



# A TOOLKIT FOR WOMEN ON CLIMATE CHANGE

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**MINISTRY OF SOCIAL SECURITY, NATIONAL  
SOLIDARITY, AND ENVIRONMENT AND  
SUSTAINABLE DEVELOPMENT  
(ENVIRONMENT AND SUSTAINABLE  
DEVELOPMENT DIVISION)**

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**REPUBLIC OF MAURITIUS**



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## Foreword

Climate change is one of the most daunting challenges which humanity is facing. It is considerably disrupting national economies, affecting livelihood, and the well-being of people in every corners of the planet. Weather patterns are changing, sea levels are rising, weather events are becoming more extreme and greenhouse gas emissions are now at their highest levels in history. Millions of people around the world have suffered and continue to suffer from extreme weather events. We have never met with a greater sense of urgency. Climate change threatens to affect all aspects of the development agenda, irrespective of countries: from poverty eradication to health care, and from economic growth to disaster risk reduction. It will represent a major impediment towards achieving sustainable development goals.

In the light of the growing concerns linked to climate change, Article 6 of the United Nations Framework Convention on Climate Change sought to promote education and awareness raising as a major pillar to trigger global climate action to ensure that everyone knows both the dangers of climate change and what is required to adapt and mitigate its impacts. Education and training are integral in enabling citizens' contributions to local and global efforts to meet the climate change challenge.

It is noteworthy that Mauritius is also being severely impacted by climate change. We are regularly being quoted among the most vulnerable countries on the planet. For instance, the 2018 World Risk Report ranked Mauritius as the 16<sup>th</sup> country with the highest disaster risk and 10<sup>th</sup> as the most exposed to natural hazards. As a matter of fact, local climate indicators are all showing signs of serious concerns. Mauritius has experienced an increase in air temperature by up to 1.2 degree Celsius and the sea level is rising at an accelerated rate of 5.6 mm per year. A reduction of 8% over the last 50 years has also been observed in the annual precipitation. The width of our beaches, which is a major pillar of our economy, has been eroded by some 20 metres over the last 10 years.

It is recognized that climate change education and public awareness are vital tools to build resilience against climate change and extreme events. The Government of Mauritius has an ongoing sensitization and public awareness programme in place with the aim to promote climate

change literacy. It involves targeting various community groups including youth, women, senior citizens as well as sectors such as education, agriculture, fisheries, infrastructure, water, energy, waste and health, among others.

The approach being used involves developing tailor made sensitization materials such as audio visuals, sensitization toolkits, posters, pamphlets, roller banners, 3D models, interactive digital tools, card games, PowerPoint presentations and mounted exhibitions to hold relevant and effective sensitization activities with various target groups.

This toolkit has been specifically developed to provide the women community with a detailed insight of climate change including the causes, the consequences, the impacts, the challenges and the opportunities. Increased knowledge and learning about the causes and impacts of climate change make people more aware of their role as consumers and how communities can be involved to contribute to solution-oriented initiatives, while engaging in taking meaningful actions in their everyday life.

# List of Abbreviations/Acronyms

AFRP	Africa Regional Platform
BUR	Biennial Update Report
CC	Climate Change
CCIC	Climate Change Information Centre
CDRP	Community Disaster Response Programme
CEB	Central Electricity Board
CGE	CEB Green Energy
CGT	Cycle Gas Turbine
DOWA	Deep Ocean Water Application
EE	Energy Efficiency
EEMO	Energy Efficiency Management Office
EWEAS	Early Warning and Emergency Alert System
GHG	Greenhouse Gases
INDC	Intended Nationally Determined Contributions
IPCC	Intergovernmental Panel on Climate Change
JICA	Japan International Cooperation Agency
LDRRMC	Local Disaster Risk Reduction and Management Committees
MARENA	Mauritius Renewable Energy Agency
NAMA	Nationally Appropriate Mitigation Actions
NDRRMC	National Disaster Risk Reduction and Management Centre
NEOC	National Emergency Operations Command
NGO	Non-Governmental Organisation
OECD	Organisation for Economic Co-operation and Development
RGSC	Rajiv Gandhi Science Centre
SADC	Southern African Development Community
SCAP	Smoke Control Action Plan
SME	Small and Medium Enterprises
SWH	Solar Water Heater
SWIO	South West Indian Ocean
TNC	Third National Communication
URA	Utility Regulatory Authority

This manual is designed to provide an overall picture of climate change and serves as a knowledge base. It introduces aspects of climate change, such as:

- ✚ What is climate change?
- ✚ Why is climate change happening?
- ✚ What are the projected impacts?
- ✚ What can be done to better address the challenges?

It has aspects on the science of climate change, which is essential in providing a better understanding of the broader picture.

In addition, this manual will bring climate change closer to women by providing concrete examples and guidelines on how to better deal with climate change. It explains the observed and projected impacts of Climate Change.

This manual could aid in women actions towards an eco-friendly future. It provides options for reducing climate change and adapting to its effects by women-led initiatives in Mauritius and around the world. This is crucial because the challenge goes beyond raising awareness and inducing behavioral changes.

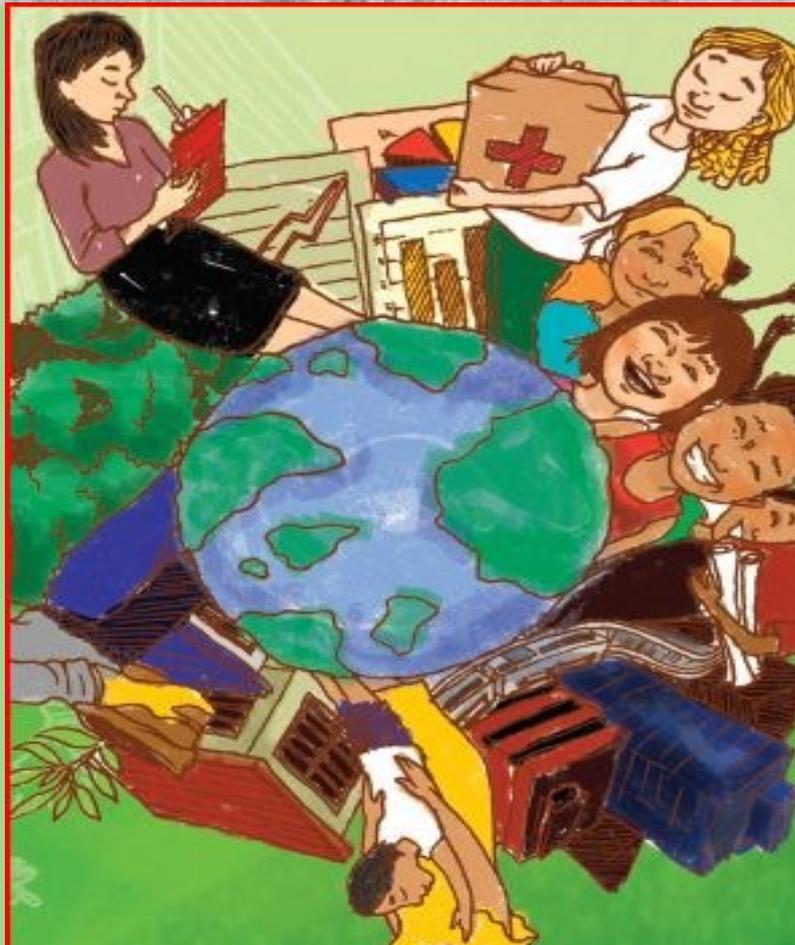
### **This manual aims to:**

- Increase awareness on the science of climate change, its causes, observed and projected impacts,
- Enhance participants' knowledge at addressing climate change,
- Provide women actions and initiatives to induce behavioral change and
- Promote a sense of responsibility in the women as climate leaders.





# INTRODUCTION





## Women and Climate



Source: *The Express Tribune*

Everyone should acknowledge the benefits that women bring to climate action so that climate change can be properly addressed. Climate change impacts people differently - in terms of socioeconomic circumstances, disabilities, age and gender. When solutions to climate change address these different realities, they are more effective and their impact ripples through society. Here are 5 reasons why climate action and women should be seen holistically:

### **1) 100 % of the population needs to be involved**

51% of humanity is comprised of women and girls. To meet the most ambitious 1.50C target of the Paris Climate Change Agreement and to limit warming to well below 20C, it is critical that the needs, perspectives, and ideas of women, as well as of men, are included in climate action so as to create just, effective, and sustainable solutions.

The traditional skills and knowledge that women have relating to natural resource management in areas such as innovation, waste and energy are effective tools in climate action strategies.

### **2) Empowering women means more effective climate solutions**

Women comprise approximately 43 percent of the agricultural labor force in developing countries. When provided with the same access to resources as men, women can increase their agricultural yields by 20 to 30 percent, not only stepping up total agricultural output in these countries by 2.5 to 4 percent but also contributing to world hunger reduction by 12 or 17 percent, according to the UN. This can positively impact climate adaptation in two ways - appropriate technology or resources contributes to more sustainable farming and conservation, and a reduction in poverty enables individuals to better adapt to changes in climate.

Investing in women and girls creates ripple effects felt throughout entire communities and countries. Research shows that countries with high representation of women in parliament are more likely to ratify international environment treaties.



### **3) Women are vital to building climate resilience in communities**

Communities do better in resilience and capacity building strategies when women are also involved in planning. According to the UN, women tend to share information about community wellbeing that is important for resilience and more willing to adapt to environmental changes since their family lives are impacted.

Additionally, women are usually first responders in community responses to natural disasters, leaders in disaster risk-reduction, and contribute to post recovery by addressing the early recovery needs of their families and strengthening community building.

### **4) Climate change impacts everyone, but not equally**

It is well established that climate change has a greater impact on those sections of the population that are most vulnerable, whether in developed or developing countries, and exacerbates existing inequalities. Women commonly face higher risks and greater burdens from the impacts of climate change in situations of poverty and due to existing roles, responsibilities and cultural norms.

Targeted investments in gender equality and women's empowerment yield returns in environmental conservation, poverty alleviation, social policy and achievement of the Sustainable Development Goals. By tackling climate change with a gender lens, women's rights are also addressed, tackling rather than exacerbating existing gender inequalities.

### **5) Countries have agreed! - Work in progress under the UNFCCC**

Countries have recognized the importance of involving women and men equally in UNFCCC processes and in the development and implementation of national climate policies that are gender-responsive by establishing a dedicated agenda item under the Convention addressing issues of gender and climate change. This includes the first ever UNFCCC Gender Action Plan established under the Lima Work programme on gender (LWPG) that has five priority areas:

- Capacity-building, knowledge sharing and communication
- Gender balance, participation and women's leadership;
- Coherence;
- Gender-responsive implementation and means of implementation; and
- Monitoring and reporting.



## Activity 1

### THINK ABOUT IT

**How do you view climate change?** Is it a problem for the future and not now? Does it happen in other countries and not in Mauritius? Will climate change not affect me or my family? Can I help to make a change?

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**What is Climate Change?**



## Weather vs. Climate



**Weather** describes the day-to-day conditions in a particular place. Weather is what it's like outside today, tomorrow, next week, next month, etc. For example, the weather can be cloudy, sunny, rainy, windy, hot or cold.

**Climate** describes the average weather conditions in a place over relatively long periods of time (e.g. 30 years). For example,

*Curepipe: Cool and Humid*

*Rivière Noire: Hot and Dry*

## What is Climate Change?

**Climate change** is the change in the usual weather found in a country or region. This could be a change in rainfall patterns, or a change in temperature. Climate takes longer time to change.

**Examples in Mauritius:** Long ago, there was a specific period for flowering of mango trees, nowadays flowering can occur more frequently in some years and less flowering occurs some other years.

**Examples in other countries:** Decreasing amount of snow falls affect the water supplies that are used for farming and the timing of the winter snow season is shifting.

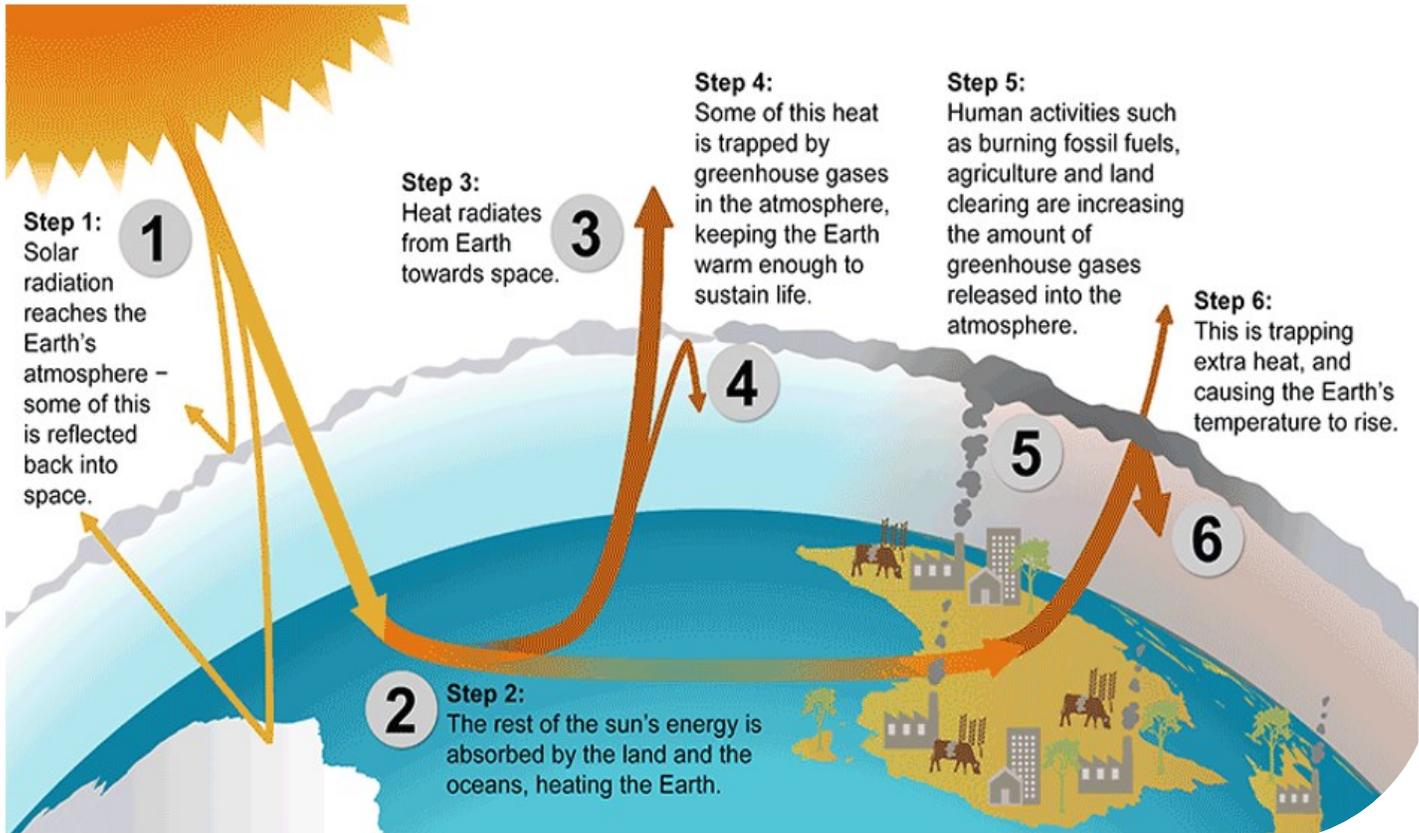
## The Greenhouse Effect

When solar radiation hits the Earth's surface, some of this energy is absorbed and warms up the ground and the oceans. The rest escapes back into space, but some of it is trapped in the atmosphere, which further warms the Earth. This is called the **greenhouse effect**. The greenhouse can be explained as the Earth's atmosphere acting like the glass panes around a greenhouse – warming the inside.

The Earth's atmosphere contains gases such as water vapour, carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O) (these are called **greenhouse gases**), and are the primary gases that retain the thermal energy reflected from the Earth's surface. The greenhouse effect is what normally keeps our planet at a comfortable temperature. However, there is clear evidence that human activities are increasing the amount of greenhouse gases in the atmosphere, which traps more heat and further raises the surface temperature of the Earth.



## Climate change mechanism – The greenhouse effect



## Global Warming

Global warming refers to the increase in the average temperatures of Earth's oceans and atmosphere over time. Most scientists believe that the temperature increases are due to the greenhouse effect. Human activities emit greenhouse gases, which subsequently exacerbates the greenhouse effect.



### What is Climate Change?

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Examples in other countries: Decreasing amount of snow falls affect the water supplies that are used for farming and the timing of the winter snow season is shifting.

### Is the hole in the Ozone layer responsible for Climate Change?

**NO!** Ozone is a very useful gas high up in the Earth's atmosphere that absorbs harmful ultraviolet radiation from the sun. When scientists realized that man-made gases used in fridges and aerosols were making a hole in the ozone layer, the international community set about phasing them out. An agreement called the Montreal Protocol was drawn up to phase out Chlorofluorocarbons (CFCs) in 2010 and hydrochlorofluorocarbons (HCFCs) in 2030.

Efforts have been so successful that the ozone layer is on track to recover by the middle of the 21<sup>st</sup> century. Unfortunately, the CFCs and their successor substances were eventually replaced by fluorinated gases, known as F-gases. These have no effect on the ozone layer but are powerful greenhouse gases. Once again, the world took action: in October 2016, under the Kigali Amendment, the 195 countries that signed the Montreal Protocol agreed to gradually reduce the imports of these gases – the Hydrofluorocarbons (HFCs) as from 2024 for developing countries like Mauritius.



## International Initiatives on Climate Change

There are several international initiatives that work on climate change issues.

### United Nations Framework Convention on Climate Change and the Kyoto Protocol

The United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol are the foundation of the international climate change governance. The Kyoto Protocol committed industrialized countries to achieving a specific level of greenhouse gas (GHG) emissions reductions.

Text of the UNFCCC, which entered into force on 21 March 1994, established an international framework for governments, working together, to develop a policy proposal to reduce the effects of climate change and adapt to its threats.

The Kyoto Protocol was negotiated in Kyoto, Japan, in December 1997 which was ratified by many countries, committed to reducing their emissions of carbon dioxide and five other greenhouse gases. The Kyoto Protocol of the UNFCCC is an amendment to the international treaty on climate change that obliges signatory nations to reduce emissions. It entered into force on 16 February 2005.

The objective of the protocol is the stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent disruption of the climate system.

### Intergovernmental Panel on Climate Change (IPCC)

The Intergovernmental Panel on Climate Change (IPCC) organisation was formed by thousands of scientists from many countries. Members of the IPCC, coordinated through the United Nations, have been collaborating since 1988 to interpret data relating to climate change. In 2007 the IPCC, along with Al Gore, was awarded the Nobel Peace Prize for their efforts in studying climate change.

The Republic of Mauritius (RoM) is among the first countries to ratify the United Nations Framework Convention on Climate Change (UNFCCC) in 1992 and one among the first 15 countries to sign and ratify the Paris Agreement on 22 April 2016. This demonstrates its willingness as a responsible member of the global community to seek and achieve global solutions on climate change matters.



## International Initiatives

The UN Environment provides a list of international initiatives on climate change:

- ✚ Absorb, Anticipate, Reshape (A2R)
- ✚ Africa Renewable Energy Initiative
- ✚ Climate and Clean Air Coalition
- ✚ Climate Initiatives Platform
- ✚ Climate Technology Centre and Network
- ✚ Global Centre of Excellence on Climate Adaptation
- ✚ Global Environment Facility
- ✚ Green Climate Fund
- ✚ GRID-Arendal
- ✚ International Environmental Technology Centre
- ✚ Partnership with the Technical University of Denmark (DTU)
- ✚ Portfolio Decarbonization Coalition
- ✚ Programme for Action on the Green Economy
- ✚ The Adaptation Fund
- ✚ UN Framework Convention on Climate Change
- ✚ UN Environment Finance Initiative
- ✚ UN Environment International Ecosystem Management Partnership
- ✚ World Conservation Monitoring Centre



Source: UN Environment<sup>1</sup>:

## National (local) Initiatives

CC and related Conventions signed by the Republic of Mauritius

- ❖ UNFCCC
- ❖ Kyoto Protocol under the UNFCCC
- ❖ Vienna Convention for the Protection of the Ozone Layer
- ❖ Montreal Protocol under the Vienna Convention
- ❖ More conventions can be found at the website of the Ministry<sup>2</sup>

<sup>1</sup> <https://www.unenvironment.org/explore-topics/climate-change/about-climate-change/climate-change-initiatives-and-partnerships>

<sup>2</sup> <http://environment.govmu.org/English/Pages/Conventions/Conventions.aspx>, and <http://environment.govmu.org/English/Pages/Conventions/International-Conventions.aspx>



## Activity 2

### THINK ABOUT IT

**Discuss with your elderly and friends on the climatic changes observed in your locality during the past years.** For example, is summer as warm as long ago? Is winter as cold as long ago? Are flowering periods for particular fruit trees the same? Are you observing heavy downpours for short intervals of time?

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# CAUSES AND IMPACTS OF CLIMATE CHANGE

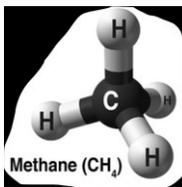
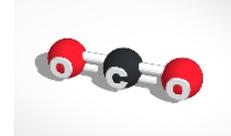




## Causes of Global Warming and Climate Change

### Greenhouse Gases (GHGs)

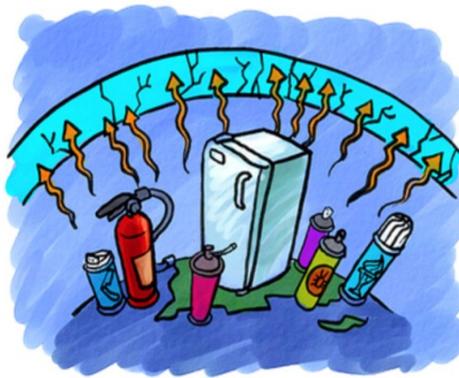
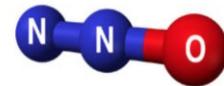
**Carbon dioxide (CO<sub>2</sub>)** is the primary greenhouse gas (GHG) emitted into the atmosphere through human activities. Humans are also influencing the ability of natural sinks, like forests, to **remove** (absorb) CO<sub>2</sub> from the atmosphere.



**Methane (CH<sub>4</sub>)** is emitted during the production, use and transportation of coal, natural gas, and oil. Methane emissions also result from **livestock** and other **agricultural practices** and by the **decay of organic waste** in municipal solid waste landfills.

**Nitrous oxide (N<sub>2</sub>O)** is emitted during **agricultural** and **industrial activities**, as well as during **combustion** of fossil fuels and solid waste.

Nitrous oxide (N<sub>2</sub>O)



**Fluorinated gases:** Hydrofluorocarbons, perfluorocarbons, sulphur hexafluoride, and nitrogen trifluoride are synthetic, powerful greenhouse gases that are emitted from a variety of industrial processes.

These gases are typically emitted in smaller quantities, but because they are powerful greenhouse gases, they are sometimes referred to as High Global Warming Potential gases ("High GWP gases")

CO<sub>2</sub> in the atmosphere highest in 650,000 years

Arctic summer ice shrank to lowest in 2012 years

China emitted around 9839 billion tonnes of CO<sub>2</sub> in 2017.



## Factors Leading to Climate Change

### Natural Causes

#### Volcanic Eruptions

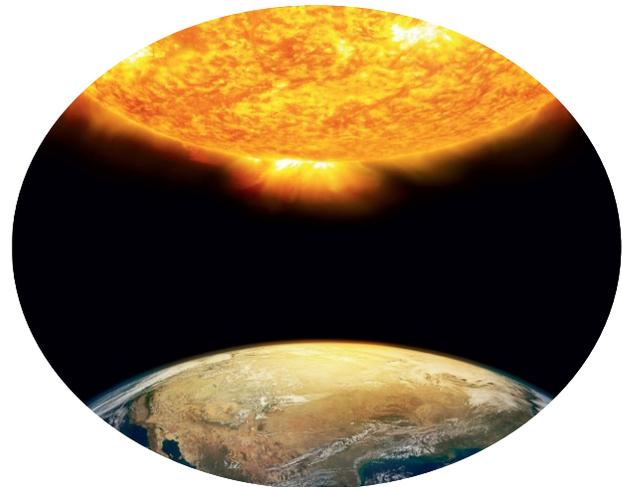


Source: Daily Express

Volcanic eruptions emit carbon dioxide (CO<sub>2</sub>) which causes global warming and volcanic ash or dust and sulfur dioxide that can block a percentage of sunlight causing a cooling effect.

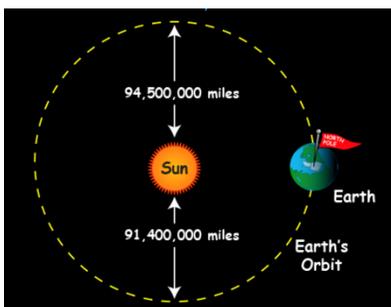
#### Variations in Solar Radiation

The sun's radiation drives the world's biological and physical processes. Changes in solar activities impact upon our climate as the rate of solar heating of the Earth and cloud forming processes are altered.



Source: Phys.org

#### Orbital Changes



Source: Pinterest

The amount of radiation that Earth receives varies with distance from the Sun. Earth's orbital changes are one of the natural causes of climate change.



## Human Induced Factors

### Activities that Release Greenhouse Gases

The world's leading climate experts confirm that human activities are the main cause of the warming observed since the Industrial Revolution (IPCC). Greenhouse gases are the main drivers of a warmer planet as these gases trap heat. Some human activities that increase the global temperature resulting in climate change are illustrated as follows.

#### Burning of fossil fuel



Source: econews.com.au

Burning coal, oil and gas produce carbon dioxide and nitrous oxide.

#### Cutting down rainforest



Source: Smithsonian Magazine

Trees help to regulate the climate by absorbing CO<sub>2</sub> from the atmosphere. Cutting them down will increase CO<sub>2</sub> in the atmosphere.

#### Increased livestock farming



Source: Livestock farming blog

Ruminants produce large amounts of methane when they digest their food.

#### Use of fertilizers



Source: Free Press Journal

Fertilizers, that contain nitrogen, increase nitrous oxide emission which is one of the greenhouse gases.



## Major GHG Sources in Mauritius

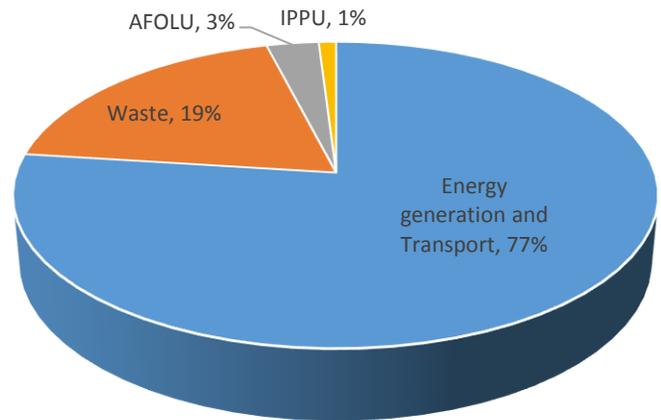
The GHGs are increasing mainly because of uncontrolled human activities such as:

- producing and using energy,
- transportation,
- deforestation, and
- waste generations.

### DID YOU KNOW...?

Fossil fuel burning currently adds nearly **6 BILLION TONS** of CO<sub>2</sub> to the atmosphere yearly, while...  
 .... Oceans and forests only remove **HALF** of this CO<sub>2</sub>.

In **Mauritius**, around 77% of the GHG emissions are from the energy sector, which includes electricity generation and transport. Wastes release some 19% of the emissions. Industrial processes and product use (*IPPU*) emit around 1% of GHGs, while Agriculture, Forestry and Other Land Use (*AFOLU*) accounted for around 3% of emissions (*source: TNC 2016*).



### DID YOU

### KNOW...?

Global warming 'solved' a land dispute between India and Bangladesh because...



...the disputed island simply **disappeared.**

### Activity 3

Identify the main activities at home that are sources of GHG emissions

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## Impacts of Climate Change Globally

Human activities are estimated to have caused approximately 1.0°C of global warming above pre-industrial levels, with a likely range of 0.8°C to 1.2°C. Global warming is likely to reach 1.5°C between 2030 and 2052 if it continues to increase at the current rate (IPCC Special Report on Global Warming of 1.5°C).

Stronger and more recurrent cyclones and extreme weather



Source: *Stirile ProTV*

Life and livelihood are threatened (scarcity of food, decrease in harvest/ fishing, etc.)

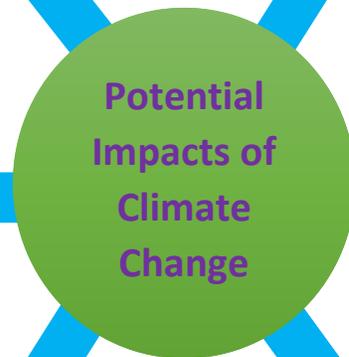


Source: *Dailymotion*

Increase in number and intensity of flash floods



Source: *The Indian Express*



Potential  
Impacts of  
Climate  
Change

More prolonged droughts



Source: *Wikipedia*

Intense heat and fire



Source: *ABC News*

Melting of Glaciers



Source: *Wonkette*



## Observed and Projected Impacts of Climate Change in Mauritius

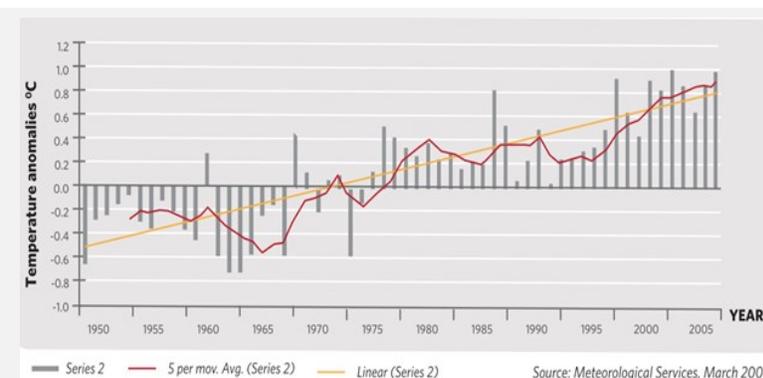
**Our contribution to GHGs  
& our exposure to risks!**



- ❖ Even if Mauritius contributes only 0.015% of global greenhouse gas emissions, it is one of the most vulnerable countries.
- ❖ The 2018 World Risk Report has ranked Mauritius as the 16<sup>th</sup> country with the highest disaster risk and 10<sup>th</sup> as the most exposed to natural hazards.

### TEMPERATURE TRENDS FOR MAURITIUS

- ❖ There is a definite warming trend.
- ❖ Average temperature for Mauritius is increasing at the rate of 0.15 °C per decade.
- ❖ Climate records over the period 1951-2014 show a significant warming trend of about 1.2°C.

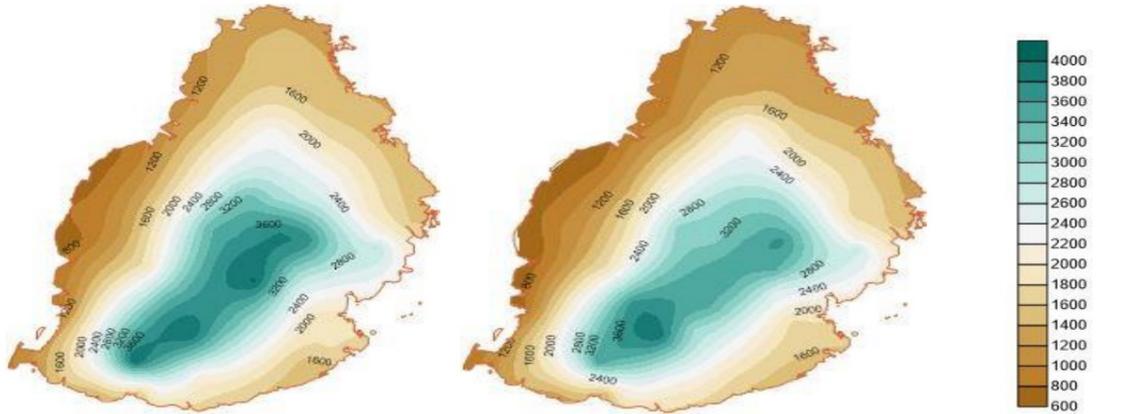


The average temperatures have increased by 0.74°C at Vacoas (high grounds) and by 1.1°C at Plaisance (coastal areas), when compared to the 1961 - 1990 long term mean.



## RAINFALL PATTERNS FOR MAURITIUS

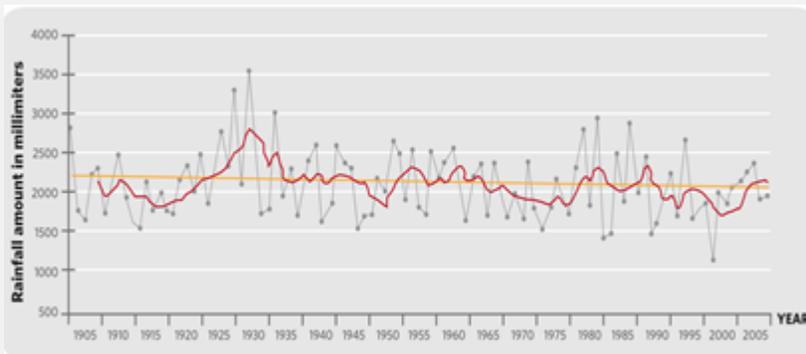
Changes in rainfall pattern between time period 1951 -1980 and 1981-2010



Source: Mauritius Meteorological Services  
(a) 1951-1980

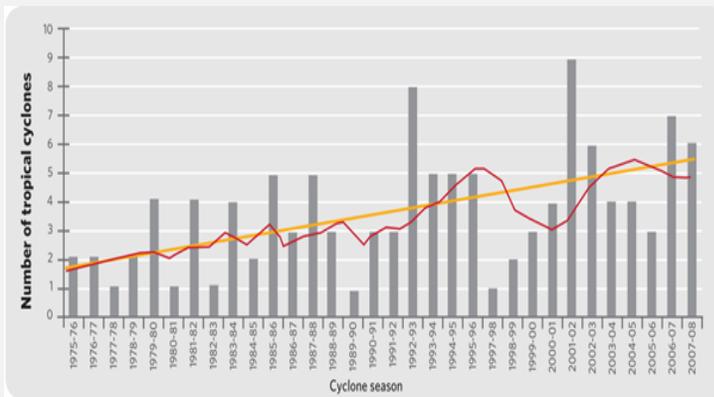
(b) 1981-2010

Rainfall scale in mm



There has been a decreasing trend in annual rainfall of 8% over Mauritius since the 1950s.

## TRENDS IN EXTREME EVENTS



Since 1975, an increasing trend in the number of intense cyclones (with gusts above 165 km/hr) has been noted. Since the last decade, there has been rapid intensification of tropical storms in the South West Indian Ocean (SWIO).

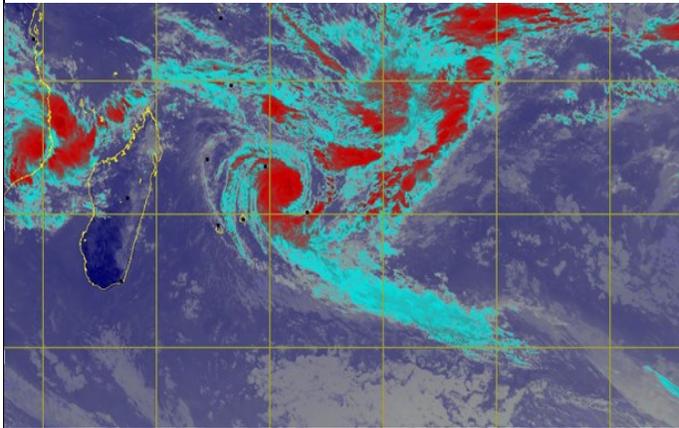
An example is cyclone Fantala in 2016 with gusts in the order of 345 km/hr. In 2019, 10 cyclones have formed, some have been devastating including for Rodrigues.



## SEA LEVEL RISE

Sea level rise has been observed to be accelerating in the last decade at an average rate of 5.6 mm/yr compared to the global value of 3.2 mm/yr. (TNC, 2016).

## CYCLONIC WEATHER



Our exposure to cyclones is increasing. The impacts and intensity of the cyclones keep on increasing with time.

Due to the gusts and rainfall from cyclone Fakir on 24 Apr 2018, at Bois-des-Amourettes, many electrical poles and trees fell down.



The hoardings and signboards at Bagatelle and other places also fell down due to the violent impulses of the wind during Cyclone Fakir in Apr 2018.

*Picture Source: l'Express*



Storm surge at Caudan due to cyclone Bejisa on 16 Jan 2014.

Many coastal regions, routes and beaches were inundated due to Berguitta cyclone on 16 Jan 2018 especially at Côteau-Raffin.



Picture Sources: L'Express

## ACTIVITY 4

1. Tick all the factors below which are likely to cause climate change

- Planting trees
- Using more fertilisers
- Reducing wastes
- Driving a petrol driven car

2. State what could happen to our coral reefs if there is 1.5 °C rise in global average temperature

-----  
-----

3. The intensity of cyclones are increasing with the advent of climate change

- True
- False



## Observed Impacts

### Water Shortages and Related Impacts



Due to the overall warming of the earth, Mauritius is having warmer summers. Water scarcity is becoming more frequent.

In November 2011, the Mare-aux-Vacoas reservoir was only 29.2% filled which led to a disruption in the water supplies to different parts of the country.

### Beach Erosion



Accentuated beach erosion has shrunk the width of beaches around certain coastal areas in Mauritius by up to 10 meters over the past eight years.



### Damage to Infrastructure

The Terre Rouge-Verdun road was damaged due to landslide after a heavy downpour.



## Damage to Buildings

Regions such as Chitrakoot and Quatre Soeurs have recurrently been affected by landslide events such that residential buildings are prone to cracks and damages.



Flash floods

Picture Source: l'Express & Le Mauricien & hacklog

There has been an increase in the frequency of extreme weather events and more frequent torrential rains, the latter causing 11 deaths in March 2013. During the heavy rainfall in January 2015, around 250 sites were flooded in Mauritius. Moreover, the flooding at Cottage and surrounding regions on 17 December 2018 have resulted into severe damage to personal properties and public infrastructure. Government is implementing an Emergency Flood Rehabilitation Programme which would focus, inter alia, on the construction of new drains and detention basins.

On 09 April 2019, flooding has caused major damage leading to material loss at Fond du Sac. To this effect, some 110 households were compensated.



## Impacts on Agriculture



A rise in temperature is resulting in an increased incidence of pests and diseases. It has been observed that bugs (small insects) are increasing in numbers and are a direct threat to some vegetation.

The decreasing trend in annual rainfall of 8% over Mauritius since the 1950s, and an increase in evapotranspiration due to global warming may lead to a decline in agricultural yield by as much as 15-25% in the long run (TNC 2016).



## Coral Bleaching



Healthy Coral Reef



After an algal bloom (dead corals)



Totally bleached corals

Warmer seas and ocean acidification causing coral bleaching due to CO<sub>2</sub> absorption.

## DID YOU KNOW...?

Corals are **ALIVE!** They are very fragile animals which have existed for over

**400 million years.**

However, many of the species of corals are listed as

**Endangered or Critically Endangered.**

- Corals are affected when the sea water temperature increases (e.g. beyond 28°C).
- The coral is also affected when the sea water become more acidic and this is known as ocean acidification which can be caused by CO<sub>2</sub> being absorbed by the ocean.
- Coral Bleaching means that the corals are affected and damaged by the acidic seawater.



## Projected Impacts of Climate Change in Mauritius

- ✚ A temperature rise of up to 2°C is projected by 2061 - 2070.
- ✚ There will be a further reduction in amount of water by 13% by 2050.
- ✚ Sea level rise is projected to be of the order of 49 cm by 2100.
- ✚ It is likely to have an increase in the frequency of extreme weather events such as frequent torrential rain, resulting in consequences such as flash floods.
- ✚ According to the UN report 'SIDS in Numbers 2017' Mauritius is projected to become a water stressed country by 2025 and its agricultural production may decline by as much as 30%.

### IMPORTANT EMERGENCY NUMBERS TO KNOW BY HEART!

**SAMU: 114**

**Fire Services: 115**

**Coastguards: 212 2747**

**Police: 112/999**

**CEB (Electricity): 130**

**CWA (Water): 170**

**Telephone directory: 150**



### IMPORTANT DATES TO REMEMBER

- ▶ World Environment Day - WED (June 5)
- ▶ World Wetlands Day (February 2)
- ▶ International Day of Forests (March 21)
- ▶ World Water Day (March 22)
- ▶ Earth Day (April 22)
- ▶ International Migratory Bird Day (May 3)
- ▶ International Day for Biological (May 22)
- ▶ World Oceans Day (June 8)
- ▶ World Day to Combat Desertification and Drought (June 17)
- ▶ International Day for the Preservation of the Ozone Layer (September 16)
- ▶ Clean Up the World (third week-end in September)
- ▶ Zero Emissions Day (September 21)
- ▶ International Day for Natural Disaster Reduction (second Wednesday in October)
- ▶ International Day of Climate Action (October 24)



# Actions to Combat Climate Change





## How to combat Climate Change?

These are the two fundamental ways to combat climate change:

- Mitigation
- Adaptation



### What is Mitigation & Adaptation



#### Adaptation

- Change in land use, relocation
- Emergency and business continuity planning
- Upgrades or hardening of building and infrastructure
- Awareness raising campaign
- Health programs

- Seal Buildings
- Green Infrastructure
- Water and Energy Conservation
- Smart Growth

#### Mitigation

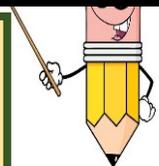
- Energy conservation and efficiency
- Renewable energy
- Sustainable transportation, improved fuel efficiency
- Capture and use of landfill and digester gas
- Increase carbon sinks

### MITIGATION

Mitigation refers to the actions that are taken to reduce and curb greenhouse gas emissions in an attempt to slow the process of climate change.

### ADAPTATION

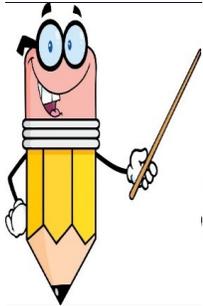
Adaptation refers to the measures that are based on reducing vulnerability to the effects of climate change.





## Adaptation

### What is Climate Change Vulnerability?



- ✚ Vulnerability is the susceptibility of exposed elements or assets to suffer damage and loss.
- ✚ Each type of exposed element can be affected by the hazard (i.e. climate change) in different ways
- ✚ For example, a certain wind speed affects a wooden house and a concrete building differently



Vulnerability depends on the following:

1. Exposure
2. Sensitivity
3. Adaptive Capacity

### Is everyone vulnerable to the same extent?

Not everyone has same vulnerability. It depends on many factors such as health, wealth, location around the globe, etc. For example:

- ✚ Poor people are more vulnerable as they have fewer facilities in terms of infrastructure and shelter.
- ✚ Vulnerability also depends on age; for example, children and old people tend to be more vulnerable.





## Adaptation

Adaptive measures in key sectors

### Health

#### Mosquito Proliferation

Higher temperatures favour the proliferation of mosquitoes and bacteria. This increases the risk of health problems such as bacteria and food poisoning.



Mosquito control especially in school premises



Sensitization campaigns



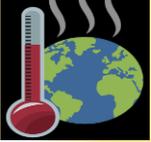
Use of mosquito coils, repellents, sprays, etc.

There is a need to prevent the proliferation of mosquitoes and to consume food that has been freshly prepared.

### Disaster Risk Reduction and Management

With the unpredictable changes in weather patterns, the youths are at risk of being victims to flash floods amidst other calamities. Many related NGOs and forces have started to carry out simulation exercises and drills to help the youngsters be better prepared for such natural disasters.





## Adaptation

### Sensitisation

Environment related topics, in particular, related to climate change are taught from most basic pre-primary to complex tertiary levels.

Initiatives like school compost project, rainwater harvesting, school endemic garden and waste segregation projects have been implemented in schools.



Extra-curricular activities related to environment are organised on special events like the Earth day, Environment day, wetlands Day, etc.

Activities like distribution of information materials, essay and drawing competitions, project presentations, debates and Slam are organised on these days.



World wetland day at Goodlands SSS



Slam presented by students of Satya Sai School of Mauritius



Children visiting the 'Bis Lamer' by REEF Conservation



## Adaptation

### Agriculture and Food Security

In the field of Agriculture and food security, the following adaptation actions are encouraged:

Cultivation of more drought and heat resistant varieties



Practice of trash blanketing in sugarcane fields



Shifting towards soilless cultures and sheltered farming



Improved livestock housing and breeding



Reduction in the use of irrigation water and fertilizer, through improved techniques e.g. pivot and drip irrigation systems and fertilization technology





## Adaptation

### Coastal Management and Tourism



In the coastal management and tourism sector, key measures have been undertaken to combat accentuated beach erosion around certain coastal areas.



Soft measure was taken as beach nourishment at La Preneuse and rock revetment for shoreline protection was implemented at Baie-du-Cap.



*Beach erosion at Flic en Flac public beach*



*Beach protection works at Flic en Flac public beach*



*Rehabilitation works at Rivière des Galets*



## Adaptation

### Mangrove Plantation



Mangroves are almost five times more effective than land forest in sequestering carbon. They also protect coastal zones from heavy waves and beaches from erosion. In the Technical Needs Assessment Report (GoM, 2012), vegetation restoration was recommended as one of the priorities for the protection of coastal zones. Consequently, an intensive mangrove propagation programme is being promoted to increase mangrove forest following a drastic decline in mangrove cover, which stood at only 45 ha in 1980.

Several NGOs are now engaged in mangrove propagation with funding from the private sector and international agencies.

The benefits of mangrove implantation are far-reaching and have the potential to not only protect but to improve the local ecosystem by restoring equilibrium; mangroves play an important role in balancing the diversity of marine life in the area. An increase in mangroves could result in improvements in local fishing with positive consequences on individual livelihoods.



## Adaptation

### Rainwater Harvesting

A rainwater harvesting system consists of stages like transporting rain water through pipes or drains, filtration and storage in tanks for reuse or recharge such as watering plants, landscape irrigation and washing of premises and cars.



Rose Belle market does rainwater harvesting since March 2017.

### Infrastructure/Settlement

- ❖ Where practicable, adopt climate sensitive building design that allows cooling through natural ventilation and that consumes low energy through proper building orientation.
- ❖ Buildings should be designed taking into consideration future climate change impacts and incorporation of future adaptation.
- ❖ Development should be controlled in areas identified to be potentially at risks from flooding and even landslide.
- ❖ Provision of proper drainage system should be considered within inhabited vulnerable areas where drains are absent.
- ❖ Green walls and roofs: A number of cities are growing plants on walls and roofs to absorb heat and help control the temperature inside buildings when it is hot. They also absorb water and reduce run off during cyclone and heavy rain fall. In some countries, such as France and Denmark, the law requires all new buildings to have green roofs!





## Mitigation

### Use of Renewable and Cleaner Energies

#### Use of renewable energies



Wind



Wave



Hydroelectric



Solar

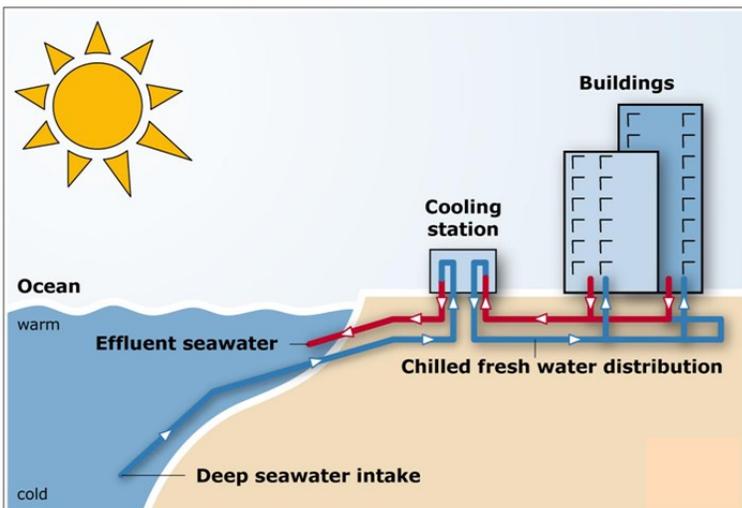


### DID YOU KNOW...?

173,000 Terawatts of Solar energy strikes the Earth continuously. That's more than 10,000 times the world's energy use.

Energy.gov

#### Deep Ocean Water Applications



The principal objective is to promote, design, construct and operate a ground-breaking system that will use thermal energy from the ocean by pumping cold seawater at 5°C from 1000 meters deep to be used for air conditioning.



## Mitigation



Bagasse and Biomass

Other energy alternatives:

- Biofuel
- Tidal
- Nuclear

- Shift towards the use of cleaner energy technologies, such as Liquefied Natural Gas (LNG), among others.



Even if the cleaner energies are not pollution free, they significantly reduce the GHG emissions.

## Sustainable Consumption and Production





## Mitigation

The three R's – reduce, reuse and recycle – all help to cut down on the amount of waste we throw away. They conserve natural resources, landfill space and energy.

**Reduce** – means to reduce the amount of waste produced in everyday activities by limiting the number of purchases. For example,

- a. Take your own bag when going shopping instead of buying biodegradable plastic or paper grocery bags.
- b. If possible, repair electronic devices instead of buying new one. This will reduce the amount of waste produced.
- c. Buy products with minimum packaging wherever possible.

**Reuse** – means looking for ways to reuse some of the materials we use for our everyday life, including paper, toys, electronics and any other tools. If we reuse, then we do not have to buy a new item. Consequently, we save energy and reduce the overall pollution.

**Recycle** - Recycling is changing old products into new ones that can be resold. For example, recycled bottles and cans wind up becoming a wide variety of new products such as new aluminum cans, rain gutters, window frames, steel beams, recycled bicycles, new jars and bottles.

**ACTIVITY 5**

1. **Tick all the mitigation measures below which can be useful**
  - Use solar water heater
  - Cut down trees
  - Use of air conditioning
2. **Using plastic bags is a way to mitigate climate change**
  - True
  - False
3. **There is no need to promote recycling of waste**
  - True
  - False



**BEST PRACTICES FOR WASTE MINIMISATION**

- Buy good quality products that will last long
- Buy in bulk to save on packaging, energy-consuming shopping trips, and money
- Avoid over packaged goods
- Buy recycled/ recyclable products
- Buy environmentally-friendly goods that won't create havoc on our rivers and marine life
- Use durable shopping bags and avoid plastic bags completely
- Buy organic and locally grown produce thereby encouraging and supporting farming that is pesticide and chemical fertilizer free



## Mitigation

### BEST PRACTICES FOR REUSING ITEMS CONSIDERED AS WASTE

- Use of PET bottles to make mini greenhouses for raising seeds and to make plastic funnels.



- Collect and knit unwanted scraps of wool into blanket squares and sew them together to make a rug or blanket.



- Make soil enricher from leaves collected by stacking them in a wire mesh frame or rubbish bag.



- Punch small holes along the length of an old discarded to make a water saving sprinkler.





## Mitigation

### BEST PRACTICES FOR ENCOURAGING SUSTAINABLE LIVING AMONG WOMEN THROUGH THE USE OF NATURAL RESOURCES FOR ECO-LIVING

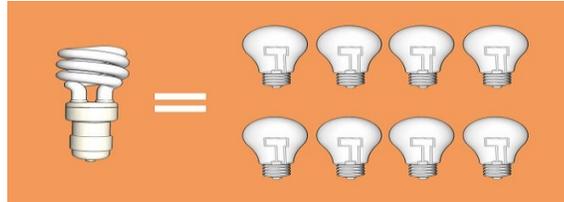
- I. Development of plates from dry banana or dry ravenala leaves
- II. Development of cottage coconut oil manufacturing and aromatic essential oils units for spas and hotels
- III. Diversification of dry coconut products for sustainability as an income generating activity (such as processing of desiccated dry coconuts, 'gateau coco', 'coco crystallize', canned coconut water, coconut milk, soap making with coconut oil)
- IV. Making of jewelry, cultural utilitarian and decorative produce with coconut shells
- V. Diversification of products from vetiver, vetiver roots, citronella tea, canned jack fruits, processed jack fruit curry, amongst others
- VI. Promotion of packaging made of cartons and paper board thereby reducing or eliminating polypropylene plastics, polystyrene and plastic wares.
- VII. Introduction of biodegradable aluminium foil paper or plant based take away food containers.





## Mitigation

- Deployment of efficient energy technologies and awareness raising on energy conservation.



- Sustainable transportation, including promotion of energy efficient mass transportation systems based on hybrid technologies and cleaner energy sources.



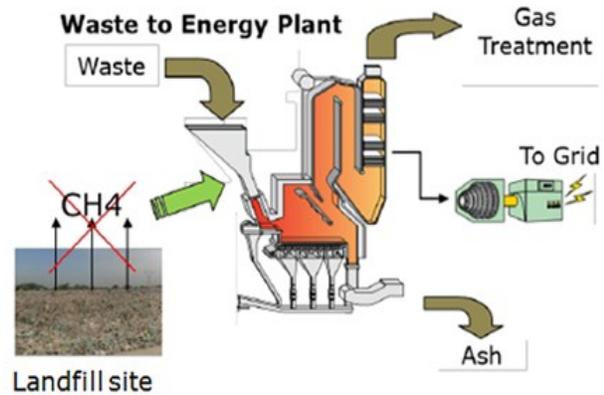
- Climate smart agriculture including bio-farming.





## Mitigation

- Sustainable and integrated waste management, including waste to energy.



- **Say no to plastic pollution**

Plastic pollution, killing a large number of seabirds and marine mammals, is a widespread problem which worsens the climate change issue. We must use eco-friendly products which can act as substitutes to plastic and other harmful materials.

## Enhancing Carbon Sinks

- Tree planting programmes

Forests are the lungs of our country. With the ongoing drastic decrease in the amount of trees, the future generations will have lesser clean air and balanced atmosphere. Many measures are being taken at the grassroots level to tackle this problem.





## Carbon Footprint

The Carbon Footprint is the impact people cause by releasing GHGs out of daily activities, such as driving a car, producing wastes, using electricity, or consuming food, etc.

### ACTIVITY 6

You may wish to calculate your carbon footprint by accessing the following link:

<https://www.carbonfootprint.com/calculator.aspx>

Welcome House Flights Car Motorbike Bus & Rail Secondary Results

Welcome to the web's leading carbon footprint calculator



First, please tell us where you live: [\[why?\]](#)

Country:

Carbon footprint calculations are typically based on annual emissions from the previous 12 months.  
If you would like to calculate your carbon footprint for a different period use the calendar boxes below (optional):

from   to  

Next, select the appropriate tab above to calculate the part of your lifestyle you are most interested in, e.g. your flights.  
Or, visit each of the tabs above to calculate your full carbon footprint.

Following your calculation, you can offset / neutralise your emissions through one of our climate-friendly projects.





## Activity 7

### THINK ABOUT IT

Discuss with your friends and neighbours and identify ways through which you can contribute to combat climate change in your daily activities

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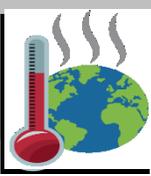
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# Success Stories/Case Studies in Fight against Climate Change





## WOMEN AND CLIMATE CHANGE: SUCCESS STORIES

1. Turning billboard advertising and textile waste into multi-purpose bags by the design and print entrepreneur, Lalita Anousha Purbho-Junggee.



Source: Lionesses of Africa

Through her up-cycling brand Sakili, Lalita has been up-cycling billboards, banners and textile waste into multi-purpose bags. Typically, after an advertising campaign, billboard materials will not be re-used and because of their thick PVC material, they often do not biodegrade, causing waste problems. To combat this, up-cycled bags and products will allow the material to have a second life and to continue being useful to the consumer in a new way.

Lalita's company is the first printing company to initiate a project like this on the island, also partnering with large companies like South African Airlines, Nissan, Porsche, Jeep, Canal Plus, Orangina, etc., which organize regular billboard campaigns.

Their focus is to ensure that their operations have minimal negative impacts on the environment as they believe that protecting our environment is an investment in the future development of our country. Being an island nation, they are the first who are affected by climate change and right now there is an emergency to create awareness regarding the same among Mauritians. And she humbly feels that Sakili is a nice way to create awareness on this issue while equally setting an eco-friendly fashion trend.



## 2. Varuna Jeetun: Eco-dresses



Source: Defimedia

Varuna specializes in designing eco-dresses by using recycled materials. She even represented Mauritius in Egypt where her creation was amongst the 10 best recycled dresses for the Miss Eco Universe 2015 competition. She believes that promoting recycled dresses challenges her creativity and most importantly helps the environment.

## 3. Production of seaweed for cosmetics



Source: INDIAN OCEAN NEWS

A seaweed culture project of several species is about to start on an experimental basis near Grand-Sable and Belle-Mare, in eastern Mauritius, for a particular use in cosmetics.

Seaweed jams, soaps and other fertilizers could also be created through the local production of seaweed. This project is co-managed by the association of women entrepreneurs and artisanal fishermen in the region, as reported by the newspaper L'Express of Mauritius. It is to be noted that aquaculture, algae cultivation and pearl oysters should create more than 1,000 jobs locally.



## 4. Kanasucre: Innovating through recycled jewelry



Shweta Lutchman-Jeetoo, through her company Kanasucre, makes use of recycled products to create jewellery. She uses good quality materials like corals, pearls, sea urchin spines, sea shells, fresh water pearls, organic cipaye (sipayi) seeds, metal charms (copper, sterling, silver, aluminium, plastic, ceramic, crystals, semi-precious stones, glass stones, paper beads (recycling), paper clay and polymer clay. She usually makes her own polymer dough and clay. Also, she uses home products like silicones to create her own moulds.

She thinks that Mauritians are more and more conscious about environment. They are starting to give preference to recycled products and other materials that cause no harm to nature. She affirms that many Mauritians as well as tourists have a “green attitude”. Her products are original and personalized as per the taste and budget of the client.



## 5. Grand Sable Women Planters, Farmers, Entrepreneurs Association (G\$WPFEA)

The Grand Sable Women Planters Farmers Entrepreneurs Association is an NGO which engages in enhancing the resilience of coastal community of Grand Sable, helping towards alternative Livelihoods (Self-Employment) and promoting women empowerment in the region of Grand Sable. It constitutes of around 60 women, who are mainly farmers and housewives.

They have been involved in various projects such as:

1. Train the Trainers program for the community on mangrove plantation
2. Talks on mangrove benefits (Sensitization Campaign)
3. Design and Construction of display boards on mangrove and climate change & promotional items
4. Production of Cloth Bags



Additional activities currently undertaken with GEF by the G\$WPFEA include:

1. Seaweed farming and development of seaweed derived products (soaps, pickles, and jam)
2. Vetiver, Ayapana, Citronelle and Cassava cultivation



The G\$WPFEA is the winner of the Island Bright Spot Award 2013 as part of the 2013 Solution Search out of 37 countries. The Global Island Partnership (GLISPA) made the announcement on 4 December 2013 and has found that this project is an excellent example of a “bright sport “that advances conservation and sustainable livelihood in an island community, and had great potential to be scaled and replicated to make a lasting impact.



## QUIZ

1. What is the most common greenhouse gas emitted from human activities?
  - A. Oxygen
  - B. Carbon Dioxide
  - C. Methane
  - D. Carbon Monoxide
2. Greenhouse gases are always bad for humans and the environment
  - A. True
  - B. False
3. In which of the following ways do people increase the concentration of greenhouse gases in the atmosphere?
  - A. Cutting down trees
  - B. Driving gasoline-powered cars
  - C. Burning coal to produce electricity
  - D. All of the above
4. Greenhouse gases cause global warming by absorbing and reradiating heat from \_\_\_\_\_ rays (infrared, sun, ultraviolet?)
5. Having more rain than usual in winter is a sign that climate change may be slowing down.
  - A. True
  - B. False



## FAQs

### **What is Weather?**

Weather describes the atmospheric conditions at a place over a short duration of time.

### **What is Climate?**

Climate is the statistics of weather over long periods of time. It is measured by assessing the patterns of variation in temperature, humidity, atmospheric pressure, wind, precipitation, atmospheric particle count and other meteorological variables in a given region over long periods of time.

### **What is Climate Change?**

Climate change is a change in the pattern of weather, and related changes in oceans, land surfaces and ice sheets, occurring over time scales of decades or longer.

### **What is the International Panel on Climate Change (IPCC)?**

The IPCC is the International body for assessing the science related to climate change. It provides policymakers with regular assessments of the scientific basis of climate change, its impacts and future risks, and options for adaptation and mitigation.

### **What are Greenhouse Gases (GHGs)?**

Greenhouse gases are any gaseous compounds in the atmosphere that are capable of absorbing infrared radiation. They trap and hold heat in the atmosphere.

### **What is the aim of the Paris Climate Agreement?**

The aim is to strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius.

### **What is adaptation?**

Adaptation refers to the measures that are based on reducing vulnerability to the effects of climate change.

### **What is mitigation?**

Mitigation refers to the actions that are taken to reduce and curb greenhouse gas emissions in an attempt to slow the process of climate change.



## Answers to Activities and Quiz

### ACTIVITY 4

Question 1: Using more fertilisers, Driving a petrol driven car

Question 2: Coral reef damage/bleaching, etc

Question 3: True

### ACTIVITY 5

Question 1: Use of solar water heater

Question 2: False

Question 3: False

### QUIZ

Question 1: B

Question 2: B

Question 3: D

Question 4: Infrared

Question 5: B

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