

Natural Disasters - Personal and Social Responsibilities

By Midlander

Introduction

Ladies and Gentlemen, the title of my presentation this evening is Natural Disasters - Personal and Social Responsibilities, which sounds somewhat heavy and pompous. I will try as hard as I can to eliminate both of these qualities from what I have to say.

As I said the title is Natural Disasters - Personal and Social Responsibilities. I want to begin by giving a little background about myself and the work I do, as this will set the scene for what I have to say later. I have worked for an uncomfortably large number of years in “fluid mechanics” – the study of air and water flow. Most of this work has been directed towards the study of the impact of wind flows on structures – such as wind effects on low rise building, cross wind effects on vehicles, tree and crop aerodynamics, the dispersion of pollutant etc. The study of such subjects inevitably leads one to consider the phenomena that drive such flows, and in particular extreme events that can cause significant problems – such as hurricanes and floods. And in this context it is impossible to ignore the effects of global warming and climate change that I will show to be important in what follows. Wearing my other hat, or more properly collar, I am also an Anglican priest. This inevitably causes me to view my professional work in theological and ethical terms. In relation to the presentation this evening, it has caused me to reflect upon the nature of personal and corporate responsibility with regard to the big issues of global warming and climate change.

Such is my background. You will of course need to take this into account when you consider what I am about to say, because I can neither claim to be objective or an uninterested observer of events. But I do believe that the subject we are tackling this evening is one of the most critical facing us as we begin this century, that demands wide scale, concerted action by individuals and nations.

Fundamentally my hypothesis is as follows. We are in a period of rapid climate change, with the primary symptom being an increase in global average temperatures. This is due primarily to anthropogenic effects, and in particular due to the production of greenhouse gasses, which are an inevitable by-product of energy consumption in the industrialised world. The medium term effects of such climate change are a rise in sea level and a change in global weather patterns, that will lead to an increased frequency of extreme climatic events such as hurricanes or floods. Such events will impact on all societies, but the major effects will be felt by those most vulnerable, primarily in the developing world. Theological and ethical considerations then lead to the conclusion that action is required to reduce global warming and minimise its effects. This in turn leads inexorably to the conclusion that the only practical way that this can be achieved is through major life style change in the developed “northern” world.

In what follows, I will firstly consider climate change itself, together with the effects of greenhouse gasses, and will identify the source of these gasses. I will then outline

the effects of climate change with particular reference to floods and windstorms. From there I will go on to discuss our responsibility within such a situation (which is where some fairly light theological ideas will be introduced), and finally think about what the future options are. At that point I will stop, and you can begin to air your disagreements!

Climate change

Whether or not climate change is occurring, and what the possible causes might be, has become a political as well as a scientific issue. Whilst almost all scientists working in this area are of the opinion that climate change is occurring, that recent climate fluctuations are beyond what will occur naturally, and that these changes are primarily due to anthropogenic effects, there is a vocal lobby that insists either that climate change is not occurring, or that if it is, it is not due to any human induced effects. However if one traces the lineage of these objections, many of them originate with right wing US politicians with links to the oil industry. In what follows I will side with the orthodox scientists – and indeed I will present evidence that at least to me seems convincing.

Climate change is investigated in a number of ways. The first is through observation of such fundamental parameters as global average temperatures. Figure 1 shows the variation of this parameter over the last 300 years. It can be seen that there is a marked upward trend. However the other the major tool that is used in the interpretation of such data are GCMs – global climate models. Amongst the most sophisticated of these are those developed at the Hadley Centre, part of the UK Met Office. These model atmospheric and ocean dynamics in great detail, and allow the effects of variability in the structure of the atmosphere. In particular the effect of greenhouse gas emissions can be modelled. Greenhouse gasses are those gases that, in sufficient concentration will allow solar radiation to pass through the atmosphere to the surface of the earth, but will contain the reflected solar radiation within the atmosphere instead of letting it escape. The major greenhouse gas is carbon dioxide caused by the burning of fossil fuels. In addition the other, less important greenhouse gasses are methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride.

Figure 1.1 Global and Central England surface temperature anomalies: 1772-2000

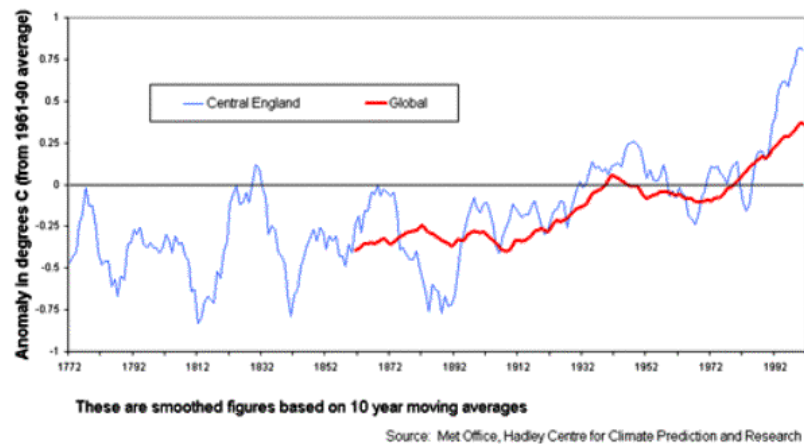


Figure 1 Temperature variations since 1700

The GCMs have been run with estimates for the actual levels of greenhouse gas emission over the last two hundred years and are able to reliably reproduce the temperature fluctuations shown in figure 1, giving confidence in their accuracy, and confirming the anthropogenic nature of these effects. Of particular interest however is the predictions that can then be made. The Hadley Centre have made predictions for low, medium and high greenhouse gas emissions scenarios, and the results are disturbing. In particular mean global temperatures are predicted to rise somewhere between 1.4 and 5.8K and mean sea levels by between 10cm and 90cm. Parts of the world are predicted to warm significantly, with the likely extension of very arid areas. However the effect is not uniform across the earth because it would appear that one of the major effects will be that global weather patterns will be disrupted, and thus some areas may cool. If, for example, the Gulf Stream were to be affected, the temperature of the UK would fall to typical values for its latitude, and the climate would become more like that of Moscow. The other major effect of climate change that is predicted is that extreme climate events, such as rain and wind storms will become significantly more common, leading to an increase in natural disasters. This can already be observed. Figure 2 shows the increase in the number of major disasters between the 1960s and the 1980s, using data from Munich Re. There are a number of factors underlying the results in this figure (including movement of people to vulnerable areas for example) but climate change does seem to be a major factor in this increase.

	1960-1969	1970-1979	1980-1989	Factor 80s/60s
Number of disasters	8	13	29	3.6
Losses to economy US\$b	20.5	28.5	34.3	1.7
Insured losses US\$b	4.8	7.5	16.6	3.5

Figure 2 Numbers of disasters and insurance losses

Effects of climate change

So what will be the effects of such climate change. Here I quote from a recent Church Times article.

“In a recent Guardian article, Sir John Houghton, the former Chief Executive of the Met Office and Chairman of the Scientific Working Group of the Intergovernmental Panel on Climate Change, compares the phenomenon of global warming to a weapon of mass destruction. He argues that, as the average global temperature increases, this will lead to larger and larger swings in the global climate, resulting in increasingly frequent and intense droughts, floods and windstorms, as well as a steady increase in mean sea level. This, Sir John argues, has led, and will continue to lead, to numbers of casualties and fatalities on a par with those that would result from the use of weapons of mass destruction, with the effects falling most severely on vulnerable third world communities. He goes on to urge western governments to take action to curb global warming through a significant reduction in the production of greenhouse gasses, and, through the development of internationally agreed principles, to ensure that the cost of such actions is equitably shared by all countries.”

Whilst in many regions of the world a steady temperature rise could be coped with, even if the ecological implications are frightening, for low lying regions the effect of sea level rise could be catastrophic. This is particularly true for some Pacific Island states and for low lying regions around, for example, the deltas of the Ganges. In addition the number of large-scale storms will increase worldwide. This will particularly impact upon tropical cyclone regions of the world, where the effects of major storms can be significant. For example figure 3 below indicates the effect of Hurricane Mitch in October 1998 on the countries of Central America. The number of fatalities, and the economic disruption are almost unimaginable. Similarly, recent flood events, such as the Mozambique floods of 2002, have had a devastating effect on development within the region.

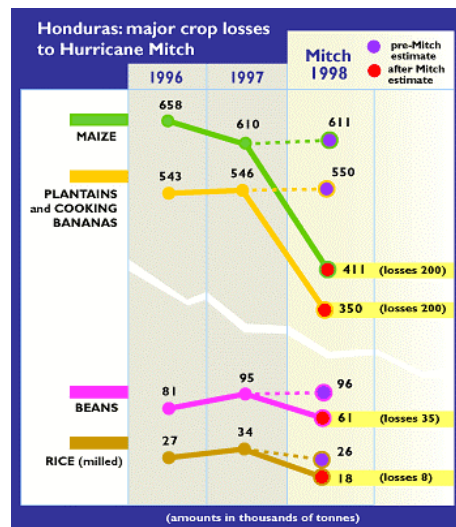
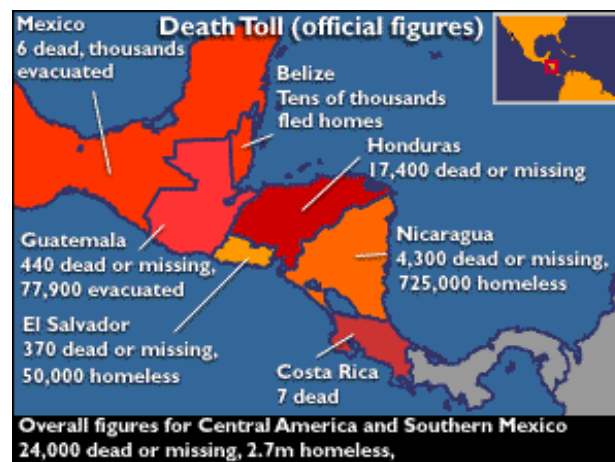
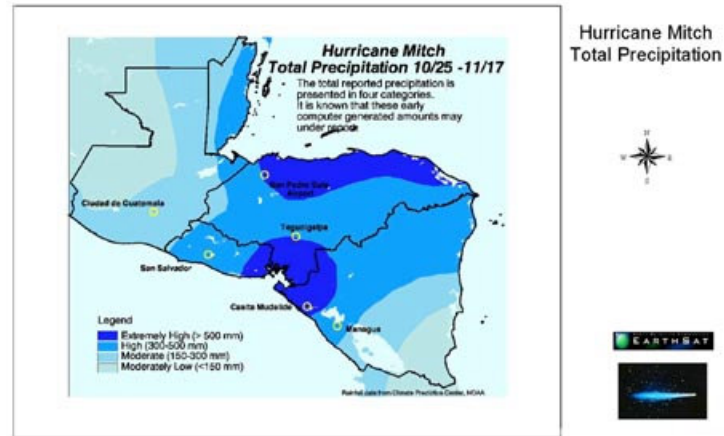


Figure 3 The effects of Hurricane Mitch (from the BBC web site and other sources)

The UK will not be immune from the effects of climate change however. Whilst some may regard the changes as beneficial, with the climate in the South of England becoming more like that of Central and Southern France, the effects will not be wholly benign. Figure 4 shows the predicted wind speed changes over the next century from the latest GCM scenarios. It can be seen that, in parts of the country an increase in windspeeds is predicted. This is of particular concern to myself and my professional community because it implies that the structures that have been designed using the old wind loading Codes of Practice may not in fact be strong enough to withstand the likely increased extreme wind speeds. One other major effect that will affect the wind climate is that recent history suggests, and the GCMs predict that storm tracks will move southwards. Historically the Atlantic depressions that form major storms are deflected northwards by the blocking high-pressure regions in Central Europe and the predominant storm track has been over northern Scotland. The blocking high-pressure regions appear to be weakening, thus allowing storm tracks to move to the south i.e. over parts of the country where buildings have not been constructed to withstand such events. Global warming will affect us all, whether we like it or not.

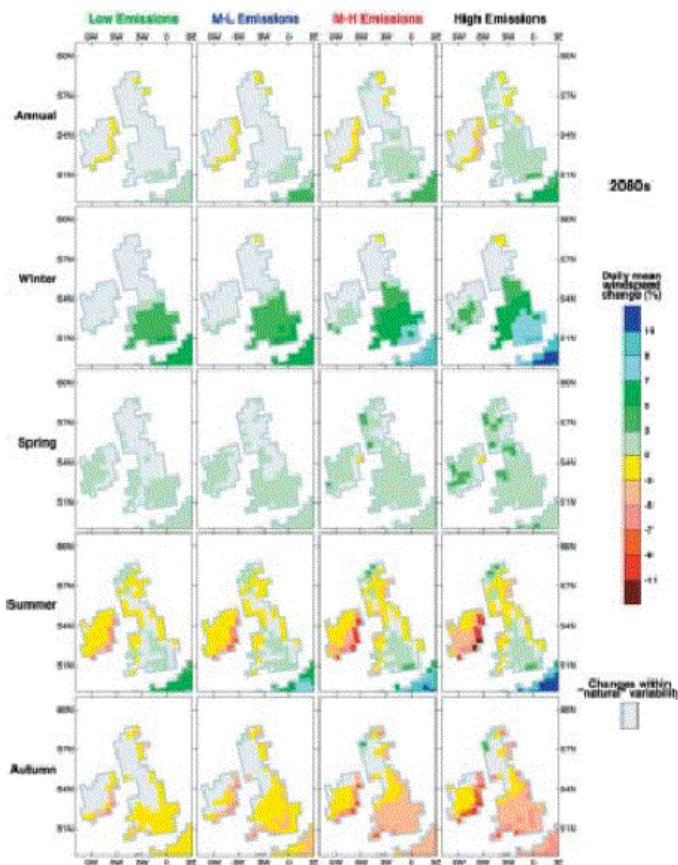


Figure 4 Predicted wind speed changes over the UK (from Hadley Centre publications)

Practical responses

If the effects of global warming are to be mitigated, then greenhouse gas emissions need to be reduced significantly. Figure 5 shows the major sources of greenhouse gas emissions in the UK over the last few years. Whilst there is an encouraging drop in the overall emissions, the emissions from domestic sources and from transport are rising – indeed the emissions from the latter seem to be almost out of control.

There are a number of responses that can be made. The obvious one is to look for non-polluting energy sources. Renewable energy, particularly wind and wave power holds some promise, but even with the most optimistic assumptions could not provide more than 15 to 20% of current energy needs in the UK. In transport terms cars powered by hydrogen fuel cells are a real possibility, but there are enormous technical difficulties still to resolve. The only no-fossil fuel energy resource that could provide enough energy to significantly reduce the use of fossil fuels and greenhouse gas emission is nuclear energy. The problems of the disposal of nuclear waste makes an expansion of this industry problematic and probably politically unacceptable.

The only possible alternative to the use of different energy resources is for major social and lifestyle changes to reduce energy consumption significantly. The difficulties in following such a course of action are of course immense.

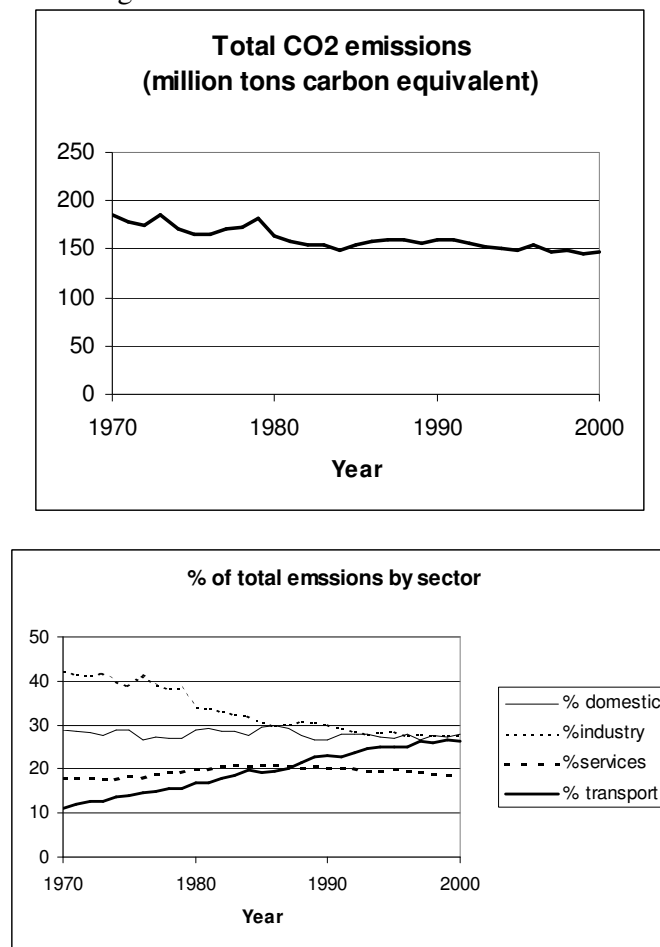


Figure 5 UK Greenhouse Gas emissions

Personal responsibility

So, in the light of these predictions, where does the responsibility lie for ensuring that the worst effects are mitigated. The only way in which this can be done is for the emissions of greenhouse gasses to be significantly reduced. Over the last decade this has begun to be taken seriously by politicians, and the Kyoto convention is the result. This has set targets for the reduction of greenhouse gasses for individual countries over the next few decades, in order to stabilise greenhouse gas levels. However as is well known the Kyoto process has stalled, with the USA refusing to ratify the convention, and there seems little hope for future movement in the international arena at the moment. In the face of such enormous challenges, it is easy to feel powerless. Nonetheless it needs to be remembered that democratic governments are ultimately under the control of the populace, and if there is sufficient popular will, then international changes can happen. It is my, perhaps naïve, belief that the individual can have a role to play here. In particular, if the Christian church could be mobilised to take this issue seriously then significant change can result.

And that brings me to theology. I end with two further lengthy quotes from the Church Times article.

“In theological terms scripture gives a number of broad principles that can be of use. From the early chapters of Genesis and elsewhere in the Old Testament, the principle of stewardship emerges – of humanity as the guardians of the earth’s resources. From here it is only a small step to the more modern, but increasingly accepted notion of sustainability – that human activity should be sustainable on a long-term basis. The Old Testament prophets speak profoundly of the need for justice at all levels, particularly for the most vulnerable. In the New Testament the primary principle that is of use is that which Jesus and the apostles so often emphasise - “neighbour love”. In twenty first century terms this needs to be interpreted on a global basis. Our activities and lifestyle have an effect on those in different parts of the world whether we like it or not, and the principle of neighbour love suggests that these consequences should not be ignored. Taken together these principles suggest that Christians should be doing all they can to reduce those activities that lead to global warming, mainly the production of greenhouse gasses, and actively engaging with what is probably the greatest challenge facing humanity today. The primary task of the church is of course to bring the good news of God’s love and redemption to a needy world – but Christians can hardly do that consistently if our actions and lifestyle are helping to bring about the appalling effects of global warming. In the words spoken by Jesus in the Sermon on the Mount, Christians are called to be “salt and light” to our society and beyond, and I remain optimistic that serious Christian engagement in activities to reduce the emission of greenhouse gasses would give a significant prophetic message, that could act as a catalyst for major societal change.....”

“.....But whilst the church as an institution can properly ask and ideally take action on such questions, the most significant change must come from a change in the lifestyle of church members. And here we are all, to some degree or other, in a cultural and arguably spiritual sense, bound by the assumptions of the society in which we live. The type of lifestyle that would result from a logical working out of the

principles of stewardship, justice and neighbour-love in the area of global warming, is a radical one. It would involve decisions on where we live, in order to reduce our transport needs, and how we live, in order to reduce our energy consumption significantly. If a significant number of Christians adopted lifestyles that positively address these issues, they would indeed be a prophetic witness both to society, and to the wider church. And the latter is, I believe, of importance. If in some way a significant proportion of the Church of England could adopt such a prophetic role, then its international influence could be enormous – particularly on the churches in the USA. Because it is, of course, the USA that is far and away the largest, most profligate producer of greenhouse gasses. If US Christians, who are perhaps the most culturally bound of all Christians, could be persuaded to adopt radical lifestyle change, then major society change in the US in this regard would be a possibility, to the massive benefit of the world community.”