Mike Hulme

can science fix climate change?

Table of Contents

New Human Frontiers series

Harry Collins, *Are We All Scientific Experts Now?*
Mike Hulme, *Can Science Fix Climate Change?*

Can Science Fix Climate Change?

A Case Against Climate Engineering

MIKE HULME

polity

First published in 2014 by Polity Press

Polity Press

65 Bridge Street

Cambridge CB2 1UR, UK

Polity Press

350 Main Street

Malden, MA 02148, USA

ISBN-13: 978-0-7456-8205-1

ISBN-13: 978-0-7456-8206-8 (pb)

ISBN-13: 978-0-7456-8526-7 (epub)

ISBN-13: 978-0-7456-8525-0 (mobi)

A catalogue record for this book is available from the British Library.

For further information on Polity, visit our website: www.politybooks.com

Acknowledgements

I would like to thank my colleagues Martin Mahony, Rob Bellamy and Helen Pallet for reading and commenting on early drafts of this book, and also two anonymous readers of the full manuscript, who made valuable suggestions for clarification and improvement. For what remains I take full responsibility. At Polity I would like to thank Emma Longstaff for commissioning this title, Manuela-Maria Tecusan for her meticulous copy-editing and the production and marketing team, especially Neil de Cort, Elen Griffiths and Ginny Graham. The index was compiled by Bill Johncocks, who, as always, performed the task with great professionalism and diligence.

Acronyms

CDR	carbon dioxide removal
ENMOD	the Environmental Modification Convention
EPSRC	the Engineering and Physical Sciences Research Council
ETC	the Erosion, Technology and Concentration action group
IPCC	Intergovernmental Panel on Climate Change
SPICE	Stratospheric Particle Injection for Climate Engineering project
SRM	solar radiation management/sunlight reflection methods
UNESCO	the United Nations Educational, Scientific and Cultural Organisation
UNFCCC	United Nations Framework Convention on Climate Change

Preface

Between 1997 and 2009 the belief persisted among most world leaders that climate change was a problem that could at least be contained, if not completely solved. In December 1997 the Kyoto Protocol was signed at the 3rd Conference of the Parties to the United Nations' Climate Convention, committing industrialised nations to reduce their greenhouse gas emissions by 5 per cent over the next 15 years. The senior British political negotiator John Prescott famously declared: ‘This is a truly historic deal, which will help curb the problems of climate change.’ Yet 12 years later, in December 2009, the hope of reaching a ‘fair, ambitious and binding’ follow-on deal at the 15th Conference of the Parties in Copenhagen ended in failure, rancour and disillusionment. The multilateral negotiating process now moves to the 21st Conference of the Parties in Paris in December 2015, where the nations of the world have agreed, yet again, to sign a treaty that should commit all nations to start reducing emissions by 2020. Few are holding their breath.

Yet the risks associated with anthropogenic climate change continue to be encountered somewhere between our direct experience of the world and our science-fuelled imaginations. As global emissions of greenhouse gases – especially carbon dioxide – have soared in the 17 years since the Kyoto Protocol was negotiated, ocean heat accumulates, Arctic sea ice shrinks, heatwaves intensify, the ocean acidifies and sea level rises. Curiously, however, global air temperature – the favoured headline indicator of climate change – has barely increased. The warming trend in global surface air temperature between 1970 and 1998 was 1.7°C per century; between 1998 and 2012, just 0.4°C

per century. At the very least, this suggests that knowledge of the complete dynamics of the planetary system is not yet complete.

Yet there are few concerns in the world today that can match the global salience and cultural reach of climate change.[1] After more than a quarter century of scientific investigation, public debate, political negotiation and policy development, climate change and its contested causes remain for many – although not all – a hot-button issue. All of human life is now lived out not just in the presence of a physically changing climate, but in the new discursive and cultural spaces that have been created by the idea of climate change. It is as though all human practices and disputes now can be – now have to be? – expressed through the language and symbolism of climate change.

So photography, cartoons, poetry, music, literature, theatre, dance, religious practice, architecture, educational curricula, and so on now use climate change as a medium of expression. Books dealing with climate change now appear at the rate of more than one per day in the English language alone, up from less than one per week a generation ago. And political disputes about landscape aesthetics, child-rearing, trade tariffs, theology, patents, extreme weather, justice, taxation, even democracy itself, find themselves inescapably caught up in the language and argumentative spaces of climate change. Climate change has become a new condition around which human life takes shape; we 'feel there might not be *any* narrative whose meaning we cannot re-evaluate in relation to climate change'.[2]

So here is the paradox of climate change. While worldwide awareness of climate change as a matter of concern has grown during these last two decades, there remain few problems that are as politically intractable. Top-down multilateralism orchestrated through the United Nations – the so-called Plan A – has abjectly failed to reign in global

emissions of greenhouse gases. And politically and culturally engineered behavioural changes within nation states have brought about only marginal adjustments to the underlying drivers of energy consumption and land use change. The world's expanding energy supply continues to be drawn mostly from fossil fuel sources, and the growth in material consumption was only halted – temporarily – by the global recession of 2009–10.

If neither global diplomacy nor changes in human behaviour can solve climate change, a new argument is now being advanced: the world needs a Plan B for regulating climate and, more importantly, science and technology can deliver one. By intervening directly in the heat flows from the sun to the Earth's lower atmosphere, it is deemed possible by some that a thermostat for the planet could be created. The plausibility of this global thermostat relies upon innovative atmospheric modification technologies, guided by reliable scientific knowledge of how the planet's climate works. The most frequently advanced intervention would involve injecting millions of tonnes of sulphur gas into the high atmosphere – so-called stratospheric aerosol injection, just one in a family of sunlight reflection methods. Climate control would then become possible not just for our cars, our buildings and our homes but – it is claimed – for the planet as well.

But *can* science fix climate change this way? And, even if it can, is it a solution we should pursue? In this book I outline the reasons why I believe this particular climate fix – creating a thermostat for the planet through aerosols injected into the stratosphere – is undesirable, ungovernable and unreliable. It is *undesirable* because regulating global temperature is not the same thing as controlling local weather and climate. It is *ungovernable* because there is no plausible and legitimate process for deciding who sets the world's temperature. And it is *unreliable* because of the law

of unintended consequences: deliberate intervention in the atmosphere on a global scale will lead to unpredictable, dangerous and contentious outcomes. I make my position clear: I do not wish to live in this brave new climate-controlled world. In Aldous Huxley's novel *Brave New World*,[3] his ironic utopia was brought about by totalitarian engineering of the human subject – 'Yes, everybody's happy now.' I seek to show that, if we promote technologies for a designer climate, an equivalent pathological utopia brought about by totalitarian engineering of the planet would 'likely' be the result.

In Chapter 1 I introduce the idea of geoengineering – more specifically, the science and technology of injecting aerosol particles into the stratosphere to cool the planet. The emergence over recent years of the idea of engineering the world's climate is described, along with some reasons for the increasing attention the idea has been receiving. The notion of a 'climate emergency', which is frequently used as a justification for this type of technological pre-emption, is criticised.

The following three chapters then develop different arguments against the idea that science can fix climate change by developing a thermostat in the sky. Chapter 2 argues that the design of a global thermostat is undesirable: extreme weather and climate change pose risks to humans and the things they care about, but seeking to minimise these risks by regulating global temperature is misguided. Chapter 3 argues that such a thermostat would be ungovernable: world agreement on the desirable temperature setting is unattainable, and the mere attempt to reach such agreement is likely to unsettle international relations. An imaginary scenario for the year 2032 illustrates the point (see Box 3.3). And Chapter 4 argues that the thermostat would be unreliable: even *if* such a technology could be created and governed, the unintended