
Ministry of Environment & Sustainable Development

Addressing Climate Change in Mauritius

Is Climate Change real?

Climate change is one of the most important challenges of our time. Latest scientific reports released by international organizations, clearly indicate that the world is heading towards an unprecedented climate crisis. According to the United States National Aeronautic and Scientific Administration (NASA), the global average surface temperature in 2012 was the ninth warmest year since 1880. Most of them have occurred since 2000, with 2005 and 2010 ranking as the hottest years on record. In 2010, the Arctic Monitoring and Assessment Programme on climate change deduced that net loss of mass from Greenland Ice Sheet has increased and contributed over 40% of an average global sea level rise of the order of 3 to 5 millimetres per year. Furthermore, the World Economic Forum's Global Risks 2013 report¹ rated rising greenhouse gas emissions as the third most likely global risk overall.

According to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change², the earth has warmed by approximately 0.8°C on average from preindustrial times, and some countries in Africa are already experiencing a rise in temperature of up to 4°C. Globally, actions are underway to limit temperature rise to an average of 2°C. However, even a 2°C global average temperature increase is likely to lead to more frequent and stronger extreme weather events, increased variability which may for example lead to water stress in many regions of the world, risk of declining food production in many tropical regions, and damaged ecosystems, including widespread loss of coral reefs, all of which exacerbate livelihoods and existing development challenges around the world. Further impacts will be unavoidable as warming continues.

In the face of the global changing climate and its impacts, the global community since 1992 came up with the United Nations Framework Convention on Climate Change (UNFCCC), which is an international environmental treaty aiming at stabilizing greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Mauritius is one amongst the first countries to have ratified the UNFCCC and its Kyoto Protocol.

¹The *Global Risks* report is the flagship research publication of the World Economic Forum's Risk Response Network, which provides an independent platform for stakeholders to explore ways to collaborate on building resilience to global risks. The 2013 report was developed from an annual survey of more than 1,000 experts from industry, government, academia and civil society who were asked to review a landscape of 50 global risks. Further information can be found at www.weforum.org/risk.

²Established in 1988, the role of the IPCC is to assess scientific information on climate change, evaluate its environmental and socio-economic impacts, formulate rational response strategies and assist governments to adopt and implement climate change mitigation and adaptation policies. Many Assessment Reports, Special Reports and Technical Papers, have been published by the IPCC and these are widely used by policymakers, experts, scientists and students. In its 4th Assessment Report, the vulnerability of SIDS was reviewed and adaptation measures proposed (IPCC-AR4, 2007). The 4th Assessment Report is available on the following website: <http://www.ipcc.ch/>. The Fifth Assessment Report (AR5) is presently under preparation and will provide an update of knowledge on the scientific, technical and socio-economic aspects of climate change.

Why is Climate Change happening?

The Earth has a natural climate control system in which certain atmospheric gases (e.g. Carbon dioxide, methane, nitrous oxide and water vapour) trap heat radiated from the sun that keeps the planet some 30°C warmer than it would otherwise be (See Figure 1). However, human-induced activities involving intensive use of fossil fuels in developed countries are causing emissions of greenhouse gases to continue to rise globally, thereby trapping more heat and accelerating global warming. According to the UNEP Emissions Gap reports, since the beginning of the industrial revolution,

there has been a 43% increase in the concentration of carbon dioxide in the atmosphere from 280 ppm to 400 parts per million (ppm) in 2013 (the breach in 400 ppm mark has been recorded at the Mauna Loa in Hawaii on 9th May 2013). Total anthropogenic emissions at the end of 2009 were estimated at 49.5 GtCO₂e³. If the same trend continues, the emissions in 2020 may be in the range of 54 to 60 GtCO₂e. Deep cuts in global greenhouse gas emissions are required so as to hold the increase in global temperatures below 2^oC.

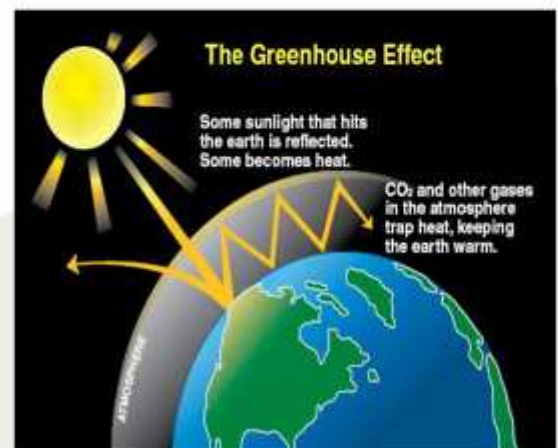


Figure 1: The Greenhouse Effect
(Source : <http://www.google.mu/search>)

Who is responsible for climate change?

It is important to note that historically, the developed countries have emitted most of the greenhouse gases whereas Least Developed Countries, Small Island Developing States (SIDS) and African countries have emitted an insignificant amount. According to the International Energy Agency, emissions from a few developing countries such as China, India and Brazil have started to rise.

Who is affected by climate change?

No one is spared from the impacts of climate change, be it developed countries such as the United States of America or SIDS like Tuvalu or Mauritius. However, developed countries are in general more resilient to the impacts of climate change, that is, they can maintain an acceptable level of functioning and structure despite being hit by the hazards. On the other hand, Least Developed Countries, SIDS and African countries in general are unable to cope with the adverse impacts of climate change, making them most vulnerable. These countries which contribute the least to the global emissions of greenhouse gases, are among the most vulnerable countries to the impacts of climate change and will be the hardest hit, often due to limited technological, financial, and institutional capabilities. In Africa, for example, a rise in temperature will definitely exacerbate the rate of crop loss, biodiversity loss, food insecurity and a spread of climate sensitive diseases. Low lying coastal areas and even certain islets are getting inundated during extreme weather events. Some are even facing the threat of disappearing forever. Small islets and even mainland countries like the Seychelles, Maldives, Bangladesh and Tuvalu are among those that are being severely

³ Gigatonnes Carbon Dioxide Equivalent (A gigatonne is equal to 1 billion tonnes)

impacted by climate change. For example, in Tuvalu, a SIDS in the Pacific Ocean, the impacts of climate change are being experienced by its people through rising sea level, high soil salinity, increasing frequency of floods and groundwater contamination by sea water intrusion amongst others. The nation's smallest island has disappeared and to adapt to this situation, new houses are being built on 10-foot pillars. The Tuvalu Government is even exploring the possibility of acquiring land in other countries and is working on the best way to ensure the integration of its people in the labour market of those countries.

Is climate change going to be a major issue for Mauritius?

In Mauritius, the impacts of climate change are already apparent through accelerating sea level rise, decreasing trend in annual rainfall, an increase in frequency and intensity of extreme weather events, as well as recurrent floods and droughts. The projected impacts are also gloomy in that decreasing trend in annual rainfall, increased duration of dry spells and more frequent heat waves among others are foreseen (See Box 2).

Box 2: Observed and projected impacts of climate change

Some observed impacts of climate change in Mauritius	Projected impacts of climate change in Mauritius
<ul style="list-style-type: none"> ~ Sea level has been rising by around 3.8 mm/year on average at Port Louis over the last 5 years and between 1998 & 2007, local mean sea level rose by 2.1mm/year ~ Average temperature has risen by 0.74⁰C when compared to the 1961-1990 mean ~ Decreasing trend in annual rainfall of around 8% over Mauritius since the 1950s ~ An increase in the annual number of hot days and warm nights ~ More frequent torrential rains resulting in flash flood⁴ ~ Increase in the frequency of extreme weather events, heavy rains and storms ~ Mauritius experienced its worst drought in 1999 and 2011 	<ul style="list-style-type: none"> ~ Sea level is expected to rise by up to 0.6m by 2100 ~ The average temperature is expected to increase up to 2⁰ C by 2061 -2070 compared to 1996 -2005. ~ Utilizable water resources will decrease by up to 13% by 2050. ~ Projections and trend analysis confirm that more frequent heat waves in summer and milder winters ~ Increase in heavy precipitation events with increased risk of flash flood ~ Increase in the number of intense tropical cyclones and high energy waves (tidal surge) ~ Increase in duration of dry spell

⁴ Mauritius experienced two dramatic flood events in two consecutive months. The first event occurred in February 2013 during which more than 100 mm of rainfall were recorded in 24 hours at 8 places across the island. This caused flooding in several regions and landslide at Mt Ory. On 30 March 2013, Port Louis experienced torrential rains of the order of 152 mm in less than one hour resulting in a flash flood which caused 11 deaths and considerable material damage.

Climate change and sea level rise are of major concern also for Outer Islands such as Agalega and St Brandon. Though most parts of these islets are around 1-2 metres above mean sea level, the highest elevation for Agalega is 7m at Colline D'Emmerez island and that of St Brandon is 6m at Albatross Island. Because of their small sizes and being low lying islands, any localized consequences of a rise in sea level would be significant for the whole of the two islands. The effects of climate change will definitely have serious impacts on Agalega and St Brandon, causing flooding of the islands, salt water intrusion and damage to vital infrastructure on which the inhabitants depend. Other direct consequences of anticipated climate and sea level changes will likely include: reduction in subsistence and commercial agricultural production of coconuts in Agalega, decreased security of water supplies and increased risk of diseases.

Climate change has therefore more far-reaching implications than only on weather patterns. Climate change is affecting not only the environment but also the social and economic prospects of our country. The principal areas of vulnerability to climate change include the coastal zone, tourism, agriculture, fisheries, health and freshwater. For example, rising sea levels can contaminate coastal freshwater and by 2030, the water supply may not be sufficient to satisfy projected demand. The decrease in rainfall, along with more frequent and severe droughts have a direct impact on crop production and therefore on food security and livelihoods of planters. Studies show that agricultural production may decline by as much as 20-30% in the medium and longer term due to rainfall variability. Similarly, the livelihoods of fishermen can also be at stake with reduction in live corals by 80-100% by the year 2100, deteriorating coastal zones and decreasing fish population. Reduction in sugar yield is expected to range from 47% to 65% with an increase in temperature of 2°C. Natural assets, such as beaches, that are the pillars of the tourism industry may slowly disappear, carrying away with them possibly over USD 50 million in value added in the sector by 2050 (National Climate Change Adaptation Policy Framework, MOESD, 2012). Higher temperature and recurrent floods can also lead to propagation of vector-borne and infectious diseases. Climate change is in fact weakening the economic, social and environmental pillars of the country and is a hindrance in the path of sustainable development, on which Mauritius is engaged through the Maurice Ile Durable project.

What is being done in Mauritius for Climate Change?

Fully aware of the possible impacts of climate change on our small island, its people and their livelihoods, Government with the collaboration of national and international partners has adopted a multi-pronged approach to deal with this issue. In this endeavor and in the recent years, Government has mobilised some USD 12 million grant from different sources (Government of Japan, Adaptation Fund Board and Global Environment Facility) to build the country's resilience against climate change. Government is focusing on several priority sectors like water, coastal zones, fisheries, tourism, public infrastructure, health and agriculture and is acting at different levels ranging from long term planning mechanisms,

institutional strengthening, policy and legislative review, outreach and demonstration projects, as follows:

Long Term Planning Mechanisms

- **Disaster Risk Reduction And Management**

In order to make the country resilient to the impacts of extreme events and climate change, Government together with other stakeholders has embarked on the Disaster Risk Reduction and Management project. Climate risk analysis, which was a central component of this project, is one of the first comprehensive climate modelling studies conducted for the country for inland flooding, landslides and coastal inundation. According to this study, 5-70 km² of built up areas, 19- 30 km² of agricultural land, 2.4-3 km of motorway, 18-29 km of main roads and 68-109 km of secondary roads are exposed to flood hazard. National Risk Profiles (Risks and Hazards Maps), Strategy Framework and Action Plan for disaster risk management have been developed under this project. These will contribute to designing robust disaster risk policies and management practices for the decades to come. It is wise to look ahead, learn about and prepare to what the future holds for the Mauritian community so as to build disaster-resilient architecture and have an up-to-date early warning system so as to enhance the country's preparedness in the face of disasters.

- **Setting up of an Agricultural Decision Support System**

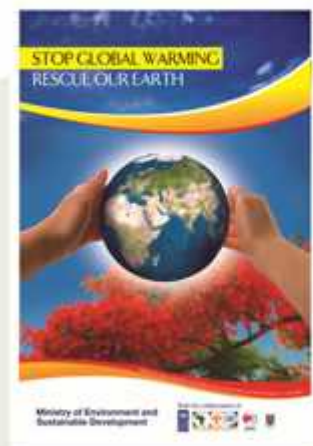
The key objectives of this project are to develop a decision support system for agriculture based on real time agro-meteorological data and to provide national level high quality climate data to a range of sectors and users namely agriculture, water management, researchers and farmers. This tool will provide information to help farmers to better adapt to the adverse effects of climate change and take the right decision and thus protect their crop, improve yield, quality, and income and ensure food security.

- **Setting up of Climate Data Server for research purposes**

Reliable climate data and information is a pre-requisite for developing comprehensive and effective adaptation solutions that will enable Mauritius to cope with climate change and its impacts. Technological change holds the key to meeting long-term climate change challenges and to meet the needs of policy makers. In this regard, a Climate Data Server for Climate Change academic and research purposes has been set up at the University of Mauritius. This initiative is the first of its kind in Mauritius and is a major step forward in mainstreaming climate change in the academic curricula and promotion of research and development on climate change adaptation. This tool will be useful to store data and information, make location-specific climate projections, and act as repository whereby registered users would be able to download already generated climate projections and information, for academic and research use. In the context of this project, relevant Ministries and other stakeholders have been trained to undertake climate analysis and climate modeling.

- **Setting up of a Climate Change Information Centre**

A Climate Change Information Centre (CCIC) will be set up at the Ministry of Environment and Sustainable Development to promote



awareness raising on climate change, provide early warning climate risk information to communities and work on collection of future climate projections for the Republic of Mauritius. The CCIC will act as a data centre for climate change related data and information meant for informed decision making.

- **Technology Needs Assessment (TNA)**

This project enabled Mauritius to define a set of clean technologies which are best suited for an enhanced climate change mitigation and adaptation approach in the energy industries, water, agriculture and coastal zone sectors for Mauritius. TNA also presents an opportunity to track evolving needs for new equipment, techniques, knowledge, and skills for mitigating greenhouse gas emissions and reducing vulnerability to climate change. During this project, the most feasible technologies have been recommended to enhance mitigation and adaptation in the following sectors: water, coastal zone, agriculture and energy industries. The results of this study will be an important tool to leverage international funding for implementation of these technologies, facilitate the transfer and diffusion of technologies and inform high level policy decision for their implementation to tackle climate change adaptation and mitigation. This project was an extensively stakeholder driven process and fully participatory involving more than 20 institutions.

Policy and Legislative Review

- **Mitigation and Adaptation Framework**

Government commissioned a study for mainstreaming climate change adaptation in climate change-related policies in sectors such as agriculture, fisheries and tourism in Mauritius and water in Rodrigues. Strategies and action plans have been developed and recommendations made with regard to enabling activities for climate change adaptation in these sectors, including research and development and the need for continuous monitoring and evaluation.

- **Food Security**

The agricultural sector is climate dependent and may affect food supply from direct effects on crop production. Such pressures have led to increasing concerns about achieving food security. As a response to this problem, Government has set up a Food Security Fund to increase the resilience of Mauritius towards food self-sufficiency by increasing production of foodstuff locally and at the regional level by partnering with neighboring countries.

- **Water Sector**

Given that climate change will have an impact on the availability and quality of freshwater, an integrated water resources plan for harnessing additional water resources has been prepared, along with maintenance of water networks, undertaking hydrological studies, boosting efficiency of water usage and amendment to water-related legislations.

Institutional Strengthening, Outreach, Research & Development

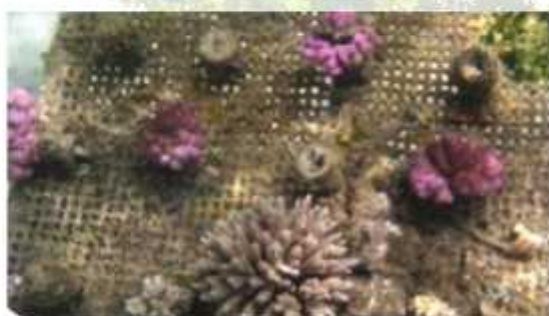
- **Capacity Building and Outreach**

Capacity building activities and sensitization campaigns including two Knowledge Fairs have been undertaken to enhance knowledge and capacity on climate change. Some 2600 professionals and other stakeholders were trained for building resilience against climate change. Furthermore, some 25000 participants from various target groups, including road and building engineers, architects, health professionals, teachers, primary, secondary &



tertiary students, academic institutions, public and private sector institutions, NGOs, civil society, women leaders and the general public, have been sensitized through the outreach programme on the causes and impacts of climate change, knowledge and techniques required to effectively plan appropriate policy measure to address climate change, likely impacts of climate change on buildings and related infrastructures, the link between gender and climate change, the impacts and implications of climate change on human health as well as adaptation strategies and climate related policy measures being implemented.

- **Demonstration Projects**



Some concrete projects have been implemented in several areas in collaboration with all stakeholders. These include the rehabilitation of degraded reefs through coral farming at Albion, Pointe aux Sables and Trou aux Biches, and in Rodrigues at Graviers and Hermitage, the setting up of an endemic garden and an Information Centre at Panchavati, procurement of salinity meters and training to onion planters of the

South East Coast to enhance resilience of planters and installation of seawater sensors in Rodrigues for monitoring sea water temperature at Riviere Banane, Anse aux Anglais, Grand Baie, Plaine Corail and Pointe L'Herbe.

- **Inventory of Greenhouse Gas**

Mauritius is engaged in a programme for sustainable National Greenhouse Gas Inventory Management Systems in Eastern and Southern Africa. This will enhance the country's capacity to prepare good quality national greenhouse gas inventories, establish a regional and international information exchange network, and establish a sustainable inventory system. Government is also promoting research and development in areas related to climate change adaptation in the fields of water using hydrological models, the agricultural sector through the use of compost as a climate change adaptation strategy, coastal zone planning with scientific studies on vulnerability of coastal communities, viable energy options and wind maps, as well as coal ash usage and impacts.

What are the future prospects?

Climate change will continue to affect and undermine the ability of Mauritius and other countries of the world to achieve sustainable development. The global nature of climate change calls for the widest possible cooperation by all countries and their participation in an effective and appropriate international response, with a view to raise efforts towards the reduction of global greenhouse gas emissions. While at the global level, cooperation, negotiations and responses will take their own course, at the local level, combating climate change requires ambitious and sustained actions. In this context, several important projects are presently in the pipeline of implementation including further actions for adaptation to climate change, formulation of national climate change mitigation policy, strategy and action plan, implementation of technologies in the energy sector for reduction of greenhouse gases, the formulation of a new legal framework for climate change and the preparation of the Third National Communication. The implementation of these programmes and other future programmes will build the country's resilience and empower it to better adapt to the impacts of climate change so as to ensure a secure future for all. Together we can change challenges into opportunities and pave the way towards the future we want.

