

Climate Change
Churches Together in Cumbria Environment Group
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Although we don't know nearly enough about the operation of the Earth's climate to make reliable predictions of the consequences of the build up of greenhouse gases, we do know enough to say that the consequences are potentially quite serious. To date we have dealt with this problem as if its effects might come in the distant future and so gradually that we could easily cope with them. This is certainly a possibility, but I believe that there is an equal possibility that they will arrive suddenly and dramatically.

Wallace S Broekner (2004)

Humanity lives on a dynamic Earth, one that is always changing and a driver of evolution. Climate Change is nothing new, but we are heading towards an unprecedentedly large change in an unprecedentedly short time. The Earth's climates can change rapidly (a century or two or less) from one state to another, from a warm interglacial to a colder glacial or to desertification and a severe drought. What is now agreed among scientists is that the current changes are due to 'anthropogenic forcing', that is caused by human activity. Uncertainty is a characteristic of the Earth's increasingly unstable climate. The size and speed of change is a special cause for worry. It is likely that the planet will experience a larger change in a shorter period than at any time in the past million years. That will create stresses outside the experience of many of Earth's species including homo-sapiens.

The Earth absorbs heat energy from the sun mainly at the surface. To maintain a steady temperature a balancing amount of energy is then radiated upwards from the surface at longer, infrared, wavelengths. Some of the gases in the atmosphere which are present naturally, particularly water vapour, carbon dioxide and methane, absorb some of this infrared radiation so acting as 'blankets' over the surface. This means that the Earth's surface is nearly 30°C warmer than it would otherwise be, providing an average climate very suitable for human life. It is called the 'greenhouse effect' because the glass in a greenhouse has similar properties to the atmosphere.

Over the last 10,000 years the Earth has remained at a relatively stable temperature and before industrialisation the natural feedback system of the forests and the seas, the carbon sinks, maintained CO₂ at between 250-270 parts per million (ppm). This kept the Earth comfortable for life.

Since 1750 the Earth has industrialised and our modern age has discovered the carbon residues of fossilised vegetation: coal, oil and gas that the Earth safely tidied away. So great has been the effect that scientists consider we are no longer living in the Holocene, the era since the last ice age, but a new age called the Anthropocene, the age dominated by humanity where the climate is not stable. By burning these fossil fuels humanity has released surplus CO₂ into the atmosphere. Such emissions take 100 years to be absorbed by the natural carbon sinks, the seas and the forests. The atmospheric concentration of CO₂ is now 383ppm. If we include other greenhouse gases such as methane and nitrous oxide which come from industry and agriculture, each of which has a different ability to absorb the radiation, we arrive at a CO₂ equivalent ("CO₂e") of about 430ppm. The concentration of these other gases is rising at between 2-3 ppm p.a. Together this increase in greenhouse gases has caused an increase in temperature of 0.7⁰C since pre-industrial times. If the CO₂ equivalent concentration increases during the 21st century to more than twice its pre-industrial

value then calculations show that the global average temperature will rise by about 2.5°C. This rate of warming has not been experienced by the Earth at any time in the last 10,000 years. That is faster than nature can cope and will cause extinctions, severe droughts, floods, changes in the patterns of rain and snowfall with other extreme weather events. The increase in temperature is not uniform across the planet, being higher at the poles. If we get to 450 ppm then a rise of 2°C will be inevitable. Most climate scientists think that 2°C is a limit that should not be passed as beyond that unpredictable and dangerous feedbacks will kick in. The current level of CO₂ has not been exceeded in the last 420,000 years.

If we continue as at present, Business as Usual (BAU) is no longer an option; the concentration of CO₂ will reach 1050ppm by 2100, bringing a catastrophic rise of over 4°C. (The increase since the last Ice Age, 15,000 years ago is 5°C.) This will bring runaway climate change with damaging weather not seen on this planet for 260 million years. Scientists do not know what level of CO₂ will be critical to cause such damage. Estimates vary from 450ppm or 550ppm as the tipping point for such changes. Increasingly 400-450ppm is being cited as the safest option at which to stabilise emissions.

In 2006, one of the warmest years on record, a number of alarming studies were published. The Gulf Stream has declined by 20-30%. This is due to increasing amounts of fresh water being poured into the North Atlantic from melting glaciers and ice caps, reducing the salinity of the sea. It is the weight and density of this salinity that drives the Great Ocean Conveyor. If the Gulf Stream collapsed it would reduce North European temperatures and North American winter temperature by 5-10°C. This scenario is considered unlikely but it happened in about 11,000 BC causing an 800 year return of the Ice Age. The tundra of Alaska, Canada and Siberia are, with Arctic ice, melting faster than expected bringing the threat of methane release stored in this frozen peat.

In recent years monsoons have proved to be more erratic, but stronger. Severe droughts are becoming more frequent in Australia. Globally shortages from fresh water sources will become more common with a reduction in agricultural yields. James Lovelock, the originator of the Gaia theory, has predicted a planetary extinction event from which only 50 million humans will survive, although this scenario has been criticised by other scientists.

More optimistically, a report by the Tyndall Centre (2006) suggested that it would be possible to keep the temperature rise below 2°C, with UK citizens living within a much reduced carbon budget, but still maintaining a high quality of life, providing there is a comprehensive, government-driven plan, involving changes in lifestyle that cut energy demand and use new technology. This would need to be in place by 2010.

In 2007 the Intergovernmental Panel on Climate Change (IPCC) delivered its extensive 4th Report. It suggested that there is *a very high confidence* that the effect of human activities has been one of global warming. Its scenarios are that the warming will be uneven with greater warming over the Arctic and Antarctic. Snow cover will contract, sea ice will shrink, heat waves will become more frequent, tropical cyclones will increase in number and intensity, the meridional circulation (Gulf Stream) will slow or close down. Sea rise from thermal expansion is not reversible. If the Greenland Ice Cap melts it would produce a 7 metre sea rise over four centuries, and if the Western Antarctic Ice Cap melts this would add another 20 metres. The temperature forecasts are at levels

not seen on the planet for 125,000 years. One criticism of the Report is that the 'conservative scientific consensus' waiting for 'incontrovertible scientific evidence' makes excessive caution dangerous over such short timescales. Climate changes are large and fast moving; threats are increasing and timescales shortening.

Of national and international concern is the UK Treasury Report of 2007 'The Economics of Climate Change' by Sir Nicholas Stern. He reports on the economic consequences of stabilising at a concentration of 550ppm CO₂e. He argues for an urgent 1% of the world's GDP as an investment to mitigate climate change. If we delay then 5% will be necessary. BAU is no longer an option. Key elements of his strategy would include education and information to change lifestyles and reduce deforestation, and efficient and minimal use of energy with low carbon technologies and emissions trading. The Report admits that a lower target would be advisable and that it is 'no longer possible to prevent all risk of dangerous climate change' (p333).

The remaining arguments seem to be not if but when we need to begin a serious change in lifestyle. Some consider it is already too late as the feedback mechanisms are already in place. Others are more optimistic with the Tyndall centre estimating 5-8 years (base date 2006), Al Gore and the MIT give us 10, and Stern argues for 20 or runaway climate changes will have set in. Whatever the timescales, some 'magic gates' (permanent changes in the planet's climate) have already happened. According to the World Health Organisation 150,000 people are being killed by climate change every year, mainly in poorer countries through disease, malnutrition, hurricanes, drought and flooding. The UK may be fortunate compared with many Third World countries, or even Southern Europe, but the changes will affect all our lives. Global food production will be reduced, tropical diseases will increase and whole populations will be forced to migrate to more habitable areas. Locally, Cumbria County Council is expecting wetter winters and drier warmer summers, increases in crop and animal diseases and a deterioration in water quality.

Humanity and our civilisations have a century of careful planet management ahead. Currently global CO₂e emissions are 27 billion tonnes per annum and rising. The ideal would be 2.7 billion tonnes. To reach this level would require a 90% reduction.

The UK has now passed the Climate Change Bill and is committed to a 60% reduction in CO₂ by 2050 based on a 1990 baseline, with a significant reduction of 20% by 2020. These proposed cuts do not include aviation (the fastest growing area) or shipping. Despite the UK Government's ambitions, greenhouse gases have only fallen slightly since 1990 (largely due to the burning of gas instead of coal). The UK is only 1% of the world's population and only emits 2% of the global warming gases. The overall effect of a reduction in UK emissions is minimal, although it is interesting to note that Christian Aid has identified business traded through the City of London as contributing to 15% of the Earth's total emissions. However, the UK's influence is important as an example of what can be achieved by a single nation, especially as regards research and public education, and as part of Europe. The EU is legislating for a 25% cut in gases by 2025 and the UK will share in this ambition.

The European nations are only part of the problem. In terms of total tonnage the USA, China and India are the biggest polluters. China is building 550 new coal fired power stations and the USA 150 (burning coal gives off the highest CO₂ of all fossil fuels). In overall tonnage China now exceeds the

USA in total pollution though emissions are still much less per capita. A framework for global reduction exists in the United Nations Convention on Climate Change, begun in Rio de Janeiro in 1992. Under the Kyoto Protocol targets have been set for developed nations to bring their emissions down. These targets are nowhere near enough, but they are a first step to stabilisation. Nations, states and concerned individuals and communities are becoming active. Bali 2007 was a meeting of 181 nations to decide what must be done in the light of the IPCC 4th Report. They agreed to stave off the worst effects of CO₂ and climate change but no targets were set. It was agreed that targets would be made by 2009 for a post Kyoto Treaty to which all the nations of the world could agree. It was also agreed that all the old growth forests of the planet must be protected and the rich nations agreed to support the poor nations, where most of these forests are located.

If our civilisation is going to manage greenhouse gas emissions and their consequences we will have to make a host of difficult transitions in the next twenty years. Technologically we will have to revamp everything from our cars, transport and energy generation, to the way we light and warm our homes and farm and transport food. Some technologies are controversial -- wind farms, genetic modification and nuclear power: others less so, like investment in energy efficiency, using local food sources and developing local economies. If emissions are to be cut as drastically as the science demands then a global framework for the reductions will have to be established. Contraction and Convergence has been much discussed as the fairest framework: the concept suggests that the world gradually contracts permissible emissions to an agreed safe level, converging to the point where these emissions are shared so that everyone has an equal right to pollute, with trading in excess permits being allowed. Such a scheme would mean very large reductions from the developed world and allowing small increases for the undeveloped world. In 2000 the annual emissions per capita in the UK were 11 tonnes and in the USA 24 tonnes, whereas a nation like Malawi was only 0.6 tonne and Bangladesh was 0.9 tonne. The proposals would also allow transfers of wealth from rich countries to poor, thereby enabling those most affected by climate change to mitigate the effects. It will need scientific monitoring, financing and enforcement systems that are planetary and will affect every organisation and person's life. Rationing on this scale will probably be the most intrusive system of global bureaucracy humanity has ever developed. Managing greenhouse gas emissions is a key goal for our global society. We need to cut carbon now as emissions are soaring and the Earth's climate is rapidly changing. The opposition from governments, industry, vested interests and individuals would need to be resisted. A stable society will also have to be formed by educating a 'prospective mind'; one that is able to meet and adapt to multiple changes. How we deal with these aspects will test the ability of our communities, society and institutions to respond to radical changes in our climate and our civilisation. If this is to happen it must come from the grass roots.

A recent study showed that environmentally-concerned groups are now the Earth's largest community movement ever. They exist in every nation of the world. Social justice and environmental justice cannot be separated. Living within the biological restraints of the Earth may be the most civilised activity any individual, community or nation can pursue. So far, globally leaderless, this grassroots movement uniquely shares a world vision, although new institutions are being formed to achieve this, such as the World Futures Council and the Transition Initiatives in the UK.

All this assumes that changes will be smooth, but this may not be necessarily the case. Palaeoclimatic studies on Greenland ice and deep sea cores have shown that increasing CO₂ could

trigger abrupt change or ‘climate surprises’. These are unlikely to be comfortable. What level of CO₂ will trigger such events is unknown, but to quote one climate scientist, ‘We are entering dangerous territory and provoking an ornery beast’. Climate scientists are the prophets of our age and our climate is no longer stable. If such are the stakes we should adopt the precautionary principle and act boldly and swiftly. Some experts are predicting failure, in which case breakdowns and catastrophes are inevitable. How we deal with these situations will test the strength of our communities, society and institutions to respond and adapt to radical changes in our climate and find new ways of living. We need to be educating ‘prospective minds’ capable of meeting and adapting to multiple changes. Stable societies, where they have existed, are likely to be a thing of the past. There is a need to increase the resilience of our communities at a variety of levels. Survival may depend on communities being prepared, and churches could well have an important role to play as community leaders. Such community actions are treated as an interest group by politicians and the media when they should be seen as heroic.

Are we as Christians called to save the planet, to look long term and not have a counsel of despair? Our greatest advantage is that we now know what we are doing and what must be done to make it right. Not all, but enough to see the direction we must travel. As individuals we should learn to live in ‘comfortable austerity’ or to live more simply so that others may simply live. Humanity must learn to share this planet Earth, not only with other people but with other life forms. God is the creator of all life and the universe. If we are made in his image then we too must recognise the rights of all life and the rights of the planet. We are called to serve creation not to exploit it. The religious must include all creation in their attempts to mitigate global warming. The impact on wildlife and the rest of the biosphere on which we depend will be greater than that on humanity. They are less mobile, and the ecosystems they depend on are increasingly threatened by humanity’s greed.

One writer has described the future as either dire or glorious. It is hard, he suggests, to be more precise. We take it we prefer glorious. Despite the many doomsday scenarios there might just be enough practical hope, enough time, enough courage, enough wisdom, enough virtue and enough concern, enough information and knowledge, and enough love for our Mother Earth, our fellow human beings and God’s creation to cause a glorious future that future generations would enjoy. We really have no alternative than to try it!

*We cannot wrestle with God. We cannot manage his universe either, but we can manage the small garden he has given us. We are called to enjoy it. **Morris West***

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