

Understanding Climate Change

Climate change is one of the most important issues facing the planet today. Most of us would have learnt that the climate worldwide is currently changing and that the last two decades have been the warmest period in the entire global temperature record.

This article series by the Office of Climate Change (OCC) is designed to share information on climate change and the Low Carbon Development Strategy (LCDS). This is our first article in this series and it aims to provide an understanding what climate change is, presenting scientific evidence on how our climate is changing and will change, and describing how climate change impacts the world.

Without a doubt, most people are aware that our climate is changing. Before we learn how it will affect us and what actions we can take to address it, it is important that we understand some common concepts and terms.

What is Climate Change?

To understand climate change, it is important to recognise the difference between weather and climate.

Weather is the condition of temperature, precipitation (rain, snow etc.) and wind, which change hour by hour and day by day.

Climate is the average condition of temperature, rainfall, snow, wind etc., over a long period of time.

Climate Change is a normal part of the Earth's natural changes through time, and is related to interactions among the land, the air and the oceans, as well as changes in the amount of solar radiation reaching the earth. Through the natural greenhouse effect, the blanket of gases that surround the Earth traps enough heat to make the planet habitable.

However, in recent years scientists have observed dramatic changes in our climate and have linked these changes to human activities. The term "anthropogenic", or human-induced, climate change is sometimes used to distinguish natural changes in climate from climate change as a result of human activities.

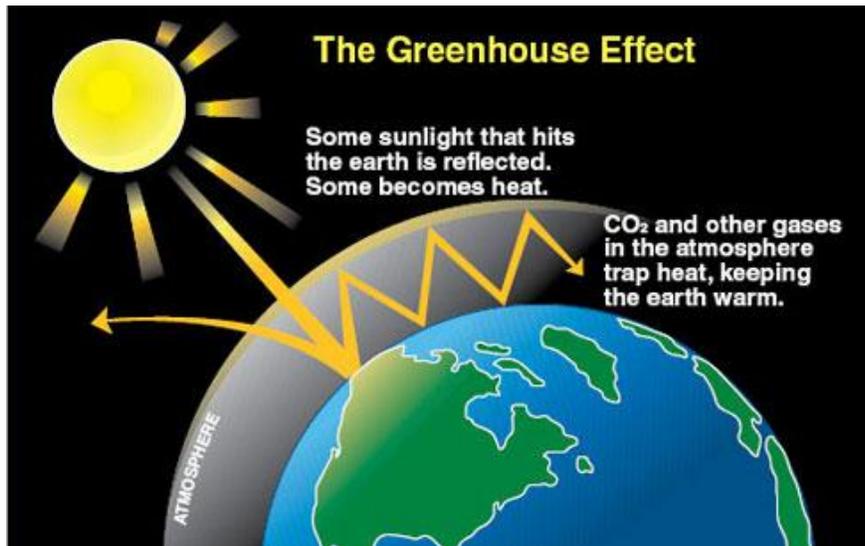
More formally, the United Nations Framework Convention on Climate Change (UNFCCC) defines climate change as a change of climate which is attributable directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable periods.

What is the Greenhouse Effect?

One of the key terms used when we speak about climate change is the **Greenhouse Effect**.

Greenhouse gases (GHG), are natural gases that keep the Earth warm by trapping heat in the Earth's atmosphere.

The Greenhouse Effect is the natural process of the atmosphere letting in some of the energy we receive from the Sun (ultraviolet and visible light) and stopping it from being transmitted back out into space (infrared radiation or heat). This makes the Earth warm enough to support life. The Figure below illustrates the Greenhouse Effect.

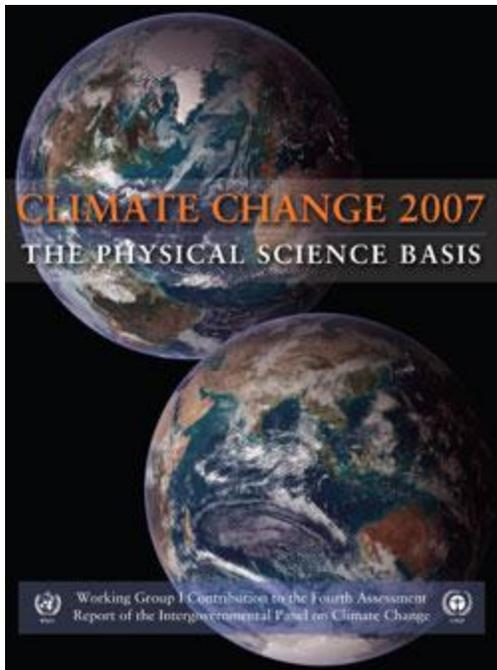


For several thousands of years the atmosphere has been delicately balanced, with levels of GHGs relatively stable.

But over the last century very high amounts of GHG's have been released at dangerously high levels which are causing the earth to get very warm in a short time leading to a rapid change in climate.

It is the extra GHGs which human activities have released that are thought to pose the strongest threat to the climate system.

In 2007, the Intergovernmental Panel on Climate Change (IPCC) released very important findings in its Fourth Assessment Report (FAR) which strongly suggest that most of the observed increase in average temperature since the mid-20th century are very likely due to the observed increase in anthropogenic GHG concentrations.



Human-induced activities result in emissions of the following major GHGs: Carbon dioxide (CO_2), Methane (CH_4), Nitrous oxide (N_2O), Hydrofluorocarbons (HCFs), Perfluorocarbons (PCFs) and Sulphur hexafluoride (SF_6).

CO_2 is one of the most important anthropogenic GHGs. Its annual emissions grew by about 80% between 1970 and 2004. The global atmospheric concentration of CO_2 has increased from a pre-industrial value of about 280 parts per million (ppm) to 379 ppm in 2005 (IPCC, 2007).

Human-induced climate change

So what are these anthropogenic or human induced activities? These include the burning of petroleum based fuels such as diesel and gasoline to produce energy and changing land use patterns such as cutting down trees. Fossil fuels like coal, oil and natural gas are burnt every day to produce energy for us to carry out basic activities such as driving our cars, operating our electrical appliances and powering our air conditioners. The burning of fossil fuels releases CO_2 as a by-product.

Deforestation also releases CO_2 , as trees store carbon in their tissues when they grow. Agricultural activities such as livestock farming and urban activities such as decomposition of waste at dump sites release methane, a less common but potent greenhouse gas.

Observed Climate Change

According to the IPCC FAR, warming of the climate system is without doubt, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global mean sea level.

The IPCC findings strongly suggest that the climate has been changing at a rapid pace and some of the global changes observed recently have been linked to it.

More specifically, the Earth has warmed by approximately 0.75 °C since pre-industrial times (over the past 200 years) and eleven of the last twelve years (1995 -2006) rank among the 12 warmest years in the instrumental record of global surface temperature.

Global **sea** levels have risen by approximately 3.1mm per year between 1993 and 2003. In addition, the expanse of Arctic sea ice has shrunk by 2.7% per decade since 1978.

Significant changes in precipitation have also been recorded over the last century. Increases in rainfall have been observed in some regions (including eastern North and South America, north Europe and northern and central Asia), and decreasing rainfall in others (including much of Africa, the Mediterranean region and parts of Asia).

It is evident, that over a few decades the world has gotten warmer. Understandably, a changing climate will have impacts for the world, for regions like Latin America and the Caribbean, and individual countries like Guyana.

Since the preparation of the IPCC reports in 2007 which indicated that the concentration of CO₂ in the atmosphere was 375 parts per million (ppm) in 2005, new studies show that climate change is occurring at even faster rate and that the present concentration of CO₂ in the atmosphere is 400ppm. The issue is further complicated by limited global actions to reduce GHG emissions. As a result, temperatures are expected to increase to as much as 4°C in the near future.

In the next instalment, we will examine the impacts and future projections of climate change for Guyana .

If you have any questions or comments, please visit our website: www.lcds.gov.gy for more information. If you would like to contact the OCC directly you can email us at info@lcds.gov.gy; call 223 5205 or write to:

Office of Climate Change
Office of the President
Shiv Chanderpaul Drive
Georgetown