WHAT IS CLIMATE CHANGE AND BIODIVERSITY LOSS

Deeside CAN, Summer 2021



Greenhouse Effect

Gases naturally occur in the earth's atmosphere. They act like the glass in a greenhouse and prevent some of the radiation from the sun from radiating back into space. Without this, the earth would be 30^{o}C colder and unable to sustain life.

But with too much greenhouse gas in the atmosphere, the effect becomes too great; too much heat is trapped in the earth's atmosphere, and the earth heats up too much.

Global Warming

Between the end of the last ice age, about 11,700 years ago, and the start of the Industrial Revolution, in about 1750, the global average temperature fluctuated but only within a range of 1^{o}C.

Since 1750 average global temperatures have increased by 1.1^{o}C.

These warmer conditions on earth cannot be explained by natural processes alone. They are caused by human activity. These warmer conditions have many effects and together these are called climate change.

Greenhouse Gases (GHG)

Carbon Dioxide CO_2

CO_2 is naturally present in the atmosphere as part of the earth's carbon cycle. But humans have increased atmospheric carbon dioxide concentration by 48% since the beginning of the Industrial Revolution, mainly by burning fossil fuels (coal, oil, gas). This alters the ability of natural carbon stores, like forests and soils, to remove and store carbon from the atmosphere.

Water Vapour

Water vapour is the most abundant greenhouse gas. A warmer atmosphere can hold more water vapour. This increases the possibility of clouds and rain, and the severity of rainstorms.

Nitrous Oxide N_2O

N_2O is naturally present in the atmosphere as part of the Earth's nitrogen cycle. Now about 40% comes from human activities, mainly agriculture, industry, and burning fossil fuels. N_2O molecules stay in the atmosphere for over 100 years and the impact on warming is 300 times greater than CO_2.

Methane CH_4

About half the CH_4 emitted worldwide comes from human activities such as coal, natural gas, and oil production, livestock and the decay of organic waste in landfill sites. CH_4 has a short lifetime in the atmosphere but 25 times greater impact than CO_2.

Fluorinated gases

These are substitutes for gases that deplete the ozone layer. They are emitted in smaller quantities than other GHG but are the most potent and longest lasting type of GHG emitted by human activities. So they can have a disproportionately large effect on global temperatures. They are most commonly used in fridges and air conditioning units.

Climate Change

Global climate change has already had observable effects on the environment around the world.

Climate change is heating the polar regions faster than other parts of the world, leading to melting of ice sheets and glaciers, and a reduction in sea ice.

Climate change's effects are being felt differently in different places. Glaciers have shrunk, ice on rivers and lakes is breaking up earlier, plant and animal ranges have shifted, trees are flowering sooner, there is loss of polar sea ice, accelerated sea level rise and longer, more intense heat waves.

Scientists have high confidence that global temperatures will continue to rise for decades to come, largely due to greenhouse gases produced by human activities.

Future effects of climate change

There will be more climate extremes (droughts, floods and extreme temperatures) which can lead to crop losses and threaten the livelihoods of agricultural producers and the food security of communities worldwide.

Increased CO_2 levels and climate change are likely to increase weeds, pests and fungi, which can thrive in warmer, wetter climates. New patterns of pests and diseases are likely to emerge, affecting plants, animals and humans, and posing new risks for food security, food safety and human health.

Rising CO_2 can stimulate plant growth but reduce the nutritional value of most food crops by reducing the concentrations of protein and essential minerals in most plant species.

Sequestration

Carbon can be removed from the atmosphere and stored using natural and artificial processes. The carbon needs to be removed from the atmosphere on a long-term basis to mitigate or defer global warming.

Carbon can be sequestered by plants, soil, peatbogs and seaweed (biological processes), by making limestone or flakes or carbon (chemical processes) and by carbon capture and storage (physical processes)

Carbon Capture and Storage

This is a way of sequestering CO_2 from industrial processes or from the atmosphere and storing the carbon in deep, underground locations, such as rock formations and old oil and gas reservoirs. This needs to be done if we are to achieve net zero, but it is still vital that we change our habits and produce far less CO_2 in the future and reduce our carbon footprint.

Carbon Footprint

A carbon footprint is the total amount of CO_2 (and other greenhouse gases) created by an event or someone's way of life. It is difficult to calculate precisely, but we can all think about the carbon footprint left behind by our lifestyles. Some things we can change ourselves, and some things require government action to change. Most people in affluent countries have an unsustainable carbon footprint.

Net Zero

This is the target is to reduce net greenhouse gas emissions by 100%, relative to 1990 levels, by the middle of this century. This will happen when the amount of carbon we add to the atmosphere is no more than the amount removed.

To reach net zero, emissions from homes, transport, agriculture and industry will need to be cut and unavoidable emissions will need to be removed from the atmosphere either by encouraging natural processes or by carbon capture and storage.

The UK Government target for net zero is 2050. The Scottish Government target is 2045. If we are to reach this target, considerable changes will need to take place well before that date, and ideally before 2030. If we and other countries achieve this, there will be a 50% chance of avoiding a 1.5°C temperature rise by the year 2100.

Net zero by 2050 is a bold target that will require significant changes within the next 10 years, at a personal level and at the level of government policies and strategies. It will not be cheap. But the costs of disastrous effects of climate change will be much higher. It is not just about cutting emissions. It’s also about bringing about a better way of life and a fairer life for all.

Just Transition

A Just Transition is a requirement of the 2015 Paris Agreement. National plans must ensure environmental sustainability, decent work, social inclusion and poverty eradication. At its heart a Just Transition requires us to leave no one behind. It requires positive intervention and action by governments.

Mass extinction and Biodiversity Loss

Due to climate change, pollution, habitat loss and other human activities, we are losing species at a rate rarely seen on earth. There have been five mass extinctions in the past. Four were due to a heating planet from volcanic activity. The fifth was due to the huge asteroid that hit the earth and caused the dinosaurs to die out. We are now experiencing the sixth mass extinction and this time it has been created by human activity.

This is known as the sixth mass extinction, the Holocene extinction or the Anthropocene extinction.

Holocene
The Holocene is the current geological epoch and started at the end of the last ice age about 11,700 years ago. It comes from the Greek holos (whole) and the suffix -cene, used to designate geological epochs, from the Greek kainos (new).

Anthropocene
The Anthropocene is a name given to a geological period either after or within the Holocene. It comes from the Greek Anthropos (man) and the suffix -cene, used to designate geological epochs, from the Greek kainos (new).

It started when human activity started having a considerable impact on the planet.

There is much discussion about when the Anthropocene started (in prehistoric times, at the start of the Industrial Revolution, at the start of the Atomic Age, etc.) and whether it is in itself a useful term as it continues to put humans at the centre of everything.

Biodiversity loss facts

Currently the world is experiencing the sixth mass extinction event. This is a consequence of human activities, which have significantly altered 75% of land-based environments. Climate change is another leading cause of biodiversity loss.

Wildlife population sizes have dropped by 68% since 1970. The decline has been most significant in tropical sub-regions of Americas, where there has been a 94% decline in the past 50 years. Over 100 million hectares of tropical forest were lost between 1980 and 2000.

According to the World Economic Forum (https://www.weforum.org/agenda/2020/11/extinction-facts-wildlife-attenborough/), there are a total of 8 million estimated animal and plant species left on Earth. More than one million species are now at risk of extinction, with many more at risk in future. Nearly 40% of plants and 40% of insects are at risk.

According to the National Academy of Sciences of the USA (https://www.pnas.org/content/115/25/6506), currently 60% of mammals on earth are livestock, with humans comprising 36% and wild animals just 4%. 70% of birds are chickens or other poultry and 30% are wild birds. About 75% of the world's fisheries are fully or over exploited.

Although thousands of plant species can be grown for food, just 12 crops supply 80% of the world's food supply. About 80% of all agricultural land is used either for livestock or to provide feed for livestock.

Deeside CAN

This may all seem daunting, but we can all make small changes every day that will collectively make a big difference. And we can let our MPs and MSPs know that we are behind firm and decisive action on climate change and a just transition.

Deeside CAN - Deeside Climate Action Network – we aim to care and nurture our communities, our environment, our planet.

We believe in a joyful reconnection with nature so we can consciously live more sustainably and safeguard our world for coming generations. We aim to help improve the quality of life and well-being of all while reducing unnecessary consumption and waste. We want to show that we CAN.

Our vision is to help communities understand the huge benefits to be gained through making the natural environment central to all our decision making, following Al Gore's three focusses:

- Our voices, to raise awareness
- Our votes, to pressure politicians to make the changes that we need
- Our choices, to live more sustainably

Deeside CAN is working on five projects at the moment

- Reduce our Carbon Footprint.
- Wildlife Friendly Village.
- Reduce Food waste.
- Deeside Way Green Walks.
- Deeside Travelling Tiny Forest.

Find out more at https://www.deesidecan.org.uk
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