

Exploring Climate Change

Controversy

Introduction

Anything as important, challenging and complicated as climate change is bound to attract a great deal of discussion and disagreement.

The media and newspapers often present stories about climate change in a sensational and emotive way and some high profile TV documentaries and books have questioned the influence of humans on the climate. At best, these live debates, attention-grabbing headlines and 'climate scandals' often leave the general public feeling that scientists don't agree. At worst, they force people to switch off and lose interest in this important global issue.

The reality is that there is an unprecedented consensus among world scientists that global warming is caused by human activity (known as anthropogenic climate change). Yes, scientists are still in disagreement about exactly what the impacts will be but the main body of evidence for climate change is widely accepted by the scientific community.

In this section, we look into the controversies surrounding climate change including 'Climategate', the 'Hockey Stick' debate and criticism of the IPCC. This section also explores the influence of climate critics and the impact they have had on public opinion. Collectively these issues highlight the importance of developing informed views based on established scientific evidence.

Windfarms too have generated controversial debate along with the Beaully-Denny powerline, recently given the go-ahead by the Scottish Government. These developments continue to face significant challenges, even as they come online and become a feature of the Scottish landscape.

Reflective questions

- What climate controversies have featured in the media recently?
- Does the controversial nature of the issue excite, challenge, confuse or bore you?
- What is your opinion?

The Public



Photo credit: Liverpool Biennial - One Year in Liverpool. Published on Wikimedia Commons by Matěj Bařha.

It is essential for the general public to be well informed about climate change so decision makers have the political will to make the changes that are necessary. For instance, in 2009 the Scottish Parliament passed ambitious legislation which commits Scotland to reducing greenhouse gas emissions by 42% by 2020 and by 80% by 2050. This shift to a low carbon economy will result in a radical change to the way we live our lives.

Shifts in opinion

There have been dramatic shifts in public opinion on climate change over the last few years.

In the USA, public opinion polling showed a steady increase in both awareness and concern about climate change, peaking in 2008. A Yale public opinion study showed that in 2008, 71% of Americans thought that climate change was happening and 57% that this was caused by human activities.

In 2010 the number accepting that climate was happening had fallen to 57%, with only 47% thinking that it is caused by human activity. This change was accompanied by a belief that there was more disagreement amongst scientists about climate change – the proportion thinking that scientists agree about climate change decreased from 47% in 2008 to 34% in 2010.

Download a copy of the Yale report: Climate Change in the American Mind: Americans' Global Warming Beliefs and Attitudes in January 2010 (PDF file):

<http://environment.yale.edu/climate-communication-OFF/files/ClimateBeliefsMay2011.pdf>

Attitudes in the UK

Public concern about climate change is higher in the UK than in the USA, but is still affected by controversy and debate. Cardiff University researched UK opinion in both 2005 and 2010. Their results show that the trend is for the UK public to be less accepting of the evidence of climate change and its human causes. In 2005, 91% of those asked thought that the climate was changing. But in June 2010 this was down to 78% with only 47% thinking that human activity is responsible.

There were no significant scientific developments in this period that would support this shift in public opinion. This could lead to the view that this change in attitudes was caused largely by media reporting of climate change issues.

Download a copy of the Cardiff report: Public Perceptions of Climate Change and Energy Futures in Britain: Summary Findings of a Survey Conducted from January to March 2010 (PDF file):

http://psych.cf.ac.uk/understandingrisk/docs/final_report.pdf

Reflective questions

- What do your friends and family think about climate change?
- Have you personally noticed a change in public attitudes to climate change over the last few years?
- If so, what do you think has caused such a change? Do you think media reporting is responsible? Why?

Scientists



Photo credit: Cairo and Alexandria , Egypt at Night (NASA, International Space Station Science, 28th October 2010).
Published on Flickr by NASA's Marshall Space Flight Center.

A Yale public opinion survey¹ in 2010 showed that only 34% of respondents believed that scientists agree about climate change. This is at odds with research which shows that there is a significant agreement among scientists about climate change.

Disagreement and debate are part of the normal scientific process. Ideas and theories are developed, discussed and tested. When scientists want to establish a new theory, they publish it as a scientific paper, along with the evidence and experiments on which their theory is based.

Before a scientific paper is published in a science journal, it must be 'peer reviewed' by other scientists who specialise in the same field. They will examine the evidence and conclusions in the scientific paper to ensure that the science is accurate and the process is valid. Once the paper is published other scientists can carry out more research to prove or disprove it and build on its conclusions.

This process of testing and disagreement is valuable because it allows all new theories and evidence to be rigorously tested and challenged to determine whether or not they are valid.

Views of the scientific community

Much of the core science around climate change has been tested in this way over many years and is now widely accepted by most scientists. In 2008, Doran and Zimmerman's article 'Examining the Scientific Consensus on Climate Change' asked 10,257 earth scientists to complete a questionnaire; 3,146 did so. When asked if mean global temperatures had changed since 1800, 90% answered yes, and that the temperature had risen. Asked if human activity is a significant factor in this rise, 82% answered 'yes'. These responses rose to 96.2% and 97.4% respectively for those scientists who regarded climate science as their main area of expertise.

Further research was undertaken by the Institute of Science, Technology and Public Policy in 2010. This explored the attitudes and profile of climate scientists in the US. 468 scientists responded to the survey.

The survey results reveal that a majority of respondents believe:

1. Climate scientists have a strong understanding of global climate change.
2. Global warming is already underway and human activities are accelerating it.
3. Global climate change will occur with a combination of gradual changes in all areas of the world and the possibility of abrupt changes in some areas.

¹ <http://environment.yale.edu/climate-communication-OFF/files/ClimateBeliefsJune2010.pdf>

4. Global climate change will most likely exert significant impact on the US in 10 to 50 years.
5. Global climate change is a significant problem that affects the social, economic, and public health aspects of the US.
6. The US is likely or fairly likely to adapt successfully to the effects of global climate change.

The survey also found significant agreement among scientists on nearly all elements of the climate change debate and that respondents' views were in alignment with recent IPCC findings. The only notable exceptions were a minority of scientists who agreed with the scientific evidence but for political reasons were less supportive of some policy choices, such as imposing taxes to discourage certain practices.

Although there is consensus among climate scientists that global climate change is occurring and is accelerated by human activities, the research showed there was disagreement about *specific* aspects of global climate change including:

- the extent and magnitude of global climate change
- the specific rates of change and timelines
- extent of local and regional impacts.

This demonstrates that determining precise outcomes is a complex and difficult task, although refinements in modelling and computing power are improving predictions.

Download a copy of the 2009 report on scientists' views:

Climate Change: A Profile of U.S. Climate Scientists' Perspectives (PDF file):

http://bush.tamu.edu/istpp/scholarship/journals/ClimateScientistsPerspectives_ClimateChange.pdf

Climate science remains an exciting and active area of scientific research. Although most scientists accept the core evidence of anthropogenic (human induced) climate change, much debate and evidence is still needed to determine the precise impacts. For instance, the rate at which the earth's temperature will continue to rise or how complex feedback mechanisms will impact on this.

Reflective questions

- Why might the views of the public regarding the attitudes of scientists towards climate change be at odds with research findings?
- Do you believe the general public been misled? If so, how has this happened? Have they been misled deliberately or accidentally?

Climate Critics

Sceptics or deniers?

When we talk of people who disagree with the evidence of climate change at some level then we immediately encounter a problem of language. Critics of climate change are often referred to as climate 'sceptics' or 'deniers'. There are no formal definitions for these terms which can lead to much confusion.

The term 'climate denier' is often used to describe someone who does not believe that the Earth's climate is changing at all. It is also used to describe those who do believe that the climate is changing but not because of human activity.

The term 'climate sceptic' is often used to refer to people who disagree with some aspects of the climate change debate. 'Sceptics' may, for instance, agree that the climate is changing because of human activity but might believe that predictions of flooding, droughts and hurricanes are exaggerated. Some of those referred to as 'sceptics' may accept the science about climate change but may disagree that we should take steps to mitigate it, for instance, by increasing taxes on petrol.

However, in its proper sense, a 'sceptic' is anyone who objectively reflects upon and considers the authenticity of evidence before developing an opinion or view. In this sense, many scientists would refer to themselves as 'sceptics' given that they are only prepared to accept evidence once it has been rigorously tested and proven to be valid.

This problem with language has far-reaching implications. The criticisms of many 'sceptics' are often misinterpreted as denial that human-induced climate change is happening. This can lead to the impression that there are more 'climate deniers', and therefore much less acceptance of climate science, than there actually is. This may offer an explanation for the change in public attitudes towards climate change.

On the other side of the debate, those who accept climate change can sometimes be referred to as 'alarmists' or 'warmists'.

Weight of opinion

It is an important skill for all global citizens to be able to think critically and objectively and develop informed views based on rigorously tested evidence. The media and newspapers are full of 'climate controversies' and opposing views and opinions. In these situations it is important to reflect on both the views being presented and the people involved.

Does the opinion of a qualified climate scientist for instance carry the same weight as a qualified journalist when it comes to discussing scientific evidence about climate change? Would someone's opinion be biased by the role they have, the company that employs them or the funding they receive?

Reflective questions

- How useful are terms such as deniers, sceptics, warmists and alarmists?
- Do you think the confusion surrounding these terms has affected public attitudes?

The 'hockey stick' debate

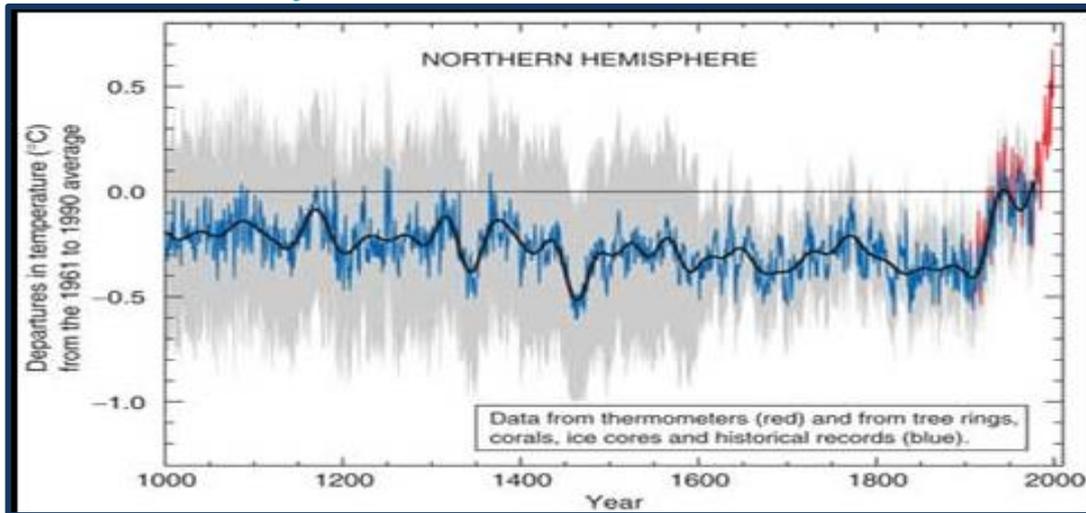


Photo credit: The Third Assessment Report of The Intergovernmental Panel on Climate Change, Chapter 2, Figure 2.20²

The 'hockey stick' graph refers to the temperature graph shown above. It shows that temperatures in the 20th century are higher than at any point in the last 1,000 years. A version of this graph was first published in a paper by Mann, Bradley and Hughes in 1998³, covering the period from 1998 back to the year 1400. It became known as the 'hockey stick' because it resembles the shape of an ice-hockey stick. Controversy around this graph has been one of the longest and most detailed in climate change science.

Much of the controversy is about the reliability of the information used. In re-constructing temperatures from the period before reliable thermometer readings became available, a whole range of other indicators have been used including data from tree-rings, lake sediments, borehole temperatures and ice cores. The accuracy and value of many of these has been challenged.

Most researchers think that temperature reconstructions using other indicators are an important way of finding out what past climate conditions were like and are working to increase the accuracy of the reconstructions. A minority think that the data and methods cannot be used to provide useful information.

However, the U.S. National Academy of Science was asked by the U.S. Congress to assess the validity of temperature reconstructions, including the hockey stick. Their report on Surface Temperature Reconstructions for the Last 2,000 Years (2006)⁴ states: 'The basic conclusion of Mann et al. (1998, 1999) was that the late 20th century warmth in the Northern Hemisphere was unprecedented during at least the last 1000 years.

This conclusion has subsequently been supported by an array of evidence that includes both additional large-scale surface temperature reconstructions and pronounced changes in a variety of local proxy indicators, such as melting on ice caps and the retreat of glaciers around the world'.

The report also says it has very high confidence that the last few decades of the 20th Century were warmer than any comparable period in the last 400 years. However, it added that climate estimates between the years AD 900 and AD 1600 were less reliable, and less still before AD 900. It called for more research to gain better proxy data for these periods.

² http://www.grida.no/climate/ipcc_tar/wg1/pdf/WG1_TAR-FRONT.PDF

³ http://www.ncdc.noaa.gov/paleo/pubs/mann_99.html

⁴ <https://www.nap.edu/read/11676/chapter/2>

For more information about the hockey stick debate, see:

- New Scientist - Climate myths
<https://www.newscientist.com/article/dn11462-climate-change-a-guide-for-the-perplexed/>
- Real Climate - myth vs fact
<http://www.realclimate.org/index.php/archives/2004/12/myths-vs-fact-regarding-the-hockey-stick/>
- the paper by Ross McKittrick, 'What is the 'Hockey Stick' Debate About?'
<https://climateaudit.org/2005/04/08/mckittrick-what-the-hockey-stick-debate-is-about/>

Reflective questions

- What is your opinion of the 'hockey stick' debate?
- Do you think that the use of indicators such as tree ring data or ice core measurements give accurate results?

Climategate

In November 2009 a large number of emails to and from climate scientists at the University of East Anglia Climatic Research Unit⁵ (CRU) were hacked and published to the internet. The University later confirmed that these were indeed genuine and that they had been obtained illegally. This led to a media storm about what the emails revealed about how climate scientists 'fudged' evidence.

Most of the 1,000 emails were simply exchanges between the scientists, but some were seen to show evidence of attempts to bias evidence in favour of climate change theories. The main allegations were that:

- staff at CRU had attempted to prevent data being released under freedom of information requests
- some of the emails showed attempts to manipulate measurements to make them fit better with the CRU's theories – especially two phrases 'hide the decline' and 'Mike's Nature trick'
- some climatologists conspired to prevent scientific journals publishing papers that disagreed with their views.

Hide the decline

References to 'hide the decline' occurred in email exchanges about presenting information on past temperatures relating to the 'hockey stick' debate. 'Hiding the decline' refers to problems with recent tree-rings, which often do not follow the expected relationship with local temperatures.

Since around 1960, trees have stopped responding to temperature increases in the same way they did in previous centuries. If plotted on a chart, from 1960 forward tree rings appear to show declining temperatures - something that scientists know from thermometer readings is not accurate. The 'trick' involves combining indicator, or proxy, measurements with more recent actual readings.

The trick is the method used by climatologist Michael Mann in a paper published in the scientific journal *Nature*. The quotes can be seen either as out-of context comments from informal private emails, or as evidence of the scientists trying to distort their results.

The leaked emails led to three enquiries by a House of Commons Committee, by an internal university inquiry and by an independent enquiry set up by the university but not controlled

⁵ <http://www.cru.uea.ac.uk/>

by it. Because of his role, Michael Mann's university in USA also carried out an inquiry. None of these found that the emails showed any evidence of attempted fraud. However, these enquiries and another by the Freedom of Information Office, criticised the CRU for its attempt to avoid answering the questions they were asked.

Reflective questions

- What is your view of the 'Climategate' events?
- Do you think there was a conspiracy by scientists to fudge the evidence about climate change? Or was this a deliberate attempt by a hacker to undermine climate science?

IPCC Report



Photo credit: Stok Kangri. Published by *Maverick34* on *Wikimedia Commons*.

At the same time as the 'Climategate' controversy was in the news at the end of 2009, a further challenge to climate science hit the headlines. This time it related to errors found in the Fourth Annual Assessment of the Intergovernmental Panel on Climate Change (IPCC)⁶.

This centred on two areas: a statement that the glaciers in the Himalayas would melt by 2035 and another on the source of figures on the rate of drying in the Amazon basin. These were called 'Himalayagate' and 'Amazongate' by the media. In the case of the Himalaya figure, this was very obviously wrong had been mistakenly taken from a report that had not undergone the proper scientific review process. The IPCC acknowledged this error and issued an apology in January 2010.

Many consider that small errors are bound to appear in a document as big as the IPCC report, with over 3,000 pages. In spite of this, the criticism has led calls for changes in the way that IPCC will operate in the future.

In a report published in August 2010, an expert panel has recommended that the IPCC should in future:

- analyse the IPCC process, including links with other UN agencies.
- review the use of non-peer reviewed sources, and quality control on data.
- assess how procedures handle 'the full range of scientific views'.
- review how the IPCC communicates with the public and the media.

The publication of the Fifth Assessment Report in 2013 will show if the changes in how the IPCC operate will help avoid such errors occurring.

Reflective questions

- What is your view of the errors in the IPCC report?
- Do you think the errors undermine climate science and the work of the IPCC or were they genuine mistakes in a large technical report?

⁶ <http://www.ipcc.ch/>

Wind Farms

Wind farms are becoming a prominent feature of the Scottish landscape.

Particularly in the early days of wind farm developments there was often resistance from local populations who expressed concerns about turbines being unattractive, noisy and a potential cause of health problems. There were also concerns about dangers to wildlife.

The energy companies involved have worked in partnership with local communities to address their concerns. For instance, by arranging for construction traffic to travel at night-time to minimise congestion at rush hour and issuing guarantees that turbine blades would be slowed down if they created too much noise. Companies have also taken many steps not just to protect wildlife but to enhance it.

Some communities, like that of Eaglesham which is near Whitelee Windfarm, also receive a community dividend from the energy companies which can be used to enhance the local community and local sports facilities.

Wind farm on Lewis

Not all proposed wind farm developments have been accepted. In 2004, a large wind farm was proposed on the Isle of Lewis. At 234 turbines, each 135 metres high, it would have been the largest in Europe. Local opinion was divided but the local authority was in favour of the development and gave it planning permission.

This was challenged and following a Public Enquiry, the decision was taken by the Scottish Government in 2008 not to allow the wind farm to be built. In this case, the special wildlife on the peatlands proved to be important in the decision.

Read more information at:

- Moorland without Turbines
<http://www.mwtlewis.org.uk/>
- The Scottish Government decision
<http://www.gov.scot/Topics/archive/energy-consents-applications/Applications-Database/Wind/Lewis-Decision-Index>

Community-owned turbines

In many parts of Scotland, local communities are setting up community trusts to build and manage their own turbines. This is especially common on the remote islands off the west coast of Scotland.

Reflective questions

- What are your thoughts on wind farms? Do you have one close to your community?
- Do you think they spoil or improve the landscape?
- Do the benefits in terms of jobs and clean, green energy outweigh any negatives?

Beauly-Denny powerline



In 2005, a consortium of power companies applied for permission to replace the power line from Beauly, north of Inverness, to Denny, south of Stirling, with a new 137 mile long high capacity route. The new route would be of larger pylons, 53 metres high, replacing the existing 33 metre pylons. The existing power lines linking north Scotland to the rest of the UK are old and low capacity. They will not be able to carry large amounts of renewably generated electricity for the windy north and west to the main energy users in the south.

A new Beauly/Denny power line would greatly increase the capacity of the national grid in north Scotland and make possible the development of renewable energy projects both north of and along the line.

The plans divided opinion and provoked much controversy. Some saw them as a necessary development to meet challenging carbon reduction targets. Others objected to the development due to the adverse impact the pylons would have on the landscape, to tourism and recreation, to wildlife, to property values and because of potential health risks. In addition many of the objectors did not think that alternatives had been investigated fully, especially options for an underground cable or an under-sea route.

In 2010 the Scottish Government gave permission for the power line to go ahead, with some modification, especially in recommending that the line went underground at key parts of its route, for example in the Cairngorms National Park and near Stirling.