

# Understanding Climate Change

## Part 1

### Background on Climate Change

Climate Change is one of the most important issues facing the planet today. Most of us would have learned that the climate worldwide is currently changing and that the last two decades have been the warmest 20 year period in the entire global instrumental temperature record, starting in the mid-19th century.

Before we learn how climate change 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.

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.

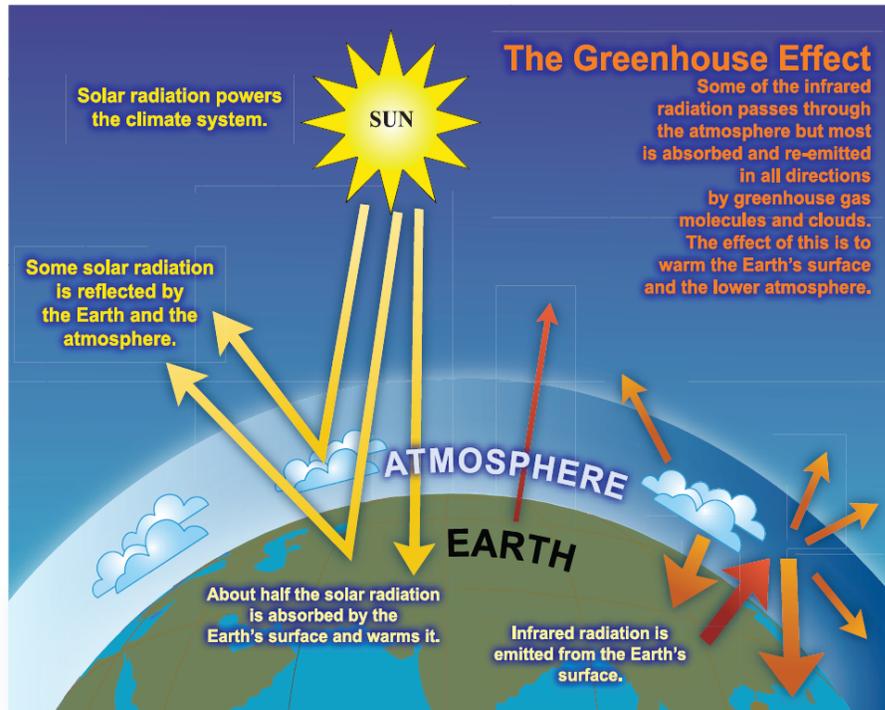
More formally, the United Nations Framework Convention on Climate Change (UNFCCC) defines climate change as a change of climate which is attributable directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed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

#### What is the greenhouse effect?

One of the key terms that is used when we talk about climate change is the **Green-House Effect**.

Green-house gases (GHG), are natural gases that keep the Earth warm by trapping heat in the Earth's atmosphere. GHG's are present in the atmosphere and help stabilize our climate. .

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.



Source: Intergovernmental Panel on Climate Change (IPCC), 2007.

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

But over the last century very high amounts of GHG's, particularly carbon dioxide, 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 greenhouse gases which human activities have released which are thought to pose the strongest threat to the climate system.

The Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC FAR) concludes that most of the observed increase in average temperature since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations. The IPCC was set up jointly by the World Meteorological Organization and the United Nations Environment Programme to provide an authoritative international statement of scientific understanding of climate change.

Anthropogenic or human-induced activities result in emissions of the following major greenhouse gases: Carbon dioxide (CO<sub>2</sub>), Methane (CH<sub>4</sub>), Nitrous oxide (N<sub>2</sub>O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PCFs) and Sulphur hexafluoride (SF<sub>6</sub>).

Carbon dioxide (CO<sub>2</sub>) is the most important anthropogenic greenhouse gas. Its annual emissions grew by about 80% between 1970 and 2004. The global atmospheric concentration of CO<sub>2</sub> 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 burned 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 carbon dioxide, a common greenhouse gas, as a byproduct.

Deforestation also releases carbon dioxide, 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.

In 2007, the IPCC released very important findings which 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.

The graphs below dramatically depict how surface temperatures and sea levels have risen and snow cover reduced over the last century.

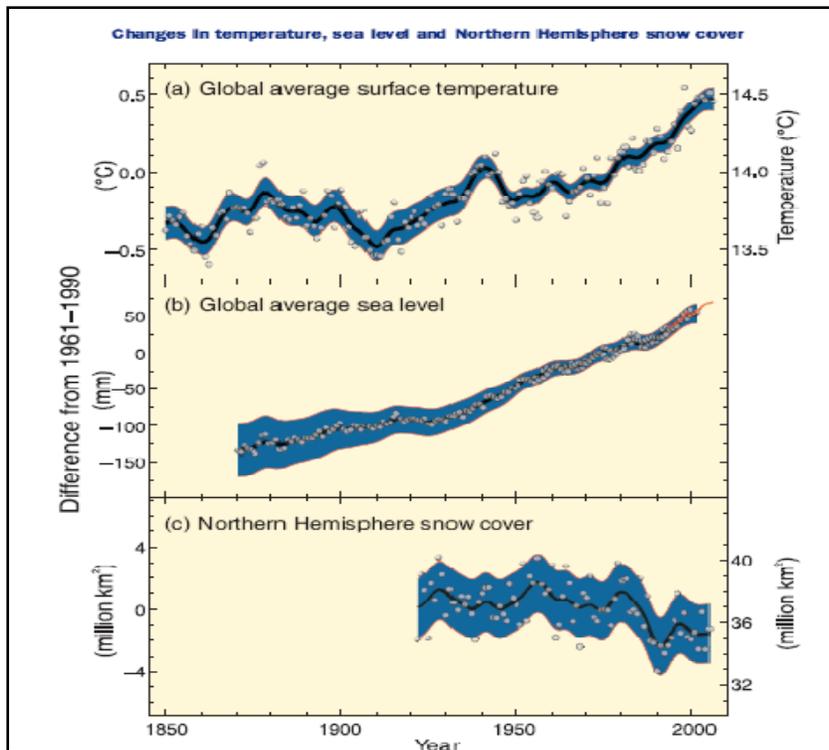


Chart showing changes in Global temperatures, sea-level and Northern Hemisphere snow cover between 1850- 2000. (Source: IPCC, 2007)

Many natural systems, on all continents and in some oceans, are being affected by regional climate changes, particularly temperature increases.

In the next installment we will examine the impacts of climate change on Guyana and the world at large.

**\*Information used in this feature were extracted from the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC FAR) and the United Kingdom’s Met Office**