



Science in Society Series

# SYSTEMS THINKING FOR GEOENGINEERING POLICY

HOW TO REDUCE THE THREAT OF DANGEROUS CLIMATE  
CHANGE BY EMBRACING UNCERTAINTY AND FAILURE

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# Systems Thinking Geoengineering Policy Uncertainty

**Trevor Letcher**



## **Systems Thinking Geoengineering Policy Uncertainty:**

**Systems Thinking for Geoengineering Policy** Robert Chris, 2015-11-19 Even by the scientists most closely associated with it geoengineering the deliberate intervention in the climate at global scale to mitigate the effects of climate change is perceived to be risky For all its potential benefits there are robust differences of opinion over the wisdom of such an intervention Systems Thinking for Geoengineering Policy is the first book to theorise geoengineering in terms of complex adaptive systems theory and to argue for the theoretical imperative of adaptive management as the default methodology for an effective low risk means of confronting the inescapable uncertainty and surprise that characterise potential climate futures The book illustrates how a shift from the conventional Enlightenment paradigm of linear reductionist thinking in favour of systems thinking would promote policies that are robust against the widest range of plausible futures rather than optimal only for the most likely and also unlock the policy paralysis caused by making long term predictions of policy outcomes a prior condition for policy formulation It also offers some systems driven reflections on a global governance network for geoengineering This book is a valuable resource for all those with an interest in climate change policy geoengineering and CAS theory including academics under and postgraduate students and policymakers *Geoengineering, Persuasion, and the Climate Crisis* Ehren Helmut Pflugfelder, 2022-12-13 A rhetorical exploration of an underexamined side of climate change the ongoing research into and development of geoengineering strategies Geoengineering Persuasion and the Climate Crisis A Geologic Rhetoric exposes the deeply worrying state of discourse over geoengineering the intentional manipulation of the earth's climate as means to halt or reverse global warming These climate altering projects which range from cloud whitening to carbon dioxide removal and from stratospheric aerosol injection to enhanced weathering are all technological solutions to more complex geosocial problems Geoengineering represents one of the most alarming forms of deliberative discourse in the twenty first century Yet geoengineering could easily generate as much harm as the environmental traumas it seeks to cure Complicating these deliberations is the scarcity of public discussion Most deliberations transpire within policy groups behind the closed doors of climate oriented startups between subject matter experts at scientific conferences or in the disciplinary jargon of research journals Further much of this conversation occurs primarily in the West Ehren Helmut Pflugfelder makes clear how the deliberative rhetorical strategies coming from geoengineering advocates have been largely deceptive hegemonic deterministic and exploitative In this volume he investigates how geoengineering proponents marshal geologic actors into their arguments and how current discourse could lead to a greater exploitation of the earth in the future Pflugfelder's goal is to understand the structure content purpose and effect of these discourses raise the alarm about their deliberative directions and help us rethink our approach to the climate In highlighting both the inherent problems of the discourses and the ways geologic rhetoric can be made productive he attempts to give the geologic a place at the table to better understand the roles that all earth systems continue to play in our

lives now and for years to come      Assessing the Societal Implications of Emerging Technologies Evan S. Michelson, 2016-05-12 A growing problem of interest in the field of science and technology policy is that the next generation of innovations is arriving at an accelerating rate and the governance system is struggling to catch up Current approaches and institutions for effective technology assessment are ill suited and poorly designed to proactively address the multidimensional interconnected societal impacts of science and technology advancements that are already taking place and expected to continue over the course of the 21st century This book offers tangible insights into the strategies deployed by well known high profile organizations involved in anticipating the various societal and policy implications of nanotechnology and synthetic biology It focuses predominantly on an examination of the practices adopted by the often cited and uniquely positioned Project on Emerging Nanotechnologies in the United States as well as being informed by comparisons with a range of institutions also interested in embedding forward looking perspectives in their respective area of innovation The book lays out one of the first actionable roadmaps that other interested stakeholders can follow when working toward institutionalizing anticipatory governance practices throughout the policymaking process      **Traditions and Trends in Global Environmental Politics** Olaf Corry, Hayley Stevenson, 2017-07-20 How can a divided world share a single planet As the environment rises ever higher on the global agenda the discipline of International Relations IR is engaging in more varied and transformative ways than ever before to overcome environmental challenges Focusing in particular on the key trends of the past 20 years this volume explores the main developments in the global environmental crisis with each chapter considering an environmental issue and an approach within IR In the process adjacent fields including energy politics science and technology and political economy are also touched on Traditions and Trends in Global Environmental Politics is aimed at anybody interested in the key international environmental problems of the day and those seeking clarification and inspiration in terms of approaches and theories that decode how the environment is accounted for in global politics It will be an essential resource for students and scholars of global environmental politics and governance environmental studies and IR      *Joint Fact-Finding in Urban Planning and Environmental Disputes* Masahiro Matsuura, Todd Schenk, 2016-10-04 The days of rationalist scientific management and deference to official data are behind us The credibility of experts and the information they provide are regularly challenged officials are routinely provided with conflicting sets of facts as they plan and make decisions and decision makers and stakeholders alike are largely skeptical that technical information will adequately account for the various interests and concerns and lead to the right outcomes They struggle to reconcile technical information with other forms of knowledge and differing interests priorities and perspectives Issues like climate change are complicating matters even further as scientists and technicians must increasingly acknowledge the uncertainty and potential fallibility of their findings and highlight the dynamic nature of the systems they are explaining This book examines how groups looking to plan and make decisions in any number of areas can wade through the imperfect and often contradictory information they

have to make fair efficient wise and well informed choices It introduces an emerging and very promising approach called joint fact finding JFF Rather than each stakeholder group marshaling the set of facts that best advance their respective interests and perspectives while discrediting the contradictory facts others provide groups are challenged to collaboratively generate shared sets of facts that all parties accept This book introduces readers to the theory of JFF the value it can provide and how they can adopt this approach in practice It brings together writings from leading practitioners and scholars from around the world that are at the forefront of the JFF approach to science intensive policymaking urban planning and environmental dispute resolution The first set of chapters outlines the concept of JFF and situates it within other bodies of theory and practice The second set of case based chapters elucidates how JFF is being applied in practice This book delivers a new perspective to scholars in the field of public policy urban planning environmental studies and science and technology studies as well as public officials technical experts policy consultants and professional facilitators

Ecosystem-Based Adaptation Arvind Kumar,2022-02-16 Ecosystem Based Adaptation Approaches to Sustainable Management of Aquatic Resources presents a close examination of the role of ecosystem based adaptation in managing river basins aquifers flood plains and their vegetation to provide water storage and flood regulation Furthermore the book explores improved ecosystem based services for managing floods conservation of water and its resources including watersheds avoiding water scarcity and ensuring long term water security planning all in the context of sustainable development goals This book will help scientists pave the way for easy implementation of sustainable development goals ensuring a secure and sustainable future Presents information in an easy to follow manner using tables figures and graphs where applicable along with case studies from all continents Provides a reference for experts to use as an authoritative source to support environmental action and regulation Delineates the role of ecosystem based adaptation in sustainable management and in the restoration of watershed forests and wetlands

**The Routledge Companion to Marketing and Society** Krzysztof Kubacki,Lukas Parker,Christine Domegan,Linda Brennan,2022-08-25 The Routledge Companion to Marketing and Society focuses on marketing for social impact as the use of marketing strategies tools and techniques to improve the well being of society As such it does not exclude the use of marketing to increase profit and shareholder value but rather prioritises the social impact of marketing both positive and negative even if largely unintended This companion is a scholarly reference providing an overview of marketing for social impact in terms of its current and emergent themes debates and developments as well as reflections on the future of the field Using marketing tools and techniques for social impact is commonly accepted as an effective commercial strategy e g corporate social responsibility cause related marketing and increasingly accepted as an approach to planned social transformation that can be used to influence positive social change in behaviours such as recycling healthy eating domestic violence and human trafficking This reference volume serves as an authoritative and comprehensive statement on the state of contemporary scholarship focusing on the diverse subject of the social impact of marketing It

features 25 chapters written by international subject specialists within six themed sections including consumer issues marketing tools commercial marketing and non profit marketing It will find a global audience of scholars and researchers within marketing and cognate fields interested in using marketing tools and techniques to create social impact in areas such as public health social and behaviour change communication sociology and cultural studies      *Managing Global Warming* Trevor Letcher,2018-11-08 *Managing Global Warming An Interface of Technology and Human Issues* discusses the causes of global warming the options available to solve global warming problems and how each option can be realistically implemented It is the first book based on scientific content that presents an overall reference on both global warming and its solutions in one volume Containing authoritative chapters written by scientists and engineers working in the field each chapter includes the very latest research and references on the potential impact of wind solar hydro geo engineering and other energy technologies on climate change With this wide ranging set of topics and solutions engineers professors leaders and policymakers will find this to be a valuable handbook for their research and work Presents chapters that are accompanied by an easy reference summary Includes up to date options and technical solutions for global warming through color imagery Provides up to date information as presented by a collection of renowned global experts      *Geoengineering, Climate Change and Future Generations* Robert Chris,2013      *Governance of Earth Systems* Robert Boardman,2010-07-07 Science and politics are closely connected in today s global environmental issues This book focuses on these links in relation to climate change the threats to wildlife species and natural hazards and disasters Close study of these links of these reveals the need for more effective international cooperation and the limits of global governance      **The Hidden Power of Systems Thinking** Ray Ison,Ed Straw,2020-03-05 *The Hidden Power of Systems Thinking Governance in a Climate Emergency* is a persuasive lively book that shows how systems thinking can be harnessed to effect profound complex change In the age of the Anthropocene the need for new ways of thinking and acting has become urgent But patterns of obstacles are apparent in any action be they corporate interests lobbyists or outdated political and government systems Ison and Straw show how and why failure in governance is at the heart of the collective incapacity to tackle the climate and biodiversity emergencies They go beyond analysis of the problem and demonstrate how incorporating systems thinking into governance at every level would enable us to break free of historical shackles They propose 26 principles for systemic governance This book will be inspiring reading for students applying their systemic methods specialists in change management or public administration activists for whole system change and decision makers wanting to effect challenging transformations It is for anyone with the ambition to create a sustainable and fair world      **Systems Practice** Ray Ison,2010-09-13      **Systems Practice: How to Act in a Climate Change World** Ray Ison,2010-07-20 It is now accepted that humans are changing the climate of the Earth and this is the most compelling amongst a long litany of reasons as to why collectively we have to change our ways of thinking and acting Most people now recognise that we have to be capable of adapting quickly as new and uncertain circumstances

emerge this capability will need to exist at personal group community regional national and international levels all at the same time Systems Practice is structured into four parts Part I introduces the societal need to move towards a more systemic and adaptive governance against the backdrop of human induced climate change Part II unpacks what is involved in systems practice by means of a juggler metaphor examining situations where systems thinking offers useful understanding and opportunities for change Part III identifies the main factors that constrain the uptake of systems practice and makes the case for innovation in practice by means of systemic inquiry systemic action research and systemic intervention The book concludes with Part IV which critically examines how systems practice is or might be utilised at different levels from the personal to the societal The development of our capabilities to think and act systemically is an urgent priority and Systems Practice aims to show how to do systems thinking and translate that thinking into praxis theory informed practical action which will be welcomed by those managing in situations of complexity and uncertainty across all domains of professional and personal concern

*Geoengineering our Climate?* Jason J. Blackstock, Sean Low, 2018-09-04 If the detrimental impacts of human induced climate change continue to mount technologies for geoengineering our climate i.e. deliberate modifying of the Earth's climate system at a large scale are likely to receive ever greater attention from countries and societies worldwide Geoengineering technologies could have profound ramifications for our societies and yet agreeing on an international governance framework in which even serious research into these planetary altering technologies can take place presents an immense international political challenge In this important book a diverse collection of internationally respected scientists philosophers legal scholars policymakers and civil society representatives examine and reflect upon the global geoengineering debate they have helped shape Opening with essays examining the historic origins of contemporary geoengineering ideas the book goes on to explore varying perspectives from across the first decade of this global discourse since 2006 These essays methodically cover the practical and ethical dilemmas geoengineering poses the evolving geoengineering research agenda the challenges geoengineering technologies present to current international legal and political frameworks and differing perceptions of geoengineering from around the world The book concludes with a series of forward looking essays some drawing lessons from precedents for governing other global issues others proposing how geoengineering technologies might be governed if as they begin to emerge from the lab into the real world This book is an indispensable resource for scientists activists policymakers and political figures aiming to engage in the emerging debate about geoengineering our climate

*Geoengineering* Jay Michaelson, 2012 This article argues that the lack of success in climate change policy stems from the exclusive focus of policymakers on various forms of preventive regulation Because climate change regulation requires an extraordinary amount of will and coordination and because uncertainty cost equity and other factors threaten the effective implementation of a regulatory regime a regulation only approach is dangerously myopic Because of these structural problems the time has now come to expand our policy horizons to include geoengineering the

direct manipulation of the Earth's climatic feedback system as a serious alternative to ineffective and contentious regulation. Once derided as science fiction, geoengineering has lately begun to merit serious debate in academic scientific and econometric literature, and some geoengineering technologies appear to be feasible. This article presents the first scholarly legal policy analysis of geoengineering. From a policy perspective, geoengineering, though perhaps counterintuitive, should be very attractive to both greenhouse True Believers and the most ardent of skeptics. To the skeptic, geoengineering offers a relatively painless, relatively cheap alternative to costly and unpopular regulation. To the greenhouse True Believer, geoengineering offers both hope and despair: hope for a solution to climate change; despair at retreating from prevention as that solution. To any thoughtful environmentalist, geoengineering is woefully counterintuitive: it treats symptoms, not causes, and allows the rapacious consumerism of the West to progress unchecked. Indeed, that is what makes it popular with skeptics. The technology is uncertain, and there may be serious secondary effects. But because a geoengineering policy avoids the pitfalls of a traditional regulation-based climate change strategy, the True Believer should still be convinced. Climate Change Marshall Plans designed to curtail greenhouse gas (GHG) emissions tend to fail before they begin. Only geoengineering can offset already existing anthropogenic interference with the Earth's systems. In the post-Kyoto world, we need more than promises of emissions cuts and tradeable permits. We need a Climate Change Manhattan Project.

**Climate Justice and Geoengineering** Christopher J. Preston, 2016-09-21. It is already clear that climate engineering raises numerous troubling ethical issues. The pertinent question yet to be addressed is how the ethical issues raised by climate engineering compare to those raised by alternative proposals for tackling climate change. This volume is the first to put the ethical issues raised by climate engineering into a comprehensive comparative context so that the key ethical challenges of these technologies can be better measured against those of alternative climate policies. Addressing the topic specifically through the lens of justice, contributors include both advocates of climate intervention research and its sceptics. The volume includes a helpful blend of the theoretical and the practical, with contributions from authors in philosophy, engineering, public policy, social science, geography, sustainable development studies, economics, and climate studies. This cross-disciplinary collection provides the start of an important and more contextualized second-generation analysis of climate engineering and the difficult public policy decisions that lie ahead.

The Ethics of "Geoengineering" the Global Climate Stephen M. Gardiner, Catriona McKinnon, Augustin Fragnière, 2020-09-10. In the face of limited time and escalating impacts, some scientists and politicians are talking about attempting grand technological interventions into the Earth's basic physical and biological systems: geoengineering to combat global warming. Early ideas include spraying particles into the stratosphere to block some incoming sunlight, or enhancing natural biological systems to withdraw carbon dioxide from the atmosphere at a higher rate. Such technologies are highly speculative, and scientific development of them has barely begun. Nevertheless, it is widely recognized that geoengineering raises critical questions about who will control planetary interventions and what



responsibilities they will have Central to these questions are issues of justice and political legitimacy For instance while some claim that climate risks are so severe that geoengineering must be attempted others insist that the current global order is so unjust that interventions are highly likely to be illegitimate and exacerbate injustice Such concerns are rarely discussed in the policy arena in any depth or with academic rigor Hence this book gathers contributions from leading voices and rising stars in political philosophy to respond It is essential reading for anyone puzzled about how geoengineering might promote or thwart the ends of justice in a dramatically changing world The chapters in this book were originally published in the journals *Ethics Policy the Environment* and *Critical Review of International Social and Political Philosophy* Climate Change Geoengineering Wil C. G. Burns, Andrew L. Strauss, 2013-07-22 In this book eleven prominent authorities on climate change consider the legal policy and philosophical issues presented by geoengineering The book asks When if ever are decisions to embark on potentially risky climate modification projects justified If such decisions can be justified in a world without a central governing authority who should authorize such projects and by what moral and legal right

*Geoengineering, the Anthropocene and the End of Nature* Jeremy Baskin, 2019-05-17 This book takes a critical look at solar geoengineering as an acceptable means for addressing climate change Baskin explores the assumptions and imaginaries which animate engineering the climate and discusses why this climate solution is so controversial The book explains geoengineering's past its revival in the mid 2000s and its future prospects including its shadow presence in the Paris climate accord The main focus however is on dissecting solar geoengineering today its rationales underpinning knowledge relationship to power and the stance towards nature which accompanies it Baskin explores three competing imaginaries associated with geoengineering an Imperial imaginary an oppositional Un Natural imaginary and a conspiratorial Chemtrail imaginary He seeks to explain why solar geoengineering has struggled to gain approval and why resistance to it persists despite the support of several powerful actors He provocatively suggests that reconceptualising our present as the Anthropocene might unwittingly facilitate the normalisation of geoengineering by providing a sustaining socio technical imaginary This book is essential reading for those interested in climate policy political ecology and science technology studies Engineering and Governing the Climate Xavier Landes, 2024-04-02 Geoengineering increasingly appears to be crucial for future climate policies Societies and governments throughout the world have so far failed to sufficiently curb greenhouse gas emissions necessary for averting dramatic global warming and climate change This book introduces readers to the concepts and methods of climate engineering by presenting the techniques and risks as well as the political and ethical issues This timely text tackles topics such as arguments for and against altering the climate on purpose the uncertainties of those technologies the hurdles of international coordination and the duties towards future generations Landes engages with global cases encompassing reforestation efforts prevention of runaway planetary warming and avoidance of climate catastrophe Distinctive features of the book include Situating climate engineering within the context of the

Anthropocene Setting up an evaluative framework used for assessing climate engineering methods thoroughly from three angles feasibility permissibility and preferability A taxonomy of the different methods of climate engineering carbon dioxide removal and solar radiation management each with dedicated chapters A structured and critical review of the different justifications for and oppositions to climate engineering R D as well as deployment Engineering and Governing the Climate Ethical and Political Issues is an essential read for all those working in environmental studies climate policy and building a sustainable future

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