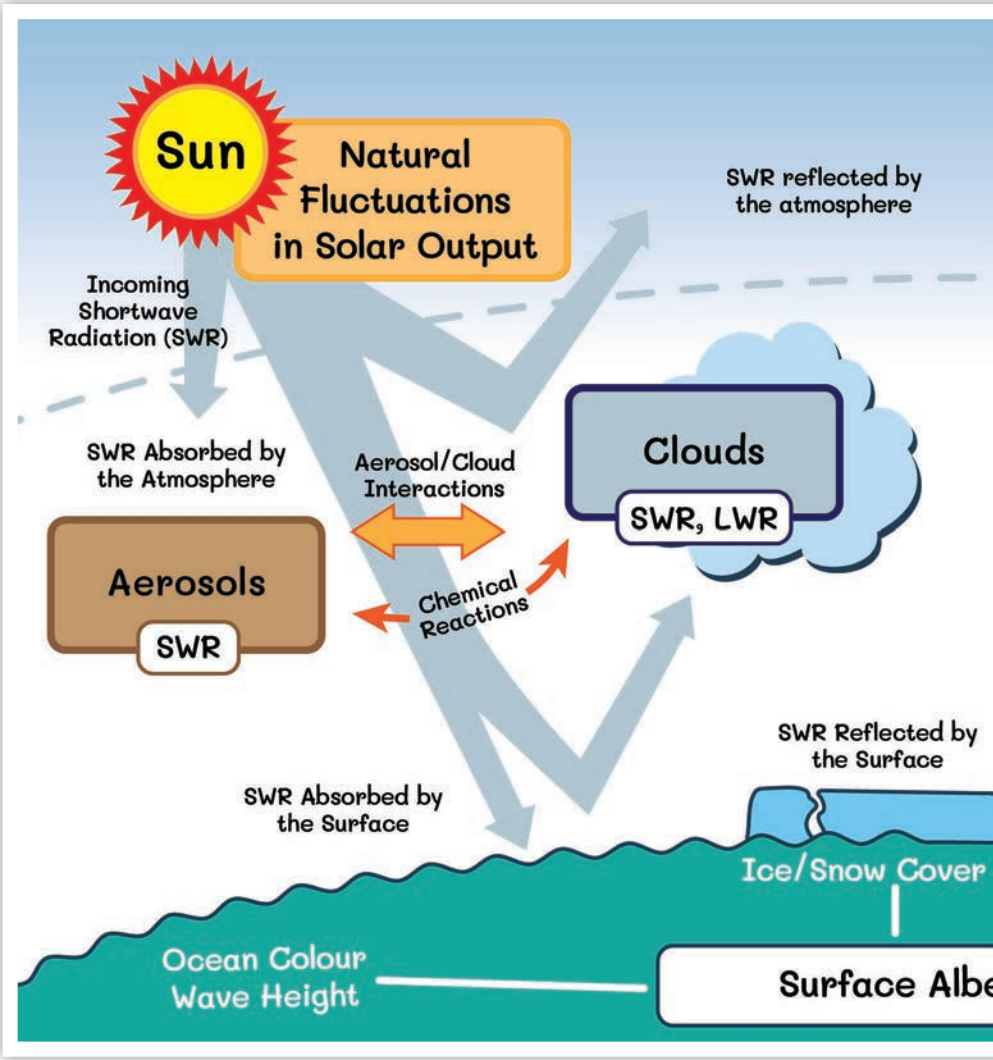
2011
- National Climate Change Response White Paper

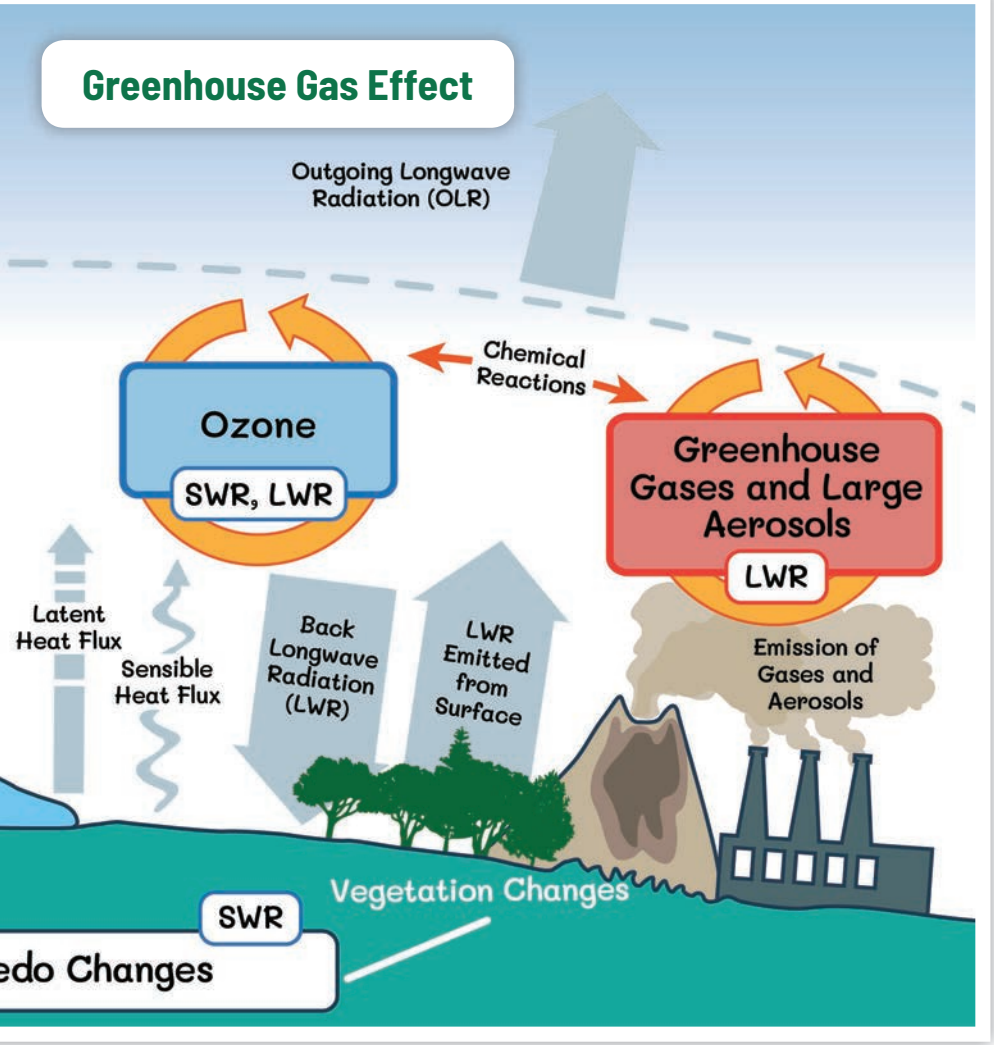
In 2010 the total GHG emissions (excluding Forestry and other land use – FOLU) in South Africa were estimated at 544314 GgCO2eq. There has been a slow increase of 21.1% since 2000 (449498 GgCO2eq).



Total GHG: Trend and levels from sectors (excluding FOLU) for 2000 - 2010.

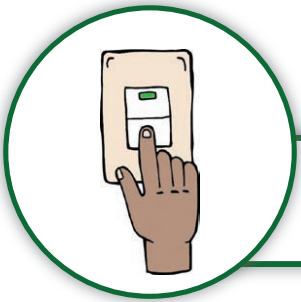



Sun
Natural Fluctuations in Solar Output
SWR reflected by the atmosphere
Incoming Shortwave Radiation (SWR)
SWR Absorbed by the Atmosphere
Aerosol/Cloud Interactions
Clouds
SWR, LWR
Aerosols
SWR
Chemical Reactions
SWR Reflected by the Surface
SWR Absorbed by the Surface
Ice/Snow Cover
Ocean Colour
Wave Height
Surface Albe


Greenhouse Gas Effect
Outgoing Longwave Radiation (OLR)
Chemical Reactions
Ozone
SWR, LWR
Greenhouse Gases and Large Aerosols
LWR
Latent Heat Flux
Sensible Heat Flux
Back Longwave Radiation (LWR)
LWR Emitted from Surface
Emission of Gases and Aerosols
Vegetation Changes
SWR
edo Changes

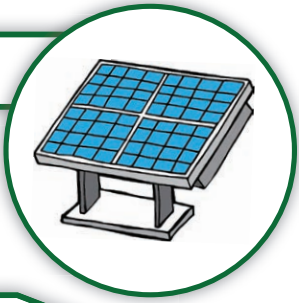
WHAT CAN I DO ABOUT CLIMATE CHANGE?

SAVE ELECTRICITY



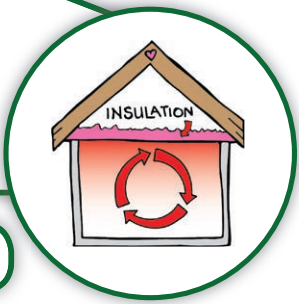
Turn off lights when you don't need them.

Install a solar geyser.



Use renewable energy sources.

Insulate your house- you will reduce your greenhouse gas emissions and save on your electricity bill by using less air conditioning and heating.



Replace lights that you use most with compact, fluorescent light bulbs. This can save up to 80% on your next electricity bill and lasts up to eight times longer.

Cook with gas.

WORLD ENVIRONMENT DAY - 5 JUNE

World Environment Day raises awareness about the environment and specific environmental issues. It is the biggest, most globally celebrated day for positive environmental action. People from all walks of life come together to ensure a cleaner, greener and brighter outlook for themselves and future generations.

The day focuses on environmental concerns including pollution, global warming, desertification, overpopulation, wildlife crime, toxic chemicals, sustainable food production and protection of wildlife. It encourages action for the protection of our environment.

World Environment Day enables everyone to realise their responsibility to care for the Earth and reminds them to become agents of change. Every action counts and becomes exponential in its impact when everyone on Earth does it.

WORLD OCEANS DAY – 8 JUNE

World Oceans Day is a time to highlight the many ways in which oceans contribute to society. They regulate the global climate, supply essential ecosystem services and provide sustainable livelihoods and safe recreation.

World Oceans Day is a chance to acknowledge the considerable challenges we face in helping the oceans to keep on doing their job. As people around the world celebrate the water that links the entire planet together, help to raise awareness for the sea's role as a source of food, oxygen and medicine.

WORLD DAY TO COMBAT DESERTIFICATION – 17 JUNE

The World Day to Combat Desertification and Drought (WDCD) promotes public awareness of international efforts and cooperation to combat desertification and the effects of drought. The WDCD also encourages community and ecosystem resilience against desertification while improving the human condition, particularly in dry lands.

This is a unique occasion to remind everybody that desertification can be effectively tackled and that solutions are possible! Key tools lie in community participation and co-operation at all levels.

CLIMATE CHANGE IN A NUTSHELL:

Climate change is regarded as the single biggest threat to wellbeing, health and socio-economic development facing humanity this century. Its impacts are widespread, unprecedented and disproportionately burdens the poorest and most vulnerable. The Paris Agreement represents a turning point in global climate governance and strengthens rules-based multilateralism, as it is the first time that a comprehensive and universal agreement has been adopted under the UNFCCC. It sets global goals to: a) keep global temperature rise well below 2°C above pre-industrial temperatures while pursuing efforts to limit it to 1.5°C; b) increase the ability to adapt; and c) make finance flows consistent with a pathway towards low emissions and climate-resilient development.

The inconvenient truth is that...

...even if South Africa becomes a 'climate saint' overnight and reduces greenhouse gas emissions to zero but the rest of the world carries on regardless, South Africa will still experience the full impacts of climate change. We cannot go at it alone. We need the whole world to make their fair contribution to reducing the severity of climate change.


TURN OFF LIGHTS NOT IN USE
GO GREEN
PLANT TREES
GO GREEN
USE SOLAR POWER
GO GREEN
USE ENERGY EFFICIENT LIGHT BULBS
GO GREEN
GO GREEN
REDUCE OUR ENVIRONMENTAL FOOTPRINT SOUTH AFRICA
CHOOSE TO WALK
GO GREEN
COMPOST
GO GREEN
FIX WATER LEAKS
GO GREEN
SHARE RIDES
GO GREEN
RECYCLE MORE
GO GREEN
INSULATE YOUR HOME
INSULATION
GO GREEN
DRY YOUR WASHING NATURALLY
GO GREEN

Climate Action Now!

Save the future

Call centre: +27 86 111 2458
callcentre@environment.gov.za
www.environment.gov.za

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