

Environmental Sociology

Series Editors: Michael Redclift, King's College London, UK and
Dr Graham Woodgate, Institute for the Study of the Americas,
School of Advanced Study, University of London, UK.

Environmental sociology and environment social science sub-disciplines more generally have been developing steadily over the last 30 years. Touching on environmental social movements and grassroots activism; environmental citizenship and green consumerism; sustainable development; the social construction of environmental risk and environmental harm; the environment in the media; ecotourism; and climate change, environmental sociology is a very broad and inclusive subject. This new series, edited by Michael Redclift and Graham Woodgate, is international, cross-disciplinary and designed to produce the leading edge publications in their field.

Mediating Climate Change

JULIE DOYLE
University of Brighton, UK

ASHGATE

science conceives of the environment as a feminised, commodified, disembodied and visible nature, quantifiable through numerical measurements based upon a universalised system of time, has proven problematic not only for the identification of climate change, but also the ways in which it is given meaning, and thus the forms of technological action advocated. Latour's observation that 'the end of nature is also the end of a certain type of scientific certainty about nature' (Latour 2004, 63) is particularly pertinent here.

Scientific conceptions of (environmental) knowledge are inscribed and reproduced through wider cultural discourses and practices. The mediating practices of both the environmental movement and the mass media have contributed to the representation of climate change as a nature 'out there', rather than an integral, embodied part of human culture, inscribed by social norms and values. As climate change fundamentally questions scientific values and current ways of understanding the environment, then a new way of thinking about the environment and human relationship is necessary; one which situates people's everyday interactions as part of environmental processes and ecosystems. Rather than waiting for scientific certainties about the exact nature of the future impacts of climate change, which can never be certain, the feminist call for 'socially responsible and reflexive forms of knowledge...essential for democratic and ethical outcomes' (Plumwood 2000, 51) must be taken up. Although the controversy over the UEA leaked emails appears to have contributed to a decrease in UK 'public confidence that climate change is happening' (Spence et al. 2010, 17), as well as in the USA (Leiserowitz et al. 2010), the event may serve to encourage climate scientists and researchers to publically acknowledge the uncertainties which underpin climate science, and in doing so create more reflexive forms of knowledge and communication. Furthermore, understanding the power relations which underpin the conceptual distinctions between nature/culture, subject/object and self/other – distinctions which climate change breaks down – will enable a more ethical and productive engagement with the issue of climate change that is attentive to a range of different perspectives, but one that ultimately acknowledges the human costs and global inequities of climatic change, and uses these as the basis for ethical action.

Chapter 2

Visualising Climate Change: Negotiating the Temporalities of Climate Through Imagery

[W]hatever you can see is not actually the global warming of the present...the warming that we see today...is a function of greenhouse gases emitted decades ago, and the full effects of the carbon dioxide we are emitting today will not be felt until decades from now...Another way to put this is that whatever you can see is the past of climate change, the *present is still invisible* (Kolbert 2009, 70, my emphasis).

As Kolbert reminds us, climate change is temporally complex and not always visible. The time lags between cause and effect pose problems for its visual representation. While historically a lack of visual 'evidence' made it difficult for scientists and environmentalists to communicate the reality of climate change to sceptical governments, publics and the world's media, the more recent proliferation of photographic and video images documenting climate change impacts (Braasch 2005; Pearce 2007; Schmidt and Wolfe 2009; NASA 2009; Cottle 2009) should not leave these difficulties unexplored. Indeed, the very concept of visual 'evidence' supports scientific knowledge systems which have figured the environment as a visible nature, making it difficult to communicate the inherent invisibility of climate change, or the temporal disjuncture between its causes and effects (Beck 1992; Adam 1998a, 1988b). Given the centrality of images to the communicative practices of scientists, environmentalists and the media, surprisingly little research has been conducted on the visual communication of climate change in comparison to textual analyses (exceptions include Nicholson-Cole 2005; Linder 2006; Doyle 2007, 2009a; Leiserowitz 2006; Lesierowitz et al. 2008; Hansen and Machin 2009; Manzo 2010; Cottle and Lester 2009; Smith and Joffe 2009). Yet, climate change provides a unique opportunity to explore both the possibilities and limitations the visual poses for the communication of temporally complex phenomena like climate change, within the context of an image-centric, western media culture.

Current analyses of climate change images have called attention to the distancing and disempowering effects of photographic and video imagery (Leiserowitz 2006; Lorenzoni et al. 2006; O'Neill and Nicholson-Cole 2009), and the reappropriation of such images, along with those of climate science, by commercial markets for financial gain (Linder 2006; Hansen and Machin 2008). If climate change imagery is increasingly distancing and decontextualised, what role have images played historically in the mediation of climate change? Given the centrality of the visual to western science and culture, how have the complex temporalities and changing visibilities of climate change been negotiated and represented through images?

This chapter explores these questions through a critical analysis of a selection of imagery produced by scientists, environmentalists and the media, from 1990 to 2007, to examine how the temporal and visual limitations of climate change have been negotiated *visually* by these social actors over time.

The focus upon scientists, environmentalists and the media is due to their historical significance in the identification of climate change and its communication to international governments and publics (Mormont and Dasnoy 1995). Comprising both a national (UK) and global context, this chapter examines IPCC assessment reports, Greenpeace (International and UK) campaign materials and BBC (British Broadcasting Corporation) television documentaries. The four IPCC assessment reports (1990, 1995, 2001 and 2007) are analysed because of their privileged status within the international politics of climate science, and their policy influence. Representing environmental communication strategies, Greenpeace has been chosen because out of all the international environmental NGOs it has been involved the longest in the communication of climate change (Leggett 1990; Greenpeace UK 1990; Mormont and Dasnoy 1995), and is specifically (but problematically) invested in the visual communication of environmental issues.¹ In the case of media representation, the visual format of television (rather than newspapers, for example) makes it ideal for the analysis of imagery; while the focus upon documentaries, over news media, addresses the relative lack of analysis of non-news factual genres within media and communications research (Mellor 2009). As a public service broadcaster, the BBC has been chosen because of its remit to inform, educate and entertain the (British) public, and its claims to impartiality and honesty (BBC 2009a; BBC 2009b). Its concern to bring 'the UK to the world and the world to the UK' (BBC 2009c) situates its communication of climate change within the context of both a national and global audience.

This chapter discursively analyses the range of images produced by these actors, at particular moments in time (synchronic), and across time (diachronic). Attentive to the context of their production and intended reception (Rose 2007), the images are also examined in relation to wider socio-cultural discourses and practices, including the status of climate science, climate policy and news media coverage at particular historical moments during the period 1990-2007. Kate Manzo's (2010) typology of climate change images provides a useful way of identifying the range of images deployed across this time period. Manzo distinguishes the categories of 'Planet', 'Environment' and 'Living Beings', and their various types: the 'Planet' is represented by globes and maps; the 'Environment' by 'flooded areas' and 'melting glaciers/polar regions'; and 'Living Beings' by 'Animals – Polar, bears, penguins' and 'People – in floodwater, on parched land, on glaciers' (Manzo 2010, 98). Significantly, people have constituted the least represented type. Alongside these categories/types of climate imagery, the analysis also considers the representational practices/technologies used, including photography,

¹ My analysis of Greenpeace here draws upon, but also extends, research I have already undertaken on Greenpeace climate change communication (see Doyle 2007).

video, satellite images, scientific drawings and computer simulations. While all images are representations, signifying on a connotative or symbolic level (Barthes 1997), photography, video and satellite images also gain authority through their indexicality, or denotive function (Barthes 1977, 2000; Sontag 1977; Nichols 2001; Mellor 2009). In contrast, computer simulations are created from mathematical data, translating 'invisible entities (beyond the range of human vision)...into visible analogues' (Wolf 1999, 274). Wolf contends, however, that 'in science and in many public sectors, as well as in the public's imagination, the mathematical basis behind computer simulation has given it a status similar to (or greater than) photography, despite the often much more tenuous indexical linkage' (ibid, 286). In examining the range of imaging technologies and representational practices used in the visual mediation of climate change, the analysis pays attention to the scope of meanings generated through varying contexts of production and reception.

Drawing upon the theoretical framework presented in Chapter 1, this chapter examines how concepts of nature, vision and time have been negotiated by the three actors through visual representation. In doing so, it charts the recent historical developments of a visual lexicon of climate change within and across science, environmentalism and the media, to consider how these may have shaped our current perceptions of climate change as a distant future, rather than locally and personally relevant (O'Neill and Nicholson-Cole 2009). The analysis identifies four historical phases (presented here in four parts) in the visual communication of climate change, to explore how imagery is variously used to make climate change meaningful as a present or future issue, and to help create the discursive conditions for promoting climate (in)action.

Part 1: Predicting the unseen future through the (in)visible present (1990-1995)

Scientific visualisations – rational visions of present/future worlds

...we might conclude that detection [of human induced climate change] with high confidence is unlikely to occur before the year 2000 (IPCC 1990, 253).

Reliant upon science for its identification, significant international recognition of climate change came through the publication of the IPCC's first assessment report in 1990. Both the IPCC and climate science more generally have depended upon climate modelling to make future projections of climatic change. Taking the form of graphs, maps and globes, these scientific visualisations are 'speculative images' whose 'representation is based partly on theory and partly on fact', and, as such, are 'simulations based on structural prediction of processes that cannot be seen' (Trumbo, J. 2000, 382). They demonstrate the temporal complexity of climate change, where data in the present is used to make predictions about the unseen future. From a representational perspective they constitute one of the first

significant sets of images of climate change to be produced, playing a crucial role in the development of climate science, and in the visual lexicon of climate change.

While computer simulations are central to climate science, Shackley and Wynne (1996) argue that the IPCC reports have failed to acknowledge the uncertainties which form the basis of climate modelling, in their efforts to influence policy decisions through the promulgation of (future) certainty. This is apparent in the 1990 IPCC report, which argues for significant investment in the production of general circulation models (GCMs) through computer technology. In 1990, three dimensional models of the atmosphere and of the ocean were produced separately, and coupled occasionally: 'even though this [coupled models] is crucial for climate change prediction, only a few models linking all the main components of the climate system in a comprehensive way have been developed' (IPCC 1990, 73). Taking into account the 'different timescales' of atmosphere and ocean requires 'computer speeds several orders of magnitude faster than is available on current machines' (ibid). Reliance upon limited computer technology is exacerbated by the different temporal dimensions of atmosphere and ocean: 'while the atmosphere reacts very rapidly to changes in its forcing (on a timescale of hours or days), the ocean reacts more slowly on timescales ranging from days (at the surface layer) to millennia in the greatest depths' (ibid, 77). The complexity and diversity of ecological time, in this instance, poses problems for the memory capacity and representational capabilities of computer technology.

Climate science, as presented by the IPCC, reinforces institutionalised discourses of techno-science through investment in the (future) capabilities of computer imaging technologies. Yet, climate modelling is dependent, not only upon the technical capacity of computers, but also 'the availability of appropriate observed data' (ibid, 100). This is a central paradox of climate modelling: improvements in computing technology and observed climate data aid the accuracy of the modelling process, yet the passage of time advances climatic change. The future capabilities of computers and 'satellite observing systems' which are 'expected to become an important new source of global data for model validation' (ibid) rely upon (imaging) technologies to generate climate data. Indeed, in 1990, the reason that increases in global mean temperature could not yet be wholly attributed to the increase in greenhouse gas emissions was because climate models were 'still in an early stage of development' (ibid, 243). Such investment in technologies is characteristic of the scientific project of global geo-research and the development of earth observational systems, instigated in the late 1960s following the production, by NASA astronauts, of some of the first photographic images of Earth from space. Wolfgang Sachs notes that 'hope of future expansion [in this case, in the production of knowledge of climate change] is directed towards observation of the earth alongside communications technology' (Sachs 1999, 125). Climate science similarly privileges the economic and power relations inscribed in scientific and governmental institutions through its commitment to the expansion of global observational projects for climate modelling.

The images produced in the first assessment report are representational; standing in for ecological processes, and utilising cultural conventions of representation in order to provide meaning. Comprising of tables, graphs and maps, the images attempt to give visual presence to invisible processes. Graphs which show ascending lines endeavour to make visible, through conventions of scientific illustration, the increase in global temperatures since 1750 and the corresponding increase in greenhouse gas emissions over the same time (produced as separate graphs in 1990). Communicated numerically by decades and centuries, the passage of time is presented as a steady horizontal line, against which the increase in global temperatures and greenhouse gases is to be measured and predicted. Time is presented as steady and ordered, and ecological processes are presented as fluctuating (see Figure 2.1), but showing a steady increase in temperature (and atmospheric concentrations of CO₂/greenhouse gases) since 1750. The multiplicity of rhythms and temporalities that constitute ecological processes are thus rendered pictorially as ascending black lines. While this simplifies ecological processes in order to show climatic change and make it 'real', at the same time, the presentation of industrial time as a steady line, against which climatic changes are measured, renders ecosystems as knowable through scientific practices premised upon industrial time. The visual order imposed upon ecological processes by the graphs, which show past, present and future through ascending lines, are counter to the temporal and spatial complexity of climatic change.

Accompanying these graphs are pictorial representations of the modelled climate system attempting to link ecological processes, such as surface air temperatures, soil moisture and CO₂ precipitation, to specific geographical places through the form of maps. These maps are focused predominantly on the global scale, flattening the contours of the earth into two-dimensional illustrations of the major continents

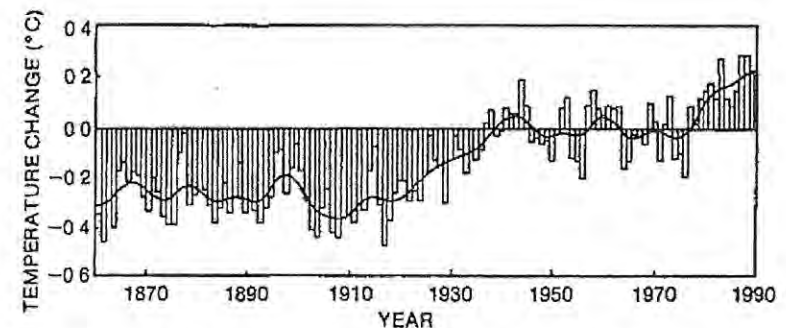


Figure 2.1 IPCC graph showing global mean combined land-air and sea-surface temperatures from 1860-1990

Source: Climate Change 1990: The IPCC Scientific Assessment Report Prepared by Working Group I, Figure 11. Cambridge University Press. Reproduced with permission of the IPCC.



Figure 2.2 Computer modelling showing effects of doubling CO₂ for July-August-September on surface air temperatures (10 year means) from the IPCC

Source: Climate Change 1990. The IPCC Scientific Assessment Report Prepared by Working Group I, Figure 5.4. Cambridge University Press. Reproduced with permission of the IPCC.

of the world (see Figure 2.2). As such, they represent the world according to the cartographic and geometric rules of longitude and latitude, first used by Mercator in the sixteenth century (Whitfield 1997; Sachs 1999). Derived from computer models, the coloured maps attempt to illustrate the predicted effects in 2030 of doubling CO₂ on 1990 rates. Colours associated with warmth and heat – yellow, orange and red – are used to demonstrate warming; the darker the colour, the higher the temperature. Such images are early representations of the potential global distribution of increased CO₂ emissions, where the different colourings illustrate the unevenness of temperature changes. The use of the world map locates specific temperature increases to broad geographical areas, adding spatial nuances to the information presented in the accompanying graphs. Yet, the limitations of current models are acknowledged by the IPCC for failing to illustrate regional specificities.

Like graphs, the simulated maps visually construct and represent the climate system through the use of existing cultural metaphors and knowledge–power relations. As Whitfield reminds us, ‘Maps are cultural artefacts’ (Whitfield 1997, viii), representations of the world that construct and reflect historical, social and cultural values. Linked historically to the western colonial project, the cartography of maps invokes ‘the desire to see an image of the entire world focused before us; clear, self-contained, comprehensible and masterable’ (Whitfield 1997, 2). The perception of ‘mastery’ provided by maps is derived in part from the viewpoint they offer; representing the physical contours of the world from above. This ‘space-centred perception’ (Sachs 1999, 103) of the world erases a sense of place. While this representational viewpoint occurred centuries before the technical means of flight enabled it to become a ‘reality’, Sheila Jasanoff argues that the military

and scientific endeavours of the mid-twentieth century provided the technological and ideological means to ‘collect and record data on a global scale’ (Jasanoff 2004, 38). The space race of the late 1950s and early 1960s initiated a new age in earth viewing, commencing with the Soviet Union’s launch in 1957 of the first scientific satellite to orbit the earth (followed by the USA). This was reinforced by the International Geophysical Year (1957–8), which sought to co-ordinate the efforts of scientists from around the world in identifying global geophysical data. As such the image of the world from space was being chartered, recorded and mapped by (inter)national governmental programmes premised upon the acquisition of scientific data, and the perpetuation of knowledge–power relations within scientific and governmental institutions.

The global maps used in the IPCC report acquire some of their meaning through these historical developments. As Jasanoff observes, ‘Providing facts on a planetary scale requires not only scientific instruments and work, but also institutions capable of interpreting and disseminating knowledge’ (Jasanoff 2004, 45). Institutions thus ‘arose to produce simulations and statistics about the Earth that could more readily serve as a basis for global policy. These bodies straddle the world of science and governance by hybridizing knowledge and power’ (Jasanoff 2004, 44). As an institution, the IPCC embodies this position. The simulated world maps produced in their 1990 assessment report (and in subsequent reports) are mediations between science and politics. These maps present a dialectical vision of a climatically changing Earth: while illustrating the potential increases in global temperatures and their differential spread across the world’s continents, at the same time, the use of a world map invokes a sense of control and order on climate change that is at odds with the temporal and spatial complexity of climatic changes, and the unpredictability of feedbacks.

Although the three-dimensional image of the globe is rarely used in the IPCC’s first assessment report, the map of the world laid flat draws meaning from this image. Much has been written on the role of the image of the earth in the development of modern environmentalism. Produced in 1968, NASA’s photographic images of Earth from space are attributed to the initiation of a global consciousness of shared humanity, representing the earth as a fragile entity under threat. The image of the earth, however, has also been critiqued precisely for instigating a global world view which erases national differences and eliminates ‘people, places and political boundaries’ (Jasanoff 2004, 46). Or, as Wolfgang Sachs argues, ‘...it stands for the unification of the world in the image of the West’ (Sachs 1999, ix). As products of western science, the simulated world maps used by the IPCC draw their authority as images invested with the power of science and technology, erasing political and cultural differences. Although the simulated maps attempt to show the differential increases in temperature around broad regions of the world, they cannot show the specificities of climate change on a local level, nor do they attribute the quantity of greenhouse gas emissions produced by different countries/nations.

As one of the first sets of images of climate change, the computer modelled maps utilise existing cultural symbols and discourses to help make climate change

meaningful. They attempt to show visually the ways in which increased CO₂ emissions will lead to future increases in temperatures across the globe. In doing so, they are dependent upon both the capabilities and limitations of computer technology, investing in a future when computer and satellite technologies will enable better data and better simulations, simultaneously denying the uncertainties which form the basis of this science (Shackley and Wynne 1996). These simulations are constrained by the fact that they are simulations; projections of future events that rely upon observations in the present to gain their validity. Both the maps and the graphs invest seeing/sight as the basis upon which knowledge of climate change is produced, where temperature increases and changes in soil moisture are designated through broad colour coded regions on the world map. Dependent upon science for their power, at the same time, these representations decontextualise the processes of climate change from a lived and sensed experience. We look down on the earth, and observe the graphs, from a disconnected position, where the specificities of place and space are removed. Furthermore, the institutionalisation of knowledge promotes the notion of techno-fixes, deflecting attention away from moral or political obligations to address the global inequalities of climate change.

The 1990 IPCC report had been preceded by a couple of years of high media coverage of global warming/climate change, particularly in the USA, UK and New Zealand (Ungar 1992; Bell 1994; Carvalho and Burgess 2005). The issue was linked to weather related events such as drought in the USA (Ungar 1992; Krosnick et al 2000), and, incorrectly, with the ozone layer in New Zealand (Bell 1994). In 1988, media coverage was supported through political announcements on climate change by the UK Prime Minister, Margaret Thatcher (Carvalho and Burgess 2005) and New Zealand's deputy Prime Minister, Geoffrey Palmer (Bell 1994). In Western Europe and North America, however, media coverage peaked in 1990 and did not increase again until 1997 following the adoption of the Kyoto Protocol (Boykoff and Roberts 2007). In Australia, New Zealand, the Middle East, Asia, Eastern Europe and South Africa, media coverage increased slightly in 1990, remaining relatively even, but low, until 1997 (Boykoff and Roberts 2007). Media coverage of climate change in the late 1980s focused upon the occurrence of extreme weather events, such as droughts and cyclones, making the simulated futures produced by climate scientists difficult to translate into credible realities. In the context of UK media coverage, Carvalho and Burgess (2005) note that while scientists first identified the issue, they lost definitional control after 1991, as climate sceptics received more media coverage than climate scientists; a shift also reflected in the USA media (McCright and Dunlap 2003; Boykoff and Boykoff 2004).

Reinforcing climate science – televisual discourses of (ir)rationality

The visualisations produced by the IPCC have been dependent upon the media and environmental NGOs for their wider circulation. NGOs, in particular, provide 'substance to scientific diagnoses which are most often expressed in the arid forms of figures, curves and diagrams', seeking 'to define the largest number of possible

consequences that may have some significance for the different publics which it addresses' (Mormont and Dasnoy 1995, 57). The BBC documentary, *The Heat is On* (BBC/OU 1991), and a Greenpeace International climate campaign report, *Emerging Impacts of Climate Change?* (Greenpeace International 1993), illustrate the different approaches taken by these actors in early attempts to make climate change meaningful to a UK and international audience. While both draw upon scientific knowledge to explain climate change, this is framed very differently, deploying divergent sets of images to communicate the issue.

Through interviews with leading climate scientists and the prolific use of scientific visualisations in the form of graphs and climate model simulations, *The Heat is On* (BBC/OU 1991) assigns definitional control to scientists. It is a 'subjunctive' documentary because it relies upon computer imaging simulations to show 'what *could be*' or what 'would be' (Wolf 1999, 274), but is also a science documentary, where 'the representational methods of scientific discourse invite similar expectations to those of documentary film', that is, indexicality (Mellor 2009, 143). Simulated images gain their indexical status through the 'truths' of scientific discourse, as conversely, the indexical status of video images favoured by the news media are disavowed in the opening sequence. Here, audio excerpts from TV news stories of rainstorms and floods in Britain and France are supported visually by video footage of sea storms, hurricanes and flooding. Acting as the 'voice-of-God' (Nichols 2001), the unseen narrator informs us that throughout the 1980s and into the 1990s, weather has been getting more extreme, with floods and droughts setting new records. Yet, the credibility of these visual signs is undermined by the narrator who tells us that whilst some (i.e. the news media) have claimed that these are signs of climate change, others have not. The 'others' are climate scientists, represented here by Stephen Schneider, from the National Center for Atmospheric Research (NCAR), USA. Schneider notes that in the last year, the media have picked up on global weather events, presenting these as signs of climate change. However, 'It's going to make many years to prove it' (BBC/OU 1991). Appearing to undermine the credibility of climate science, what Schneider and the documentary are doing is establishing climate science as a rational, cautious, and long term project, whose knowledge is accumulated over time. The rationality of science and the irrationality of media representations are thus presented through images, where indexicality is assigned to the future predictions of climate modelling and graphs, rather than video evidence of weather events in the present.

The contested 'truth' status of climate imagery is at the centre of the programme's exposition, as science is both textually and visually established as more credible than the indexical force of news media images. A scientific graph depicting an increase in global temperatures is directly contrasted with the visual spectacle of media coverage, as the narrator says, 'It was the slow rise in temperatures that had climatologists worried rather than extreme weather events the media were excited about' (ibid). Linguistically linking worry to climatologists and excitement to the media conveys a sense of scientific responsibility as opposed to inappropriate

media hype. In this instance, scientific images in the form of climate model simulations of the future are presented as more credible than photographic/video images of the present/past (Wolf 1999).

Credibility is established further through large scale imaging and computer technologies. Accompanied by an image of a computer model of the globe, Schneider states,

In order to make predictions you need satellites of the earth looking down to see the amount of energy that's coming in and out to see what's happening on the globe, then large computers to store, process and validate the only tools we have for forecasting the future climate models (BBC/OU 1991).

Schneider comments that computer models are 'very computer intensive', that 'we need lots of instruments', and that 'hopefully by about 2000 we'll begin to build credible forecasting skills' (ibid). In framing the issue as a concern of science and technology, the role of the (news) media in the communication and making meaningful of climate change is undermined. While the documentary's critique of the indexical status of video images helps to foreground the unseen nature of climate change, the framing of this critique constructs an inverted hierarchy of image production and type. Trust is placed in scientific and governmental institutions for the development of future technologies in order to make better climate predictions. The temporal future is thus more reliable than the present, effectively placing knowledge and power within an institutional framework.

Like the work of the IPCC, the institutionalisation of knowledge production is reinforced through the linkage of science to policy (Shackley and Wynne 1996). Alongside scientists, politicians are given precedence as the main protagonists in the co-ordination of international efforts to address climate change, effectively rendering citizen/NGO action as secondary. Video footage of politicians debating visualises the link between science and policy. In this instance, the indexical status of photographic/video evidence is not questioned, but affirmed through discourses of governmentality. Both politicians and the media, however, are criticised for demanding visible proofs. Condemning the media for distorting the debate on climate change, Schneider says, 'What gets lost in this confusion is the basic consensus', whilst what remains uncertain are 'details such as timescale' (BBC/OU 1991). Schneider's criticisms of media representations and common (mis)perceptions of scientific knowledge are supported by the narrator; 'The global warming debate has thrown into sharp focus the very nature of scientific evidence. Politicians are being asked like never before to take action based on estimates rather than established facts...science can rarely provide the 100% proof that politicians are demanding' (ibid). By acknowledging the uncertainties associated with predicting the exact magnitude and effects of global climate change within particular countries, the documentary highlights the temporal and spatial complexities of climate change. As an early example of the televisual communication of climate science to a mainstream audience, this questioning of

the notion of scientific (un)certainty in the context of climate change is a timely reminder of the misrepresentation of scientific uncertainty in relation to the consensus of opinion on climate change during the 1990s (Boykoff and Boykoff 2004), but also the loss of a more open discussion of scientific uncertainty as revealed by 'Climategate' (see Chapter 5).

In foregrounding the science of climate as reliant upon computer model simulations, the documentary argues that climate change needs to be understood as long term and future based, rather than short term and visible in the present. This could be viewed as an important early critique of the spectacular nature of media coverage of climate, also highlighting the contingent nature of scientific knowledge. However, the promotion of scientific imaging processes, dependent upon substantial economic and institutional support, reinforces existing power relations, effectively disempowering the mass media, the public and NGOs. Indeed, within the institutional framework of the BBC, the documentary reinforces the discursive authority of (techno)science and government, as the viewer is called upon to place trust in these institutions. Yet, given that the programme is itself a mass media product, the tensions and contradictions inherent to its critique of media discourses are also played out. The need to make the issue culturally meaningful is revealed by the title of the programme – *The Heat is On* – which metaphorically invokes a warming planet and helps to simplify the effects of climate change for the public, reinforced by the narrator's use of the term 'global warming'. 'Climate change' is the term used by the scientific community and the IPCC, whilst 'global warming' has been the term most used by the media (Whitmarsh 2009). Interchanging between 'climate change' and 'global warming', the programme's use of both phrases illustrates the media's negotiation of scientific terminology and language that may be more culturally meaningful to a wider audience, even as it criticises the sensationalism of media representations.

Climate change in the 'here and now' – NGO communication on present/future effects

Greenpeace's climate change communication performs a more explicit motivational function. As one of the first international environmental NGOs to communicate the findings of the IPCC's first assessment report to a wider audience, Greenpeace has been at the forefront of climate change communication since the early 1990s (Leggett 1990; Greenpeace UK 1990). While its early climate publications are predominantly text based, subsequent campaign materials have integrated the visual with the textual. Unlike the cautious findings of the IPCC, and the BBC's critique of news media representations of climate change, Greenpeace's campaign report, *Emerging Impacts of Climate Change?* (Greenpeace International 1993), asserts the presence of climate impacts in the here and now. Through photographs of weather related events, such as droughts,

cyclones, floods and fires, the question posed is answered in the affirmative (See Figure 2.4).

Opening with a photograph of scorched earth, accompanied by the text 'the first signs of the big heat', the report places climate change in the present through photographic 'evidence' that associates it with warming and heat. The temporality of rising heat is given immediacy through criticism of the term 'global warming': "'Global warming", the "greenhouse effect" – these are terms that do not in any way reflect the danger of what we humans are doing to the atmosphere. "Climate chaos", "climate apocalypse", the "hothouse effect" – these terms would be more appropriate' (ibid). The urgency of climate change is (re)defined through an appeal to make it linguistically more immediate, dangerous and catastrophic. Tensions emerge between the discourses of science and those of environmentalism, as the need for the climate change to be made immediately relevant to the public is in conflict with the cautious observations offered by science.

Greenpeace reappropriates the findings of the IPCC, through the inclusion of a temperature graph, citing research from other scientific bodies such as NASA and the British Scott Polar Institute. Yet, it is critical of scientists for being constrained by institutional protocols and for waiting for proof of climatic changes: 'there are *already* many worrying indicators that the climate is *already* responding to the effects of our uncontrolled emissions of greenhouse gases and that global warming is *already* being felt' (ibid, 5, my emphasis). The future predictions of science, based upon current observations, are altered to emphasise the existence

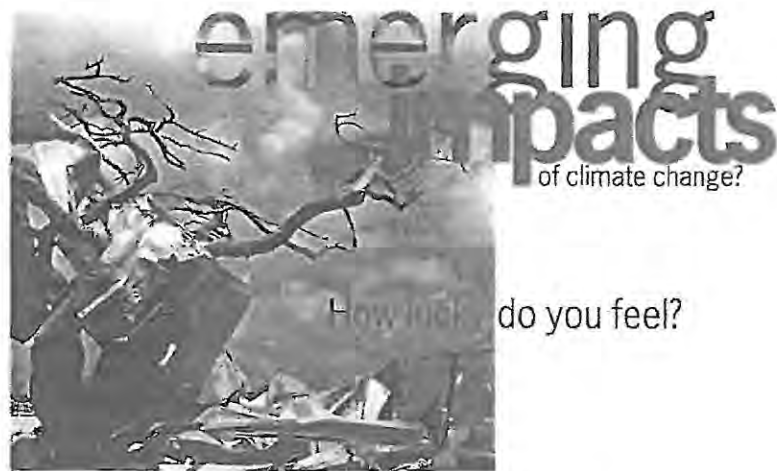


Figure 2.3 Front cover of Greenpeace's *Emerging Impacts of Climate Change?* report

Source: Greenpeace International 1993. Reproduced with permission.

and urgency of climate change in the present, reinforced by the use of active verbs to depict these ongoing changes: rising; melting; warming; dying; foundering; spreading; intensifying; shifting; shrivelling, imperilling.

As a basis for mitigatory action, this urgency is supported by visual 'evidence'. With the exception of one graph, all the images are photographs. Some depict weather 'events' that have already occurred, or show impacts to biology such as bleached corals. Working as both denotations and connotations of climate change (Barthes 1977), they show the present impacts of climate change, and make it culturally meaningful through weather. Other images in the report signify more explicitly through connotation. For example, images of animals imply the future impacts of climate change through association with the photographic 'evidence' of impacts. Importantly, future impacts are linked to both animals and humans: animals are represented by the polar bear and the Coroboree frog, whose habitats are at risk; humans are visually represented in relation to the loss of home/habitat and the return of diseases. In one photograph, a white man with a facial sore signifies the visible effects of the potential return of old diseases such as Leishmaniasis (oriental sore), malaria and dengue fever. Overall, discourses of danger and catastrophe for humans and animals prevail, illustrating how environmental NGOs 'operate a type of futurology, occasionally a little catastrophic because the message presupposes an appeal to the emotions and preoccupations and daily experiences of ordinary people' (Mormont and Dasnoy 1995, 57)

As an early example of NGO climate change communication, what is striking is the range of images used to convey the present and future impacts of climate change. The inclusion of humans is particularly noteworthy, helping to shift the environmental focus away from non-human nature, lacking in more recent visualisations (Manzo 2010). These images, however, are not exempt from critique, while they figure climate change as a global issue affecting all humans and animals, their positioning of people in developing countries reinforces a discourse of vulnerability and danger that has colonial roots (ibid). While most of the photographs in the report include an explanatory title, two images do not. One shows three black people digging in between the cracks of a drought stricken land (see Figure 1.4). The other shows two black people, laid on dusty earth, whose faces and upper bodies are covered over with sheets, signifying death. In the background are groups of black people waiting outside tents. Without any textual reference, apart from the titles of the section of the report they appear in – 'Spreading drought' and 'Shrivelling food supplies' – these images signify on a connotative level, assuming the viewers a priori interpretation of photographic images of suffering related to African famine and western aid to developing countries (Chouliaraki 2008). Intended to convey the human impacts of climate change, they are generic images that utilise an existing discourse of vulnerability that denies the western colonial roots of poverty in developing countries.

Depoliticisation and disavowal are further reinforced by the images and text which follow on the final two pages of the report, focused on threats to insurance industries and economies: 'Greenpeace has spoken to people at the top of the



Figure 2.4 Photograph from inside Greenpeace's *Emerging Impacts of Climate Change?*

Source: Greenpeace International 1993. Reproduced with permission.

insurance industry in both London and Zurich who fear for the very future of the insurance industry' (Greenpeace International 1993). Unable to predict the magnitude of catastrophe that climate change may bring, 'the world's biggest business would have been reduced to a shadow of its current self' (ibid). A western economic model is thus presented as a global perspective, where a neoliberal discourse is in tension with a discourse of morality presented through images of vulnerability and suffering. At the end of the report, while Greenpeace identifies human activity as the cause of climate change, it is policy makers who are called upon to take 'real action'.

Discussion – scientific caution and environmental/human catastrophe

The developing visual lexicon of climate change in the early 1990s demonstrates a negotiation by all the actors of the present and the future through imagery. For climate scientists, simulations, in the form of computer modelling and graphs, use present data for future projections. While the images present unseen futures, their validity depends upon observations in the present, constrained by the temporal and visual dimensions of empiricism. Furthermore, their presentation of *global* climate change through simulations of world maps draws upon a history of imperial visions, inscribing power through the observational imperatives of techno-science. Investment in communication and visual technologies as a basis of increasing climate knowledge further invests power in western institutions. The difficulty in understanding these

images outside of science is illustrated by the BBC documentary, *The Heat is On* (BBC/OU 1991), which gives credibility to the science of climate by explaining how climate modelling works, and disavowing media representations of extreme weather events in the present. A disconnection between scientific visualisations and media representations is thus established quite early on. However, both science and the media are bound by the use of evidence in the present to make predictions and to help communicate climate change, defined at this stage through science and policy.

Scientific rationality can be contrasted with the rhetoric employed by Greenpeace which seeks to make climate meaningful in the present though the evidential status of photography and an emotional appeal through a language of catastrophe. Although appropriating scientific findings, Greenpeace chooses not to reproduce computer models, instead making the issue meaningful through an array of photographic images that convey the breadth of present climate impacts on humans, animals, habitats and industries, in developed and developing countries. Recent media images of extreme weather events and distant lands are evident here, but this is countered by the wider range of images/effects shown. Yet, the focus upon humans works to reinforce unequal economic and power relations, even as a discourse of morality is present. In all three examples, it is not made clear how the individual and/or communities can help mitigate climate change as the issue is framed through scientific institutions and government policies.

Across all three actors, Manzo's (2010) categories of planet, environment and living beings are represented. The IPCC and the BBC focus upon planet (in the form of globes and maps), and the BBC criticises media coverage of weather events (within the category of environment). In contrast, Greenpeace does not use images of the planet, instead focusing upon the category of environment and living beings to make climate change meaningful in the present. Thus, at this early stage in the developing visual lexicon of climate change, there are distinct differences between these three actors in their choice of images and how climate change is temporally framed. Greenpeace uses photography to lend immediacy, while the IPCC and the BBC adopt a more cautious approach, investing knowledge and power within scientific and computational technology, and the institutions which support them. The purported linearity of technological developments, however, deflects attention away from the urgencies and temporal complexities of ecological time.

Part 2: Scientific caution versus urgent action (1995-1997)

Detection of a human-induced change in the earth's climate will be an evolutionary and not a revolutionary process...While there is already initial evidence for the existence of an anthropogenic climate signal, it is likely (if model predictions are correct) that this signal will emerge more and more convincingly with time (IPCC 1995, 438).

The characteristically cautious findings of the IPCC meant that its second assessment report in 1995 was only able to state that 'the balance of evidence suggests a discernible human influence on global climate' (IPCC 1995, 4, my emphasis). The report failed to attract the same kind of media attention as the first had, and was published during a period of low media coverage and public perception. As ever, climate modelling is presented as central to climate science, with much of the report explaining developments since 1990, significantly the production of coupled atmosphere-ocean models and increased confidence in their accuracy as a result of the 'increasing realism of simulations of current and past climate' (IPCC 1995, 5). Although there is still very little regional information available, important progress is identified by the shift from simulating 'global mean changes to comparisons of modelled and observed spatial and temporal patterns of climate change' (ibid). Yet, as 'climate models are calibrated, in part, by introducing adjustments which are empirically determined' (ibid, 34), dependency upon present observations illustrates the temporal limitations of empiricism. While climate models are presented as having significantly improved, they remain constrained by the epistemologies of empiricism where evidence is sought in the present/past. In 1995, the observed data from 1979-1988 is used as a basis for simulations, and as a comparison for assessing their validity, rendering the 'real' as already in the past.

Taking the form of graphs and simulated maps, the images in this report are similar to those produced in the first. What differs is the inclusion of a wider range and more detailed model simulations of the world, with a broader range of colours used to represent predicted global climatic change for different ecological processes, for example, air surface temperature, sea level changes, storm tracks and precipitation. The wider colour spectrum, however, leads to aestheticisation of the images and, potentially, decontextualisation (Hansen and Machin 2008).

The simulated maps of the world depict more detailed outlines of the continents, whilst other variations from the 1990 report include the use of simulated spherical globes, rather than flattened world maps. While regional simulations remain limited, maps of the USA, UK, Europe and Antarctica do appear, revealing the North American and Western European focus of the IPCC. Criticism of the western perspectives presented through the image of the globe as well as the world maps (Sachs 1999; Jasanoff 2004; Cosgrove 1994) thus find further articulation through the regional maps included in the IPCC, reinforced by the dominance of USA and UK scientists as lead and contributory authors to the reports. The IPCC's explicit promotion of the need for more satellite data to provide 'globally consistent data sets of long duration' (IPCC 1995, 528) further links a global perspective to the technological and economic models of the west, inscribing power through visual technologies and perspectives which view the earth from space in order to map and control it. To advance understanding of the climate system the IPCC calls for 'a co-ordinated spectrum of approaches ranging from individual research projects through to global-scale experiments and observational systems and infrastructures' (ibid, 21). The move from the global to the national and local, at this stage, is enacted from the perspectives of the west, communicated through the range of images used in the

IPCC and the dependence upon large scale visual and communications technologies which assign power to governmental and scientific institutions. Although the report calls for substantial cuts in greenhouse gas emissions in order to stabilise greenhouse gas concentrations in the atmosphere, understanding the past, present and future of climate change remains the preserve of science and technology, thereby maintaining the dominance of the west in climate science and in suggested policies.

Although media coverage of climate change was low at the time of the publication of the IPCC's second assessment report in 1995, coverage increased during this period and throughout 1997, as the international Kyoto Protocol was adopted in December 1997 (Carvalho and Burgess 2005; Boykoff and Roberts 2007). The BBC science documentary, *The Science of Climate* (BBC 1997), assigns definitional control of climate change to scientists and scientific technologies. Opening with an image of a satellite circling the globe, and news images of floods, hurricanes and storms, the narrator tells the viewer that satellites collect weather data 24 hours, but that climate is a complicated system. Initially making climate culturally meaningful through weather, the premise of the programme is to complicate this interpretation through a consideration of the complexity of climate beyond weather. It does so by foregrounding the scientific technologies and practices required to understand climate, and the necessity of acquiring empirical data. Dominating its visual narrative are images of satellites stationary in space and orbiting the globe, computer models in the form of globes, and graphs depicting temperature changes. These scientific representations position scientific technologies and practices as in control of climate, as the documentary seeks to downplay the urgency of climate change through an appeal for more data and interdisciplinary research, so that scientists can better ascertain the extent to which climate change is the result of human causes. The scientific representations are supported by footage of male scientists working in situ, for example, looking at ice cores in Antarctica, or men working on computers. While there is some discussion of the potential human causes of climate change - 'mankind is burning fossil fuels' - overall, discourses of science and technology prevail, as the urgencies of addressing climate change are over-ridden by the faith in the rationality of the practices and protagonists of science and technology. In doing so, the viewer is left unable to contribute to the mitigation of climate change, as confidence is invested in the retributive qualities of science.

Investment and faith in the techno-practices of (climate) science can be contrasted with the approaches taken by Greenpeace in 1997, through its international campaign to stop new oil exploration. *Putting the Lid on Fossil Fuels* (Greenpeace UK 1997) renders climate change present by linking fossil fuel production to climate change (see Figure 2.5). Although the climate models on the front cover appropriate scientific authority, they function as catalysts for immediate action, not for more investment in climate modelling. Greenpeace utilises the representational practices of science in order to give legitimacy to its efforts to make climate change meaningful. The image of the globe draws more explicitly upon discourses of global interconnectedness and planetary vulnerability, common to NASA's *whole earth* image (Cosgrove 1994), but reappropriates these meanings in the context of

climate change. The nearly uniform redness encircling and shrouding the once-beautiful planet of blue, green and white in NASA's original image signifies a globally uniform increase in temperatures that appears horrifying in its magnitude. Drawing upon the meanings associated with an existing photographic icon central to the discourse of environmentalism, Greenpeace gives meaning to climate change in the form of danger and catastrophe (similar to its earlier communication strategies). Even though the photographic image is digitally altered, and is not 'real', it functions both denotively and connotively through its referential relationship to the original photograph.

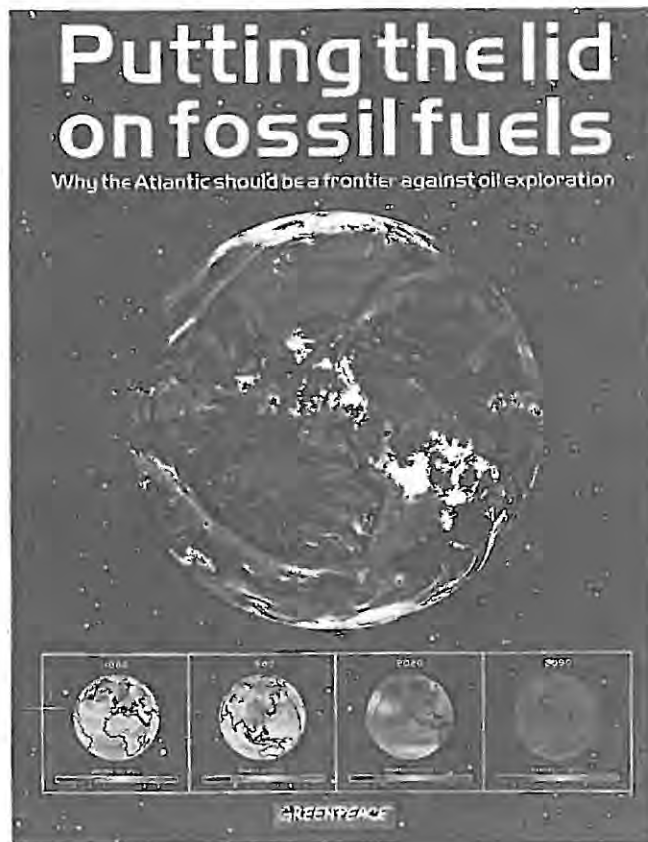


Figure 2.5 Front cover of Greenpeace's *Putting the Lid on Fossil Fuels*

Source: Greenpeace UK 1997. Reproduced with permission.

The reappropriated planetary icon gives meaning to, and is given meaning by, the set of four globes appearing underneath it. Representative of climate modelling, these globes are more explicitly linked to scientific discourse, using the conventions of scientific illustrations/graphs through temperature data and time. They lend (scientific) legitimacy to the enhanced photographic globe while, simultaneously, the image of a globally warmed world gives meaning to the computer models through its use of environmental discourse. Yet, 'the significance of the globe in the language of contemporary debate about the environment' is problematic, because it renders the world 'as an object of contemplation detached from the domain of lived experience' (Ingold 1993, 31-32).

Climate science is given an authoritative voice throughout the report, with quotes from the IPCC's second assessment report on the opening page: "The balance of evidence suggests a discernible human influence on global climate" IPCC, 1995' (Greenpeace UK 1997). This science is somewhat simplified by Greenpeace's translation of this as affirmation by the IPCC that 'climate change had arrived' (ibid). In contrast to the truth status assigned to climate change scientists, Greenpeace critiques the politics of climate change by appealing to the world's governments to 'take these opportunities to agree a fossil fuels budget for the world and commit to a phaseout' at the forthcoming Kyoto Climate Convention in December 1997 (ibid).

The report offers a linear visual narrative of cause, effects and solutions. The inclusion of photographs of oil platforms on the opening page is intended to establish an associative link between oil and climate change. The effects of climate change are conveyed by a series of four photographs placed together, depicting devastation wrought to buildings and landscape by wind and water; indexical signs of an already warming world. At the end of the report a photograph of a group of children surrounding a solar panel is used to metonymically signify the future, and solution to climate change. The temporal dilemma which underpins climate change communication, that is, the need to communicate both the present reality and future threats, without extensive visual evidence, is negotiated in the report through the inclusion of photographs of existing destruction wreaked by weather, alongside the future possibility of a warming planet signified by the computer model predictions.

The tying of the impacts of climate change to a particular location – the Atlantic Ocean – utilises the more usual discursive strategy of aestheticising nature and humanising animals (Soper 1995) to create an emotional resonancy. The beauty and pristineness of a specific ocean habitat is set in visual opposition to industrial oil pollution, 'a wilderness which the industrial world can well afford to leave alone' (Greenpeace UK 1997). The burning of fossil fuels as the cause of climate change is communicated through the destructive image of an oil platform producing a fiery plume, with the risk of flood and hurricane damage communicated via photographs. Significantly, humans are not identified as victims, rather the loss of beautiful ocean habitats and its wildlife, with the clean

technology of solar panels on the final page setting up an opposition between dirty and clean energy.

Discussion – mapping climate change through simulated globes and animal habitats

During the mid 1990s, climate modelled globes produced by climate scientists and reproduced in the IPCC report move from the domain of science into televisual narratives and NGO communication on climate change, acquiring a range of different meanings according to their discursive context. In the IPCC report, the simulations gain legitimacy as representations based upon observed, empirical data, but are simultaneously constrained by reliance upon observed data in the present/past. Furthermore, these visualisations reinforce a particular view of the world, and of climate change, as able to be understood, mapped and (ultimately) controlled through expansion of computing and satellite technology. Although attempts are made to offer a more spatially nuanced range of predictions through regionalisation, the focus upon the UK, USA and Northern Europe reproduces a western perspective. Televisual narratives bring the science of climate and its visualisations to a mainstream audience, yet the cautious findings of the IPCC are reproduced through the BBC documentary analysed, offering a conservative and science bound view of climate change.

The reproduction of climate models in Greenpeace's campaign material signals a more radical reappropriation of their meanings. While the IPCC report and BBC documentary take time to explain the complexity of these models in relation to the accumulated data they are based upon, Greenpeace positions these models as evidence of global climate change in the present as a catalyst for immediate action. In drawing upon the meanings associated with the existing icon of the planet, the globally warmed planet draws upon the viewers' imagination in a way that makes climate change more real through its link to a national (UK) context. Greenpeace's continued use of photographic images reinforces its investment in making climate change real in the present.

To some extent, this period marks a shift towards linking climatic change to particular regions and places, through the start of regional climate modelling, and Greenpeace's focus upon a specific geographical area close to the UK. However, the focus upon animals and their habitats more specifically, marks a slight shift away from the impacts upon humans present in its previous campaign material. As the IPCC and BBC continue to image climate change through computer modelling in the form of globes and maps (at the expense of environment and living beings), Greenpeace also simplify their visual language to focus upon ocean animals. While science and the media continue to link science to policy, environmentalists politicise climate change by identifying the links between industry and government in the production of greenhouse gases.

Part 3: Visible 'evidence' in the present – distant ice, local weather (1997-2001)

Linked to the 1992 United Nations Framework Convention on Climate Change, the Kyoto Protocol was established in 1997 in order to set 'binding targets for 37 industrialized countries and the European community for reducing greenhouse gas (GHG) emissions... at an average of five per cent against 1990 levels over the five-year period 2008-2012' (UNFCCC 2009). Although the protocol did not enter into force until 2005, and was not adopted by Australia (until 2007) or the USA, its establishment signalled an important international governmental commitment to dealing with climate change through the reduction of greenhouse gases. Although receiving high media coverage in the lead up, following the announcement of the protocol there was a drop in media coverage of climate change until 1999, when there was a dramatic increase until 2001, the year the IPCC's third assessment report was published (Carvalho and Burgess 2005; Boykoff and Roberts 2007). Yet, this period of fluctuating media coverage marks an important shift in the visual discourse of climate change towards identifying more geographically specific places as at risk from climate change in efforts to make it more personally meaningful.

For Greenpeace, during the latter years of the 1990s and into the 2000s, the Arctic and Antarctica figure as geographically and politically contested, sites within the mitigation and communication of climate change. The Arctic, and Alaska in particular, is not only an area at the centre of oil expansion, but also an area that has experienced the effects of climate change more acutely than others. As oil companies such as ARCO, BP, Shell and ExxonMobil are targeted, the Arctic and its inhabitants also begin to figure prominently in the iconography of climate change. In July 1997, Greenpeace set off on its first expedition to Alaska's North Slope in the Arctic, 'to study the impacts of global warming and to confront offshore oil development' (Greenpeace International 1999). Both scientific expedition and environmental action, subsequent trips took place over the next three years, specifically to prevent BP from constructing its Northstar oil field project. Both humans and animals are represented as at risk from the impacts of climate change: the lands and cultures of indigenous Alaskans, and animals such as the polar bear and caribou. While the impacts upon the inhabitants of Alaska are being experienced and felt, in Antarctica more potent visual 'evidence' of climate change emerges. The crack in the Larsen B ice shelf, identified and photographed by Greenpeace in 1997, signifies as visible evidence of increasing temperatures, thus initiating one of the most dominant sets of images of climate change, that is, melting/retreating ice, which effectively supplants the human voices of climate change.

Nature's Bottom Line: Climate Protection and the Carbon Logic (Greenpeace UK 1998) makes full use of the photograph of the crack in the Larsen B ice shelf (see Figure 2.6). It denotes the impacts of climate change and, drawing upon dominant discourses of the environment, connotes a fragile and visible nature at risk. Stretching from the bottom of the page across to the top, it draws the eye beyond the physical borders of the image, making the damage to the ice appear

extensive. Although the inside of the report explains in detail how much carbon, in the form of fossil fuels, we can afford to burn in order to stay within 'nature's ecological limits', the photographic image implies that we are already beyond those limits. From the heat and warmth explicitly connoted by the cover of its previous publication (*Putting the Lid...*), where climate change is implied as a future present, the temporal discourse shifts to impacts in the present. However, the crack in the ice signifies as evidence of increased temperatures, and global warming/climate change, only in relationship to previous associations with red heat.

NATURE'S BOTTOM LINE

CLIMATE PROTECTION AND THE CARBON LOGIC

A crucial component is missing from the international plan to combat climate change - the bottom line. How much warming can our planet tolerate before its ecological systems begin to break down? What are Nature's ecological limits and how can we stay within them?

GREENPEACE

Figure 2.6 Front cover of Greenpeace's *Nature's Bottom Line: Climate Protection and the Carbon Logic* showing crack in Larsen B ice shelf

Source: Greenpeace UK 1998. Reproduced with permission.

Although the documentation of visible impacts enables Greenpeace to shift attention towards promoting solutions through renewable energy, it is interesting to note how this period in its campaigning (from 1997-2000) has appeared to leave a lasting impression on the wider visual lexicon of climate change, that is, the production of the Arctic/Antarctica as a 'symbolic/iconic' environment of climate change (Hansen and Machin 2008, 792). Although Greenpeace focused upon human and animal impacts, its imagery links the Arctic to the polar bear more specifically. Since achieving iconic status as the 'poster child' of climate change, the polar bear has diverted attention away from the impacts of climate change upon humans, particularly the cultures and livelihoods of the indigenous peoples of the Arctic and sub-Arctic (Trainor, S.F. et al. 2007).

The shift towards more geographically specific impacts of climate change in the visual discourse of Greenpeace's climate change communication is also adopted by BBC documentaries. Rather than distant (to UK citizens) lands, peoples and animals, however, the impacts of climate change in the UK are foregrounded. In *Underwater Britain* (BBC 2000), climate change is linked to specific weather events, previously criticised as media misrepresentations by the IPCC and earlier BBC documentaries. Opening with the observation, 'more storms, more floods... It looks like the first instalment of global warming' (ibid), the documentary implies that these may be the first impacts of climate change in the UK, using weather events as evidence of climate change; an association that has a longer history in news media and NGO representation. Significantly, this is a human drama, following the lives of people affected by widespread flooding, particularly in Selby, Yorkshire. UK. Here, a warlike mentality is connoted through footage of the army bringing in sandbags to stem the floods, with families helping to fill the sandbags in communal efforts reminiscent of the Second World War. Framed through a discourse of war, the map of Britain is invoked as a territory that will be geographically and economically reshaped as a result of a changing climate. The narrator states that insurance companies are already redrawing the map of Britain, as more areas are identified as at risk from flooding, while the physical contours of Britain, specifically East Anglia, will have to be redrawn as low lying land is submerged under water. The message is that climate change impacts are happening and that this is a present indication of Britain's future.

The human experiences of flooding – as individuals and families are interviewed in their flooded homes, or returning to them once the waters have receded – gives an emotional resonancy to the issue of climate change, supported by the rationality of science. When one resident says, 'Someone needs to tell us if it [flooding] is global warming', the shot cuts to Professor Martin Parry, a climate scientist and a contributor to the IPCC's fourth assessment report (2007), who declares, 'it fits the pattern' (BBC 2000). Computer models from the British Met Office are then shown, as a representative, Helen Young, tells us that there will be more and heavier rain. The narrator states that 'the scientific community now largely agree that global warming is here' (ibid). Scientific discourse and representational practices are offered as rational and authoritative, and computer

model simulations are able to signify as more real and relevant in relation to local experiences of climate change.

Like scientists, politicians are given positions of authority in the programme. A flood victim is shown in conversation with Deputy Prime Minister, John Prescott. Prescott asserts that the flooding is due to climate change, in contrast to one resident who says they do not believe him. Scientists and politicians are presented as the rational voice of climate science, while the public are figured as emotional sceptics. The programme thus sets out to make the case for the reality of climate change using the emotional resonancy (and partial scepticism) of the public for the viewer to potentially identify with, in contrast to the assertions of scientists and politicians. Significantly, institutionalised voices from science and policy frame the issue, while NGO voices are not represented.

The documentary leaves the viewer unclear as to what they can do to help mitigate climate change. Instead they are left with the notion that they may be at risk and are vulnerable, as '1 in 10 people in Britain live on floodplains' (ibid). More commonly used to represent people in developing rather than developed countries, this sense of vulnerability is reinforced through the temporality of climate change. While the programme reinforces the reality of climate change in the present, the certainties of the past are said to be giving way to the uncertainties of the future. Climate change is framed as unpredictable, unprecedented and unknown, with worse to come. The viewer is left with a sense of foreboding and dread that does little to help with the idea of mitigation.

Discussion – distant polar bears and localised human drama

During the latter years of the 1990s there emerges a distinct visual lexicon of climate change that continues its resonancy today. The symbolic and iconic environment of the Arctic/Antarctica figures prominently as a geographical and imaginative place at risk from increasing temperatures, with the polar bear as the emerging icon of climate change. Climate imagery becomes associated with distant places and loss of animal habitats. At the same time, attempts are made to make climate change meaningful and relevant by focusing upon national/local contexts. In the case of the BBC, the extreme weather events of flooding are presented as the human drama of climate change, supported by scientific discourse. The status of the science of climate change is thus more or less established as a consensus in mainstream representation; a position that Greenpeace had taken since the early 1990s.

Using Manzo's (2010) typology, the categories of planet, environment and living beings are all utilised, but represented in very specific ways. Representing the category of planet, the globes and maps of science continue to be reproduced by BBC documentaries but are given meaning through their specific relation to the UK in the form of regional climate modelling. Maps are literally and metaphorically redrawn; through the changing physical contours of the UK as a result of rising sea levels, and the economic redrawing of areas at risk in the UK

through increasing flood. The environment and living beings feature in specific relation to each other. Thus, the Arctic as a geographical space is visually and imaginatively represented by polar bears, effectively shifting attention away from humans. Simultaneously, the move towards specific landscapes in the UK, and the impacts to humans through extreme weather events, finds representation. The BBC's criticism of the media dramatisation of extreme weather events as representative of climate change is reversed, as local human drama is offered. However, the BBC documentary requires the evidence provided by scientists to be able to present these events as signs of climate change, continuing its discursive framing of climate change through science.

This period marks a shift towards imagery linking the global to the local. Yet, as O'Neill and Nicholson-Cole have shown through focus group discussions in the UK, the juxtaposition of images of distant lands/animals and human suffering at a local level, although making climate change seem more important, also disempowers people, making them feeling unable to address the issue (O'Neill and Nicholson-Cole 2009). Such disempowerment is also indicative of how responsibility for mitigating climate change is discursively framed. While Greenpeace identify industry and politics as the basis for change, the BBC continues to provide no critique of industry or governments, nor offer a means for the viewer to help mitigate climate change. Instead they are presented as (sceptical) victims of a decontextualised and depoliticised issue.

Part 4: Observing climate impacts in the present/past (2001-2007)

An increasing body of *observations* gives a *collective picture* of a warming world and other changes in the climate system (IPCC 2001a, 2, my emphasis)

In 2001, the IPCC's third assessment report finally declared that 'there is new and stronger evidence that most of the observed warming observed over the last 50 years is attributable to human activities' (IPCC 2001a, Preface ix). The period following the publication of the report, and leading up to its fourth assessment report in 2007, marked a distinctive shift in political and media discourses on climate change. A significant increase in print media coverage in Western Europe and North America occurred, particularly so after 2003, following summer heat waves in Europe and Hurricane Katrina in the USA in 2005 (Boykoff and Roberts 2007). Although in opposition to the cautious findings of the IPCC, and supported by the discourses of earlier BBC documentaries, the linking of extreme weather events to climate change gained momentum in the news media, as climate change impacts became increasingly linked to geographical places other than the Arctic/Antarctica. Political debate about the urgency of mitigating climate change was aided by the publication of the UK Government's Stern Review (2006), which provided an economic incentive for addressing climate change, while the release of Al Gore's documentary, *An Inconvenient Truth*, in September 2006, offered further

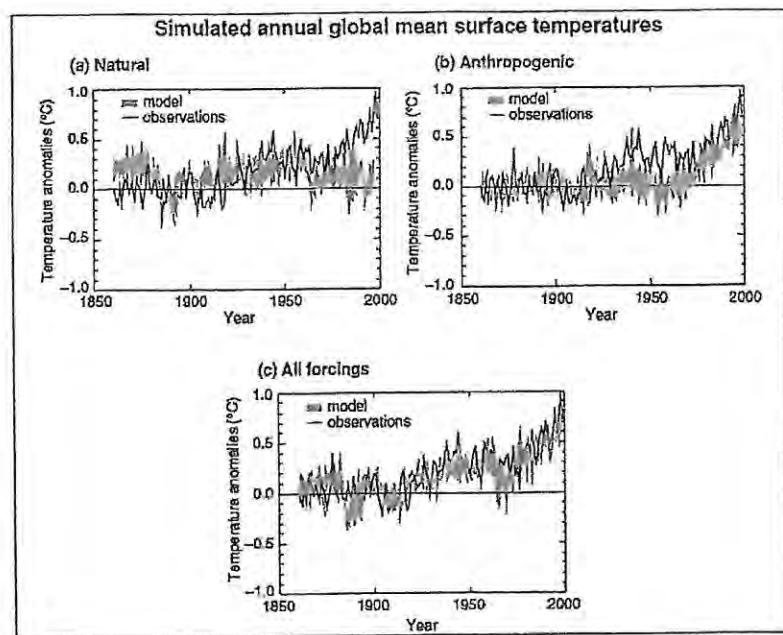


Figure 2.7 IPCC graphs showing visible correlations between observed and simulated temperature rises from 1860-2000

Source: *Climate Change 2001: Synthesis Report. A Contribution of Working Groups I, II and III to the Third Assessment Report of the Intergovernmental Panel on Climate Change*, Figure SPM-2. Cambridge University Press. Reproduced with permission of the IPCC.

high profile representations of climate change. Yet, political debate continued with regards to mitigatory action, with the UK Government attempting a controversial rebranding of nuclear power as carbon neutral (Bickerstaff et al. 2006; Doyle 2011). Therefore, while the significance of climate change increased in terms of media coverage, political debate and public understanding, the different discursive framings of climate change continued.

What had made the IPCC finally attribute climate change to human activity? This was related to 'new and stronger evidence' (IPCC 2001a, Preface ix), provided by correlations between observed and simulated data of climate processes (see Figure 2.7). As in the previous assessment reports, graphs and computer modelled maps feature prominently, but in this instance these representations are presented as more 'real' than in previous reports. What are the conditions of this realism, as the new evidence of human induced climate change? Since the 1990 first assessment report, observational data had been used to simulate future climatic

changes, with the persistent message of the IPCC reports being a call for investment in the collation of more data and better computational technology. In 2001, the claims that increasing temperatures were the result of increased greenhouse gases in the atmosphere through human activity are based upon the results of climate modelling matching the observed data. In other words, the direct observations match the simulated models because, by 2001, there is more empirical data to draw upon and computer modelling is more technologically advanced. As such, the conditions of realism are empirical data and computational ability, as science and technology are intertwined as discourses of truth.

Temporal disjunctures are again revealed as the representational limitations of climate science. Investment in technology is an investment in developments over time, while the need for more empirical data on climate processes also takes time for these to emerge and to be gathered. The point at which enough observational data is accumulated, and computer technology is sufficiently advanced to be able to process this data, for scientists to be able to declare that climate change is attributed to human activities, is at temporal odds with the progression of climate change. The IPCC state, 'several centuries after CO₂ emissions occur, about a quarter of the increase in CO₂ concentrations caused by these emissions is still present in the atmosphere' (2001a, 17, my emphasis). Furthermore, 'ice sheets will continue to react to climate warming and contribute to sea level rises for *thousands of years after* climate has been stabilised' (ibid, my emphasis). Temporal disjunctures between climate processes and scientific knowledge production reveals the problem at the centre of scientific approaches to understanding ecological issues. In the time taken for the IPCC to attribute climate change to humans, greenhouse gas emissions continued to rise, further committing the world to future climatic change.

As a science-policy document, the IPCC produced a synthesis report of the findings of its three working groups (IPCC 2001b), increasing its potential mediation across science, policy, media and public domains. As a form of science communication, the synthesis report is noticeable for its aesthetic and stylistic decisions, as coloured borders and typeface draw attention to specific findings. Increased aestheticisation is also apparent in the wider range of colours used in the graphs and computer models, as the communication of climate science involves representational decisions that take into account the visual format of the findings. Furthermore, the production of knowledge is itself guided by choices of representation, where 'the need to balance scientific understanding against computational efficiency and model realism often guides the choice of the particular class of models used' (IPCC 2001a, 475). In 2001, the deficiencies of computer models, however, still relate to the question of scale, as regional models remain difficult to produce.

The political conservatism preventing the IPCC from attributing climate change to human activities until 2001 has been reflected in the BBC documentaries on climate change since the early 1990s. Yet, the titles of a high profile two-part BBC (in conjunction with Discovery Channel and Open University) documentary series,

Are We Changing Planet Earth? (BBC 2006a) and *Can We Save Planet Earth?* (BBC 2006b), frame climate change as an issue still open to scientific debate. Written and narrated by natural historian Sir David Attenborough, they are both science and natural history documentaries, utilising an expository mode by putting 'the case for a particular view or interpretation of evidence before us' (Nichols 2001, 4). It is Attenborough's own journey as a natural historian to accepting the reality of climate change (a narrative device also used in Gore's *An Inconvenient Truth*) that provides the basis for evidence and interpretation. Supported by an explanation of climate science, video evidence of climate change impacts and the presentation of potential solutions, Attenborough's exposition draws the viewer along his journey to accepting the 'truth' of climate change. The organising logic is both a story and the solving of a problem (Nichols 2001). As a veteran producer of BBC natural history documentaries over 50 years, Attenborough's professional and cultural status provides a voice of authority, reinforced by the scientific discourse Attenborough draws upon and embodies. The truth status of the figure of Attenborough and science is substantiated further in the commercial DVD set of the programmes, packaged and sold under the title, *The Truth About Climate Change* (2008).

The textual rhetoric is supported by the visual rhetoric, which reproduces all of the categories of climate change imagery identified by Manzo (2010) – planet, environment and living beings – and utilises a range of visual technologies and practices including video footage, satellite imagery, computer simulations and scientific graphs. Yet, the most dominant sets of images used are video footage of landscapes and animals, alongside computer model simulations of a warming planet and scientific graphs of global temperature increases. The framing of climate change is one in which visible (video) evidence of climate impacts upon animal species and their physical habitats is prioritised, alongside the truth claims of scientific visualisations and data in the form of computer model simulations and graphs. The 'subjunctive' (Wolf 1999) nature of the computer simulations draws upon the indexicality of video footage, and vice versa, to frame these images as 'truthful' representations of past, present and future climate change. Through the images and discourses of science and non-human nature (environment), the link between representation and reality is established, further reinforced by the authoritative status of Attenborough as spokesperson for the natural world, and through 'extensive footage of interviewees presented as experts', that is, scientists (Mellor 2009, 143).

Temporal and visual discourses intertwine, as past, present and future are represented through visual practices. The first documentary draws upon visual and empirical evidence in the present and past to answer the question posed by the title – *Are We Changing Planet Earth?* (BBC 2006a) – in the affirmative. Initially this is undertaken via Attenborough's reflections upon his own history of documentary film-making, particularly his exploration of the developments of life on earth before humans. Focused primarily upon animal and plant species, Attenborough states in the opening sequence: 'Since life began four thousand million years ago,

it [planet earth] has gone through extraordinary changes in relation to climate and the species that live on it' (ibid). Ecological time is thus established through clock time, where the 'the arrival of human beings' is 'still a recent event in the history of our planet' (ibid). Although changes to the climate and species have always occurred, the fairly recent and rapid changes are attributed to the activities of humans: 'it seems that our planet is being transformed, not by natural elements, but by the actions of one species, mankind' (ibid). As a species, humans are presented as newcomers to planet earth who have brought potentially devastating effects.

As a dominant discourse of the environment, the imposition of humans on the planet is simultaneously reinforced and undermined by the visual rhetoric accompanying the narration. Opening with an aerial viewpoint from outer space, the camera looks down onto the edge of planet earth, then zooms into this earth, traversing above and along a series of generic landscapes that represent the visible beauty of the natural world. Accompanied by reverential music, Attenborough slowly states, 'This is our planet – planet earth' (ibid). Visualising the beauty of nature through landscape and animals, the narrative invites the viewer to consider the earth as 'ours', suggesting human ownership of the natural (non-human) world, even as humans are identified as a recent and damaging addition. Introducing the history of animal and plant species, the visuals cut to polar bears on ice. In stark contrast to the visible beauty of such animals, humans are represented by images of urban cities. The opening sequence thus reproduces dominant discourses of the environment through the icon of planet earth, to simultaneously connote the beauty and fragility of this earth through the landscapes and animal/plant species that inhabit it, against the potential destructiveness of human beings. As such, the viewer is addressed as both an observer/owner of this planet and its beautiful species, as well as a potential destroyer. 'We' are simultaneously part of this planet, but also outside, looking down on its visible beauty, separated and disembodied from nature.

In setting out to answer the programme's question, Attenborough establishes a strong visual aesthetic that reproduces dominant discourses of the environment as a visible nature at risk established in the opening sequence. In the first 20 minutes the viewer is offered a visual tour of the world's animal and plant species, alongside footage of extreme weather events, as Attenborough states, 'In every part of the world new climatic extremes are now being recorded. Our weather is in turmoil' (ibid). The indexical nature of these images function as mounting evidence of potential climatic change, as polar bears are identified as the first victims of increasing global temperatures. The visual and narrative prioritisation of this species in the programme's rhetorical structure, followed by the retreat of mountain glaciers, renders climate change, for the viewer, as distant and 'out there'. Indeed, while human voices are accessed, through interviews with the inhabitants of the South Pacific island of Tuvalu, whose homes are routinely flooded as a result of rising sea levels, and through video footage of the impacts of Hurricane Katrina on New Orleans (USA) in 2005, the visuals, reinforced by the opening sequence of planet earth, assign climate change to dramatic weather events.

Although the documentary offers these images and events as sets of visual evidence, Attenborough continues to question their validity, drawing the assumed viewer along with him on his personal journey: 'is global warming and the changes we are now seeing really a new phenomenon in the earth's history?' (ibid). Further evidence is sought and acquired through scientific data, supported by interviews with a range of male scientists. Empirical data is presented in the form of atmospheric measurements and glacial ice cores, supported by technology in the form of super computers that 'can perform 10 billion calculations per second' (ibid). Discursive practices of techno-science reinforce the visible evidence provided by video footage of weather events and impacts to animals, plants and, to a lesser extent, humans, in order to build an evidential case for the reality of human induced climate change.

The interconnections between time and vision are a significant discursive feature. Empirical evidence is sought in the past and the present to provide the case for present and future climatic change. Attenborough looks back at his own documentaries in order to show the changes over time, now visible in the present. Archive footage of Attenborough's *Life on Earth* (1979) series, where he explored the beauty of coral reefs, is compared to the bleaching of corals in the present as a result of increased ocean temperatures. Similarly, footage of Attenborough in the treetops of the Amazonian rainforest 27 years earlier is contrasted with the current state of the rainforest as a result of deforestation and drought. Signifying as before and after shots, present conditions are authenticated through reference to the past based upon differences that have become visible over time. Yet the visualisation of the passing of time, charted through observable change, is problematic in the context of climate change. Incorrectly, one of the scientists states, 'What we are seeing now is the impact of humans, humans are *beginning* to change the climate' (BBC 2006a, my emphasis). What we see in the present, however, are the effects of past emissions (Kolbert 2009), as humans began to change the climate before these changes could be seen. Reinforcing the dominant discourses of science as empirical data observable in the present/past, the documentary fails to acknowledge the invisibilities and latencies which characterise climate change.

Both a knowledge structure and representational practice, scientific clock time is deployed to understand and validate climate change through the deployment of graphs. While the first documentary began with Attenborough offering a visual and textual synopsis of the development of animal and plant species over time, the programme ends with a graph depicting the increase of global temperatures over time, from 1850 to 2000. In an effort to make the scientific graph more meaningful, both Attenborough and climate scientist, Professor Peter Cox, literally insert themselves into the graph marked out on the floor of a hall. Cox says 'what we are going to do is take a walk through time, and the first thing to note as we walk through is that climate is naturally variable' (ibid). Walking from left to right to demonstrate the passing of time, a growing red line is superimposed onto the floor to depict the rate and levels of temperature rise. When the line reaches 2000, the graph depicts an overall increase in global temperatures. Two

further coloured lines are then superimposed upon the graph: green represents the data from a climate model which takes into account natural climate variations; yellow represents the data from a climate model which takes into account natural variability and human factors such as the greenhouse gas effect. The yellow line visually resembles the trajectory of the red line, depicting human attribution of increased global temperatures since 1850. As a simulated representation, the yellow line on the graph is given the status of indexicality when Cox states, 'the model looks realistic, it looks like the real world' (ibid). Given authority by science, this slippage between representation and reality is afforded further credence by Attenborough when he declares, 'So there you have it. There seems little doubt that this recent rise, this steep rise in temperature, is due to human activity' (ibid). The first documentary thus uses a combination of scientific visualisations and practices in the form of graphs and the gathering of quantitative empirical data, as well as old and new video footage of animals, plants and extreme weather events, to answer the question. The temporal discourses of past and present are communicated through imagery to validate human induced climate change.

In an effort to identify solutions to climate change, the second documentary – *Can We Save Planet Earth?* (BBC 2006b) – switches the temporal dimension to the present and future. Clock time underpins the textual and visual rhetoric. The opening sequence reiterates how changes in the past have been natural, while current changes are caused by humans. What have now become dominant images of climate change are deployed in the opening sequence: penguins, polar bears and cubs, satellite images of planet earth, bleached coral, waves, storms, and people stranded in floods. Attenborough's accompanying narrative interchanges between the temporal dimensions of present and future: 'We *are* causing the world to heat up', 'The vast forest of the Amazon *could* wither and burn', 'The oceans *could* turn acid', 'The arctic *could* be transformed', 'Rising tides *could* cast millions of people adrift', 'There *are* ways to minimise these changes' (ibid, my emphasis). The move from present to future implies the possibility of positive change; Attenborough says, 'We still have time' (ibid). Potential and imminent catastrophe is down played by the possession of time.

Attenborough reiterates the scientific consensus on climate change introduced in the first documentary, but simultaneously undermines it by partially removing human responsibility: 'The great majority of scientists are now agreed that our planet is warming and that human beings *are at least some part of the reason* it's doing so' (ibid, my emphasis). In contrast to the first, however, this documentary focuses more specifically upon humans as contributors to, and victims of, climate change, although the overall emphasis is upon contribution rather than impacts. Throughout, video footage of existing impacts upon humans, such as the flooding in Boscastle, UK (2004), Hurricane Katrina, USA (2005) and increasing bush fires in Australia, are juxtaposed with visualisations of the future in the form of computer model simulations of a warming planet and mock British weather forecasts for the year 2050 of high temperatures and increasing storms. The continuous movement between timescales of past, present and future, and between different geographical

places, is a convention of expository documentary 'which may sacrifice spatial and temporal continuity to rope in images from far-flung places if they help advance the argument' (Nichols 2001, 107). The argument that climate change is real is articulated through the evidentiary status of video and simulated images.

Visualisations of time (as present and future) take centre stage, as seeing and sight are central to the legitimisation of climate change. Computer simulations make visible the invisibility of greenhouse gases, by showing a grey blanket around the earth to represent the thickening of the atmosphere, and through simulated black blocks to signify emissions spewing from households, cars and factories. Future climate change is visualised most prominently by climate models which constitute a large portion of the visual and textual narrative of the documentary. Invited by climate scientist Cox to 'help me visualise what's in store for us' (BBC 2006b), Attenborough and Cox are shown sitting in front of a screen at a projected climate model. This image of the two scientists sitting in a darkened room contemplating the large model projection is continually returned to at points throughout the programme, as the conversation between the two interjects the exposition. The sheer size of the projected image, and the continual return to this scene, gives the image a sense of importance, as it gains its authority through discourses of science and visual evidence, in order to give credibility to future predictions. Attenborough claims, 'This is a vision of how and where the world will heat up if we continue down the path we are on' (ibid). Yet, at the same time, this constant *looking* at the simulated image of the map of the earth as a means of understanding how the world will warm is both a disembodied and decontextualised view, similar to looking at the icon of the planet earth; we are positioned as viewers onto a world of which we are simultaneously part of, but disconnected from. This is reinforced further through the assumption that viewing a world map, where rising temperatures are indicated by changing colours across continents, can tell us about what it will be like to live in a world of increased temperatures, decontextualised from the lived, everyday experiences of a climatically changing world.

Changing individual behaviours is the main way that humans can address climate change, specifically the carbon emissions produced by 'domestic activities'. Through the story of a fictitious western family – The Carbons – the viewer is taken on a visual journey of domestic carbon production. Comprised of a heterosexual couple with two female children, living 'in an average suburban house outside an average city' (the house is by no means of average size), and using 'an average amount of electric power', they signify as a 'normal' family based upon traditional gender roles (ibid). Mother is shown shopping, as Father travels to work by car and takes a business trip by flight. Constructing an assumed viewer through a heterosexual moral economy of the household, their normativity goes unquestioned. Car use, flying, electric appliances such as kettle, oven and TV, packaged food flown across large distances and food wastage are identified as carbon producing practices. These everyday practices of energy consumption through domestic appliances are linked visually and textually to the melting glaciers of the Arctic and Antarctica, and to drought in the Amazon rainforest, in

an attempt to link the local with the global, the immediate to the distant. Yet, in promoting a discourse of individual lifestyle for the mitigation of climate change, responsibility is placed on the individual, at the expense of wider structural and institutional changes such as government policy, or business practices (Hobson 2006).

Accompanying this discourse of individualism is the concomitant message that not much behavioural change is required. Attenborough is shown around a typical UK house by another expert, Dr. Dave Reay from University of Edinburgh, to illustrate what changes can be made to reduce carbon dioxide emissions, including turning off lights and appliances when not in use, turning down the thermostat, switching to energy saving light bulbs, composting waste, buying an energy efficient fridge, or only boiling the specific amount of water needed in a kettle. These changes represent 'simple and painless steps', often encouraged by Government climate communication campaigns, for example, the UK Government's 'Act on CO₂' (UK Government 2009) and the European Commission's 'You Control Climate Change' (European Commission 2009). Such approaches are criticised by WWF as inadequate because of their failure to facilitate deeper, more 'ambitious' behaviour change, including an 'engagement with political process' (WWF-UK 2009, 6). Yet, talking to Reay, Attenborough says, 'Alright, let's get this clear. It's not about stopping ourselves making cups of tea, we're talking about *living the life more or less as we've lived it before* but more efficiently, and waste is the source of our trouble, not actually living?' (BBC 2006b, my emphasis). Answered in the affirmative, imminent catastrophe is averted through an appeal for individuals to make small and painless behavioural changes to their everyday lives.

The profound disconnect of people's lives from the reality of climate change is further reinforced by the foregrounding of technological salvation, from small to large scale. Much of the second documentary is concerned with identifying solutions to climate change, as scientist, Professor Steve Picala, presents 7 steps to stabilising greenhouse gases on current levels over the next 50 years (a figure that is in opposition to the stabilisation of greenhouse gases to 1990 levels that is needed and proposed by the IPCC and the Kyoto Protocol). Quantifying the reduction of greenhouse gases into identifiable slices on a graph of rising temperatures, each solution proposed enables one slice to be removed, presenting a linear process of cause and effect in the mitigation of climate change. Behavioural and technological changes are proposed, from small scale behaviours to large scale technologies. Changing domestic appliances and behaviours in the house remove ones of the imaginary slices, using a fuel efficient car removes another, but is dependent upon '2 billion of the world's cars' being able to do '60 miles to the gallon' by 2050, thus placing trust in future technology (ibid). Driving less removes another slice, but contradicts the investment in car manufacturing previously proposed.

Discourses of technology prevail, as large scale technologies are presented as offering the biggest means of emissions reduction. Under the guise of 'carbon free sources of power' such as solar and wind, nuclear is proposed, 'however controversial, tripling the world's nuclear power would cut our emissions by a

further slice' (ibid). The discursive construction of nuclear as carbon free is a fairly recent development, promoted by the UK Labour Government as a means of building public support for the commissioning of new power stations; and representing a U-turn on their commitment to no new nuclear power (Bickerstaff et al 2006; Doyle 2011). The documentary thus reproduces dominant governmental and institutional discourses without acknowledging the carbon produced through the building of new power stations (which can take up to ten years), nor the significant amount of financial investment required to build new nuclear stations, at the expense of investment in renewable technologies such as wind and solar. Techno-fixes are further promoted through the unproven technology of carbon capture and storage (CCS), introduced by Attenborough as 'technology we already have [that] can save us' (BBC 2006b). Picala states 'the Norwegians have estimated that we could store all of Europe's carbon dioxide for the next few hundred years in this way', describing it as 'exactly the kind of technology that could keep those monsters from ever coming out behind their doors', monsters being 'things we don't yet fully understand' (ibid). The inaccurate presentation of CCS as proven technology is further obfuscated by the reference to unidentified monsters, which the technology will help keep at bay. As this is the last technology presented in the discussion of solutions to climate change, it serves to undermine the behavioural changes which preceded it, and the viewer is left with the incorrect impression that technology will store the carbon we emit.

The two documentaries are reliant upon video evidence and scientific simulations to make climate change 'real'. Through an expository mode, in the context of science and subjunctive documentaries, the viewer is taken on a journey by Attenborough to witness climate change in the past and present in order to try and imagine the future. Yet, the visual and textual movement between these different temporalities, and across different geographical spaces, works to undermine the seriousness of the issue when considered in relation to the underpinning narrative structure, which follows a linear trajectory identifying the problem, showing the evidence, then offering solutions. Furthermore, the actual solutions proposed are either small scale individual behavioural changes, or large scale technological solutions for the future. A discourse of individualism places responsibility on individuals to make small changes to their lifestyle (Hobson 2006), while political pressure is not even discussed and government responsibility is excised. Scientists are given definitional control, as policy and citizen action (rather than consumer action) are rendered invisible.

Climate action in the 'here and now' – a global problem addressed locally

In contrast to Attenborough's (and thus the BBC's) framing of both the reality and mitigation of climate change as still in question, the focus of Greenpeace campaigns has always been climate action in the here and now. In the early 2000s, Greenpeace focused its attentions upon energy sources, particularly the links between oil companies and politics. Continuing its longer term critique of the activities of oil



Figure 2.8 An individual and collective appeal to climate action from Greenpeace

Source: Greenpeace International 2007.

companies, ExxonMobil became the main focus of campaigning due to its funding of the Global Climate Coalition (which sought to undermine climate science), and its successful lobbying of the Bush Administration in the USA, to remove a USA climate scientist as chair of the IPCC, who advocated governmental action on climate change (Greenpeace International 2002a). From exposing 'dirty' politics, it moved on to promoting renewable energy, particularly wind power, providing both an economic and environmental justification for governmental investment in wind as opposed to nuclear power (Greenpeace UK 2002, 2004). Advocating changes to government policy and industry practices, Greenpeace places individual action within a wider institutional context rather than the individualist discourse offered by the BBC. *How to Save the Climate: Join the Energy [R]evolution* (Greenpeace International 2007) is an explicit call for action through an appeal to a collective movement (see Figure 2.8). Different temporalities are evoked through the word

play: revolution connotes abrupt and radical change, while evolution implies a natural, gradual progression. The double meaning simultaneously positions energy changes as a fundamental shift to a new social order, but one that is more developed and natural than the previous one reliant upon fossil fuels.

Significantly, no photographic images are included in the report. Instead cartoon images depict climate processes, climate impacts, climate actions, and an imagined future of decentralised energy production: energy produced and consumed close to its source. Past, present and future are communicated via images, serving to make climate action fun through the humour associated with cartoon imagery, indicating (or assuming) an audience's familiarity with existing climate imagery. All of Manzo's typology of climate images are represented here, however, people figure more prominently than any other type, not simply as victims of climate change but as agents of change. Scientific images in the forms of graphs, computer models of the globe and maps are minimal. The globe itself features here not as a scientific model of a warming world but as an environmental symbol, emblazoned on the chest of the person on the front cover (see Figure 2.8). The inclusion of longitudinal and latitudinal lines on the globe, however, does signify a scientific discourse. As a global call for action, the image draws upon earlier discourses of environmentalism, particularly citizen activism of the 1970s. This global call also evokes an individualist/consumerist approach through branding and logos emblazoned across the chest and the appeal to 'I'. Such contradictory meanings are indicative of the globe as an icon, but also within the context of Greenpeace's use. The slogan (whose signs are intended to be read as 'I love the planet') appears as a motif throughout the report, appearing on a placard of someone protesting outside the Whitehouse (USA), on a T-shirt hanging on a washing line, and as graffiti on an office building. The politicisation of the globe in the form of protest – both legal (demonstration) and illegal (graffiti) – is concurrent with the commercialisation of its environmental meanings through branded clothes. As such, the report addresses a number of different audiences in its attempts to build a collective movement.

Climate science is taken for granted, as attention is focused upon what can be done. Explicitly, humans are addressed as agents of change through an appeal to the human dimensions of climate change: 'This problem is unlike anything in the past. It affects the whole planet and *threatens every living person in every country on every continent*' (Greenpeace International 2007, 2, emphasis in original). This focus upon humans as opposed to animals is reinforced through the text, with repeated references to 'people' and a global 'we'. Through a global discourse, inequity between countries in relation to energy consumption and the ability to cope with climate change is acknowledged as one of (in) justice, where 'every living person on this planet will have to reduce his [sic]

personal output of CO₂ to 1.3 tons per annum by the year 2050' (ibid, 6).² While some of the changes advocated are similar to the 'small and painless steps' presented in Attenborough's documentaries, others, such as informing oneself, persuading others, and protesting, provide a more socio-political context for action. Although the brochure 'is being published in many countries around the world' (ibid, 3), it is clear that a western neoliberal economic perspective is presented, as the forms of action advocated are possible 'without endangering the global economy and still giving poorer countries the opportunity to develop' (ibid). In the context of energy saving, economic, technological, consumerist and environmental discourses are entwined: 'A lot of household appliances consume much more energy than necessary – even when they are switched off. You can change all of that with a combination of wise purchase decisions and a few simple tricks – and both your *household accounts* and your *climate account* will look a lot healthier' (ibid, 12, my emphasis). The economic justification for climate mitigation, proposed in the Stern Review (2006), enables a language of economics to be used and legitimised in the context of climate change. A neoliberal agenda is articulated through the appeal to 'home-owners' as 'the pioneers' of decentralised energy, although it is not clear how they will achieve this. Cartoons of imagined future suburbs, cities and villages depict the use of solar and wind energy, and the consumption of energy close to its source. Concurrently, the message that 'less is more' contradicts the framing of homeowners as pioneers. The attempt to change perceptions of 'quality of life', assumed in 'the modern world' to be achieved by 'as much, as soon, and as cheaply as possible', does, however, demonstrate an effort to make climate change meaningful through an appeal to, and a questioning of, existing social and cultural values (Greenpeace International 2007).

Discussion – chasing time

Following years of media misrepresentation of the consensus of climate science, the increasing instances of extreme weather events have provided an important news media hook. Although western news media have linked weather events to climate change since the late 1980s (Ungar 1992; Bell 1994; Krosnick et al 2000), the context of scepticism within which these links were made, and thus interpreted, has changed. Where weather events were once criticised by climate scientists and the BBC for misrepresenting climate change, from 2000 onwards, weather has been foregrounded by the BBC and by the climate scientists it has interviewed, as visible evidence of climate change.

² The focus upon human dimensions of climate change is an important shift, signalled earlier in a 2004 report by the International Institute for Environment and Development (IIED) and new economics foundation (nef), that was supported by Greenpeace and other environmental, faith and development organisations/charities entitled *Up in smoke? Threats from, and responses to, the impact of global warming on human development* (IIED and nef 2004).

For the IPCC reports and Attenborough's documentaries, the evidence of climate change is provided by the correlations between observed and simulated data. Computer model simulations and graphs of past, present and (projected) futures are given indexical status through scientific empirical data. These images, and the knowledges produced, are reliant upon clock time, and hence the passing of time, to gain legitimacy. The time encoded in these visualisations is at odds with ecological time, as the observable effects of climate change in the present are the product of past emissions, producing a time lag. Attenborough's documentaries, in particular, are constrained by this sense of time, because it is only when climate change is proven through visible evidence (which includes photographic/video images and computer simulations) that action is advocated.

In contrast, Greenpeace has always maintained that climate change is real, deploying photographs to give it a sense of reality and advocating preventative measures. While Attenborough utilises video images (predominantly) of non-human nature to demonstrate climate impacts, and to provide indexical evidence for the computer simulations, Greenpeace has chosen to use cartoon images in place of photographs to depict the causes, impacts and solutions. Although both Attenborough and Greenpeace advocate 'small and painless steps' for individuals to mitigate climate change, these behavioural changes are framed very differently by each actor. Placed in the context of larger technological fixes, Attenborough renders the mitigation of climate change as the responsibility of individual consumer actions, and large scale technological projects. Greenpeace places the individual within a broader social and political context, advocating changes to behaviour and perception, as well as industry practices and governmental policies. Although both utilise a neoliberal economic discourse, Greenpeace shift attention away from non-human nature to present climate change as a humanitarian crisis.

Whereas the IPCC have been constrained by developments in observational data and computer technology – an issue of economics and time – both Attenborough and Greenpeace place clock time, and the passing of time, as central to climate action. The quantification of time as a means of generating action is intended to communicate, simultaneously, that 'we still have time' (BBC 2006b), but that it is running out. Greenpeace more explicitly identify a timeline for action, stating that 'the next ten years are crucial' (Greenpeace International 2007). Given that the world is already committed to climate change through past emissions, it is interesting to note that adaptation is not discussed. Attenborough's documentary does, however, acknowledge the commitment to increased temperatures when Cox states, 'we don't have very much choice over what happens in the next 25 years because it is largely the function of what we've emitted in the past' (BBC 2006b). Yet, this observation is subsumed within the broader exposition of the documentary and does not facilitate talk about adaptation. In the context of a society based upon clock time, to discuss the need for adaptation to existing climate change does not generate a sense of urgency for action in the present. Instead, attention is focused upon action for

the future in the present, as a means of quantifying and containing the threat of climate change. In doing so, ecological time, again, exceeds the boundaries of clock time.

Conclusion

Despite the problems associated with visualising the temporally complex and invisible phenomena of climate change, images have provided an important means of communicating this issue for all three actors, although for very different purposes. In delineating preferred forms of climate in/action images have been used to convey the immediacy of climate change in the present, but also to render it as a future concern. Examined over a period of time, distinct patterns of image use emerge within and across the three actors. For Greenpeace, the indexical function of photographs has consistently been used to substantiate the immediate present of climate change, supported by a textual narrative that asserts climate change in the 'here and now'. Through photographic images of causes (fossil fuels), impacts (weather events, disease) and solutions (solar, wind), the urgency of climate change, and the motivation for climate action, is reinforced through the use of scientific graphs and computer models, whose meanings have been reappropriated and amplified as evidence of climate 'truth'. Originally using a range of images covering the categories of 'Planet', 'Environment' and 'Living Beings' (Manzo 2010), Greenpeace's visual language became more focused upon 'Environment' through distant lands (Arctic/Antarctica) and 'Living Beings' in the form of animals (polar bears) during the late 1990s, in an attempt to create symbolic/iconic environments for climate change. More recently, Greenpeace has moved away from photographic imaging of land and animals towards a renewed focus upon humans as agents of change, including a questioning of existing social values.

For the IPCC, computer model simulations and graphs constitute the basis of climate science and its visual communication. Premised upon the accumulation of observable data in the past to make future predictions, climate models embody a time lag, replicated in the IPCC's consistent appeals for investment in computer technology to offer more credible future scenarios. As such, climate change is communicated as a future issue through the deferral of knowledge production, where investment in future technology remains at temporal odds with the developmental processes of climatic change. As representations which fit into Manzo's category of 'Planet', the computer models map space through cartographic projections that are geopolitical (Jasanoff 2004; Sachs 1999) and distancing. Concerned with influencing policy decisions, in their search for more credible computer model projections, policy action is deferred.

BBC documentaries have consistently appropriated the model projections and graphs of climate science as a means of asserting scientific credibility. In undermining the indexical status of news media images of weather events

and reifying the projections of science as 'truth' (Wolf 1999), the BBC has corresponded with the conservative views of the IPCC, and placed responsibility with scientists and policy makers. While its documentaries have importantly discussed the scientific uncertainties which underpin climate projections, this has been used as a means of appealing for better computer technology to create more accurate climate predictions, thus deferring mitigatory action. Although a shift in representation occurs in the BBC documentary from 2000, as the indexical status of video images of weather events are given credence as evidence of climate change (previously and vehemently denied), it is only through interviews with climate scientists that these images are given credibility. Furthermore, as the BBC documentaries have corresponded to the cautious discourses of the IPCC across this time period, David Attenborough's documentaries from 2006 are conversely incommensurate with climate science, as human induced climate change is posed as a question still requiring answering.

Over the 17-year period analysed, Greenpeace has consistently presented climate change as a future that is present, while the IPCC and BBC documentaries have more explicitly assigned climate change to the future. Although images of science (graphs and computer models) have been deployed in Greenpeace's campaign literature and in the BBC documentaries, they have been appropriated for different purposes, to either amplify or delay the need for mitigating action. Images of climate impacts used by Greenpeace (and by the news media) have been critiqued by BBC documentaries, in favour of the indexical status of scientific images (Wolf 1999). Similar forms of climate imagery have thus been used to convey very different fields of action through their varying contexts of production and reception (Rose 2007). As an institution, the BBC has positioned itself beyond the representational practices of mainstream media, to align itself with the institutional authority of science. Yet, this close alignment with science as a means of conveying its claims to impartiality and honesty (BBC 2009b), conversely denies the political nature of the IPCC, while deferring mitigating action to a future.

Current climate images have been identified as disempowering and disconnected through their simultaneous focus upon distant lands and local impacts (O'Neill and Nicholson-Cole 2009). Over the time period analysed, Greenpeace images have corresponded to this figuration, particularly during the period 1997 to mid 2000s. A more recent focus upon human action through non photographic imaging (Greenpeace International 2007), however, importantly shifts attention onto human agency. The BBC has made climate distanced through its adherence to the scientific images of computer model simulations and the authority of science, but over the last ten years has drawn upon dramatic impacts to humans (BBC 2000) and animal habitats (BBC 2006a, 2006b). Given the BBC's persistent elision of citizen action through its focus upon scientific knowledge however, its more recent use of distant/local images to convey the impacts of climate change must be viewed in this historical and institutional context, which has constrained the promotion of citizen action on climate change.

Significantly, across all three actors, none have discussed the invisibility of climate change, and the temporal disjunctures between its causes and effects, as a means of substantiating action in the present. In focusing upon the visible present (Greenpeace), or investing in future imaging processes (IPCC and BBC), the temporal complexity of climate change and its inherent invisibility has not been mutually recognised.