

# TUTORIAL FOR **COMMUNITY CLIMATE CHANGE AWARENESS PROJECT**

Prepared by:

Aloysius Denkabe, David Pessey and Abdul-Razak Saeed





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# INTRODUCTION

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Global Climate Change is as a result of increase in Greenhouse Gas emissions. The increased atmospheric concentrations of these gases lead to the trapping of more heat on Earth from the sun's rays that need to be reflected into space. As more heat is trapped, global warming will result in some parts of the globe. It is prudent to recognise that Global warming and climate change is about global governance, justice and equity. It requires new global institutions and arrangements in economy and society that overcome rather than defend the current inequality within and between countries. It also requires to be tackled (adaptation and mitigation) holistically and in a cyclical way by paying attention to the local realities to inform high level policy decisions and also reviewing how implementation of those policies affect local realities. This approach will lead to bridging any disjoints in the system.

The purpose of this tutorial is to provide basic information on issues of climate change. The earlier segments of the series will focus on the technical aspects of explaining the basic science of climate change, the physical manifestations and also mention the techno-fix issues. In the latter segments, the political issues and power-struggles that surround the mitigation of and adaptation to Climate Change will be discussed.

It is hoped that by the end of this series, the participants should have fully understood the following:

- i. The difference between climate and weather
- ii. What the carbon cycle is and its importance
- iii. The phenomenon of climate change and global warming
- iv. The causes of global warming
- v. How climate change affects mankind and its link to their individual livelihoods
- vi. Understand the gender issues of climate change
- vii. What needs to be done to combat climate change
- viii. The national and international power structures in addressing climate change

# WHAT IS WEATHER? WHAT IS CLIMATE? WHAT IS THE CLIMATE SYSTEM? WHY IS IT IMPORTANT NOT TO HARM THEM?

The term *weather* is used to refer to the interaction between temperature, rainfall, moisture, cloudiness, sunshine, wind etc. at a particular place and time. It can change from hour-to-hour, day-to-day and season-to-season. The term *climate* however refers to the usual state of the weather for a particular area over at least a 30 year period. Climate, like weather, can change. But, unlike weather, its change normally occurs over a long period of time. Both weather and climate depend on the sun's energy in order to work. Their interrelationship and functioning under the influence of the sun is vital to the climate system.

The *climate system*, sometimes also referred to as the *earth system*, is made up of 5 parts. These are

- the air (the atmosphere),
- the seas and the oceans,
- the living and dead organisms on land, in the soil, in the air, and in water (the biosphere),
- the frozen part of the earth's surface, including ice at the poles, glaciers and snow cover (the cryosphere), and
- land, including that under the seas (the geosphere)

The climate system or earth system, powered by the sun, supports life and is central to life. It is a system which controls itself in order to maintain order. When one element in the system changes others change to maintain an overall stable balance.

The main problem facing humanity now is that human activity is changing the

climate balance. More and more, this is happening in ways that threaten the conditions for our very life and survival. Aside the human activities that cause changes to the Earth's climate, other human activities cause the destruction of our environment and these put us in a more vulnerable position to climate change impacts. These other destructive activities of the physical environment are well established and referred to as environmental degradation. Some examples include *desertification* and the destruction of whole species of animal and plant life (the loss of *biodiversity*).

We must now add a new one to these problems. This particular environmental problem is new in the sense that it is no longer an issue known to a few scientists and environmentalists. It is a problem that now commands global political attention. It is the problem of climate change which human activity has created and is intensifying.

## WHAT IS “CLIMATE CHANGE” AND HOW IS IT RELATED TO “GLOBAL WARMING” AND LEVELS OF “GREENHOUSE GASES”?

From what we have said so far, we can conclude that climate change is long term, significant change in the regular weather patterns existing on earth. In regions across the world, there is clear evidence of climate change. This evidence includes:

- a rise in global temperatures; average, air and sea temperatures have risen by 0.76 degrees
- global temperatures are rising; average air and sea temperatures have risen by 0.76 degrees celsius since about 1850; hot days and hot nights have become more frequent over land areas; cold days, cold nights and frosts have become less frequent over the last 50 years.
- rainfall patterns are changing; over the past 100 years, there has been more rainfall in some parts of the world and less in others. Heavy rainfall occurs more often, resulting in more run-off and increased flooding in some places whilst others experience more droughts. Indeed, droughts are occurring every 2 - 3 years, instead of every 10 years in some semi-arid regions, and over wider areas and when they occur, they last longer.
- ‘extreme weather events’, as the scientists call it, are happening increasingly – droughts, floods, heat waves, hurricanes, storms, as well as rising sea levels as a result of melting ice and expansion due to heat.

Global Warming (GW) is the result of increasing amounts of the so-called *greenhouse gases* (GHG) in the air. GHGs in the air act like a blanket, trapping the (infrared) heat radiation reflected from the earth back to space. This is the so-called *“Green House Effect”* (GHE)

The principal GHG is carbon-dioxide. When anything containing carbon such as petroleum products in cars or factories is burnt carbon dioxide occurs in the

smoke that is produced. It is a gas that has no colour and no smell. It is also found in the air that living things breathe out. Other GHGs include methane, nitrous oxide, and water vapour. Methane and nitrous oxide are emitted from such other sources as agricultural activities and changes in land use.

Green house gases are normally present in the air and the green house effect is part of nature. They control the flow of natural energy through the climate system. The green house effect is what makes life on our planet possible in the first place. Without an atmosphere, green house gases and the green house effect, the earth would be a cold, lifeless place. Energy coming in from the sun will be immediately reflected back into space.

The energy balance of the climate system is affected by changes in the level of green house gases in the air, changes in land cover and sunshine. Global warming (**GW**) is due to **increased energy** in the climate system from the **rising levels of GHGs and enhanced GHE**. It is the extra energy in the climate system that causes the **increased heating**. This in turn drives the increased frequency of extreme weather events.

### 3.

## WHY ARE THE LEVELS OF GREENHOUSE GASES RISING?

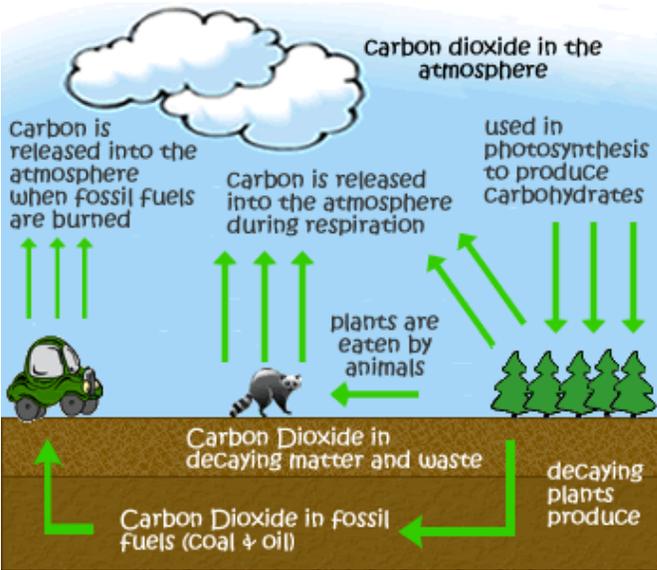
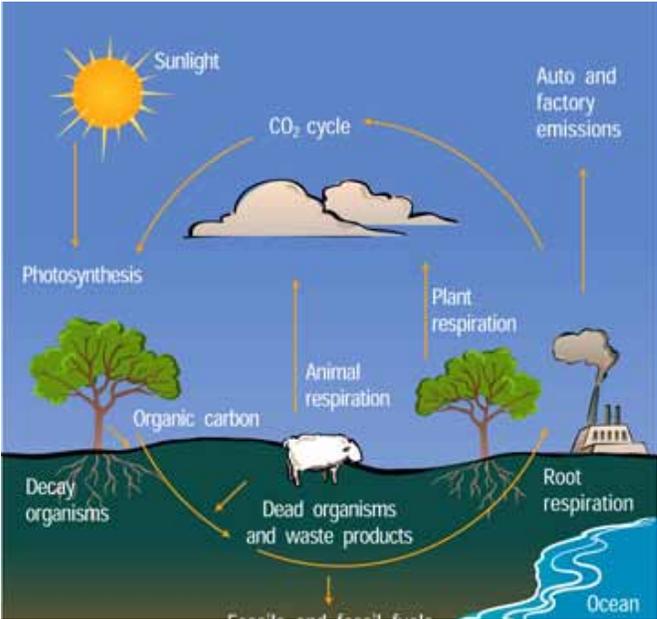
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The main cause for the rising level of carbon dioxide, which is the principal green house gas, is the burning of *fossil fuels* (coal, petroleum oil and gas) for energy by humans (See diagram below). This occurs in thermal electric power generation and in the internal combustion engines of cars, trains, ships and aircraft. Another important source of increasing carbon dioxide in the air is the destruction and burning of trees and forests. The loss of forests also limits the capacity of nature to 'fix' carbon dioxide and that further disturbs the balance.

Whilst the levels of methane and nitrous oxide have gone up since the beginning of the industrial age, they have more or less stabilised. The levels of carbon dioxide have been rising (See figure above). This has been the case especially in recent decades. Scientists have found that the level of green house gases has gone up since the start of our *industrial age* because of man's activity. 70% of the increase has been in the last 40 years.

Carbon dioxide is the combination of carbon – the principal matter of all living (organic) things and oxygen which makes up about one-fifth of the air. Practically all living things (including man) produce carbon dioxide as a regular part of their existence from their breathing. Carbon dioxide produced by living things has never been a problem. It was taken up by the leaves of trees and plants. They in turn incorporated the carbon part into organic matter as more leaves, wood, sap, fruits and seed. The oxygen was released back into the air. This process - called the *Carbon Cycle (or the 'cycle of life')* - ensured that a balance was maintained, and the level of carbon dioxide in the air stayed stable more or less (See diagram below).

Figures showing the Earth's Carbon Cycle



Source: [www.windows2universe.org](http://www.windows2universe.org), [www.biochar-us.org](http://www.biochar-us.org)

Fossil fuels come from previously living matter buried under the earth millions of years ago. Through immense pressure and heat this buried material got transformed into solid material (coal or peat) or liquid or gas (petroleum). The carbon in fossil fuels is outside the carbon cycle (or the cycle of life). **By burning fossil fuels for energy, and releasing carbon dioxide into the air, man is overloading the world's limited capacity to cycle carbon.**

This process began with the coming of industries about 150 years ago. In the last decades of the 20<sup>th</sup> century and in the 21<sup>st</sup> century it has been accelerating. Scientists estimate that from an initial level of 280 *parts per million (ppm)* in 1850, the level of carbon dioxide in the air has risen to an estimated 379 ppm in 2005. 20% of the increase occurred in the decade 1995 to 2005.

The central issue then is **the production and use of energy from fossil fuels and the consequent release of extra carbon dioxide into the air, over and above what nature can safely cycle.** The crucial issue for the world is how to reduce further emissions, and to stabilise levels of green house gases below those that scientists predict will cause dangerous climate change.

So far we have stated the problem of climate change in physical terms. But more importantly, the problem of rising green house gases, global warming and climate change is about economics, social relations and power structures. It is about how what belongs to all of us – in this case the limited carbon cycling capacity of the climate system – has been appropriated by a few of us to the disadvantage of the many. This unjust situation is the direct outcome of the ruling world economic system in existence over the last 150 years. It is a system in which the very basis of life – land, water – which should be held in common and to which all should have rights – are increasingly the private property of a few individuals. In this system, the drive for private profit is often more important than social values. This system is at the heart of all the current global crises that face humans in the global financial system and in global food production and supply.

Climate change is a global problem which requires a global response. If it is not addressed soon, scientists warn of catastrophic consequences for us – for our land, for our water, for our livelihoods – farming and fishing, and for our health. Global warming and climate change is about global governance, justice and equity. It requires new global institutions and arrangements in economy and society that overcome rather than defend the current inequality within and between countries. Addressing rising green house gases, global warming

and climate change is about how to share the world's limited capacity to cycle carbon such that there is fairness. It is crucial that solutions proposed do not become a means for the rich to further take away air and land from the poor. Unfortunately the world is yet to begin to deal with the problems of our environment in a fair and just way.

So far the global science and policy process set up to address the problems of rising green house gases, global warming and climate change has ignored the underlying economic and social and power relations of our environmental problem. It has been seen principally as a technical problem. The technocratic fixes that have been tried have not worked. Instead of these fixes reducing emissions, the level of emissions continues to go up. These attempts at solutions to the problems of the global environment must come with recognition that there has to be fairness and equity as well.

Those who bear the most responsibility for the global environmental problems are the big transnational energy companies like Exxon-Mobil, Shell, BP and Total. For 200 years, they have profited and continue to profit from a ceaseless search for, production and burning of oil, gas and coal. Alongside these are the car industry companies. Next are the politicians that have used public funds to subsidise the coal, oil and gas industries rather than support investment in "cleaner" technologies. Finally, the rampant consumerism of consumers in the developed countries has helped develop a very high material standard of living based on these environmentally unsafe technologies. The elites in Ghana and other Third World countries by their lifestyle are also therefore part of the problem.

Really addressing global warming will mean that citizens in the rich *global north* must face drastic life-style changes. For all citizens of our globe, addressing climate change requires rethinking the essence of development, and determining which paths are sustainable. Fundamental changes in how economies and society are organised and run must be made if we are to avoid global catastrophe.

## 4.

# HOW IS CLIMATE CHANGE AFFECTING MANKIND?

Climate shapes the natural environment, the land, vegetation and animal life. Climate change impacts all livelihood activities that depend on the natural environment – agriculture, livestock herding, fishing, hunting, bee keeping etc. Climate change is already affecting our lives. The occurrence of extreme weather events - storms, heat waves, droughts, floods and hurricanes - across the globe has led to a rising toll of injuries and deaths, the loss of farmland, of crops and livestock, the destruction of infrastructure – dams, roads, bridges, and houses. Future climate change will affect the health of humans, animals and plants through impacts on the amount and availability of water; as well as the occurrence and distribution of pests, carriers of vector borne diseases. Climate change will also affect leisure activities and tourism that depend on nature. In certain areas, the warming will cause sea levels to rise. As it gets warmer, seas and oceans expand from the thermal energy absorbed and also from the melting of the earth's ice caps. This sea level rise threatens to submerge whole islands and low lying coastal lands and settlements. Climate change may lead to mass migrations, as people move in search of more favourable natural conditions – water, agricultural land, hunting and fishing grounds.

**Africa** is one of the continents most vulnerable to climate change:

- Droughts are occurring every 2 - 3 years, instead of every 10 years.
- When droughts occur they last longer.
- 75–250 million people across Africa could face more severe water shortages by 2020.
- Agricultural production and access to food will be severely affected in many African countries. Agricultural land will be lost, and there will be shorter growing seasons and lower yields. In some countries, yields from rain-fed crops could be halved by 2020.
- Rising water temperatures will decrease fish stocks in large lakes, already depleted by over fishing.

The world's poorest countries are and will be hardest hit by climate change although they have contributed least to causing it. However, within these poor countries, it is the poorest of the poor people who will be hardest hit. This injustice is recognized in the United Nations Framework Convention on Climate Change (UNFCCC), which commits developed countries to assist developing countries "that are particularly vulnerable to the adverse effects of climate change in meeting costs of adaptation to those adverse effects".

Climate change will be seen in events like the change in the type of crops that grow in an area, the appearance of animals and plants in places they used not to be and their disappearance in areas they used to be. Other events such as shorter rainy seasons, more intense rainfall when it rains will result and thereby cause greater run off and soil erosion. This will affect the possibility of growing crops or raising livestock as well as the types that can be grown.

## IS GHANA ALSO WARMING UP?

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Average temperatures in Ghana have increased by about 1°C over the last 30 years. Scientists believe that by 2100 temperatures will increase further by between 2.5 to 3.2 °C in different parts of the country. Two clear signs of climate change in Ghana are:

- Changes in Rainfall
- Sea Level Rise

### Changes in Rainfall

In the last 30 years, rainfall has decreased by 20% whilst run-off water, the rain water that flows away into the sea as waste has decreased by 30%. Our scientists predict that annual rainfall will decrease by 9-27% by the year 2100 in different parts of the country.

### Sea Level Rise

Over the last 30 years, the sea level has risen at the rate of 2.1 mm per year. Scientists expect a global sea level increase of 1 m by 2100. This will lead to the flooding and loss of low lying coastal land, coastal erosion, and the entry of saltwater into fresh water bodies (on the surface and in the ground) that border the sea. The wetting of land can lead to landslides/mudslides, and to earthquakes.

## WHAT ARE THE CURRENT AND EXPECTED FUTURE EFFECTS OF CLIMATE CHANGE ON FARMING AND FISHING?

About 60% of Ghanaians are farmers. They are mostly smallholders. 85% have land holdings of less than 5 acres (2 hectares) in area. The sector accounts for about 37% of total economic output. Our agriculture is mainly rain-fed and thus very dependent on climate. Scientists have studied the likely impacts of climate change on maize and millet, on roots and tubers and on cocoa because they are vulnerable and because of their contribution to food security and economic development.

**Cereals:** Millet and sorghum are staple crops in the savannah of northern Ghana. Maize and rice are widely grown across all *agro-ecological zones*. Scientists predict that high temperatures will lead to low cereal yields due to a reduction in the growing period and an increase in loss of water through evaporation and transpiration. More erratic rainfall will lead to droughts, soil degradation resulting from rainfall extremes, and unpredictable growing seasons, all of which are likely to reduce yields. Studies show that the north of Ghana is the most easily affected area in terms of agriculture. This is as a result of the high proportion of people who depend on farming for a living as well as well as the likely climate change situation of falling rainfall and more frequent droughts.

**Roots and tubers:** These account for approximately 40% of the total market value of Ghana's agricultural goods and services, with cassava, yam and cocoyam representing the most important crops. Generally roots and tubers are grown for household consumption, but increasingly households are selling these crops to earn income. Based on available climate models, cassava production is expected to reduce by up to 53% by 2080, and cocoyam by 68%. The study also found indirect impacts of climate change on root and tuber production, including increased incidence of pests during drought years.

**Cocoa** is the main export crop of Ghana. In 2002 it made up 63% of foreign export earnings. Over 800,000 families, mainly in the Western,

Central, Ashanti, Brong Ahafo, Eastern and Volta region, depend on cocoa production for their livelihoods. For these families, cocoa represents 70-100% of household incomes. Generally speaking, cocoa farms are small and use limited technology or insignificant inputs. Cocoa is susceptible to drought and erratic rainfall. Water below what the crop requires can kill seedlings, and reduce bean size and yields of bearing plants. There are also indications that climate change may alter the distribution and timing of pests and diseases which affect cocoa crops.

**Fishing:** About 10% of Ghanaians depend on coastal fisheries. Inland fisheries are also important for livelihoods of communities living on rivers. Both temperature and rainfall are important factors in determining productivity of fisheries. A study of how easily affected the fisheries industry would be found that changes in climate will affect coastal and river based communities, their environments and the size of catches they would be able to make..

Combined with overfishing, climate change will affect livelihoods based on fisheries. The livelihoods of fishmongers and transporters will also be affected and ultimately an important source of protein will be reduced.

## WHAT ARE THE CURRENT AND EXPECTED FUTURE EFFECTS OF CLIMATE CHANGE ON OUR ACCESS TO WATER?

The availability of water is critical for human needs, for agriculture, for industry and for energy generation. Both surface water and groundwater resources are important in Ghana. In 2000, the use of water was estimated at 66% for agriculture, 24% for domestic use, and 10% for industrial purposes. The use of water for hydroelectricity generation is not included in this break down because the water is not used up.

Access to water for domestic use is critical to health and well-being. As of 2004, 88% of urban

populations and 64% of rural populations were using an improved water source. Generally speaking, rural populations in Ghana rely on groundwater resources, while urban populations use surface water sources. Reductions in rainfall, which are already being observed and which is expected to continue as a result of climate change, will negatively impact both surface and groundwater sources, potentially limiting availability. Floods may also impact water availability as sources may be contaminated.

Because agriculture depends mostly on rain, farmers in Ghana are particularly easily affected by climate change. Irrigation is not widespread. In 2000, only 0.5% of the cultivated area in Ghana was irrigated. However it is expected that climate change will increase demand for irrigation water. Together with the reduced rainfall and runoff that are predicted by climate models, water availability for agriculture is likely to be greatly affected.

At present, Ghana gets 77% of its electricity from water generation. This makes the energy sector vulnerable to changing rainfall patterns. Studies of the Pra basin show that climate change could lead to a reduction in production of electricity by approximately 60% by 2020.

## WHAT ARE THE CURRENT AND FUTURE EFFECTS OF CLIMATE CHANGE ON HUMAN HEALTH?

Climate change will have direct and indirect impacts on human health. Direct impacts are observed for diseases such as malaria and guinea worm that are caused by organisms carried by one host to another. The distribution of these diseases are likely to change based on changing temperature and humidity which make conditions more or less favourable for the growth of the hosts.

Malaria is one of the most common causes of illness and death in Ghana. Based on predicted climate change for Ghana, there will be a shift in the way malaria is carried from one person to the other and from place to place. The number of malaria cases is expected to decrease. This assumes that current positive steps for malaria control will be continued.

The host through which guinea worm is transmitted is called Cyclops and is found in forests and washed into water sources during the rainy season. When people take water from these sources, particularly during the early rains, they become infected with Cyclops. A year later guinea worm sores develop. Climate data show that rising temperature and lower rainfall will increase risk of guinea worm infestation.

Measles and meningitis are airborne diseases. They are prevalent during the dry season. Currently, epidemics of measles occur every two to three years in rural areas. The incidence is decreasing as a result of improved treatment and prevention. Climate change is likely to increase incidence of measles as a result of higher temperatures and reduced rainfall. This could be limited with expansion of the control measures mentioned above. It is expected that the number of months with favourable conditions for outbreaks of meningitis will increase.

Diarrheal diseases such as cholera are water and food-borne and are linked to changing rainfall patterns. A rise in cases is seen during rainy periods because

of runoff from rainfall into surface water. A rise in cases of such diseases also happens during dry periods because of reduced water supplies and the use of water that is not safe. Floods also affect access to safe water by making water unclean and by limiting access to safe sources.

The increased natural disasters that are expected to result from climate change represent a threat to people in the form of death or injury. Indirect impacts on health include potential increases in hunger and malnutrition. Malnutrition is already a problem in Ghana, with 22% of children under-five underweight. Decreasing food supplies resulting from droughts and other extreme weather will increase the likelihood of hunger and malnutrition, and subsequently increase the likelihood of people falling sick.

## WHAT ARE THE CURRENT AND FUTURE EFFECTS OF CLIMATE CHANGE ON SOCIAL RELATIONSHIPS, MIGRATION AND CONFLICT?

As things like water and good land become more scarce, it is likely that people will migrate to areas that are seen as better. In Ghana, migration is particularly common from poorer areas in the north to the southern part of the country. As an example, over the last 15 years the rice industry in the north has failed because of reduced government support, trade without controls or limits and declining rainfall. There has been an increase in migration to work in towns and commercial centres (example as “kayayei”) in the south. This migration is typically seasonal and is practiced by young men and women.

Conflicts in Ghana are generally ethnic, chieftaincy, religious and land-based and are most often caused by disagreements over control of fertile land. These conflicts sometimes lead to violence between ethnic groups, religious factions, and families. Occasionally conflicts also arise between communities that move about with their animals and farmers. The conflicts are usually over the use of water and the feeding of cattle, sheep and goats on farmland. Climate change may worsen the conditions for these kinds of conflicts particularly in the northern part of the country.

In West Africa, there is also potential for regional conflict over shared water resources. For example, the Volta River, which is used by both Ghana and Burkina Faso, has potential to be a source of conflict in future as a result of decreasing flows. Currently, the Volta provides a large proportion of Ghana’s hydroelectric power. Burkina Faso is planning increased use of the river for power, irrigation and water supply to Ouagadougou. Combined with the impacts of climate change, this increase in water use in the upper basin could have a bad impact on power generation in Ghana. Ultimately, this could lead to conflict between the two countries over rights to use the Volta

## GENDER DIMENSIONS OF GLOBAL WARMING & CLIMATE CHANGE

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Climate change will affect men and women differently within countries, regions, communities, social groups and households. Women are most likely to be affected by climate change because of their responsibilities in the home and because of the problem they usually face with getting information, resources and services.

In Ghana, women play an important role in the production, distribution and marketing of agricultural products. According to the EPA, women “constitute 52% of the agricultural labour force, contribute 46% of the total GDP and produce 70% of subsistence crops”. Women also contribute significantly in the fisheries sector, which provides full-time and seasonal employment.

Women are likely to be responsible for managing water, fuel and other resources for household use. Climate change impacts will reduce availability of these precious resources. Scarcity of natural resources and the changeable climate affecting agriculture will have a major impact on women’s livelihoods, and consequently on the family. In addition, women tend to be responsible for caring for sick children and other family members, which increases their workload, particularly in times of crisis.

Equal access to information, resources and services is very important if we are to reduce the likely bad effects of climate change on people. As a result of educational and cultural practices, women often have limited access to information that could inform decision-making and risk mitigation strategies. Despite women’s role in agriculture and household livelihoods, extension and credit services are rarely directed at their particular needs. Their rights to land and other resources are often compromised by legal provisions that do not advance their interests and needs.

## WHICH AUTHORITIES IN GHANA DEAL WITH CLIMATE CHANGE? WHAT INTERNATIONAL SYSTEMS ARE IN PLACE TO TACKLE CLIMATE CHANGE?

Ghana has set up a national climate change unit resident in the Environmental Protection Agency under the Ministry of Environment. The office is set up to handle Ghana's climate change issues on both adaptation and mitigation. In addition to the Climate Change Unit, there is a National Climate Change Committee that comprises of members from various ministries and agencies including three NGOs.

There is also a climate change unit in the forestry commission to handle issues on and implementation of reducing emissions from deforestation and degradation (*REDD*) under climate change mitigation.

At the international level, there is the United Nations Framework Convention on Climate Change (UNFCCC) which includes about 189 countries worldwide. The UNFCCC is the secretariat that handles all the global climate change issues. The UNFCCC organises annual global negotiations on climate change known as the Conference of the Parties (COP).

At the COPs under the UNFCCC, each country has one vote and no one country is more powerful than another in decision making. The UNFCCC has a preamble that notes that the largest share of historical and current global emissions of GHG has originated in developed countries. However it also recognises that per capita emissions in developing countries are still relatively low and that the share of global emissions originating in developing countries will grow to meet their social and development needs. In light of this, mitigation of climate change has been tasked for all member countries on a theme of 'common but differentiated responsibility'. During the various COPs, each party country sends delegates and negotiators to make submissions that represent their nation's interest and position.

## WHAT IS THE CURRENT POLITICAL SITUATION OF CLIMATE CHANGE? HOW DO WE MOVE FORWARD NATIONALLY TO INFLUENCE INTERNATIONAL TALKS?

At the various negotiations, the same political and power struggle that has been on-going between countries always manifests forcing negotiation outcomes to be devoid of concrete agreements and actions to reduce emissions. Developed countries (mostly responsible for the historical and current emissions) like USA and Japan were not willing to take on emission cuts and are calling for developing countries (who have not caused the CC problem but will face the brunt of it) to also take on emission reduction cuts before they will in turn accept to take reduction commitments.

Currently, there is a Protocol known as the Kyoto Protocol that binds developed countries (referred to as Annex 1 countries), except USA, to cut their greenhouse gas emissions by a certain percentage below what the GHG emissions of 1990 was. Regarding the fact that the world needs to reduce its greenhouse gas emissions by 90% by 2050, it is therefore become necessary to involve tropical forested developing countries in the GHG emission reductions as 20% of these gases come from deforestation and degradation. Thus even if the developed countries managed to reduce the 80% emissions from the fossil fuel use, developing countries need to also reduce deforestation and degradation to achieve a 90% decrease by 2050.

In order to ensure that our national interest including our livelihoods, culture, traditional/social values, future generations and economy are protected, we as citizens of Ghana need to make inputs and raise concerns to the authorities in charge of climate change in Ghana. At the district and regional level, there are the various metropolitan, municipal, and district assemblies that we can engage and channel our concerns on how the government needs to deal with climate change in relation to the local realities that we experience.

# Glossary

Biodiversity:	This refers to the variety of living things (plants, animals and insects in a particular geographical area
Desertification:	These is the process by which human activities result to conditions that create deserts in areas that were previously not deserts
Greenhouse Gases	These are gases in the atmosphere that trap some heat from the sun in order to warm the planet and keep it from being cold and lifeless. Primarily these gases include Carbon dioxide, methane, and Nitrous oxide. Greenhouse gases is abbreviated as GHGs
<i>Greenhouse Effect</i>	<i>This occurs when</i> GHGs in the air act like a blanket, trapping the (infrared) heat radiation reflected from the earth back to space
Industrial Age	Refers to the period starting from the 1750s when there was a proliferation of industries in order to boost economies in the global north countries
Carbon Cycle	The process by which the earth system keeps its balance. It involves trees and forests taking in carbon dioxide during photosynthesis and returning it back to the atmosphere and soils when they die and decompose or are burnt. The oceans and seas also absorb such carbon in the air. This cycle continues day in and day out
Parts Per Million (ppm)	This is used to describe the concentration of gases in the atmosphere. It is based on taking a total amount of a million
Global North	This refers to the countries that are developed. It mostly is used for developed European countries like UK, Germany, France, etc and also North American countries such as Canada and the US

Agro-ecological Zones These are the zones with varying conditions that uniquely support certain types of agricultural plants species. In Ghana, there are 5 recognised agro-ecological zones and these are the Northern Region, High forest zone, coastal zone, Forest-savanna transition zone, Upper West and Upper East zones.

REDD This stands for 'Reduced Emissions from Deforestation and Forest Degradation' It is a new climate change mitigation mechanism that is still under debate and negotiations. It aims to reduce GHG emissions from deforestation and degradation as 20% of global emissions have been estimated to come from this sector.

# Electronic Links

## Climate change News Sources

- The Guardian: [www.guardian.co.uk](http://www.guardian.co.uk)
- REDD-Monitor: [www.redd-monitor.org](http://www.redd-monitor.org)
- The Independent: [www.independent.co.uk](http://www.independent.co.uk)
- CAN: <http://www.climatenetwork.org/eco>

## General Climate Change Resources

- *IPCC (on adaptation)*: <http://unfccc.int/adaptation/items/4159.php>
- *Climate Action Network*: <http://www.climatenetwork.org/>
- WEDO: <http://www.wedo.org/tag/climate-change>
- GFC: [www.globalforestcoalition.org](http://www.globalforestcoalition.org)





