



# Understanding Climate Change

## INTRODUCTION

For the past 100 years, global temperatures have been rising by about 0.6°C annually. It is predicted that by the year 2100 the world's temperatures will increase by an average of 1.8 to 4°C (Jotoafrika, 2009). This rise in temperatures of the world has resulted in the melting of ice in the Antarctic and Greenland. This has resulted in the rise in ocean levels leading to the flooding of low-lying areas.

A significant aspect of the rise in the earth's temperatures is the change in climates of many regions of the world. In some areas, there are now torrential rains resulting in serious floods that destroy lives and property. In other areas, there is severe drought leading to starvation and death of both human beings and animals. There has been a rise in hurricanes, cyclones, Tornadoes and typhoons in some cases accompanied by tsunamis that have killed millions of people and destroyed property worth billions of dollars in some parts of the world.

Climate change has also been implicated in the unusual increase in the number of people suffering from various forms of cancer in recent years. Climate change means "global warming". This is caused by the emission of greenhouse gases (GHGs) into the atmosphere through human activities, particularly the burning of fossil fuels.

What causes climate change?

The earth in which we live is the only planet in our solar system (a collection of planets that revolve round the sun) in which life exists. As we all know, the earth is spherical in shape, suspended in space. It is enveloped by the atmosphere which is a mixture of gases. The upper atmosphere is occupied by a gas known as Ozone (O<sub>3</sub>). The Ozone layer acts as a protective shield for the earth. It allows the unharmed rays of the sun to reach the earth but reflect ultra violet rays (UV radiation) back to space. The Ozone layer also allows heat from the earth's surface to pass through it into space.

This ensures that the earth's temperatures remain stable.

### Destruction of the Ozone layer

Green house gases (GHGs) which include carbon dioxide (CO<sub>2</sub>), Carbon Monoxide (CO), Chlorofluoro Carbon (CFC), Hydrogen Chlorofluoro Carbon (HCFC) and nitrous oxide, go into the atmosphere and destroy the Ozone layer. They do this by removing an atom of Oxygen from the molecule of Ozone thus changing it from O<sub>3</sub> to O<sub>2</sub>. Its ability to reflect UV radiation is therefore lost. These green house gases further allow UV radiation to pass through them and reach the earth. The earth is thus heated up. Worse still, these gases act like a green house by preventing the heat from passing through them back to space thus increasing the earth's temperatures. Climate is average weather conditions observed over a 30 year period. The increase in the earth's temperatures over a period of 30 years or more result in changes in the climate of many regions of the world. Forest communities should initiate projects that result decreased deforestation and emission reduction which will enable them to access carbon credit.

### Source of Green House Gases (GHGs)

It has been demonstrated beyond reasonable doubt that the greatest source of green house gases is anthropogenic (man-made) activities (Jotoafrika, 2009). These include

- Burning fossil fuels such as coal, gas and oil which release carbon dioxide that has been locked up since these fuels were formed.
- Deforestation for timber or to clear land for farming, and the subsequent burning of wood, release carbon into the atmosphere that would otherwise be stored in the trees. The Intergovernmental Panel on Climate Change's fourth assessment report (IPCC, 2007) estimated that the forest sector contributes 17.4 percent of all green house gases from

anthropogenic sources; most of this is due to deforestation and forest degradation.

- Many agricultural activities release GHGs. For example, methane (CH<sub>4</sub>) is released by livestock during enteric fermentation (which takes place in the digestive systems of ruminant animals), and nitrous oxide is used to make many fertilizers. Carbon dioxide is emitted when the bush is burnt to clear land for agriculture.

## Impacts of climate change

The impacts of climate change are already being observed around the world from retreating glaciers to changing seasons and rainfall patterns. Temperate and boreal forests experience reduced snow cover and earlier snowmelt, shorter frost period and more extreme weather, which increases the likelihood, frequency, extent or severity of drought, heat waves, floods and intense storms. Forest fire seasons in many parts of the world are now longer or more severe. Warmer temperatures, coupled at times with poor forest management have also predisposed some of the large, homogeneous forest ecosystems to outbreaks of insects, diseases and other pests.

Climate change is likely to be evident in the future through more frequent storms, droughts, heat waves, floods and other extreme events. A vivid example is the outbreak of mountain pine beetle (*Dendroctonus ponderosae*) that has ravaged more than 1.3 million hectares of forests in Canada.

## Evidence of climate change in Africa

The Intergovernmental Panel on Climate Change (IPCC, 2007) has reported a warming of approximately 0.7°C over most of the African region during the twentieth Century. This warming occurred at the rate of about 0.05°C per decade.

Africa is the continent most vulnerable to the impacts of change due to widespread poverty and low levels of technical development limit adaptation capabilities. There is considerable evidence that climate change is already affecting Africa's people and its environment.

- The maximum temperature in Kericho in Kenya's Rift Valley Province, has increased by 3.5°C during the past 20 years (Africa Up in Smoke 2, 2007).
- Africa's six warmest years on record have all occurred since 1987.
- Lake Chad has shrunk from 26,000 square Kilometres in the 1960s to just 1,500 in 2000.
- The ice caps on Africa's highest mountains are receding, Mount Kenya has lost 92 percent of its glaciers in the last 100 years.

In arid and semi-arid lands, drought has increase tree mortality and resulted in degradation and reduced distribution of entire forest ecosystems, such as the Atlas cedar (*Cedrus atlantica*) forests of Algeria and Morocco.

## Mitigation and Adaptation to Climate Change

Climate change poses a potentially major challenge to social and economic development in all countries. Mitigation of climate change tackles the problem by reducing GHG emissions at source or "locking them up" into ocean and terrestrial stores, through measures such as afforestation programmes. Forests play an integral role in mitigating climate change. Not only are they one of the most important carbon sinks, storing more carbon than both the atmosphere and the world's oil reserves, they also constantly remove carbon from the atmosphere through photosynthesis, which converts atmospheric carbon to organic matter. This process is often referred to as carbon sequestration.

Adaptation refers to the ability of human and ecological systems to manage or cope with a changing climate. We are now committed to some climate change because industrial nations have already emitted vast amounts of GHGs into the atmosphere and emissions

by developing countries are also increasing.

The United Nations Framework Convention on Climate Change (UNFCCC) came into effect in 1994 with the objective of reducing the rate of human-induced climate change through mitigation and adaptation. The "rich" countries listed by the UNFCCC have all accepted their obligation to assist poor countries to adapt to climate change, particularly small island States and Least Developed Countries (LDCs). The seventh conference of parties of the UNFCCC, held in Marrakech, Morocco, in 2001, created several new funds specifically for this purpose.

Reducing Emissions from Deforestation and Degradation (REDD) is a policy that has been proposed for inclusion in a post 2012 international climate policy agreement. If accepted, signatories to a post - Kyoto international climate policy agreement could then receive incentives for verifiable reductions in deforestation and/or forest degradation.

Examples of project activities that may result in decreased deforestation (J. Carter Ingram et al., 2008)

- Creation of a protected area to conserve forests.
- Working with communities to identify and adopt a sustainable land use practices and/or income generating activities that don't result in deforestation (e.g. eco-tourism, eco-art, cultural products).
- Ingram, J. C. et al. (2008). REDD Project Development Guide.
- Planting of community wood lots for fuel wood and construction materials to decrease pressure on forest for these needs.

## Carbon Markets

The term 'Carbon Market' refers to the buying and selling of emissions permits (rights to pollute) or emissions reductions (offsets) that have been either distributed by a regulatory body or generated by GHG emission reductions projects, respectively. Six GHGs are generally included in 'Carbon' markets: Carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, hydrofluorocarbons and perfluorocarbons.

GHG emission reductions are traded in the form of Carbon credits, which represent the reduction of GHG equal to one metric ton (tonne) of Carbon dioxide (tCO<sub>2</sub>e), the most common GHG.

Carbon markets can be separated into two major categories: the compliance (or regulatory) and voluntary markets. Because the voluntary market inherently does not operate under a universal cap, all carbon credits purchased in the voluntary market are project - based transactions (with the exception of the Chicago Climate Exchange).

## Conclusion

Climate change is real and already here with us. There is therefore the urgent need to adopt mitigation and adaptation measures.

## Recommendations

- Forest communities should initiate projects that result in decreased deforestation and emission reduction which will enable them to access carbon credit.
- Farmers need information about switching to drought resistant and fast-maturing crops, and access to improved seeds.
- It is important to promote water harvesting and demonstrate different farming techniques.
- The storage of grain during bumper harvests can provide food in poor seasons; processing this surplus can also add value and avoid wastages.
- Policy makers should consider irrigation investment in areas this will allow farmers increased control over water.

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