

Climate Change

‘We have a message here to tell these countries that you are causing aggression to us by causing global warming’

Yoweri Museveni, President of Uganda, 2007

Cover pic: Uganda Nr. Mukono
A girl uses a leaf for shelter during a rain storm.
Photo: Caroline Penn/ Panos Pictures

Inside Cover pic: Two Gabbra woman Ilo Jarso and Gonche
Salesa make their way through a dust-storm as they walk
back into Kalacha.
Photo: Gideon Mendel, Kenya.



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Contents

Introduction	02
Objectives	02
Disturbing Facts	02
Section One Understanding Climate	03
Definitions of climate	03
What human activities have contributed to global warming and climate change?	06
Section Two Consequences of Climate Change	11
What are the consequences of Climate Change?	11
Realities of Climate Change in the Developing World	16
Section Three International Agreements. What can be done?	21
International Agreements on Climate Change	21
What can be done?	23
Web links - further information	27

Introduction

The impact of uncurbed global warming is already devastating the lives of millions of people across the globe, particularly in those countries that have the fewest resources to cope. The floods affecting 17 countries in Africa in September 2007 were said to have been the worst in decades, with over 250 people killed and 1.5 million people displaced from their homes and villages. For millions of poor people around the world the devastating effects of climate change are now a fact of life, and are already undermining the progress intended under the internationally agreed Millennium Development Goals. Those who are least responsible for creating global warming it seems, will be the very ones to suffer most from its effects.

OBJECTIVES

This resource has been written for Second Level Geography teachers and their students.

- For the Leaving Certificate Curriculum, it aims to complement the Elective Unit: Trade and the Environment and Optional Units: Global Interdependence and The Atmosphere/Ocean Environment.
- This resource is also relevant to the Human Habitat Section on the Junior Certificate Syllabus and to the Study: Acting Locally – Thinking Globally in Section B Environment of the CSPE Programme.
- Case studies of the impacts of climate change in the developing world are included.

DISTURBING FACTS

Crop yields in Sub-Saharan Africa are projected to fall by 20% because of global warming

Vulnerable areas have seen a 65-fold increase in the number of people affected by disasters in the past 30 years.

www.neweconomics.org

Of the 600,000 or so people who died in extreme weather events during the 1990s 99% were in poor countries.

www.who.int

In Bangladesh 20 million people will become environmental refugees as a result of climate change

www.timesonline.co.uk

In 2007 the worst flooding in 50 years in Hunan Province in China caused a plague of 2 billion mice.

www.irishtimes.com

In 2005 there were 28 tropical storms - the highest number since record keeping began about 150 years ago - and 15 hurricanes including 7 major hurricanes.

www.pewclimate.org

Rising temperatures in Alaska has spurred the spruce bark beetle to breed faster. From 1993 to 2003, the beetle chewed up 3.4 million acres of Alaskan forest.

www.ndrc.org

Ocean temperatures have increased from the surface as far down as 3000m.

www.un.org

In India the Gangotri glacier is receding at an average rate of 23 meters per year.

nationalgeographic.com

The Ward Hunt Ice Shelf, which had been in place for 3,000 years is now breaking into pieces.

www.ndrc.org

Worldwide deforestation accounts for up to 25% of global emissions of heat trapping gases.

www.independent.co.uk

Section One

Understanding Climate

In order to understand climate change it is important to understand the nature of climate. Climate can be defined as the meteorological conditions that characteristically prevail in a particular region.

Weather, however, is the state of the atmosphere over a short period of time such as a day, a week or a month. Climatic elements include precipitation, temperature, humidity, sunshine, wind velocity, fog, frost, hailstorms and other measures of weather. In short:

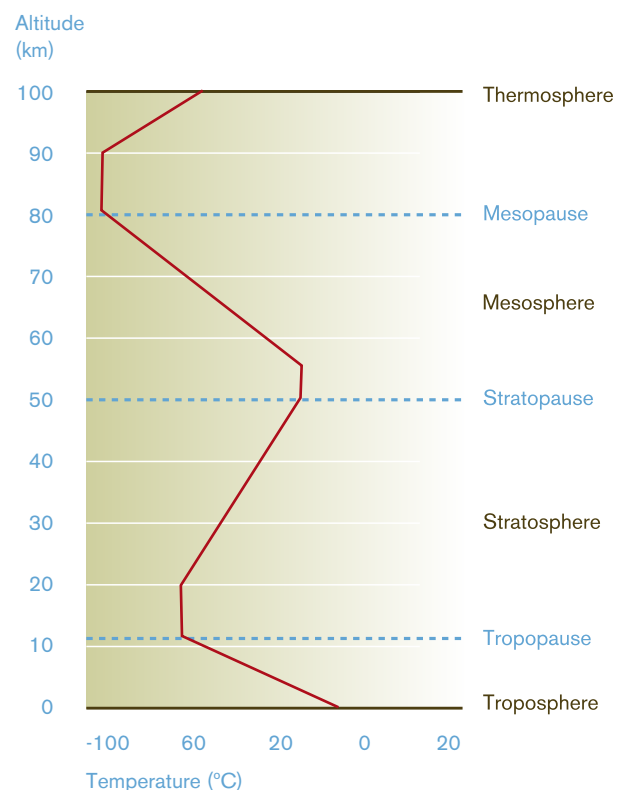
- Climate is the average weather, usually taken over a 30 year time period, for a particular region;
- Continual changes in climatic elements occur within the lowest layer of the atmosphere (the troposphere);
- Climate determines the productivity of food and fibre, fisheries and water resources;
- Earth's global climate depends on the amount of energy received from the sun and the amount of energy trapped at its surface by the greenhouse gases;
- Earth's regional climates are highly variable and this ensures the diversity of ecosystems.

The atmosphere

An envelope of gases called the atmosphere surrounds the earth. These gases extend to a height of 1,000 km. The Earth's atmosphere has four main layers: the troposphere, the stratosphere, the mesosphere and the thermosphere. The layers are distinguished by different temperatures and densities. Through the effects of gravity, 75% of the total mass of the atmosphere is in the troposphere. The depth of the troposphere varies from about 8 to 16 kilometres. Without the atmosphere, there would be no life on earth.

The atmosphere is comprised mainly of:

- Nitrogen (N₂, 78.1% volume mixing ratio);
- Oxygen (O₂, 20.9% volume mixing ratio);
- Argon (Ar, 0.93% volume mixing ratio).



Source: www.physicalgeography.net

In the atmosphere, both oxygen and nitrogen exist in their most stable elemental states. Atmospheric oxygen exists as a molecule of two oxygen atoms bonded together, O₂, and atmospheric nitrogen exists as a molecule of two nitrogen atoms bonded together, N₂. These gases do not interact with the infrared radiation emitted by the Earth.

There are heat-trapping gases, known as greenhouse gases, which absorb infrared light and prevent it being re-radiated into outer space.

Greenhouse gases

These greenhouse gasses include:

- carbon dioxide (CO₂) which is exhaled by living organisms and utilised by plants during photosynthesis. The main human-related sources of carbon dioxide (CO₂) include the burning of fossil fuels; deforestation; forest fires; the destruction of peatlands; and the manufacture of cement;
- methane (CH₄), a carbon-based gas, which is released from ruminants such as cattle, sheep, goats and buffalo. Methane is also released from the breakdown of plant material under wet conditions. Other sources of methane include rice cultivation, biomass burning, fossil fuel combustion and disposal of domestic refuse in landfill sites;
- nitrous oxide (N₂O). The main human-related sources of nitrous oxide (N₂O) are fertiliser use; livestock management; biomass burning and industrial activities. There is very little N₂O in the atmosphere (about 0.000003%), but due mostly to human activity, it is actually increasing by about 0.3 % every year. N₂O is extremely efficient at warming up the atmosphere. In fact, one molecule of N₂O has 200 to 300 times the greenhouse warming effect of CO₂, the primary greenhouse gas;
- chlorofluorocarbons (CFCs) are halocarbons used in air conditioners and many industrial processes. CFCs deplete the ozone as well as act as greenhouse gases.

Greenhouse effect

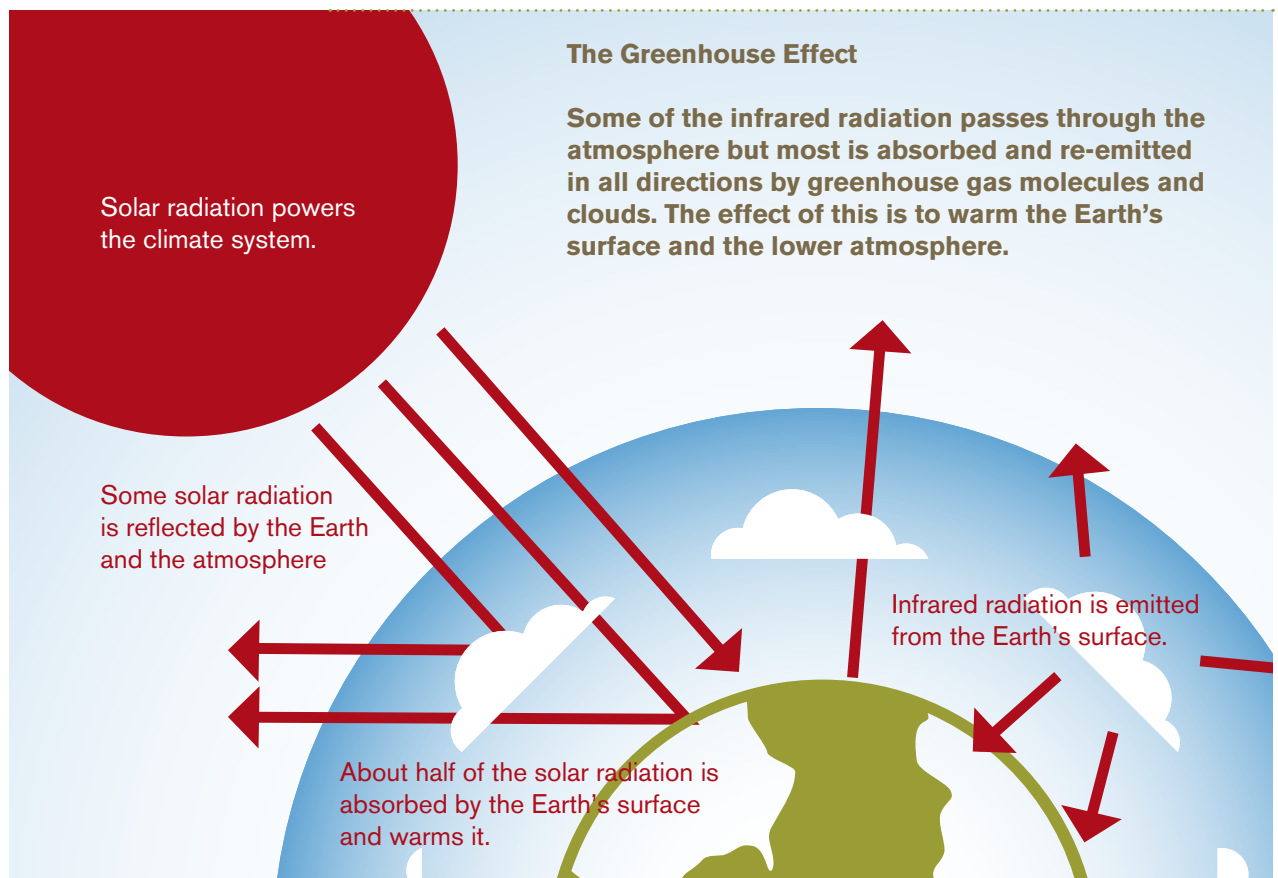
The greenhouse effect is a necessary phenomenon that keeps all of earth's heat from escaping to the outer atmosphere. Without the natural greenhouse effect life on earth would be difficult to sustain.

Due to increased greenhouse gases however the atmosphere is absorbing more infrared energy than it re-radiates to space, resulting in a net warming of the earth-atmosphere system. It is this excess heating which is causing global warming and climate change. During the last 150 years, the atmospheric concentration of carbon dioxide has increased by 31% and the level of atmospheric methane has risen by 151%.

Carbon dioxide, methane, and nitrous oxide have different global warming potential.

GWP: an index used to translate the level of emissions of various gases into a common measure in order to compare the relative impact on the environment. GWPs are calculated as the ratio to one tonne of CO₂. Global warming potentials (GWPs) are based on the heat-absorbing ability of each gas relative to that of carbon dioxide (CO₂).

Greenhouse Gas	CO ₂ carbon dioxide	CH ₄ methane	N ₂ O nitrous oxide	HFC-23 hydrofluoro-carbon-23
Global Warming Potential (GWP)	1	21	310	11,700



The Intergovernmental Panel on Climate Change (IPCC) was established in 1988 by The World Meteorological Organisation (WMO) and the United National Environmental Programme (UNEP) to assess scientific, technical and socio-economic information relevant for the understanding of climate change.

Climate Change

The warming of the globe is expected to result in more extreme weather because of changes in atmospheric wind patterns and the ability of warmer air to hold more moisture.

According to the World Meteorological Organisation (WMO) - the United Nations' authority on weather, climate and water issues - the range of weather extremes is well outside the historical norm.

- WMO reported that January and April 2007 were the warmest months worldwide on record.
- Eleven of the twelve years in the period (1995-2006) rank among the top 12 warmest years since 1850.
- Germany had its wettest May on record in 2007, and April was the driest there in a century.
- In England and Wales, the period from May to July 2007 was the wettest since record-keeping

began in 1766, resulting in floods that killed nine people.

- Temperatures in Bulgaria reached 45 degrees in Summer 2007.
- In 2007, up to a quarter of a million Mozambicans, living along the Zambezi valley, were affected by severe flooding for the second consecutive year.
- In May 2007 Uruguay was hit by the worst flooding since 1959. The floods affected more than 110,000 people and severely damaged crops and buildings
- The Antarctic Peninsula has experienced some of the fastest warming on Earth, nearly three degrees Celsius over the last half-century.

The IPCC's **Fourth Assessment Report**, Climate Change 2007, notes many changes in the earth's climate including:

- The amount of carbon dioxide in the atmosphere in 2005 (379 parts per million) exceeded by far the natural range of the last 650,000 years (180 to 300 parts per million);
- The amount of methane in the atmosphere in 2005 (1774 parts per billion) exceeded by far the natural range of the last 650,000 years (320 to 790 parts per billion);
- Nitrous oxide concentrations rose from a pre-industrial value of 270 ppb to a 2005 value of 319 ppb. More than a third of this rise is due to human activity, primarily agriculture.



What human activities have contributed to global warming and climate change?

The increase in carbon dioxide (CO₂); methane (CH₄); nitrous oxide (N₂O) and water vapour (H₂O) play a big part in raising the temperature in the lower atmosphere. The increase in water vapour (H₂O), a natural greenhouse gas, is consistent with the extra moisture that warmer air can hold. Activities which are significant sources of greenhouse gases are:

- **Unsustainable use of energy and resources in everyday life;**
- **Transportation;**
- **Deforestation;**
- **Agriculture and food industry.**

Cause: Unsustainable use of energy and resources in everyday life

Everyday lifestyle actions which consume energy contribute to climate change. Fossil fuels, such as coal, oil and gas, are locked away and their carbon is only released when they are dug up and used for energy. Oil is created as a result of the compression of small marine creatures under rock formations. Coal deposits had their beginnings in the Carboniferous Period 350 -290 million years ago when swamp forests were flooded and under pressure of sediment and heat transformed into coal. **Trees and oceans act as carbon sinks. Trees absorb carbon dioxide (CO₂) from the atmosphere through photosynthesis and store carbon in their wood and leaves. In the oceans, carbon dioxide goes to produce carbonate of lime, which is essential for the formation of the shells and skeletons of sea creatures. As sea creatures die the carbon is stored in the sea bed.**

The rapid increase in concentrations of CO₂ began with coal burning during the Industrial Revolution. The use of oil for transport, and gas, oil and coal for heating and cooking later contributed to this increase. From 2004 to 2005, there was an increase of 2.4% in greenhouse gas emissions in the energy industries in Ireland. A large part of this increase was attributed to peat burning in power stations. It is not possible to keep emitting greenhouse gases with the expectation that carbon sinks will absorb them all and the climate will remain stable. The rapid rate of fossil fuel burning has disrupted the natural balance of carbon in the air, soil and seas.

Cause: Transportation

Transportation related emissions of carbon dioxide are growing rapidly. The United States alone consumes about 21 million barrels of crude oil per day, of which approximately 2/3rds (14 million barrels) is used to fuel their transport needs.

In 2005, the Environmental Protection Agency identified that sales of cars, in Ireland, with engine sizes between 1.7 and 1.9 litres had increased by 400% since 1990.

An IPCC report predicted that greenhouse gas emissions from aircraft could rise from the present 3.5% of human-related global warming to 15% within 50 years. As well as releasing CO₂, NO_x, ozone, methane and other pollutants, aircraft trail water vapour which has a heat trapping effect. These emissions are released directly into the **stratosphere**, where they have around three times the global warming potential than the same emissions on the ground.

The stratosphere is the calm layer in the atmosphere, above the troposphere. It stretches up to 50 km above sea-level. The stratosphere contains a thin layer of ozone which absorbs most of the harmful ultraviolet radiation from the Sun.



Traffic
Photo: istock

Taking the food of the poor to burn in the cars of the rich!

Bio-fuel demand will have a significant and detrimental impact upon achieving the first Millennium Development Goal of eradicating poverty and hunger. Estimates include an extra 600 million people going hungry by 2025 as a result of biofuel policies

Runge and Senauer, 2007

Bio-fuels are considered one of the solutions to fossil fuel burning, however a closer look at the production of bio-fuels confirms that:

- bio-fuels would take up a large amount of land to the detriment of food security and bio-diversity. The powering of the average US car for one year on ethanol would require 11 acres of farmland;
- the energy used to produce bio-fuels exceeds the energy delivered;
- nitrous oxide emissions which would arise from increased cultivation of biofuel crops could negate some of the benefits;
- ethanol produces less than 70% of the energy of petrol. It would take 1.4 litres of ethanol to displace 1 litre of petrol;
- If the US increased biofuels production *more than 20 times*, it would meet little more than one-fifth of its current petroleum needs within the next 15 years;
- A recent analysis from the International Food Policy and Research Institute predicts that forecast demand for biofuels will push corn prices 26.3% higher by 2020 than would otherwise be the case (von Braun, 2007). In 2007, 40% of the US maize and corn harvest was used to produce fuel.

According to GRAIN, an NGO which promotes the sustainable management and use of agricultural biodiversity, the stampede into biofuels is causing enormous environmental and social damage . . . ecosystems are being destroyed and indigenous and peasant communities are being thrown off their land. "We believe that the prefix bio, which comes from the Greek word for 'life', is entirely inappropriate for such anti-life devastation. So, following the lead of non-governmental organisations and social movements in Latin America, we shall not be talking about biofuels and green energy. Agrofuels is a much better term, we believe, to express what is really happening: agribusiness producing fuel from plants to sustain a wasteful, destructive and unjust global economy."

The recent increase in global food prices is having a significant impact on the lives of the poorest people, in the poorest countries of the world. These are the most vulnerable people on earth and the ones Concern Worldwide is already committed to working with.

Globally food prices soared by 40% between 2007 and 2008. In January 2008, international wheat prices were up by 83% from one year earlier; maize was nearly 50% more expensive and rice 20% more expensive.

Concern believes that high food prices have been caused by many factors including:

- The growing demand for bio-fuels which means that fuel-crops are displacing food crops because they are becoming more profitable and income-secure;
- An increased incidence of extreme weather events due to climate change, resulting in droughts, floods and other hazards which have reduced the supply of key crops;
- A major increase in demand for food, mainly from larger and increasingly prosperous populations in China and India, especially a demand for meat and dairy products which require high levels of cereal or livestock feeds;
- The high price of oil is also having an important effect since the whole value chain of food production and sale is affected by high costs of inputs (fertiliser; pest control etc.) and transportation.

The high price of oil and the need to reduce carbon emissions has led the US and EU to set ambitious targets to increase the percentage of their future energy needs supplied by biofuels. This is one of the factors in the explosion in food prices.

But this policy shift on biofuels is being questioned from two perspectives. The first is a basic moral one. At a conference in Alexandria, Egypt on how science can contribute to solving the world's food/energy/ climate change problems, one delegate described US and EU policy on biofuels as 'taking the food of the poor to burn in the cars of the rich'.

The second is an efficiency one; whether, when account is taken of the increased inputs and subsidies required to increase the use of biofuels, as well as some of the environmental effects of bringing the additional land into production, the net gain in terms of carbon emissions is justified.

Both factors suggest that the US and the EU should reassess their biofuels policies or at least phase it in at a slower rate.



Cause: Deforestation

Worldwide 80% of original forest cover has been cleared, fragmented or degraded. Africa lost 64 million hectares of forest between 1990 and 2005, the greatest decline of any continent. The Global Canopy Programme, an alliance of leading rainforest scientists, summarising findings from the United Nations and from the Stern Report, shows that **deforestation accounts for up to 25 % of global emissions of heat-trapping gases.** Carbon stored for years in the trees is being released at a high rate. Trees release carbon into the atmosphere through fire, disease, climatic changes and timber harvesting.



Causes of deforestation

Cause: Agriculture and food industry

Climate change and loss of bio-diversity are accelerated by intensive agriculture activities and the conventional global food industry which:

- convert forests to agricultural land;
- Use only a few crop varieties. When monoculture takes precedence over diverse local crops bio-diversity is lost and food insecurity increases.
- transport food over long distances;
- use fertilisers one of the sources of nitrous oxide (N₂O);
- manage large numbers of livestock.

Methane (CH₄) emissions are produced by cattle. Ruminants have a unique, four-chambered stomach. In the chamber called the rumen, bacteria break down food and generate methane as a by-product.

Food is transported all around the world, with the average meal travelling 2400 kilometres. The CO₂ emissions attributable to producing, packaging and distributing the food consumed by a family of four are estimated to be about eight tonnes a year.

Indirect cause: Subsidies

Many rich countries subsidise their fossil fuel industries. A subsidy can be an action, inaction or concession which results in making an energy-intensive activity relatively cheaper and includes:

- Lower tax rates on certain fuels. International aviation and marine fuels are exempt from any kind of taxation that would internalise the real environmental cost;
- Allowing a polluter to avoid paying compensation for the impacts of their polluting activity. Many environmental impacts are known as “externalities” since the costs of these impacts often accrue to persons other than those responsible for them. Eco-economic theory contends that if the cost of externalities were included in the market pricing, market forces could stimulate more sustainable use of resources;
- Large businesses obtaining electricity from National Grids at less than the tariffs which apply to smaller businesses and other power consumers;
- In 2003 fossil fuels projects represented 86% of the World Bank spending on energy while renewable energy projects got 14%.

Indirect cause: Poor Planning

- Sprawling cities encourage the use of private transport and need more transportation to supply goods and services. Planning policies which allow urban sprawl contribute to this problem.
- Using more financial resources to develop roads rather than improving public transport leads to an inadequate public transport system.

Polar Warming

Average temperatures in the Arctic region are rising twice as fast as they are elsewhere. This will lead to serious consequences for the entire planet. Images from NASA satellites show that the area of permafrost is contracting at a rate of 9% each decade. Last time the polar areas were significantly warmer than the present (125,000 years ago) there was a rise in sea level of 4 - 6 metres. Permafrost is solid frozen soil, extending to depths of 2.200 feet in some areas of the arctic regions, containing grasses, roots, sticks, much of it dating back 30,000 years. As the permafrost thaws, carbon stored there bubbles up to the surface of thaw lakes and into the atmosphere as methane. The bubbling methane is accelerating global warming by heating the earth even more.

Destructed forest
Photo: istock





Section Two

Consequences of Climate Change

The consequences of uncurbed global warming are devastating the lives of millions of people across the globe, particularly in countries that have the fewest resources. Some of these consequences are explored below.

Consequence: Storms

In 2005 there were 28 tropical storms - the highest number since record keeping began about 150 years ago - and 15 hurricanes including 7 major hurricanes.

This increase in frequency correlates with the rise in North Atlantic sea surface temperature. According to the 2007 Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC-AR4), it is "more likely than not" that there is a human contribution to the trend of hurricane intensification since the 1970s and it is likely that future tropical cyclones will become more intense, with larger peak wind speeds and heavier precipitation associated with increases of sea surface temperatures. Increased sea temperatures cause more water to evaporate.

As a result of cyclone Sidr, which happened in the Bay of Bengal in November 2007, an estimated 10,000 people died, millions of livestock were wiped out, the rice in the paddy fields was rendered inedible, the open ponds that people use for drinking water were contaminated with salt, mud and dead bodies and 1.5 million homes were wholly or partly destroyed.

Consequence: Floods and rise in salinity in land and water

Rising sea levels threaten low-lying areas with flooding, erosion of land, and contamination of freshwater supplies. Salt water seeps into the ground water, reducing productive farmland and fresh water supplies.

As a result of rising sea levels and increasing rain fall, the amount of silt deposited onto river beds is rising, leaving cultivated land prone to prolonged submersion. Some farmers try to adapt by growing water-resistant produce, such as coconut and date

trees. With the land submerged during the rainy season, maintaining these trees is difficult.

Himalayan glaciers are receding at 10-15 meters per year, while in India the Gangotri glacier is receding at an average rate of 23 meters per year. The risk of floods and landslides increases as glacial lakes burst.

Consequence: Internally displaced people and environmental refugees.

In refugee camps and in slums around the world, the human faces behind the statistics can be seen. Political instability and intense suffering as a result of people having to migrate to avoid droughts and floods.

- In Bangladesh 20 million people stand to become environmental refugees because of Climate Change.
- In India more than a million people were displaced in 2007 because of severe flooding.
- In Nepal, floods destroyed crops and disrupted transport and electricity supplies in Summer 2007. Around 2,500 houses were washed away, forcing residents to flee to higher grounds.
- The Dechatu River, which runs through Dire Dawa in Ethiopia, flooded in August 2006, leaving more than 300 people dead and 10,000 homeless.

Those who lose their jobs or homes because of flooding end up in the city slums. People from Khalinchi, in Bangladesh, for example, who leave to seek better lives end up living in the slums in Satkhira, Khulna or Dhaka, working as rickshaw pullers, or in other irregular low income jobs.

Consequence: Drought

The Intergovernmental Panel on Climate Change (IPCC) warns that climate change will bring more floods, more droughts, and more vulnerability, hindering the efforts of millions of people to escape poverty. In the Sahel there has been on average a 25% decrease in annual rainfall over the past thirty years. Africa accounts for less than 3% of the global emissions of carbon dioxide from fuel burning since 1900, yet its 840 million people face some of the biggest risks from drought and disrupted water supplies. In the Turkana region of Kenya rains during the wet season have been insufficient to allow the full regeneration of pasture and to refill the watering holes.



Consequence: Extinctions

Climate change and loss of bio-diversity is a security threat to the foundation of life on earth. It threatens the livelihoods of poor people who depend on ecosystems and the ecological services they provide.

The IPCC'S Fourth assessment report states "Ecosystems and species are vulnerable to climate change - some will be irreversibly damaged or lost." Based on studies of plants and animals covering about 20% of the world's land areas, a recent paper in *Nature Magazine* concluded that 15-37% of species in the sample will be committed to extinction as a result of mid-range climate warming.

- The disruptions of ecosystems under climate change could include shifting flowering or migration times and could cause entire species to move away from their protected areas.
- The decrease in Alaska's coastal ice pack is threatening the survival of polar bears.
- In New Mexico, the degradation of south-western grasslands, due to climate change, land-use and other factors, is threatening the habitat of the lesser prairie chicken, the black-tailed prairie dog and migratory birds.
- As well as releasing carbon dioxide into the atmosphere deforestation and burning threatens the habitat of many endangered species. In Brazil's tropical forests, for example, it threatens the habitat of at least 15 species of endangered birds. This scenario is repeated in forests all around the world.
- Ecosystems are also being destroyed and indigenous communities are losing their land because of the increasing demand for bio-fuels which are promoted to lower emissions.
- The reefs of Papua New Guinea's Kimbe Bay, which are teeming with rare species, are threatened by coral bleaching brought on by climate change.

Coral reefs and mangroves are nursery places for a significant number of fish. Island and coastal communities rely on them to support the fishing that provides their livelihoods. As water comes in contact with CO₂ they combine to make carbonic acid. The acidification of oceans due to excess levels of CO₂ is making shell formation problematic and destroying coral reefs. Rising ocean temperatures is a further cause of coral reef destruction.

Mangroves are also important for reef protection, stabilisation of coastlines, timber supply and medicinal uses. The Sunderbans, a 20,000 square kilometre mangrove forest delta, is a protective buffer between Bangladesh and the Indian Ocean. The Sunderbans (literally 'the beautiful forest' in Bengali) is very rich in bio-diversity. Over the last decade, the sea is eating into the Sunderbans. Mangroves could not have withstood the force of the tsunami. However, satellite images showed that in areas where there were mangrove forests the damage was lessened.

The shrinking of the protective Sunderbans coupled with a rise in poverty due to failed crops has pushed this area into a vicious circle of poverty and ecological destruction. As the frequency of natural disasters increases, the community's capacity to cope with them decreases. Shushilan, a local NGO, focuses on raising awareness about natural disasters and how to deal with them.


Shushilan, one of Concern's partners, has been operating in Bangladesh for 15 years. Its main working areas are ecology, agriculture, forestry, and promoting human rights and good governance. The issues of environmental and climatic changes are at the core of the organisation, as these affect livelihoods and aggravate poverty in the area.



In order to achieve the MDGs by the 2015 target date . . . we need to step up our efforts to address the challenge of climate change”

Léo Mérorès, President, Economic and Social Council

In the year 2000, the governments of the world agreed a set of 8 development goals that set targets for the international community on progress toward a more equal, just and sustainable world. The target date for the achievement of these goals is 2015.

The 8 goals are:		
	Goal 1:	Eradicate extreme poverty and hunger
	Goal 2:	Achieve universal primary education
	Goal 3:	Promote gender equality and empower women
	Goal 4:	Reduce child mortality
	Goal 5:	Improve maternal health
	Goal 6:	Combat HIV & AIDS other diseases
	Goal 7:	Ensure environmental sustainability
	Goal 8:	Develop a global partnership for development

Consequence: Pests and diseases

The World Health Organisation estimates that over 150,000 people are dying each year because of existing levels of climate change mainly through the spread of disease.

Climate change related diseases could undermine the Millennium Development Goal to reduce child mortality.

- Unexpected flooding gives rise to parasites in the water.
- Flooding can cause a plague of rodents. Rodent borne diseases, associated with flooding, include leptospirosis which if not treated can cause kidney damage, meningitis, liver failure and respiratory distress.
- Warmer highlands allow malaria-carrying mosquitoes to survive.

The Khalinchi people, in Bangladesh, complain of an increase in diseases with more people suffering from colds, coughs and pox. Salma Khatun, a local resident says that her children suffer much more from fevers and coughs these days and she thinks this is a result of the constantly changing, unpredictable weather.

Bacterial contamination of drinking water is a problem in richer countries in times of flooding. The difference is that Salma’s family cannot afford to visit a certified doctor so they rely on the local quack doctor. He charges 50 taka per visit, but medicine is an expensive luxury they usually cannot afford.

In the village of Srikhola, Bangladesh, produce, like pumpkin, fall off the vine before they are ripe. The villagers blame the changes in weather and the increase of insects for this new problem.



The worst flooding in 50 years in the Hunan province of China caused a plague of two billion mice. Roads and hillsides have been blackened with rodents, and entire crop fields are being devoured in a single afternoon. Irish Times 28/07/07

Consequence: Food security

The IPCC’s Second Assessment Report stated that climate change is likely to have its greatest impacts on areas where the ability of poor farmers to adapt is limited. African communities are vulnerable to changes in rainfall. Rural communities have relied on predictable rainfall patterns for their crops. Agriculture in Sub-Saharan Africa – of which 90% is rainfed – accounts for 70% of the region’s employment. Climate change has resulted in unpredictable seasons and crop failures. Studies have also shown that the glaciers of Mount Kilimanjaro and Mount Kenya are greatly reduced. These glaciers are the source of streams and rivers, and are also very important for crops.



"We have a message here to tell these countries that you are causing aggression to us by causing global warming;" **Alaska will probably become good for agriculture, Siberia will probably become good for agriculture, but where does that leave Africa? Scientists say it has become increasingly clear that worldwide precipitation is shifting away from the equator and toward the poles.**

President of Uganda Yoweri Museveni, 2007

In Srikhola village, Satkhira district Bangladesh, temperatures have become more extreme with winters becoming colder and summers becoming hotter. Farmers experience crop failures due to the excessive cold during the germination period, which kills the seedlings. The seedlings that survive the extreme winter cold are burnt by the blazing summer sun. As the weather becomes unpredictable, planning for the year ahead becomes very difficult.

The use of land for fuel rather than food will be detrimental to food security.

According to GRAIN, the Indian government is talking of planting 14 million hectares of land with jatropha. The Inter-American Development Bank says that Brazil has 120 million hectares that could be cultivated with agrofuel crops. And an agrofuel lobby is speaking of 379 million hectares being available in 15 African countries.

The biggest problem lies in the scale of agro-fuel planting. There have been successful community projects using jatropha for fuel and other uses. The living fences of jatropha in Mali protected food crops; stabilised soil; were used for fuel, lubrication, medicine and soap production. In this project the local people used jatropha to boost their livelihoods.

Consequence: **Poverty**

The Millennium Ecosystem Assessment Report, released in 2005, showed the strong link between ecosystem health and human well-being. This report concluded that the destruction of the natural world was a significant barrier to the reduction of poverty. Despite the wealth and material benefits derived from nature, billions of people remain poor. Global warming threatens to reverse human progress making the Millennium Development Goal for poverty reduction unachievable.

Poverty cannot be made history by using the current Western Model of development without leading to catastrophic climate change.

Economic development in many countries is based on fossil fuels. Sustainable livelihoods through rebuilding diverse local economies is the best way forward to meet local needs and safeguard against consequences of climate change.

Women are the biggest victims of climate change,

as the provision of food, fuel and water falls on their shoulders. While female headed households are becoming more common in Bangladesh they are often stigmatised in the conservative culture for not having a marital partner. Many women struggle with the double burden of poverty and social exclusion.

Gender

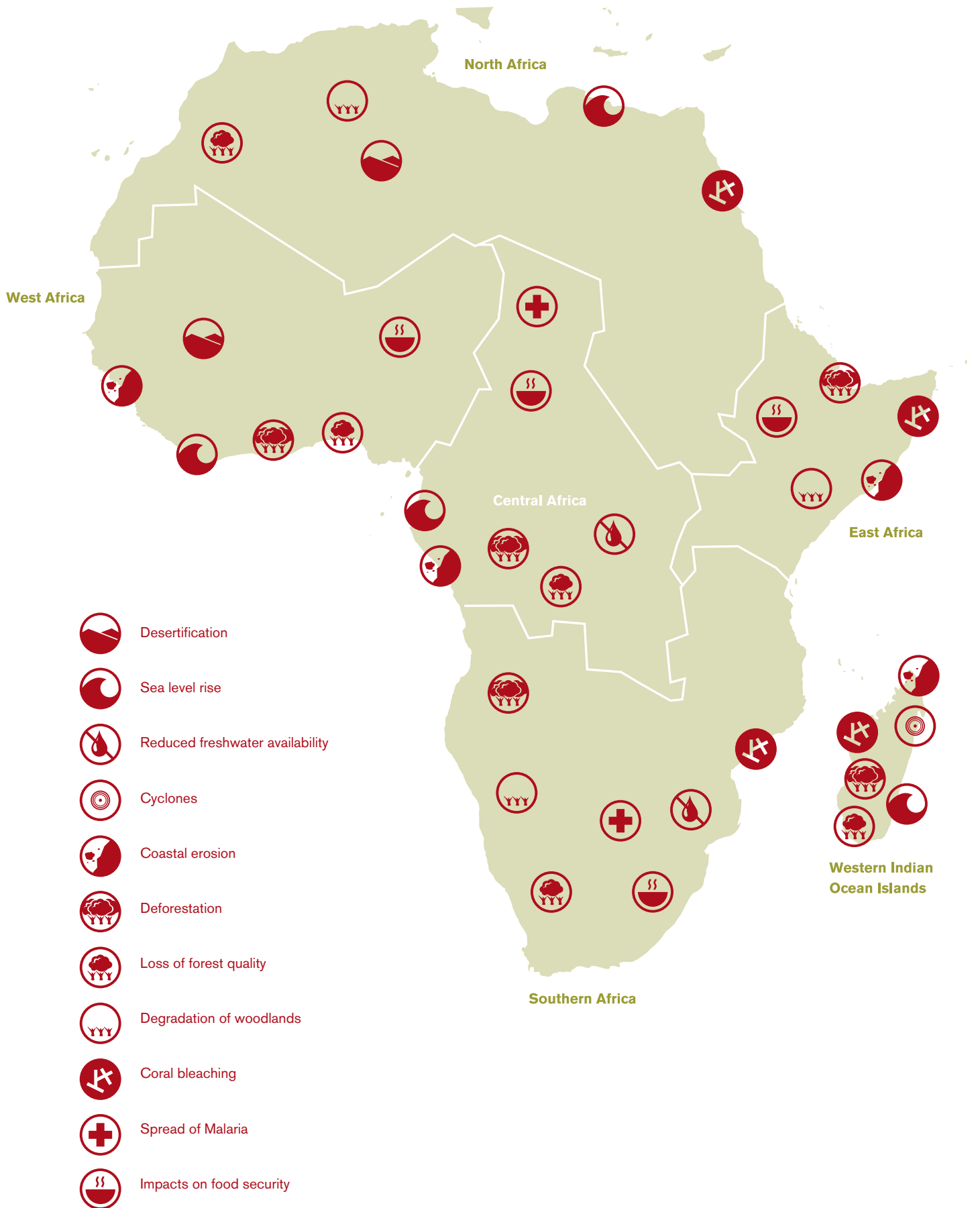
If climate change policies are to be successful women will have to have opportunities to:

- influence decision making;
- build their capacity;
- lower their vulnerability;
- diversify their income sources.

“The poorest developing countries will be hit earliest and hardest by climate change, even though they have contributed little to causing the problem”

Stern Report

Climate Change Vulnerability in Africa



Bangladesh: Vanishing Shrimp, 2007

Nurul Islam, a fifty-six year old fisherman, has lived in Khalinchi village all his life. Lately, he has noticed changes in the weather and the frequency and strength of storms. The sea levels and the salinity of the water continue to rise, affecting the fish. 'There used to be more than twenty different types of fish here', remembers Nurul, 'and now there are only one or two'. Five or six years ago, he would work about three hours a day to collect the amount of shrimp and fish he needed to provide for his family. Now he must cover a larger area to find the same amount of fish: he works a twelve hour day with just a two-hour break at midday when the sun is at its most unforgiving.

Every year since 2004, Nurul has taken a loan of 100,000 taka to maintain his shrimp fry. Last year he lost everything in a tidal storm, and had to take a loan of an additional 70,000 taka to repair the embankments.

Floods and storms wash away homesteads, belongings and food supplies. Too often there is also a loss of human life. Nurul lost two of his sons in 1980 when they were snatched out of his arms by the winds and washed out to sea.



Nurul Islam
Photo: Concern 2007

Zambia: Floods, 2006

Joseph Muhau Matongo, a 64 year old father and grandfather, was a successful small scale farmer. On average he would have produced about 100 x 50-kilograms bags of maize, 130 x 50-kilograms bags of super rice, 17 x 50-kilograms bags of cassava. He owned about 100 cattle.

Agricultural production levels in the past five to ten years have fallen. In 2006 – 2007, he managed to harvest only 5 x 50-kilograms bags of maize, most of which was rotten because of premature harvesting due to floods. He has harvested no cassava or millet because these crops were affected by the long dry spell experienced at the start of the rainy season in November, 2006. His rice field was also affected by floods. The number of animals has reduced to 17.

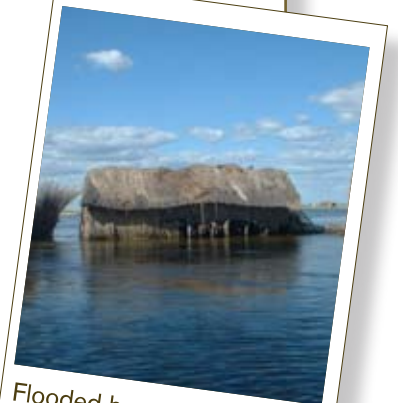
Early floods have become common along the Zambezi plains and affect maize, rice and groundnut. Due to indiscriminate cutting down of trees, drought is common on higher land. The bare land is exposed to erosion and there are no forests to regulate rainfall.

Effects of climate change in the last decade include: reduced rainfall; low crop yields, high cattle mortality rates.

Mr. Matongo said, "We used to have three meals in a day. I managed to send my children to school from the money I got after selling rice and maize. Now I can't send my grand children to school, we've reduced our meals to two per day".

As a coping strategy, Mr. Matongo resorted to fishing. However, he says, "Nowadays the catch is not as big as it used to be in the past . . . fish stocks have been depleted . . ."

Other community members collect and sell wild fruits. Some have resorted to unsustainable activities such as charcoal burning and logging. The women brew illicit beer called "kachipembe", which is a local traditional spirit with high alcohol content.



Flooded house along
the Zambezi river
Photo: Concern

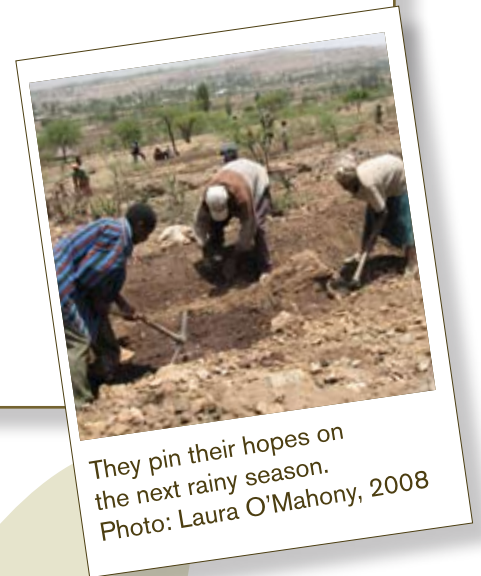
Ethiopia: Drought, 2008

Climate change is making its mark on this beautiful Ethiopian landscape. Soil erosion is everywhere to be seen, the roots of the trees that line the roads exposed, the trunks leaning dangerously. Hidden behind the seemingly lush vegetation are barren fields. They call it the "green hunger".

The crops of maize and haricot beans have withered and died. All around the leaves of coffee and eucalyptus trees are turning silver as they burn in the scorching heat. Some have dug up their fields already and replanted in the hope that the summer "Mahar" rains won't let them down as the "Belg" rains have. They should have come in January but never materialised. The situation is affecting not just people in Ethiopia, but millions of others elsewhere in the Horn of Africa. North-eastern Kenya and Somalia depend on the same rain cycle, which has failed them too.

In the meantime, as they pin their hopes on the next rainy season, thousands of subsistence farmers and their families in southern Ethiopia have been left with little or nothing. Many have eaten the seeds they would have planted for this autumn's harvest. The only crop that is growing widely is "enset", a banana-like plant native to Ethiopia and resistant to drought. Its root is ground up to make bread as well as a gruel or porridge. It may look healthier than the rest but it doesn't contain the nutrients people need to survive. Malnutrition rates are on the rise.

"Even in a good harvest year, five months out of twelve there is a food gap," says Concern's Abraham Asha. "The area is too dependent on the rains and there is little resistance to shocks. That means the people here are very vulnerable." So a bad harvest year like this one has a huge impact. The basic reason – low production. As well as its huge population, the fertility of the soil is being degraded. Fields aren't left fallow, crops are not rotated, there's a lack of fertiliser, landholdings are too small. But people don't have any alternatives to farming. At a time like this, many contemplate migrating to survive.



They pin their hopes on the next rainy season.
Photo: Laura O'Mahony, 2008



Mozambique: Floods, 2008

"Mozambique has been hit by floods again, nine months after the waters receded in 2007. The floods this year have come earlier and heavier than expected, challenging the resilience of the people of the Zambezi valley once again.

Last year, the floods drove people from their homes on the flood plains of the Zambezi, where they were living an autarkic life-style, with lots of space and fertile land. Visiting the resettlement zones on higher ground in the Tambara District, where 7,000 people are living since the 2007 floods, you notice quickly how life is very different here in comparison. People live in makeshift houses in a densely populated camp environment.

With support from Concern and partner Magariro, people had begun farming again by their temporary homes. The heat of the dry season helped produce the first bricks of clay. Maize had started to grow, not in the quantity and quality of the flood plains, but enough to secure a stable food supply for most families.

Now the floods and heavy rains have hit again, abruptly ending the breathing space that people so desperately needed to rebuild their lives.

After the recent floods one mother recounted; 'I grew up on an island, in the middle of the river. I was rescued with my family last year during the floods and decided to stay on this side. I look after my four children, while my husband travels and trades dry fish to make sure that we at least have enough to eat. Life is not easy, but at least it's safer. The children, the two older ones, can go to school, and when we are sick there is a health post with treatment. On the island, where we used to live, you don't have all this. But there I had at least a good machamba (small farm) and goats. Here we don't have a good machamba yet. Now the rain has come again. The roof of our new house has started leaking. Everything that we planted was washed away. There wasn't even sufficient time to take away our drying bricks from the river bank. We have to start all over again!'



Floods along the Zambezi River
Photo: Remko Berhout,
Concern 2008

Miulwe, Zambia

Ms Mushiba Nyambe, a subsistence farmer who lives in the Miulwe area within the Mongu District of Zambia, is around 75 years old. She said that the Miulwe area was well-known for production of reed mats, handcrafts and agricultural produce such as maize, rice and vegetables. Reed mat making was an occupation of the men folk. The women folk produced abundant food. She remembers when almost all the households were capable of producing enough food for their families and at times were left with surplus which they exchanged for fish, game meat and clothing. Ms Nyambe explained that, "*when the natural lake dried up all the huge reserves of reeds died away, the land also dried up and became incapable of supporting crops and grazing land. I believe the lake started drying up in the early 1990's after a long drought. It completely dried out within just a few years.*"



A dry river bed
Photo: iStock

India: Floods, 2007

35-year-old Smt. Bimala Tandi lives in Bahalpada, Sambalpur, India. She is a widow and a mother of four children.

She is a daily wage worker and her main priority is to earn something in order to be able to feed her family for the day.

In her own words

"I live in a mud house with my children, my niece and my mother-in-law, who is ill due to old age. My nightmare is another spell of heavy rains.

My house had two small rooms, but most of it collapsed due to flash floods in Sambalpur.

There was no one in my family to provide support as I am the only bread winner.

After the collapse of the house, we had to shelter in a school building where my family was provided with cooked food for three days.

I was worried as to how my damaged house could be repaired and my family could get a safe shelter as before. We have come back to our house but because the roof is gone water drops inside with even slight rains.

I received a polythene sheet from the volunteers in the distribution point, and I used it for roofing. This means I can at least leave my children in my courtyard when I go out to make daily money.

It is a comfort to me that my family is in one place rather than being dispersed elsewhere. The volunteer who asks me if the polythene is of any use does not know how much use it is to me.

The thought of saving money from my daily earnings for the repair of my damaged house is very stressful to me, as I know that my children will go hungry."



Mohammed Idris drawing water from a covered well in Embulday, Anseba, Southern Eritrea.
Photo: Danny Rowan/Concern



Section Three

International Agreements. What can be done?

The First Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), completed in 1990, led to the adoption of the **UN Framework Convention on Climate Change (UNFCCC)**. The Convention was adopted in 1992 and entered into force in 1994.

Under Article 2 of the Convention, countries are committed to; "Achieve stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous interference with the climate system - within a time frame sufficient to allow ecosystems to adapt naturally – to ensure food production is not threatened and to enable economic development to proceed in a sustainable manner."

The **Second Assessment Report** led to the negotiation of the Kyoto Protocol in December 1997. The Kyoto Protocol passed into international law on **February 16, 2005**.

Governments are separated into two categories:

- developed countries, referred to as Annex I countries, have accepted greenhouse gas emission reduction obligations and have to submit an annual greenhouse gas inventory;
- developing countries, referred to as Non-Annex I countries have no greenhouse gas emission reduction obligations yet but may participate in the Clean Development Mechanisms. India and China, for example, have ratified the protocol but are not required to reduce carbon emissions under the present agreement.

Carbon markets set out under the rules of the Kyoto Protocol allow developed economies to meet their greenhouse gas emission limitation through;

- carbon offset projects. These projects, carried out in developing countries under the Clean Development Mechanisms (CDMs), are designed to reduce emissions or sequester carbon and in this way to offset some of the CO₂ emissions caused;
- purchasing greenhouse gas emission reductions from exchanges such as the EU Emissions Trading Scheme.

Article 12 of the Kyoto Protocol states that developing countries are to benefit from projects which result in "certified emission reductions" (CERs) and that industrialised countries may use

CERs to comply with their emissions reduction commitments.

The EU Emissions Trading Directive established an allowance-trading scheme to promote reductions of greenhouse gas emissions, in particular carbon dioxide. The Directive was transposed into Irish law with the Environmental Protection Agency (EPA) having responsibility for its implementation in Ireland.

Companies are given an Emission Allocation Permit by the Agency. Companies, in energy intensive sectors, exceeding their allocation will need to purchase allocation to cover the deficit. Companies who do not use their full allocation will be able to sell or bank the excess.

Carbon trading refers to the trade in "rights to pollute" whether in the form of pollution quotas set by governments or "carbon credits" generated from offset projects.

Environmental and social responsibility

The environmental and social sustainability of Clean Development Mechanism (CDM) projects should be seen as a priority. Environmentalists and human rights activists have concerns that the supervision and implementation of projects does not always meet the social and environmental criteria needed. Carbon credits from tree planting encourage the expansion of large scale industrial plantations which indigenous people and dependent forest communities oppose. These plantations impact on the livelihoods of local people and on biodiversity.

Bio-fuel projects also carried out under the Clean Development Mechanism have negative social and environmental consequences.

According to a World Wildlife Fund (WWF) report, entitled *Emissions Impossible*, the emissions-trading scheme could lead to almost all of the reductions required in Europe taking place in developing countries. The report, questioned whether projects in developing countries, being supported by the carbon-credit system were actually delivering real reductions in greenhouse gas emissions.



In relation to Ireland, up to 95% of the emissions reductions required under the Kyoto agreement could occur outside of the country through the Government and companies buying carbon credits.

Land is taken from indigenous people for tree planting and labelled as carbon stock. If the trees die back for any reason, including climate change, and are not replaced then the value of the carbon credit effectively amounts to zero. Although the warming of the earth would mean trees in the northern hemisphere could grow nearer to the pole and absorb CO₂, rising temperatures may reduce the growth rate of trees in tropical rainforests and elsewhere.

Unsustainable Projects

- In Minas Gerais in Brazil eucalyptus plantations covering 23,000 hectares were established at the expense of existing mixed forestry and the homes of local people who were evicted.
- A large electrical corporation, when trying to make a new coal-fired power plant in Connecticut more acceptable to regulators, decided to mitigate the plant's carbon dioxide emissions by financing forestry projects in Guatemala. Forty thousand small holder farmers were to plant 50 million pine and eucalyptus trees. Many indigenous subsistence farmers in the project were pushed to the edge of the agricultural frontier. Land with official forest status was often declared off-limits to continued agricultural use under Guatemala's 1996 forest law. Access to the trees was taken from the hands of ordinary people.

Poorer countries need access to low/zero carbon technology to enable them to progress economically and end poverty without the same pollution the rich world produces. Carbon credits could usefully be awarded for investments in local community projects which would facilitate this transition.

It was widely agreed in Bali, in December 2007, that for poorer countries to avoid the same development mistakes of industrialised countries, they would need newer and cleaner technologies.

The Stern Report

The Stern report, published in 2006, shows the need to act now. It sends a very urgent message: that the benefits of early action on climate change outweigh the costs. The report states that the costs of coping with climate change would far exceed the costs of preventing it.

The report further establishes guidelines for action and a framework for international cooperation that must include all regions of the world, both developed and developing.

Cost

It is very difficult to assess the true cost of weather related disasters. Between 1980 and 2003 countries with the least developed insurance markets suffered 88% of the fatalities but had only 2% of insured losses. In 2003 the 20 worst disasters in terms of loss of life happened in the developing world. However it was in North America and Europe that the insurance pay back for natural catastrophes cost over US\$55 billion in the same year. The frequency and predictable consequences of some disasters mean that commercial insurers are not interested in this market. A global risk assessment of the likely costs of adaptation to climate change in poor countries should be a priority. Rich countries have primary responsibility to cover these costs, in addition to achieving the 0.7% commitment to overseas aid.

Ireland's climate pollution – at 17 tonnes carbon dioxide equivalent - makes us the second worst polluter in the European Union after Luxembourg. The EU average is 11 tonnes. India on the other end of the scale emits 1 tonne carbon dioxide equivalent.

Ireland ratified the Kyoto Protocol on the 31 May 2002 and agreed to limit its greenhouse gas emissions to 13% above 1990 levels by the first commitment period 2008-2012. In 2005 its greenhouse gas emissions were 25.4% above 1990 levels. The country is now legally bound to reduce its greenhouse gas emissions and has set aside nearly €270 million to purchase carbon credits.



The United Nations Climate Change

Conference in Bali culminated in the adoption of the Bali roadmap, to launch negotiations toward a global agreement to address climate change. This process, which has a deadline of 2009, is intended to lead to a post-2012 international agreement on climate change. The agreement is to succeed the Kyoto Protocol, which expires in 2012.

A model has to be designed for human progress and development that is climate friendly and gives a fair share of the natural resources on which we all depend.

Red Cross 2002



Climate Injustice

- Despite their minimal per person contributions to greenhouse gas emissions the world's poorest and most vulnerable communities will be hit hardest by the impacts of climate change.
- As the oceans swell with water from melting ice, it is the crowded river deltas in southern Asia and Egypt, along with small island nations, which are most at risk. Bangladesh, one of the poorest countries in the world, may become one of the worst affected by continued climate chaos.
- The Inuits, (a race of Eskimos) believe there is sufficient evidence to demonstrate that the failure to take action to stop global warming by reducing emissions constitutes a violation of their human rights – specifically the rights to life, health, culture, means of subsistence, and property.
- The richest countries have practically spent the earth's natural capital and got rich through a 200 year fossil fuel binge.
- Twenty-six power stations running 24/7 would be needed to power appliances on standby in US, while two billion people worldwide have no access to electricity.
- Women bear the brunt of the consequences of climate change. Men are forced to leave the communities to search for new opportunities.
- Although Ireland is the sixth most generous country per capita in terms of aid it is the fifth most climate polluting country per capita. This undermines the life chances of those who receive the aid and erodes the prospects for global poverty reduction.

What can be done?

To avoid dangerous climate change, scientists are warning that the international community keeps the rise in global temperatures to below 2 degrees compared to pre-industrial temperatures.

Adaptation and Early Warning

Adaptation increases the ability of human and ecological systems to cope with changing climate and to live with the degree of global warming that cannot be stopped.

Adaptation to climate change and action for reducing poverty should go hand in hand in mainstream development policies. Reducing the vulnerability of poor people to climate change must be a key component of any adaptation programmes.

Funding of adaptation will be necessary in developing countries to achieve poverty alleviation.

Global Environmental Facility (GEF) Trust Fund is the main funding channel for climate change projects in developing countries. Nearly all the world's industrialised nations pledged to help when they signed the first global warming treaty, the Framework Convention on Climate Change, in 1992. Under that treaty, industrialised countries promised to assist others "that are particularly vulnerable to the adverse effects of climate change in meeting costs of adaptation." A \$3 billion Global Environmental Facility fund maintained by contributions from developed countries has nearly \$1 billion set aside for projects in poorer countries that limit emissions of greenhouse gases. But critics say those projects often do not have direct local benefits, and many are happening in the large fast-industrializing developing countries.

New York Times Company Apr 1, 2007

Andrew C. Revkin



Early Warning

Nature and society are often unprepared and vulnerable when climate changes occur. The WMO is putting together an early-warning system for climate extremes and is establishing long-term monitoring systems to help the countries most vulnerable to climate change. Co-ordinated plans should also be made for relocating threatened communities and providing them with the necessary political, legal and financial help.

Mitigation

Mitigation refers to the stopping of further global warming – this means reducing greenhouse gas emissions or “locking them up” in sinks.

Power of One It's easy to become overwhelmed when we look at "The Big Picture". Global warming, climate change and fuel shortages can make us all feel powerless. That's where the idea of the power of one comes in. If each of us becomes aware of our own power when it comes to energy efficiency, we can collectively make a big difference. By taking individual responsibility and changing our behaviour in small ways every day, we'll help save energy while we save money too. www.powerofone.ie/

Examples of sustainable solutions

Everyday actions:

- Turn off lights in unoccupied rooms
- Turn down the thermostat; 1 degree lower reduces heating costs by 10%
- Use the dishwasher and washing machine only when they're full
- Boil just the required amount of water in the kettle
- Dry clothes outdoors
- Turn on appliances at off-peak times
- Do not leave appliances on standby or mobile phone chargers plugged in
- Shop locally
- Insulate attics



High Peak High peak demands for energy means that the supplier has to add generation capacity to meet the need. A utility having an average load of 200kW and a peak load of 500kW for example, must designate 500kW of generation capacity to meet the facility's peak load, even though on average, only 40% of this infrastructure would be utilised at any one time. Turning on appliances at off-peak times helps to avoid high generation capacity demands.

Alternative Energy



Solar More sun hits the earth in one hour than would satisfy the energy needs of one year. Solar energy is abundant, clean and safe. However the component parts of the systems are still expensive and the pay back time is very long. The expensive metals now used would need to be replaced by cheaper alternatives.



Wind, wave and tidal power can all be harnessed to give a zero carbon alternative. Evaluation of the world's wind resources suggest that sufficient wind exists worldwide over land for climate and air pollution problems from vehicles and power plants to be addressed by wind power many times over. Wind-powered battery vehicles require 30 times less land area than corn ethanol and 20 times less land area than cellulosic ethanol for powering the same vehicle fleet.



Nuclear Climate change is being harnessed as a late hope for nuclear revival. With nuclear power there is the problem of nuclear waste and the danger that civilian nuclear technologies could be adapted for weapons.



Transportation Simple activities like walking, cycling, or using public transport whenever possible can make a difference. When only private transport is feasible to reach a destination, driving at a pace which ensures energy efficiency can lessen emissions.

US Senators approved an amendment to an energy bill in June 2007 that would require an improvement in the average efficiency of the new US vehicle fleet from 25 miles per gallon now to 35 mpg by 2020. This is expected to reduce tailpipe emissions by 1 billion tonnes.



Shipping Solar panels and huge sails could reduce the emissions of large freight ships.



Air Travel Environmental damage caused by essential flights could be offset by planting trees.



Sensitive and sustainable forest management Forests provide ecosystem services to the world that we all benefit from. Apart from carbon storage, these services

include water storage, rainfall generation, climate buffering, bio-diversity and soil stabilisation. Trees play an important role in improving soils, protecting watersheds, reducing salinity and modifying climate. These services are likely to be worth billions of dollars per year, but need to be valued more accurately. Their loss would threaten food security, energy security and environmental security.

Trees have the potential to absorb about 10% of projected global carbon emissions. However when cleared or when there is dieback they contribute global carbon emissions.

According to the Hadley Report by the year 2050 and as a result of vegetation dieback and change the terrestrial land surface becomes a source of carbon releasing approximately 10 billion tonnes of CO₂ into the atmosphere each year.

More than 50% of the life on Earth is in tropical forests, which cover less than 7% of the planet's surface. **Forests are also home to 1.6 billion of the world's poorest people who rely on them for subsistence.** Community forestry can meet the needs of local people in a way that is sustainable by making forest products available to them.

In Bali, countries agreed on a range of measures to study and assess the issue of deforestation, including encouraging demonstration projects that can address the needs of local and indigenous communities. Delegates also agreed that "positive incentives" for reducing deforestation should be part of a future climate agreement. A deal was reached for the World Bank to oversee pilot schemes to discourage deforestation.



Windfarm near Cootehill Co. Cavan

Launched in London on September 12th 2007, the Forests Now Declaration is a document sponsored by international research network the Global Canopy Programme (GCP); it calls on world governments to take immediate action to tackle deforestation. Among many other recommendations it urges governments to ensure that carbon credits for the protection of standing forests are included in all national and international carbon markets, especially those created by the UN Framework Convention on Climate Change. You can add your support for the declaration by logging on to www.forestsnow.org

Public pressure for political action on climate change

- The public play a vital role in preventing climate chaos. Putting pressure on politicians and other decision makers as well as taking personal responsibility will determine the extent of the devastation caused by future generations
- It is important that subsidies, state aid or tax exemptions which encourage greenhouse gas emissions are identified and phased out.
- The cost of emissions abatement should be introduced to alleviate some of the externalised cost of energy use that is borne by society in varying degrees of health risks, climate destabilisation and economic loss.
- Policy decisions must pass the test of whether they will increase or decrease vulnerability to the effects of climate change.
- To ensure that rich countries move towards a low-carbon economy, governments should set an annual Carbon Budget.



Stop Climate Chaos

Stop Climate Chaos is a coalition of civil society organizations - including Concern Worldwide - campaigning to ensure Ireland plays its part in preventing runaway climate change. The coalition's vision is a world where human impact on the global climate has been contained to a level that enables social, environmental and economic justice for all.

Together, they call on the Government to:

- 1. Push for an international agreement to keep the rise in global temperatures to 2 degrees C or less. This means global greenhouse gas emissions must reach their peak and begin to decline irreversibly within 10 years.**
- 2. Ensure Ireland does its fair share to prevent climate chaos by implementing the polluter pays principle and immediately bringing in a climate change law which provides for an annual Carbon Budget and 3% year-on-year reductions in Irish greenhouse gas emissions.**
- 3. Ensure developing countries can access additional, appropriate and adequate resources to enable them to adapt to the current and future impacts of climate change.**
- 4. Ensure that natural environment considerations are integrated into adaptation and mitigation strategies for dealing with climate change.**

The coalition believes that adaptation measures should adhere to three principles.

They should:

- 1) be integrated within existing development and poverty reduction activities and not viewed as a separate sector;
- 2) strengthen communities from the bottom up, building on their coping capacities to live with climate change;
- 3) strengthen disaster risk reduction projects such as expanding mangrove forests, planting trees to prevent landslides or building shelters on higher ground.

Buy Local The vast majority of our food continues to be flown thousands of air miles across the world. This is not sustainable. Supporting local organic food growers is one important way of reducing greenhouse gas emissions.

Rural Environment Protection Scheme (REPS) is designed to reward Farmers for carrying out their farming activities in an environmentally friendly manner and to bring about environmental improvement on existing farms. Reduction in emissions of methane, nitrous oxide and carbon dioxide can be achieved through:

- reduced nitrogen fertiliser use and better manure management;
- improved crop and grazing land management to increase soil carbon storage;
- restoration of cultivated peaty soils and degraded lands;
- improved energy efficiency;
- agroforestry.

Promotion of knowledge Farming based on energy-intensive artificial inputs will be both vulnerable to fuel prices and further add to the problem of climate change.

It is essential to promote knowledge methods which enhance the resilience of small farmer agriculture and food production and an approach to farming based on diversification.



Image: Framers market – organic food
Photo: istock

Seed Banks could be established to ensure diversification and the continuance of plants which suit local areas.

Promote Biodiversity

Richer nations already recognise the value of uncultivated land. The EU offers €200 per hectare subsidies for “environmental services” to its farmers to leave their land unused. Action to address climate change should ensure that we protect global biodiversity which is essential to sustainable development. Tropical forests provide services to the world that we all benefit from. Their loss would have significant impacts, threatening food security, energy security and environmental security. The buffering capacity of natural systems such as wetlands, mangroves and forests should be taken in to account and compensation made to local communities towards their conservation.

A pledge to combat climate change: I Pledge...

1. To campaign that my country joins an international treaty within the next 2 years that cuts global warming pollution by 90% in developed countries and by more than half worldwide in time for the next generation to inherit a healthy earth;
2. To take personal action to help solve the climate crisis by reducing my own CO₂ pollution as much as I can and offsetting the rest to become carbon neutral;
3. To fight for a moratorium on the construction of any new generating facility that burns coal without the capacity to safely trap and store the CO₂;
4. To work for a dramatic increase in the energy efficiency of my home, workplace, school, place of worship, and means of transportation;
5. To lobby for laws and policies that expand the use of renewable energy sources and reduce dependence on oil and coal;
6. To plant new trees and to join with others in preserving and protecting forests;
7. To buy from businesses and support leaders who share my commitment to solving the climate crisis and building a sustainable, just, and prosperous world for the 21st century.

WEB LINKS - FURTHER INFORMATION

Here are some links to help you find out more about combating climate change

1) Stop Climate Chaos

Stop Climate Chaos is a coalition of civil society organisations campaigning to ensure Ireland plays its part in preventing runaway climate change. Current members include development, environmental, youth and faith based organisations. → www.stopclimatechaos.ie

2) GRAIN

GRAIN is an international non-profit organisation which promotes the sustainable management and use of agricultural biodiversity based on people's control over genetic resources and local knowledge. *Seedling* is GRAIN's quarterly magazine, published in January, April, July and October. It provides background articles, news, interviews and much more on the issues GRAIN is working on. *Seedling* is available free on GRAIN's website www.grain.org/seedling → www.grain.org

3) Just Forests

Just Forests is a voluntary organisation founded in September 1989, in response to concern about global deforestation and wood wastage. Just Forests supports the concept of sustainable development and the wise use of natural resources - in particular wood. → www.justforests.org

4) Global Canopy Programme

The Global Canopy Programme is an alliance of 29 scientific institutions in 19 countries, which lead the world in forest canopy research, education and conservation. → www.globalcanopy.org

5) Forests Now

Forests provide one of the largest opportunities for cost effective and immediate action against climate change and must now be treated with urgency. → www.forestsnow.org

6) United Nations Framework Convention on Climate Change

The Convention was adopted in 1992 and came into force in 1994. → unfccc.int

7) The Intergovernmental Panel on Climate Change

The Intergovernmental Panel on Climate Change (IPCC) was established in 1988 by The World Meteorological Organisation (WMO) and the United National Environmental Programme (UNEP) to assess scientific, technical and socio-economic information relevant for the understanding of climate change. → www.ipcc.ch

8) UNEP

The mission of the UNEP is to provide leadership and encourage partnership in caring for the environment by inspiring, informing, and enabling nations and peoples to improve their quality of life without compromising that of future generations. → www.unep.org

9) WWF

The mission of World Wildlife Fund (WWF) - the global environment network - is to stop the degradation of the planet's natural environment, and to build a future in which humans live in harmony with nature, by conserving the world's biological diversity; ensuring that the use of renewable natural resources is sustainable; reducing pollution and wasteful consumption. → www.wwf.org.uk/climatechange

10) The World Meteorological Organisation

The World Meteorological Organisation (WMO) is a specialized agency of the United Nations. It is the UN system's authoritative voice on the state and behaviour of the Earth's atmosphere, its interaction with the oceans, the climate it produces and the resulting distribution of water resources. → www.wmo.int

11) Live Earth

Calculate your Carbon Footprint by logging into the Live Earth website. → www.liveearth.msn.com

12) Zero Waste

Zero Waste is a design principle for the 21st Century that seeks to redesign the way resources and materials flow through society. Zero Waste requires eliminating subsidies for raw material extraction and waste disposal, and holding producers responsible for their products and packaging 'from cradle to cradle.' The goal is to promote clean production, prevent pollution, and create communities in which all products are designed to be cycled safely back into the economy or environment. → www.grrn.org/zerowaste

13) Vital Climate Change Graphics

Vital Climate Change Graphics was first published in 2000 by the United Nations Environment Programme (UNEP) and GRID-Arendal. Based on the findings of the Second Assessment Report (SAR) of the Intergovernmental Panel on Climate Change (IPCC), it presented a collection of graphics focussing on the environmental and socio-economic impacts of climate change. The updated edition, launched in February 2005, is based on the Third Assessment Report (TAR) of the IPCC that was published in 2001. → www.vitalgraphics.net

14) Greenhouse Gas Online

The aim of Greenhouse Gas Online is to provide a freely available and up to date resource dedicated to greenhouse gas news and scientific publications. The site catalogues the greenhouse gas related articles published in over 100 peer reviewed journals from around the world. → www.ghgonline.org

15) Concern Worldwide

Concern works in 28 countries in Africa, Asia and the Caribbean. Climate change has adversely affected the lives of thousands of people with whom we work. Our Emergency Response and Disaster Risk Reduction Programmes are endeavouring to help people in the Developing World to cope with the devastating results of climate change. → www.concern.net



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