

Climate change

What it is and what it's doing to the world

Introduction

One of the biggest challenges we face today is climate change and how we can stop it. Although it's partly a natural process, some of the things we do are speeding it up. Many of our normal everyday activities cause air pollution and this is making our world get too hot. The result is change to our climate and weather such as more floods, more droughts and more dangerous storms. Food security and livelihoods across Africa and in many other countries are being damaged. Climate change is very unjust in that it is caused mainly by rich countries but Africa and other poorer continents will be the worst affected. If we all act together, we can stop it getting worse and we can also adjust our lifestyles to cope better with the impacts. This needs action and commitment from all of us.

This booklet gives a background on climate change, the causes, and also the impacts that are already happening or are likely in the future. A second booklet – *Climate change: what we can all do about it* – gives ideas of actions we can all take to minimise our impacts on the environment and climate.



What is climate change?

Climate

To understand how the climate is changing, we first need to understand what we mean by the word 'climate'. We know it is somehow related to weather. But our daily weather is a bit different. We can experience dry, sunny, hot weather in Tamale one day, while a friend in the Akwapim Hills says it's cool and rainy up there, and another friend says it's cloudy and a bit breezy in Accra. That's what we call our weather, and it can be very changeable from day to day and even within a day, depending on where in the world we live. It's also very local: we can be in a trotro and suddenly there's torrential rain. But when we travel a short distance down the road we find it's completely dry. There hasn't even been one drop of rain. That's the weather. It's local and changeable from day-to-day. Climate is different. It's like the bigger picture across a wider area and over a longer time. We say the climate of Ghana is tropical because it's dry and humid with rainy

seasons, two in the south and one in the north. The south is more humid, while the north is drier with hotter temperatures because it's getting up towards the desert areas. In contrast, the climate at the North Pole is bitterly cold with permanent continental ice and also sea ice, while the climate of the UK is temperate with cold winters, lots of rain and sometimes snow, and warm to hot summers.

The institutions that study climate around the world, such as the Ghana Meteorological Agency, collect data on rainfall and temperature so we can get averages each year around the world. Other data collected include the frequency and severity of storms, the hours of sunshine, the quality of the air, and the strength and direction of the wind. This data enables us to see patterns and changes in the averages from one year to the next, as well as over a range of many years into the past. In some countries, this data has been collected for more than 120 years.

The climate data is assessed and reported on by the Intergovernmental Panel on Climate Change (IPCC), established in 1988 by the World Meteorological Organization and the United Nations Environment Programme (UNEP) to provide policymakers with regular assessments of climate change, impacts, future risks, and options for mitigation and adaptation. The most recent was the IPCC 5th Assessment Report published in 2014. Weather data collected over the years show, for instance, that rainfall in some parts of eastern and southern Africa has increased. Meanwhile in other regions of Africa, such as parts of western and eastern Sahel in northern Africa, rainfall has decreased. Although insufficient data has been collected over the years in West Africa to determine changes in rainfall here, the data does show that temperatures in Ghana are gradually increasing. The IPCC 5th report says the West African and Sahel region warmed by between 0.5°C and 0.8°C between 1970 and 2010, and that more of this increase occurred during the second 20 years of that time period. What this means is that the rate of the warming is getting faster. This increase may seem very small, but it has very big consequences for our weather patterns, as we will see later.



The data trends and the knowledge about how the climate is changing have also enabled climate scientists to make predictions of how the weather and climate may change in the future in different parts of the world. They have projected that temperatures in Africa will rise faster than the average increases in the rest of the world during this century (IPCC, 5th Report, Africa chapter). They also think West Africa will have extreme rainfall more frequently than we do at the moment, which is likely to cause more flooding and damage unless we construct infrastructure to cope with the increased rainfall. We also need to be more careful about the waste such as plastic bags and sachet water bags we drop on the ground, because these choke up the storm gutters and worsen the flooding.

So we understand what we mean by 'climate'. Now we'll look at what actually drives the weather and climate around the earth so we can begin to understand what's changing.

What drives the climate?

You may be surprised to find out it's actually the sun that's the main force driving our weather and climate around the world. This is how it works: about half of the sun's energy reaches the earth while the rest is reflected back by clouds or absorbed by the atmosphere. The rays of the sun don't fall evenly across the earth because the earth is round. This means that areas on or near the equator, such as Ghana, get more heat from the sun because they get direct sunrays. Areas such as the Poles are at an angle to the sun and so they don't experience the direct sun. They get much less heat, and their winter days are very short and the temperatures are extremely cold. These differences in temperature between the various regions of the world cause air and water to move around the earth in great circular currents. This is because the currents are trying to even out the temperatures around the earth. It happens because warm air and cold air have different densities. Warm air is less dense and so it rises. Cold air is heavier and so it sinks. This sets up the circular movements of air. This even happens within a building. If you have air conditioning in your home, the cold air sinks to the lower rooms in the house while the warm air rises within the room and then up to the rooms upstairs. Because the air is constantly moving around the earth in the same way, its force drives the weather patterns.

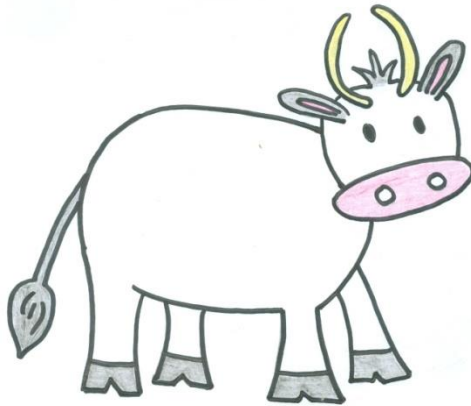
So that's the climate system. But what's causing it to change?

Nature has many processes to keep everything in balance on and around the earth. But our activities are overloading parts of this system so it's getting out of balance, and that's causing the world to get hotter. Here's how it's happening. We have natural climate change that happens very gradually, like the change from the ice age to the warmer climates of today. But some of the things we do on earth result in air pollution which is causing the earth's temperature to increase and the climate to change at a much faster rate than the naturally occurring temperature rise. These activities result in what we call 'human induced climate change', because we are changing the atmosphere that surrounds the earth.

There are lots of human activities that pollute the atmosphere with what we call 'greenhouse gases'. These gases include carbon dioxide, methane, nitrous oxides, ozone and even water vapour. The biggest causes of greenhouse gas emissions are burning fossil fuels in cars, airplanes and power stations, and from farming animals (especially cows) on a very huge scale to meet the rich countries' excessive meat consumption (especially the US).



Carbon dioxide is thought to be the most widespread greenhouse gas. Here's where it comes from. Carbon is locked up inside fossil fuels such as coal, petroleum oil (made into petrol and diesel) and natural gas. When we burn these fossil fuels to give us electricity or run our cars or fuel our airplanes, the carbon dioxide is emitted into the air. Everybody wants their own car and more people want to fly places, so the number of cars on the road and planes in the sky is always increasing. That means more carbon dioxide is being produced. There's also an ever increasing number of electrical gadgets being produced and sold in the world, and they all need electricity to power them. More than a billion people worldwide still don't have access to electricity, and so the world still needs to produce more. Fossil fuels provide a cheap way to produce that electricity, but only when the environmental and health impacts are not included in the production costs: energy production from fossil fuels contributes around 35% of the greenhouse gases emitted by human activities. Another source of carbon dioxide is found in combination with the oil we pump out from inside the earth. This carbon dioxide escapes and, instead of being captured by the oil companies and used as a source



of energy, it is cheaper for them to simply burn it off at source (even though this is illegal). The gas flares we see at the oil rigs are from the gas being burned off. Carbon is even released from trees when we cut them down and burn the wood or use it to make wood products or paper.

Animal farming, especially cattle for meat and dairy, produces methane, which is a very potent climate changing gas and many believe the contribution of the world's livestock sector to greenhouse gas emissions is actually greater than the contribution from the world's transport sector¹.

Greenhouse gases are emitted all the way along the production chain in animal farming, from the carbon dioxide produced when forests are converted into pastures and feedstock, to the methane produced by the farm animals, to the nitrous oxide (an extremely potent greenhouse gas²) released from animal manure, and finally to the carbon dioxide emitted while transporting the meat around

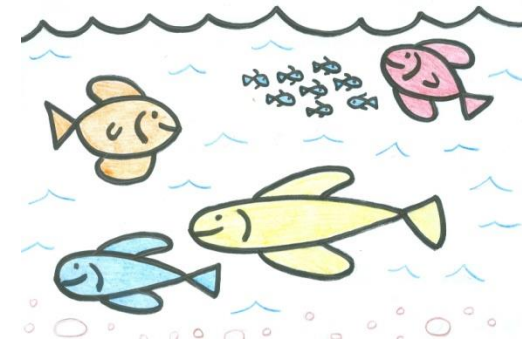
the world to the end consumers. This is not so much an issue in Africa, but is an extreme problem in the Americas (in North America where meat consumption is very high, and South America where tropical forests are cut down to make way for cattle production and to clear land for growing soya as a feedstock for the animals). Other developed countries also have high meat and dairy consumption, so they too are contributing to the problem and should greatly reduce their intake of these products.

As we noted earlier, because people are causing so much pollution, nature's capacity to maintain the balance in the atmosphere is being overwhelmed. An example of how nature keeps things in balance is a carbon sink such as a forest. It's called a carbon sink because the trees absorb carbon from the atmosphere and lock it up inside themselves. In this way, the forest also acts as a carbon store. But this carbon is

¹ Food and Agriculture Organisation (2006) *Livestock's Long Shadow*. Available online here: <http://www.fao.org/docrep/010/a0701e/a0701e00.HTM>

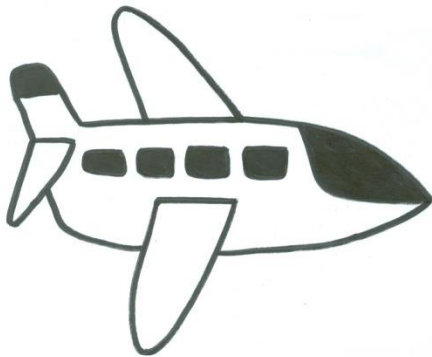
² Methane has 23 times the global warming potential of carbon dioxide; nitrous oxide has 296 times (FAO).

released if the tree is cut down and used to make paper or furniture or burned for cooking or heating. If the cut trees are replaced, the carbon sink and storage capacity is maintained. But mostly this does not happen. The other very important carbon sink is the oceans. But now we are producing more carbon dioxide than nature can absorb into the carbon sinks. So it has built up in the earth's atmosphere, i.e. in the layer of gases that surround the earth. Measuring the atmospheric content of carbon dioxide over time has proved that it is rapidly building up. The other greenhouse gases (e.g. methane and nitrous oxide) are also building up in the atmosphere.



So how are these gases making the world hotter? What's happening now is this: as the sun shines down on the earth, a lot of the sun's heat is reflected back towards the sun rather than being absorbed by the earth. This is normal. But as the greenhouse gases build up in the atmosphere, they are trapping this reflected heat. This means the earth is getting hotter because the heat can't escape. It's just like wrapping yourself up in a big thick blanket. Gradually you'll get hotter and hotter because the heat from your body is trapped by the blanket around you. The heat can't escape. What's happening to the earth is called global warming because the temperatures on earth are slowly increasing. This leads to the changes in other parts of our climate, such as changes in rainfall and the intensity and frequency of storms.

You have probably noticed that most of the activities causing climate change, such as driving cars, flying in airplanes or burning coal to make electricity, have been going on for much longer in the rich developed countries than in the poor developing countries. It is a huge injustice that rich countries have caused most of the pollution that's resulted in global warming and have benefited greatly during their development. Meanwhile it's poor developing countries, most especially their poorest people, who will suffer the worst of the impacts. For example, temperatures are expected to rise more in Africa than in other parts of the world, which will damage food production and undermine food security. Poor people have the least capacity to cope with the impacts of the changing climate such as floods, droughts or food price increases. Rich people can move house or buy new land or pay higher prices for food and water. Poor people have fewer options. Poverty means they are much less able to adapt to the changes that are happening.



What changes have already happened to the weather systems?

Some impacts from global warming have already started. The most important one is that the world's average temperature is slowly rising: in 2012 it was estimated to be 0.85°C warmer than the global temperature during pre-industrial times (1880). This may seem like a really small and

insignificant increase. But it means we've reached the half-way point to 2°C warming, which is very significant. An increase of 2°C is what scientists think is the safe limit. Beyond this point, they predict catastrophic global warming impacts. So it's really important that we all act now to slow down the temperature increase and stop the world warming any more. We'll look at what we can do to help stop the warming later, and also what we can do to change our lifestyles and activities so that we are more able to cope with – or we're better adapted to – the hotter temperatures and the other changes to the world's weather.

As well as the world's temperature, the frequency and intensity of storms are also increasing. This is because, as the temperature of the air rises, the oceans also become warmer as they absorb heat from the air. Warmer oceans result in more powerful tropical storms because they get their energy from the warmth in the oceans. This is very worrying because the coastal environment, wildlife and communities are badly damaged by tropical storms and many lives are lost.

Another impact is the change in rainfall across the world. We will look at what scientists think is likely to happen to rain all patterns in Africa and what changes they think have already taken place. But for now, changes in rainfall are already happening and they're having devastating impacts on food production, homes and livelihoods in many countries of the world. This is because of the floods and droughts that destroy crops, livestock, homes, and infrastructure, and sometimes results in mass migration of people as well as death. We've seen it on the TV and read about it in the newspapers. These devastating weather events are becoming more frequent because of climate change.



As young people, you probably haven't noticed any changes in the temperatures or rainfall during your lifetimes. But there are lots of people who have noticed them: your grandparents and even perhaps your parents. The older generations in Ghana often say how they have noticed the weather is hotter than when they were young, or that the rain falls less frequently. People who farm notice these changes more instinctively because they rely so closely on rain coming at the right time and in the right quantity to make their crops grow and to refill water wells. You can ask them about these weather changes and what they've noticed. Ask your grandparents how they've changed the way they do things over time to help them cope with the changes in rainfall and temperature that they've experienced, especially in their farming systems. Perhaps they've changed the times they plant their crop seeds, for example, or they use different ways of conserving soil and water on their land. Older people have a lot of very useful and valuable lessons to teach us about how to cope with the changing climate and it's important we learn from them. Then we can also pass these things on to our own children and grandchildren.

So we know what's happening and why, but what are the expected impacts on us and on our communities, the wildlife and the environment around us?

We've already looked at some of the impacts of the rising global temperatures, including changes in the frequency and intensity of storms, and changes in rainfall patterns. There are other impacts that will affect the environment around us, and will impact on our lifestyles and livelihoods. Life will become much more difficult for many of us, most especially for very poor people.

Worldwide impacts

- **Ice is melting and sea levels are rising**

Although it's very hot in Ghana most of the time, there are places on the earth that are so cold they are covered with ice all year round. This extreme coldness is like living inside the freezer at your local cold store. These very cold places are mainly at the earth's two poles. They're called the Arctic and the Antarctic. There are also very cold places at the tops of mountains that are covered in snow and icebergs all year round like the Alps and the Himalayas. As the temperature of the earth slowly rises, the ice at the poles and other places is gradually melting. When it melts, the water goes into streams and rivers, and eventually reaches the oceans. This means that over time there's more water in the oceans, so the level is slowly rising. As it rises, it is covering over the land we live on and submerging it. Communities and farm lands will gradually be submerged. Small islands where people live could one day go underwater. The President of the Republic of Maldives Island has since 2008 been looking for a new 'home' to buy for his people. The islands are only just a few feet above sea level.



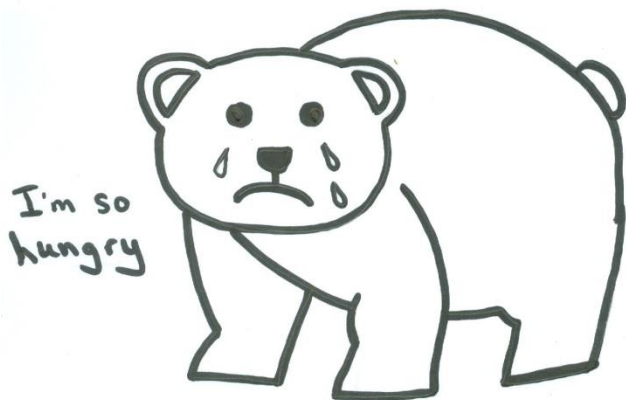
Sea level rise together with increased rainfall and storms is putting coastal cities at a greater risk of flooding. West Africa has many cities near the sea that are at risk due to sea level rise including Accra, Abidjan, Lagos, Douala, Freetown and Monrovia. Africa as a continent has hundreds of cities on its coastline where millions of people live. The fear is that many coastal cities around the world will be underwater by the end of this century. Africa has the added burden of increasingly violent rainstorms that will exacerbate coastal flooding. We can remember the floods that have taken many lives in Ghana in recent years. Rich people have the option of moving house, but it is much more difficult for poor people to do the same. Their lives, homes and businesses could one day be in danger of submersion. Even without this added burden, poor people already live in greater risk because they often occupy lands endangered by some environmental disaster such as flooding or dangerous levels of pollution because they can only afford to live in degraded and inhospitable areas.

- **Desertification**

While some areas are expected to get heavier rainfall but less frequently, other areas are predicted to get less rain. Desert areas are spreading as temperatures rise, rainfall declines and droughts persist for longer. The desertified areas of northern Ghana are slowly spreading southwards through the Brong Ahafo Region as rainfall becomes less frequent. This process of fertile lands turning into desert is known as desertification and is speeded up by inappropriate agriculture and vegetation removal. The vegetative covering is beneficial to the soil: the leaves protect it from the hot sun, reducing loss of soil moisture, while the roots bind the soil together. Loss of this protective vegetation means that fertile topsoil is exposed and can easily be removed – or eroded – by heavy rainfall and strong winds. We've all been out in the open air when the wind has blown dusty soil or sand particles into our faces. That's a type of soil erosion. Wildfires are also becoming more frequent and difficult to stop in forests and other vegetated areas, which similarly damage the soil's protective cover.

- **Species change and loss**

Changes in rainfall and temperature result in changes in the habitat conditions of plants. These changes mean that some plants will decline in number or disappear locally as their environment becomes unsuitable for them. Plants can't just get up and move somewhere else the way animals and humans can, so the ranges where they can survive and thrive will gradually shift. The same will happen to crop plants. Some crops that grow well in the temperatures and rainfall of their existing habitats may not grow again if it gets too hot and if the rainfall changes so there are worse floods or droughts. This will undermine agriculture and food security and is already forcing farmers to change the crops they grow. In certain areas, wild sources of food and medicines that communities have depended on will also become more difficult to find, bringing further problems for food security and health.



Likewise animals that live happily in the existing conditions of their habitat today may die if it gets too hot or if there's less water for them to drink or if their food resources decline. Fish may not survive when the oceans they live in get warmer. Certain species of animal, fish and other creatures can migrate to areas that are more suitable for them such as cooler areas of land or sea, or to areas where water and food are plentiful, and some are already doing this. But this may also disturb the balance of biodiversity in the ecosystems that already exist there, as well as in those they leave behind. Life will need to adjust and adapt to these changes. Many animals are now completely extinct in the world because of climate change and other damaging human impacts on the environment such as forest removal or pollution of rivers. More will disappear in the future. Polar bears, for instance, are dying as a result of the melting polar ice. This is because they feed almost exclusively

on seals and use the ice patches as floating platforms to catch their food. These platforms are melting and disappearing, so they have fewer opportunities to catch their food. The seals are also likely becoming scarcer in their habitats. It is a very sad consequence of human activity that's causing some bears to starve to death.

The difficulties some people face living in their environments are forcing them to migrate temporarily or permanently in search of food, water, fertile land for farming, or a job when farming and survival in their home community becomes too difficult. We will see this increasingly in communities experiencing desertification, and in coastal communities faced with sea level rise. Migration can cause conflicts because of the increased competition for local resources at the new destinations, especially fresh water and fertile land for farming. It can also lead to abuse and trafficking of women and children. It inevitably disrupts children's education, and jeopardises the health of vulnerable groups. The impact on women and children is especially bad.

Main impacts for Africa

The United Nations says Africa is the continent most vulnerable to climate change. As we all know, much of Africa is hot, dry and arid with seasonal rainfall. Because of this, many areas already don't support agriculture. A hotter and drier climate will mean areas that produce food today may not do so in the future. The changing climate is made worse for many Africans because of factors such as limited access to fertile land and other productive resources, poor and unequal economic development, widespread poverty, and low capacity to adapt to environmental changes. Frequent natural disasters such as floods and droughts make the situation worse. And many African countries depend mainly on rain-fed agriculture due to lack of irrigation water and facilities, so this makes Africa even more vulnerable to the changing rainfall. Africa also has low capacity to adapt to climate change due to financial and technological constraints.

There will be many impacts on people and the environment, including those already discussed. Below are some of the main and most worrying impacts for Africa.

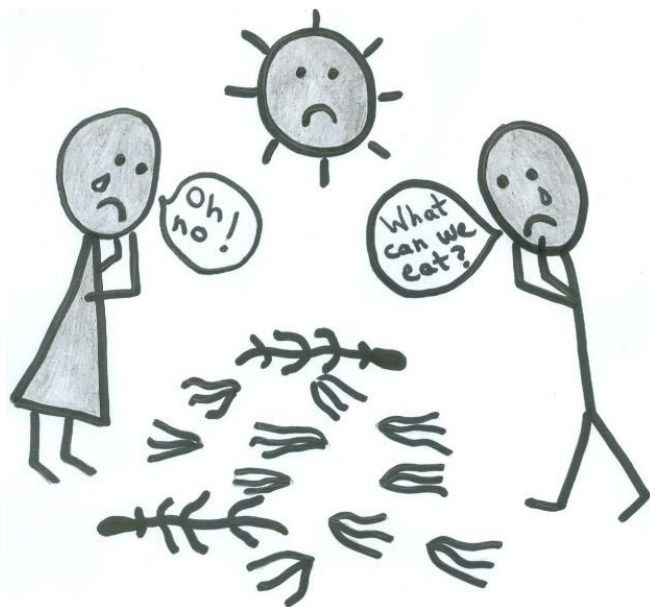
- **Agriculture and food security**

Our subsistence farmers are likely to experience falling crop yields due to changes in temperature, rainfall patterns, and the frequency and severity of storms. This will undermine their livelihoods and family food security, and drive more farmers off the land to seek work elsewhere. Falling crop yields and loss of subsistence farmers from the land are extremely worrying because small scale subsistence farmers are the



backbone of Ghana's food security. Reduced crop yields will mean there's less food for us all to eat, especially in our rural communities where food security is already weak.

Every person has the fundamental right to adequate food, as recognized by the 1948 Declaration on Human Rights, and to be free from hunger, both recognized by the 1976 International Covenant on Economic, Social and Cultural Rights. Food security is not only about food availability. It has other dimensions too. Food security is about a person being able to access enough food to ensure they are not hungry and not



malnourished. So food security has many dimensions: availability, affordability, access, nutrition, and the adequacy and stability of supply. All these are important. Consider for example a situation where food is available at the market for people to buy, but some cannot afford it because they don't have enough money. Their food security is undermined. Nutrition and health status are important to food security too because certain sicknesses limit a person's ability to absorb nutrients from their food. Another important dimension is the stability of food supply: Ghana like many countries in Africa imports a lot of staple foods from other countries. Huge quantities of rice are imported from the US and Asian countries, for example. If productivity in those countries is damaged by climate change, they'll have less to export to Ghana, so supply will be disrupted. This will also cause food prices to increase and further undermine poor people's access to food.

It's clear that climate change will have very negative impacts on food security in Africa. As we said earlier, increased floods, droughts, changes in the amounts and times of the rains, and increased temperatures will all have direct impacts on agriculture. Some

crops and livestock won't survive in the changed climate and environment. But certain pests and diseases that damage crops, livestock and harvested food may thrive even better in the hotter or more humid weather or in the different rainfall. Hotter or more humid weather could also spoil certain foods even more quickly, especially fresh fruits and vegetables, reducing availability and increasing prices.

- **Access to water**

As we discussed earlier, rainfall patterns are changing across Africa. The scientists are not very certain what will happen, but there's some confidence that West Africa will get more days of very heavy rainfall so it's likely that the flooding will get worse. Other areas such as parts of east and southern Africa will get less rain. There'll be less fresh water around, and it will be more prone to evaporation with the hotter

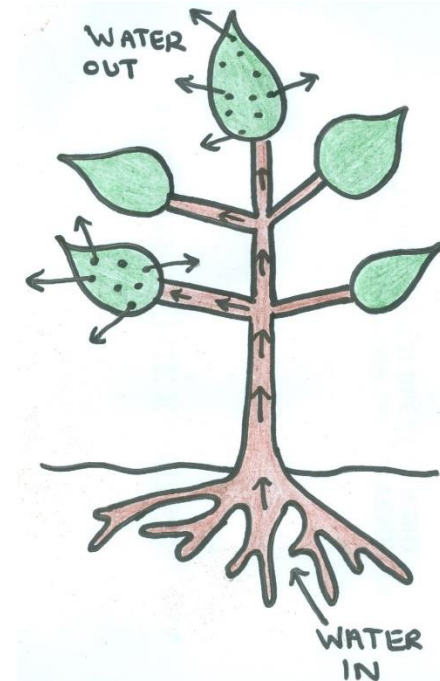
temperatures. This will mean that millions more people will find it increasingly difficult to get clean water. In areas where rainfall becomes very heavy, it could cause storm drains and sewage systems to overflow and pollute existing clean water sources. So we need to think up some really good ways of improving people's access to clean water, for example through rainwater harvesting and storage. Then we'll be better prepared for the worst. We'll look at some possibilities later.

- **Forests**

Ghana's forests are home to a huge diversity of animals and plants, and many people also live in the surrounding forest fringe communities. Besides providing a habitat, they also have other important roles. Forests help keep the air in balance by absorbing carbon dioxide and breathing out the oxygen that animals and people need to stay alive. Trees and other vegetation also play an important role in the water cycle: trees and plants take in water through their roots which is carried through the plant or tree to small pores or holes on the underside of their leaves. There the water evaporates from the leaf's surface and is absorbed into the atmosphere. This process of water moving through the plant is called transpiration. When it leaves the plant, the water joins with other water in the atmosphere that's been evaporated from earth and condenses into clouds. This eventually falls as precipitation (rain, snow, sleet or hail) that waters crops and other plants, provides fresh water for animals and people to drink, and replenishes groundwater, rivers, streams and lakes. Thus forests are crucial to the survival of many living species, including humans. But they can get damaged by climate change because they are sensitive to weather changes such as droughts. As droughts in Africa and other regions get worse, wildfires will spread more easily and do greater damage to the forests. These fires also harm the wildlife and people who live in and around the forests. In other regions such as Europe, forests get damaged by the increasing power of the storms and strong winds that blow the trees down. Trees and vegetation are also damaged by pollution that gets into the soil and is then absorbed by the trees through their roots.

- **Spread of disease**

With the changes in the climate, certain diseases and disease vectors will be able to spread to new locations. Some areas that don't have malaria today, for example, could become good habitats for the malaria-carrying mosquitoes to survive in the future due to changes in temperature and rainfall. The areas that may become more suitable include the mountainous areas of Ethiopia, Kenya, Rwanda and Burundi. There's widespread concern they could also spread to countries that currently don't have malaria or to those that have managed to control it, such as Spain.



- **Coastal communities**

As we noted earlier, the ice around the North and South Poles and the icebergs in the mountains is melting due to the rising temperatures around the earth. The melted water goes into the sea and this makes the sea levels rise. Beaches are getting eroded and wetlands damaged by rising seas. Hundreds of people around the world live in coastal areas, and some of them are already losing their homes and their lands. It has been reported this year (2016) that five small uninhabited islands that make up part of the Solomon Islands in the Pacific have disappeared due to erosion and sea level rise (caused by climate change). Another six of the islands have lost large areas of land with entire villages destroyed on two of them, forcing people to move. The coast by Keta in Ghana's Volta Region has been damaged by rising sea levels and more powerful coastal storms and waves. The rising sea levels and the increasing ocean temperatures will also have damaging impacts on fisheries and tourism too. People who rely on these activities may lose their livelihoods.

- **Impacts on women**

Women produce around 60-80% of food in Africa. In Ghana it's estimated that women produce 70% of our subsistence food crop. Women farmers are clearly crucial to Africa's food security. They should receive special attention from the government's agricultural support services and from NGOs working on climate change to help them adapt their farming systems to climate change. Unfortunately the opposite is truer: women receive less support partly because of the remoteness of their farms, and partly because of gender issues. This must change. Women and girls are also more vulnerable in other ways too. They are responsible for providing water, fuel wood and food for their families. As these resources become more scarce, women and girls have to walk further to collect them and this can put them at greater risk of violence. Lack of food can also affect women and girls more because women characteristically give a larger and more nutritious share of available food to men and boys, thus putting their own health, food security and nutrition at risk. Also, because women and girls lack certain rights in some communities and societies, they are not allowed to leave home without a male escort. This can put them in grave danger in times of floods and storms. We must all be vigilant and look out for our families, neighbours and disadvantaged people in our communities and ensure we help them to safety in times of danger.



Final note...

The booklet explained why the climate is changing and some of the impacts the world is experiencing. Although efforts have been made by governments and inter-governmental organizations to stop climate change, action has been slow and weak. Industry and big business are too

powerful throughout the world, and their lobbies ensure progress on beating climate change is delayed. They fear profit losses if they are forced to account for the environmental damage they cause, and increased costs to minimise their environmental impacts. These fears are unfounded. Until they are banned from discussion and decision making about global action on climate change, the situation will remain the same: they will always stifle progress towards stopping it.

Industry, big business and governments are not acting fast enough to minimise countries' damaging impacts on the climate, but we can make changes in our own lives to reduce our own impacts. If we lead by example, these changes can ripple through communities and cities to make much wider changes in our countries. The other booklet – *Climate change: what we can all do about it* – that accompanies this one gives ideas for what we can do ourselves to reduce our impacts on the environment and climate change. There are so many actions we can take and changes we can make in our homes, communities and schools that will help us act together to make positive impacts. Lots of the activities will also help us adapt our lives and livelihoods to the damaging impacts we expect from climate change, such as changes in rainfall and problems in food production. Have a look and see what you can do together to help strengthen resilience in your families and communities. It's much more fun if we all act together!

Further reading

Friends of the Earth-International resource pages on climate change:

<http://www.foei.org/what-we-do/climate-justice-and-energy>

Youtube video with Nnimmo Bassey (Environmental Rights Action / Friends of the Earth-Nigeria) explaining climate change:

<https://www.youtube.com/watch?v=zce0HFHQV0>

Civil Society Review (2015) *Fair Shares: A civil society equity review of INDCs*. Civil Society Review, November 2015. The full report and summary are both available online here: <http://civilsocietyreview.org/>

Climate and Development Knowledge Network (CDKN) The IPCC's fifth assessment report: what's in it for Africa? Available here:

http://cdkn.org/wp-content/uploads/2014/04/J1731_CDKN_FifthAssesmentReport_WEB.pdf

IISD: Climate Change Policy and Practice. 175 Parties Sign Paris Agreement, 15 Ratify Agreement on Earth Day <http://climate-i.iisd.org/news/175-parties-sign-paris-agreement-15-ratify-agreement-on-earth-day/>

International Institute for Environment and Development's (IIED) coalition project 'Up in Smoke' published several reports on climate change and its impacts on Africa and other regions. The reports can be accessed here: <http://www.iied.org/smoke>

IPCC 5th Report, Chapter 22 Africa: Available at: http://ar5-syr.ipcc.ch/resources/htmlpdf/WGIAR5-Chap22_FINAL/

Planet Save: Global warming effects and causes: a top 10 list: <http://planetsave.com/2009/06/07/global-warming-effects-and-causes-a-top-10-list/>

Tiki the Penguin is trying to make the world a better place for people and animals and the rest of the world: <http://tiki.oneworld.org/> and also Tiki's pages about climate change here: http://tiki.oneworld.net/global_warming/climate_home.html

United States Environmental Protection Agency pages for kids to understand climate change: <http://www3.epa.gov/climatechange/kids/>

38 degrees website: www.home38degrees.org